Cash Flow Volatility and Capital Structure in Asia

Chris Harris
Elon University

Zhe Li
Colorado State University Colorado Springs

Thibaut Morillon
Elon University

This paper aims to investigate the relationship between cash flow volatility and capital structure policy for firms in developing Asian economies. The relationship is then examined, with all firms separated based on their economic development, and again based on prior debt levels and operating cash flows. Higher levels of cash flow volatility are positively related to the amount of debt in the capital structure. The positive relationship exists only among firms in developing economies and firms with higher historic leverage and positive operating cash flows.

Keywords: capital structure, cash flow volatility, developing economies

INTRODUCTION

Capital structure theory and its related studies have primarily been centered on the pecking order theory and the trade-off theory [(Modigliani and Miller, 2006), (Myers and Majluf, 1984)]. To assist in narrowing down the list of determinants of capital structure and to bridge the existing theories in capital structure, Frank and Goyal (2009) established a list of variables from prior research that have been found to impact leverage. Their results identified six common determinants that help bridge the differences between competing theories. While these established factors have helped determine underlying firm-specific variables that may determine firm debt levels, they have not been able to explain some observable trends in capital structure. As just one example, these six factors alone cannot explain the significant increase in corporate debt levels over the previous century (Graham et al. (2015)). Thus, while the Frank and Goyal (2009) model provides a valuable foundation, additional factors undoubtedly influence capital structure decisions.

This study examines two recent trends in finance and their potential impact on capital structure policy in one of the world's fastest-growing regions: Asia. The first trend is related to the documented rise in cash flow volatility (Bates *et al*., 2009). This increase in cash flow volatility can lead to firms experiencing shortfalls in cash. The second trend is related to the documented rise of firms with negative cash flow [(Ritter and Welch, 2002), (Fama and French, 2004), (Denis and McKeon, 2018)]. Both of these trends are important because if negative operating cash flows persist or if firms experience cash flow volatility

resulting in negative changes in cash flow, they may not be able to meet their funding obligations. When firms are not in a position to meet their funding obligations, they will seek to raise capital. When firms experience these types of near-term cash demands, they are more likely to issue debt than equity (Huang and Ritter, 2021). Thus, the result of increased cash flow volatility and the growing number of firms with negative operating cash flows can directly impact the decision to increase debt levels.

This paper follows others in demonstrating a link between cash flow volatility and capital structure policy [(Keefe and Yaghoubi, 2016), (Memon *et al*., 2018), (Harris and Roark, 2018)]. However, this study focuses on this relationship with firms in 22 Asian countries. We focus on Asia because of the rapid growth taking place in the economies of those nations, because there is evidence we should see a relationship in these countries similar to what is observed in the United States (Booth *et al*., 2002), and because (to our knowledge) no other study has identified this meaningful relationship across this wide range of firms. We first expand upon existing capital structure literature by finding a positive and significant relation between the use of debt and cash flow volatility across a sample of firms based in 22 Asian nations. Second, we contribute to the capital structure literature by demonstrating that this positive relationship is primarily driven by firms in developing economies. We identify a link between this relationship and a firm's prior debt levels. We also demonstrate that this relationship is driven by firms with positive operating cash flows, specifically those in the highest quartile of operating cash flows. Overall, these results suggest that the documented increases in cash flow volatility are contributing to capital structure decisions throughout Asia, but in particular for firms based in developing countries.

The rest of the paper is structured as follows. In Section 2, we review the relevant literature on trends in rising cash flow volatility, capital structure, and negative operating cash flows. Section 3 describes our empirical model, explaining the hypotheses, methodology, and data used. In Section 4 we report and discuss our results. Section 5 presents the conclusions of the study.

LITERATURE REVIEW

Frank and Goyal (2009) investigate 25 separate factors that may be determinants of capital structure. These potential factors are chosen based on prior capital structure literature, such as the pecking order theory and the trade-off theory [(Modigliani and Miller, 1963), (Myers and Majluf, 1984)], among others. The objective was to determine which factors were reliable determinants of capital structure policy. The result was six primary determinants that were reliably related to debt levels. Those six determinants are median industry debt, market-to-book ratio, asset tangibility, firm profitability, firm size, and expected inflation. This model, with these primary factors, has been widely used since its publication [(Faccio and Xu, 2015), (Leary and Roberts, 2014), (Reinartz and Schmid, 2016), (Faulkender and Smith, 2016), (DeAngelo *et al*., 2017), (Keefe and Yaghoubi, 2016), (Harris and Roark, 2018), (Garcia and Herrero, 2021)]. While these six determinants have been widely used, it has also been established that some observable trends are not fully explained by these determinants alone. For example, the dramatic rise in corporate debt levels observed over the past decade (Graham *et al*., 2015) is not fully explained by these determinants. Thus, several other factors have been shown to offer additional explanatory power in understanding capital structure policies. Harris (2015) shows higher levels of financial flexibility are positively related to debt levels. Pindado *et al*. (2017) show that when expectations of the overall economy weaken, there is a corresponding decrease in debt levels.

