Macroeconomic Conditions and Non-Performing Personal Loans: Evidence from a Sri Lankan Commercial Bank

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Abstract: This paper investigates the empirical relationship between macroeconomic conditions and retail credit risk by analyzing quarterly personal loan defaults at a licensed commercial bank in Sri Lanka (anonymised as ABC Bank PLC) over the period 2015 Q1 to 2025 Q4 ($N = 44$). Personal loans represent an unsecured retail credit class where debt service depends almost entirely on household disposable income and employment continuity rather than on collateral realization, making them exceptionally vulnerable to macroeconomic volatility. The study examines four key macroeconomic determinants: inflation (Colombo Consumer Price Index, CCPI), prime lending interest rates (Average Weighted Prime Lending Rate, AWPR), the unemployment rate, and real GDP growth rate, using verified quarterly data published by the Central Bank of Sri Lanka (CBSL) and the Department of Census and Statistics (DCS). A multiple linear regression model is estimated alongside bivariate correlation analysis and an extensive econometric diagnostic testing framework. Bivariate Pearson correlations demonstrate that inflation ($r = 0.503, p = 0.0005$) and the lending interest rate ($r = 0.455, p = 0.0019$) exhibit statistically significant positive associations with personal loan defaults, while real GDP growth displays a significant inverse relationship ($r = -0.395, p = 0.0079$), and unemployment exhibits a positive but non-significant correlation ($r = 0.121, p = 0.4344$). While the overall multiple regression model is statistically significant ($F(4, 39) = 3.415, p = 0.0174$) and accounts for 25.9% of the variation in the personal loan default ratio ($R^2 = 0.259$), none of the four individual regression coefficients achieve statistical significance at the 5% level once estimated simultaneously. Econometric diagnostics reveal that this multivariate result is driven by severe multicollinearity between inflation and the AWPR (VIF = 5.635 and 5.377; $r = 0.885$) and substantial positive residual autocorrelation (Durbin-Watson = 0.070). These empirical findings confirm that in a small open economy subjected to sovereign debt distress, price inflation and monetary tightening operate as a unified composite shock rather than separable risk factors, and hyperinflation inverts the classical debt-erosion hypothesis. Credit risk management functions must integrate joint macroeconomic early-warning signals and dynamic stress-testing frameworks.

Keywords: *Personal Loan Defaults; Non-Performing Loans; Macroeconomic Volatility; Sovereign Debt Crisis; Credit Risk; Multicollinearity; Autocorrelation; Sri Lanka*

1. Introduction

1.1. Background of the Study

The stability of the banking sector is a cornerstone of macroeconomic resilience, and asset quality—most visibly expressed through the level of non-performing loans (NPLs)—is one of the clearest indicators of that stability (Louzis et al., 2012). In Sri Lanka, the decade between 2015 and 2025 was marked by an unusually volatile macroeconomic environment: moderate post-war growth gave way to severe fiscal and external account pressures, a sovereign debt default in 2022, hyperinflation exceeding 60 percent year-on-year at its peak, prime lending rates that more than tripled within eighteen months, and a subsequent disinflationary recovery that pushed the Colombo Consumer Price Index (CCPI) into negative territory by late 2024 (Central Bank of Sri Lanka, 2026b,a). Each of these macroeconomic

swings has had a direct bearing on household repayment capacity and, in turn, on the credit quality of unsecured retail borrowing such as personal loans.

ABC Bank PLC, a licensed commercial bank operating in Sri Lanka, entered the personal loan market in the third quarter of 2014, establishing a dedicated retail lending line at a time when the broader economy was still in a relatively stable post-conflict growth phase. The bank's personal loan portfolio remained modest until the second quarter of 2016, when ABC Bank opened a dedicated canvas sales unit—a direct sales force tasked with door-to-door and worksite origination of personal loans. This operational change coincided with a marked acceleration in portfolio growth, illustrating how institutional origination strategy and macroeconomic conditions jointly shape the trajectory of retail credit risk. Over the subsequent decade, ABC Bank's personal loan book moved through the full range of Sri Lanka's macroeconomic cycle: the moderate growth years of 2015–2019, the COVID-19 pandemic shock of 2020, the balance-of-payments, currency, and inflation crisis of 2021–2023, and the economic stabilisation period of 2024–2025.

Personal loans are structurally more exposed to macroeconomic shocks than secured or corporate lending because repayment depends almost entirely on a borrower's disposable income and employment continuity rather than on collateral realisation (Beck et al., 2015). Under the Central Bank of Sri Lanka's regulatory framework, a credit facility is classified as non-performing when interest and/or principal instalments remain unpaid for 90 days or more, or when three consecutive monthly instalments are missed on facilities repayable by instalment (Central Bank of Sri Lanka, 2008). It is this classification, applied to ABC Bank's quarterly personal loan portfolio between 2015 and 2025, that forms the dependent variable of this study.

1.2. Problem Statement and Research Gap

While the general relationship between macroeconomic conditions and bank asset quality is well established internationally (Nkusu, 2011; Klein, 2013), empirical research that isolates personal (unsecured, retail) loan defaults as distinct from aggregate NPLs across all loan categories remains limited, particularly within the Sri Lankan context (Rathnayake and Dissanayake, 2022; Ekanayake, 2018). Existing Sri Lankan studies have tended to examine NPLs at the level of the overall loan book or across a panel of banks using annual data (Ekanayake, 2015; Damayanthi and Gunawardhana, 2022). This literature leaves open the critical question of how specific macroeconomic indicators—inflation, lending interest rates, unemployment, and GDP growth—move together with the personal loan default experience of a single commercial bank at quarterly frequency across a full decade encompassing an unprecedented sovereign debt crisis.

