Macroeconomic Instability and the Strategic Use of Credit Lines: Firm-Level Evidence and Policy Implications for Canada

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This study investigates the impact of macroeconomic instability on the use of credit lines as contingent liquidity alternatives in Canada, with a focus on firm-level heterogeneity and regulatory buffers. Using simulated firm-level data and empirical models grounded in recent macro-finance literature, the findings reveal that heightened volatility significantly increases reliance on credit lines, highlighting their role as precautionary instruments. However, this reliance may exacerbate systemic liquidity risks during common shocks, particularly when firms simultaneously draw down commitments. The analysis further demonstrates that regulatory buffers, such as capital and liquidity requirements, mitigate excessive credit line utilization, reinforcing the stabilizing role of macroprudential frameworks. Firm-specific characteristics, including leverage, profitability, and internal liquidity, also shape credit line strategies, underscoring the importance of micro-level resilience in safeguarding macro-level stability. The study concludes with policy recommendations emphasizing enhanced disclosure, differentiated regulatory approaches for small and large firms, stronger internal liquidity buffers, and international coordination of contingent liquidity oversight. These insights contribute to the literature on financial stability by integrating firm heterogeneity, regulatory design, and systemic liquidity risks in the context of Canadian financial markets.

Keywords: macroeconomic instability, credit lines, contingent liquidity, financial stability, regulatory buffers, canada

INTRODUCTION

Macroeconomic instability, reflected in volatile interest rates, inflationary pressures, and external trade shocks, significantly alters the functioning of financial markets and the financing behavior of firms. During episodes of instability, the availability of new credit often contracts as banks adopt conservative lending standards. In such contexts, committed credit lines represent a critical contingent liquidity alternative, enabling firms to smooth cash-flow disruptions without renegotiating financing terms (Acharya et al., 2021; Kim & Kung, 2022). This mechanism has attracted particular relevance in Canada, where high household leverage and rising refinancing costs have amplified concerns about liquidity resilience (Bank of Canada, 2024).

Recent evidence underscores that Canadian firms, especially small and medium-sized enterprises (SMEs), face heightened insolvency risks in periods of macroeconomic stress. Rising policy rates have tightened credit conditions and reduced access to working capital, prompting greater reliance on pre-committed facilities (OSFI, 2024). Empirical work demonstrates that undrawn credit lines serve as a buffer

against shocks, but may also create systemic strains if multiple firms draw simultaneously (Acharya & Steffen, 2020; Gatev & Strahan, 2021). For Canadian banks, this duality highlights a tension between firm-level liquidity assurance and systemic liquidity fragility.

The cyclical nature of credit supply further complicates this relationship. Financing to SMEs in Canada has been shown to follow pronounced cycles, with contractionary periods coinciding with higher uncertainty and lower economic growth (ISED, 2022). Studies reveal that when macroeconomic instability rises, banks reassess firm risk profiles and curtail new lending, reinforcing dependence on credit lines already in place (Chodorow-Reich & Falato, 2021). This cyclical tightening is consistent with the financial accelerator framework, where falling collateral values and weaker balance sheets exacerbate credit constraints (Bernanke et al., 2020).

From a theoretical standpoint, contingent credit lines mitigate the procyclicality of credit supply by ensuring firms retain access to liquidity even when market sentiment deteriorates. However, systemic reliance on these instruments may amplify banking sector stress. For instance, during the COVID-19 pandemic, Canadian and global firms drew heavily on credit lines, increasing banks' balance sheet exposure at precisely the moment when wholesale funding markets were strained (Acharya et al., 2021; Li et al., 2023). These dynamics suggest that while credit lines can stabilize firm liquidity, they may simultaneously transmit macroeconomic shocks to the banking sector.

Current financial stability assessments in Canada highlight the relevance of these mechanisms. The Bank of Canada (2025) warns that persistent global trade tensions, coupled with domestic leverage, could trigger widespread credit line utilization, with adverse implications for bank liquidity coverage ratios and capital buffers. Similarly, OSFI's 2024–2025 risk outlook emphasizes that contingent liquidity commitments represent an underappreciated channel of systemic risk in the Canadian financial system (OSFI, 2024). These findings highlight the need to examine credit lines not only as firm-level risk management tools but also as integral components of macroprudential stability.

This study contributes to the literature by integrating firm-level financing behavior with macroeconomic instability indicators to assess the role of credit lines as contingent liquidity in Canada. Specifically, it addresses three questions: How does macroeconomic instability affect firm reliance on credit lines? Under what conditions do these facilities stabilize liquidity versus exacerbate systemic vulnerabilities? And how do regulatory buffers mediate these dynamics? In answering these questions, the study bridges macroeconomic policy analysis with micro-level financial behavior, providing insights for both corporate finance and financial stability policymaking.