Of particular importance to this paper is Harris and Roark (2018) which demonstrates a positive relationship between cash flow volatility and debt levels in the United States. Given the fact that more firms are experiencing an increase in cash flow volatility (Bates *et al.,* 2009), and that firms are more likely to experience a short-term cash shortfall when experienced cash flow volatility, and given the fact that firms are more likely to issue debt when experiencing a short-term funding need (Huang and Ritter, 2021), it is reasonable to expect firms to increase debt levels when experiencing more cash flow volatility. This result from Harris and Roark (2018) and Bates *et al.* (2009), is supported by Kim and Sorenson (1986) who also found a positive relation between leverage and volatility.

While these factors have been well established for firms in the United States, the trend of rising cash flow volatility and its impact on capital structure for firms in other parts of the world, particularly in Asia, remains an important question to be answered. The Asian Development Bank estimates that the economies of Asia will account for 60% of global GDP by 2030. While the United States remains the world's largest economy, the impact of growth in Asia is significant and continues to grow. It is reasonable to expect there could be a similar relationship between cash flow volatility and capital structure for firms in Asian economies since many determinants of capital structure policy can be expected to be similar between U.S.-based firms and non-U.S. based firms (Booth *et al.,* 2002), but this relationship has not yet been demonstrated.

While we explore the relationship between cash flow volatility and capital structure in Asia, it is also relevant that Deesomsak et al. (2004) demonstrate that capital structure policies for Asian firms may differ due to the environment in which they operate. Asia has a large portion of the world population and total economic development, but also has significant differences in economic development across countries. We, therefore, explore whether the effect of cash flow volatility differs for firms based on one of the largest distinguishing factors in the sample – namely, firms operating in developed economies versus those in developing economies.

Another documented trend related to shortfalls in cash needs that could impact capital structure policies is the firm's level of operating cash flow. Denis and McKeon (2018) identify a significant increase in the percentage of firms with a net operating loss. They found that roughly 6% of firms in 1960 had negative operating cash flow, and that percentage increased to nearly 30% by the end of their sample (2016). This dramatic increase in firms with negative operating cash flow is significant because it indicates that more firms rely on regular asset issuance to raise capital. Huang and Ritter (2016) find that when firms need to raise capital to meet immediate funding needs, they are more likely to issue debt than equity. Therefore, the specific level to which cash flow volatility impacts capital structure decisions (because of its impact on short-term financing needs) is likely also impacted by the firm's operating cash flows. Harris and Roark (2018) find that operating cash flow levels had a significant relation between cash flow volatility and debt among firms in the United States. Given that determinants in the United States may be similar to those internationally, including in developing economies (Booth et al., 2002), we aim to determine whether the level of operating cash flows affects the relationship between cash flow volatility and capital structure. The remainder of the paper focuses on the interaction between cash flow volatility and firm debt levels, providing possible explanations and robust checks.

EMPIRICAL MODEL AND METHODOLOGY

Building from the Frank and Goyal (2009) foundation, our model includes leverage as the dependent variable, with size, median industry debt, tangibles, inflation, profitability, and market-to-book value as independent variables. We also include cash flow volatility as our independent variable of interest. We hypothesize that, similar to firms in the United States (Harris and Roark, 2018), there is a positive relation between cash flow volatility and firm debt levels.

H1: *There is a positive relation between cash flow volatility and firm debt levels.*

We run the following regression model using panel data with standard errors clustered at the firm level and with year, industry, and country fixed effects included:

$$Leverage_{i,t} = b_0 + b_1 (Industry\ CFV)_t + b_2 (Size_{i,t}) + b_3 (Market\ to\ Book_{i,t}) + b_4 (Profitability_{i,t}) + b_5 (Industry\ Debt_t) + b_6 (Tangibles_{i,t}) + b_7 (Inflation_t) + m_{i,t} \quad (1)$$

After running the regression on this entire sample, we next explore whether the effect of cash flow volatility differs based on whether a firm is based in a developed or developing nation. We split all firms into these two categories using the IMF Advanced Economies classification and then run the regression in

Equation 1 on each separate subsample. Given the expected positive relationship between cash flow volatility and debt, and the higher observed cash flow volatility levels in developing economies, we believe that developing economies will exhibit a greater positive relationship.