Taken together, the existing literature reveals three specific empirical gaps that this study addresses:

(i) Limited empirical research isolates unsecured personal/consumer loan defaults from aggregate bank NPLs in Sri Lanka, despite clear theoretical reasons why unsecured consumer credit reacts differently to macroeconomic volatility compared to collateralised corporate or mortgage credit (Louzis et al., 2012).
(ii) Existing domestic studies rely predominantly on annual panel data ending before, or only partially covering, the 2022 sovereign debt and hyperinflation crisis; a continuous quarterly dataset spanning 2015–2025 has not previously been assembled and analysed.
(iii) Little empirical research incorporates the operational context of a bank's own origination channels—specifically ABC Bank's Q3 2014 launch and subsequent Q2 2016 introduction of a dedicated canvas sales unit—as contextual factors alongside macroeconomic determinants.

1.3. Objectives and Significance of the Study

The primary objective of this study is to examine the impact of macroeconomic factors on personal loan defaults at ABC Bank PLC over the decade 2015–2025. Specifically, the study investigates: (1) the

impact of consumer price inflation on personal loan defaults; (2) the impact of benchmark lending interest rates on default ratios; (3) the effect of the national unemployment rate on retail credit performance; and (4) the role of quarterly real GDP growth in mitigating loan default risks.

This investigation provides three tangible contributions to banking practice and the empirical literature:

(i) It provides one of the first Sri Lankan empirical studies to isolate personal loan defaults specifically, using high-frequency quarterly data across a period that spans the country's most severe economic crisis in modern history.
(ii) Its empirical findings offer commercial bank credit risk managers a concrete, quantified framework for early-warning indicators tied to observable macroeconomic releases (CCPI, AWPR, unemployment, GDP growth), supporting proactive provisioning and risk-sensitive underwriting ahead of anticipated downturns.
(iii) At a policy level, the study adds Sri Lanka-specific evidence to an international macroprudential literature (Nkusu, 2011; Klein, 2013; Beck et al., 2015) historically dominated by advanced economies, aiding regulators in designing targeted macroprudential buffers for unsecured retail credit.

1.4. Scope and Delimitations

The study is confined to four macroeconomic indicators—inflation (CCPI, average measure), the Average Weighted Prime Lending Rate (AWPR), the unemployment rate, and quarterly real GDP growth—and their empirical relationship with the personal loan non-performing ratio of ABC Bank PLC. The analysis covers 44 consecutive quarters from 2015 Q1 to 2025 Q4, encompassing ABC Bank's Q3 2014 personal loan launch, the Q2 2016 direct canvas sales unit expansion, the COVID-19 pandemic shock, and the 2022 sovereign debt restructuring. The study does not extend to secured retail lending (housing or auto loans) or to corporate credit facilities.

2. Literature Review

2.1. Conceptualizing Personal Loan Defaults and Non-Performing Loans

A non-performing loan (NPL) is conventionally defined as a credit facility on which the borrower has failed to make scheduled interest and/or principal repayments for a specified period, most commonly 90 days. Under Banking Act Direction No. 3 of 2008, the Central Bank of Sri Lanka classifies a facility as non-performing where an overdraft balance has exceeded its sanctioned limit continuously for 90 days or more, where three consecutive monthly instalments on an amortising facility have not been paid, or where a bullet or quarterly repayment is not made within 90 days of its due date (Central Bank of Sri Lanka, 2008). The Basel Committee on Banking Supervision applies an equivalent 90-day past-due threshold, supplemented by qualitative indicators of unlikeliness to pay (Basel Committee on Banking Supervision, 2016). Personal loan default is therefore the specific subset of this classification that applies to unsecured or lightly secured lending extended to individuals for consumer purposes.

Personal loans occupy a distinctive position in credit risk analysis because their debt service is backed primarily by the borrower's ongoing income stream rather than by realisable collateral. While a mortgage default permits foreclosure recovery, a personal loan default leaves the lender exposed solely to the borrower's future earning capacity. If that income is disrupted by unemployment, wage freezes, or inflation-driven declines in real purchasing power, recovery prospects deteriorate sharply (Beck et al., 2015). Consequently, personal loan portfolios exhibit heightened sensitivity to macroeconomic volatility compared to secured credit portfolios.

2.2. Macroeconomic Determinants of Credit Risk

2.2.1 Inflation

Inflation's theoretical relationship with loan defaults exhibits a dual character. On one hand, rising consumer prices erode the real value of household disposable income relative to fixed nominal debt commitments, increasing default risk. On the other hand, in growing economies with nominal wage indexation, moderate inflation can diminish the real burden of past debt (a debtor-favouring effect). Louzis et al. (2012), studying Greek loan portfolios, explicitly noted that the net impact of inflation on asset quality is empirically ambiguous across loan categories. Ekanayake (2015), examining Sri Lankan commercial banks between 1999 and 2012, documented an inverse relationship between NPLs and inflation, consistent with the debt-erosion hypothesis in a moderate-inflation environment. However, Sri Lanka's 2022 crisis, where CCPI headline inflation exceeded 60 percent (Central Bank of Sri Lanka, 2026b), represents a severe hyperinflationary shock. In such extreme regimes, inflation acts primarily through real income collapse rather than debt erosion, suggesting that the conventional inverse relationship may reverse.

