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CASH FLOW VOLATILITY AND FINANCIAL STABILITY: EVIDENCE FROM INSURANCE AND NON-FINANCIAL FIRMS IN JORDAN

Abstract

Cash flow volatility is an important source of financial uncertainty because unstable operating cash flows may weaken firms' ability to meet obligations, sustain investment, and preserve financial flexibility. This issue is particularly relevant in emerging markets, where firms often face financing constraints and sectoral structure may shape financial stability differently. This study examines the relationship between cash flow volatility and financial stability in Jordanian listed firms and investigates whether the insurance sector responds differently to operating cash flow uncertainty compared with other non-financial firms. Financial stability is measured using the Z-score, while cash flow volatility is calculated as the rolling standard deviation of operating cash flow scaled by average total assets. The analysis uses panel data for Jordanian listed firms over 2014–2024. A three-year rolling window is applied in the baseline model, while a five-year rolling window is used as a robustness check. The regression model includes an interaction term between cash flow volatility and an insurance-sector dummy, along with firm size, leverage, firm age, and sales growth as control variables. The results indicate statistically weak evidence that the Z-score is negatively associated with cash flow volatility, albeit in a directionally weak one. But this is not statistically significant in the baseline fixed-effects model. Furthermore, the interaction between cash flow volatility and the insurance sector dummy is not statistically significant and has a different sign in one robustness specification. The study therefore does not confirm that insurance firms are structurally less sensitive to cash flow volatility. Leverage remains the most robust determinant of lower financial stability.

Keywords insurance regulation, financial stability, distance to insolvency, operating cash flow uncertainty, leverage, liquidity uncertainty, firm-level stability

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INTRODUCTION

Business cash flow is one of the most visible indicators of a company's ability to continue operations, pay its bills, and maintain financial flexibility. If these cash flows become volatile, companies may be under increased pressure to finance activities, sustain investments, and absorb unexpected shocks. It is particularly relevant in emerging markets where financing from outside the firm could be more expensive, and firms may be more sensitive to demand, liquidity, and institutional factors. In these types of environments, operating cash flow fluctuations are not only an accounting reality but also a financial uncertainty that could affect the company's stability in the future. The impact of volatile cash flows may vary across different sectors. Insurance companies have a different business model than other non-financial companies. Underwriting activities, claims obligations, technical reserves, reinsurance, investment income, and regulatory capital requirements influence their financial position. Such characteristics can enable the insurers to impact the operating volatility to a greater

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extent than companies that are more directly dependent on sales, production cycles, and normal operating margins. Meanwhile, insurance firms continue to face liquidity challenges associated with claims, reserve adequacy, investment shocks, and reporting requirements changes. This provides an interesting scope to explore whether operating cash flow volatility has similar stability implications across various types of listed firms and constitutes a relevant context for this study. For this reason, Jordan is a useful context. In addition to a large number of non-financial companies, the Amman Stock Exchange also lists some relatively small but significant insurance companies. In the five-year period 2014–2024, the operating and reporting environment for listed companies in Jordan has been evolving, while the insurance industry has experienced supervisory and accounting developments in the industry, such as the transition to reporting on insurance contracts in accordance with the international financial reporting standards. The Jordanian market is appropriate for investigating the relationship between operating cash flow instability and sector stability of a firm in various sectors with different structures.

During the study period, the insurance sector represented a relatively small but regulated segment of the Amman Stock Exchange. The listed insurance sample consists of 16 firms, compared with a broader group of 58 non-financial listed firms included in the empirical analysis. Insurance companies in Jordan operate under sector-specific supervision and are subject to reporting requirements that differ from those applied to ordinary non-financial firms. The period 2014–2024 is also relevant because it covers years of changing reporting practices and the transition toward more detailed insurance-contract presentation under international financial reporting requirements. These features make the Jordanian market a useful setting for examining whether operating cash flow volatility has similar stability implications across firms operating in different sectoral structures.

