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MODELING CREDIT DEMAND AND SUPPLY OF FIRMS AND HOUSEHOLDS IN ALBANIA: LONG-RUN INSIGHTS FROM A VECM FRAMEWORK

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C O N T E N T S

ABSTRACT

This paper investigates the long-run and short-run dynamics of Albania's credit market by decomposing bank lending into its fundamental components—credit demand and credit supply—and examining their distinct macro-financial determinants for firms and households. Using quarterly macroeconomic and banking sector data from 2008 to 2022, the study fills a key gap in the Albanian literature by testing whether credit demand is cointegrated with macro-financial fundamentals such as GDP, wages, interest rates, and confidence indicators, and whether credit supply is similarly anchored in long-run relationships with banking sector characteristics, including liquidity, competition, and prudential behaviour. A further objective is to determine whether deviations from these long-run equilibria are corrected through an error-correction mechanism. To address these questions, the paper employs a dual-layered disequilibrium modelling framework tailored to capture post–Global Financial Crisis developments in Albania's financial system. The findings offer insights into the structural drivers of credit constraints and contribute to policy discussions on financial stability and credit market functioning.

Keywords: *Credit demand, credit supply, market disequilibrium, bank lending channel, bank lending survey, VECM, small open economy, Albania.*

JEL Codes: *C32, E22, E44, E51, E58, G21, G28.*

1. INTRODUCTION

Credit markets are central to economic performance, given the banking sector's key role in shaping aggregate activity. Since the Global Financial Crisis, researchers and central banks have increasingly emphasized financial frictions, which challenge traditional views of efficient intermediation. As Yuan and Zimmermann (1999) note, imperfections in the credit channel amplify monetary shocks through the financial accelerator by linking borrower balance sheets to credit conditions. Although classical models assume marketclearing interest rates, newer evidences show that persistent credit market imperfections—such as excess demand or supply—can dampen economic activity. These disequilibria conditions[1], called "credit crunches", stem from asymmetric information, moral hazard, monitoring costs, and regulatory pressures. Such dynamics highlight the need to distinguish clearly between credit demand and credit supply, as understanding their separate drivers is essential for identifying market failures and designing effective policy responses.

In the Albanian context, most empirical studies on credit markets have relied on the traditional Walrasian price-clearing framework, assuming equilibrium conditions under which credit demand and supply are jointly determined. This aggregate approach has generally overlooked the distinct mechanisms underlying credit demand and supply, thereby limiting the ability to capture structural and behavioural asymmetries between borrower segments, particularly between firms and households. As a result, the analytical depth and policy relevance of existing research remain constrained. Notable contributions, especially by Shijaku (2022, 2023), have advanced the understanding of credit market shocks by attempting to disentangle demand- and supply-side influences. However, these studies do not examine whether long-run cointegrating relationships exist between disaggregated credit components and their macro-

[1] *See among others, Klaus-Jurgen and Nills (2009); Schmidt and Lina (2012); and Soana, et al. (2017).*

financial determinants. This omission is particularly significant in the post-crisis period, marked by structural shifts in Albania's financial system and evolving borrower behaviour that may have fundamentally altered credit dynamics. Moreover, the lack of disaggregated data has hindered efforts to explicitly differentiate these relationships across borrower types. Consequently, the empirical literature has yet to fully capture the sector-specific drivers of credit allocation, underscoring the need for more granular analysis that reflects the heterogeneity of credit behaviour across firms and households.

This study seeks to address that gap by posing three central research questions: (1) Does credit demand for firms and households exhibit long-run cointegration with macro-financial variables such as GDP, wages, interest rates, and confidence indicators? (2) Is credit supply to these groups similarly anchored in long-run relationships with banking sector conditions, including liquidity, competition, and prudential behaviour? (3) Is there an error correction mechanism that restores equilibrium following short-term deviations? To answer these questions, this study adopts a dual-layered disequilibrium modelling framework to empirically analyse credit market dynamics in Albania, with a focus on post–Global Financial Crisis developments. The methodology follows a two-step approach inspired by Dumičić and Ljubaj (2017). In the first step, separate equations are specified to estimate credit demand and credit supply for firms and households, allowing for borrower-specific dynamics. In the second step, each equation is populated with distinct explanatory variables to capture the structural and behavioural heterogeneity across borrower categories and is tailored to the Albanian context. The set of macroeconomic and banking sector explanatory variables is grouped, accordingly: those that predominantly influence firm-level credit activity and those that better capture household-level credit dynamics. Finally, we apply a Vector Error Correction Model (VECM) to quarterly data spanning from 2007 Q4 to 2022 Q2 to test for long-run cointegration and short-run adjustment mechanisms. This approach enables a more nuanced and empirically grounded understanding of the structural forces shaping Albania's credit market.

This paper makes several substantive contributions to the literature on credit markets in Albania. First, it builds on the foundations of previous work by Shijaku (2022, 2023) and by complementing the earlier study by Shijaku and Kalluci (2013), it is the first to examine credit allocation through the lens of long-run cointegration relationships, explicitly disaggregating bank lending into credit demand and credit supply for both firms and households. This dual focus allows for a more granular analysis of credit market dynamics, capturing the distinct behavioural patterns and macro-financial sensitivities of each borrower segment. Second, the study employs a robust Vector Error Correction Model (VECM) framework to identify the long-run determinants of bank lending. By integrating a comprehensive set of macroeconomic and banking sector variables, the model offers a more refined understanding of the structural and cyclical forces shaping credit behaviour. Importantly, the analysis distinguishes between explanatory variables that are more relevant to firms' credit activity and those that better capture household borrowing trends, enhancing the precision of policy-relevant insights. Finally, the study benefits from an extended and updated quarterly dataset covering the period from 2008 to 2022—surpassing the temporal scope of previous empirical work conducted by the Bank of Albania. This broader timeframe strengthens the reliability of the results and enables a more informed assessment of post-crisis credit market evolution, offering valuable guidance for future research and policy formulation.

