Accruals, Free Cash Flows, and EBITDA for Agribusiness Firms

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Selected Paper prepared for presentation at the American Agricultural Economics Association Annual Meeting, Long Beach, California, July 23-26, 2006

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Abstract

This study explores the relationships between the accrual and cash flow components of earnings for agribusiness. Three accrual models with their respective cash flows, free cash flows, and free cash flows to equity are analyzed. Results for the agribusiness industry are compared with results from previous studies of all firms. Earnings Before Interests, Taxes, Depreciation, and Amortization (EBITDA), a measure frequently recommended as a proxy for cash flow is tested using these models. Empirical results show that both the magnitude and the behavior of EBITDA differ from cash flows and should not be used as a proxy.

Accruals, Free Cash Flows, and EBITDA for Agribusiness Firms

This study explores the relationships between the accruals and cash flows components of earnings for agribusinesses using data covering the period 1962-2004. The definitions and modeling of accruals versus cash flows by Healy (1985) and Sloan (1996) have been considered the standard in the accounting economics literature. Recent introduction of a more comprehensive model by Richardson (2005) proves to be useful in explaining financial accounting and cash flow relationships by exploring accruals components other than just current operating accruals (non-current operating accruals and financing accruals). The most important contribution of the work by Sloan (1996) and Richardson et al (2005) is the recognition that even though accruals provide valuable information about current and future earnings, few decision makers pay attention to this information.

This study builds on these models by introducing a third measure of accruals as an alternative to directly relate accruals to free cash flow. In addition, Earnings Before Interests, Taxes, Depreciation, and Amortization (EBITDA), an accounting measure frequently recommended as a proxy for cash flow is tested using these models.

The next section of the paper is devoted to discussing the methodology, including variable measurement, models and a literature review. Then results are discussed for different models and comparing results for agribusiness and for 'all firms' from previous studies. Conclusions are provided.

Data and Methodology

The data used in this study is from the CRSP/COMPUSTAT merged (CCM) database[1]. The CCM database provides records of a firm's financial statements and stock prices from 1962 through 2004. Specifically, information from the balance sheet and the income statements are used. Fama and French (1992) document that pre-1962 data have serious selection bias towards large, historically successful firms. The sample includes 402 firms with 4,785 firms-year observations.

For the cross-sectional analysis all firms were ranked according to the size of accrual component of their financial statements. The firms were then grouped into portfolios with the smallest twenty percent in the first portfolio, the next twenty percent in the second portfolio, and so on.

Variable Measurement

Standardized variables. All variables in the study are standardized by firm size to allow for relative comparisons. Therefore, all financial measures are divided by average total assets, or the average of beginning and ending total assets. This scaling of variables has been documented as necessary to fix potential problems of heteroskedasticity of undeflated earnings Beaver (1970), and to avoid spurious correlations due to size Dechow (1994).

Accruals and Cash Flow. Accruals are the net effect of non-cash accounts included in the calculations of earnings. Earnings and cash flows differ to the extent that accruals change. In an infinite length financial period (or just one period accounting

[1] SIC codes used in this study include 2000, 2011, 2013, 2015, 2020, 2024, 2030, 2033, 2040, 2050, 2052 2060, 2070, 2080, 2082, 2086, 2090, and 2092.

system) earnings and accruals would be the same. This study uses three definitions of accruals, each of them mapping a different business activity-related cash flow. Definitions by Healy (1985) and Sloan (1996) contain the core components of what have become synonymous with accruals in the accounting economics literature.

The first accruals measure *(Acc)* in this study given by Sloan (1996) has

(1) $Acc = (\Delta CA - \Delta Cash) - (\Delta CL - \Delta STDebt - \Delta TP) - DA$

Where,

$CA \equiv$ current assets
$Cash \equiv$ change in cash and cash equivalents
$CL \equiv$ current liabilities
$STDebt \equiv$ short term debt
$TP \equiv$ income taxes payable
$DA \equiv$ depreciation and amortization

have all been standardized by average total assets.

