AMERICAN JOURNALS
Open Access, Peer Reviewed Journals

American Journal of Business Management, Economics and Banking
ISSN (E): 2832-8078 Volume 52, September- 2026

MONETARY POLICY AND FINANCIAL STABILITY: EVIDENCE FROM UZBEKISTAN

Ataniyazov Jasurbek [1]
Farruh Tursunboev [2]
[1] Head of International Finance, Tashkent State University of Economics
j.ataniyazov@tsue.uz
[2] Academic Lyceum of Westminster International University in Tashkent
farrux200920@gmail.com

A B S T R A C T

This study examines the macroeconomic determinants of financial stability in Uzbekistan over 2013–2024. Using the credit-to-GDP ratio as the financial stability proxy, three OLS regression models with HC3 heteroskedasticity-robust standard errors are estimated to assess the associations between inflation, the real interest rate (RIR), broad money supply, and commodity price volatility (oil, gold, copper) and financial intermediation depth. Annual data are drawn from the World Bank WDI, IMF WEO, and the World Bank Pink Sheet.

The principal finding is that the real interest rate is positively and suggestively associated with credit-to-GDP ($\beta = 0.837$, $p < 0.10$ in the baseline specification only), consistent with the simultaneous occurrence of monetary normalisation and financial deepening following Uzbekistan's 2017 liberalisation reforms. This association loses significance once additional controls are added and should be treated as indicative. Inflation and commodity price volatility are individually insignificant across specifications, though a complementary specification using bank assets as the dependent variable confirms a large and significant inflation association ($\beta = 3.441$, $p < 0.01$). A CUSUM structural stability test identifies a parameter break attributable to the 2017 reform programme. The findings support a policy stance that balances continued monetary prudence with targeted macroprudential measures and structural economic diversification.

K E Y W O R D S

Financial Stability; Monetary Policy; Real Interest Rate; Credit-to-GDP; Inflation Targeting; Commodity Volatility; Uzbekistan; Macroprudential Policy

JEL Classification: E52; E44; G21; G28; O16; P34

Introduction

Financial stability — defined as the capacity of the financial system to withstand shocks, allocate resources efficiently, and support sustained economic growth — has assumed increasing prominence alongside price stability as a core central bank objective (Smets, 2014). The two mandates are deeply complementary: a well-functioning financial system amplifies monetary policy transmission, while financial fragility can render conventional policy tools ineffective or counterproductive (Adrian & Liang, 2018). The global financial crisis of 2007–2009 and the COVID-19 pandemic demonstrated that disruptions within the financial sector can rapidly propagate to the real economy, necessitating a rethinking of how monetary and macroprudential policies interact to preserve systemic stability.

Uzbekistan provides a compelling emerging-market case study of this nexus. Following a sweeping liberalisation programme initiated in 2017 — encompassing exchange rate unification, capital account liberalisation, and the dismantling of administered credit allocation — the financial sector underwent rapid structural transformation. The **Central Bank Law of 2019** formalised the CBU's mandate of price stability and banking supervision (IMF, 2021; Central Bank of Uzbekistan, n.d.; Central Banking, 2019), and the adoption of **inflation targeting** in the same year marked a decisive shift in the monetary policy framework. These reforms produced a pronounced structural break: credit-to-GDP **more than tripled** from approximately 10% in 2013 to 34% by 2021 (a 3.4× increase), while inflation surged to 17.5% in 2018 before declining toward 10% under tighter monetary conditions.

Despite the significance of this transformation, the empirical literature on monetary policy and financial stability in Uzbekistan remains underdeveloped. This study addresses that gap through three contributions: (i) a first systematic multi-model regression analysis of monetary policy's **association with** financial stability in Uzbekistan; (ii) explicit incorporation of **commodity price volatility** — reflecting gold's structural dominance of export revenues, with gold representing 37–43% of total exports in 2024–2025 (IMF, 2025; IVO Capital Partners, 2026) — as a financial stability determinant; and (iii) a **CUSUM structural break test** that formally documents the parameter instability induced by the 2017 reform programme, with methodological implications for financial stability research across reform-era transition economies.

2. Literature Review

2.1 Monetary Policy Transmission and the Financial Stability Nexus

Bernanke and Blinder (1992) established the foundational credit channel of monetary transmission, demonstrating how changes in short-term interest rates alter both the cost and availability of credit, affecting borrower balance sheets and aggregate demand. Building on this, Smets (2014) argued that financial stability is a precondition for effective monetary policy transmission — a constraint particularly binding in emerging economies where financial markets are shallow, institutional capacity is still maturing, and bank balance sheets carry significant legacy vulnerabilities from directed lending programmes. Adrian and Liang (2018) formalised the intertemporal trade-off inherent in accommodative policy: while lower rates stimulate current economic activity, they simultaneously build future financial vulnerabilities through the risk-taking channel — a dynamic directly observable in Uzbekistan's 2019–2021 credit expansion phase.

