FREE CASH FLOW AND PERFORMANCE PREDICTABILITY: AN INDUSTRY ANALYSIS

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ABSTRACT

This study investigates the ability of Free Cash Flow to predict performance in capital intensive and non-capital intensive industries. This study provides empirical evidence on Free Cash Flow versus traditional performance indicators and indicates whether Free Cash Flow better summarizes firm performance as reflected in stock returns/prices. This study makes three contributions. First, Free Cash Flow, considered by some as a refinement of cash flow and a more contemporary measure is used. Second, the predictability of Free Cash Flow is compared to traditional measures of performance. Third, this study extends the research on industry comparisons by using industry-specific analyses to examine the predictability of Free Cash Flow. Results indicate that Free Cash Flow is significantly different from Operating Cash Flow and Net Income, but there are mixed results on differences in the relative explanatory power in capital intensive and non-capital intensive industries.

Keywords: Cash Flow, Free Cash Flow, Capital intensity, Industry analysis

INTRODUCTION

Little of the existing research has considered Free Cash Flow for measuring firm performance. Prior studies have focused on operating cash flows. However, some analysts claim that Free Cash Flow better captures capital intensity, and is a better measure of performance in capital intensive industries (Tole, McCord, & Pugh, 1992).

Financial reporting as required by SFAC No. 1, is designed to provide information to investors, creditors and others, about an enterprise's financial performance (Financial Accounting Standards Board (FASB), 1985). While most investors focus on Earnings, Value Line (2011) suggests that other performance measures, like Free Cash Flow should be considered because Earnings can be affected by accounting methods and managerial discretion (manipulation), whereas, Free Cash Flow is harder to manipulate. However, there is very little empirical evidence on the predictability of Free Cash Flow. The objective of this study is to examine whether Free Cash Flow or more traditional financial measures better predict performance.

Some analysts (Tole, McCord, & Pugh, 1992) claim that Free Cash Flow better captures capital intensity, and hence is a better measure of performance in capital intensive industries. Operating cash flows have been the focus of the prior research, therefore, the existing research offers little evidence on the ability of Free Cash Flow to measure performance. Free Cash Flow definitions vary widely between companies and between industries, because U.S. GAAP does not require firms to disclose Free Cash Flow, and it provides little guidance on measuring Free Cash Flow. Some guidance is provided by the International Accounting Standards Board with International Accounting Standard (IAS) 7, which recommends that Free Cash Flow should be recognized as "cash from operations less the amount of capital expenditures required to maintain the firm's present productive capacity" (International Accounting Standards Board (IASB), 1977).

This study makes three important contributions. First, Free Cash Flow, considered by some as a refinement of cash flow and a more contemporary measure is used. Second, the predictability of Free Cash Flow is compared to the predictability of operating cash flows and earnings. Third, this study extends the research on industry comparisons by using industry-specific analyses to examine the predictability of Free Cash Flow in capital intensive versus non-capital intensive industries.

BACKGROUND AND LITERATURE REVIEW

The prior literature on cash flows focuses on operating cash flows vs. earnings to explain performance, as proxied by abnormal stock returns (Dechow, 1994; Bowen, Burgstahler & Daley, 1987; Livnat & Zarowin, 1990). While the term Free Cash Flow is widely used in the press and in the business world, U. S. GAAP does not require firms to disclose Free Cash Flow, and as a result few firms voluntarily report it. Free Cash Flow definitions are not uniform and there is little theoretical or conceptual guidance on how to calculate Free Cash Flow (Adhikari & Duru, 2006). Firms reporting Free Cash Flow either use a Cash flow from operations-based method, or an income-based method to calculate Free Cash Flow (Adhikari & Duru, 2006). Adhikari and Duru (2006) determined that income-based methods are used to calculate Free Cash Flow by only a small percentage of firms, 14.2 percent. Income-based methods typically start with earnings before interest, taxes, depreciation and amortization as a proxy for Cash flow from operating activities, and then make various adjustments.

Additionally, half of the Free Cash Flow reporting firms use a Cash flow from operations-based method where Free Cash Flow is calculated one of two ways: (1) A capital maintenance perspective-Cash flow from operating activities less capital expenditures necessary to maintain the productive capacity of the firm, and (2) An all-inclusive perspective- Cash flow from operating activities less capital expenditures, plus proceeds from fixed asset sales and changes in long-term investments (Adhikari & Duru, 2006). Over 50 percent of the firms using a Cash flow from operations-based method rely on the capital maintenance perspective. The capital maintenance perspective is consistent with guidance provided by The International Accounting Standards Board (IAS 7).