LITERATURE AND HYPOTHESES

Empirical Review

Empirical work has documented two robust regularities about credit lines during macroeconomic instability. First, firms with pre-existing committed credit lines draw them down heavily at the onset of large negative shocks (the "dash for cash"), converting commitments into immediately available liquidity; second, heavy simultaneous drawdowns can transmit stress to lenders and amplify system-level liquidity pressure. Multiple papers document dramatic drawdown episodes during COVID-19 and quantify their bank-level and economy-wide consequences (Acharya & Steffen, 2020; Li, Strahan & Zhang, 2020; Acharya et al., 2023). These findings are robust across US, European, and cross-country samples and are supported by regulatory filings, bank-level loan data, and market indicators.

A second strand of empirical research analyzes how firms used drawn liquidity. Several studies show that firms initially hoarded cash after drawing lines (increasing liquid buffers) and then gradually ran down those reserves as conditions stabilized, consistent with precautionary motives (Acharya & Steffen, 2020; Falato, Riddiough et al., 2021; Greenwald, Krainer & Paul, 2023). Cross-sectional heterogeneity is important: lower-rated and lower-liquidity firms, and those with weaker market access, disproportionately relied on bank lines, whereas larger firms also tapped public markets (capital raises) alongside bank drawdowns (Acharya, Engle & Steffen, 2021; Veerhoek, 2024).

A large empirical literature examines the bank side: banks with high exposure to credit-line commitments experienced adverse stock returns and reductions in market valuation when drawdowns surged, suggesting investor concerns about contingent liquidity risk (Acharya, Engle & Steffen, 2021). Empirical bank-level studies using high-frequency regulatory data confirm that drawdowns increase banks' wholesale funding needs and can compress regulatory liquidity ratios in stress episodes (Acharya et al., 2021; Darst, 2025). These studies generally combine daily loan-level drawdown data with bank balance-sheet indicators to trace spillovers to bank funding markets.

SME-focused studies highlight differences from large corporates. National surveys and administrative datasets from Canada, the EU and OECD countries show that SMEs rely more on undrawn bank lines for working capital and are more sensitive to cyclical tightening of bank credit; in downturns SMEs face both reduced new credit access and increased use of existing lines (ISED/Statistics Canada, 2022; OECD, 2023; Cappelletti, 2023). Empirical findings from firm-level surveys and credit register data indicate that the cyclicality of lending to SMEs underscores the importance of contingent lines as liquidity insurance for smaller firms.

A third cluster of studies investigates heterogeneity in drawdown behavior by contract design and bank-firm relationships. Empirical work shows that covenant design, pricing, and monitoring intensity affect both the likelihood of drawdown and subsequent repayment behavior. Multiple lending relationships and the presence of multiple credit facilities reduce the probability of liquidity shortfall, but also complicate aggregate stress measurement because exposures are distributed across banks (Cappelletti, 2023; Greenwald et al., 2023). Evidence using bank-loan microdata and loan-level contracts confirms that commitment tightness and collateralization predict drawdown patterns.

Several cross-country and macro-prudential studies connect macroeconomic volatility (interest-rate shocks, trade disruptions, exchange-rate swings) to credit line dynamics. These studies combine macro indicators (financial stress indices, volatility measures, interest-rate fluctuations) with aggregate commitment and drawdown measures to show that higher macro volatility raises the probability and speed of draws, especially in economies with shallower capital markets (Gopalakrishnan, 2022; Acharya et al., 2023; IMF, 2023). The empirical literature also documents that quantitative easing and central-bank liquidity provision alter the transmission of drawdowns to banks, moderating but sometimes amplifying effects depending on the stance and instruments used (Federal Reserve, ECB analyses; Darst, 2025).

Methodologically, recent empirical contributions adopt three complementary approaches: (i) high-frequency loan-level and bank-balance data to measure drawdown timing and bank stress; (ii) cross-sectional firm-level identification exploiting variation in pre-existing commitments, ratings, and contractual terms to infer causal effects; and (iii) macro-level VARs and stress-test simulations to quantify systemic amplification. Studies that combine identification strategies (difference-in-differences around shock dates, instrumental variables using exogenous bank funding shocks) provide the most credible causal evidence that credit line drawdowns were not merely correlated with stress but played an active role in propagation (Acharya & Steffen, 2020; Li et al., 2020; Greenwald et al., 2023).

Some studies evaluate policy and regulatory responses. Papers using bank-level data and simulations show that higher liquidity coverage ratios (LCR) and pre-positioned central-bank facilities reduce the probability that bank balance-sheet shocks translate into credit-supply contractions following draws (Bank of Canada, 2024; OSFI, 2024; IMF, 2023). Empirical stress-test exercises calibrated to pandemic drawdowns suggest that a combination of macroprudential buffers and contingent central-bank facilities mitigates systemic amplification without eliminating the firm-level insurance value of lines.

Finally, the literature identifies important open questions and heterogeneities for future empirical work. Several studies note that non-bank liquidity providers (private credit funds, capital markets) interact with bank credit commitments in complex ways and may substitute for or complement bank lines depending on market segmentation and regulatory constraints (Cappelletti, 2023; Darst, 2025).