More recently, Checo, Grigoli, and Sandri (2024), in a BIS Working Paper covering a broad panel of emerging markets, confirm that monetary policy transmission in developing economies is broadly comparable in speed and magnitude to that in advanced economies, but is more heterogeneous across countries and more sensitive to institutional quality — a finding that underlines the importance of country-specific empirical assessments such as the present study. Elsayed, Naifar, and Nasreen (2023) examine the monetary policy–financial stability relationship across GCC economies and find that the effectiveness of interest rate policy depends critically on the prevailing financial conditions regime —

consistent with the CUSUM evidence of regime change in Uzbekistan's monetary transmission documented in this study.

At the banking sector level, Kashyap and Stein (1994) and Jiménez et al. (2012) demonstrated that monetary tightening reduces loan origination, particularly among poorly capitalised institutions — a finding directly pertinent to Uzbekistan's predominantly state-owned banking sector. Barone, Oggero, and Damilano (2025), employing a structural VAR on US data through January 2024, show that contractionary shocks reduce loan volumes, increase non-performing loans, and deteriorate bank capital and liquidity ratios, while confirming that **extraordinary institutional conditions can invert conventional transmission patterns** — the key interpretive lens for the counterintuitive coefficient signs documented in this study. Borio and Zhu (2012) identified the risk-taking channel as a missing link in monetary policy transmission, showing that low interest rates incentivise financial intermediaries to expand credit and take on additional risk — a mechanism that may partially explain Uzbekistan's rapid credit-to-GDP expansion in the accommodative period of 2019–2021.

2.2 Inflation Targeting, Financial Deepening, and Stability in Transition Economies

The relationship between inflation targeting (IT) and financial stability in emerging economies is contested in the literature. Fouejieu (2017), analysing 26 emerging countries, found that IT adopters exhibit greater sensitivity to financial risks relative to non-targeting countries, suggesting a potential tension between price stability objectives and macroprudential concerns. This contrasts with Ben Romdhane, Chakroun, and Mensi (2023), who construct a Financial Stability Index for 35 emerging economies and find, using a Panel VAR, that IT regimes are associated with improved financial stability outcomes once adequate institutional preconditions — including central bank independence and supervisory capacity — are in place. Their finding that preconditions matter is directly applicable to Uzbekistan, where the 2019 Central Bank Law was designed precisely to establish these preconditions before deepening the IT framework.

The IMF (2023) Caucasus and Central Asia (CCA) Monetary Policy Frameworks report documents that CCA central banks, including the CBU, are at varying stages of transition toward inflation targeting, with the CBU among the more advanced in the region. The report highlights persistent challenges in the areas of institutional independence and monetary policy communication — factors that condition the effectiveness of the IT framework and the credibility of the inflation anchor. In Uzbekistan's specific context, IMF (2021) confirms that the 2019 reforms substantially enhanced CBU independence and set price and financial stability as co-equal mandates, marking a structural break from the pre-reform administered rate regime.

Arsic et al. (2022), examining 21 IT economies in Europe and Central Asia using NARDL models, find that exchange rate depreciation increases domestic price levels in the long run, while energy price shocks generate inflationary pressures that inflation-targeting frameworks struggle to contain in the short run. This is particularly relevant for Uzbekistan, where the 2017 exchange rate unification generated an immediate inflationary shock and where global energy price movements directly affect the cost structure of an energy-importing economy.

2.3 The Credit-to-GDP Ratio: Financial Deepening Versus Systemic Risk

The use of credit-to-GDP as a financial stability proxy requires careful theoretical grounding, as the indicator captures two economically distinct phenomena simultaneously. Borio and Lowe (2002) identified the credit-to-GDP gap — the deviation of the ratio from its long-run trend — as a leading early warning indicator of banking crises, providing the foundation for the Basel III countercyclical capital buffer (CCyB). Drehmann and Tsatsaronis (2014), evaluating multiple early warning indicators, find that the credit-to-GDP gap consistently outperforms alternatives at longer forecast horizons of up to five years, while the debt service ratio dominates at shorter horizons of one to two years before a crisis. These findings underscore that the **level** of credit-to-GDP captures financial deepening, while **deviations from trend** capture systemic risk accumulation — a distinction central to interpreting Uzbekistan's trajectory from a shallow 10% baseline to 34% over 2013–2021.

Schularick and Taylor (2012), in a landmark study of 14 advanced economies over more than a century, demonstrate that credit booms are the single most powerful predictor of financial crises, with rapid credit growth in the five years preceding a crisis being a robust early warning signal. Their framework reinforces the dual nature of the credit-to-GDP indicator: gradual deepening from a low base, as observed in Uzbekistan, carries different risk implications than rapid expansion in an already-developed financial system. Beck, Degryse, and Kneer (2014) extend this analysis to differentiate productive financial intermediation — which supports economic development — from financial system size effects, finding that intermediation benefits growth while pure financial sector expansion does not. This distinction motivates treating Uzbekistan's post-reform credit expansion as reflecting primarily productive deepening at the current stage, while recommending macroprudential vigilance as the system approaches the saturation thresholds documented in more developed financial systems.