H2: *The positive relation between cash flow volatility and debt level will be greater in developing economies.*

Finally, we explore whether firms' operating cash flow levels impact the relationship between cash flow volatility and debt levels. Given the rise in firms with negative operating cash flow (Dennis *et al*., 2018), we expect to find firms with positive operating cash flows are in a better position to borrow to manage increases in cash flow risk (possible short-term cash shortfalls) due to rising cash flow volatility.

H3: *The positive relation between cash flow volatility and firm debt levels will be greater for firms with positive operating cash flows.*

Our variables are defined as follows:

1) *Industry CFV* – Measure of the riskiness of cash flows. Following Bates *et al*. (2009), we measure Industry CFV as the average industry (Fama-French 48) cash flow volatility, which is the standard deviation of cash flows to assets for the previous 10 years. For younger firms, we require at least three observations.
2) *Firm Age* – The firm's age in number of years since first recorded activity. Computed as the current year minus the year the firm first records activity on *Global Compustat.*
3) *Goodwill/TA*: The ratio of goodwill to total assets. Computed as (GDWL / AT) from *Global Compustat*.
4) *Inflation*: Yearly inflation rate obtained from the World Bank's database.
5) *Leverage:* Debt over market value. Computed as [(DLC + DLTT) / (PRCCD * CSHPRIA + DLC + DLTT + PSTK - TXDITC)] from *Global Compustat*.
6) *Market to Book:* The ratio of the market value of assets divided by the book value of assets. Computed as [(PRCCD * CSHPRIA + DLC + DLTT + PSTK - TXDITC) / AT] from *Global Compustat*.
7) *Industry Debt:* Median market leverage of an industry, computed by fiscal year at the Fama-French 48 industry level.
8) *Profitability*: Firm profitability. Computed as (IOBDP / AT) from *Global Compustat*.
9) *Size:* The log of the firm's total assets. Computed as log(AT) from *Global Compustat*, adjusted for inflation (2010 levels). Total assets for all firms are shown in British pounds.

The countries included in this study are: *United Arab Emirates, Bangladesh, Bahrain, Cyprus, Mainland China, Hong Kong, Indonesia, India, Israel, Jordan, Japan, Kazakhstan, South Korea, Kuwait, Lebanon, Sri Lanka, Malaysia, Oman, Pakistan, Philippines, Palestine, Qatar, Saudi Arabia, Singapore, Thailand, Turkey, and Vietnam. Developed countries are Cyprus, Hong Kong, Japan, Israel, South Korea, and Singapore (classified by the International Monetary Fund).*

DATA AND SUMMARY STATISTICS

The initial data set includes all *Global Compustat* active and research file firms with an Asian ISO country code of incorporation for the time period from January 1988 to October 2021. The original sample includes 338,703 firm year observations. The final sample comprises 205,835 firm-year observations, with data for all variables included in the regressions. All variables were collected using annual fiscal year data from *Global Compustat*, except for the yearly inflation variable, which was collected from the World Bank's database.

TABLE 1
SUMMARY STATISTICS

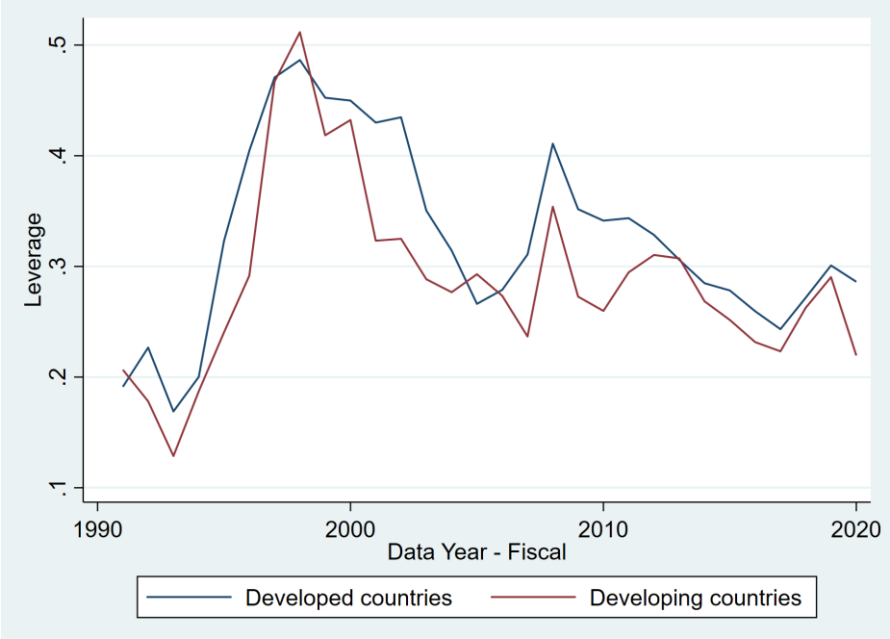
Panel A: All Asian countries						
	N	Mean	Std-dev	P25	Median	P75
Leverage	222738	0.301	0.224	0.281	0.043	0.507
Industry CFV	222738	0.048	0.047	0.025	0.031	0.058
Industry Debt	222738	0.270	0.237	0.193	0.112	222738
Market to Book	222738	1.337	0.824	1.574	0.560	1.426
Tangibles	222738	0.317	0.291	0.208	0.152	0.453
Profitability	222738	0.076	0.073	0.087	0.035	0.119
Size	222738	4.720	4.721	1.833	3.581	5.855
Inflation	222738	2.807	2.000	3.688	0.467	3.945

