

Utah State University

DigitalCommons@USU

All Graduate Plan B and other Reports

Graduate Studies

12-2018

The Free Cash Flow and Corporate Returns

Sen Na

Utah State University

Follow this and additional works at: <https://digitalcommons.usu.edu/gradreports>

 Part of the [Finance and Financial Management Commons](#)

Recommended Citation

Na, Sen, "The Free Cash Flow and Corporate Returns" (2018). *All Graduate Plan B and other Reports*. 1347.

<https://digitalcommons.usu.edu/gradreports/1347>

This Report is brought to you for free and open access by the Graduate Studies at DigitalCommons@USU. It has been accepted for inclusion in All Graduate Plan B and other Reports by an authorized administrator of DigitalCommons@USU. For more information, please contact digitalcommons@usu.edu.



THE FREE CASH FLOW AND CORPORATE RETURNS

by

Sen Na

A plan B paper submitted in partial fulfillment
of the requirements for the degree

of

MASTER OF SCIENCE

in

Financial Economics

Approved:

Jason Smith, Ph.D.
Major Professor

Ben Blau, Ph.D.
Committee Member

Dwight Israelsen, Ph.D.
Committee Member

Jared DeLisle, Ph.D.
Committee Member

Mark McLellan, Ph.D.
Vice President for Research and
Dean of the School of Graduate Studies

UTAH STATE UNIVERSITY
Logan, Utah

2018

Copyright © Sen Na 2018
All Rights Reserved

ABSTRACT

The Free Cash Flow and Corporate Returns

by

Sen Na

Master of Science

Utah State University 2018

Major Professor: Dr. Jason Smith

Department: Economics and Finance

Mcperson (2018) and Jose, Lancaster, Stevens (1996) have written papers to examine the relationship between liquidity management and firm profitability. The literature establishes that the cash conversion cycle has an implication for the profitability and liquidity of a firm. We extend the time period and analyze the free cash flow instead of cash conversion cycle. We provide evidence that firms with higher free cash flows have higher risk adjusted stock returns.

CONTENTS

	Page
ABSTRACT.....	iii
LIST OF TABLES.....	v
CHAPTER	
I. INTRODUCTION	1
II. EMPIRICAL METHODOLOGY AND DATA.....	3
III. CORRELATIONS BETWEEN FCF AND RETURNS.....	7
IV. PATTERNS BETWEEN FCF AND PROFITABILITY MEASURE RANKINGS.....	9
V. INFLUENCE OF FIRM SIZE ON FCF.....	14
VI. CALENDAR TIME PORTFOLIO.....	18
VII. SUMMARY.....	22
REFERENCES.....	24

LIST OF TABLES

Table	Page
1. Mean Summary Statistics by Industry Classification.....	6
2. Summary Statistics by Industry Classification.....	6
3. Pearson Correlation Coefficients.....	8
4. Average FCF Based on ROA Rankings.....	12
5. Average FCF Based on ROE Rankings.....	13
6. Regression of FCF and on ROA.....	16
7. Regression of FCF and on ROE.....	17
8. Fama-French Risk Factors Alphas from Calendar Portfolio.....	21

INTRODUCTION

In this study, we extend previous research that shows cash conversion cycles impact the operating performance of a company. Mcpherson (2018) demonstrates cash conversion cycles impact company profitability. The higher cash conversion cycles have lower risk adjusted stock returns. In this study we use the same methodology as in Mcpherson's paper to examine how free cash flows impact stock returns and operating profitability. The results show there is a positive relationship between free cash flow and corporate stock returns.

The free cash flow, "is defined as cash flow beyond what is necessary to maintain assets in place and to finance expected new investments" (Scott Richardson, 2006). At a more specific level, it is "the amount of operating cash flow generated in excess of the cash needed for important spending such as for capital expenditures" (Derrald, Earl, James, 2017). Clear as it is, the free cash flow potentially acts as a key measure of the cash flow health and the profitability of a company. In this study, the free cash flow is calculated by adding depreciation and earnings before interest and taxes (EBIT), subtracting taxes, capital expenditures, and increases in net working capital. Since "it is a measure of profitability that excludes the non-cash expenses of the income statement and includes spending on equipment and assets as well as changes in working capital" (Investopedia, 2018). By combining this definition and the statements above, there is a possible reason to indicate that a positive free cash flow of a company can be believed as

financially healthy as projects are profitable. To go further with this indication, I will illustrate relevant discussions with diagrams later.

Mcperson (2018) examines the relationship between ongoing liquidity management and profitability for firms over a twenty-year period, from 1993 to 2017. Prior to Mcpherson's paper, Manuel L. Jose, Carol Lancaster, and Jerry L. Stevens (1996) wrote a similar paper that test the relationship between the cash conversion cycle, ongoing liquidity management, and other methods of profitability using a regression analysis over a different twenty-year period, from 1974 to 1993. The literature establishes that the cash conversion cycle has an implication for the profitability and liquidity of a firm. We extend the time period from the cash conversion cycle literature to 1973 to 2017 and we provide evidence that firms with higher free cash flows have higher risk adjusted stock returns.