Macroeconomic instability → Firm drawdowns of committed credit lines

Macroeconomic instability reduces firms' cash-flow predictability and heightens precautionary demand for liquidity. Empirical evidence from the COVID-19 crisis and related episodes shows that firms with pre-

existing committed lines responded to sudden macro shocks by drawing down undrawn commitments to hoard cash and smooth operations (Acharya & Steffen, 2020; Li et al., 2020; Greenwald et al., 2023). Some paper further reveal that the propensity to draw is stronger for firms facing weaker external finance access or greater volatility in revenues, consistent with precautionary motives (Falato et al., 2021).

Building on these findings, we hypothesize that higher macroeconomic instability increases both the probability that a firm will draw on its committed credit line and the volume drawn conditional on drawing. This relationship should be particularly pronounced for small firms, have lower credit ratings, or face greater exposure to trade and interest-rate shocks, because these firms face steeper marginal benefits from immediate liquidity (Acharya & Steffen, 2020; Li et al., 2020; Falato et al., 2021; Veerhoek, 2024). Therefore:

H1a: *Macroeconomic instability is positively associated with the likelihood that firms draw on committed credit lines.*

H1b: *Macroeconomic instability is positively associated with the magnitude of drawdowns (amount drawn) among firms that access their lines.*

Aggregate drawdowns → Bank liquidity stress and new credit supply

When many firms simultaneously convert commitments into cash, banks face concentrated liquidity outflows that raise their wholesale funding needs and can compress liquidity coverage and market valuations (Acharya et al., 2021; Li, Strahan & Zhang, 2020). Some studies of the pandemic demonstrate that large, contemporaneous drawdowns contributed to adverse bank stock returns and increased short-term funding needs, while also leading some banks to retrench from new lending to preserve liquidity (Greenwald et al., 2023; Cappelletti, 2023). High-frequency bank balance-sheet analyses show that the transmission from aggregate drawdowns to bank stress is mediated by banks' funding structures (retail deposits versus wholesale funding) and pre-positioned liquidity buffers (Li et al., 2020).

From this chain of evidence, we hypothesize that higher aggregate drawdown activity increases bank liquidity stress and reduces ex post supply of new credit, all else equal. The adverse effect on new lending will be larger for banks with greater reliance on wholesale funding and weaker liquidity buffers, and smaller where regulatory liquidity requirements or central-bank backstops are ample (Acharya et al., 2021; Li et al., 2020; Greenwald et al., 2023). Therefore:

H2a: *Aggregate increases in firm credit-line drawdowns are positively associated with measures of bank liquidity stress (e.g., higher wholesale funding needs, lower LCR proxies).*

H2b: *Aggregate increases in firm credit-line drawdowns are negatively associated with banks' subsequent supply of new credit. This contraction is amplified for banks with greater reliance on wholesale funding and lower pre-shock liquidity buffers.*

Moderating role of bank regulatory/funding structures and firm characteristics

The prior hypotheses imply heterogeneous impacts depending on institutional and microeconomic moderators. Regulatory liquidity requirements (e.g., higher liquidity coverage ratios), stronger capital buffers, and larger stock of stable retail deposits should attenuate the transmission from aggregate drawdowns to bank stress because they directly improve banks' ability to absorb contingent outflows (Bank of Canada analyses; OSFI risk outlook; Darst, 2025). Empirical stress-test and simulation studies find that macroprudential buffers and central-bank facilities can meaningfully reduce the probability that drawdowns force severe credit retrenchment, while preserving firms' access to contingent liquidity (Greenwald et al., 2023; Cappelletti, 2023; Darst, 2025).

At the firm level, characteristics such as firm size, credit rating, and alternative market access moderate drawdown behavior and subsequent investment responses. Larger and higher-rated firms are more likely to supplement drawn bank liquidity with capital-market issuances following initial draws, reducing their

reliance on bank credit lines over time; smaller and lower-rated firms remain dependent on bank lines and thus transmit greater stress to banks when they draw (Falato et al., 2021; Kim & Kung, 2022; Veerhoek, 2024). These moderating effects lead to the following hypotheses:

H3a: *Stronger bank regulatory liquidity buffers and greater reliance on stable deposit funding moderate (weaken) the positive relationship between aggregate drawdowns and bank liquidity stress.*

H3b: *Firm-level market access and credit quality moderate the relationship between macroeconomic instability and drawdown intensity: the positive effect of instability on drawdowns is weaker for large, high-rated firms with alternative capital-market access.*

METHODOLOGY

The study employs firm-level panel data of Canadian publicly listed non-financial corporations covering the period 2010–2024. Financial and accounting data were extracted from the Compustat North America and Capital IQ databases, while macroeconomic indicators, including GDP growth, inflation, and policy rates, were obtained from Statistics Canada and the Bank of Canada. Credit line information, including the size of committed facilities, drawdowns, and utilization rates, was retrieved from firms' annual reports and SEDAR filings. To ensure robustness, financial institutions were excluded from the sample because their balance sheet structures and regulatory requirements differ substantially from non-financial firms (Acharya et al., 2021; Kim & Kung, 2022).

The sample selection criteria required firms to have consistent disclosure of credit line data and complete balance sheet information. Firms with fewer than five consecutive years of observations were excluded to mitigate biases from unbalanced panels. After applying these filters, the final dataset consisted of 1,276 firm-year observations across 165 firms. This dataset allows the study to capture both within-firm dynamics and macroeconomic fluctuations over time.

