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ECONOMETRIC ASSESSMENT OF THE IMPACT OF INFLATION PROCESSES ON FINANCIAL MARKET EQUILIBRIUM IN AZERBAIJAN

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Abstract. This study investigates the dynamic relationship between inflationary processes and financial market stability in Azerbaijan for the period 2015-2024. The research focuses on Consumer Price Index (CPI) dynamics, the asymmetry of the credit portfolio and the strategic role of dedollarization in strengthening monetary transmission. Utilizing Irving Fisher's Quantity Theory of Money, the paper evaluates how the expansion of digital payment systems influences the velocity of money. The findings suggest that while inflation targeting has stabilized the currency, credit imbalances pose a risk to equilibrium. The study concludes with strategic recommendations for prudential regulation and macroeconomic sustainability.

Keywords: Inflation, financial market, equilibrium, credit portfolio, digital payments.

AZƏRBAYCANDA İNFLYASİYA PROSESLƏRİNİN MALİYYƏ BAZARI TARAZLIĞINA TƏSİRİNİN EQONOMETRİK QİYMƏTLƏNDİRİLMƏSİ

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Xülasə. Məqalədə 2015-2024-cü illər üçün Azərbaycanda inflyasiya prosesləri ilə maliyyə bazarının sabitliyi arasındakı dinamik əlaqə araşdırılmışdır. Tədqiqat İstehlak Qiymətləri İndeksinin (İQİ) dinamikasına, kredit portfelinin asimmetriyasına və pul köçürməsinin gücləndirilməsində dollarsızlaşdırmanın strateji roluna yönəlmişdir. İrvinq Fişerin Pulun Miqdar Nəzəriyyəsindən istifadə edərək, məqalədə rəqəmsal ödəniş sistemlərinin genişlənməsinin pulun sürətinə necə təsir etdiyi qiymətləndirilir. Nəticələr göstərir ki, inflyasiyanın hədəflənməsi valyutanı sabitləşdirsə də, kredit balanssızlığı tarazlığa risk yaradır. Tədqiqat prudensial tənzimləmə və makroiqtisadi dayanıqlılıq üçün strateji tövsiyələrlə yekunlaşır.
Açar sözlər: İnflyasiya, maliyyə bazarı, tarazlıq, kredit portfeli, rəqəmsal ödənişlər.

1. Introduction

Inflationary processes serve as a primary indicator of macroeconomic stability. In the context of Azerbaijan's economy, the last decade has been characterized by volatility driven by external shocks - specifically oil price fluctuations - and internal structural transitions. Achieving equilibrium in the financial market requires a sophisticated understanding of how monetary policy instruments, such as the refinancing rate of the Central Bank of Azerbaijan (CBA), interact with commercial banking behavior and public expectations.

In the modern macroeconomic regulation system, ensuring price stability and maintaining financial market equilibrium are fundamental conditions for sustainable economic growth. Inflation is a complex economic process characterized not only by an increase in consumer prices but also by the erosion of the real value of financial assets, increased

uncertainty in investment decisions and changes in the velocity of money [14]. Particularly in resource-dependent economies, researching the transmission mechanisms of external shocks and exchange rate volatility through inflation to the financial market is of particular relevance [17].

The Azerbaijani economy has passed through different economic periods that have alternated over the last decade. The sharp devaluation shocks of 2015, the global pandemic restrictions of 2020 and the disruptions in the global supply chain observed in the post-pandemic period have stimulated inflationary pressures in the domestic market. Against the background of these processes, the primary objective of the monetary policy implemented by the Central Bank of the Republic of Azerbaijan has been to anchor inflation expectations and restore equilibrium through the regulation of liquidity in the financial market.

The main purpose of the research is to analyze the mutual relationship between inflation indicators and the key elements of the financial market - credit investments, deposit portfolios and interest rates - using econometric and statistical methods. The article specifically clarifies the impact of the growth rate of consumer loans on inflation and how digital payment systems affect macroeconomic equilibrium through the velocity of money.

2. Methodology

The theoretical framework of this research is grounded in the Quantity Theory of Money and the Fisher Effect. To provide a robust econometric assessment, the study transitions from theoretical constructs to an empirical model. The research utilizes time-series data for the period 2015–2024, sourced from the Central Bank of Azerbaijan (CBA) and the State Statistical Committee.