Earnings (ROA) are defined as operating income after depreciation (standardized by average total assets. The measures of earnings for empirical studies in the accounting economics literature varies, Freeman, Ohlson, and Penman (1982) , for instance, use net income. While Dechow (1994), and Moehrle, Moehrle, and Wallace (2003), use net income excluding extraordinary items and discontinued operations. We use operating income after depreciation consistent with the work of Sloan (1996) and Richardson et al (2005). The attractiveness of item operating income after depreciation is that it excludes non-recurrent items such as extraordinary items, discontinued operations, special items and non operating income, taxes and interest expenses.

Cash flow (CF) is the difference between earnings and accruals. That is

(2) $CF = ROA - Acc$.

Accruals by definition represent outflows (negative accruals imply inflows). Thus positive accruals decrease cash flows, and negative accruals increase them.

The second definition of accruals is a comprehensive accruals measure, recently introduced in the literature by Richardson et al (2005). This total accruals model is an extension of the work by Sloan (1996) and it allows for testing of accounting reliability. Total accrual (TACC) is,

(3) $TACC = \Delta WC + \Delta NCO + \Delta FIN$

with,

(4) $WC = \underbrace{(CA - Cash)}_{COA} - \underbrace{(CL - STDebt)}_{COL}$

(5) $NCO = \underbrace{(TA - CA - LTInv)}_{NCOA} - \underbrace{(TL - CL - LTDebt)}_{NCOL}$

(6) $FIN = \underbrace{(STInv + LTInv)}_{FINA} - \underbrace{(LTDebt + STDebt + PStock)}_{FINL}$

Where,

$TACC$ ≡total accruals
ΔWC ≡change in working capital
ΔNCO ≡change in net non-current operating assets
ΔFIN ≡change in net financial assets

COA ≡ current operating assets
CA ≡ current assets
$Cash$ ≡ cash and short term investments
COL ≡ current operating liabilities
CL ≡ current liabilities
$STDebt$ ≡short term debt

$NCOA$ ≡non-current operating assets
TA ≡total assets
$LTInv$ ≡long term investment or investment and advances other
$NCOL$ ≡non-current operating liabilities
TL ≡total liabilities
$LTDebt$ ≡long term debt

$FINA \equiv$ financial assets
$STInv \equiv$ short term investments
$FINL \equiv$ financial liabilities
$PStock \equiv$ preferred stock

The cash flow corresponding to total accruals is referred in this paper as Free Cash Flow to Equity (FCFE). Richardson et al (2005) refers to this metric as cash flow or "free cash flow". FCFE is defined (similarly as cash flow) as the difference between earnings and total accruals

(7) $FCFE = ROA - TACC$

In equation 3 total accruals is decomposed into an operating and a financing part. The operating component is in turn decomposed into a current and a non-current element (change in working capital and change in non-current operating assets). The financing component is also separated into financial assets and financial liabilities. One can think on the operating components as including both the operating and investing activities of the firm. Thus, the total accruals definition separates the operating, investing, and financing activities of the firm, providing with a useful framework for management decisions. Also, the working capital component of total accruals, equation 4, contains the core elements of accruals as defined by Sloan (1996) as shown in equation 1. Thus, the new definition of total accruals by Richardson et al (2005) adds the non-current operating accruals and financial accruals to the classical definition of accruals. The inclusion of the non-current component of accruals is motivated by the fact that "such accruals were at the heart of the well-known debacle of WorldCom" (Richardson et al (2005)). The empirical results of that work show that, in fact, non-current operating

accruals and financing accruals should be considered by investors in their picking stock strategies.

Free Cash Flows. The analysis of cash flows can become a difficult task given the complexities introduced by the accrual accounting. Thus, various shortcuts or proxies for cash flow are common in finance textbooks and in practice. In addition, there exist multiple cash flows. To illustrate this, the statement of cash flows provides three cash flows, an operating cash flow, an investing cash flow, and a financing cash flow. Another cash flow is the so called "relevant" cash flow as used for capital budgeting decisions on which sunk costs and cannibalization effects, for instance, are taken into account to adjust free cash flows to be discounted at the weighted average cost of capital. The list can be increased with metrics varying in their degree of relevance for financial management decisions.