The results provide robust evidence of long-run cointegration and statistically significant error correction terms, confirming that credit demand and supply converge toward equilibrium—typically within four to six quarters. Household credit demand and supply adjust more rapidly, reflecting heightened sensitivity to macro-financial fluctuations. These findings reinforce prior research indicating that credit rationing in Albania is primarily driven by macro-financial fundamentals rather than market frictions. Other results show that credit behaviour is distinctly pro-cyclical, shaped by economic growth, deeper financial intermediation, liberalization, declining

borrowing costs, and improved lending standards. Exchange rate movements further influence household credit through valuation effects and consumption smoothing, underscoring the sector's exposure to external shocks. Although equilibrium is restored over time, the pace of adjustment remains gradual.

The rest of the paper is organised as follows. Section 2 presents the methodology and the data. Section 3 summarizes and interprets the estimated empirical results. The paper concludes in Section 4.

2. METODOLOGY AND THE DATA

Historically, most empirical studies on Albania's credit market have relied on the traditional Walrasian price-clearing assumption, treating credit demand and supply as jointly determined under equilibrium conditions. Seminal contributions[2], primarily focus on aggregate lending behaviour without disentangling the distinct dynamics of credit demand and supply. More recent work by Shijaku (2016, 2018a) continues this approach, offering valuable insights into credit developments, but stops short of examining long-run cointegration between disaggregated credit components and their macro-financial determinants. Moreover, the equilibrium assumption has come under increasing scrutiny in contemporary research, which highlights the presence of pervasive information asymmetries, pricing rigidities (e.g., credit ceilings, collateral constraints, and loan rejections), financial frictions, and behavioural risks, including adverse selection and moral hazard that prevent interest rates from adjusting freely. In response, studies building on Maddala and Nelson's disequilibrium framework advocate for the separate identification of credit demand and supply using distinct explanatory variables. Yet, as Everaert et al. (2015) emphasize, this task is inherently complex: both credit demand and supply are latent constructs influenced by overlapping determinants, and there is limited consensus on the directional impact of many variables. This analytical challenge is further intensified when attempting to differentiate credit behaviour across borrower types, firms-versus-households, due to data limitations and sector-specific heterogeneity. As a result, empirical modelling of credit markets remains both methodologically intricate and conceptually demanding, underscoring the need for more refined approaches that account for disequilibrium dynamics and borrower segmentation.

To address these gaps, this study builds on a dual-layered disequilibrium modelling framework to explicitly estimate credit

[2] *See among others Kalluci (2012); Suljoti & Hashorva (2012); Note & Suljoti (2012); Shijaku & Kalluci (2013); Vika & Suljoti (2015); and Vrioni & Abazaj (2015).*

demand and supply for both firms and households. By focusing on the post–Global Financial Crisis period, it captures the structural shifts and evolving financial behaviours that have shaped Albania's credit market in recent years. This approach allows for a more precise identification of the macro-financial determinants driving credit allocation, offering a deeper empirical understanding of the disequilibrium dynamics that characterize Albania's post-crisis lending environment. Methodologically, the study follows a two-step approach inspired by Dumičić and Ljubaj (2017). In the first step, separate equations are specified to estimate credit demand and credit supply for firms and households, allowing for borrower-specific modelling. In the second step, each equation is populated with distinct explanatory variables that reflect the structural and behavioural heterogeneity across borrower categories. These variables are grouped according to their relevance: those primarily influencing firm-level credit activity, and those more closely associated with household credit dynamics. This segmentation facilitates a more granular and realistic analysis of credit allocation, particularly under conditions of financial stress, credit rationing, or institutional rigidity [Allain & Oulidi, 2009; Everaert et al., 2015].

Within this framework, credit demand is modelled separately for firms and households to capture the unique macroeconomic and behavioural determinants shaping credit behaviour across sectors, accounting for both structural and cyclical influences. For firms, credit demand (ld_t^F) is specified as a function of economic activity, financing costs, inflationary pressures, internal liquidity, energy consumption, and exchange rate dynamics:

$$ld_t^F = a_{11} + a_{12}\, ld_{t-j}^F + a_{13}\, GDP_{t-j} + a_{14}\, i_{t-j}^F + a_{15}\, PPI_{t-j} + a_{16}\, DEP_{t-j}^F + a_{17}\, EC_{t+4}^F + a_{18}\, REER_{t-j} + \mu_t^{d\wedge F} \quad [1]$$