Firms operating in capital-intensive industries require significant investments in capital to start and maintain operations. Non-capital intensive industries generally depend on labor rather than capital, and are thus not considered capital intensive. The automobile, chemical, telecommunications, and refinery industries are often considered examples of capital-intensive industries. The household products industry, insurance companies and other service oriented industries generally depend on labor rather than capital, and are often considered examples of non-capital-intensive industries (Investing Answers, 2014).

Capital investments are necessary to equip firms with essential tools and high tech machinery necessary for operations. In most capital-intensive industries, millions of dollars must be invested. For example, oil companies must spend millions of dollars setting up oil rigs, oil refineries and other infrastructure in order to bring in oil. Telecommunications companies must set up a network of phone lines, fiber-optic lines and other equipment in order to service customers. Because of significant investments in capital, companies in capital-intensive industries are often marked by high levels of depreciation and fixed assets on the balance sheet. The Electric Utility industry is another example of a capital-intensive industry. Electric Utility firms often undertake large-scale construction programs to update aging infrastructures, add capacity, and to comply with environmental regulations.

Substantial depreciation expense usually results from the significant capital expenditures. The depreciation expense (a non-cash expense) leads to net operating cash flows that significantly exceed net income. Given the distortional effect depreciation expense has on net operating cash flows, Tole, McCord and Pugh (1992), suggest that cash flows are a better measure of performance than net income for a capital-intensive industry like the Electric Utility industry. Generally, the Electric Utility Industry reports Free Cash Flow with a capital maintenance perspective, and Free Cash Flow is defined as operating cash flow minus capital expenditures (Tole, McCord & Pugh, 1992; Bilicic & Connor, 2004). Moreover, Tole, McCord & Pugh (1992), recommend Free Cash Flow to equity investors as a better measure of performance than net income.

Seminal cash flow studies focus on operating cash flows versus earnings, to explain performance as measured by abnormal stock returns (Dechow, 1994; Bowen, Burgstahler & Daley, 1987; Livnat & Zarowin, 1990). These studies generally demonstrate that cash flows and earnings both provide incremental information, but do not directly address the relative superiority of one measure over the other. In a more current study, Burgstahler, Jiambalvo & Pyo (1998) find that cash flow has more predictive ability than earnings, but Finger (1994) found mixed results. Further, Barth, Cram and Nelson (2001) find cash flows have more predictive ability than earnings. None of the earlier studies focus on Free Cash Flow or capital intensity. One possible explanation for the mixed results of prior research is the failure to focus on a more relevant measure like Free Cash Flow, or a failure to focus on industry-specific samples. Nunez (2013) considers Free Cash Flow and the Electric Utility Industry. Nunez (2013) found that Free Cash Flow is significantly different from Operating Cash Flow and Net Income, but could not detect significant differences in the relative explanatory power of Free Cash Flow, Operating Cash Flow and Net Income. This study attempts to build on Nunez (2013) by considering the predictability of Free Cash Flow in both capital and non-capital intensive industries.

HYPOTHESES AND METHODOLOGY

This study examines whether Free Cash Flow is a better measure of performance than net income and operating cash flows, for capital intensive and non-capital intensive industries. Tole, McCord & Pugh (1992) suggests that for a capital intensive industry like the Electric Utility Industry, cash flows are a better measure of performance than net income, and Free Cash Flow is better than operating cash flow. Therefore, the authors of this study expect Free Cash Flow to have greater performance predictability than Operating Cash Flow and Net Income for firms in capital intensive industries. Further, we expect Free Cash Flow to have less performance predictability than Operating Cash Flow and Net Income for non-capital intensive industries.

The first hypothesis considers the relation between capital intensity and free cash flow. Building on Tole, McCord and Pugh (1992) the authors expect capital intensive firms to have lower levels of Free Cash Flow, and non-capital intensive firms to have higher levels of Free Cash Flow. The hypothesis stated in the null:

H1: The association between Free Cash Flow and capital intensity does not differ between capital intensive firms and non-capital intensive firms.

As suggested by Tole, McCord & Pugh (1992) the authors of this study expect Free Cash Flow to be a better measure of performance than operating cash flows and net income, for capital intensive firms, and operating cash flows and net income to be better measures of performance than Free Cash Flow for non-capital intensive firms. The second hypothesis, stated in the null:

H2: The predictability of Free Cash Flow does not differ between capital intensive firms and non-capital intensive firms.

The authors used an independent measure of capital intensity, as defined in prior literature. The Fixed Asset Ratio (FAR) is plant, property and equipment divided by noncash total assets, based on Kang and Zhau (2010). Kang and Zhau (2010) defined capital intensive industries as having a mean industry fixed asset ratio of 0.5 or greater. Based on the approach used by Kang and Zhau (2010), the authors utilized two groups: Group A-capital intensive industries where the mean industry FAR is 0.5 or greater, and Group B-non-capital intensive industries where the mean industry FAR is less than 0.5. Also, we used Fama and French (1997) to guide our industry classifications using SIC/NAICS codes.