Free cash flow is the amount of funds available to all investors in a firm after paying for all expenses and meeting investment needs. The standard textbook definition of free cash flow adjusts earnings by adding back depreciation and amortization and subtracting changes in working capital and capital expenditures (Hough (2005) and Richardson et al (2005)). A slight variation to this definition of free cash flow includes net operating profits after tax (NOPAT) instead of net earnings (Brigham and Ehrhardt (2005), and Greenwood and Scharfstein (2005)). Such adjustment excludes interests (and other extraordinary items), thus providing with a theoretically sound free cash flow for valuation purposes since it avoids double counting of cost of debt both in the free cash flows and in the cost of capital. The definition of total accruals (equation 3) introduced by Richardson et al (2005) and its corresponding cash flow (equation 7) follow the spirit of

the definition given above but with a major difference. Richardson et al (2005) introduces in the accounting economics literature the most comprehensive definition of accruals in the sense that it considers every major accrual item from the financial statements. The corresponding computation of free cash flow proposed by Richardson el al (2005) (equation 7), "represents a combination of actual cash flows plus the relative reliable financing accruals". Equation 6 represents the decomposition of net financial assets (i.e. net investment minus net debt preferred stock payments included), which is in turn a component of total accruals (equation 3). Since cash flow is by definition the difference between earnings and accruals, the inclusion of net financial assets (equation 6) in the computation of total accruals, reduces free cash flow available for *all* investors, thus leaving free cash flow available for *equity* investors only. In this paper the cash flow computed in Richardson et al (2005) (equation 7) and replicated for agribusiness is referred to as 'free cash flow to equity' or FCFE. The decomposition of total accruals into current operating accruals, non-current operating accruals, and financial accruals by Richardson et al (2005) is innovative since it provides with a new and comprehensive framework to analyze the properties of accruals and cash flows replacing the accruals definition by Healy (1985) and Sloan (1996).

In addition, the accruals decomposition by Richardson et al (2005) is useful in the identification of different degrees of reliability among different categories of items of the financial statements. Reliability is defined as "the quality of information that assures that information is reasonably free from error and bias and faithfully represents what it purports to represent" (Statements of Financial Accounting Concepts). Richardson et al (2005) summarizes their own assessment of the degree of reliability of each major

component of total accruals. For instance, current operating assets (COA) in equation 4 is expected to have a low level of reliability since it is dominated by account receivables and inventory, both involving a high degree of subjectivity in the estimations of un-collectible accounts receivables or write-downs of inventory. In contrast, marketable securities such as short term investments (*STInv*) in equation 6 are expected to be sold within the year and are comparable to cash; hence, they are expected to be highly reliable accruals. Empirical results presented by Richardson et al (2005) shows that among the three components of total accruals, operating accruals, both the current (working capital as defined in equation 2) and non- operating accruals, are the less reliable accruals (the more negative the most reliable accruals and less persistent into the future as modeled in that study). In light of these results, this paper uses an alternative free cash flow (FCF) measure instead of free cash flow to equity (FCFE) to distinguish between earnings and accruals for agribusiness.

Computation of free cash flow requires a shorter version of total accruals. It would be enough to exclude change in financial assets, ΔFIN from equation 2 and obtain,

(2.a) $ACC_{free} = \Delta WC + \Delta NCO$

Which will be referred to in this paper as "accruals free" $\left(ACC_{free}\right)$ to differentiate it from accruals and from total accruals. Similar to equation (7), free cash flow (FCF) is computed as,

(7.a) $FCF = ROA - ACC_{free}$

To reconcile 7.a. with the standard definition of free cash flow, 2.a. and 7.a. are combined as follows,