Despite the growing literature on cash flow volatility, financial stability, and insurance soundness, there is still limited evidence on whether the stability implications of operating cash flow volatility differ between insurance companies and other non-financial firms in emerging markets. This gap is particularly relevant in Jordan, where the insurance sector is regulated and structurally distinct, but still operates within the same capital market environment as other listed firms. Addressing this gap can help clarify whether sectoral characteristics matter when interpreting the financial consequences of unstable operating cash flows.

1. LITERATURE REVIEW AND HYPOTHESES

The literature in this study can be classified into four streams: cash flow volatility as an economic friction, corporate liquidity and precautionary behavior, sectoral structure and insurance stability, and empirical identification in panel data. Volatility of operating cash flow is analyzed in the literature as being more than a variability in an accounting figure. Dechow (1994) argues that this is so because operating cash flows contain information about the performance of the firm because they reflect the firm's internally generated liquidity rather than accrual-based adjustments. In the Jordanian environment, Shubita (2021) also states that cash flows can predict earnings, while Moa. Shubita and Moh. Shubita (2010) demonstrate that accounting-based information can be used to explain firm-specific outcomes. It shows a lack of confidence in a firm's capacity to raise funds internally from its business operations. As cash flows become volatile, companies could experience an increase in their liquidity constraints, financing expenses, and ability to absorb unplanned events. The ratio could vary by industry since business models and revenue recognition schedules do not necessarily match, nor do the regulatory environment or capital structure. The impact of premiums received, claims paid, movements in reserves, reinsurance agreements, and investment income on cash flows is especially significant in this regard, with insurance companies being particularly relevant. These characteristics make the insurance sector an appropriate setting for examining whether the stability implications of cash flow volatility differ from those observed in other non-financial firms.

Classical evidence links cash flow volatility to underinvestment and higher external financing costs (Minton & Schrand, 1999). In parallel, corporate liquidity and cash policy studies show that firms with riskier cash flows and tighter financing frictions tend to alter cash holdings, payout, and leverage decisions in ways that balance flexibility against costs (Opler et al., 1999; Acharya et al., 2007; Han & Qiu, 2007; Bates et al., 2009). This argument is also consistent with Almeida et al. (2004), who show that financially constrained firms tend to save more cash out of internal cash flows, and with Khurana et al. (2006), who link financial development to the cash-flow sensitivity of cash. Kim et al. (1998) further relate corporate liquidity decisions to financing costs and expected distress costs.

However, when the industry in question is characterized by specific structural peculiarities, the question becomes more and more subtle. The logic of insurance companies is based on cash flow, which is very different from the logic of non-financial businesses. Contractual premiums and investment income are their main inflows, but claims payouts and reserve provisions regulate their outflows. The systemic-risk literature repeatedly underlines that the core business of insurers is not the same as the maturity-transformation model that banks are generally engaged in, though peripheral business can cause the spill-over effect (Harrington, 2009; Eling & Schmeiser, 2010; Cummins & Weiss, 2014).

Minton and Schrand (1999) reveal that the average discretionary investment is lower, and the cost of accessing external capital is higher in firms with high cash-flow volatility, which is in line with financing constraints and underinvestment channels. This reasoning is consistent with the larger perspective according to which internal capital would be pertinent when external capital is expensive, and that companies would respond to policy instruments instead of smoothing cash flows.

A second line of research links cash flow uncertainty to liquidity management and hedging motives. Opler et al. (1999) show that firms hold cash partly to protect themselves from financing constraints and volatile investment opportunities. Further, cash should not be regarded as negative debt, as firms will find flexibility in their financing options when they experience future frictions, Acharya et al. (2007) add. Precautionary cash holdings are supported by similar evidence by Han and Qiu (2007), particularly for financially constrained firms. Other research indicates that the value of cash is affected by a firm's financial position, its governance structure, and outside financing (Faulkender & Wang, 2006; Dittmar & Mahrt-Smith, 2007; Pinkowitz et al., 2006). The evidence provides a basis for concluding that companies with volatile cash flows may be less likely to manage liquidity in a way that is conducive to financial stability. Financial flexibility has also been stressed in related corporate finance studies. Therefore, financial flexibility enables firms to cushion themselves against shocks if they occur without taking on the immediate burden of external funds at a high cost (Gamba & Triantis, 2008). Myers and Majluf (1984) also give an account of why financing frictions give special relevance to internally generated funds in the presence of information asymmetry. In this context, the relationship between risk, expected returns, cash-flow shocks, and cash holdings and saving behavior is as in Palazzo (2012) and Riddick and Whited (2009). Governance considerations are also relevant, since managers' use of internal funds may be shaped by incentives and monitoring mechanisms (Jensen & Meckling, 1976; Harford, 1999; Harford et al., 2008). In regulated financial settings, Laeven and Levine (2009) further show that governance and regulation influence risk-related financial behavior.