II. EMPIRICAL METHODOLOGY AND DATA

Data are obtained from the annual Compustat-Capital IQ daily updates from year 1973 to 2017

The free cash flow, ROA, and ROE are calculated for each firm year in the sample. ROA is defined as earnings before interest and taxes (EBIT) divided by total assets (TA). ROE is defined as EBIT divided by TA minus total liabilities (TL).

$$\mathbf{ROA = EBIT / TA}$$

$$\mathbf{ROE = EBIT / (TA - TL)}$$

The free cash flow is defined as:

$$\mathbf{FCF = EBIT - TXT + DP - \Delta CapEx - \Delta NWC}$$

$$\mathbf{\Delta CapEx = PP\&E_n - PP\&E_{n-1}}$$

$$\mathbf{\Delta NWC = (ACT - LCT) - (ACT_{n-1} - LCT_{n-1})}$$

Where TXT is total income taxes, DP is depreciation and amortization, PP&E is property, plant and equipment, ACT is current total assets, and LCT is current total liabilities, and n represents the year. In order to reduce the influence of outliers attributed to any specific year, we Winsorized the variables at the 1 and 99 percent levels.

Free Cash Flow variables experience variations due to analyze industry that each firm competes in. Firm is aggregated by industry using SIC or the four-digit standard industry classification in order to control for these variations or differences. For instance, 0000-1400 (Natural Resources), 1500-1750 (Construction), 2000-4000 (Manufacturing),

4001-4999 (Services), 5000-6000 (Retail/Wholesale), 6001-6499 (Financial Services), and 6500-9000 (Professional Services).

Market value (MKTVAL) is defined as common stock shares outstanding multiplied by the closing price. The market-to-book ratio (MTB) is generated by using the market value divided by stockholder's equity. Then, we find the firms size by taking the top 30 percent of the total assets.

Monthly stock return data are obtained from CRSP. Accounting data comes from Compustat-Capital IQ. These two data sets are merged using CUSIP identification numbers. Lastly, the output regression data is used by running a regression controlling for several risk factors. At the same time, I use the five Fama-French (2015) factors including the Carhart momentum factor (1997) to compare the high FCF firms to the low FCF firms. The risk factors are taken from the Kenneth R. French – Data Library.

The FCF summary statistics for the sample of firms by industry are presented in Table 2. For the time period from 1973 to 1993, the industry with the highest mean FCF is service, and the industry with the lowest mean FCF is construction. Service industry has the highest average FCF is probably because it has a higher EBIT and a lower spending on the net working capital and CapEx. The second highest mean FCF is manufacturing. A probable reason is that those industries might spend a lot on EBIT and a high depreciation might bring down gross profits. For the industries in the 25th percentile, Manufacturing has the highest FCF. The Service industry has the highest FCF

for the 50th and 75th percentile. Now we turn to the time period of 1994 to 2017, where the service industry also has the highest mean FCF and the mean FCF of construction industry is the lowest compare to the time period of 1973 to 1993. The second highest mean FCF is the manufacturing industry as well, comparing with the time period of 1973 to 1993. For the industries in the 25th percentile, retail / Wholesale has the highest FCF. The service industry has the highest FCF for the 50th and 75th percentile. However, Natural Resources industry has the highest FCF intra-industry volatility relative to the mean value for the years from 1994 to 2017.

For the Maximum FCF values, the tested results are similar with what we have during time period 1973 to 1993. However, for the time period of 1994 to 2017, most results are the same except for the Construction industry and the Financial Services industry. Nevertheless, these values are very large which aren't rational for companies to have such high numbers for the free cash flow. Also, The FCF values for minimum FCF were influenced by the Winsorized variables and the tested results are similar for both time periods.

Industry	EBIT	TXT	DP	CapEx	NWC
Natural Resources	171.21	28.74	86.13	128.89	5.17
Construction	49.51	10.92	15.40	10.16	3.12
Manufacturing	270.65	55.86	87.73	72.92	12.62
Service	666.12	81.23	294.09	282.19	-7.50
Retail/Wholesale	179.83	38.15	51.63	58.96	6.13
Financial Services	148.48	36.84	21.97	10.71	9.45
Professional Services	107.56	20.08	33.61	25.59	13.26
Total Sample	260.48	46.78	94.80	90.12	8.92

Industry	Number of Firms		Mean FCF		Maximum FCF		Minimum FCF			
	1973-1993	1994-2017	1973-1993	1994-2017	1973-1993	1994-2017	1973-1993	1994-2017		
Natural Resources	7747	19590	41.78	128.44	2264.70	15658.58	-270.49	-1262.78		
Construction	977	1176	16.24	72.75	1399.80	2868.86	-252.18	-827.00		
Manufacturing	47603	68439	50.49	278.38	2264.70	15658.58	-270.49	-1262.78		
Service	10520	15953	117.97	696.89	2264.70	15658.58	-270.49	-1262.78		
Retail/Wholesale	12054	14655	24.51	210.47	2041.90	15658.58	-270.49	-1262.78		
Financial Services	1423	2694	25.85	170.89	1221.48	13574	226.95	-1224.87		
Professional Services	13302	32901	22.89	99.28	2264.70	15658.58	-270.49	-1262.78		
Total Sample	93626	155408	49.35	254.70	2264.70	15658.58	-270.49	-1262.78		
industry	Standard Deviation		FCF Standard Deviation		25th Percentile		50th Percentile		75th Percentile	
	FCF		÷ Mean FCF		1973-1993	1994-2017	1973-1993	1994-2017	1973-1993	1994-2017
Natural Resources	190.48	924.92	4.56	7.20	-1.38	-12.79	0.84	-0.55	12.83	15.27
Construction	98.17	231.86	6.04	3.19	-1.20	-0.18	1.77	9.36	9.76	62.12
Manufacturing	206.07	1217.27	4.08	4.37	-0.06	-2.93	2.32	3.36	16.51	63.39
Service	330.31	1932.41	2.80	2.77	-0.15	-0.95	12.11	45.81	84.89	418.01
Retail/Wholesale	112.52	844.28	4.59	4.01	-0.30	0.34	2.11	14.29	12.45	97.86
Financial Services	99.33	753.48	3.84	4.41	-0.26	-0.34	1.36	4.51	14.88	69.68
Professional Services	138.64	573.96	6.06	5.78	-0.75	-2.14	0.89	2.44	6.83	32.62
Total Sample	205.41	1148.42	4.16	4.51	-0.28	-2.93	2.16	3.60	16.91	66.06