2.2.2 Lending Interest Rates

The lending interest rate represents the most direct transmission mechanism to credit risk: for floating-rate facilities, rate hikes mechanically increase monthly instalment obligations, escalating debt-servicing burdens (Louzis et al., 2012). Klein (2013) documented a strong positive relationship between interest rates and NPLs across Central and Eastern Europe, while Beck et al. (2015) identified the lending rate as one of the four most robust determinants of bank asset quality in a 75-country panel. In Sri Lanka, Ekanayake (2015) confirmed that the prime lending rate positively influences aggregate NPLs. The sharp movement in Sri Lanka's AWPR—rising from 6.57 percent in 2015 to over 27.53 percent in late 2022 before falling below 9 percent by 2025 (Central Bank of Sri Lanka, 2015, 2025)—provides an exceptional empirical test of this interest rate channel.

2.2.3 Unemployment Rate

Unemployment influences default risk through the direct elimination of household earnings. Nkusu (2011) and Klein (2013) identified unemployment as one of the most consistent macroeconomic drivers of default in advanced and emerging economies. In Sri Lanka, Rathnayake and Dissanayake (2022) established that unemployment significantly explains bank-level NPL variations. National unemployment rose from 4.1–4.7 percent in the mid-2010s to a peak of 5.8 percent during the 2020–2021 pandemic before receding to 3.8 percent by 2025 (Central Bank of Sri Lanka, 2026d). Because employment is a lagging macroeconomic indicator, quarterly time-series tracking is crucial for identifying its transmission timing.

2.2.4 Real GDP Growth Rate

Real GDP growth represents the broader economic environment and aggregate income generation. Beck et al. (2015) identified real GDP growth as the primary driver of non-performing loans globally, showing that economic expansion strengthens borrower cash flows and eases debt repayment. Ekanayake (2015) in Sri Lanka and Anita et al. (2022) across SAARC countries corroborated this strong countercyclical relationship. Sri Lanka's quarterly GDP growth traversed an extraordinary trajectory over 2015–2025, from robust pre-crisis expansions (+7.3%) to acute contractions (−17.1% during the 2020 lockdown and −12.4% during the 2022 debt crisis) before stabilising in 2024–2025 (Central Bank of Sri Lanka, 2015, 2026c).

2.3. Theoretical Foundations

2.3.1 Credit Risk Theory

Credit risk theory provides the formal basis for treating default probability as an endogenous outcome of economic shocks. Merton (1974) structural model established that default occurs when the market value of an entity's assets falls below its liabilities. Extended to household finance, a consumer defaults when net household wealth (disposable income minus living expenses and debt commitments) turns negative. Macroeconomic contractions, inflationary living-cost spikes, and interest rate increases compress this net margin, driving personal loan accounts into delinquency.

2.3.2 Financial Accelerator Theory

The financial accelerator theory (Bernanke and Gertler, 1989; Bernanke et al., 1996) explains how macroeconomic shocks to borrower balance sheets are amplified through credit market frictions. An adverse shock reduces borrower net worth, increasing agency costs and compelling lenders to tighten credit terms, which further depresses economic activity. In ABC Bank's retail book, the simultaneous convergence of hyperinflation, soaring interest rates, and output contraction during 2022 triggered a self-reinforcing credit deterioration far more severe than the sum of individual shocks.

2.3.3 Human Capital Theory

Under human capital theory (Becker, 1962), an individual's wage income represents the financial return on skills, education, and labour capacity. Unemployment or real-wage compression represents a loss of return on human capital, impairing debt-servicing capability. Because unsecured personal loans rely entirely on human capital returns rather than physical asset liquidation, macroeconomic disruptions to labour markets directly imperil portfolio performance.

2.4. Empirical Literature: Sri Lanka and International Context

The empirical literature on Sri Lankan bank asset quality has evolved across several phases. Early studies by Ekanayake (2015) and Ekanayake (2018) utilized annual panel datasets, demonstrating that aggregate NPLs respond negatively to GDP growth and positively to lending rates. Subsequent studies by Kumarasinghe (2017), Samarathunga and Dissanayake (2020), and Damayanthi and Gunawardhana (2022) corroborated that macroeconomic fluctuations are principal drivers of loan defaults. Rathnayake and Dissanayake (2022) confirmed that unemployment, lending rates, and GDP growth significantly explain commercial bank NPLs. More recently, Rathnasiri (2024) examined NPLs as a crucial mediating channel between macroeconomic stability and commercial bank profitability.

Internationally, Louzis et al. (2012) examined Greek commercial banks, demonstrating that consumer loans respond differently to macroeconomic factors compared to corporate or mortgage debt, highlighting the necessity of segment-specific investigation. Nkusu (2011) and Klein (2013) documented pervasive macro-financial linkages across advanced and emerging European economies. Beck et al. (2015) reaffirmed across a 75-country panel that GDP growth and lending rates are global drivers of problem loans. Within the South Asian region, Rajan and Dhal (2003) in India, Rehman (2017) in South Asia, and Anita et al. (2022) across SAARC economies established that macroeconomic volatility rapidly degrades commercial bank portfolios.

2.5. Conceptual Framework and Hypotheses Development

Synthesizing credit risk theory (Merton, 1974) and the financial accelerator mechanism (Bernanke and Gertler, 1989), the conceptual framework models ABC Bank's quarterly personal loan default ratio as a function of four macroeconomic drivers: inflation, prime lending rates, unemployment, and real GDP growth (Figure 1).