Where, GDP_{t-j} captures the scale of economic activity and investment needs, with expansionary periods typically associated

with increased credit demand [Atanasova & Wilson, 2004][3]; $\mathbf{PPI}_{t-j}$ reflects inflationary pressures from input costs; a rising PPI signals heightened financing needs, while a decline may indicate market uncertainty and subdued demand [Guo & Stepanyan, 2011]; $\mathbf{i}_{t-j}^{F}$ denotes the lending interest rate applied to firms, representing the cost of borrowing. Higher rates are expected to dampen credit demand [Kremp & Sevestre, 2015][4]; $\mathbf{DEP}_{t-j}^{F}$ proxies firms' internal financial resources. Under the pecking order theory, greater internal liquidity reduces external borrowing, whereas the trade-off theory suggests that profitable firms may still borrow to hedge against future uncertainty [Farihna & Felix, 2015]; $\mathbf{EC}_{t+4}^{F}$ serves as a proxy for operational intensity and investment behavior. A positive relationship is expected between energy consumption and credit demand, aiding identification of the demand equation without conflating supply-side dynamics [Allain & Outlidi, 2009; Ludvigson, 1999]; $\mathbf{REER}_{t-j}$ captures movements in the real effective exchange rate, reflecting external competitiveness and valuation effects; $\mu_t^{d\wedge F}$ is the error term accounting for unobserved influences on firm-level credit demand.

For households, credit demand $\mathbf{ld}_t^{HH}$ is modeled as a function of income, sentiment, wealth, consumption behavior, borrowing costs, and macroeconomic risk:

$$\mathbf{ld}_t^{HH} = a_{21} + a_{22}\,\mathbf{ld}_{t-j}^{HH} + a_{23}\,\mathbf{WAGE}_{t-j} + a_{24}\,\mathbf{CC}_{t+j} + a_{25}\,\mathbf{HPI}_{t-j} + a_{26}\,\mathbf{EC}_{t-j}^{HH} + a_{27}\,\mathbf{i}_{t-j}^{HH} + a_{28}\,\mathbf{DEP}_{t-j}^{HH} + a_{29}\,\mathbf{REER}_{t-j} + \mu_t^{d\wedge HH} \quad [2]$$

Where, $\mathbf{WAGE}_{t-j}$ captures household income and economic scale; $\mathbf{CC}_{t+j}$ reflects consumer sentiment and expectations; $\mathbf{HPI}_{t-j}$ proxies household wealth and collateral availability; $\mathbf{EC}_{t-j}^{HH}$ indicates consumption intensity; $\mathbf{i}_{t-j}^{HH}$ represents borrowing costs, which are expected to negatively affect credit demand; $\mathbf{DEP}_{t-j}^{HH}$ denotes internal

[3] *While GDP is a suitable proxy, alternative indicators such as asset prices, unemployment, and wage growth are excluded due to multicollinearity concerns [Bambulovic & Valdec, 2018].*

[4] *This measure allows differentiation between firm and household borrowing behaviour.*

liquidity and self-financing capacity; **REER** captures macroeconomic risk and purchasing power effects; and $\mu_t^{d\hat{}HH}$ denotes an error term capturing unobserved influences on household credit demand.

From a theoretical standpoint, household credit demand is generally expected to decline as interest rates rise, reflecting the increased cost of borrowing. Conversely, higher consumer confidence and stronger consumption patterns tend to stimulate credit uptake, as households become more optimistic about future income and economic conditions [Ludvigson, 1999; Igan et al., 2009]. The influence of wages, deposits, and housing prices is more nuanced. Rising wages may enhance borrowing capacity through a wealth effect or reduce reliance on credit via a substitution effect, consistent with pecking order theory [Myers & Majluf, 1984]. Similarly, household deposits can either substitute for credit or signal financial resilience that supports precautionary borrowing, aligning with trade-off theory [Kraus & Litzenberger, 1973]. Housing prices affect credit demand through collateral channels, where higher valuations increase borrowing potential. However, rapid price appreciation may also signal speculative risk, discouraging credit expansion [Bambulovic & Valdec, 2018; Squires & Webber, 2019]. These theoretical perspectives underscore the complex and often non-linear relationship between household credit behaviour and macro-financial conditions.

In the other set of equations, credit supply for firms ls_t^{firms} and households ls_t^{HH} is modeled likewise as a function of macroeconomic performance, banking sector conditions, and borrower-specific risk indicators. In line with the dual-layered disequilibrium framework, equations are disaggregated by borrower type to capture structural and behavioural heterogeneity:

$$ls_t^{firms} = a_{31} + a_{32}\, ls_{t-j}^{F} + a_{33}\, GDP^{*}_{t+j} + a_{34} LIQ_{t-j}^{tot} + a_{35} s_{t-j}^{F} + a_{36} (Boone_{t-j} * BPI_{t-j}) + a_{37} (BSI_{t-j} * NPL_{t-j}^{F}) + a_{38}\, REER_{t-j} + \mu_t^{s\hat{}F} \quad [3]$$

And,

$$ls_t^{HH} = a_{41} + a_{42}\, ls_{t-j}^{HH} + a_{43}\, GDP_{t+j}^{*} + a_{44}\, LIQ_{t-j}^{tot} + a_{45}\, s_{t-j}^{HH} + a_{46}\,(Boone_{t-j} * BPI_{t-j}) + a_{47}\,(BSI_{t-j} * NPL_{t-j}^{HH}) + a_{48}\, REER_{t-j} + \mu_t^{s\wedge HH} \quad [4]$$

Where, GDP^{*}_{t+j} captures a forward-looking economic performance; LIQ_{t-j}^{tot} denotes an aggregate banking sector liquidity and lending capacity of banks from a capital disposable point of view; s_t^{F} and s_t^{HH} denote lending spreads to firms and households; $Boone_{t-j}$ is an indicator of competitive dynamics within the banking sector; BPI_{t-j} captures prudential behaviour of banks[5]; and BSI_{t-j} is a measure of bank stability conditions; NPL_{t-j}^{F} and NPL_{t-j}^{HH} refer to the volume of non-performing loans associated with firms and households. $\mu_t^{s\wedge F}$ and $\mu_t^{s\wedge HH}$ denote error terms accounting for unobserved influences.