2.4 Commodity Price Shocks and Financial Vulnerability in Resource-Dependent Economies

Urom et al. (2023) document time-varying spillovers between commodity prices and interest rates, showing that the magnitude and direction of commodity-monetary policy interactions shift substantially across financial cycle phases — underscoring the importance of accounting for commodity price dynamics when assessing monetary policy's impact on financial stability in resource-dependent economies. Balgobind et al. (2022) show that commodity price cycles directly affect fiscal sustainability and banking sector resilience through fiscal revenue volatility, exchange rate depreciation, and deterioration of corporate debt-servicing capacity.

These findings are structurally applicable to Uzbekistan, where gold constitutes 37–43% of total export revenues. As documented by IMF (2022) and IMF (2025), strong gold prices have materially supported Uzbekistan's fiscal position, reserve accumulation, and macroeconomic stability, while the IMF explicitly warns that volatile gold prices create inflationary pressures when high and reduce government spending capacity when low, increasing macroeconomic risks. Uzbekistan's international reserves reached USD 49.7 billion in mid-2025, with gold comprising the dominant share — making the CBU's reserve position and financial stability simultaneously contingent on global precious metals market conditions. This structural gold dependence creates a transmission pathway from international commodity cycles to domestic banking sector asset quality that is qualitatively distinct from, but analogous to, the oil-banking nexus documented for Russia (IMF, 2022) and the copper-fiscal linkage studied for Chile and other Latin American commodity exporters.

2.5 Macroprudential Policy, Monetary Policy Interaction, and Emerging Economy Applications

Cerutti, Claessens, and Laeven (2017), in a landmark cross-country study of 119 countries, find that emerging economies use macroprudential policies most frequently — especially foreign exchangerelated instruments — and that macroprudential tightening is generally associated with lower credit growth, particularly in household credit. Their evidence that macroprudential policy effectiveness is lower in financially more developed systems implies that Uzbekistan, at an early stage of financial development, may derive relatively stronger stabilisation benefits from macroprudential interventions such as the CCyB. This provides empirical support for the CCyB recommendation in Section 5 of this study.

Smets (2014) argues that while price stability remains the primary mandate, financial stability concerns should not be treated as secondary — and that the interaction between monetary and macroprudential policies is critical for maintaining systemic resilience. Afanasyeva et al. (2024) demonstrate that periods of economic expansion systematically precede financial instability through accumulating leverage and risk-taking, reinforcing the case for activating countercyclical macroprudential tools during credit booms rather than waiting for distress signals. In Uzbekistan's context, the credit expansion of 2017–2021 combined with rising non-performing and watch loans to 20% of total loans by 2023 represents precisely the pattern Afanasyeva et al. identify as a precursor to systemic fragility. Dabla-Norris and Srivisal (2013) confirm that macroeconomic volatility — particularly in inflation and real interest rates — disproportionately amplifies financial vulnerabilities in emerging markets, creating a rationale for policy coordination between the monetary and macroprudential frameworks. This is directly relevant to Uzbekistan, where the real interest rate ranged from −13.7% to +10.6% within the sample period, a volatility profile that the empirical results in Section 4 show is closely associated with swings in the credit-to-GDP ratio.

3. Data and Methodology

3.1 Data

Table 1: Variable Definitions

Variable	Definition	Role	Source
Credit-to-GDP (%)	Bank credit to private sector / GDP	Dependent	World Bank WDI
Inflation (%)	CPI year-on-year change (%)	Independent	IMF WEO
Real Interest Rate (%)	Nominal lending rate minus inflation (%)	Independent	World Bank WDI
Broad Money (% GDP)	M2 monetary aggregate / GDP (%)	Independent	World Bank WDI
Oil Volatility	Rolling SD of oil price returns (2-yr window)	Independent	WB Pink Sheet
Gold Volatility	Rolling SD of gold price returns (2-yr window)	Independent	WB Pink Sheet
Copper Volatility	Rolling SD of copper price returns (2-yr window)	Independent	WB Pink Sheet

Note: Commodity volatility is the rolling standard deviation of year-on-year percentage price changes over a two-year window. WDI = World Development Indicators; WEO = World Economic Outlook; WB = World Bank; SD = standard deviation.

The study uses annual data for 2013–2024 (N = 12), sourced from the World Bank WDI (credit-to-GDP, real interest rate, broad money), the IMF WEO (inflation), and the World Bank Pink Sheet (oil, gold, and copper prices). The 2013 starting point provides a pre-reform baseline. The regression sample is 2015–2024 (N = 10), reflecting the two-year window required for the commodity volatility measures. **Note on the dependent variable.** Credit-to-GDP serves as the primary financial stability proxy, consistent with its use in the CBU's own Financial Stability Reports and in the cross-country empirical literature (Beck et al., 2014). Following Borio and Lowe (2002) and Drehmann and Tsatsaronis (2014), this indicator is recognised as dual-natured: moderate and stable expansion from a low base reflects productive financial deepening, while rapid growth above trend constitutes an early warning signal of systemic risk (Schularick & Taylor, 2012). Uzbekistan's trajectory from 10% to 34% over 2013–2021 captures both dimensions simultaneously — initial deepening from a shallow base, followed by a pace that warrants macroprudential monitoring. The analysis therefore interprets credit-to-GDP as a financial intermediation depth measure, and the positive association with the real interest rate in Section 4.3 is read as capturing structural reform dynamics rather than as evidence that higher credit-to-GDP is unconditionally stabilising. The complementary specification in Section 4.6 and CBU Financial Stress Index evidence in Section 5 provide additional stability perspectives.

