THE IMPACT OF CASH FLOW VOLATILITY ON THE MARKET LEVERAGE OF LISTED COMPANIES IN VIETNAM

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Appendix 1. Statistics of the stock exchange

Stock Exchange	Number	Percentage
Hanoi Stock Exchange (HNX)	207	53.21%
Ho Chi Minh Stock Exchange (HOSE)	182	46.79%
Total	389	100.00%

Appendix 2. Statistics of industry sector

Industry sector	Number	Percentage
Real Estate and Construction	143	36.76%
Technology	14	3.60%
Industry	43	11.05%
Services	48	12.34%
Consumer Goods	34	8.74%
Energy	32	8.23%
Materials	35	9.00%
Agriculture	25	6.43%
Healthcare	15	3.86%
Total	**389**	**100.00%**

Appendix 3. Summarizing the calculation formulas for the variables used in the model

Variables	Formula	Expectations	References
Market Leverage (TDM)	$TDM = \frac{\text{Total Debt}}{\text{Market Value of Equity} + \text{Total Debt}}$		Harris & Roark (2019)
Industry Median Market Leverage (INDTDM)	INDTDM=Median TDM of firms within the same industry	+	Li & Islam (2019), Frank & Goyal (2009)
Cash Flow Volatility (VCF)	$VCF = \frac{\text{Standard deviation of CF for the company in years t, t−1, t−2}}{\text{Book value of Assets}}$ Cash Flow (CF) = EBITDA – Interest – Tax – Dividends.	-	Nguyen et al. (2021), Ahmed & Elnahass (2024), (Keefe & Yaghoubi, 2016)
Market-to-Book Ratio (MB)	$MB = \frac{\text{Market Value of Total assets}}{\text{Book Value of Total assets}}$	-	Nam et al., (2024), Chang et al. (2014)
Tangible Asset Ratio (TANG)	$TANG = \frac{\text{Net Tangible Fixed Assets}}{\text{Total Assets}}$	+	Abdalla et al. (2025), Huang & Ritter (2021)
Return on Assets (PROF)	$PROF = \frac{\text{EBITDA}}{\text{Book Value of Total assets}}$ EBITDA = EBT + Interest + Depreciation	-	Nguyen (2024), Frank & Goyal (2009)
Firm Size (SIZE)	$SIZE = \text{Ln}\left(BVA * \frac{\text{Deflator GDP Index in 2015}}{\text{Deflator GDP Index in year t}}\right)$ BVA: Book Value of Assets	+	Armanious & Zhao (2024), Frank & Goyal (2009), Ozkan & Ozkan (2004)
Inflation Rate (INFL)	The consumer price index (CPI) inflation rate of Vietnam in year *t* is published by the World Bank (WB).	+	Brunnermeier et al. (2024), Frank & Goyal (2009)

Appendix 4. Descriptive statistics for the full sample and quartiles

Variable	Statistic	Full Sample	Quartile 1 (Q1)	Quartile 2 (Q2)	Quartile 3 (Q3)	Quartile 4 (Q4)
TDM	Mean	0.535	0.548	0.524	0.544	0.551
	Standard Deviation	0.245	0.256	0.268	0.246	0.246
	Median	0.560	0.587	0.547	0.556	0.567
	Minimum	0.005	0.003	0.018	0.0096	0.036
	Maximum	0.983	0.984	0.978	0.947	0.963
INDTDM	Mean	0.560	0.575	0.556	0.576	0.584
	Standard Deviation	0.137	0.152	0.134	0.152	0.142
	Median	0.576	0.672	0.589	0.586	0.588
	Minimum	0.235	0.265	0.283	0.252	0.245
	Maximum	0.823	0.841	0.852	0.803	0.804
VCF	Mean	0.043	0.024	0.039	0.035	0.032
	Standard Deviation	0.067	0.062	0.055	0.073	0.047
	Median	0.031	0.022	0.019	0.021	0.024
	Minimum	0.000	0.000	0.000	0.000	0.000
	Maximum	1.158	0.594	0.771	1.169	1.088
MB	Mean	1.031	0.962	1.028	1.037	1.133
	Standard Deviation	0.572	0.358	0.468	0.378	0.627
	Median	0.934	0.887	0.922	0.940	0.974
	Minimum	0.191	0.254	0.181	0.338	0.404
	Maximum	9.047	4.971	4.960	3.456	9.039
TANG	Mean	0.189	0.163	0.168	0.221	0.267
	Standard Deviation	0.187	0.154	0.154	0.204	0.236
	Median	0.133	0.093	0.124	0.146	0.202
	Minimum	0.000	0.000	0.000	0.000	0.000
	Maximum	0.952	0.849	0.866	0.959	0.924
PROF	Mean	0.128	0.072	0.117	0.133	0.150
	Standard Deviation	0.118	0.095	0.114	0.107	0.121
	Median	0.112	0.067	0.105	0.117	0.134
	Minimum	-0.724	-0.737	-0.206	-0.311	-0.085
	Maximum	2.033	0.653	1.478	1.041	2.023
SIZE	Mean	26.652	25.442	26.237	27.014	28.453
	Standard Deviation	1.533	1.216	0.861	0.844	1.132

Variable	Statistic	Full Sample	Quartile 1 (Q1)	Quartile 2 (Q2)	Quartile 3 (Q3)	Quartile 4 (Q4)
	Median	26.735	25.333	26.083	27.078	28.340
	Minimum	22.841	22.955	23.396	23.353	25.522
	Maximum	33.163	29.737	29.463	29.271	33.154
INFL	Mean	0.062	0.061	0.064	0.063	0.062
	Standard Deviation	0.055	0.057	0.046	0.050	0.056
	Median	0.043	0.042	0.040	0.039	0.036
	Minimum	0.007	0.012	0.007	0.007	0.007
	Maximum	0.197	0.191	0.187	0.188	0.189

Appendix 5. Variance inflation factors (VIF) for independent variables

Biến	VIF
PROF	1.36
MB	1.28
INDTDM	1.23
INFL	1.12
VCF	1.13
SIZE	1.09
TANG	1.08
Mean VIF	**1.18**

Appendix 6. Full Sample Regression Estimates Using POOL, FEM, and REM models

Variables	POOL (Pooled OLS)	FEM (Fixed Effects Model)	REM (Random Effects Model)
INDTDM	0.432***	0.451***	0.443***
	(0.023)	(0.028)	(0.03)
VCF	-0.175***	0.070*	0.048
	(0.057)	(0.0361)	(0.036)
MB	-0.171***	-0.155***	-0.158***
	(0.007)	(0.006)	(0.006)
TANG	0.048***	0.069***	0.054***
	(0.016)	(0.021)	(0.019)
PROF	-0.547***	-0.313***	-0.313***
	(0.034)	(0.023)	(0.022)
SIZE	0.039***	0.094***	0.074***
	(0.002)	(0.005)	(0.004)
INFL	0.157**	0.203***	0.183***
	(0.067)	(0.041)	(0.040)
Constant	-0.523***	-2.045***	-1.432***
	(0.056)	(0.126)	(0.097)
Observations	3,810	3,810	3,810
R-squared (Overall)	0.4128	0.388	0.3649
Number of Groups	-	381	381

Notes: Robust standard errors are indicated in parenthesis. ***, **, and * denote significance at 1%, 5%, and 10% levels, respectively. R-squared (Overall) for the REM model is reported; however, FGLS fails to include R-squared directly.