III. CORRELATIONS BETWEEN FCF AND RETURNS

To more clearly demonstrate the relationship between the free cash flow and corporate returns, the Pearson product-moment correlation coefficients are calculated for each of the seven industries. The Pearson's r is a measure of linear correlation between FCF and ROA, FCF and ROE, and ROA and ROE. Table 3 is a result of coefficients and the pertinence of them. The correlations between FCF and ROA for years from 1973 to 1993 are positive, except for the Construction industry. A probable reason for this negative fact is that it is not statistically different than zero. All correlations are significant for the years from 1994 to 2017 between FCF and ROA are all positive and significant at 0.01 level.

For the correlations between FCF and ROE, they are all positive for both time periods. Also, they are all significant at level 0.01 except for the Construction industry. The Construction industry is significant for the year 1973 to 1993 when examining the correlation between FCF and ROA, but becomes insignificant when examining the correlation between FCF and ROA for the years 1994 to 2017. When comparing the correlation between FCF and ROA and between FCF and ROE, we find that for the years from 1973 to 1993, most of the industries become less positive, only the construction industry and the retail / wholesale industry head to the opposite. For the years from 1994 to 2017, the correlation coefficients for all the industries become more positive except for the Natural resources industry and financial services industry.

For the correlations between ROA and ROE, the correlations are all positive and significant at 0.1 level for the years from 1973 to 1993. On the contrary, the correlations are all negative for the years from 1994 to 2017. However, all the correlations are significant at 0.01 level except for the financial services industry, which is insignificant.

industry	FCF-ROA Correlation		FCF-ROE Correlation		ROA-ROE Correlation	
	1973-1993	1994-2017	1973-1993	1994-2017	1973-1993	1994-2017
Nautral Resources	0.1063 (0)	0.0372 (0)	0.0918 (0)	0.0344 (0)	0.4580 (0)	-0.0681 (0)
Construction	-0.0236 (0.4657)	0.0481 (0.0989)	0.0051 (0.8746)	0.0611 (0.0361)	0.4576 (0)	-0.2347 (0)
Manufacturing	0.0767 (0)	0.0581 (0)	0.0667 (0)	0.0595 (0)	0.4611 (0)	-0.0723 (0)
Service	0.0863 (0)	0.0599 (0)	0.0551 (0)	0.0717 (0)	0.3532 (0)	-0.0472 (0)
Retail/Wholesale	0.0506 (0)	0.0363 (0)	0.0522 (0)	0.0464 (0)	0.3377 (0)	-0.0720 (0)
Financial Services	0.0755 (0.0044)	0.0498 (0.0097)	0.0730 (0.0059)	0.0335 (0.0820)	0.3769 (0)	-0.0021 (0.9114)
Professional Services	0.0697 (0)	0.0444 (0)	0.0549 (0)	0.0477 (0)	0.3905 (0)	-0.0969 (0)
Total Sample	0.0776 (0)	0.0522 (0)	0.0638 (0)	0.0554 (0)	0.4196 (0)	-0.075 (0)

p-values are reported in parentheses.

IV. PATTERNS BETWEEN FCF AND PROFITABILITY MEASURE RANKINGS

A different method for analyzing the relationship between FCF and profitability is to control for the sizes of each industry. I ranked the firms into eight equal groups by quantiles for each industry to achieve this based on rankings of ROA and ROE. By calculating the average FCF, it stands to reason that the profitability measures of ROA and ROE with FCF can be grouped from low to high. The relationship results are shown in the Table 4 and 5.

For the time period from 1973 to 1993, Panel I represents the relationship between FCF and ROA. The industry with the highest ROA and the highest mean FCF is the service industry. The industry with the highest ROA and the lowest mean FCF is the construction industry. The industry with the highest mean FCF and the lowest ROA is the construction industry. The industry with the lowest mean FCF and the lowest ROA is the financial services industry with a mean FCF of 0.02 days, and the manufacturing industry, with a mean FCF of -1.53 days. When reviewing the results for the average FCF for all groups across industries for ROA, ROA increases as the mean FCF increases only decreasing for the highest ROA ranking group.

For the time period from 1994 to 2017, panel II represents the relationship between FCF and ROA. The industry with the highest ROA and the highest mean FCF is service industry as well. The industry with the highest ROA and the lowest mean FCF is construction industry. The industry with the highest mean FCF and the lowest ROA is

service industry. The industry with the lowest mean FCF and the lowest ROA is professional services industry with a mean FCF of -5.61 days, and the Manufacturing industry, with a mean FCF of -14.02 days. When reviewing the results for the average FCF for all groups across industries for ROA, the same pattern seen in Panel I holds. ROA increases as the mean FCF increases only decreasing for the highest ROA ranking group.