(8) $FCF = ROA - \Delta WC - \Delta NCO$

Decomposing equation (8) into a stylized textbook definition leaves,

$$FCF = ROA - \Delta WC - \left(\text{Investment in PP\&E, gross - Depreciation}\right)$$

$$FCF = ROA + \text{Depreciation} - \Delta WC - \text{Investment in PP\&E, gross}$$

and,

(9) $$FCF = ROA + \text{Depreciation} - \Delta WC - \text{Capital Expenditures}.$$

This is the typical definition of free cash flow as discussed previously. That is, earnings adjusted by adding up depreciation minus change in working capital and capital expenditures; resulting in the amount of funds available to all investors in a firm after paying for all expenses and meeting investment needs. Recall, however, that ΔWC and ΔNCO in equation 8 contain accruals other than just changes in working capital and expenses in property, plant, and equipment (refer to equations 4 and 5), they include all current accrued expenses and long term operating deferrals.

Multiple versions of cash flows are used in practice. Three are of interest in this study. The first one, cash flow, is shown in equation 2. It follows from the definition of accruals as in Sloan (1996) in equation 1 above. The second, free cash flow to equity (FCFE), refers to the definition by Richardson et al (2005) in equation (7) and follows from the definition of total accruals as in equation (3). The third definition, free cash flow (FCF), in 7.a follows from the definition of accruals free in equation 2.a. The first version, cash flow, contains the core of the computation of component change in working capital ΔWC in the second and third versions.

EBITDA. Companies disclose numerous earnings performance measures, including EBITDA, in addition to those defined by the generally accepted accounting principles (Moehrle, Moehrle, and Wallace, (2003)). Furthermore, many financial

analysts have widely adopted EBITDA as a proxy for cash flows of operations (Shook (2003)). EBITDA, however, as opposed to cash flows, excludes among other items changes in working capital. Academics and practitioners have serious doubts about the use of EBITDA as a proxy of cash flow from operations, arguing that EBITDA is often misleading and does not accurately reflect liquidity or cash flow. To illustrate this concern, some financial accounting considerations follow.

EBITDA is defined as operating income plus depreciation and amortization

(10) $EBITDA = ROA + DA$

Using accruals as defined in (1) and cash flow in (2) and setting EBITDA equal to cash flow yields the following

(11) $\left(\Delta CA - \Delta Cash\right) = \left(\Delta CL - \Delta STDebt - \Delta TP\right)$

Equation (11) should hold for EBITDA to be equal to cash flow. Both sides of equation (11) are very important components of current accrual accounting, and they capture working capital management strategies. For them to be equal is equivalent to assuming working capital management does not matter. In addition, recall that operating income excludes interests, taxes, and extraordinary items. Thus, there is very little doubt that EBITDA and cash flows will differ in magnitude.

A second empirical concern regarding EBITDA, perhaps of greater importance, is the possibility that EBITDA, regardless its magnitude, behaves different from cash flows. This means that EBITDA and cash flow may actually move in different directions. The methodology of portfolios by Sloan (1996) proves to be useful in analyzing this problem

since it allows for comparison of accruals and cash flow (and EBITDA in our problem) across sections or portfolios with different accruals and cash magnitudes.

The use of EBITDA is suspicious given the fact that this measure uses earnings and depreciation dollars earmarked for replacement capital. Based on this property, for instance, Koller, Goedhart, and Wessels (2005) refer to EBITDA as a "good measure of extremely low short-term ability to meet interest payments… most companies cannot survive very long without replacing worn assets".

Why has EBITDA received much attention in corporate finance? Why not simply use cash flows? Possible reasons include, 1) EBITDA involves less components than cash flows making it easier to forecast, 2) EBITDA in general looks better since it tends to be larger than the cash flows of operations, and 3) the statement of cash flow is still considered the "new" statement and many managers are not as familiar with this statement as they are with the other financial statements (Hertenstein and McKinnon (1997)).