The formulation, as illustrated in Equations [3] and [4], captures the complex and multidimensional nature of credit supply, highlighting how banking sector factors, market competition, and borrower risk profiles interact with macro-financial conditions to shape lending behaviour across sectors. The selected variables reflect key theoretical and empirical determinants of credit supply. First, economic growth and lagged loan volumes serve as controls for macroeconomic scale and persistence. Stronger growth environments are generally associated with reduced borrower risk and increased lending activity [Čeh & Krznar, 2011]. Second, proxied by deposits and equity relative to GDP, bank financial resources represent lending capacity, with higher liquidity positively correlated with credit supply [Nehls & Schmidt, 2003]. Third, interest rates influence lending through opportunity cost and risk-screening channels. While elevated rates may improve bank margins, they can also signal heightened risk, discouraging lending due to adverse selection concerns [Čeh et al., 2011]. The loan-deposit rate spread is used as a proxy for perceived borrower risk.

[5] *These indicators is estimated and used previously by Shijaku (2019, 2012, 2023).*

Additional variables capture broader banking system dynamics, including competition, liquidity, borrower creditworthiness, and prudential behaviour. Empirical evidence suggests that the effects of capital and liquidity on lending vary by bank size and regional context [Polizzi et al., 2020]. Market competition may either stimulate lending or incentivize excessive risk-taking, potentially undermining financial stability [Chemmanur et al., 2020]. Finally, non-performing loan (NPL) ratios for firms and households, when interacted with bank stability indicators (BSI), reflect both credit risk and institutional resilience. Banks are expected to prioritize low-risk borrowers, and higher BSI levels can mitigate the negative impact of NPLs on credit supply [Huljak et al., 2020].

Finally, to assess long-run relationships between credit demand/supply and macro-financial variables for each sector i at time t, the Johansen Vector Error Correction Model (VECM) is applied:

$$\Delta X_{i_t} = \beta_0 + \alpha_i \left(X_{i_{(t-1)}} + \sum_{i=1}^{p-1} \beta_i X_{i_{(t-1)}} \right) + \sum_{j=1}^{p-1} \beta_j \Delta X_{i_{t-1}} + \beta_j Z_{i_t} + \varepsilon_{i_t} \qquad [5]$$

Where Δ is the difference operator, $\mathbf{X}_{it}$ are endogenous credit variables as explained in equations [1] to [4], $\mathbf{Z}_{it}$ are exogenous controls (e.g. crisis dummies), and α_i captures the speed of adjustment. A negative and statistically significant error correction term confirms cointegration. Following Enders (2010), the VECM is implemented in three steps: (1) stationarity testing of each variable is conducted through the ADF and PP tests to confirm I(1) integration[6]; (2) each model undergoes a series of diagnostic checks (SIC, LM, ARCH, normality) to ensure model robustness and reliability; and (3) each model is analysed for cointegration rank selection using Trace and Max-Eigen statistics.

[6] *Due to the limited sample size, the KPSS test is employed alongside ADF and PP tests to improve the robustness of stationarity diagnostics through a complementary testing strategy.*

2.1.Data description

This study employs quarterly data spanning the period from 2007 Q4 to 2022 Q2, yielding 62 observations. The sample is constrained by the quarterly frequency of macroeconomic indicators and the limited historical coverage of survey-based data for Albania. The dependent variables represent bank lending to firms and households. Specifically, L_t^F and L_t^{HH} denote the end-period amounts of new bank loans to firms and households, respectively, unadjusted for seasonality and corrected for write-offs of impaired loans. These flows are estimated as the moving annual sum of quarterly changes in outstanding loans and expressed as a ratio to annualized GDP. This transformation yields proxies for credit demand for firms ld_t^F and households ld_t^{HH} and credit supply for firms ld_t^F and households ld_t^{HH}.

The set of explanatory variables used in this analysis reflects Albania's macroeconomic environment and banking sector conditions. GDP denotes the annualized Gross Domestic Product, calculated as the moving sum of four quarterly values, while GDP* represents the annual real economic growth rate. WAGE captures the real average wage in both public and private sectors, deflated by the Consumer Price Index (CPI). Energy consumption by firms and households—denoted as EC_{t-j}^F and EC_{t-j}^{HH}, respectively—is annualized using a four-quarter moving sum. Lending interest rates to firms (I_t^F) and households (I_t^{HH}) are weighted averages of domestic and foreign currency loans, adjusted to real terms by subtracting annual CPI inflation. The 12-month Treasury bill rate (T-BILLs) is similarly deflated. Interest rate spreads for firms, s_t^F and s_t^{HH} for households, are calculated as the difference between the respective lending rates and T-BILLs. The Producer Price Index (PPI), representing input cost pressures, and the Housing Price Index (HPI), a proxy for household wealth and collateral, are both de-trended using the Hodrick-Prescott filter ($\lambda = 1600$) to isolate cyclical components. The Real Effective Exchange Rate (REER) measures the value of the Albanian Lek (ALL) against the currencies of five major trading partners; an increase indicates depreciation, while a decrease signals appreciation. Banking sector indicators