Recent Jordanian and regional evidence also shows that financial stability is shaped by cash-flow information, capital structure, governance quality, and reporting environments. Shubita (2021), Moa. Shubita and Moh. Shubita (2010), and Shubita (2019) support the relevance of accounting and cash-flow information in explaining firm outcomes, while Mansour et al. (2024), Shubita (2023), Al-Khazaleh et al. (2024, 2025)

A third strand points out that insurance companies have a different structure when compared to non-financial firms and even banks. In the global financial crisis, the debate on scholarship and policy analysis focused on the question of whether insurers are a source of systemic risk, frequently

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concluding that core insurance operations were less systemic and non-core ones could be problematic (Harrington, 2009; Eling & Schmeiser, 2010; Cummins & Weiss, 2014). In empirical research, the use of Z-score to represent insurers is growing, with other constructions being compared, and arguing that it can be a good indicator of financial soundness in thoughtfully adapted versions (Moreno et al., 2021). The studies on insurance soundness and prediction of failure are present in the Jordanian context and lead to the enhancement of the overall value of stability diagnostics, yet the approaches to measuring distress vary between the Altman-type models and the industry-specific ones (Salameh, 2022; Almanaseer & Al-Oshaibat, 2018; Abu Shihab et al., 2025).

The fourth strand is about identification and inference of panel models. In the case of combining time-invariant attributes, including an insurance-sector dummy, with firm fixed effects, the absorption of the former takes place. As a result, structural sector heterogeneities are represented in terms of interaction and slope heterogeneity as opposed to level shifts. The inference issue: clustered standard errors are essential in finance panels since there is correlation of residuals across firms over time (Petersen, 2009). Specification testing (Hausman, 1978) is generally used to test between a fixed and a random effects specification, whereas heteroskedasticity-robust covariance estimation is an essential part of sound inference (White, 1980).

Boyd and Runkle (1993) researched financial stability among financial institutions and discovered that capital adequacy and regulatory oversight are key factors in restraining excessive risk-taking behavior. Boubakri et al. (2013) examined corporate risk-taking in emerging markets and found that the institutional structures and ownership systems have a strong impact on corporate financial stability.

This study addresses the gap by examining cash flow volatility, financial stability, and insurance-sector characteristics within one comparative setting for Jordan. The analysis does not assume that the insurance sector is structurally different in advance. Instead, it tests whether the association between cash flow volatility and financial stability differs between insurance companies and other non-financial firms, while also reporting sector-specific estimates as supporting evidence.

Overall, prior studies suggest that unstable operating cash flows may weaken firms' financial stability through higher liquidity pressure and financing uncertainty. However, the magnitude of this relationship may differ across sectors depending on regulatory structures and business models. The insurance sector may therefore display different stability dynamics, although this remains an empirical question.

The purpose of this study is to examine whether cash flow volatility affects financial stability among Jordanian listed firms and whether this relationship differs between insurance companies and other non-financial firms. Financial stability is measured using the Z-score, while cash flow volatility is measured through rolling operating cash flow volatility scaled by total assets.

Study hypotheses are as follows:

H1: Cash flow volatility negatively affects financial stability measured by the Z-score.

H2: The link between cash flow volatility and financial stability differs between insurance companies and other non-financial firms.