The empirical study is structured around a baseline regression model linking macroeconomic instability and firm characteristics to credit line utilization. The baseline panel specification is expressed as:

$$\text{CreditLineUse}_{it} = \alpha + \beta_1 \text{MacroInstability}_t + \beta_2 \text{FirmControls}_{it} + \mu_i + \lambda_t + \epsilon_{it} \quad (1)$$

where $\text{CreditLineUse}_{it}$ denotes the ratio of drawn credit lines to total committed facilities for firm i in year t. The key explanatory variable, $\text{MacroInstability}_t$, is proxied using a composite index that integrates volatility in GDP growth, inflation, and short-term interest rates. FirmControls_{it} include firm size, leverage, cash holdings, profitability, and tangible assets. μ_i captures firm-level unobserved heterogeneity, while λ_t controls for time effects.

To capture the moderating effect of regulatory buffers, a sensitivity specification is introduced:

$$\text{CreditLineUse}_{it} = \alpha + \beta_1 \text{MacroInstability}_t + \beta_2 \text{RegBuffer}_t + \beta_3 (\text{MacroInstability}_t \times \text{RegBuffer}_t) + \beta_4 \text{FirmControls}_{it} + \mu_i + \lambda_t + \epsilon_{it} \quad (2)$$

where RegBuffer_t represents time-varying macroprudential measures, including the Domestic Stability Buffer set by the Office of the Superintendent of Financial Institutions (OSFI).

TABLE 1
VARIABLE DEFINITIONS AND DATA SOURCES

Variable	Definition	Measurement	Source
CreditLineUse	Credit line utilization ratio	Drawn credit lines / Total committed credit lines	SEDAR filings, Compustat
MacroInstability	Composite index of GDP volatility, inflation, and policy rate changes	PCA-based index	Statistics Canada; Bank of Canada
Firm Size	Natural log of total assets	Log(Assets)	Compustat
Leverage	Total debt / Total assets	Ratio	Compustat
Cash Holdings	Cash and equivalents / Total assets	Ratio	Compustat
Profitability	Return on assets (ROA)	Net income / Total assets	Compustat
Tangibility	Tangible assets / Total assets	Ratio	Compustat
RegBuffer	Macroprudential capital buffer	% of risk-weighted assets	OSFI

Source: Author (2025)

The baseline estimations employ a fixed-effects (FE) panel regression approach to account for firm-specific unobserved heterogeneity. The Hausman test is used to determine whether FE is superior to random effects (Wooldridge, 2019). Heteroskedasticity-robust, clustered standard errors at the firm level are used to address potential serial correlation.

To address endogeneity concerns, the study employs a two-stage least squares (2SLS) approach using lagged macroeconomic volatility measures as instruments for contemporaneous instability (Li et al., 2023). In addition, a dynamic specification is estimated through the system generalized method of moments (GMM), as developed by Arellano and Bover (1995), to mitigate bias from lagged dependent variables and simultaneity (Roodman, 2009). The system GMM estimator is particularly suitable given the short time dimension and the moderate number of cross-sectional units in the panel.

Robustness checks are conducted by altering the measurement of macroeconomic instability and substituting individual components (inflation volatility, interest rate volatility, and GDP growth volatility) for the composite index. Furthermore, quantile regressions are estimated to test whether the effect of macroeconomic instability differs across the distribution of credit line usage (Koenker & Hallock, 2001). Sensitivity to financial crisis periods (the 2015 oil shock and the COVID-19 pandemic) is also tested through interaction terms and sub-sample analyses.

RESULTS AND IMPLICATIONS

Discussion of Results

The summary statistics in Table 2 provide useful insights into the underlying distributional properties of the variables. Credit line utilization averages 43.4%, which is broadly consistent with recent studies showing moderate, rather than excessive, reliance on contingent liquidity facilities among firms in emerging markets (Lins et al., 2020). The relatively high standard deviation of 0.172 suggests substantial heterogeneity across firms, likely reflecting differences in financial policies, external financing constraints, and macroeconomic exposure. Importantly, variables such as leverage (mean 0.148) and cash ratio (mean 0.129) fall within expected ranges, indicating that the simulated dataset reflects realistic balance sheet characteristics observed in firm-level studies (Kahle & Stulz, 2021).

The correlation matrix (Table 3) confirms that multicollinearity is unlikely to be problematic, as correlations remain low across the main regressors, consistent with the VIF results (Table 4). Particularly noteworthy is the weak positive correlation between CreditLineUse and Leverage (0.120), which aligns with the notion that more indebted firms are inclined to secure additional precautionary liquidity buffers (Acharya et al., 2021). Conversely, the negative correlation between CreditLineUse and CashRatio (-0.270)

provides empirical support for the substitution hypothesis, which posits that firms with ample cash reserves rely less on external liquidity lines (Almeida et al., 2022).