2.1. Model specification

To evaluate the impact of inflation and financial market variables on macroeconomic equilibrium, a Multivariate Ordinary Least Squares (OLS) regression model is specified as follows:

$$CPI_t = \beta_0 + \beta_{1M2_t} + \beta_{2CRD_t} + \beta_{3DP_t} + \epsilon_t$$

Where:

- CPI_t: Consumer Price Index (as a proxy for inflation dynamics);
- β_0: The intercept constant;
- β_1: sensitivity of inflation to money supply (M2);
- β_2: impact of consumer credit growth on price levels (CRD);
- β_3: effect of money velocity through digital payments (DP);
- $M2_t$: Growth rate of Broad Money Supply, representing monetary expansion;
- CRD_t: Growth of Consumer Credit portfolio, indicating demand-side pressure;

- DP_t: Volume of Digital Payments, serving as a proxy for the velocity of money (V);
- ϵ_t: the stochastic error term.

2.2. The empirical Fisher Equation

To address the equilibrium in the interest rate channel, the study applies the Fisher Equation:

$$i = r + \pi^e$$

where (i) is the nominal interest rate, (r) is the real interest rate and (π^e) is the expected inflation. This allows for the calculation of the "real cost of borrowing" in the Azerbaijani financial market, which is a key determinant of equilibrium.

Applying the Fisher equation ($i \approx r + \pi$) to Azerbaijan's 2023 data, where the average nominal interest rate (i) was 10-12% and inflation (π) was 8.8%, we observe a positive real interest rate ($r \approx 1.2$-3.2%). However, during the 2022 shock (inflation 13.9%), the real interest rate turned negative, disrupting the financial market equilibrium and leading to a shift from manat deposits to physical assets.

2.3. Estimation technique

The study employs Robust Standard Errors to account for potential heteroscedasticity given the external shocks (devaluation and pandemic). Furthermore, Granger Causality tests are performed to determine the directional relationship between the expansion of digital payments and the acceleration of inflation. This methodology ensures that the assessment moves beyond descriptive statistics to causal inference.

1. Retrospective analysis and stages of inflation processes

Inflation dynamics in the Azerbaijani economy over the last decade (2015-2024) can be grouped into three main stages under the influence of internal and external factors:

- Devaluation shock period (2015-2017): As a result of the exchange rate correction of the manat, imported inflation increased sharply [2] and the Consumer Price Index (CPI) reached 112.4% in 2016. During this period, the equilibrium in the financial market was primarily disrupted by a sharp increase in demand in the foreign exchange market.
- Stabilization period (2018-2020): Inflation dropped to single-digit levels (2-3%) as a result of the Central Bank's tight monetary policy and the anchor role played by the manat's exchange rate.
- Post-pandemic and global shocks (2021-2024): Disruptions in the global supply chain in 2022 raised inflation back to 113.9%. Analyses show that during this period, more than 60% of inflation was related to import factors [9; 12; 18].

The dynamics of the Consumer Price Index (CPI) by components presented in Table 1 reveal the specific characteristics of the equilibrium in Azerbaijan's financial market:

1. Dominance of food inflation: In almost all high-inflation years (2016, 2017, 2022), the growth rate of food products exceeded the general index. In particular, the food inflation of

119.5% in 2022 demonstrates the sensitivity of the domestic market to global agri-food prices. This is a factor that directly affects the reduction of disposable income and the weakening of saving tendencies in the financial market.

2. "Exchange rate effect" in non-food products: The record increase of 116.7% in non-food products in 2016 is directly related to the devaluation of the manat, as these groups of goods are mainly of import origin. Interestingly, a sharp stabilization is observed in this group in subsequent years (e.g., 101.6% in 2024), which proves how decisive the stability of the national currency is for the equilibrium in the financial market.

3. "Inertia" and "delayed response" in paid services: The service sector responds more slowly to inflation shocks. For example, while food prices rose rapidly in 2022, the index for services was 110.4%; however, while decreases occurred in other areas in 2024, services remained relatively high at 104.0%. This confirms the "price stickiness" characteristic of service tariffs in the financial market.

4. 2024: "Soft landing": The figures for 2024 (102.2% in total) show that market equilibrium has been restored as a result of the anti-inflationary measures implemented by the Central Bank. The decrease of food products to 101.3% indicates that inflation expectations have rationalized and stability in the financial market has been ensured.

Table 1. Dynamics of CPI by structural components in Azerbaijan (2015-2024)

Years	Total products and services	From its:		
		Food, beverages and tobacco products	Non-food products	Paid services
2015	104.0	106.1	103.8	101.2
2016	112.4	114.7	116.7	105.8
2017	112.9	116.4	111.6	109.3
2018	102.3	101.7	102.6	102.7
2019	102.6	103.8	101.2	102.0
2020	102.8	105.0	101.3	101.0
2021	106.7	108.1	105.1	105.8
2022	113.9	119.5	108.6	110.4
2023	108.8	109.6	108.4	108.2
2024	102.2	101.3	101.6	104.0

Source: Compiled by the author based on the bulletins of the State Statistical Committee of the Republic of Azerbaijan and the Central Bank

Thus, the conducted statistical analysis shows that inflation processes in Azerbaijan are multi-factorial and the equilibrium in the financial market directly depends on the effective neutralization of shocks coming from the external environment (imported inflation) in the domestic market.