2. METHOD

This study uses firm-year panel data for companies listed on the Amman Stock Exchange over the period 2014–2024. The data were collected from annual reports, ASE disclosures, and published financial statements. The sample consists of two groups. The first group includes 16 listed insurance companies. The second group includes 58 non-financial listed firms. Banks, diversified financial institutions, investment companies, and other financial firms are excluded because their balance sheets, regulatory requirements, and cash-flow structures differ substantially from those of insurance and ordinary non-financial firms.

The first data set covers the period from 2014 to 2024. The problem is that the rolling-window

variables have to be constructed using the observations of the previous year. For this reason, the three-year specification (main) will start in 2016 and the five-year robustness in 2018. The baseline regression sample consists of 494 firm-year observations, where 137 observations are from insurance firms and 357 observations are from non-financial firms. Note that the panel is imbalanced; that is, some firms have full observations on all variables and years, and some have partial observations. Listwise deletion is applied at the model level; this means that a firm-year observation is used only if all the variables needed for the corresponding regression are present.

Financial stability is measured using the Z-score, which captures the distance from insolvency. Cash flow volatility is measured as the rolling standard deviation of operating cash flow scaled by total assets. The main analysis uses a three-year rolling window, and a five-year rolling window is used as a robustness check. Continuous variables are winsorized at the 1st and 99th percentiles to reduce the influence of extreme values.

Different studies employ alternative specifications of the Z-score measure. Therefore, this study adopts a rolling-window approach based on profitability and capitalization indicators to ensure consistency across firms and years.

The baseline regression sample covers the period 2016–2024 because the construction of the rolling three-year variables requires prior observations. Table 1 reports the distribution of the final firm-year observations by sector and year after applying the data availability requirements.

As shown in Table 1, the final baseline sample includes 494 firm-year observations. Insurance firms account for 137 observations, while other non-financial firms account for 357 observations. The panel is therefore unbalanced, reflecting differences in data availability across firms and years. The relatively sharp decline in 2024 observations reflects the data availability requirements imposed by the rolling-window construction and the listwise deletion procedure used in the regression model. The figures for 2024 are not the total number of listed firms for that year, but rather a sample of firm-years that were retained by the data quality control requirements for the Z-score components, operating cash flow volatility, total assets, sales growth, and the control variables. Among non-financial enterprises, the decrease is more pronounced due to the exclusion of several of the 2024 observations that did not satisfy all the requirements for regression data when applying the rolling three-year measures.

The basic comparison model used is a panel regression controlling for firm and year fixed effects. The insurance dummy is time-invariant and is absorbed by firm fixed effects and is therefore not estimated directly. The interaction between CFV and INS is used to explore the sectoral slope difference, using the CFV slope across sectors.

Table 1. Sample distribution by sector and year

Year	Insurance firms	Non-financial firms	Total observations
2016	16	56	72
2017	16	51	67
2018	16	40	56
2019	16	40	56
2020	16	42	58
2021	16	42	58
2022	15	39	54
2023	14	38	52
2024	12	9	21
Total	137	357	494

Note: The table reports the firm-year observations included in the baseline three-year rolling specification after applying the data availability requirements for the regression model. The final sample consists of 494 firm-year observations, including 137 insurance-firm observations and 357 non-financial-firm observations.

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Table 2. Variable definitions and construction

Variable	Symbol	Construction	Expected relationship with Z-score
Z-score	Z	Distance-to-insolvency proxy computed as (mean ROA over rolling window + mean equity-to-assets over rolling window) divided by the standard deviation of ROA over the same window. Main window is 3 years; robustness uses 5 years	Higher Z implies greater financial stability and lower insolvency risk
Cash flow volatility	CFV	Standard deviation of operating cash flow scaled by total assets, computed using a 3-year rolling window; robustness uses 5 years	Expected negative association with Z
Insurance sector dummy	INS	Equals 1 for insurance firms and 0 for non-financial firms	Not identified under firm fixed effects
Interaction term	CFV × INS	CFV multiplied by the insurance dummy to examine sectoral slope differences	Expected positive if insurance is more resilient
Firm size	SIZE	Natural logarithm of total assets	Expected positive
Leverage	LEV	Total liabilities divided by total assets.	Expected negative
Firm age	AGE	Years since the firm first appears in the 2014-2024 panel sample, Year minus first sample year plus 1	Ambiguous
Sales growth	GROWTH	Year-on-year percentage change in total revenues. For insurance firms, total revenues; for non-financial firms, operating revenues	Expected positive

Note: All continuous variables in the main specification are winsorized at the 1st and 99th percentiles.