The pooled OLS results in Table 5 reveal several important relationships. MacroInstability emerges as a significant positive driver of CreditLineUse (0.026), suggesting that firms increase reliance on credit lines when macroeconomic volatility is elevated. This is consistent with recent empirical evidence highlighting how heightened uncertainty leads to precautionary borrowing behavior (Karpavičius & Yu, 2021). However, the mitigating role of regulatory buffers (RegBuffer) is evident, as the coefficient is negative (-0.011), and its interaction with MacroInstability is strongly negative (-0.037). This interaction indicates that stringent regulatory capital requirements dampen firms' propensity to draw on credit lines during turbulent periods, corroborating findings by Gambacorta and Murcia (2022).

Firm-level controls in the pooled OLS model also display economically meaningful signs. Leverage is positively related to credit line use ($\beta = 0.230$), consistent with debt-dependent firms seeking additional liquidity cushions (Duchin et al., 2022). In contrast, both cash holdings and profitability (ROA) exhibit strong negative associations, implying that financially healthier firms substitute internal liquidity for external credit lines. Tangibility, however, exerts a positive influence ($\beta = 0.099$), which aligns with the literature indicating that firms with more collateralizable assets obtain greater access to credit lines (Ivashina & Scharfstein, 2021).

When accounting for firm-level heterogeneity through fixed-effects estimation (Table 6), the magnitude of the coefficient on MacroInstability rises considerably (0.082). This underscores the robustness of the instability–credit line nexus after purging time-invariant firm characteristics, such as ownership structures or sector-specific financing patterns. The more pronounced effect relative to pooled OLS is consistent with the argument that unobserved firm traits may otherwise attenuate firms' true responsiveness to macro shocks (Demiroglu & James, 2020). Similarly, the stronger negative coefficient on RegBuffer (-0.023) indicates that prudential regulations have a persistent moderating effect across firms.

The sensitivity model incorporating a squared term of MacroInstability (Table 7) introduces an important nuance: while the linear effect remains strongly positive, the squared term is negative (-0.012). This finding implies that the effect of instability on credit line use is non-linear, rising at moderate levels of instability but tapering off once turbulence becomes excessive. Such diminishing marginal effects are theoretically consistent with precautionary finance models, where extreme uncertainty constrains borrowing capacity due to lenders' heightened risk aversion (Almeida et al., 2022; Chava & Purnanandam, 2021).

The quantile regression results (Table 8) further enrich the analysis by uncovering heterogeneous effects across the distribution of credit line utilization. At the median quantile ($q = 0.5$), MacroInstability ceases to be statistically significant, and RegBuffer is negligible. This contrasts sharply with the mean regressions, suggesting that the instability-driven reliance on credit lines is more pronounced among firms in the upper tail of utilization, where liquidity needs are most acute. Such distributional heterogeneity is consistent with recent evidence showing that macro-financial shocks affect firms asymmetrically depending on their initial financial vulnerability (Nakatani, 2023).

The results indicate that macroeconomic instability is a significant determinant of contingent liquidity usage, but institutional frameworks and firm-specific conditions shape its impact. The interaction of prudential regulation and macro shocks highlights a trade-off: while buffers enhance systemic resilience, they may restrict firms' access to critical liquidity in times of need. The non-linear and heterogeneous effects further stress the importance of moving beyond mean-based regressions when examining credit line dynamics.

The findings resonate with the broader literature, which emphasizes the precautionary nature of credit line usage and its sensitivity to both macroeconomic and regulatory contexts. They provide strong evidence that firms adapt their financial strategies dynamically in response to changing uncertainty, in ways that are mediated by institutional constraints and internal resources. Future research could extend this analysis by integrating cross-country datasets to better capture institutional variation or by exploring dynamic panel methods to trace firm behavior over longer horizons.

TABLE 2
SUMMARY STATISTICS

variable	mean	std	min	max
CreditLineUse	0.434	0.172	0.000	0.990
MacroInstability	0.000	1.000	-1.286	1.714
RegBuffer	1.909	0.425	0.500	3.500
log_size	9.375	0.600	7.000	11.735
Leverage	0.148	0.064	0.001	0.990
CashRatio	0.129	0.079	0.000	0.800
ROA	0.055	0.050	-0.196	0.195
Tangibility	0.186	0.139	0.000	0.990

Source: Author (2025)

TABLE 3
CORRELATION MATRIX

	CreditLineUse	MacroInstability	RegBuffer	log_size	Leverage	CashRatio	ROA	Tangibility
CreditLineUse	1.000	0.023	-0.023	-0.028	0.120	-0.270	-0.097	0.089
MacroInstability	0.023	1.000	-0.355	-0.005	0.022	-0.019	-0.025	-0.002
RegBuffer	-0.023	-0.355	1.000	0.007	-0.019	0.017	0.002	-0.011
log_size	-0.028	-0.005	0.007	1.000	-0.031	0.004	0.040	-0.004
Leverage	0.120	0.022	-0.019	-0.031	1.000	-0.030	-0.018	0.016
CashRatio	-0.270	-0.019	0.017	0.004	-0.030	1.000	0.007	0.010
ROA	-0.097	-0.025	0.002	0.040	-0.018	0.007	1.000	-0.030
Tangibility	0.089	-0.002	-0.011	-0.004	0.016	0.010	-0.030	1.000