3.2 Hypotheses

H1 — Real Interest Rate: Higher real interest rates are associated with improved credit discipline and risk screening. Given Uzbekistan's reform context, the directional prior is ambiguous: monetary normalisation and financial deepening occurred simultaneously, potentially producing a positive reduced-form association.

H2 — Inflation: Higher inflation is associated with eroded real asset values, raised default risk, and weakened financial stability (negative expected sign), consistent with Dabla-Norris and Srivisal (2013).

H3 — Broad Money: Greater monetary liquidity is associated with credit growth and financial deepening (positive expected sign), though excessive expansion can generate inflationary instability (Cerutti et al., 2017).

H4 — Commodity Price Volatility: Higher commodity price volatility is associated with adverse movements in external balances, fiscal revenues, and banking sector asset quality through indirect fiscal and corporate solvency channels (negative expected sign), following Urom et al. (2023) and Balgobind et al. (2022).

3.3 Econometric Specification

Three nested OLS models are estimated, each with credit-to-GDP as the dependent variable. Given the small sample ($N = 10$), which renders cointegration testing unreliable and makes the ARDL bounds test underpowered, OLS estimation in levels with HC3 heteroskedasticity-robust standard errors (MacKinnon & White, 1985) is adopted, consistent with standard practice in short annual macroeconomic samples (Wooldridge, 2012). A key limitation is that the ARDL bounds-testing approach (Pesaran, Shin & Smith, 2001), designed for mixed I(0)/I(1) regressors, is the preferable estimator and should be employed once a longer data record is available.

Model 1 (Baseline): $\text{Credit-to-GDP} = \alpha + \beta_1 \text{ RIR} + \varepsilon$
Model 2 (Monetary): $\text{Credit-to-GDP} = \alpha + \beta_1 \text{ Inflation} + \beta_2 \text{ RIR} + \beta_3 \text{ BroadMoney} + \varepsilon$
Model 3 (Full): $\text{Credit-to-GDP} = \alpha + \beta_1 \text{ Inflation} + \beta_2 \text{ RIR} + \beta_3 \text{ BroadMoney} + \beta_4 \text{ OilVol} + \beta_5 \text{ GoldVol} + \beta_6 \text{ CopperVol} + \varepsilon$

Model 1 isolates the interest rate channel. Model 2 captures the full monetary transmission constellation — price, interest rate, and liquidity channels. Model 3 augments the monetary framework with commodity price volatility, following Urom et al. (2023). Adjusted R^2 serves as the primary model comparison criterion given the small-sample penalty for additional parameters.

Endogeneity caveat. A key limitation is the endogeneity of the real interest rate and inflation with respect to credit conditions: the CBU may adjust the policy rate in response to credit market developments, creating reverse causation. Instrumental variable (IV) estimation is infeasible at $N = 10$. All results should be interpreted as **conditional associations rather than causal estimates**, and findings are framed accordingly throughout Section 4.

3.4 Unit Root Tests

Stationarity is assessed via the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests, both testing H_0: unit root (non-stationary). Results are in Table 2.

Table 2: Unit Root Test Results

Variable	ADF Stat.	ADF p-val	PP Stat.	PP p-val	Order
Credit-to-GDP (%)	−0.657	0.858	0.636	0.863	I(1)
Inflation (%)	−2.575	0.098*	−0.941	0.774	I(0)/I(1)
Real Interest Rate (%)	-2.678	0.000***	−1.569	0.499	I(0)/I(1)
Broad Money (% GDP)	1.544	0.512	−1.472	0.547	I(1)

Note: H_0: unit root (non-stationary). * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. I(0)/I(1) denotes conflicting results across tests, reflecting known small-sample sensitivity (Maddala & Kim, 1998).

Given mixed integration orders, regressions are estimated in levels with HC3 robust standard errors. Spurious regression risk is mitigated through multivariate controls and the complementary specification in Section 4.6. ARDL bounds testing is recommended for future work once a longer data record is available.

4. Empirical Results

4.1 Descriptive Statistics

Table 3: Descriptive Statistics — Uzbekistan, 2013–2024 (N = 12)

Variable	Mean	SD	Min	Max	Skewness	Kurtosis
Credit-to-GDP (%)	22.19	10.54	9.33	34.36	−0.091	−2.072
Inflation (%)	11.56	2.72	8.50	17.50	0.949	0.478
Real Interest Rate (%)	3.26	6.60	−13.69	10.61	−1.777	3.517
Broad Money (% GDP)	18.44	1.37	16.00	20.54	0.084	−0.464
Oil (USD/bbl)	68.01	17.27	43.21	99.19	0.391	−0.538
Gold (USD/troy oz)	1,472.60	282.86	1,169.13	2,074.46	0.937	0.107
Copper (USD/mt)	6,695.04	974.49	5,176.96	8,516.50	0.447	−0.360

Source: World Bank WDI, IMF WEO, World Bank Pink Sheet. N = 12 (2013–2024).