Results

Total Accruals and Free Cash Flows to Equity. Descriptive statistics for agribusiness are presented in table 1 along with results from the previous study by Richardson et al (2005) for all firms (excluding financial firms). The agribusiness sample used in this study represents around 5% of the 'all firms' sample. From panel A table 1 it can be observed that on average earnings for agribusiness firms is 10.6% of assets (with a 0.127 standard deviation) whereas for 'all firms' this figure is 7% (with a corresponding 0.175 standard deviation). Average total accruals (TACC) represents 3.5% of average

total assets compared to 5.2% for 'all firms'. In general, firms with higher positive accruals are faster growing firms and require higher levels of cash flow to support their growth. Agribusiness, as suggested by the results, is an above of average industry in terms of profitability and free cash flow to equity.

Panel B of table 1 reports the decomposition of total accruals into its three main elements, working capital (the current operating component), non-current operating assets (the non-current operating and investing component), and net financial assets (the financing component). It is evident that changes in non-current operating assets, ΔNCO contributes the most to total accruals. Also, while the change in working capital and change in non-current operating assets are positive, the change in net financial assets is negative, supporting the idea developed in Richardson et al (2005) that the average firm is growing its net operating assets and reducing its net financial assets (e.g. increasing its net debt position) to finance this growth. In other words, the average firm is not internally financing its growth.

Panel C of table 1 includes free cash flow to equity (FCFE) and EBITDA. These two metrics along with ROA are commonly used in practice to measure firms' performance. And as noted, many financial analysts have widely adopted EBITDA as a proxy for cash flows of operations (Shook, 2003). EBITDA is by far the largest among all those measures from table 1 (0.152 compared to 0.106 and 0.071). This result supports the appeal of EBITDA to managers when providing performance measures to investors and board of directors.

Table 2 presents the Pearson pair-wise correlations for total accruals decomposition for agribusiness (bold, the upper right) and for 'all firms' (lower left).

Positive correlation between current and non-current accruals (0.14 for agribusiness), negative correlations between financial accruals and both current operating accruals (-0.4 for agribusiness) and non-current operating accruals (-0.63 for agribusiness) are consistent with the 'all firms' correlations. This suggests that firms on average tend to grow their current and non-current activities in tandem (Richardson et al (2005)) and tend to finance such growth by reducing their net financial assets position either by reducing their financial investments or by increasing financial liabilities. It can also be noticed from the matrix that the positive correlation between change in financing accruals, ΔFIN , and earnings in period t and t+1 is the same at the two decimal level for both agribusiness and 'all firms' (0.11 and 0.04 respectively) suggesting the dominance of long term over short term financing activities as related to earnings.

Correlations between each component of accruals and free cash flow to equity not reported show that the correlation between current operating accruals and free cash flow to equity, and between non- current operating accruals and free cash flow to equity are higher than the correlation between financial accruals and free cash flow to equity. This suggests the dominance of operating over financial accruals in explaining free cash flows. Statistics from tables 1 and 2 are supportive of the following two ideas, a) the importance of extending the classical definition of accruals as proposed by Richardson et al (2005), and b) the agribusiness industry behaves in a manner that is similar to all other firms, with regards to accruals and cash flows.

Total Accruals and Free Cash Flows to Equity across Portfolios. Previous studies by Sloan (1996) and Dechow (1994) for 'all firms' traded on the U.S. stock exchanges document a negative relationship between accruals and cash flows. Both

studies use the definition of current accruals and follow the portfolios methodology. Following Sloan (1996) firms are ranked by the magnitude of accruals every year and five portfolios are formed based on quintiles. Means and medians of selected variables are reported by portfolio, thus allowing for cross sectional comparisons. Portfolios for agribusiness are formed but using the total accruals instead of accruals as done in Sloan (1996). Additionally, EBITDA, a measure not included in previous research related to accruals and cash flows, is included in this study. Panel A of Table 3 shows the components of earnings and EBITDA, panel B shows a decomposition of total accruals, and panel C presents depreciation and amortization.