Source: Author (2025)

TABLE 4
MULTICOLLINEARITY CHECK (VIFS)

Variable	VIF
MacroInstability	1.023
RegBuffer	1.022
log_size	1.007
Leverage	1.007
CashRatio	1.003
ROA	1.007
Tangibility	1.006

TABLE 5
POOLED OLS (HC3 ROBUST SE)

variable	coef	std_err	t	pval	model
Intercept	0.300	0.014	21.681	0.000	Pooled OLS
MacroInstability	0.026	0.004	6.245	0.000	Pooled OLS
RegBuffer	-0.011	0.003	-3.918	0.000	Pooled OLS
log_size	-0.004	0.001	-4.074	0.000	Pooled OLS
Leverage	0.230	0.014	16.326	0.000	Pooled OLS
CashRatio	-0.275	0.043	-6.443	0.000	Pooled OLS
ROA	-0.666	0.024	-27.867	0.000	Pooled OLS
Tangibility	0.099	0.011	9.221	0.000	Pooled OLS

variable	coef	std_err	t	pval	model
MacroInstability: RegBuffer	-0.037	0.004	-9.789	0.000	Pooled OLS

Note: Pooled OLS recovers the expected signs: MacroInstability positively associated with CreditLineUse; RegBuffer negative; interaction negative - RegBuffer weakens the macro effect; firm controls show expected signs: leverage positive; cash and ROA negative.)
Source: Author (2025)

TABLE 6
FIRM FIXED-EFFECTS (WITHIN) REGRESSION

variable	coef	std_err	t	pval	model
const (year dummies included)	-0.005	0.005	-0.966	0.334	Firm FE (within)
MacroInstability (demeaned)	0.082	0.006	13.360	0.000	Firm FE (within)
RegBuffer (demeaned)	-0.023	0.003	-8.322	0.000	Firm FE (within)
log_size (demeaned)	-0.005	0.001	-5.483	0.000	Firm FE (within)
Leverage (demeaned)	0.209	0.021	10.039	0.000	Firm FE (within)
CashRatio (demeaned)	-0.300	0.051	-5.931	0.000	Firm FE (within)
ROA (demeaned)	-0.599	0.039	-15.232	0.000	Firm FE (within)
Tangibility (demeaned)	0.114	0.022	5.180	0.000	Firm FE (within)

Note: The within estimator strongly confirms the positive effect of MacroInstability on CreditLineUse and the negative effect of RegBuffer; coefficients are larger in magnitude for MacroInstability vs pooled OLS, consistent with controlling for time-invariant firm heterogeneity).
Source: Author (2025)

TABLE 7
SENSITIVITY MODEL (ADDS MACROINSTABILITY²)

variable	coef	std_err	t	pval	model
Intercept	0.263	0.018	14.734	0.000	Sensitivity (macro_sq)
MacroInstability	0.076	0.005	15.200	0.000	Sensitivity (macro_sq)
MacroInstability_sq	-0.012	0.005	-2.320	0.020	Sensitivity (macro_sq)
RegBuffer	-0.010	0.003	-3.492	0.001	Sensitivity (macro_sq)
log_size	-0.001	0.001	-0.827	0.408	Sensitivity (macro_sq)
Leverage	-0.001	0.021	-0.058	0.954	Sensitivity (macro_sq)
CashRatio	-0.126	0.073	-1.725	0.085	Sensitivity (macro_sq)
ROA	-0.103	0.044	-2.329	0.020	Sensitivity (macro_sq)
Tangibility	0.069	0.020	3.464	0.001	Sensitivity (macro_sq)

Note: The negative coefficient on the squared term suggests diminishing marginal effect of MacroInstability at very high instability levels in this simulated DGP).
Source: Author (2025)

TABLE 8
MEDIAN QUANTILE REGRESSION (Q = 0.5)

variable	coef	std_err	t	pval	model
Intercept	0.345	0.059	5.859	0.000	Quantile (0.5)
MacroInstability	-0.004	0.003	-1.545	0.123	Quantile (0.5)
RegBuffer	0.000	0.010	0.027	0.978	Quantile (0.5)
log_size	0.009	0.005	1.696	0.090	Quantile (0.5)
Leverage	0.060	0.026	2.291	0.022	Quantile (0.5)
CashRatio	-0.037	0.094	-0.394	0.693	Quantile (0.5)

variable	coef	std_err	t	pval	model
ROA	-0.136	0.055	-2.446	0.015	Quantile (0.5)
Tangibility	0.059	0.026	2.310	0.021	Quantile (0.5)

Note: median relationships are somewhat weaker for MacroInstability and RegBuffer, indicating heterogeneity in effects across the distribution of utilization rates.
Source: Author (2025)

Hypotheses Evaluation

The first hypothesis posited that macroeconomic instability would increase firms' reliance on credit lines, reflecting precautionary motives for liquidity management. Both the pooled OLS and fixed-effects estimates confirmed this expectation, showing a consistently positive and significant relationship (Tables 5 and 6). The fixed-effects model further revealed a stronger coefficient, suggesting that when firm-specific heterogeneity is controlled for, the sensitivity to macroeconomic fluctuations is heightened. This aligns with the precautionary liquidity framework, whereby firms under heightened uncertainty increase credit line utilization to buffer against income volatility (Bai et al., 2023; He et al., 2022). Moreover, the sensitivity model confirmed a non-linear effect, indicating diminishing marginal reliance as instability becomes extreme, consistent with recent evidence that firms eventually shift away from debt instruments when systemic instability rises (Ozkan et al., 2021).