complement the macroeconomic variables. The Bank Stability Index (BSI), following Shijaku (2018b), is a composite measure of financial system soundness, where higher values imply greater stability. The Bank Prudence Index (BPI), as defined by Shijaku (2019), reflects the degree of conservative lending practices. The Boone indicator (Shijaku, 2017) captures competitive dynamics, with higher values indicating stronger competition; it is computed at the bank level and aggregated using historical market shares. Deposit stocks of firms ($\mathbf{DEP}_{t-j}^{f}$) and households ($\mathbf{DEP}_{t-j}^{HH}$) are expressed as ratios to GDP, while total bank liquidity ($\mathbf{LIQ}_{t-j}^{tot}$) is measured similarly, indicating lending capacity. Finally, credit risk is captured by the non-performing loan ratios for firms ($\mathbf{NPL}_{t-j}^{f}$) and households ($\mathbf{NPL}_{t-j}^{HH}$), each expressed as a share of total loans to the respective sector.

All series undergo a three-step standardization to ensure comparability and statistical robustness: First, each variable is centred (mean = 0) and scaled to unit variance[7]. Second, using a Min–Max scaling approach,[8] normalized series are rescaled into the [0, 1] interval, preventing high-variance features from dominating. Finally, indexing survey-based and selected series are re-indexed to a base year (2010 = 100) by taking the 2010 annual average and multiplying by 100. This pre-processing aligns data on a common scale, meets linear regression assumptions, and enhances interpretability of coefficients and graphs (Kutner et al. (2005). Furthermore, three exogenous binary variables capture major shocks: (1) global financial crisis (GFC) dummy (2008 Q3–2010 Q4 = 1; else 0); (2) Eurozone debt (EUROZONE) crisis dummy (2009 Q3–2014 Q2 = 1; else 0), accounting for the effect of the multi-year European debt crisis[9]; (3) COVID-19 (COVID) pandemic dummy (2020 Q1–2021 Q1 = 1; else 0). All series are log-transformed in end-period form prior to empirical estimation. Finally, the data on quarterly CPI, GDP, WAGE, FEC and HEC are taken from the Albanian Institute of Statistics (INSTAT). The remaining variables are taken from the Bank of Albania.

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[7] *The formula used in this case is* $Z_t=(X_t-\bar{X})/\delta$, *where* $\bar{X}$ *is the actual data from the BLS;* $\bar{X}$ *is the mean and* δ *is the standard deviation over the selected sample.*

[8] *The formula is given as* $Z_t'=(1/(1+exp(-Z_t))$.

[9] *See also ECB's publications on long-term interest rate statistics for EU member states.*

3. EMPIRICAL RESULTS

This section presents the core empirical findings from the cointegration analysis of credit demand and supply for firms and households in Albania. Unit root tests (Table 1, Appendix) confirm non-stationarity at conventional significance levels, justifying the use of the VECM framework. Subsequent diagnostics support a one-lag specification, with residual tests showing no serial correlation, heteroscedasticity, or non-normality. The model also passes stability checks, confirming its suitability for long-run analysis. The long-run analysis on the properties of each model is further examined by relying on three key components: Johansen Cointegration Test (JCT) results, the sign and significance of the error correction term, and the estimated long-run coefficients, which provide insight into the adjustment process and equilibrium relationships in Albania's credit market.

Consistent with VECM literature, the Johansen Cointegration Test results (Tables 3–6, Appendix) show that the Max-Eigen Statistic consistently rejects the null hypothesis of no cointegration ($r = 0$), confirming at least one cointegrating vector in each model. This outcome is particularly robust for firm-level credit demand and supply (Tables 3 and 4) and also holds for household models (Tables 5 and 6) under specifications without trend or intercept. These findings indicate that the variables in Equations [1] to [4] share a stable long-run equilibrium relationship with their explanatory variables, validating the use of the VECM framework. Accordingly, the model is estimated with one cointegrating vector, satisfying the condition for identifying one-way causality within the system, while results are presented in Table 7 (Appendix). The first two columns display the credit demand equations for firms and households, while the remaining columns correspond to credit supply. The Error Correction Mechanism (ECM) coefficients (α_i), reported at the bottom of the table with their respective t-statistics in parentheses, range from –0.199 to –0.328 for firms and from –0.293 to –0.429 for households.

These coefficients exhibit the theoretically expected negative sign and are statistically significant at the 1% level across all models, confirming the existence of a stable long-run equilibrium relationship. At the same time, the magnitude and significance of the ECM terms suggest that deviations from equilibrium are corrected relatively swiftly—typically within four to six quarters. Notably, the speed of adjustment is higher in household credit models, indicating greater sensitivity to macro-financial fluctuations. These results provide robust evidence of cointegration between credit demand and supply and their respective macro-financial determinants, reinforcing the validity of the VECM framework and confirming that long-run equilibrium is empirically attainable. Moreover, these findings align with Shijaku (2023) in two key respects. First, they suggest that credit market participants—both borrowers and lenders—respond differently to macro-financial shocks, making episodes of transitory market disequilibrium a tolerable feature of the system. Second, they confirm that credit rationing in Albania is primarily driven by macro-financial conditions rather than by information asymmetries typically linked to credit crunch scenarios. This implies that credit behaviour is more sensitive to structural economic shifts than to adverse selection or moral hazard, with lending patterns reflecting broader financial dynamics rather than distortions from imperfect information.