2.1. Primary fixed-effects model

The general comparative specification is written as follows:

$$\begin{aligned} Z\_it = {} & \beta 0 + \beta 1\ CFV\_it + \beta 2\ INS\_i \\ & + \beta 3\ CFV\_it \cdot INS\_i + \beta 4\ SIZE\_it \\ & + \beta 5\ LEV\_it + \beta 6\ AGE\_it \\ & + \beta 7\ GROWTH\_it + \varepsilon\_it. \end{aligned} \quad (1)$$

However, because the insurance-sector dummy is time-invariant, it is absorbed by firm fixed effects in the fixed-effects estimation. Therefore, the estimated fixed-effects model is specified as follows:

$$\begin{aligned} Z\_it = {} & \beta 0 + \beta 1\ CFV\_it \\ & + \beta 2\ CFV\_it \cdot INS\_i + \beta 3\ SIZE\_it \\ & + \beta 4\ LEV\_it + \beta 5\ AGE\_it \\ & + \beta 6\ GROWTH\_it + \alpha\_i + \delta\_t + \varepsilon\_it, \end{aligned} \quad (2)$$

where Z_it is the Z-score of firm i in year t, CFV_it is cash flow volatility, INS_i is a dummy variable equal to 1 for insurance firms and 0 for non-financial firms, and $CFV\_it \times INS\_i$ is the interaction term. $SIZE\_it$, LEV_it, AGE_it, and $GROWTH\_it$ represent firm size, leverage, firm age, and sales growth, respectively. α_i represents firm fixed effects, δ_t represents year fixed effects, and ε_it is the error term.

In the principal specification, standard errors are clustered at the firm level, following common practice in finance panel data (Petersen, 2009). Robustness checks include five-year rolling measures, non-winsorized variables, and a random-effects GLS estimator.

3. RESULTS

Table 3 presents descriptive statistics for the main variables by sector. The descriptive evidence shows that insurance firms have lower average cash flow volatility than other non-financial firms. Insurance firms also report a higher mean Z-score. This pattern suggests that listed insurers appear more stable in descriptive terms, but it should not be interpreted as evidence of a statistically confirmed structural difference before examining the regression results.

3.1. Correlations

Table 4 reports Pearson correlations. Z-score is negatively correlated with CFV, consistent with the hypothesized stability cost of operating cash-flow uncertainty. Z-score is also strongly negatively correlated with leverage, consistent with balance-sheet fragility. The insurance dummy is negatively correlated with CFV and positively correlated with Z-score, matching the descriptive pattern.

Table 3. Descriptive statistics for main variables by sector (2016–2024, winsorized)

Panel A: Non-Financial firms						
Variable	**Mean**	**Median**	**Std. Dev.**	**Min**	**Max**	**N**
Z-score	45.581	19.307	71.021	–18.230	356.419	357
Cash flow volatility (CFV)	0.074	0.057	0.060	0.002	0.284	357
Firm size (ln assets)	16.901	16.739	1.474	13.140	20.887	357
Leverage	0.504	0.423	0.394	0.009	1.937	357
Firm age	6.221	6.000	2.351	3.000	10.000	357
Sales growth	0.043	0.027	0.274	–0.590	0.734	357
Panel B: Insurance firms						
Variable	**Mean**	**Median**	**Std. Dev.**	**Min**	**Max**	**N**
Z-score	58.291	38.104	67.532	–0.075	356.419	137
Cash flow volatility (CFV)	0.038	0.030	0.028	0.002	0.150	137
Firm size (ln assets)	17.507	17.362	0.611	16.437	18.778	137
Leverage	0.652	0.651	0.102	0.322	1.142	137
Firm age	6.825	7.000	2.529	3.000	11.000	137
Sales growth	0.075	0.055	0.219	–0.438	0.622	137

Note: CFV is the rolling standard deviation of operating cash flow scaled by total assets using a 3-year window. Z-score is computed using the rolling 3-year mean ROA and the rolling 3-year mean equity-to-assets divided by the rolling 3-year standard deviation of ROA. All continuous variables are winsorized at the 1st and 99th percentiles.