Panel B: Developed countries						
	N	Mean	Std-dev	P25	Median	P75
Leverage	97501	0.329	0.282	0.277	0.068	0.546
Industry CFV	97501	0.039	0.030	0.027	0.022	0.048
Industry Debt	97501	0.303	0.288	0.176	0.170	97501
Market to Book	97501	0.960	0.677	1.093	0.486	0.991
Tangibles	97501	0.290	0.272	0.189	0.144	0.408
Profitability	97501	0.071	0.070	0.080	0.037	0.109
Size	97501	5.214	5.066	1.622	4.109	6.169
Inflation	97501	0.791	0.467	1.506	-0.182	1.380

Panel C: Developing countries						
	N	Mean	Std-dev	P25	Median	P75
Leverage	125237	0.278	0.182	0.282	0.030	0.467
Industry CFV	125237	0.055	0.051	0.020	0.044	0.062
Industry Debt	125237	0.244	0.185	0.202	0.085	125237
Market to Book	125237	1.631	1.013	1.811	0.655	1.835
Tangibles	125237	0.337	0.310	0.220	0.159	0.492
Profitability	125237	0.079	0.076	0.092	0.033	0.127
Size	125237	4.334	4.402	1.894	3.085	5.579
Inflation	125237	4.376	3.328	4.098	2.000	5.925

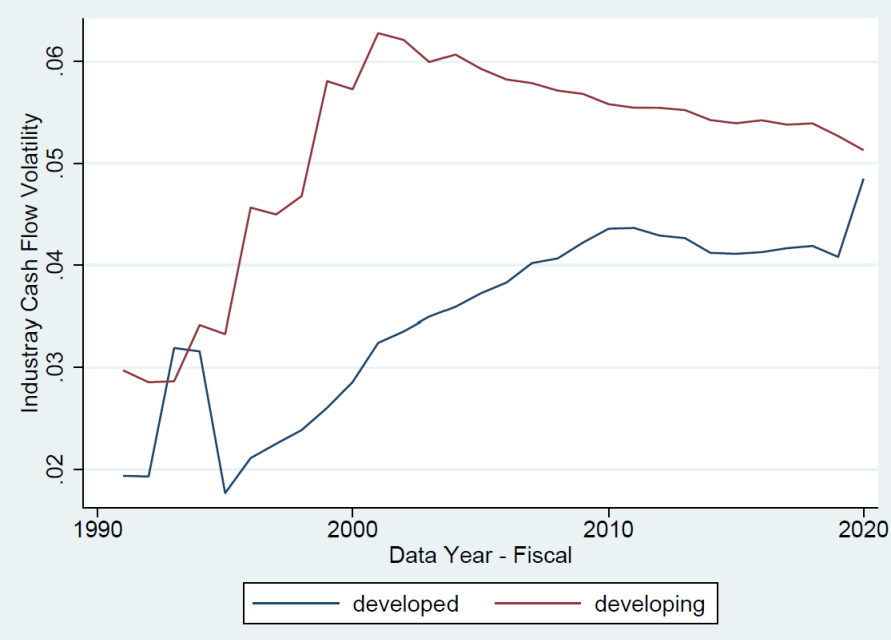
Summary statistics for the sample are displayed in Table 1. Panel A of Table 1 presents summary statistics for all Asian countries in the sample, while Panels B and C display summary statistics for the represented developed and developing countries, respectively. Consistent with the theory that lenders are more willing to lend in stable economics environments, we observe a statistically significant difference in both market debt levels and industry debt ratios between firms in developed and developing economies – with higher levels of both observed in developed economies. Importantly, we also find that debt levels have been rising significantly. Figure 1 illustrates debt levels across the sample of firms in Asia, as well as the distribution of firms between developed and developing countries.

FIGURE 1



Additionally, Figure 2 shows that firms in developing countries have higher total cash flow volatility. While the trend is for cash flow volatility to decrease slightly in developing economies, it is increasing in developed economies. Overall, developing economies continue to exhibit a statistically higher level of cash flow volatility.