To test Hypothesis 1 and examine the relationship between capital intensity and Free Cash Flow observed by scatterplots. The direction, magnitude and shape of the relationships is conveyed in the plots. The measurement of the relationship between capital intensity and Free Cash Flow is based on the following variables,

$$Y = f(X) \tag{1}$$

Where (Compustat descriptions are in parentheses), Y= Free Cash Flow, calculated as Operating Activities Net Cash Flow minus Capital Expenditures (OANCF-CAPX), and X = Fixed Asset Ratio, calculated as plant, property and equipment divided by noncash total assets, (PPENT/(AT-CH).

The estimated correlation coefficients used to measure the direction and strength of the association, and to draw more definitive inferences. Commonly used measures of association include the Pearson and Spearman correlation coefficients, Goodman and Kruskal's gamma (γ) and Kendall's tau (τ). Pearson's correlation coefficient requires normally distributed variables or it will produce unreliable results, and the Spearman rank correlation requires a monotonic underlying relationship between variables (Goktas & Isci, 2011). Goodman and Kruskal's gamma (γ), is a non-parametric measure of rank correlation that does not rely on any assumptions on the distributions of X or Y, or the distribution of (X,Y), and it does not consider tied pairs (Blumberg, Cooper, & Schindler, 2011). A tied pair occurs when observations have the same value on the X variable, on the Y variable or on both. Kendall's tau (τ) is recognized as a refinement of gamma (γ) that considers tied pairs (Blumberg, Cooper, & Schindler, 2011). The Kendall's tau b (τ_b) used to measure the direction and strength of the association between capital intensity and Free Cash Flow. Kendall's tau b (τ_b) is a non-parametric measure of rank correlation that does not rely on any assumptions on the distributions of X or Y, or the distribution of (X,Y), it does consider tied pairs and is suitable for data tables of any size (Blumberg, Cooper, & Schindler, 2011).

The following models used to test Hypothesis 2 and examine the predictability of Free Cash Flow:

$$R_t = a_0 + a_1 FCF_t + e_t, \tag{2a}$$

$$R_t = a_0 + a_1 OCF_t + e_t, \quad (2b)$$

$$R_t = a_0 + a_1 NI_t + e_t, \quad (2c)$$

Where (Compustat descriptions are in parentheses), *R* is raw annual returns; *FCF* is Free Cash Flow, calculated as Operating Activities Net Cash Flow minus Capital Expenditures (OANCF-CAPX), *OCF* is Operating Cash Flow, Operating Activities Net Cash Flow (OANCF); *NI* is net income after extraordinary items and discontinued operations (NI). All variables except *R*, are deflated by market value of common equity at the previous fiscal year-end. Models 2a, b and c are based on Dhaliwal, Subramanyam, and Trezevant (1999). Kim & Kross (2005) used a similar model to test the explanatory power of earnings and cash flows.

To draw more definitive inferences, and to minimize the potential econometric and theoretical problems with returns models, the authors used price models (Kothari & Zimmerman, 1995).

$$P_t = a_0 + a_1 FCF_t + e_t, \quad (3a)$$

$$P_t = a_0 + a_1 OCF_t + e_t, \quad (3b)$$

$$P_t = a_0 + a_1 NI_t + e_t, \quad (3c)$$

Where, *P* is market value of common equity (PRCC) at fiscal year-end. All variables are deflated by the number of shares of common stock outstanding (CSHO) at fiscal year-end, adjusted for stock splits and stock dividends (AJEX).

METHODOLOGY

Methods

Some industries had a small number of firms and time periods available for study, therefore the observations were pooled across time to increase the number of observations and the power of the regression models. Pooling the data can introduce cross-sectional and time series dependencies in the sample data, which could understate the standard errors of the regression coefficients and inflate the t-statistics. To mitigate this, Huber-White (1967) standard errors are used in the regression models for the construction of the t-statistics.

The Huber-White robust standard error estimator produces correct standard errors even if the observations are correlated and heteroscedastic (Huber 1967; White 1980). Maximum-likelihood estimates are generally preferable to ANOVA and OLS estimates so the full maximum likelihood procedure for estimating the parameters of the regressions is used, (see Searle, 1988; Harville, 1988; Searle, Casella and McCulloch, 1992). Firm-specific and time-specific intercepts are also used in the models.