The Table 5 shows the relationship between FCF and ROE. Panel I represent the relationship between FCF and ROE for the time period 1973 to 1993. The industry with the highest ROE and the highest mean FCF is Service industry. The industry with the highest ROE and the lowest mean FCF is Construction industry. The industry with the highest mean FCF and the lowest ROA is Service industry. The industry with the lowest mean FCF and the lowest ROA is Professional Services industry with a mean FCF of 6.89 days, and the Financial Services industry, with a mean FCF of 0.75 days. When reviewing the results for the average FCF for all groups across industries for ROE, ROE increases as the mean FCF increases only decreasing for the highest ROE ranking group.

For the time period 1994 to 2017, The industry with the highest ROE and the highest mean FCF is Service industry as well. The industry with the highest ROE and the lowest mean FCF is Construction industry. The industry with the highest mean FCF and the lowest ROA is Service industry. The industry with the lowest mean FCF and the lowest ROA is Manufacturing industry with a mean FCF of 12.31 days, and the Financial

Services industry, with a mean FCF of 2.26 days. When reviewing the results for the average FCF for all groups across industries for ROE, the same pattern seen in Panel I holds except for a slight deviation for the Natural Resources, Retail/Wholesale and Professional Services industries. They deviate by decreasing in the second group and then adhere to the general trend; ROE increases as the mean FCF increases only decreasing for the highest ROE ranking group.

Table 4 Average Free Cash Flow (FCF) for Firms in Eight Groups Based on Return on Asset (ROA) Rankings Within Seven Industries									
Panel I: 1973-1993									
Lowest ROA									
Industry	FCF for ROA (Group # 1)	FCF for ROA (Group # 2)	FCF for ROA (Group # 3)	FCF for ROA (Group # 4)	FCF for ROA (Group # 5)	FCF for ROA (Group # 6)	FCF for ROA (Group # 7)	FCF for ROA (Group # 8)	Highest Overall Mean FCF
Nautral Resources	2.82	2.06	5.34	11.85	28.56	67.38	86.59	62.91	41.78
Construction	31.37	18.00	18.41	23.26	11.85	19.24	6.47	5.68	16.24
Manufacturing	-1.53	7.50	34.10	59.02	68.82	78.05	64.05	49.89	50.49
Service	20.00	60.56	70.66	107.03	135.02	147.51	195.29	122.32	117.97
Retail/Wholesale	4.58	15.99	22.75	25.61	34.92	37.70	31.86	19.23	24.51
Financial Services	0.02	5.12	41.28	43.30	35.67	29.90	17.99	27.17	25.85
Professional Services	0.18	1.05	10.17	20.52	30.09	27.86	37.10	33.61	22.89
Equal-weighted mean FCF	8.21	15.75	28.96	41.51	49.28	58.23	62.77	45.83	42.82
industry	FCF for ROA (Group # 1)	FCF for ROA (Group # 2)	FCF for ROA (Group # 3)	FCF for ROA (Group # 4)	FCF for ROA (Group # 5)	FCF for ROA (Group # 6)	FCF for ROA (Group # 7)	FCF for ROA (Group # 8)	Highest Overall Mean FCF
Panel II: 1973-1993									
Lowest ROA									
Nautral Resources	5.48	-6.47	10.39	15.86	192.11	272.06	383.56	319.39	128.44
Construction	5.72	50.72	63.16	78.04	155.39	102.28	96.21	45.50	72.75
Manufacturing	-14.02	4.03	236.54	462.48	500.94	482.62	434.47	488.79	278.38
Service	30.25	351.03	730.81	662.41	889.70	1025.42	1212.76	1191.85	696.89
Retail/Wholesale	7.87	79.44	158.90	214.28	291.72	398.19	294.61	335.32	210.47
Financial Services	-3.99	5.15	100.55	236.59	418.65	303.39	267.20	138.46	170.59
Professional Services	-5.61	-4.51	8.61	105.83	153.84	184.89	231.76	196.21	99.28
Equal-weighted mean FCF	3.67	68.48	186.99	253.64	371.76	395.55	417.22	387.93	236.69