FIGURE 2



RESULTS

TABLE 2
THE RELATIONSHIP BETWEEN INDUSTRY CASH FLOW VOLATILITY AND CAPITAL STRUCTURE

	Leverage
	All Asian Countries
Industry CFV	0.180***
	(3.25)
Industry Debt	0.578***
	(66.61)
Market to Book	-0.032***
	(-45.57)
Tangibles	0.294***
	(39.61)
Profitability	-0.770***
	(-62.16)
Size	0.027***
	(27.95)
Inflation	0.001**
	(2.01)
N	222,738
Adj. R squared	0.43
Year FE	Yes
Industry FE	Yes
Country FE	Yes
Clustered SE	Firm

This table reports the results of our specification detailed in equation (1), designed to investigate the relationship between industry cash flow volatility and capital structure. ***, **, and * denote significance of coefficients at the 1%, 5%, and 10% levels, respectively.

Table 2 presents the results from the multivariate analysis shown in equation 1. We confirm there is a positive relationship between cash flow volatility and leverage among Asian firms. This result is similar to those observed in the United States and other individual countries, confirming our hypothesis that firms may respond to higher cash flow volatility by increasing borrowing.

TABLE 3
RELATIONSHIP BETWEEN CASH FLOW VOLATILITY AND FIRM DEBT, BASED ON ECONOMIC DEVELOPMENT

	Leverage	
	Developed Countries	Developing Countries
Industry CFV	0.043	0.318***
	(0.50)	(4.40)
Industry Debt	0.601***	0.559***
	(38.89)	(53.52)
Market to Book	-0.037***	-0.031***
	(-24.12)	(-37.23)
Tangibles	0.421***	0.228***
	(30.25)	(27.08)
Profitability	-0.750***	-0.798***
	(-36.23)	(-51.69)
Size	0.019***	0.033***
	(11.54)	(27.97)
Inflation	0.004***	0.001**
	(5.17)	(2.23)
N	97,501	125,237
Adj. R squared	0.36	0.47
Year FE	Yes	Yes
Industry FE	Yes	Yes
Country FE	Yes	Yes
Clustered SE	Firm	Firm

***, **, and * denote significance of coefficients at the 1%, 5%, and 10% levels, respectively.

By further breaking down the sample between developed and developing Asian countries, we find that this positive relationship between cash flow volatility and debt levels only exists among firms based in developing countries. This is a very interesting, and unique, finding. While the relationship is positive and significant for the entire Asian sample, it is not significant for firms in developed countries. Thus, the trend of rising cash flow volatility (Bates et al., 2009) appears to have impacted the corporate capital structure policies of a specific subset of firms throughout Asia.

Overall, the results of Tables 2 and 3 are consistent with our initial hypothesis that increases in cash flow volatility are positively related to the amount of debt in the capital structure of firms throughout Asia and is driven by firms in developing economies.

TABLE 4
RELATIONSHIP BETWEEN CASH FLOW VOLATILITY AND DEBT LEVELS, SEPARATED BY LEVERAGE QUARTILES

	Lowest leverage			2nd quartile leverage			3rd quartile leverage			Highest quartile leverage		
	All Asian Countries	Developed Countries	Developing Countries	All Asian Countries	Developed Countries	Developing Countries	All Asian Countries	Developed Countries	Developing Countries	All Asian Countries	Developed Countries	Developing Countries
Industry CFV	0.072***	0.145***	0.008	0.072**	0.304***	-0.064*	0.177***	0.375***	0.078	0.441***	0.607***	0.347***
	-4.7	-5.53	-0.41	-2.57	-5.76	(-1.80)	-4.73	-5.46	-1.6	-6.27	-5.57	-3.69
Industry Debt	0.087***	0.150***	0.056***	0.278***	0.291***	0.269***	0.361***	0.354***	0.357***	0.270***	0.270***	0.256***
	-17.68	-16.5	-8.83	-52.81	-29.59	-42.1	-63.99	-34.4	-50.76	-33.51	-18.15	-26.08
Market to Book	-0.001***	-0.001***	-0.001***	-0.011***	-0.013***	-0.010***	-0.031***	-0.040***	-0.027***	-0.033***	-0.041***	-0.029***
	(-9.84)	(-4.59)	(-12.18)	(-31.75)	(-16.44)	(-26.00)	(-21.64)	(-12.65)	(-19.25)	(-8.27)	(-4.62)	(-7.11)
Tangibles	0.022***	0.027***	0.018***	0.036***	0.041***	0.031***	0.034***	0.043***	0.031***	0.072***	0.111***	0.055***
	-12.02	-6.32	-10.67	-12.32	-7.78	-9.07	-10.29	-7.36	-7.74	-11.59	-9.88	-7.74
Profitability	-0.012***	-0.013***	-0.004	-0.078***	-0.060***	-0.088***	-0.145***	-0.121***	-0.150***	-0.460***	-0.398***	-0.470***
	(-4.94)	(-2.90)	(-1.37)	(-14.37)	(-7.16)	(-12.37)	(-18.55)	(-9.67)	(-15.42)	(-30.88)	(-14.96)	(-27.43)
Size	0.001***	0.002***	0.001***	0.002***	0.002***	0.002***	0	0.001**	-0.001	0.008***	0.008***	0.009***
	-6.24	-4.49	-4.23	-5.56	-3.51	-4.78	(-0.39)	-2.39	(-1.58)	-9.68	-6.29	-7.9
Inflation	0.001***	0.009***	0.000**	0.003***	0.008***	0.003***	0.002***	0.002**	0.003***	0	-0.002*	0.001***
	-4.56	-14.88	-2.5	-8.38	-12.85	-7.42	-6.04	-2.51	-6.71	(-0.68)	(-1.89)	-3.36
N	56,066	24,435	31,631	55,469	24,354	31,115	55,734	24,392	31,342	55,463	24,318	31,145
Adj. R squared	0.42	0.45	0.42	0.66	0.66	0.66	0.76	0.66	0.8	0.61	0.38	0.69
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered SE	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm

***, **, and * denote significance of coefficients at the 1%, 5%, and 10% levels, respectively.

We next investigate whether the relationship between cash flow volatility and capital structure is influenced by the level of debt already present in the firm's capital structure. Table 4 presents the results, categorizing firms into quartiles based on leverage and further distinguishing between developed and developing economies. We find that cash flow volatility is positively related to debt levels in all quartiles of leverage for the entire sample of Asian firms. Of particular importance is that the level of significance rises with the leverage quartile. In other words, the size of the coefficient increases with statistical significance, demonstrating that firms already in the highest quartile of debt have the strongest positive relationship between cash flow volatility and debt levels.

We next investigate whether the relationship between cash flow volatility and debt levels is related to the firms operating cash flow levels. We explore this relationship in two ways. Table 5 identifies whether a firm has a positive or negative operating cash flow. Table 6 separates operating cash flows into quartiles to identify more detailed differences.

TABLE 5
RELATIONSHIP BETWEEN CASH FLOW VOLATILITY AND DEBT LEVELS FOR NON-NEGATIVE OCF AND NEGATIVE OCF FIRMS

	Non-negative OCF			Negative OCF		
	All Asian Countries	Developed Countries	Developing Countries	All Asian Countries	Developed Countries	Developing Countries
Industry CFV	0.353***	0.332***	0.367***	0.157*	0.072	0.298**
	(6.10)	(3.51)	(4.95)	(1.94)	(0.66)	(2.53)
Industry Debt	0.569***	0.589***	0.549***	0.574***	0.596***	0.568***
	(62.99)	(36.39)	(50.69)	(43.26)	(23.94)	(35.93)
Market to Book	-0.029***	-0.027***	-0.030***	-0.028***	-0.030***	-0.026***
	(-38.63)	(-14.44)	(-35.33)	(-24.14)	(-16.85)	(-18.00)
Tangibles	0.314***	0.447***	0.244***	0.287***	0.385***	0.235***
	(40.53)	(30.68)	(28.39)	(26.38)	(20.19)	(17.68)
Profitability	-0.909***	-1.045***	-0.867***	-0.346***	-0.211***	-0.452***
	(-64.25)	(-38.72)	(-52.47)	(-18.62)	(-7.42)	(-18.46)
Size	0.022***	0.015***	0.028***	0.047***	0.042***	0.050***
	(22.50)	(8.77)	(23.42)	(31.37)	(14.57)	(28.57)
Inflation	0.001***	0.005***	0.001***	-0.001***	0.001	-0.001
	(3.46)	(5.35)	(2.89)	(-2.78)	(0.43)	(-1.05)
N	176,942	80,242	96,700	45,794	17,258	28,536
Adj. R squared	0.44	0.38	0.49	0.43	0.38	0.46
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Clustered SE	Firm	Firm	Firm	Firm	Firm	Firm

***, **, and * denote significance of coefficients at the 1%, 5%, and 10% levels, respectively.

Results in Table 5 show that the relationship between cash flow volatility and debt levels is weakly significant for firms with negative operating cash flow for the entire sample. Among firms with negative operating cash flows, the relationship is not significant for firms in developed countries, but it is significant

at the 5% level for firms in developing countries. However, the relationship is highly significant among all firms in the sample with positive operating cash flows. Thus, the results in Table 5 support the idea that firms may increase debt in response to cash flow volatility, but firms with positive operating cash flows largely drive it.