Credit-to-GDP averaged 22.2% with high dispersion (SD = 10.5), ranging from 9.3% (2013) to 34.4% (2021). The more than tripling of this ratio (3.4×) directly reflects the 2017 liberalisation programme. The flat, symmetric distribution (skewness ≈ 0, kurtosis = −2.1) is consistent with gradual trend-driven financial deepening rather than an abrupt boom — though, as noted in Section 3.1, productive deepening and risk accumulation may characterise this trajectory simultaneously (Borio & Lowe, 2002; Schularick & Taylor, 2012).

Inflation averaged 11.6% (SD = 2.7%). The positive skewness (0.95) reflects the exceptional 17.5% episode in 2018, consistent with Arsic et al.'s (2022) finding that exchange rate pass-through generates inflationary shocks following IT regime adoption in Central Asian economies. **Real interest rate** is the most volatile variable (SD = 6.6%), ranging from −13.7% in 2017 to +10.6% as the CBU tightened. The strongly negative skewness (−1.78) and high kurtosis (3.52) confirm that deeply negative real rates were extreme tail events. **Broad money** was stable (SD = 1.4%), consistent with measured CBU liquidity management. Commodity prices exhibit moderate positive skewness, driven by the 2021–2022 post-pandemic surge.

4.2 Correlation Analysis

Figure 1: Pearson Correlation Matrix

The Pearson correlation matrix reveals two nominally significant bivariate relationships. The real interest rate is positively correlated with credit-to-GDP ($r = 0.540$, $p < 0.10$), reflecting the concurrent occurrence of rate normalisation and financial deepening in the post-reform period — a pattern consistent with Ben Romdhane et al.'s (2023) finding that IT adoption promotes financial stability when preceded by adequate institutional reform. Broad money is negatively correlated with credit-to-GDP ($r = -0.513$, $p < 0.10$), consistent with the substitution of government-directed liquidity by market-based intermediation. Inflation is uncorrelated with credit-to-GDP ($r = 0.121$, $p > 0.10$). No regressor pair exceeds $|r| = 0.50$, mitigating acute multicollinearity concerns.

Inferential caveat. Significance stars at $p < 0.10$ on $N = 10$ carry limited inferential weight given the near-zero statistical power for detecting moderate correlations at this sample size. These bivariate associations should be treated as **indicative of direction rather than confirmatory of magnitude**, and they are presented to motivate the multivariate specifications in Section 4.3 rather than as standalone evidence.

4.3 Regression Results

Table 4: OLS Regression Results — Dependent Variable: Credit-to-GDP (%)

Variable	Model 1 Baseline	Model 2 Monetary	Model 3 Full
Inflation	—	1.578 (2.894)	−1.525 (5.684)
Real Interest Rate (RIR)	**0.837* (0.467)**	1.170 (1.332)	0.342 (1.825)
Broad Money (% GDP)	—	0.238 (3.350)	4.235 (9.410)
Oil Volatility	—	—	−0.755 (0.924)
Gold Volatility	—	—	1.396 (1.615)
Copper Volatility	—	—	0.656 (0.616)
Constant	**21.878*** (3.658)**	2.212 (132.437)	114.445 (250.440)
R^2	0.394	0.538	0.808
Adjusted R^2	0.318	0.307	0.423
N	10	10	10

Note: HC3 heteroskedasticity-robust standard errors in parentheses. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. Sample: 2015–2024 ($N = 10$). '—' indicates variable excluded from specification. All estimates are associational; see endogeneity caveat in Section 3.3. The large standard errors on the Model 2 constant (SE = 132.4) and Model 3 constant (SE = 250.4) reflect the small sample.

Model 1 — Baseline

The real interest rate is positively and significantly associated with credit-to-GDP in the baseline specification (**$\beta = 0.837$, $p < 0.10$**), indicating that a one percentage point increase in RIR is associated with a 0.84 percentage point rise in credit-to-GDP. The model explains 39.4% of variance (adj. $R^2 = 0.318$). The positive sign is counterintuitive under standard credit demand theory but is economically coherent in the reform context: prior to 2017, administered rates were set below inflation, subsidising directed lending. The post-reform normalisation — from −13.7% to positive territory — coincided with displacement of administered by market-based credit, producing a positive reduced-form association that captures institutional restructuring rather than a price-demand channel. This resonates with Barone et al.'s (2025) observation that institutional transformation reshapes transmission, and with Ben Romdhane et al.'s (2023) finding that IT adoption is associated with financial stability improvements when institutional preconditions are met. Critically, **this association loses significance in Models 2 and 3** and should be treated as suggestive. H1 receives tentative directional support.

Model 2 — Monetary

R^2 rises to 0.538 but adjusted R^2 falls to 0.307, indicating inflation and broad money do not add significant incremental power. Inflation enters positively ($\beta = 1.578$, SE = 2.894) and broad money marginally positively ($\beta = 0.238$, SE = 3.350), both insignificant. The positive inflation coefficient reflects the 2017–2019 episode in which elevated inflation coincided with a government-directed credit push — a co-movement consistent with Fouejieu's (2017) finding that IT adopters in transition exhibit non-standard inflation-credit relationships during the early adoption phase. H2 and H3 are not confirmed at conventional significance levels.