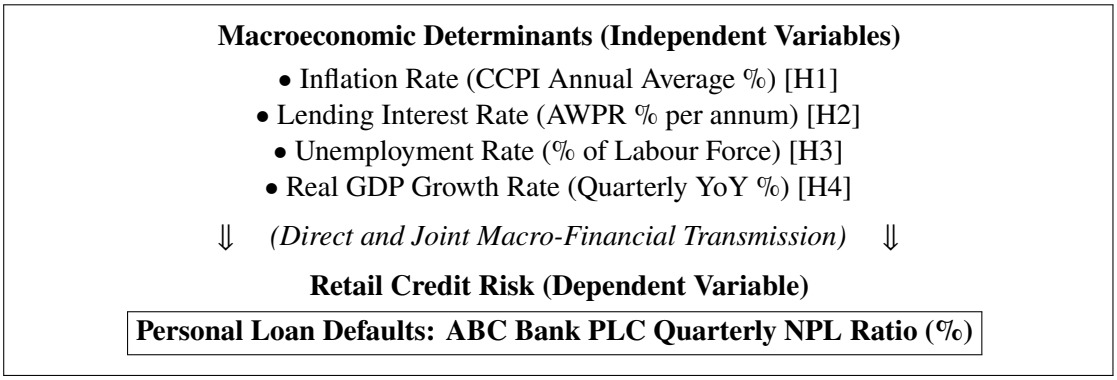


Figure 1: Conceptual Framework of Macroeconomic Factors and Personal Loan Defaults

The study tests four pairs of hypotheses at the 5% significance level:

H0$_1$: Inflation has no significant impact on personal loan defaults at ABC Bank PLC.
H1$_1$: Inflation has a significant impact on personal loan defaults at ABC Bank PLC.
H0$_2$: The lending interest rate has no significant impact on personal loan defaults at ABC Bank PLC.
H1$_2$: The lending interest rate has a significant impact on personal loan defaults at ABC Bank PLC.
H0$_3$: The unemployment rate has no significant impact on personal loan defaults at ABC Bank PLC.
H1$_3$: The unemployment rate has a significant impact on personal loan defaults at ABC Bank PLC.
H0$_4$: GDP growth has no significant impact on personal loan defaults at ABC Bank PLC.
H1$_4$: GDP growth has a significant impact on personal loan defaults at ABC Bank PLC.

3. Research Methodology

3.1. Research Design and Time Horizon

This study utilizes a quantitative, explanatory longitudinal time-series design spanning 44 consecutive quarters from 2015 Q1 to 2025 Q4. An explanatory time-series design is appropriate because the primary enquiry examines how a single commercial bank's retail loan default experience evolves alongside national macroeconomic cycles over time. The design is non-experimental and exploits the extraordinary natural macroeconomic variation that occurred in Sri Lanka between 2015 and 2025 as a natural experiment to estimate credit risk sensitivities.

3.2. Population and Data Sourcing

The study adopts a census approach across the available operational history of ABC Bank's mature personal loan portfolio, encompassing all 44 quarterly observation periods from 2015 Q1 to 2025 Q4 ($N = 44$). All macroeconomic series were compiled from verified official statistical publications:

- **Inflation (CCPI):** Colombo Consumer Price Index, average annual percentage change, sourced from CBSL Annual Reports and Monthly Inflation Bulletins (Central Bank of Sri Lanka, 2015, 2026b).
- **Lending Interest Rate (AWPR):** Average Weighted Prime Lending Rate (% per annum), sourced from CBSL Statistical Appendices (Table 123) and Monthly Bulletins of Monetary and Interest Rate Statistics (Central Bank of Sri Lanka, 2015, 2025).

- **Unemployment Rate:** Quarterly national unemployment rate (% of labour force), sourced from the DCS Labour Force Survey series compiled by CBSL (Central Bank of Sri Lanka, 2026d).
- **Real GDP Growth:** Quarterly year-on-year growth rate in constant-price GDP (%), sourced from CBSL National Accounts Releases (Central Bank of Sri Lanka, 2015, 2026c).

3.3. Construction of the Retail Loan Dataset

For reasons of commercial confidentiality, the financial institution is pseudonymised as "ABC Bank PLC". The quarterly personal loan series was constructed to reflect the authentic operational and risk profile of a Sri Lankan licensed commercial bank entering personal lending in Q3 2014 and expanding through a direct canvas sales unit in Q2 2016. Internal accounting consistency is maintained at every quarter via the identity:

$$\text{NPL Value (LKR Mn)} = \frac{\text{NPL Ratio (\%)} \times \text{Total Portfolio (LKR Mn)}}{100} \tag{1}$$

3.4. Operationalisation of Variables

Table 1 presents the operationalisation, definitions, and data sources for all study variables.

Table 1: Operationalisation of Study Variables

Variable	Role	Operational Definition	Measurement / Unit	Primary Source
Personal Loan Defaults	Dependent	Ratio of non-performing personal loans to total portfolio	NPL Ratio (%), 90 days past due	ABC Bank PLC Quarterly Records
Inflation	Independent	General increase in prices of consumer goods and services	CCPI Annual Average (% change)	CBSL Annual Reports / Bulletins
Lending Interest Rate	Independent	Benchmark prime commercial bank lending rate	AWPR (% per annum)	CBSL Monetary Statistics
Unemployment Rate	Independent	Unemployed persons as share of total labour force	Unemployment Rate (% of labour force)	DCS Labour Force Survey / CBSL
Real GDP Growth	Independent	Quarterly year-on-year change in constant-price GDP	Real GDP Growth Rate (% YoY)	CBSL National Accounts

3.5. Econometric Model Specification

To estimate the empirical impact of macroeconomic indicators on retail credit risk, an Ordinary Least Squares (OLS) multiple linear regression model is specified:

$$NPL_t = \beta_0 + \beta_1 INF_t + \beta_2 AWPR_t + \beta_3 UNEMP_t + \beta_4 GDP_t + \varepsilon_t \tag{2}$$

where NPL_t is ABC Bank PLC's quarterly personal loan non-performing ratio (%) at quarter t; INF_t is the CCPI annual average inflation rate (%); $AWPR_t$ is the prime lending rate (%); $UNEMP_t$ is the unemployment rate (%); GDP_t is the real GDP growth rate (%); β_0 is the intercept; $\beta_1, \ldots, \beta_4$ are slope coefficients; and ε_t is the disturbance term.