Sample and Data Collection

The Compustat Database was used to identify the initial sample of 131,861 observations from 2000-2012. Firms with insufficient data to calculate the Fixed Asset Ratio (FAR), Free Cash Flow, Operating Cash Flow, Net Income, and market value were deleted, resulting in 72,246 observations. Observations for which the test variable falls in the top and bottom percentile of the test-variable distribution were eliminated from the sample. The resulting sample is composed of 64,566 observations, representing 11,036 firms and 48 industries. Table 1 provides a list of industries used in this study.

Table 1
List of Industries

Abbreviation	INDUSTRY	# of firms	# of Observations
Aero	Aircraft	37	297
Agric	Agriculture	41	223
Autos	Autos and Trucks	126	818
Banks	Banking	972	5,162
Beer	Alcoholic Beverages	31	190
BldMt	Construction Materials	161	1,060
Books	Printing and Publishing	59	352
Boxes	Shipping Containers	21	119
BusSv	Business Services	1,423	7,749
Chems	Chemicals	187	1,199
Chips	Electronic Equipment	570	3,845
Clths	Apparel	100	683
Cnstr	Construction	94	548
Coal	Coal	41	195
Comps	Computers	394	2,289
Drugs	Pharmaceutical Prod	736	4,501
ElcEq	Electrical Equipment	142	1,037
Energy	Petro and Nat Gas	762	3,815
FabPr	Fabricated Products	28	163
Fin	Trading	316	1,462
Food	Food Products	134	937
Fun	Entertainment	144	856
Gold	Precious Metals	308	1,484
Guns	Defense	15	119
Hlth	Healthcare	141	915
Hshld	Consumer Goods	121	749
Insur	Insurance	178	803
LabEq	Meas and Contrl Equip	168	1,343
Mach	Machinery	268	1,837
Meals	Rest, Hotel, Motel	200	1,228
MedEq	Medical Equipment	337	2,127
Mines	Nonmetallic Mining	442	2,111
Misc	Miscellaneous	155	662
Paper	Business Supplies	89	595
PerSv	Personal Services	102	629
RlEst	Real Estate	122	626
Rtail	Retail	358	2,434
Rubbr	Rubber and Plastic Products	78	503
Ships	Shipbuilding, Rail Eq	13	102
Smoke	Tobacco Products	5	43
Soda	Candy and Soda	24	157
Steel	Steel Works Etc	126	731
Telem	Telecommunications	308	1,686
Toys	Recreational Products	75	415
Trans	Transportation	268	1,641
Txtls	Textiles	26	170
Util	Utilities	273	1,933
Whlsl	Wholesale	317	2,023
	Total	**11,036**	**64,566**

Descriptive Statistics

Table 2 reports descriptive statistics for variables used to estimate the models, and for key firm size variables used to gain additional insight about firm characteristics. Descriptive statistics

are presented for the entire sample, and to gain additional insight, the sample is further classified based on capital intensity. Columns 1 and 2 (all observations) of Table 2 report means and standard deviations for the total sample of 64,566 observations; columns 3 and 4 (capital intensive firms) report means and standard deviations for 15,287 observations, 24% of the total observations, representing firms that have a mean FAR of 0.5 or greater; and the last two columns (non-capital intensive firms) report means and standard deviations for 49,279 observations, 76% of the total observations, representing firms that have a mean FAR of less than 0.5.

Table 2
Descriptive Statistics

	All Observations		**Capital Intensive Firms**		**Non-Capital Intensive Firms**	
	Mean	**Std Dev**	**Mean**	**Std Dev**	**Mean**	**Std Dev**
FCF	51.77	204.66	22.52	190.64	60.84	207.99
FAR	0.30	0.29	0.75	0.14	0.16	0.14
CAPX	61.59	212.78	146.41	359.75	35.26	127.39
OCF	113.20	342.54	168.64	459.80	96.00	294.79
NI	50.79	205.07	61.37	234.15	47.51	195.06
R	0.20	1.17	0.25	1.24	0.19	1.14
ROE	(0.26)	99.20	(1.83)	189.69	0.22	41.61
LTD	326.63	1,177.94	546.30	1,595.65	258.37	1,003.93
TOTASS	1,508.79	5,193.28	1,765.40	4,819.36	1,429.19	5,301.44
PPE	431.73	1,780.40	1,181.53	3,255.18	199.14	798.58
TOTSALE	1,067.84	3,809.89	1,165.26	4,198.20	1,037.62	3,680.64
MVE	1,200.71	3,735.78	1,320.43	3,708.36	1,163.58	3,743.50
BVE	0.30	0.29	0.75	0.14	0.16	0.14
No. of Obs	64,566		15,287		49,279	