As one moves from portfolio 1 to portfolio 5 (lowest total accruals with a mean (median) of -0.11 (-0.05) to highest total accruals with a mean (median) of 0.18 (0.13)) free cash flow to equity, FCFE, decreases from a mean of 0.13 to -0.02[2]. Free cash flow to equity, however, remains stable for portfolios in the middle (portfolios 2, 3, and 4) with values of 0.08, which is around the mean of 0.071 reported for FCFE in table 1. A possible explanation to this is the existing difference in correlations among the components of total accruals, as reported in table 2. The performance of earning across portfolios is clearer. There is a strong positive relationship between total accruals (TACC) and earnings (ROA). When agribusiness' increase earnings the increment of total accruals offsets the effects on cash and free cash flow to equity tends to decrease. Agribusinesses reporting high positive total accruals are growing firms with more potential to manipulate reported earnings increasing the distress on equity holders due to

[2] When interpreting cash flows, keep in mind that cash flows computed using the accruals framework will tend to be higher than 'actual' cash flows figures taken directly from the statement of cash flows, mainly because operating income instead of net earnings is used as variable earnings as this presents some advantages discussed in the methodology section.

the decrease in free cash flow to equity. EBITDA, however, shows the opposite. As agribusiness increase total accruals EBITDA increases significantly from portfolio 1 with a mean of 0.07 to the portfolio 5 with values of 0.20. This happens because of the strong positive relationship between total accruals and earnings; since ROA is defined as operating income after depreciation and amortization as total accruals (hence, ROA) increases across portfolios EBITDA unambiguously increases also[3]. This result is consistent with the view of EBITDA as a suspicious measure to evaluate firm performance.

Agribusiness with high levels of accruals are growing firms that fund such growth with externally generated flows leaving little room for free cash flow to equity. Very high levels of total accruals leading to negative free cash flow to equity (-0.02 in table 3 for portfolio 5), however, would probably be harmful for agribusiness owners since it might be the result of creditors restricting funds to the company as perceived risk had probably increased. The behavior of ΔFIN in panel B table 3 supports this. As one moves across portfolios, ΔFIN become less negative (recall negative accruals imply inflows) with this value switching to positive for portfolio 5, the portfolio with the highest level of accruals. In any situation, however, stockholders' concern increases as the agribusiness may face the need to stop dividends and sale additional shares. An opposite plausible, but less probable view is that the high growing company does not enter into distress and the negative free cash flow is the result of the desire of stockholder to increase their position in the company for capital structure reasons. Table 3, however, shows that EBITDA does

[3] Alternative results not reported were obtained using net income and income before extraordinary items as variable earnings instead of operating income after depreciation and amortization. Quality of results is similar.

not capture this effect. Using EBITDA as a proxy for cash flow would be misleading in such a situation.

In panel B of table 3 a decomposition of total accruals is shown. All components seem to have a regular behavior when analyzed across portfolios. Consistent with results from table 1, the components ΔFIN and ΔNCO taken together account for a higher magnitude in total accruals than the ΔWC component. Recall that the former are the new components aggregated to the classical definition of accruals.

Panel C of table 3 presents depreciation, which is the difference between EBITDA and operating income after depreciation and amortization. Note that depreciation & amortization for agribusiness remain stable around 5% with respect to total assets regardless of the level of accruals firms report. Results by Sloan (1996) for 'all firms' are slightly different showing that as firms report higher component accruals depreciation decreases from 6% in the 'lowest' portfolio to 3% in the 'highest'. Although in Sloan (1996) accruals measure is used instead of total accrual, our results, not reported, for total accruals and for accrual free show the same stability around 5% of depreciation. One should expect less variation in depreciation & amortization when analyzing firms within an industry (i.e. agribusiness) than when all industries are pooled together ('all firms') due to similarities in the nature of the assets structure of an industry. However, significant variations within an industry across portfolios might exist due to the fact that managers have discretion in some inputs that determine the amount to be depreciated (such as estimation of residual values or useful life of PP&E), in such a scenario, one should expect that aggressive firms with higher level of accruals to report lower

depreciation values in order to show better earnings. This is not the case for agribusiness industry on average as suggested by results on panel C table 3.