Table 4. Pearson correlation matrix (winsorized)

Variable	Z-score	CFV	Insurance	Size	Leverage	Age	Sales growth
Z-score	1.00	–0.13***	0.08*	0.14***	–0.32***	0.04	–0.05
CFV	–0.13***	1.00	–0.29***	–0.33***	0.05	0.04	0.01
Insurance	0.08*	–0.29***	1.00	0.21***	0.19***	0.11**	0.16***
Size	0.14***	–0.33***	0.21***	1.00	–0.12**	0.07	0.02
Leverage	–0.32***	0.05	0.19***	–0.12**	1.00	0.11**	0.09**
Age	0.04	0.04	0.11**	0.07	0.11**	1.00	0.26***
Sales growth	–0.05	0.01	0.16***	0.02	0.09**	0.26***	1.00

Note: *** p < 0.01, ** p < 0.05, * p < 0.10.

3.2. Main fixed-effects regressions with interaction

Table 5 reports the baseline fixed-effects regressions. Model 1 estimates the association between cash flow volatility and the Z-score after controlling for firm size, leverage, firm age, sales growth, firm fixed effects, and year fixed effects. Model 2 adds the interaction term between cash flow volatility and the insurance-sector dummy. In both

Table 5. Fixed-effects regressions: Z-score, cash flow volatility, and insurance-sector interaction (2016–2024)

Predictor	Model 1 Baseline	Model 2 With interaction
Constant	–31.105 (t = –0.21)	–30.652 (t = –0.21)
Cash flow volatility (CFV)	–155.973 (t = –1.60)	–164.105 (t = –1.57)
CFV × Insurance sector		65.086 (t = 0.27)
Firm size (ln assets)	8.995 (t = 1.13)	8.910 (t = 1.12)
Leverage	–36.157** (t = –2.31)	–36.358** (t = –2.30)
Firm age	3.517 (t = 1.48)	3.510 (t = 1.48)
Sales growth	–0.122 (t = –0.22)	–0.101 (t = –0.19)
R-squared within	0.044	0.044
Observations	494	494
F-statistic	743.56*** (df = 85, 408)	649.82*** (df = 86, 407)

Note: Firm and year fixed effects are included but not reported. Standard errors are clustered at the firm level. *** p < 0.01, ** p < 0.05, * p < 0.10.

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models, the coefficient of cash flow volatility is negative, suggesting that firms with more volatile operating cash flows tend to have lower financial stability. However, the coefficient is not statistically significant at conventional levels under firm-clustered standard errors. The interaction term has the expected positive sign, but it is also statistically insignificant. Therefore, the baseline model provides only directional evidence that insurance firms may be less sensitive to cash flow volatility. It does not statistically confirm a structural difference between the two groups.

Although the interaction coefficient carries the expected sign, statistical significance is not achieved in the baseline fixed-effects specification.

Leverage remains the most consistent predictor in the model. Its coefficient is negative and statistically significant, indicating that firms with higher liabilities relative to assets tend to report lower Z-scores and weaker financial stability.

3.3. Sectoral regressions as robustness

Table 6 reports separate fixed-effects regressions for non-financial firms and insurance firms. The estimated CFV slope is more negative in non-financial firms than in insurance firms, which is directionally consistent with possible sectoral sensitivity. However, inference remains weak in the insurance-only regression, which is unsurprising given the smaller sample.

3.4. Robustness checks

Table 7 summarizes robustness checks required by the study design.