Model 3 — Full Model

The full specification achieves the highest raw fit ($R^2 = 0.808$), but the adjusted R^2 of 0.423 and pronounced coefficient instability — inflation reverses to −1.525, broad money expands to 4.235, with SE = 250.4 on the constant — are symptomatic of near-multicollinearity and overfitting on $N = 10$. All commodity volatility coefficients are individually insignificant; 90% confidence bands encompass zero for all estimates. The full model is appropriately treated as a descriptive upper bound on explanatory power. H4 is not confirmed statistically, though CBU stress-testing results in Section 5 provide convergent evidence of commodity transmission through fiscal and asset quality channels, consistent with Urom et al. (2023).

4.4 Residual Diagnostics

Figure 2: Residual Diagnostic Plots — Model 2

The Residuals vs. Fitted plot shows no systematic heteroskedastic pattern, though two observations (2017–2018) generate residuals exceeding ±7 percentage points, reflecting credit expansion during peak reform implementation that monetary variables alone cannot fully capture. The Q-Q plot confirms departures from normality at both tails, validating HC3 inference over conventional OLS t-statistics. The Residuals Over Time plot documents pronounced temporal clustering: large negative residuals in 2016–2017 transition to large positive residuals in 2018–2019, indicating a structural break in the data-generating process — motivating the formal CUSUM test below.

4.5 Structural Stability: CUSUM Test

Figure 3: CUSUM Structural Stability Test

The CUSUM test for Model 2 rejects parameter stability throughout the sample: all five recursive observations lie outside the 5% critical bounds, with the cumulative sum growing monotonically from 5.6 to 29.7 — far above the upper bound of 6.3. The 2017 reform break reference confirms that the structural shift originated at or preceded the liberalisation programme.

This finding has a direct implication for interpreting Table 4: the full-sample OLS coefficients are averages across structurally distinct sub-periods (pre- and post-2017), and should not be read as stable structural parameters — as conceded in the second paragraph of this section itself. This is consistent with Elsayed et al.'s (2023) finding that monetary policy effectiveness is regime-dependent, and with IMF's (2023) assessment that CCA central banks are at heterogeneous stages of monetary policy framework development, implying evolving transmission parameters. Future research should employ sub-sample estimation or time-varying parameter models to identify post-reform transmission dynamics with greater precision.

4.6 Complementary Specification: Bank Assets as an Alternative Financial Stability Proxy

Table 5: Complementary Specification — Bank Assets (% GDP) as Dependent Variable (2014–2021, N = 8)

Variable	Coefficient	Std. Error	p-value
Constant	−8.352	14.502	0.565
Inflation	**3.441*** **	**1.108**	**0.002**
Real Interest Rate	0.701	0.982	0.475
R^2	0.690	—	—
Adjusted R^2	0.566	—	—
N	8	—	—

Note: HC3 robust standard errors. * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. Sample: 2014–2021 (N = 8). Both the dependent variable and sample period differ from the main models; this should be read as a complementary analysis rather than a robustness check.

As a complementary specification employing an alternative financial stability measure, Table 5 reports results with bank assets (% of GDP) as the dependent variable. This is not a robustness check in the strict sense — both the dependent variable and sample period differ — but a complementary analysis providing an additional perspective on monetary policy's association with banking sector conditions.

Inflation enters with a large, positive, and highly significant association ($\beta = 3.441$, $p < 0.001$): a one percentage point rise in inflation is associated with a 3.44 percentage point increase in bank assets relative to GDP. This reflects nominal balance sheet expansion during Uzbekistan's 2017–2019 high-inflation period, consistent with Dabla-Norris and Srivisal's (2013) finding that inflation volatility inflates nominal banking sector size indicators while eroding real credit quality. The real interest rate remains positive but insignificant ($\beta = 0.701$, $p = 0.475$). The superior adjusted R^2 (0.566 vs. 0.307 in

Model 2) indicates that bank asset dynamics respond more cleanly to inflation, reinforcing the sensitivity of financial stability estimates to proxy choice — a point also made by the early warning indicator literature (Drehmann & Tsatsaronis, 2014).

5. Conclusion and Recommendations

This study provides **a first systematic econometric assessment** of the association between monetary policy and financial stability in Uzbekistan over 2013–2024. Three principal findings emerge, each with direct contextual corroboration and policy implications.

Real interest rate as the dominant statistically significant correlate of credit depth

The real interest rate is positively and suggestively associated with credit-to-GDP in the baseline specification ($\beta = 0.837$, $p < 0.10$), though this loses significance in fuller models and should be treated as indicative. The positive sign reflects the concurrent normalisation of real rates and financial deepening following the 2017 liberalisation — consistent with Barone et al.'s (2025) evidence that institutional transformation reshapes transmission, and with Ben Romdhane et al.'s (2023) finding that IT adoption improves financial stability when institutional preconditions are in place. The CBU's Financial Stability Report (2024) corroborates this: maintaining the policy rate at 14% contributed to a steady decline in the Financial Stress Index throughout 2023, the bank liabilities-to-capital ratio declined by 28%, and credit-to-GDP grew by only 2 percentage points in 2023 versus 4.5 in 2022, confirming credit growth moderation without disorderly contraction.