Where*,

FCF= Free Cash Flow=Operating Cash Flow minus Capital Expenditures (OANCF-CAPX)
FAR= Fixed Asset Ratio=Plant, Property & Equip/Noncash Total Assets ((PPENT/(AT-CH
CAPX= Capital Expenditures (CAPX)
OCF= Operating Cash Flow=Operating Activities Net Cash Flow (OANCF)
NI=Net Income after extraordinary items and discontinued operations (NI)
R= Raw annual percentage returns
ROE=Return on equity, NI (NI) divided by Book Value of Equity (CEQ)
LTD=Long term debt (DLTT)
TOTASS=Total assets (AT)
PPE=Plant, Property and Equipment (PPENT)
TOTSALE=Total sales (SALE)
MVE=Market value of equity= price times common shares outstanding (PRCC x CSHO)
BVE=Book value of equity (CEQ)
**Compustat item description in parentheses.*

The average market value (MVE) for the entire sample is $1,200.71 million. Capital intensive firms are considerably larger with an average market value of $1,320.43, 13% larger than the average market value of non-capital intensive firms, $1,163.58. The other size-based characteristic, book value of equity (BVE), exhibits the same pattern. The earnings variable (Net Income) in Table 2 indicates capital intensive firms are more profitable, with an average Net Income of $61.37 million compared to $47.51 million for non-capital intensive firms. Return on equity (ROE) is included because it is a more relative measure of profitability and it indicates that capital intensive firms are not relatively more profitable as they have an ROE of -183% compared to an ROE of 22% for non-capital intensive firms.

Capital intensive firms are characterized by having significant capital investment leading to substantial depreciation expense, hence Operating cash flow (OCF) is 275% of Net income (significantly different at the 1% level), but only 202% of Net Income for non-capital intensive firms (significantly different at the 5% level). Furthermore, Free Cash Flow is only 37% of Net income for capital intensive firms (significantly different at the 1% level) but 81% of Net income for non-capital intensive firms (significantly different at the 5% level). These results suggest that mean Operating cash flow is significantly different from mean Net income and mean Free Cash flow is significantly different from mean Operating Cash flow, for both capital intensive and non-capital intensive firms.

EMPIRICAL TESTS

To test Hypothesis 1 the relationship between Free Cash Flow and capital intensity is examined. The authors expected capital intensive firms to have lower levels of Free Cash Flow, and non-capital intensive firms to have higher levels of Free Cash Flow. Consistent with expectations, capital intensive firms have a mean Fixed Asset Ratio (FAR) of 0.75, which is significantly different (at the 1% level) from the mean Fixed Asset Ratio (FAR) of 0.16 for non-capital intensive firms. Further, capital intensive firms have a mean Free Cash Flow of $22.52, which is significantly different (at the 1% level) from the mean Free Cash Flow of $60.84 for non-capital intensive firms. These results lend some support to Hypothesis 1. In our next step, we prepared scatter plots of the relationship between Free Cash Flow and Capital Intensity. The scatter plots are reported in Figure 1. Panel A of Figure 1 demonstrates the relationship of Free Cash Flow and Capital Intensity for capital intensive firms, and Panel B demonstrates the relationship of Free Cash Flow and Capital Intensity for non-capital Intensive firms. There is some indication from the scatter plots that capital intensive firms have lower levels of Free Cash Flow, and non-capital intensive firms have higher levels of Free Cash Flow.

Table 3 presents correlations between Free Cash Flow and Capital Intensity for capital and non-capital intensity firms.. Pearson and Spearman correlation coefficients, as well as the non-parametric measure of rank correlation, Kendall’s tau were utilized. The correlation coefficients for capital intensive firms are all significant at the 1% level. Only the Pearson correlation coefficient for non-capital intensive firms is significant (at the 1% level). Overall, evidence from the descriptive statistics, the scatter plots and the correlation coefficients supports Hypothesis 1, and indicate that capital intensive firms have lower levels of Free Cash Flow, and non-capital intensive firms have higher levels of Free Cash Flow.

To test Hypothesis 2 and to examine whether Free Cash Flow is a better measure of performance than Operating Cash Flow and Net Income, we estimate models (2a) – (2c). Summary model statistics are reported in Table 4. A coefficient significantly different from zero on Free Cash Flow, Operating Cash Flow and Net Income indicates the variable provides significant explanatory power. Free Cash Flow, Operating Cash Flow and Net Income are not

Figure 1
Scatter Plot of Free Cash Flow and FAR (Capital Intensity):