1. **Alternative rolling window:** using five-year rolling CFV and five-year rolling Z-score leaves the sign pattern unchanged.

2. **Winsorization:** removing winsorization does not change the qualitative conclusions.

3. **Fixed versus random effects:** a random-effects GLS estimator with year fixed effects yields a negative CFV coefficient that is marginally significant, while the CFV × Insurance interaction remains statistically weak. A Hausman-style comparison does not suggest strong evidence against the random-effects specification in this setting.

4. **Alternative inference:** the robustness tests confirm that the statistical evidence remains modest. The cash flow volatility coefficient keeps the expected negative sign in most specifications, but the interaction term remains statistically weak.

Further sensitivity tests were carried out given that the Z-score could be influenced by extreme values when the rolling standard deviation of ROA is very low. Qualitatively the results are comparable to those obtained after winsorizing the continuous variables and to those obtained when comparing the baseline specification of three years with the specification of the five years rolling window.

Table 6. Separate fixed-effects regressions by sector (2016-2024)

Predictor	Non-financial firms	Insurance firms
Constant	161.398 (t = 0.30)	94.538 (t = 0.93)
Cash flow volatility (CFV)	–159.803 (t = –1.50)	–5.377 (t = –0.04)
Firm size (ln assets)	6.786 (t = 0.63)	17.534 (t = 1.16)
Leverage	–35.205** (t = –2.12)	–63.472 (t = –1.55)
Firm age	3.175 (t = 1.21)	2.002 (t = 0.68)
Sales growth	–0.205 (t = –0.28)	0.466 (t = 0.63)
R-squared within	0.084	0.111
Observations	357	137
F-statistic	208.01*** (df = 66, 290)	128.63*** (df = 26, 110)

Note: Firm and year fixed effects are included but not reported. Standard errors are clustered at the firm level. *** p < 0.01, ** p < 0.05, * p < 0.10.

Table 7. Robustness checks and Z-score sensitivity

Predictor	FE 3-year winsorized	FE 5-year winsorized	FE 3-year no winsor	RE GLS winsorized
Constant	–30.652 (t = –0.21)	–145.040 (t = –1.39)	15.105 (t = 0.11)	5.329 (t = 0.10)
Cash flow volatility (CFV)	–164.105 (t = –1.57)	–213.547 (t = –1.60)	–170.318 (t = –1.60)	–121.488*(t = –1.88)
Insurance dummy				16.936 (t = 1.24)
CFV × Insurance sector	65.086 (t = 0.27)	163.298 (t = 0.56)	116.009 (t = 0.44)	–17.057 (t = –0.09)
Firm size (ln assets)	8.910 (t = 1.12)	13.155* (t = 1.86)	9.585 (t = 1.22)	2.751 (t = 0.85)
Leverage	–36.358** (t = –2.30)	–25.487 (t = –1.59)	–21.001* (t = –1.90)	–58.395*** (t = –5.36)
Firm age	3.510 (t = 1.48)	–4.545 (t = –0.81)	6.270**(t = 2.27)	7.480*** (t = 3.61)
Sales growth	–0.101 (t = –0.19)	–0.986 (t = –1.52)	–0.029 (t = –1.16)	0.031 (t = 0.06)
R–squared (within)	0.044	0.058	0.030	0.221
Observations	494	350	494	494
Firm fixed effects	Yes	Yes	Yes	No
Year fixed effects	Yes	Yes	Yes	Yes
Std. errors	Clustered by firm	Clustered by firm	Clustered by firm	Clustered by firm

Note: In the fixed-effects models, the insurance dummy is absorbed by firm fixed effects and therefore not estimated. *** p < 0.01, ** p < 0.05, * p < 0.10.

Table 8. Hypotheses testing results

Hypothesis	Decision
H1: Cash flow volatility negatively affects financial stability	Not confirmed; only directional support
H2: The CFV-financial stability relationship differs between insurance and non-financial firms.	Not confirmed

The general finding thus remains unaffected: cash flow volatility is negatively associated with financial stability, although in a statistically small way, and there is no statistically significant association between cash flow volatility and the insurance-sector dummy.