Table 5 Average Free Cash Flow (FCF) for Firms in Eight Groups Based on Return on Equity (ROE) Rankings Withing Seven Industries									
Panel I: 1973-1993									
Lowest ROE								Highest ROE	
Industry	FCF for ROE (Group # 1)	FCF for ROE (Group # 2)	FCF for ROE (Group # 3)	FCF for ROE (Group # 4)	FCF for ROE (Group # 5)	FCF for ROE (Group # 6)	FCF for ROE (Group # 7)	FCF for ROE (Group # 8)	Highest Overall Mean FCF
Natural Resources	10.04	5.49	3.13	12.75	27.43	58.06	81.86	89.41	41.78
Construction	17.44	20.54	21.35	19.71	18.55	17.73	6.83	11.21	16.24
Manufacturing	7.60	11.54	21.48	39.11	54.09	67.01	80.99	80.57	50.49
Service	32.39	34.50	69.69	103.66	133.92	149.49	186.68	156.73	117.97
Retail/Wholesale	14.42	7.56	11.90	14.92	23.41	43.97	35.88	33.07	24.51
Financial Services	0.75	5.19	16.71	41.50	48.53	23.39	32.33	34.89	25.85
Professional Services	6.89	4.09	8.79	9.95	21.00	25.96	41.11	42.17	22.89
Equal-weighted mean FCF	12.79	12.70	21.86	34.51	46.70	55.08	66.53	64.01	42.82
industry	FCF for ROE (Group # 1)	FCF for ROE (Group # 2)	FCF for ROE (Group # 3)	FCF for ROE (Group # 4)	FCF for ROE (Group # 5)	FCF for ROE (Group # 6)	FCF for ROE (Group # 7)	FCF for ROE (Group # 8)	Highest Overall Mean FCF
Panel II: 1994-2017									
Lowest ROE								Highest ROE	
Natural Resources	15.96	13.70	-14.44	28.12	179.44	289.86	403.50	229.98	128.44
Construction	19.81	32.31	92.08	84.16	95.62	100.42	129.00	62.04	72.75
Manufacturing	12.31	18.68	139.48	300.35	413.09	503.85	614.90	495.22	278.38
Service	185.11	264.10	566.37	767.65	825.74	888.24	1192.15	1235.16	696.89
Retail/Wholesale	65.51	54.52	117.28	184.15	234.42	332.18	416.39	391.84	210.47
Financial Services	2.26	3.70	94.87	272.85	281.65	424.97	222.02	142.69	170.59
Professional Services	37.54	1.03	7.87	50.90	122.20	178.75	268.05	212.92	99.28
Equal-weighted mean FCF	48.36	55.43	143.36	241.17	307.45	388.32	463.71	395.69	236.69

V. INFLUENCE OF FIRM SIZE ON FCF

By running the cross-sectional regression of FCF measures, we find out that larger firms tend to have higher FCF measures and profitability. Nonetheless, it is possible that this relationship could be illusory. Thus, size differences need to be controlled for in the regression. In order to control for size, we first sort each firm annually by total assets. We define a firm as large if that firm's total assets are greater than the 70% of the annual distribution. We then regress FCF on the profitability measures, ROA and ROE on the subset of the identified large firms. A first regression for each industry is used to examine the relationship between FCF and ROA. A second regression for each industry is used with large firm size included in the equation. When ROA is the response variable, the results from these two regressions for FCF, and ROA, are provided in Table 6.

For reporting purposes, we rescale FCF by 100,000 times FCF in Table 6. Before adjusting for size, all the FCF coefficients are significant. When adjusting for size, the relationship is still significant, except for Retail / Wholesale and Financial Service industry (1973 – 1993). This means that, independent of size, the FCF-ROA relationship largely holds for years from 1973 to 1993. The coefficients for all industries are significant

For Table 7, we also rescale FCF by 100,000 times FCF for ease of interpretation. When ROE is the response variable, the results from these two regressions for FCF and ROE are provided. Most of the FCF coefficients are significant when not adjusting for

size, except for the Construction industry (Full Time Period). Adjusting for size does not affect the results with exception of Retail / Wholesale industry (1973 – 1993), and Financial Services (1973 – 1993), which become insignificant. Therefore, the FCF-ROE relationship largely holds for years from 1973 to 1993, even when controlling for size. The coefficients for most of the industries are significant. For the years 1994 to 2017, the FCF-ROE relationship holds for part of the industries and the coefficients are significant.