Panel A: Capital Intensive Firms **Panel B: Non-Capital Intensive Firms**

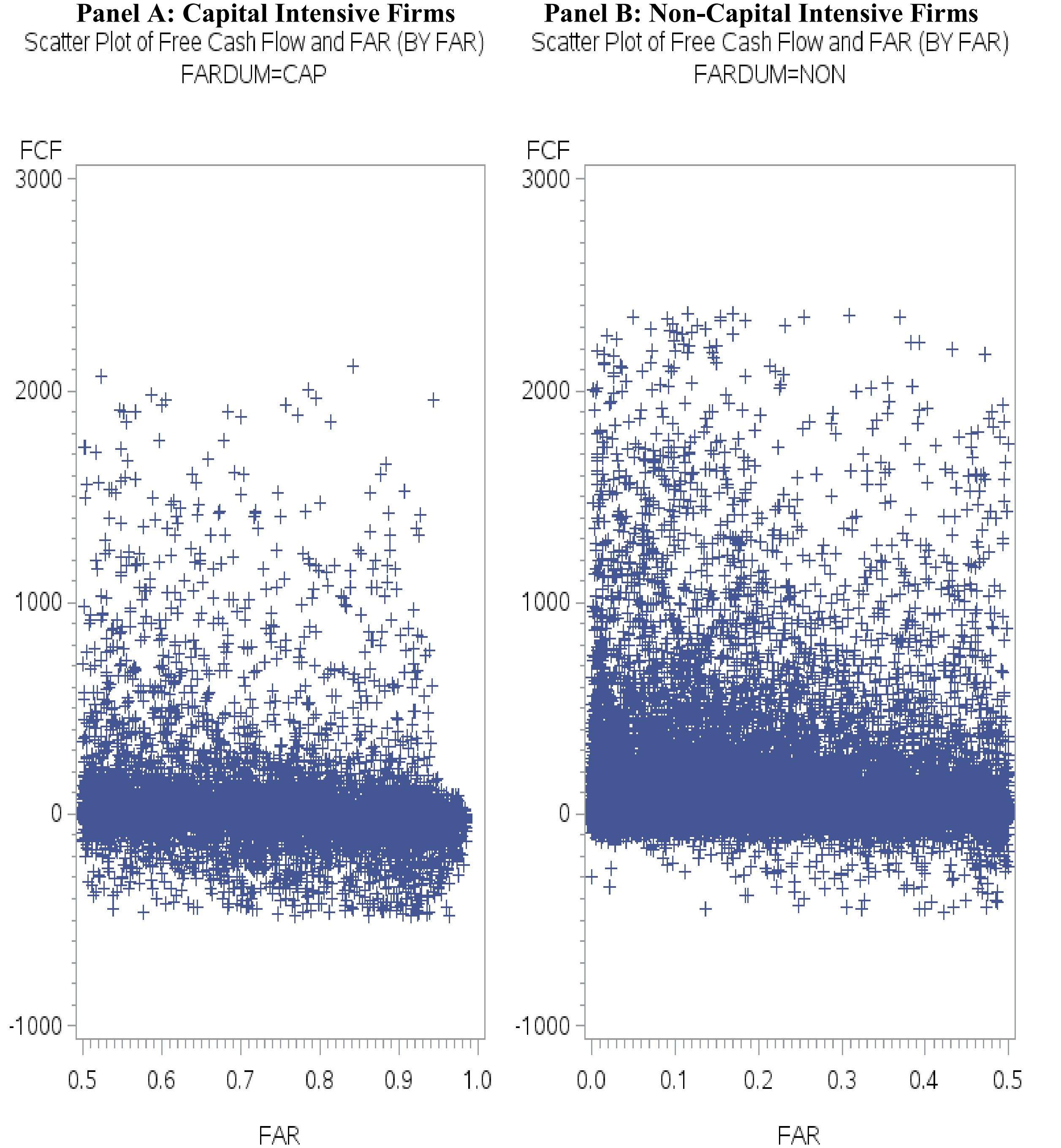

Table 3
Correlations Between Free Cash Flow and Capital Intensity

CAPITAL INTENSIVE FIRMS			
	Capital Intensity (FAR) *(Pearson)*	Capital Intensity (FAR) (Spearman)	Capital Intensity (FAR) (Kendall's tau b)
Free Cash Flow (FCF)	-0.144	-0.022	-0.147
	(0.000)	(0.000)	(0.000)
NON-CAPITAL INTENSIVE FIRMS			
	Capital Intensity (FAR) *(Pearson)*	Capital Intensity (FAR) (Spearman)	Capital Intensity (FAR) (Kendall's tau b)
Free Cash Flow (FCF)	-0.027	-0.001	-0.002
	(0.000)		

P-values are in parentheses.

significant for capital intensive firms, however, Operating Cash Flow and Net Income are both significant at the 1% level for non-capital intensive firms. This result provides some support for hypothesis 2, in that we expect Operating Cash Flow and Net Income to be better measures of performance for non-capital intensive firms, and these variables should have more explanatory power than Free Cash Flow. The maximum likelihood procedure does not produce a formal R^2 statistic, therefore, the pseudo R^2 (Cox & Snell, 1981) measures are reported. The three capital intensive models and the three non-capital intensive models have pseudo R^2 measures of nearly 8%, and all are significant at the 1% level using the null model likelihood ratio test (not reported in Table 4).