The other set of results[10], presented in Table 7 (Appendix) offers valuable insights into the long-run relationships between macro-financial variables and credit demand and supply for firms and households in Albania. First, the coefficients associated with consumer confidence and investment willingness—proxied by the Investment Confidence Index (ICI) and Energy Consumption (EC)—exhibit the expected positive signs. EC is statistically significant at conventional levels, while the magnitude of the Consumer Confidence Index (CCI) remains relatively low. These patterns persist when EC is used as a proxy for household sentiment, suggesting that credit demand, particularly for firms, is positively influenced by economic optimism and investment appetite, though the strength of this relationship varies

[10] *Further, based on the joint weak-exogeneity LR-test tests on the non-significant* α*-coefficients, we report the elasticities of a more parsimonious model.*

across sectors. Second, GDP and WAGE, representing purchasing power and economic scale, show strong and statistically significant positive effects on credit demand for both firms and households. The impact is notably stronger for firms: a 1 percentage point increase in GDP raises firm credit demand by approximately 2.1 percentage points—nearly ten times the effect of WAGE on household credit demand. This implies that macroeconomic shocks are more visibly transmitted through firm-level credit dynamics. Similarly, credit supply is positively and significantly associated with GDP, reinforcing the pro-cyclical nature of bank lending. Third, interest rates to firms ($\mathbf{I}_t^{\mathrm{F}}$) and households ($\mathbf{I}_t^{\mathrm{HH}}$) show divergent effects. For firms, the expected negative relationship holds, indicating that higher borrowing costs dampen credit demand. In contrast, the positive and statistically significant coefficient for $\mathbf{I}_t^{\mathrm{HH}}$ suggests that household credit demand may have increased alongside interest rates—possibly due to mortgage-driven borrowing during periods of low rates, reflecting a wealth effect. Lending spreads ($\mathbf{s}_t^{\mathrm{F}}$ and $\mathbf{s}_t^{\mathrm{HH}}$) also diverge as spreads negatively affect credit supply to firms, signalling perceived market risk, while positively influencing household credit supply, likely due to the profitability and lower risk associated with mortgage lending.

In addition, firm credit demand is positively but weakly associated with liquidity (**DEP**), with statistical insignificance suggesting a limited role. For households, however, the relationship is negative and statistically significant: a 1 percentage point increase in the deposit ratio reduces household credit demand by 0.298 percentage points, indicating a substitution effect. On the supply side, bank liquidity ($\mathbf{DEP}^{\mathrm{tot}}$) is positively and significantly related to credit supply for both firms and households, with stronger effects observed for firms (0.188) than households (0.096). Furthermore, depreciation of the real effective exchange rate (**REER**) is positively associated with credit demand and supply, particularly for households. This suggests that exchange rate movements influence borrowing behaviour through valuation and consumption smoothing effects. The relationship is statistically significant for credit demand, with a stronger impact observed in the household sector. Rising

production costs (ICP) and housing prices (HPI) exert a negative and statistically significant effect on credit demand for both sectors, with firms showing greater sensitivity. This reflects the adverse impact of cost inflation and asset price volatility on borrowing decisions. Finally, regarding bank-specific indicator, results show that improved bank stability and reduced non-performing loans (**BSI*NPL^{F} and BSI*NPL^{HH}**) are positively associated with credit supply, though the magnitude of the effect is modest. This indicates that healthier bank balance sheets support lending activity. Conversely, the interaction between bank competition and prudential behaviour (**BOONE*BPI**) yields a negative and statistically significant coefficient, suggesting that increased competition—when paired with stricter prudential standards—may constrain credit supply. This reflects banks' cautious approach to preserving loan quality amid competitive pressures.

4. CONCLUSIONS

Credit markets play a pivotal role in shaping economic activity and transmitting monetary policy impulses, a relevance that has grown markedly since the Global Financial Crisis. This is especially true for small, open economies such as Albania, where financial intermediation is a key channel through which macroeconomic shocks are propagated. In such contexts, the financial accelerator effect, where deteriorating borrower balance sheets amplify the impact of monetary policy, underscores the importance of understanding deeper the underlying dynamics of credit market. Despite this significance, a persistent empirical challenge lies in the limited availability of granular data that distinctly capture credit demand and supply, particularly when disaggregated by borrower type. Most existing studies treat credit as a unified outcome, obscuring the structural and behavioural differences between firms and households. This study addresses that gap by explicitly decomposing bank lending into its two fundamental components: credit demand and credit supply. By doing so, it enables a more nuanced analysis of the distinct macro-financial drivers influencing each segment, firms and households. Using quarterly macroeconomic and banking sector data spanning 2008 to 2022, the study contributes to the Albanian literature by testing two core hypotheses. First, it examines whether credit demand from firms and households exhibits long-run cointegration with macro-financial fundamentals such as GDP, wages, interest rates, and consumer confidence. Second, it investigates whether credit supply to these groups is similarly anchored in long-run relationships with banking sector conditions, including liquidity, competition, and prudential behaviour. In addition, the study explores the presence of an error correction mechanism, which would indicate that short-term deviations from equilibrium are systematically corrected over time—thereby confirming the stability and responsiveness of Albania's credit market.