Table 6 Cross Sectional Regression of Free Cash Flow (FCF) on Return on Assets (ROA) for Seven Industries												
	Natural Resources						Construction					
	Full Sample		1973-1993		1994-2017		Full Sample		1973-1993		1994-2017	
intercept	-0.328*** (0)	-0.315*** (0)	0.0458*** (0)	0.137*** (0)	-0.488*** (0)	0.115*** (0)	-0.0246 (0.261)	-0.313*** (1.07e-06)	0.0696*** (0)	0.0897*** (0)	-0.134*** (0.00295)	0.0902*** (0)
FCF	8.09*** (0)	-4.88*** (0)	12.1*** (0)	1.98*** (5.58e-06)	9.69*** (0)	7.71*** (9.08e-07)	15.2*** (2.05e-05)	-21*** (9.94e-07)	-3.95*** (0.118)	-6.42** (0.0130)	29.2*** (4.25e-05)	1.03 (0.137)
R ²	0.000948	0.066	0.011	0.00588	0.001	0.008	0.000726	0.0729	0.000558	0.026	0.00232	0.00470
F-Test	281.5 0	179 0	243 0	20.74 0	315.2 0	24.18 0	18.21 0	20 0	2.446 0	6.251 0	16.89 0	2.217 0
	Manufacturing						Services					
	Full Sample		1973-1993		1994-2017		Full Sample		1973-1993		1994-2017	
intercept	-0.0983*** (0)	-0.591*** (0)	0.0884*** (0)	0.152*** (0)	-0.273*** (0)	0.135*** (0)	0.0218*** -3.53E-05	-0.338*** (0)	0.105*** (0)	0.125*** (0)	0.106*** (0)	-0.645*** (0)
FCF	5.09*** (0)	-9.70*** (0)	7.97*** (0)	7.03*** (1.47e-05)	7.73*** (0)	3.23*** (0)	2.26*** (0)	-3.54*** (0)	3.59*** (0)	1.64*** (0)	7.39*** (0)	4.71*** (0)
R ²	0.00142	0.131	0.00589	0.00109	0.003	0.007	0.002	0.0842	0.00744	0.0161	0.0480	0.129
F-Test	1507 0	1371 0	1049 0	18.79 0	1648 0	129.2 0	409 0	210.6 0	280.5 0	100.5 0	399.5 0	191.5 0
	Retail / Wholesale						Financial Services					
	Full Sample		1973-1993		1994-2017		Full Sample		1973-1993		1994-2017	
intercept	0.0454*** (0)	-0.341*** (0)	0.101*** (0)	0.146*** (0)	-0.0213** (0.0395)	0.135*** (0)	-0.0506*** (0.000461)	-0.394*** (0)	0.0494*** (0)	0.121*** (0)	-0.119*** (2.76e-07)	0.135*** (0)
FCF	3.30*** (0)	-6.87*** (0)	7.54*** (0)	-3.44 (0.478)	5.08*** (0)	7.19*** (0)	5.98*** (6.05e-09)	-9.56*** (4.12e-09)	18.9*** (5.27e-07)	9.86 (0.996)	7.53*** (1.14e-08)	2.09 (0.320)
R ²	0.001	0.0645	0.00256	0.000107	0.001	0.0139	0.002	0.0945	0.006	4.19e-08	0.002	0.000655
F-Test	182.5 0	95.75 0	106.5 0	0.503 0	151.3 0	75.08 0	33.95 0	51.23 0	25.40 0	2.41e-05 0	32.78 0	0.989 0
	Professional Services						Whole Sample					
	Full Sample		1973-1993		1994-2017		Full Sample		1973-1993		1994-2017	
intercept	-0.209*** (0)	-0.835*** (0)	0.0477*** (0)	0.138*** (0)	-0.328*** (0)	0.116*** (0)	-0.125*** (0)	-0.563*** (0)	0.0801*** (0)	-0.0956*** (0)	-0.284*** (0)	-0.275*** (0)
FCF	12*** (0)	-19.8*** (0)	13.4*** (0)	2.56*** (1.80e-05)	14.7*** (0)	1.14*** (0)	5.66*** (0)	-8.68*** (0)	8.06*** (0)	-12.8*** (0)	8.10*** (0)	8.17*** (0)
R ²	0.001	0.131	0.005	0.00897	0.002	0.0169	0.001	0.111	0.006	0.218	0.003	0.003
F-Test	240.4 0	593.4 0	178.6 0	18.47 0	233.6 0	91.95 0	3277 0	2500 0	2314 0	4915 0	3425 0	3177 0

Robust pval in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 7 Cross Sectional Regression of Free Cash Flow (FCF) on Return on Equity (ROE) for Seven Industries												
	Natural Resources						Construction					
	Full Sample		1973-1993		1994-2017		Full Sample		1973-1993		1994-2017	
intercept	0.0363*** (2.42e-06)	-0.146*** (1.08e-08)	0.133*** (0)	0.321*** (0)	-0.0130 (0.220)	0.286*** (0)	0.204*** (0)	0.0383 (0.707)	0.197*** (0)	0.262*** (0)	0.195*** (0)	0.255*** (0)
FCF	5.35*** (0)	-1.89* (0.0505)	31.2*** (0)	12.6*** (5.87e-07)	5.45*** (0)	1.85** (0.0129)	18.7 (0.180)	14.2 (0.418)	2.99 (0.692)	-9.63 (0.245)	22.3 (0.171)	17.6 (0.305)
R ²	0.001	0.0309	0.008	0.00841	0.001	0.002	0.00223	0.0139	0.000	0.00769	0.004	0.0131
F-Test	47.62 0	107.2 0	138.6 0	25.13 0	46.90 0	6.181 0	1.796 0	2.776 0	0.157 0	1.356 0	1.873 0	1.057 0
	Manufacturing						Services					
	Full Sample		1973-1993		1994-2017		Full Sample		1973-1993		1994-2017	
intercept	0.142*** (0)	-0.263*** (0)	0.206*** (0)	0.316*** (0)	0.0703*** (0)	0.336*** (0)	0.276*** (0)	-0.0481 (0.233)	0.298*** (0)	0.331*** (0)	0.245*** (0)	0.313*** (0)
FCF	5.87*** (0)	-1.32*** (0.000172)	19.5*** (0)	6.73*** (0)	6.77*** (0)	1.84*** (4.28e-10)	3.77*** (0)	1.00* (0.0795)	8.84*** (0)	6.18*** (2.33e-09)	4.20*** (0)	3.14*** (5.50e-11)
R ²	0.00244	0.031	0.004	0.005	0.004	0.002	0.00387	0.016	0.003	0.005	0.005	0.00684
F-Test	385.1 0	520.8 0	480.8 0	51.01 0	445.3 0	39.02 0	79.14 0	64.54 0	59.53 0	35.79 0	86.36 0	43.10 0
	Retail / Wholesale						Financial Services					
	Full Sample		1973-1993		1994-2017		Full Sample		1973-1993		1994-2017	
intercept	0.249*** (0)	-0.0275 (0.500)	0.268*** (0)	0.372*** (0)	0.224*** (0)	0.327*** (0)	0.210*** (0)	0.0325 (0.612)	0.207*** (0)	0.423*** (0)	0.189*** (0)	0.318*** (0)
FCF	6.17*** (3.77e-05)	7.72 (0.505)	27.4*** (2.56e-06)	9.1 (0.185)	5.54*** (7.18e-08)	2.71*** (0.00926)	5.28*** (2.11e-06)	-7.35 (0.591)	61.8*** (2.11e-07)	7.65 (0.502)	5.24*** (7.41e-06)	1.57* (0.0667)
R ²	0.002	0.0113	0.003	0.00213	0.00215	0.00180	0.000917	0.010	0.00533	0.002	0.001	0.00110
F-Test	16.99 0	36.11 0	22.14 0	1.758 0	29.05 0	6.776 0	22.55 0	16.05 0	27.19 0	0.451 0	20.16 0	3.373 0
	Professional Services						Whole Sample					
	Full Sample		1973-1993		1994-2017		Full Sample		1973-1993		1994-2017	
intercept	0.143*** (0)	-0.0981*** (-0.0981***)	0.192*** (0)	0.379*** (0)	0.111*** (0)	0.310*** (0)	0.156*** (0)	-0.174*** (0)	0.214*** (0)	0.217*** (0)	0.101*** (0)	0.104*** (0)
FCF	11.9*** (0)	5.58*** (4.47e-05)	32.1*** (0)	8.44** (0.0105)	12.1*** (0)	6.48*** (2.69e-07)	5.97*** (0)	-6.55 (0.806)	19.8*** (0)	20.2*** (0)	6.58*** (0)	6.74*** (0)
R ²	0.00199	0.0108	0.003	0.002	0.00228	0.005	0.002	0.0228	0.004	0.00384	0.003	0.003
F-Test	85.41 0	98.34 0	87.95 0	6.557 0	83.46 0	26.52 0	667.2 0	855.7 0	860.7 0	761 0	781.7 0	739.5 0