To estimate price models (3a) – (3c) as suggested in Kothari & Zimmerman (1995), to minimize the potential econometric and theoretical problems associated with the returns models used in (2a) – (2c). Table 5 reports summary model statistics for price models (3a) – (3c). Free Cash Flow is significant for capital intensive firms, and Free Cash Flow and Operating Cash Flow are both significant for non-capital intensive firms at the 1% level. These results provide further support for hypothesis 2. Also, consistent with the returns models, the three capital intensive models and the three non-capital intensive models have pseudo R^2 measures of nearly 8%, and all are significant at the 1% level using the null model likelihood ratio test (not reported in Table 5).

The likelihood ratio tests and pseudo-R^2 measures are of limited use in making comparisons across measures, and cannot be used to compare non-nested models (Burnham & Anderson, 2002). The authors used an approach suggested by Biddle, Seow & Siegel (1995) to compare the three measures of performance. Their approach is based on the Wald statistic. The Wald Statistic can be used to test equality of coefficients across regression equations. It will be used to test the null hypothesis that the parameter estimates from the Free Cash Flow Model (2a)

Table 4
Results of the estimation of returns models that test whether Free Cash Flow is a better measure of performance than Operating Cash Flow and Net Income

Panel A: Capital Intensive Firms

MODEL[a]	INT[b]	FCF[b]	OCF[b]	NI[b]	Pseudo- R^2
(2a)	-0.0048	0.00008			7.7%
(2b)	-0.005		-0.00021		7.7%
(2c)	-0.0038			0.00016	7.7%
N		15,287	15,287	15,287	

Panel B: Non-Capital Intensive Firms

MODEL[a]	INT[b]	FCF[b]	OCF[b]	NI[b]	Pseudo- R^2
(2a)	0.1607***	-0.00001			7.5%
(2b)	0.1607***		-0.00001***		7.5%
(2c)	0.1608***			0.00002***	7.5%
N		49,279	49,279	49,279	

*Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

[a]Models:

(2a) $R_t = a_0 + a_1 FCF_t + e_t$,

(2b) $R_t = a_0 + a_1 OCF_t + e_t$,

(2c) $R_t = a_0 + a_1 NI_t + e_t$,

Where,

R= Raw annual percentage returns
FCF=Free Cash Flow
OCF=Operating Cash Flow

Notes: The sample consists of all 2000-2012 observations that have Compustat data needed to calculate the Fixed Asset Ratio, Free Cash Flow, Operating Cash Flow, Net Income, Market value of Common Equity, and Returns. Observations for which the test variable falls in the top and bottom percentile of the test-variable distribution are eliminated from the sample. All variables except R are deflated by market value of common equity at the previous fiscal year-end.

Table 5

Results of the estimation of price models that test whether Free Cash Flow is a better measure of performance than Operating Cash Flow and Net Income

Panel A: Capital Intensive Firms

MODEL[a]	INT[b]	FCF[b]	OCF[b]	NI[b]	Pseudo- R^2
(3a)	-0.0051	1E-06***			7.7%
(3b)	-0.0052		2E-06		7.7%
(3c)	-0.005			1E-06	7.7%
N		15,287	15,287	15,287	

Panel B: Non-Capital Intensive Firms

MODEL[a]	INT[b]	FCF[b]	OCF[b]	NI[b]	Pseudo- R^2
(3a)	0.1607***	-0.0000007			7.5%
(3b)	0.1607***		-0.0000005***		7.5%
(3c)	0.1608***			0.00013	7.5%
N		49,279	49,279	49,279	

[a]**Models**:

(3a) $P_t = a_0 + a_1 FCF_t + e_t,$

(3b) $P_t = a_0 + a_1 OCF_t + e_t,$

(3c) $P_t = a_0 + a_1 NI_t + e_t,$

Where,

P= Market value of common equity at fiscal year end, Price (PRCC)

FCF=Free Cash Flow

OCF=Operating Cash Flow

*Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

Notes: The sample consists of all 2000-2012 observations that have Compustat data needed to calculate the Fixed Asset Ratio, Free Cash Flow, Operating Cash Flow, Net Income, Market value of Common Equity, and Returns. Observations for which the test variable falls in the top and bottom percentile of the test-variable distribution are eliminated from the sample. All variables except R are deflated by market value of common equity at the previous fiscal year-end.