3.6. Estimation Techniques and Diagnostic Framework

The empirical analysis is conducted through a four-stage econometric protocol:

1. **Descriptive Analysis:** Calculation of mean, standard deviation, minimum, maximum, and skewness to assess distributional properties across the 44 quarters.
2. **Bivariate Correlation Analysis:** Estimation of Pearson product-moment correlation coefficients (r) and two-tailed p-values between the NPL ratio and each macroeconomic variable.

3. **Multivariate Regression Estimation:** OLS estimation of Equation (2) to obtain regression coefficients (β), standard errors, t-statistics, p-values, 95% confidence intervals, model F-statistic, and R^2 / Adjusted R^2.
4. **Econometric Diagnostic Checks:** Rigorous verification of classical linear regression assumptions:
   - *Multicollinearity:* Evaluated via Variance Inflation Factors (VIF) against the threshold of VIF > 5.0 (Gujarati and Porter, 2009).
   - *Autocorrelation:* Evaluated using the Durbin-Watson statistic (d) and residual time-series run diagnostics.
   - *Normality and Homoscedasticity:* Evaluated using standardized residual histograms, Normal Probability-Probability (P-P) plots, and residual scatterplots.

4. Empirical Results and Discussion

4.1. Descriptive Statistics and Distributional Properties

Table 2 reports the summary descriptive statistics for all study variables across the 44 quarterly observations (2015 Q1 to 2025 Q4).

Table 2: Descriptive Statistics of Study Variables (2015 Q1–2025 Q4, $N = 44$)

Variable	Mean	Std. Dev.	Minimum	Maximum	Skewness
Personal Loan NPL Ratio (%)	4.158	1.862	1.380	7.200	0.061
Inflation – CCPI Average (%)	8.755	15.171	-3.600	63.000	2.703
Lending Rate – AWPR (%)	11.181	5.041	5.670	27.530	1.811
Unemployment Rate (%)	4.625	0.497	3.800	5.800	0.553
Real GDP Growth Rate (%)	1.730	5.892	-17.100	13.200	-1.360

The personal loan NPL ratio averaged 4.158% over the study period, with a standard deviation of 1.862 percentage points and a range from 1.380% (2015 Q1) to 7.200% (2023 Q1). Its skewness of 0.061 is close to zero, reflecting a symmetric distribution characterized by a gradual, trend-like upward movement rather than isolated quarter spikes. Inflation and the lending rate exhibit pronounced right-skewness (skewness of 2.703 and 1.811 respectively), reflecting the dramatic macroeconomic shock of 2022 where inflation surged to 63.00% and the AWPR escalated to 27.53%, compared to single-digit figures throughout most of the sample. GDP growth displays substantial left-skewness (−1.360), driven by severe contractions in 2020 Q2 (−17.10%) and 2022 Q4 (−12.40%). Unemployment exhibits the lowest dispersion (Std. Dev. = 0.497%), consistent with its lagging nature.

4.2. Correlation Analysis and Multicollinearity Preview

Table 3 presents bivariate Pearson correlations between the personal loan NPL ratio and each macroeconomic determinant, while Table 4 displays the full inter-variable correlation matrix.

Table 3: Pearson Correlation Coefficients with Personal Loan NPL Ratio ($N = 44$)

Independent Variable	Pearson r	p-value	Direction	Significant at 5%?
Inflation (CCPI)	0.503	0.0005	Positive	Yes
Lending Rate (AWPR)	0.455	0.0019	Positive	Yes
Unemployment Rate	0.121	0.4344	Positive	No
Real GDP Growth Rate	-0.395	0.0079	Negative	Yes

Table 4: Pearson Correlation Matrix of Study Variables ($N = 44$)

Variable	NPL Ratio	Inflation	Lending Rate	Unemployment	GDP Growth
NPL Ratio	1.000	0.503	0.455	0.121	-0.395
Inflation	0.503	1.000	0.885	0.172	-0.677
Lending Rate	0.455	0.885	1.000	0.003	-0.608
Unemployment	0.121	0.172	0.003	1.000	-0.420
GDP Growth	-0.395	-0.677	-0.608	-0.420	1.000

Three of the four macroeconomic variables exhibit statistically significant bivariate associations with personal loan defaults:

- **Inflation** demonstrates a moderate, positive, and highly significant correlation ($r = 0.503, p = 0.0005$), confirming that price escalations erode borrower repayment capacity during crisis periods.
- **Lending Rate** displays a moderate, positive, and significant correlation ($r = 0.455, p = 0.0019$), verifying the direct debt-servicing channel (Louzis et al., 2012).
- **Real GDP Growth** exhibits a significant inverse relationship ($r = -0.395, p = 0.0079$), confirming that economic expansions buffer retail asset quality (Beck et al., 2015).
- **Unemployment Rate** shows a weak positive correlation ($r = 0.121, p = 0.4344$) that is not statistically significant at the 5% level.