The results in Table 6 further categorize firms into quartiles based on their operating cash flow levels. Results show that for the entire sample there is no significant relationship for the lowest quartile of operating cash flow levels. For the entire sample, we observe a statistically significant result starting in the second quartile of operating cash flow, which increases statistically significantly in the third quartile and then again in the fourth quartile. In other words, the positive relationship between cash flow volatility and debt levels increases as the firms operating cash flows increase. These results are especially true for firms based in developing countries.

TABLE 6
REGRESSION ESTIMATION BY OCF QUARTILES. *, **, AND * DENOTE SIGNIFICANCE OF COEFFICIENTS AT THE 1%, 5%, AND 10% LEVELS, RESPECTIVELY**

	Lowest operating cash flow			2nd quartile operating cash flow			3rd quartile operating cash flow			Highest quartile operating cash flow		
	All Asian Countries	Developed Countries	Developing Countries	All Asian Countries	Developed Countries	Developing Countries	All Asian Countries	Developed Countries	Developing Countries	All Asian Countries	Developed Countries	Developing Countries
Industry CFV	0.116	0.022	0.260**	0.291***	0.449***	0.186	0.330***	0.337**	0.319***	0.409***	0.381***	0.442***
	(1.48)	(0.21)	(2.27)	(3.29)	(3.03)	(1.64)	(4.10)	(2.52)	(3.02)	(5.60)	(3.12)	(4.91)
Industry Debt	0.584***	0.625***	0.569***	0.586***	0.604***	0.564***	0.573***	0.555***	0.557***	0.489***	0.546***	0.455***
	(44.67)	(25.99)	(36.90)	(45.65)	(25.77)	(36.20)	(47.84)	(24.70)	(39.04)	(39.21)	(23.40)	(29.38)
Market to Book	-0.029***	-0.030***	-0.027***	-0.038***	-0.043***	-0.037***	-0.039***	-0.043***	-0.038***	-0.019***	-0.019***	-0.020***
	(-26.09)	(-17.41)	(-19.33)	(-30.90)	(-13.64)	(-26.53)	(-38.41)	(-16.51)	(-33.69)	(-23.38)	(-10.30)	(-21.17)
Tangibles	0.304***	0.442***	0.224***	0.345***	0.493***	0.273***	0.325***	0.467***	0.258***	0.290***	0.384***	0.247***
	(27.65)	(22.72)	(17.41)	(31.76)	(24.04)	(21.91)	(33.19)	(26.03)	(22.94)	(31.85)	(22.20)	(23.71)
Profitability	-0.358***	-0.230***	-0.465***	-0.736***	-0.808***	-0.723***	-0.953***	-1.083***	-0.913***	-0.786***	-0.831***	-0.783***
	(-19.74)	(-8.13)	(-19.55)	(-29.69)	(-16.71)	(-24.99)	(-41.19)	(-23.89)	(-33.70)	(-45.23)	(-26.88)	(-37.32)
Size	0.043***	0.033***	0.050***	0.033***	0.025***	0.038***	0.021***	0.014***	0.027***	0.008***	0.001	0.014***
	(29.11)	(12.02)	(29.58)	(24.45)	(10.36)	(23.77)	(18.09)	(7.39)	(17.86)	(7.81)	(0.54)	(9.98)
Inflation	-0.001***	0.003*	-0.001	-0.000	0.005***	-0.000	0.001**	0.006***	0.001***	0.002***	0.003**	0.002***
	(-2.90)	(1.77)	(-1.48)	(-0.29)	(3.16)	(-0.57)	(2.55)	(3.76)	(2.73)	(3.47)	(2.02)	(4.18)
N	53,848	22,918	30,929	53,543	22,843	30,700	53,690	22,869	30,818	53,405	22,804	30,601
Adj. R squared	0.41	0.35	0.46	0.43	0.36	0.49	0.44	0.38	0.49	0.43	0.39	0.46
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Clustered SE	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm

CONCLUSION

In this paper, we investigate the relationship between two trends that have been explored in recent literature: rising cash flow volatility and increasing percentages of firms with negative operating cash flows. Specifically, we explore how these two trends impact firm capital structure throughout Asia. This is the first study, to our knowledge, which investigates this relationship for this region. We find evidence of a positive and significant relationship between cash flow volatility and debt levels. We interpret this to mean that firms respond to higher levels of cash flow volatility, and the associated increased risk of short-term cash shortages, by increasing their borrowing. Additionally, we find that this positive relationship exists only among firms based in developing economies, and there is no statistically significant relationship for firms based in developed economies. We investigate whether this relationship is influenced by the firm's total debt level, as well as whether it is contingent upon firm operating cash flow – specifically, whether the operating cash flow is positive or negative, and second, based on the quartile ranking of operating cash flows. We find that the relationship between cash flow volatility and debt levels is positively related to leverage, concentrated in firms with positive operating cash flows, and that this positive relationship increases as the operating cash flow quartile increases.