The results confirm the existence of a strong long-run cointegration between credit demand and supply and their macro-financial determinants. In all models, the error correction term is negative and statistically significant, indicating that deviations from equilibrium are systematically corrected over time. This adjustment typically occurs within four to six quarters, with household credit behaviour exhibiting faster responsiveness—highlighting greater sensitivity to macro-financial fluctuations. These findings align further with prior evidence from Albania, showing that credit actors respond asymmetrically to macro-financial shocks and that credit rationing is shaped more by economic fundamentals than by market frictions. Beyond the statistical confirmation of equilibrium relationships, the analysis yields several other substantive insights. Credit behaviour is positively and significantly associated with economic growth, underscoring the pro-cyclical nature of bank lending. Lending activity is further amplified by factors such as deeper financial intermediation, progressive financial liberalization, declining borrowing costs, reduced government crowding-out through domestic debt issuance, and improvements in the quality of bank lending portfolios. These drivers collectively enhance the capacity and willingness of banks to extend credit, particularly in favourable macroeconomic environments. Exchange rate movements also play a notable role, influencing credit demand through valuation effects and consumption-smoothing mechanisms, especially in the household sector, where foreign currency exposure and asset valuation are more prominent. While the presence of an adjustment mechanism confirms the system's tendency to restore equilibrium, the magnitude of the ECM coefficients suggests that convergence, though consistent, may be gradual rather than immediate.

Taken together, these findings offer a robust empirical foundation for understanding the disequilibrium dynamics of Albania's credit market. They contribute to the broader literature by disentangling the structural drivers of credit demand and supply and provide actionable insights for policymakers seeking to enhance financial stability, improve credit allocation, and design more responsive

monetary and macro-prudential frameworks. Looking ahead, future research could build on this foundation in several promising directions. First, integrating micro-level data, such as firm financials or household income and debt profiles, would deepen the analysis of borrower-specific credit behaviour. Second, expanding the scope to include non-bank financial institutions would illuminate the growing influence of alternative lenders in Albania's financial system. Third, exploring how credit dynamics interact with monetary transmission under different policy regimes could strengthen the design of countercyclical tools. Lastly, comparative studies across similar small, open economies in the region would help benchmark Albania's experience and uncover common structural patterns or policy lessons.

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APPENDIX

Table 1. Unit Root Test Analysis.												
Variables	Augmented Dickey-Fuller Test						Phillips-Perron Test					
	Level			First Difference			Level			First Difference		
	Constant	Constant & trend	None	Constant	Constant & trend	None	Constant	Constant & trend	None	Constant	Constant & trend	None
L^F	[0.117]	[0.180]	[0.355]	[0.000]	[0.000]	[0.000]	[0.158]	[0.305]	[0.385]	[0.000]	[0.000]	[0.000]
L^{HH}	[0.267]	[0.695]	[0.260]	[0.000]	[0.001]	[0.000]	[0.173]	[0.511]	[0.290]	[0.000]	[0.000]	[0.000]
GDP	[0.049]	[0.137]	[0.986]	[0.000]	[0.001]	[0.000]	[0.015]	[0.263]	[0.995]	[0.000]	[0.001]	[0.000]
Wage	[0.002]	[0.011]	[0.796]	[0.276]	[0.670]	[0.024]	[0.000]	[0.000]	[0.999]	[0.000]	[0.000]	[0.000]
CCI	[0.791]	[0.913]	[0.262]	[0.003]	[0.008]	[0.000]	[0.963]	[0.991]	[0.222]	[0.002]	[0.008]	[0.000]
PPI	[0.103]	[0.253]	[0.010]	[0.000]	[0.000]	[0.000]	[0.090]	[0.205]	[0.009]	[0.000]	[0.000]	[0.000]
HPI	[0.000]	[0.000]	[0.909]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.908]	[0.000]	[0.000]	[0.000]
DEPF	[0.923]	[0.020]	[0.109]	[0.000]	[0.000]	[0.000]	[0.876]	[0.027]	[0.084]	[0.000]	[0.000]	[0.000]
DEP^{HH}	[0.992]	[0.946]	[0.082]	[0.000]	[0.000]	[0.000]	[0.997]	[0.934]	[0.111]	[0.000]	[0.000]	[0.000]
REER	[0.680]	[0.881]	[0.503]	[0.418]	[0.169]	[0.089]	[0.970]	[0.976]	[0.390]	[0.000]	[0.000]	[0.000]
i^F	[0.724]	[0.086]	[0.372]	[0.000]	[0.000]	[0.000]	[0.832]	[0.116]	[0.252]	[0.000]	[0.000]	[0.000]
i^{HH}	[0.746]	[0.549]	[0.178]	[0.000]	[0.000]	[0.000]	[0.759]	[0.542]	[0.148]	[0.000]	[0.000]	[0.000]
s^F	[0.002]	[0.010]	[0.484]	[0.000]	[0.000]	[0.000]	[0.002]	[0.008]	[0.464]	[0.000]	[0.000]	[0.000]
s^{HH}	[0.014]	[0.045]	[0.445]	[0.000]	[0.000]	[0.000]	[0.013]	[0.029]	[0.456]	[0.000]	[0.000]	[0.000]
Boone	[0.455]	[0.907]	[0.659]	[0.000]	[0.000]	[0.000]	[0.477]	[0.883]	[0.646]	[0.000]	[0.000]	[0.000]
BPI	[0.047]	[0.786]	[0.965]	[0.007]	[0.001]	[0.001]	[0.068]	[0.828]	[0.946]	[0.000]	[0.000]	[0.000]
BSI	[0.201]	[0.935]	[0.236]	[0.000]	[0.000]	[0.000]	[0.245]	[0.941]	[0.316]	[0.000]	[0.000]	[0.000]
NPL^F	[0.660]	[0.355]	[0.429]	[0.000]	[0.000]	[0.000]	[0.663]	[0.340]	[0.429]	[0.000]	[0.000]	[0.000]
NPL^{HH}	[0.582]	[0.923]	[0.108]	[0.000]	[0.000]	[0.000]	[0.582]	[0.931]	[0.108]	[0.000]	[0.000]	[0.000]
Source: Author's Calculations												