Accruals and Cash Flows across Portfolios. The previous analysis shows the relationship between earnings and its components for agribusiness using total accruals as proposed by Richardson et al (2005) but following the methodology by Sloan (1996) with an extension for EBITDA. EBITDA is more closely related to cash flow from operations than to free cash flow to equity. Results for agribusinesses presented in table 4 show more clearly the negative relation between accruals (ACC) and cash flows (CF). As one moves across portfolios and accruals increase from a mean of -0.04, 0.03, 0.06, 0.09, and 0.17, cash flows decrease from 0.10, 0.08, 0.06, 0.04, and -0.07. These are very similar results to those for Sloan's (1996) 'all firms'. In this model there is not a plateau as the one observed in free cash flow to equity in table 3 for portfolios 2, 3, and 4. Notice that for portfolio 3, in the middle, agribusiness report a 12% ROA with equally distributed accrual and cash flow components of 6%.

For EBITDA, its mean value is higher than cash flow's (CF) for portfolio 2 to portfolio 5. Note the differences between these two measures in "EBITDA-CF" in table 4. An agribusiness reporting 0.17 positive accruals in portfolio 5 (highest level of accruals) would be experiencing negative cash flow from operations consistent with the idea developed previously but will be reporting a high EBITDA of positive 0.16. In addition, only agribusiness with negative or very low levels of accruals have 'regular' EBITDA's but in such companies the distinction between cash and its shortcuts would not be an issue in the absence of accruals earnings equal cash flows. Only in portfolio 1 is EBITDA lower than cash flow from operations with a mean of 0.09 compared to 0.10.

Conservative agribusiness in their accounting practices might be in this category, and for them EBITDA can be used as a proxy for cash flow for operations. After that notice the jump of EBITDA from 0.09 to 0.16 from portfolio 1 to portfolio 2 while cash flows actually decreases slightly from 0.10 to 0.08. Both, the magnitude and the change of EBITDA across different levels of cash flows from operations for agribusiness are misleading. Only for agribusiness with negative accruals will EBITDA and cash flow from operations report similar magnitudes, but across portfolios EBITDA does not mimic cash flow.

Conclusions

The nature of the relationships between the accruals and cash flows components of earnings for agribusiness is investigated in this study. Empirical results show that there is a negative relationship between accruals and cash flows for agribusiness regardless of the type of cash flow measure as analyzed in the study. Three definitions of accruals and their respective relation to cash flow from operation, free cash flow, and free cash flow to equity are explored across portfolios, with firms ranked according to their levels of accruals. The classical definition of accruals and cash flow had been introduced in the accounting economics literature by Healy (1985) and Sloan (1996). Recently Richardson et al (2005) proposed a comprehensive total accruals / free cash flow to equity measure which proves to be necessary in explaining relationships between activities other than current operations (e.g. non-current operating accruals and financing accruals). Consistency between the accruals/cash flows relationships for the three measures analyzed in this article allows the use of accruals free / free cash flow which might be

more suitable for agribusiness decision makers familiar with the free cash flows framework.

EBITDA is also tested in this study as a potential metric to mimic cash flows. Empirical results show that both the magnitudes and the behavior of EBITDA significantly differs from cash flows for agribusiness. EBITDA, in most of the cases is misleading. At best EBITDA might be used as a proxy for cash flows only for agribusiness with conservative accounting practices.

Special attention with regards to cash flows should be taken for agribusinesses reporting high levels of earnings since they tend to have high level of accruals. Agribusiness with high level of accruals show very low levels of free cash flow which might be harmful for debt and equity holders.

In comparison to 'all firms' the agribusiness industry behaves in a manner that is similar with regards to accruals and cash flows. Result, however, suggest that the agribusiness industry is an above average industry in terms of profitability and free cash flows but not in terms of cash flow from operations. This suggests the need to further explore the subcomponents of non-current operating accruals.