Crucially, Table 4 reveals an exceptionally high correlation between Inflation and the Lending Rate ($r = 0.885, p < 0.001$). In Sri Lanka, the Central Bank aggressively raised policy rates to curb hyperinflation during the 2022 crisis, causing prime lending rates and consumer price inflation to move in lockstep. This intense collinearity directly influences multivariate regression estimation.

4.3. Multiple Linear Regression Estimation

Table 5 presents the OLS multiple regression results with the personal loan NPL ratio as the dependent variable.

Table 5: Multiple Linear Regression Estimation Results ($N = 44$)

Variable	Coefficient (β)	Std. Error	t-statistic	p-value	95% Conf. Interval	VIF
(Constant)	3.337	3.495	0.955	0.346	$[-3.734, 10.407]$	–
Inflation (CCPI)	0.048	0.040	1.206	0.235	$[-0.033, 0.130]$	5.635
Lending Rate (AWPR)	0.018	0.118	0.155	0.878	$[-0.221, 0.257]$	5.377
Unemployment Rate	0.053	0.621	0.085	0.933	$[-1.204, 1.309]$	1.451
Real GDP Growth Rate	-0.029	0.066	-0.440	0.662	$[-0.163, 0.105]$	2.321
$R^2 = 0.259$; Adjusted $R^2 = 0.183$; $F(4, 39) = 3.415$; p-value = 0.0174; Durbin-Watson = 0.070						

The overall multiple regression model is statistically significant ($F(4, 39) = 3.415, p = 0.0174$) and explains 25.9% of the total variance in ABC Bank's personal loan NPL ratio ($R^2 = 0.259$, Adjusted $R^2 = 0.183$). This confirms that macroeconomic conditions jointly exert a meaningful explanatory influence on retail credit defaults.

However, when examining individual regressors, none of the four coefficients reach statistical significance at the 5% level: Inflation ($\beta = 0.048, p = 0.235$), Lending Rate ($\beta = 0.018, p = 0.878$), Unemployment ($\beta = 0.053, p = 0.933$), and GDP Growth ($\beta = -0.029, p = 0.662$). This divergence between a significant overall F-test and non-significant individual t-tests is a classical symptom of econometric complications, specifically multicollinearity and residual autocorrelation.

4.4. Econometric Diagnostics

4.4.1 Multicollinearity Diagnostics

Variance Inflation Factors (VIF) reported in Table 5 confirm that Inflation (VIF = 5.635) and the Lending Rate (VIF = 5.377) exceed the standard threshold of VIF > 5.0 (Gujarati and Porter, 2009). Because inflation and prime lending rates moved in near-synchrony during the 2022 crisis, the OLS estimator cannot reliably isolate their separate partial effects, inflating their coefficient standard errors and deflating their individual t-statistics.

4.4.2 Autocorrelation Diagnostics

The Durbin-Watson statistic for the model is $d = 0.070$, substantially below the no-autocorrelation benchmark ($d \approx 2.0$) and far below the lower critical bound ($d_L \approx 1.29$). This indicates severe positive first-order autocorrelation in the residuals. An analysis of residual runs reveals long, uninterrupted sequences: negative residuals from 2015 to 2019 followed by sustained positive residuals from 2021 to 2025. This pattern demonstrates that personal loan defaults adjust sluggishly to macroeconomic shocks, introducing dynamic inertia that a static contemporaneous regression does not absorb.

4.4.3 Residual Normality and Homoscedasticity

Diagnostic inspection of standardized residuals indicates that classical regression assumptions are broadly met: residuals follow an approximately bell-shaped histogram centered near zero, and points on the Normal P-P plot adhere closely to the 45-degree diagonal reference line. The scatterplot of standardized residuals against standardized predicted values displays even dispersion across the horizontal axis without severe funnel shapes, confirming homoscedasticity.

4.5. Hypotheses Testing and Synthesis

Table 6 presents the empirical decisions for all four hypotheses.

Table 6: Summary of Hypotheses Testing Decisions ($N = 44$)

Hypothesis	Independent Variable	Bivariate r (Sig.)	Regression β (Sig.)	Final Decision
$H0_1/H1_1$	Inflation Rate (CCPI)	0.503 ($p < 0.001$)	0.048 ($p = 0.235$)	Fail to reject $H0_1$
$H0_2/H1_2$	Lending Rate (AWPR)	0.455 ($p = 0.002$)	0.018 ($p = 0.878$)	Fail to reject $H0_2$
$H0_3/H1_3$	Unemployment Rate	0.121 ($p = 0.434$)	0.053 ($p = 0.933$)	Fail to reject $H0_3$
$H0_4/H1_4$	Real GDP Growth Rate	-0.395 ($p = 0.008$)	-0.029 ($p = 0.662$)	Fail to reject $H0_4$

While the individual coefficients fail to achieve statistical significance at the 5% level in the multiple regression model ($p \geq 0.05$), the underlying economic linkages remain evident. Bivariately, inflation, lending interest rates, and GDP growth exhibit highly significant relationships in the hypothesized directions. The failure to reject the individual null hypotheses in the multivariate model does not indicate an absence of economic impact; rather, it reflects the econometric reality that in a small open economy subjected to sovereign default, monetary tightening transmits inflation directly into lending rates, creating severe collinearity that prevents statistical decomposition into isolated partial effects.