Overall, these findings help explain the important relationship between cash flow volatility and firm debt levels throughout Asia, which varies based on economic development, leverage, and operating cash flow levels.

One avenue of future research includes further exploration of how firms in developed economies manage the risk of cash shortfalls in response to cash flow volatility since it is not observed it is done through increased borrowing. This future research will be an important contribution to understanding a significant difference in borrowing behavior.

REFERENCES

Artavanis, N., & Karra, S. (2020). Financial Literacy and Student Debt, *The European Journal of Finance*, *26*(4–5), 382–401. https://doi.org/10.1080/1351847x.2019.1711435

Cherney, K., Rothwell, D., Serido, J., & Shim, S. (2020). Subjective Financial Well-Being During Emerging Adulthood: The Role of Student Debt. *Emerging Adulthood*, *8*(6), 485–495. https://doi.org/10.1177/2167696819879252

Board of Governors of the Federal Reserve System. (2016). *Student Loan Counseling Challenges and Opportunities: Findings from Focus Groups with Financial Aid Counselors.* Retrieved from https://www.federalreserve.gov/consumerscommunities/files/student-loan-counseling-challenges-and-opportunities-2016.pdf

Borden, J.P. (2021). An Innovative Approach to Improving Financial Literacy of College Students. *Business Education Innovation Journal*, *13*(2), 70–75.

Duarte, P., Silva, S., Ramalho, W., & Rui Sebastião, F. (2022, March 23). Are business students more financially literate? Evidence of differences in financial literacy amongst Portuguese college students. *Young Consumers: Insight and Ideas for Responsible Marketers*, *23*(1), 144–161. https://doi.org/10.1108/YC-12-2020-1264

Guohua, M., & Feng, K. (2018). Evaluating Financial Literacy Student Ambassador Program: A Student-led Approach to Promoting Financial Literacy. *Business Education Innovation Journal*, *10*(2), 7–11.

Harnisch, T. (2010). Boosting Financial Literacy in America: A Role for State Colleges and Universities. *Perspectives*. American Association of State Colleges and Universities. Retrieved from https://aascu.org/resources/boosting-financial-literacy-in-america-a-role-for-state-colleges-and-universities/

Inside Higher Ed College Pulse with support from project partner Kaplan. (2024). *Student Voice: Financial Wellness.* Retrieved from https://reports.collegepulse.com/financial-wellness

Joo, S.-H., Durband, D.B., & Grable, J. (2008). The Academic Impact of Financial Stress on College Students. *Journal of College Student Retention: Research, Theory & Practice*, *10*(3), 287–305. https://doi.org/10.2190/CS.10.3.c

Lusardi, A., & Mitchell, O.S. (2023). The Importance of Financial Literacy: Opening a New Field. *Journal of Economic Perspectives*, *37*(4), 137–154. https://doi-org.libproxy.eku.edu/10.1257/jep.37.4.137

Migliaccio, J.N. (2021). Taking the High Ground on Financial Literacy. *Journal of Financial Services Professionals*, *75*(6), 12–18.

Modigliani, F. (1966). The life cycle hypothesis of saving, the demand for wealth and the supply of capital. *Social Research*, pp. 160–217.

Mireku, K. (2024). Determinants of financial literacy among university students: Insight into background and exposure characteristics. *Journal of Business & Finance Librarianship*, *29*(3), 203–235. https://doi-org.libproxy.eku.edu/10.1080/08963568.2024.2352311

Panos, G.A., & Wilson, J.O.S. (2020). Financial Literacy and Responsible Finance in the FinTech Era: Capabilities and Challenges, *The European Journal of Finance*, *26*(4–5), 297–301, https://doi.org/10.1080/1351847X.2020.1717569

Rothstein, J., & Rouse, C.E. (2011). Constrained after college: Student loans and early-career occupational choices. *Journal of Public Economics*, *95*(1–2), 149–163. https://doi.org/10.1016/j.jpubeco.2010.09.015

Shook, J.L., & Keup, J.R. (2012). The benefits of peer leader programs: An overview from the literature. *New Directions for Higher Education*, (157), 5–16.

Taylor, Z.W., Serna, K., Eguiluz, L., & Marois, M. (2023). "Not impossible to do": Why Community College Students Participate and Persist in Voluntary Financial Education Programs. *Critical Questions in Education*, *14*(3), 259.

Tergesen, A. (2019, March 23). Schools Aim to Teach Teens Financial Savvy. *The Wall Street Journal*. Retrieved from https://www.wsj.com/articles/schools-aim-to-teach-teens-financial-savvy-11553342401