4. DISCUSSION

The results are presented in a two-layered way. The first layer is descriptive. The insurance companies in the sample have significantly lower cash flow volatility and higher average Z-scores than other nonfinancial companies. This descriptive pattern is economically meaningful because it is consistent with the nature of insurance activity. Insurers are obliged to collect premiums, deal with claims, create technical reserves, invest the collected premiums and adhere to certain regulations. These elements can be useful in reducing the effects of cash flow volatility on your short-term financial security. It is econometric (economic) in the second layer. The results of the fixed-effects regressions indicate that there is a negative but weak relationship between cash flow volatility and the Z-score. This result is consistent with the hypothesis that the more volatile operating cash flows might increase the demand for liquidity, and increase uncertainty about the availability of cash to fuel operating activity, which could have a negative impact on financial stability. This interpretation is similar to the arguments of Minton and Schrand (1999), Opler et al. (1999), and Han and Qiu (2007) that cash flow volatility impacts financial policy, liquidity behavior, and financing constraints.

There is only limited directional evidence of sectoral moderation, however. In the baseline model, the interaction term between cash flow volatility and the insurance sector dummy is expected to have a positive sign, implying that insurers are less sensitive to cash flow volatility. However, this coefficient is not statistically significant. The robust checks also do not yield a stable statistically significant effect of the interaction. So, from the results, it is not possible to make a statistically verifiable claim that the insurance sector is structurally different. There is some evidence that insurance companies seem to be descriptively more stable, and the regression evidence gives limited directionality support of less sensitivity to operating cash flow volatility. The most consistent and strongest result is related to leverage. The Z scores are inversely related to the level of leverage in the main specification. This finding indicates that the balance-sheet

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structure continues to be an important factor in the financial stability of insurance companies and non-financial corporations. This is significant for insurers as liabilities, reserves, and claim obligations are components of the industry's financial structure. Non-financial companies can be more vulnerable in the case of less predictable operating cash flows. The implications for practice are discussed. Volatility of operating cash flow should not be used by regulators or investors to compare operating cash flow across sectors. The volatility experienced by a business or firm may not be the same for all businesses or firms. The practical implications of cash flow instability can be mitigated in the insurance industry by underwriting discipline, reserve adequacy, reinsurance arrangements, and investment income. Nevertheless, the results of this study are not strong enough to conclude that there is a significant moderation effect on a sectoral level.

This study has limitations. The Z-score is affected by the standard deviation of ROA in the rolling period, particularly if the profitability is relatively unchanged over the rolling period. This is a critical but also a modifying step, since it makes winsorization necessary; the winsorization step can also have an influence. The age of the firm is based on the presence of the firm in the available panel and not strictly on the date of incorporation, as this may not fully reflect maturity effects. Lastly, the number of insurance companies registered in Jordan is small, which results in small statistical power of the interaction test. Possible future studies involve including more of these risk variables in the insurance-specific analysis, exploring other types of risk measures (e.g., earnings volatility, claims volatility, or solvency-based measures), and examining the analysis over longer time horizons.

CONCLUSION

This study aims to investigate the relationship between operating cash flow volatility and financial stability in listed companies in Jordan and its variation between insurance companies and other non-financial companies. From the descriptive results, it is noted that, for the main three-year rolling specification, insurance firms have lower cash flow volatility and higher average Z-scores than non-financial firms. The results of the regression should be considered with some care. The CFV coefficient has the expected negative sign in the baseline fixed-effects model, but it is not statistically significant. The interaction term between cash flow volatility and the insurance-sector dummy is also statistically insignificant in the baseline model and changes sign in one robustness specification. The most definite finding is that leverage is strongly correlated with poor Z-scores. Overall, the study indicates that the relationship between the structure of the balance sheet and financial stability is steadier than the relationship between cash flow volatility and financial stability and between insurance-sector moderation and financial stability. Future research may expand the analysis to longer time periods, other risk measures for a specific insurance type, and other measures of financial stability.

AUTHOR CONTRIBUTIONS

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