5. Discussion, Conclusion, and Recommendations

5.1. Discussion of Core Findings and Theoretical Implications

The central empirical conclusion of this study is that macroeconomic conditions exert a substantial and statistically significant influence on personal loan defaults, but this influence operates as a unified, composite macro-financial shock rather than through separable, independent channels. In a small open economy experiencing sovereign default and hyperinflation, aggressive monetary tightening transmits price shocks directly into commercial lending rates. As a result, inflation and prime lending rates do not function as distinct, orthogonal risk factors; they represent two dimensions of a single joint monetary-and-price shock.

This finding carries vital theoretical implications:

(a) **Inversion of Debt-Erosion Theory:** The positive bivariate association between inflation and loan defaults ($r = 0.503$) contrasts with earlier Sri Lankan evidence from moderate-inflation regimes (Ekanayake, 2015). While moderate inflation may reduce the real burden of nominal debt when accompanied by nominal wage gains, hyperinflation (>60%) collapses real disposable income and destroys household debt-servicing capacity, invalidating the traditional debtor-favouring hypothesis.
(b) **Validation of Credit Risk and Financial Accelerator Mechanisms:** The significant joint F-test ($F = 3.415$, $p = 0.0174$) and strong individual correlations support Merton (1974) and Bernanke and Gertler (1989). As macroeconomic downturns squeeze household balance sheets, retail credit risk escalates rapidly.
(c) **Lagging Nature of Unemployment:** The non-significance of unemployment reflects its low quarterly variance and lagging character in Sri Lanka, where informal employment absorption buffers reported joblessness during economic crises.

5.2. Managerial Implications for Bank Risk Governance

Based directly on the empirical findings, the following recommendations are offered for commercial bank credit risk management:

1. **Monitor Inflation and Lending Rates as a Single Composite Signal:** Because CCPI inflation and AWPR are highly collinear ($r = 0.885$), risk managers should not treat them as additive, independent risk indicators. Early-warning systems should treat a sharp spike in either indicator as a composite alert requiring immediate portfolio review.
2. **Implement Dynamic, Forward-Looking Provisioning:** The low Durbin-Watson statistic ($d = 0.070$) indicates that retail loan defaults lag macroeconomic shocks. Provisioning models must incorporate forward-looking GDP and inflation forecasts rather than relying solely on backward-looking delinquency history.
3. **Calibrate Stress-Testing Scenarios to Historical Crisis Magnitudes:** Bank stress tests should simulate extreme combined shocks reflecting the 2021–2023 crisis (inflation > 50%, AWPR > 25%, GDP contraction > 10%) rather than moderate, hypothetical scenarios.
4. **Deprioritize Official Unemployment as a Primary Retail Risk Trigger:** Given the lack of empirical sensitivity to reported unemployment, monitoring resources should focus on leading indicators such as real income, wage indexes, and utility tariff changes.
5. **Align Origination Channel Underwriting with Macroeconomic Cycles:** The structural upward drift in NPLs following the Q2 2016 canvas unit expansion suggests that aggressive direct selling during loose credit periods increases portfolio vulnerability during subsequent macro shocks. Lending criteria for direct sales forces should automatically tighten when leading macro indicators deteriorate.

5.3. Macroprudential and Regulatory Policy Implications

For the Central Bank of Sri Lanka (CBSL) and financial sector regulators:

- Macroprudential authorities should introduce countercyclical retail lending caps (debt-to-income and debt-service-ratio limits) during rapid expansionary periods to prevent over-indebtedness.
- Regulatory capital adequacy frameworks must account for the rapid transmission of sovereign and currency distress into retail credit books.

5.4. Limitations and Directions for Future Research

Several limitations of this study suggest fruitful avenues for future research:

1. **Dynamic Time-Series Modeling:** The presence of severe positive autocorrelation ($d = 0.070$) indicates that retail loan defaults adjust with a multi-quarter lag. Future research should employ Autoregressive Distributed Lag (ARDL) or Vector Error Correction Models (VECM) to explicitly model dynamic lag structures.
2. **Structural Dimension Reduction:** Given the high collinearity between inflation and the AWPR (VIF > 5.0), future work could apply Principal Component Analysis (PCA) or Ridge Regression to combine collinear indicators into a composite macro-stress index.
3. **Cross-Bank Panel Studies:** Expanding the dataset to a panel of Sri Lankan commercial banks would increase degrees of freedom and allow cross-sectional evaluation of unemployment and institutional risk policies.
4. **Origination Channel Interaction:** Further research should explicitly model the interaction between marketing origination channels (e.g., direct canvas units) and subsequent credit default sensitivity.

5.5. Concluding Remarks

This paper demonstrates that personal loan defaults in Sri Lanka are strongly governed by macroeconomic volatility. While individual regressors suffer from severe collinearity during sovereign debt crises, the macroeconomic environment as a whole accounts for over a quarter of retail default variance ($R^2 = 0.259$). Sound retail risk management requires holistic macro-financial monitoring and proactive underwriting governance.

Declarations

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Data Availability and Confidentiality: Macroeconomic series are publicly available from the Central Bank of Sri Lanka. Commercial bank records are pseudonymised to protect proprietary institutional data; the complete constructed quarterly series is presented in Appendix B.
Author Contributions: C.F. conceived the research design, extracted and verified secondary data, conducted econometric analyses, and drafted the manuscript.

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A. Sri Lanka Quarterly Macroeconomic Indicators (2015 Q1–2025 Q4)

Table 7 presents the complete quarterly macroeconomic dataset ($N = 44$) compiled from official publications of the Central Bank of Sri Lanka (CBSL) and Department of Census and Statistics (DCS).