Inflation, commodity vulnerability, and emerging micro-level risks

Inflation and commodity price volatility are individually insignificant in the OLS models, but the complementary specification confirms a large inflation association with bank assets ($\beta = 3.441$, $p < 0.001$). CBU stress-testing establishes that a 15% oil price decline raises the NPL ratio by 1.5 percentage points — material indirect transmission through fiscal and asset quality channels, consistent with Urom et al. (2023) and Balgobind et al. (2022). The share of non-performing and watch loans rose to 20% of total loans in 2023, up 4 percentage points from 2022 — a transition from macro-stability to micro-credit risk that aligns with Afanasyeva et al.'s (2024) finding that financial imbalances accumulate during expansion and crystallise during tightening.

Structural break and methodological implications

The CUSUM test confirms structural parameter instability associated with the 2017 reform programme. Full-sample OLS coefficients in Table 4 are averages across structurally distinct sub-periods, limiting their interpretive value. This is the most consequential limitation of the current design, and carries a methodological lesson for transition economy research more broadly: conventional regression models estimated across reform periods risk conflating structurally distinct regime dynamics. Future research should employ quarterly or monthly data — raising the sample to approximately 44–48 observations — and adopt ARDL bounds testing (Pesaran et al., 2001) or time-varying parameter estimation to identify post-reform monetary transmission dynamics with greater precision.

The following recommendations follow from the findings:

1.Implement a countercyclical capital buffer (CCyB). The more than tripling of credit-to-GDP (3.4×, 2013–2021) and the subsequent rise in NPL and watch loans to 20% by 2023 demonstrate systemic risk accumulation consistent with the credit boom patterns identified by Borio and Lowe (2002) and Schularick and Taylor (2012). A CCyB framework, aligned with Basel III standards and supported by empirical evidence from Cerutti et al. (2017) on emerging economy macroprudential effectiveness, would require capital accumulation during above-trend credit phases, providing an automatic stabiliser without discretionary intervention at cyclical peaks.

2.Strengthen foreign exchange liquidity buffers and commodity hedging instruments. Given that gold constitutes 37–43% of export revenues (IMF, 2025) and a 15% oil price decline raises the NPL ratio by 1.5 percentage points, expanding FX standing facilities and developing commodity derivatives markets would directly reduce the probability that commodity shocks propagate into systemic banking stress, consistent with the commodity-financial stability transmission documented by Urom et al. (2023).

3.Deepen domestic capital markets. Development of liquid local-currency government bond and corporate debt markets would reduce over-reliance on bank intermediation, create market-based interest rate benchmarks, and provide instruments for managing duration and currency risk — all priorities consistent with Beck et al.'s (2014) evidence that financial deepening supports growth while pure balance sheet expansion does not.

4.Consolidate the inflation-targeting framework. Maintaining a credible path toward the CBU's 5% inflation target by end-2027 — as projected in the IMF's 2025 Article IV — is essential to anchor expectations, preserve the positive real rate environment associated with financial stability improvements, and consolidate the IT preconditions that Ben Romdhane et al. (2023) identify as necessary for financial stability benefits to materialise.

5.Accelerate structural economic diversification. Reducing gold and commodity export dependence — consistent with priorities at the 2025 Tashkent International Investment Forum — would mitigate the indirect transmission of commodity price shocks to fiscal balances and banking sector asset quality documented by Balgobind et al. (2022), and reduce the amplitude of the financial cycle driven by commodity revenue volatility.

References

1. Adrian, T., & Liang, N. (2018). Monetary policy, financial conditions, and financial stability. International Journal of Central Banking, 14(1), 73–131.
2. Afanasyeva, E., Jerow, S., Lee, S.J., & Modugno, M. (2024). Sowing the seeds of financial imbalances: The role of macroeconomic performance. Journal of Financial Stability, 74, 100839.
3. Anvarova, M., & Isakov, O. (2024). Impact of government ownership on banks' profitability: Evidence from Uzbekistan. Tripal Publishing House.
4. Arsic, M., Nojkovic, A., & Randjelovic, S. (2022). Macroeconomic performance of inflation targeting in European and Asian emerging economies. Energy Economics, 115, 106761.