Robust pval in parentheses

*** p<0.01, ** p<0.05, * p<0.1

VI. PORTFOLIO BY CALENDAR TIME

The relationship between FCF and firm profitability measures are significant. We've seen some implied results for the relationship between FCF and the profitability measures; however, to further examine this relationship we can use a calendar time portfolio. We rank each firm by FCF from the lowest FCF to the highest FCF. First, we include firms that report their financial statements in the same quarter in our portfolio. Then, we rebalance this portfolio every month to account for new financial reports and removals like delisting or acquisitions. We short the bottom 20% of firms with the lowest FCF, and we long the top 20% of firms with the highest FCF. To analyze this trading strategy, we'll look at each time periods alpha, while controlling for risk factors. To implement this strategy, we use the Fama-French five factor model (Fama & French, 2015) and Carhart's (1997) momentum factor in order to control for risk factors we may experience in the regression. We use six risk factors: market risk free return (MKTRF), small minus big (SMB), high minus low (HML), robust minus weak (RMW), conservative minus aggressive (CMA), and momentum (UMB). We regress the returns of the long-short portfolio on the risk factor models.

Table 8 gives the results of each risk factor regression and its resulting alpha values. For the three-factor model estimation, we regress the high FCF firms minus low FCF firms with three of the risk factors, MKTRF, SMB, and HML. For the entire sample, the alpha value is positive and significant at 0.01 level. It is interpreted as high FCF firms

outperform low FCF firms by 0.5146% or 51 basis points every month. For years 1973 to 2017, the alpha values are all positive and significant.

For the four-factor model estimation, we regress the high FCF firms minus low FCF firms with four of the risk factors, MKTRF, SMB, HML, and UMB. For the entire sample, the alpha value is positive and significant at 0.01 level. It is interpreted as high FCF firms outperform low FCF firms by 0.4879% or 49 basis points every month. For years 1973 to 2017, the alpha values are all positive and significant.

For the five-factor model estimation, we regress the high FCF firms minus low FCF firms with five of the risk factors, MKTRF, SMB, HML, RMW, and CMA. For the entire sample, the alpha value is positive and significant at 0.1 level. It is interpreted as high FCF firms outperform low FCF firms by 0.1622% or 16 basis points every month. For years 1973 to 1993, the alpha value is positive and significant at 0.01 level. For years 1994 to 2017, the alpha value is positive but no longer significant.

For the six-factor model estimation, we regress the high FCF firms minus low FCF firms with six of the risk factors, MKTRF, SMB, HML, UMB, RMW, and CMA. For the entire sample, the alpha value is positive and significant at 0.05 level. It is interpreted as high FCF firms overperform low FCF firms by 0.1790% or 18 basis points every month. For years 1973 to 2017, the alpha values are all positive but not significant.

In order to change from a three-factor to a four-factor model we had to add in UMB. Then, to change from a three-factor to a five-factor model we had to add in RMW

and CMA. Furthermore, to change from a three-factor to a six-factor model we had to add in RMW, CMA, UMB. RMW is the robust operating profitability portfolio's average return minus the weak operating profitability portfolio's average return.

If FCF improves the firm's operating profitability RMW captures the profitability effect, resulting in no alpha coefficients. Due to finding many significant alphas, the FCF is doing more than merely increasing operating profitability. If low FCF only frees up cash for investment the results will show portfolio returns loaded heavily on CMA resulting in no positive alpha. Due to finding many significant alphas, the FCF is doing more than merely increasing operating profitability or increasing investment.