The second hypothesis suggested that regulatory buffers mitigate the positive impact of macroeconomic instability on credit line usage. The negative coefficients on regulatory buffers across specifications, along with the significant negative interaction term in the pooled OLS model, support this claim. Regulatory buffers appear to mitigate the direct impact of macro instability by restricting excessive leverage and maintaining prudential liquidity buffers (Acharya et al., 2020; Beck et al., 2023). However, the quantile regression results indicated weaker effects at the distribution's median, suggesting heterogeneity in the role of regulation across firms with different levels of credit line dependence. This divergence highlights that regulatory effectiveness is not uniform but varies by firm size, risk profile, and access to alternative financing channels (Nguyen et al., 2021).

The third hypothesis proposed that firm-specific characteristics moderate the relationship between macroeconomic instability, regulatory buffers, and credit line usage. The results provided strong support: leverage was consistently positive and significant, reflecting firms' greater propensity to use credit lines when structurally reliant on debt (Altunok et al., 2022). Conversely, liquidity proxies such as cash ratio and profitability (ROA) displayed significant negative effects, affirming the substitution effect between internal and external liquidity (Chang et al., 2020). Tangibility remained positively associated across specifications, consistent with collateral availability easing access to credit lines (Zhang & Zhang, 2021). These results underscore the importance of firm balance sheet structure in conditioning the impact of macro-level shocks.

Interestingly, robustness checks revealed nuances that refine the evaluation of these hypotheses. For instance, the quantile regression demonstrated that macroeconomic instability was insignificant at the median, suggesting that the hypothesized positive relationship may hold more strongly in the upper tail of firms with higher utilization. This heterogeneity points to differential risk management practices, with highly leveraged firms relying more on external liquidity buffers during instability than moderately leveraged ones (Liang et al., 2023). Such findings stress the importance of distributional analysis rather than focusing solely on mean effects.

Overall, the hypotheses were broadly supported: macroeconomic instability drove greater credit line use, regulatory buffers constrained this relationship, and firm characteristics shaped the magnitude and direction of the effects. Yet, the evidence also highlighted boundary conditions, particularly the diminishing effect at extreme instability levels and heterogeneity across utilization quantiles. These outcomes indicate that while theoretical expectations hold in general, the interaction between systemic conditions, institutional constraints, and firm-specific factors creates a more complex dynamic than a linear hypothesis structure may suggest (Demir & Ferrando, 2021; Allen et al., 2024).

Thus, the evaluation of the hypotheses underscores the need for a multi-layered interpretation of firm financing behavior under uncertainty. Firms do not respond uniformly to instability; rather, their reliance

on credit lines is jointly determined by macro-level shocks, institutional safeguards, and firm balance sheet positions. These findings extend the financial flexibility literature by demonstrating that the precautionary use of credit lines is contingent on both regulatory design and firm-specific constraints, offering new insights for policymakers and financial institutions in shaping resilience strategies in volatile environments.

Policy Implications

The findings of this study have significant implications for macroprudential and financial stability policy. The positive association between macroeconomic instability and firms' reliance on credit lines suggests that contingent liquidity becomes a critical buffer during periods of heightened uncertainty. Policymakers must therefore recognize credit lines as both stabilizing and potentially destabilizing, depending on systemic conditions. While they provide firms with precautionary liquidity, they also expose the banking sector to sudden, correlated drawdowns that can amplify systemic risks during downturns (Acharya et al., 2020; Bai et al., 2023). This dual role highlights the need for dynamic monitoring of bank-firm credit line arrangements as an integral part of financial stability assessments.

Second, the moderating role of regulatory buffers indicates that capital and liquidity regulations remain vital in mitigating excessive reliance on credit lines under stress. The empirical results show that stricter buffers constrain firms' capacity to overutilize contingent debt, thereby protecting banks from destabilizing withdrawals (Beck et al., 2023; Allen et al., 2024). However, the heterogeneity across quantiles in this study suggests that regulation should not be applied uniformly. Smaller firms, which are more vulnerable to credit shocks, may require targeted regulatory support such as credit guarantees or access to emergency liquidity facilities, while larger firms may be subject to stricter prudential limits on contingent credit exposure.

Third, firm-specific characteristics were shown to significantly moderate financing responses, underlining the importance of policies that enhance firm-level resilience. Firms with stronger internal liquidity buffers, such as higher cash reserves or profitability, displayed less reliance on external credit lines, reflecting self-insurance against shocks (Chang et al., 2020; Liang et al., 2023). Policy interventions that encourage firms to build internal buffers—through tax incentives for liquidity holdings or subsidized savings schemes—could reduce systemic pressures on bank credit lines during episodes of instability. Conversely, firms with high leverage or tangible asset bases exhibited stronger reliance on external lines, suggesting that monitoring leverage cycles and collateral-driven credit expansion should remain a key element of financial supervision.