5. Balgobind, N., Naidoo, R., & Phetla, M. (2022). Commodity cycles and macro-financial linkages in emerging economies. Journal of Emerging Market Finance, 21(3), 315–340.
6. Barone, S., Oggero, N., & Damilano, M. (2025). Monetary policy and financial stability: Evidence from a new macroeconomic environment. Research in International Business and Finance, 77, 102992.
7. Beck, T., Degryse, H., & Kneer, C. (2014). Is more finance better? Disentangling intermediation and size effects of financial systems. Journal of Financial Stability, 10, 50–64.
8. Ben Romdhane, I., Chakroun, M.A., & Mensi, S. (2023). Inflation targeting, economic growth and financial stability: Evidence from emerging countries. Quantitative Finance and Economics, 7(4), 697–723.
9. Bernanke, B.S., & Blinder, A.S. (1992). The federal funds rate and the channels of monetary transmission. American Economic Review, 82(4), 901–921.
10. Borio, C., & Lowe, P. (2002). Assessing the risk of banking crises. BIS Quarterly Review, December, 43–54.
11. Borio, C., & Zhu, H. (2012). Capital regulation, risk-taking and monetary policy: A missing link in the transmission mechanism? Journal of Financial Stability, 8(4), 236–251.
12. Central Bank of Uzbekistan (2024). Financial Stability Report 2024. Tashkent: CBU. https://cbu.uz/en/financial-stability/report/
13. Central Bank of Uzbekistan (n.d.). Monetary policy: Objective and principles. https://cbu.uz/en/monetary-policy/concept/
14. Central Banking (2019, November 18). Uzbekistan boosts transparency with new central bank law. Central Banking. https://www.centralbanking.com/central-banks/governance/4555821
15. Cerutti, E., Claessens, S., & Laeven, L. (2017). The use and effectiveness of macroprudential policies: New evidence. Journal of Financial Stability, 28, 203–224.
16. Checo, A., Grigoli, F., & Sandri, D. (2024). Monetary policy transmission in emerging markets: Proverbial concerns, novel evidence. BIS Working Papers No. 1170. Basel: Bank for International Settlements.
17. Dabla-Norris, E., & Srivisal, N. (2013). Revisiting the link between finance and macroeconomic volatility. IMF Working Paper No. 13/29. Washington, DC: IMF.
18. Drehmann, M., & Tsatsaronis, K. (2014). The credit-to-GDP gap and countercyclical capital buffers: Questions and answers. BIS Quarterly Review, March, 55–73.
19. Elsayed, A.H., Naifar, N., & Nasreen, S. (2023). Financial stability and monetary policy reaction: Evidence from the GCC countries. Quarterly Review of Economics and Finance, 87, 396–405.
20. Fouejieu, A. (2017). Inflation targeting and financial stability in emerging markets. Economic Modelling, 60, 51–70.
21. IMF (2021). Republic of Uzbekistan: 2021 Article IV Consultation — Staff Report. IMF Staff Country Reports, 2021(085). Washington, DC: IMF.
22. IMF (2022). Republic of Uzbekistan: 2022 Article IV Consultation — Staff Report. IMF Staff Country Reports, 2022(189). Washington, DC: IMF.
23. IMF (2023). Monetary Policy Frameworks and Communication in the Caucasus and Central Asia. IMF Working Paper No. 2023/251. Washington, DC: IMF.
24. IMF (2024). Global Financial Stability Report. Washington, DC: IMF.

25. IMF (2025). Republic of Uzbekistan — Staff Concluding Statement of the 2025 Article IV Mission. Washington, DC: IMF. https://www.imf.org/en/news/articles/2025/04/23
26. IVO Capital Partners (2026). Uzbekistan — The new Silk Road: Gold, reforms, and opportunities. https://www.ivocapital.com/en/2026/06/22/uzbekistan-the-new-silk-road-gold-reforms-and-opportunities/
27. Jiménez, G., Ongena, S., Peydró, J.L., & Saurina, J. (2012). Credit supply and monetary policy: Identifying the bank balance-sheet channel with loan applications. American Economic Review, 102(5), 2301–2326.
28. Kashyap, A.K., & Stein, J.C. (1994). Monetary policy and bank lending. In Monetary Policy. University of Chicago Press, pp. 221–261.
29. MacKinnon, J.G., & White, H. (1985). Some heteroskedasticity-consistent covariance matrix estimators with improved finite sample properties. Journal of Econometrics, 29(3), 305–325.
30. Maddala, G.S., & Kim, I.M. (1998). Unit Roots, Cointegration, and Structural Change. Cambridge: Cambridge University Press.
31. Pesaran, M.H., Shin, Y., & Smith, R.J. (2001). Bounds testing approaches to the analysis of level relationships. Journal of Applied Econometrics, 16(3), 289–326.
32. Schularick, M., & Taylor, A.M. (2012). Credit booms gone bust: Monetary policy, leverage cycles, and financial crises, 1870–2008. American Economic Review, 102(2), 1029–1061.
33. Smets, F. (2014). Financial stability and monetary policy: How closely interlinked? International Journal of Central Banking, 10(2), 263–300.
34. Urom, C., Guesmi, K., Abid, I., & Dagher, L. (2023). Dynamic integration and transmission channels among interest rates and oil price shocks. Quarterly Review of Economics and Finance, 87, 296–317.
35. Wooldridge, J.M. (2012). Introductory Econometrics: A Modern Approach (5th ed.). Mason, OH: South-Western Cengage Learning.
36. Younsi, M., & Nafla, A. (2019). Financial stability, monetary policy, and economic growth: Panel data evidence from developed and developing countries. Journal of the Knowledge Economy, 10(1), 238–260.