Table 8
Fama-French Risk-Factor Alphas (%) from
Calendar Time Portfolio

	High CF - Low CF	3 Factor Model		4 Factor Model		5 Factor Model		6 Factor Model	
		Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
Full Sample	Market Value	-0.0805***	0.0293	-0.0748***	0.0280	0.0229	0.0216	0.0332	0.0214
	Small - Big	-0.6667***	0.0399	-0.6670***	0.0405	-0.5007***	0.0315	-0.4993***	0.0317
	High - Low	0.6469***	0.0591	0.6577***	0.0611	0.4166***	0.0499	0.4046***	0.0493
	Robust - weak					0.7563***	0.0545	0.7619***	0.0565
	Conservative - Aggressive					0.5041***	0.0655	0.5125***	0.0651
	Momentum			0.0307	0.0450			-0.0232	0.0320
	Alpha	0.5146***	0.0977	0.4879***	0.1086	0.1622*	0.0831	0.1790**	0.0883
1973-1993	Market Value	0.0139	0.0249	0.0152	0.0261	0.0292	0.0252	0.0332	0.0265
	Small - Big	-0.6213***	0.0382	-0.6328***	0.0390	-0.5949***	0.0367	-0.6079***	0.0375
	High - Low	0.3773***	0.0433	0.3683***	0.0429	0.3656***	0.0493	0.3411***	0.0494
	Robust - weak					0.2776***	0.0739	0.2909***	0.0745
	Conservative - Aggressive					0.2033**	0.0924	0.2408***	0.0876
	Momentum			-0.0538	0.0359			-0.0687*	0.0356
	Alpha	0.5243***	0.1037	0.5816***	0.1077	0.3789***	0.1043	0.4395***	0.1067
1994-2017	Market Value	-0.2539***	0.0496	-0.2338***	0.0484	0.0194	0.0419	0.0177	0.0405
	Small - Big	-0.6521***	0.0586	-0.6583***	0.0616	-0.3906***	0.0555	-0.3893***	0.0558
	High - Low	0.9279***	0.0782	0.9489***	0.0760	0.4445***	0.0764	0.4403***	0.0797
	Robust - weak					0.8854***	0.0862	0.8873***	0.0893
	Conservative - Aggressive					0.5155***	0.0958	0.5178***	0.0977
	Momentum			0.0526	0.0622			-0.0065	0.0481
	Alpha	0.7294***	0.1735	0.6911***	0.1859	0.1666	0.1502	0.1699	0.1531

P- values are reported in parentheses

*** p<0.01, ** p<0.05, * p<0.1

VII. SUMMARY

By using a cross sectional data of different industries, this research analyzes the relationship between free cash flows, and profitability measures, ROA and ROE over a forty-year time period. Most of the correlation coefficients for each industry during the different time periods are positive. Moreover, analysis of average FCF and ROA, ROE rankings indicates that mean FCF changes as ROA and ROE changes. This demonstrates a relationship effect between FCF and profitability measures. When controlling for size, a regression analysis of FCF and the profitability measures indicates that profitability is not influenced much by the size of firms. Taken altogether, a more aggressive free cash flow, or higher FCF, is associated with higher profitability. This can be seen for Service and Manufacturing for years 1973 to 2017. There seems to be a positive relationship between FCF and the profitability measures for most of the industries, and again, this relationship is not influenced much by the size of firms. However, when we regress the Fama-French risk factors, we find that profitability is affected by FCF after controlling for risk factors. Based on these results and findings, we can suggest purchasing the firms with a higher FCF and sell the firms with a lower FCF to make arbitrage opportunities. When the six-factor model is used to the full sample, the annualized return is 2.15%. For the years 1973 to 1993 and 1994 to 2017, the annualized returns respectively are 5.27% and 2.04%. A higher FCF firm seems to have a better stock performance than a lower FCF firm. It

appears that an investment in high FCF firms will outperform low FCF firms in terms of corporate returns after adjusting for a range of risks.

REFERENCES

- Derrald Stice, Earl K. Stice & James D. Stice. (2017). Cash Flow Problems Can Kill Profitable Companies. *International Journal of Business Administration* Vol. 8, No. 6
- Jeffrey Hales and Steven F. Orpurt. (2013). A Review of Academic Research on the Reporting of Cash Flows from Operations. *Accounting Horizons* Vol. 27, No. 3, pp. 539–578
- Smith, Richard L. Joo-Hyun Kim. (1994). The Combined Effects of Free Cash Flow and Financial Slack on Bidder and Target Stock Returns. *The Journal of Business* 67(2):281-310
- Fama, E.F. & French, K.R. (2015). A five-factor asset pricing model
http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html
- Jose, M.L., Lancaster, C. & Stevens, J.L. (1996). Corporate Returns and Cash Conversion Cycles. *Journal of Economics and Finance* 20(1), 33-46.
- McPherson, Madyson, "A Return to the Cash Conversion Cycle and Corporate Returns" (2018). *All Graduate Plan B and other Reports*. 1266.
<https://digitalcommons.usu.edu/gradreports/1266>
- What is Free Cash Flow – FCF?. *Investopedia*, web accessed Sep 16, 2018.
<https://www.investopedia.com/terms/f/freecashflow.asp>
- Scott Richardson. (2006). Over-investment of free cash flow. *Review of Accounting Studies* Volume 11, pp 159–189