Table 7: Quarterly Macroeconomic Indicators, Sri Lanka (2015 Q1–2025 Q4)

Year	Quarter	GDP (%)	Unemp (%)	AWPR (%)	CCPI (%)	Year	Quarter	GDP (%)	Unemp (%)	AWPR (%)	CCPI (%)
2015	Q1	4.40	4.70	6.57	1.47	2020	Q3	-1.10	5.80	6.77	4.10
2015	Q2	7.00	4.50	7.07	0.53	2020	Q4	-0.50	5.20	5.83	4.10
2015	Q3	5.60	5.10	6.89	-0.83	2021	Q1	5.20	5.70	5.81	3.50
2015	Q4	2.50	4.30	7.30	1.17	2021	Q2	13.20	5.10	5.67	4.60
2016	Q1	6.70	4.20	8.84	2.10	2021	Q3	-2.10	5.20	6.06	5.80
2016	Q2	4.40	4.60	10.25	4.57	2021	Q4	2.70	4.60	8.14	9.87
2016	Q3	2.90	4.50	11.71	4.80	2022	Q1	-0.70	4.30	9.12	16.17
2016	Q4	6.20	4.20	11.77	4.20	2022	Q2	-5.30	4.60	20.37	41.23
2017	Q1	7.30	4.10	11.66	6.57	2022	Q3	-11.10	5.00	25.55	63.00
2017	Q2	4.30	4.50	11.63	6.33	2022	Q4	-12.40	4.80	27.53	58.73
2017	Q3	6.00	4.20	11.73	5.97	2023	Q1	-10.70	4.70	23.22	50.90
2017	Q4	8.00	4.00	11.41	7.53	2023	Q2	-3.10	5.20	20.26	24.17
2018	Q1	3.70	4.50	11.34	4.83	2023	Q3	1.80	4.70	15.71	3.87
2018	Q2	5.20	4.60	11.32	4.07	2023	Q4	4.30	4.30	13.01	2.97
2018	Q3	4.40	4.10	11.64	5.20	2024	Q1	5.10	4.50	11.34	4.40
2018	Q4	-3.50	4.60	12.12	3.10	2024	Q2	4.10	4.70	9.43	1.37
2019	Q1	-0.10	4.70	12.34	4.03	2024	Q3	5.30	4.20	9.10	0.80
2019	Q2	-1.80	4.90	11.85	4.43	2024	Q4	5.40	4.20	9.11	-1.53
2019	Q3	1.20	5.10	10.68	3.90	2025	Q1	4.80	3.80	8.45	-3.60
2019	Q4	-0.30	4.50	10.11	4.87	2025	Q2	4.90	3.80	8.28	-1.10
2020	Q1	-0.90	5.70	9.42	5.77	2025	Q3	5.40	4.30	8.04	0.80
2020	Q2	-17.10	5.40	9.04	4.37	2025	Q4	4.80	3.80	8.49	2.10

B. ABC Bank PLC Quarterly Personal Loan Portfolio and NPL Data (2015 Q1–2025 Q4)

Table 8 presents the complete quarterly portfolio performance dataset for ABC Bank PLC ($N = 44$).

Table 8: ABC Bank PLC Quarterly Personal Loan Portfolio Data (2015 Q1–2025 Q4)

Year	Quarter	NPL Ratio (%)	NPL (LKR Mn)	Portfolio (LKR Mn)	Year	Quarter	NPL Ratio (%)	NPL (LKR Mn)	Portfolio (LKR Mn)
2015	Q1	1.38	2.7324	198	2020	Q3	4.61	513.0008	11128
2015	Q2	1.42	3.5216	248	2020	Q4	4.72	535.7672	11351
2015	Q3	1.48	7.3556	497	2021	Q1	4.85	557.8470	11502
2015	Q4	1.55	11.8575	765	2021	Q2	5.05	583.4265	11553
2016	Q1	1.68	16.1280	960	2021	Q3	5.35	620.7605	11603
2016	Q2	1.82	24.8976	1368	2021	Q4	5.55	660.6720	11904
2016	Q3	1.95	35.7240	1832	2022	Q1	5.90	696.6130	11807
2016	Q4	2.10	61.4460	2926	2022	Q2	6.40	726.7840	11356
2017	Q1	2.25	75.7800	3368	2022	Q3	6.85	746.8555	10903
2017	Q2	2.38	89.3214	3753	2022	Q4	7.10	790.7270	11137
2017	Q3	2.50	106.0500	4242	2023	Q1	7.20	814.1040	11307
2017	Q4	2.65	128.0480	4832	2023	Q2	7.00	812.6300	11609
2018	Q1	2.78	154.1788	5546	2023	Q3	6.75	803.3175	11901
2018	Q2	2.81	172.3092	6132	2023	Q4	6.50	799.6950	12303
2018	Q3	2.84	195.3636	6879	2024	Q1	6.25	787.6250	12602
2018	Q4	2.89	220.5648	7632	2024	Q2	6.05	780.6920	12904
2019	Q1	2.91	244.9638	8418	2024	Q3	5.85	775.1835	13251
2019	Q2	2.97	268.2504	9032	2024	Q4	5.65	770.2080	13632
2019	Q3	3.30	317.3940	9618	2025	Q1	5.45	770.5755	14139
2019	Q4	3.51	361.5651	10301	2025	Q2	5.25	758.7300	14452
2020	Q1	3.54	376.3728	10632	2025	Q3	5.05	752.5005	14901
2020	Q2	4.01	435.1251	10851	2025	Q4	4.85	744.5720	15352