Results using accruals free and free cash flow lead to the same conclusions discussed in this study. The two components of more importance for accruals to explain the accruals/cash flows relationships for agribusiness are both the current operating accruals and non-current operating accruals, which is useful for agribusiness decision makers familiarized with free cash flow. Future research may further explore these two components and subcomponents in terms of level of persistence into the future, and in terms of their relationship with categorized metrics such as financial ratios (e.g. quality of

ratios) used in agribusiness to measure financial performance. The introduction of risk and return on these models may also be of interest for future work.

Table 1. Descriptive statistics for earnings, total accruals, free cash flows to equity, and EBITDA for agribusiness and for 'All firms'.

	Agribusiness		All firms (previous study)*	
	Mean	Std. Dev.	Mean	Std. Dev.
Panel A				
TACC	0.035	0.133	0.052	0.181
ROA	0.106	0.127	0.070	0.175
Panel B				
ΔWC	0.016	0.094	0.022	0.108
ΔNCO	0.040	0.137	0.051	0.151
ΔFIN	(0.022)	0.153	(0.021)	0.181
Panel C				
FCFE	0.071	0.155	0.018	NA
EBITDA	0.152	0.128	NA	NA

* Results on Richardson et al (2005) for all firms. Sample of 1088,617 firm-year observations from 1962-2001.

Table 2. Pearson pair-wise correlations for total accrual decomposition and earnings for agribusiness (bold in the upper diagonal) and for 'all firms'* (in the lower diagonal).

	TACCt	ΔWCt	ΔNCOt	ΔFINt	ROAt	ROAt+1
TACCt		**0.39**	**0.42**	**0.24**	**0.28**	**0.14**
ΔWCt	0.39		**0.14**	**-0.40**	**0.12**	**0.01**
ΔNCO_t	0.42	0.11		**-0.63**	**0.06**	**0.00**
ΔFIN_t	0.42	-0.29	-0.48		**0.11**	**0.11**
ROA_t	0.25	0.22	0.09	0.04		**0.72**
ROA_{t+1}	0.13	0.11	0.02	0.04	0.79	

* Results on Richardson et al (2005) for all firms. Sample of 108,617 firm-year observations from 1962-2001

Table 3. Values of selected characteristics for five portfolios of agribusiness formed by assigning firms to quintiles based on the magnitude of total accruals

	Portfolio 1	Portfolio 2	Portfolio 3	Portfolio 4	Portfolio 5
Panel A- Components of Earnings & EBITDA					
TACC					
Mean	(0.11)	0.00	0.03	0.06	0.18
Median	(0.05)	0.00	0.03	0.06	0.13
FCFE					
Mean	0.13	0.08	0.08	0.08	(0.02)
Median	0.12	0.08	0.08	0.08	0.03
ROA					
Mean	0.03	0.08	0.11	0.14	0.15
Median	0.05	0.08	0.11	0.15	0.16
EBITDA					
Mean	0.07	0.13	0.16	0.19	0.20
Median	0.10	0.12	0.16	0.19	0.20
Panel B- Components of Accruals					
ΔWC					
Mean	(0.03)	0.01	0.02	0.03	0.05
Median	(0.02)	0.00	0.01	0.02	0.04
ΔNCO					
Mean	(0.02)	0.02	0.04	0.05	0.12
Median	(0.01)	0.01	0.02	0.04	0.06
ΔFIN					
Mean	(0.05)	(0.03)	(0.02)	(0.01)	0.01
Median	(0.03)	(0.01)	(0.01)	0.00	0.01
Panel C- Depreciation & Amortization					
DA					
Mean	0.05	0.04	0.04	0.05	0.05

Table 4. Mean of selected characteristics for five portfolios of agribusiness formed by assigning firms to quintiles based on the magnitude of total accruals.

	Portfolio 1	**Portfolio 2**	**Portfolio 3**	**Portfolio 4**	**Portfolio 5**
ACC	(0.04)	0.03	0.06	0.09	0.17
CF	0.10	0.08	0.06	0.04	(0.07)
ROA	0.06	0.12	0.12	0.13	0.11
EBITDA	0.09	0.16	0.17	0.18	0.16
EBITDA-CF	(0.01)	0.08	0.11	0.14	0.23

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