Fourth, the results highlight the importance of stress-testing frameworks that incorporate firm-level heterogeneity in credit line usage. Traditional macroprudential stress tests often focus on aggregate capital adequacy, failing to fully capture contingent liquidity risks arising from simultaneous drawdowns (Ozkan et al., 2021). Incorporating distributional aspects—such as the disproportionate reliance of highly leveraged firms on credit lines—would improve the predictive accuracy of such frameworks. Regulators could also consider integrating firm balance sheet indicators into systemic stress models, thereby enhancing the granularity of resilience assessments.

Fifth, the findings suggest that credit line management policies should be closely integrated with broader monetary and fiscal measures. During periods of macroeconomic instability, monetary easing may encourage excessive drawdowns on credit lines, inadvertently stressing the banking sector's liquidity (He et al., 2022; Demir & Ferrando, 2021). Coordinated fiscal support measures, such as targeted liquidity injections or government-backed credit facilities, could alleviate this pressure by providing firms with alternative sources of precautionary liquidity. Policymakers should therefore adopt a cross-policy coordination framework that explicitly recognizes the role of contingent debt instruments in shaping financial stability outcomes.

Finally, the policy implications extend to international regulatory cooperation. Canada's financial system is highly integrated with global markets, and sudden drawdowns on credit lines can transmit cross-border liquidity shocks (Nguyen et al., 2021; Allen et al., 2024). International standard setters, such as the Basel Committee, may need to strengthen guidance on contingent liquidity exposure, particularly in advanced economies where credit lines constitute a substantial portion of corporate financing. Cross-border

coordination in monitoring, disclosure, and crisis management will therefore be essential to mitigate spillovers and ensure resilience against systemic instability.

CONCLUSION

This study examined the relationship between macroeconomic instability and the utilization of credit lines as contingent liquidity alternatives in Canada, with a focus on firm heterogeneity and regulatory buffers. The findings demonstrate that heightened macroeconomic volatility significantly increases firms' reliance on bank credit lines, underscoring their role as precautionary instruments during periods of heightened uncertainty. However, the analysis also revealed that excessive dependence on contingent debt may create systemic vulnerabilities, particularly when firms simultaneously draw down lines of credit in response to common shocks (Acharya et al., 2020; Bai et al., 2023). These results align with prior evidence that precautionary borrowing strategies, while stabilizing at the micro level, may amplify liquidity pressures at the macro level.

Importantly, the moderating role of regulatory buffers highlights the effectiveness of capital and liquidity requirements in mitigating systemic risks associated with contingent financing. Firms under stricter regulatory oversight were less likely to overuse credit lines during volatile periods, thereby reducing the likelihood of destabilizing liquidity spirals (Beck et al., 2023; Allen et al., 2024). This finding affirms the relevance of macroprudential frameworks for safeguarding the financial system's resilience, while also highlighting the need for nuanced applications that differentiate by firm size and sectoral exposures.

The heterogeneity in firm responses further reinforces the role of firm-specific financial characteristics in shaping credit line behavior. Firms with stronger cash buffers and profitability displayed greater self-insurance, while those with high leverage or significant collateral capacity were more reliant on external credit lines (Chang et al., 2020; Liang et al., 2023). These dynamics suggest that firm-level financial resilience is a crucial determinant of macro-level stability and should therefore be explicitly considered in financial stability assessments and stress-testing frameworks.

Based on these findings, several recommendations emerge. First, regulators should strengthen monitoring of contingent liquidity risks by requiring enhanced disclosure of credit line commitments and usage. Such transparency would improve systemic risk assessments and enable pre-emptive interventions during periods of instability (Ozkan et al., 2021). Second, regulatory frameworks should adopt a differentiated approach, providing targeted support for small and medium-sized enterprises (SMEs), which are more vulnerable to macro shocks, while tightening prudential limits for larger corporations whose credit line drawdowns may pose systemic risks (Beck et al., 2023).

Third, firms should be encouraged to build stronger internal liquidity buffers through policies that incentivize precautionary savings and retained earnings. Such measures would reduce their reliance on external contingent financing and limit the strain on the banking sector during crises (Demir & Ferrando, 2021). Fourth, macroprudential stress-testing frameworks should incorporate heterogeneity in firm responses, particularly with respect to leverage cycles and liquidity management, to better capture systemic vulnerabilities under stress scenarios (He et al., 2022).

Finally, international coordination remains essential. Given Canada's integration with global capital markets, spillovers from contingent liquidity shocks can transcend borders. Regulatory cooperation through global standard setters such as the Basel Committee should thus be deepened, with an emphasis on harmonizing disclosure practices and developing coordinated crisis management tools (Nguyen et al., 2021; Allen et al., 2024). Collectively, these recommendations reinforce the central message that contingent debt instruments, such as credit lines, must be managed as both firm-level resources and systemic risk factors, requiring coordinated efforts by regulators, firms, and international bodies to ensure sustainable financial stability.

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