are equal to the Operating Cash Flow Model (2b), or equal to the Net Income Model (2c). Vectors of estimated coefficients and the variance-covariance matrices are used to form the test statistic. A necessary condition for this application of the Wald test is that the regression equations being compared must have the same size coefficient vectors, and the same size variance-covariance matrices. The Wald statistic used in this study is based on a comparison of model (2a) to model (2b), and a comparison of model (2a) to model (2c) for capital intensive and non-capital intensive firms. The statistics were also used to compare model (3a) to model (3b), and a comparison of model (3a) to model (3c) for capital intensive and non-capital intensive firms. For testing the null hypothesis, the Wald statistic (Liao, 2004) is

$$W= (\hat{\beta}_g - \hat{\beta}_{g*})' \, [\mathrm{var}\,(\hat{\beta}_g) + \mathrm{var}\,(\hat{\beta}_{g*})]^{-} \, (\hat{\beta}_g - \hat{\beta}_{g*}) \ ,$$

Where β is the coefficient vector containing all parameter estimates for the regression equation, var $(\cdot)$ is the estimated variance-covariance matrix for the coefficients, the operator on the first term $(\cdot)'$ is the transpose, and the operator on the middle term $[\cdot]^{-}$ is the generalized inverse. The probability of this equality approaches one asymptotically. The degrees of freedom for the test equals the number of rows in the first or the third matrix. The Wald statistic is chi-square ($\chi 2$) distributed for large samples. The Wald statistics are reported in Table 6. Panel A reports the Wald statistics for capital intensive firms, and Panel B reports the Wald statistics for non-capital intensive firms. None of the statistics in Panel A are statistically significant at conventional levels, suggesting that there is no relative difference between the ability of Free Cash Flow and Operating Cash Flow, or between Free Cash Flow and Net Income to predict performance as reflected in stock returns/prices, for capital intensive firms. Also, none of the statistics in Panel B are statistically significant at conventional levels, suggesting that there is no relative difference between the ability of Free Cash Flow and Operating Cash Flow, or between Free Cash Flow and Net Income to predict performance as reflected in stock returns/prices, for non-capital intensive firms.

Table 6
Summary Statistics for the Wald Test:
A test of the equality of coefficients across regression equations

Panel A: CAPITAL INTENSIVE FIRMS

	Model 2A vs 2B	Model 2A vs 2C	Model 3A vs 3B	Model 3A vs 3C
Wald Statistic	0.8731	0.3461	0.0602	0.2621
	(>0.100)	(>0.100)	(>0.100)	(>0.100)

Panel B: NON-CAPITAL INTENSIVE FIRMS

	Model 2A vs 2B	Model 2A vs 2C	Model 3A vs 3B	Model 3A vs 3C
Wald Statistic	0.0003	11.234	2.324	0.8516
	(>0.100)	(>0.100)	(>0.100)	(>0.100)

P-values are in parentheses.

LIMITATIONS OF THIS STUDY

Because this study only focuses on capital intensive firms and non-capital intensive firms, it does not capture industry differences and the effects on capital intensity. As a result, the results may not be applicable to specific industries because of differences in levels of capital intensity.

RECOMMENDATIONS FOR FUTURE RESEARCH

Future research in this area should focus on obtaining a better understanding of industry differences and the effects on capital intensity. Additional research is needed on the effect of capital intensity on Free Cash Flow, and the role that capital intensity plays in the predictability of Free Cash Flow. More precise and convincing results might be obtainable with industry groups formed based on levels of capital intensity.

CONCLUSIONS

Overall, the results presented in this paper are mixed. Simple t-tests demonstrate that mean Free Cash Flow is statistically different from mean Operating Cash Flow, and mean Net Income for both capital intensive and non-capital intensive firms. Evidence from the descriptive statistics, the scatter plots and the correlation coefficients indicate that capital intensive firms have lower levels of Free Cash Flow, and non-capital intensive firms have higher levels of Free Cash Flow. Our results also indicate some support for Operating Cash Flow and Net Income as better measures of performance for non-capital intensive firms. Also, there is some indication that Free Cash Flow is a better measure of performance for capital intensive firms.

This study makes three important contributions. First, Free Cash Flow, considered by some as a refinement of cash flow and a more contemporary measure is used. Second, the predictability of Free Cash Flow is compared to the predictability of operating cash flows and earnings. Third, this study has extended the research on industry comparisons by using industry-specific analyses to examine the predictability of Free Cash Flow in capital intensive versus non-capital intensive industries**.**

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