Table 2. VEC Residual Heteroskedasticity Tests (Levels and Squares).					
		Chi-sq	df	Prob.	Sample
Firms	Supply	297.4	294	0.43	2008Q2 2022Q1 [Included observations: 56]
	Demand	529.1	532	0.53	2009Q1 2022Q1 [Included observations: 48]
HHs	Supply	481.5	448	0.13	2008Q1 2022Q1 [Included observations: 53]
	Demand	471.6	476	0.55	2009Q1 2022Q1 [Included observations: 49]
Source: Author's calculations					

Table 3. Johansen Cointegration Test: Firms' Credit Demand Equation.					
Sample: 2009Q1 2022Q2 [Included observations: 52] Endogenous Variables: Series: L^{F}_{t} GDP i^{F} ICP DEPF EC REER Exogenous series: CRISIS [Lags interval: 1 to 1]					
Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept	Intercept	Intercept	Intercept	Intercept
	No Trend	No Trend	No Trend	Trend	Trend
Trace	5	3	2	2	2
Max-Eigen	0	1	1	1	1
Critical values based on MacKinnon-Haug-Michelis (1999) Selected (0.05 level) Number of Cointegrating Relations by Model					
Source: Author's calculations					

Table 4. Johansen Cointegration Test: Firms' Credit Supply Equation.					
Sample: : 2008Q2 2022Q2 [Included observations: 55] Endogenous Variables: Series: L^{Firms}_{t} GDP DEP^{tot} s^{firms*} BOONE*BPI BSI*NPL REER Exogenous series: CRISIS COVID [Lags interval: 1 to 1]					
Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept	Intercept	Intercept	Intercept	Intercept
	No Trend	No Trend	No Trend	Trend	Trend
Trace	2	2	2	2	1
Max-Eig	1	1	1	1	1
Critical values based on MacKinnon-Haug-Michelis (1999) Selected (0.05 level) Number of Cointegrating Relations by Model					
Source: Author's calculations					

Table 5. Johansen Cointegration Test: Households' Credit Demand Equation.					
Sample: 2008Q3 22022Q2 [Included observations: 48] Endogenous Variables: Series: L^{HH}_{t} TBK WAGE i^{HH} HPI DEP^{HH} REER Exogenous series: CRISIS COVID [Lags interval: 1 to 1]					
Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept	Intercept	Intercept	Intercept	Intercept
	No Trend	No Trend	No Trend	Trend	Trend
Trace	2	4	4	3	3
Max-Eig	1	2	2	2	1
Critical values based on MacKinnon-Haug-Michelis (1999) Selected (0.05 level) Number of Cointegrating Relations by Model					
Source: Author's calculations					

Table 6. Johansen Cointegration Test: Households' Credit Supply Equation.

Sample: 2008Q1 2022Q2 [Included observations: 52]
Endogenous Variables: Series: L^{HH}, PBBR DEP^{tot} s^{HH} BOONE*BPI BSI*NPL REER
Exogenous series: CRISIS COVID [Lags interval: 1 to 1]

Data Trend:	None	None	Linear	Linear	Quadratic
Test Type	No Intercept	Intercept	Intercept	Intercept	Intercept
	No Trend	No Trend	No Trend	Trend	Trend
Trace	3	3	3	4	4
Max-Eig	1	2	2	2	2

*Critical values based on MacKinnon-Haug-Michelis (1999)
Selected (0.05 level*) Number of Cointegrating Relations by Model

Source: Author's calculations

Table 7. Long-run estimation coefficients of credit demand and credit supply.

Variables	Credit Demand Equation		Credit Supply Equation	
	$(L_{t-1}^{F})^1$	$(L_{t-1}^{HH})^2$	$(L_{t-1}^{F})^3$	$(L_{t-1}^{HH})^4$
ICI	-2.135 [-3.7]			
CCI		-0.010 [-0.1]		
GDP			-0.581 [-3.5]	-0.387 [-3.8]
WAGE		-0.232 [-1.8]		
i^F	0.007 [0.06]			
i^{HH}		-0.096 [-2.2]		
s^F			0.012 [0.4]	
s^{HH}				-0.030 [-2.3]
ICP	0.149 [3.1]			
HPI		0.086 [2.2]		
DEP^F	-0.051 [-0.3]			
DEP^{HH}		0.298 [6.7]		
DEP^{tot}			-0.188 [-1.8]	-0.096 [-1.4]
EC	-0.575 [-1.94]			
REER	-0.161 [-2.84]	-1.046 [-5.2]	-0.285 [-0.9]	-0.339 [-1.7]
BOONE*BPI			0.027 [1.2]	0.011 [0.9]
$BSI*NPL^F$			-0.012 [-2.0]	
$BSI*NPL^{HH}$				-0.041 [-10.9]
ECM	-0.199 [-5.2]	-0.293 [-5.9]	-0.328 [-4.0]	-0.429 [-7.3]

1. Sample (adjusted): 2009Q1 2022Q1;
2. Sample (adjusted): 2008Q1 2021Q4;
3. Sample (adjusted): 2008Q2 2022Q1;
4. Sample (adjusted): 2008Q3 2022Q1;
t-statistics in [ ]

Source: Author's calculations.

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