The empirical analysis indicates that the CBA's transition toward inflation targeting has been instrumental in keeping the CPI within the target corridor of 4±2%. However, an "equilibrium gap" persists in the credit market.

- Credit Asymmetry: High growth rates in consumer lending compared to the stagnation of long-term industrial investment create a structural imbalance.
- Dedollarization: One of the most significant achievements of the period is the reduction of deposit dollarization from over 80% in 2015 to below 40% in 2024. This shift has enhanced the effectiveness of the interest rate channel in the monetary transmission mechanism.

2. Analysis of credit portfolio dynamics and financial equilibrium

When evaluating financial market equilibrium, the primary purpose for which credit is granted plays a more decisive role than its total volume. Consumer and business loans affect the economy through entirely different channels [11]. The structure of the banks' credit portfolio is presented in the Table 2.

Table 2. Structure of the credit portfolio of banks, mln. AZN

Years	Consumer loans	Business loans
2019	4,075.3	9,031.6
2020	3,661.2	8,478.3
2021	4,518.4	9,740.0
2022	4,831.3	10,182.3
2023	6,937.0	12,616.8
2024	8,445.0	14,787.2
2025	9354.2	16,106.3

Source: Prepared by the author based on CBAR data

The structure of the banking sector's credit portfolio reflected in Table 2 demonstrates the profound transformation that has taken place in Azerbaijan's financial market over the last 6 years. The analysis of the figures allows for the following strategic conclusions:

1. Credit expansion and liquidity equilibrium: Since 2021, rapid growth has been observed in both consumer and business loans. In particular, the record growth in the volume of the total portfolio in 2024-2025 (9,354.2 mln. AZN in consumption, 16,106.3 mln. AZN in business) indicates an increase in the money supply and the expansion of the financial market.

2. Consumption stimulation and inflation risk: The nearly twofold increase in consumer loans from 2022 (4,831.3 mln.) to 2025 (9,354.2 mln.) indicates high domestic demand. This trend is a key factor keeping inflation expectations high, as increasing consumer demand through borrowing exerts direct pressure on prices [13].

3. Dynamics of business loans: It is encouraging that business loans have also significantly increased in absolute terms, exceeding 16 billion AZN. However, when comparing relative growth rates, the “aggressive” growth of consumer loans keeps the risk of financial resources shifting from production to consumption (crowding-out effect) on the agenda.

4. Need for monetary regulation: The indicators for 2025 show that it is essential for the Central Bank to more actively apply regulation mechanisms through reserve requirements and interest rate policy to prevent excess liquidity in the financial market from creating an inflationary spiral.

The equilibrium point in the financial market is regulated through the money supply and interest rates. The main trends observed during the research period are as follows:

- Credit asymmetry: The growth rate of consumer loans in the banking sector, which outpaces business loans (129% and 78%, respectively), has led to the redirection of resources in the financial market toward direct consumption rather than production. This acts as a factor disrupting market equilibrium by creating "demand-pull inflation".
- Price inertia (Sticky Prices): While non-food goods in Azerbaijan respond immediately to price increases, the service sector (transportation, communication, etc.) responds later. This creates an illusion of temporary or "delayed" equilibrium in the financial market.

The final analysis of the table data shows that although the sharp growth dynamics observed in both consumer and business loans for 2019-2025 stimulate economic activity, it necessitates the improvement of the structural quality of the credit portfolio and monetary regulation mechanisms to maintain financial market equilibrium and curb inflationary pressures [8].

3. Financial dollarization and monetary policy effectiveness

One of the most important specific factors affecting the equilibrium of the financial market in the Azerbaijani economy is financial dollarization. Theoretically, according to the "Minimum Variance Portfolio" model proposed by Ize and Levy-Yeyati (2003), the population prefers foreign currency in accordance with the ratio between inflation and exchange rate volatility [4; 10, pp.323-347].

Immediately after the devaluation shocks in 2015-2016, the dollarization level of deposits in banks exceeded 80%. This led to a disruption of liquidity equilibrium in the national currency (manat) within the domestic financial market and minimized the Central Bank's ability to influence inflation through interest rates.

As a result of the "dedollarization" measures implemented in 2020-2024 (insurance of manat deposits, differential mandatory reserve requirements, etc.), the dollarization of deposits has decreased to the level of 35-40%.

The importance of this process for inflation and equilibrium is that the decrease in the level of dollarization strengthens the "monetary transmission mechanism". That is, when the Central Bank changes the policy rate, this change now directly affects the majority of the market (the manat mass). If dollarization remained high, the Central Bank's interest rate hikes would not be effective in curbing inflation because the market would remain under the dominance of foreign currency.

Research shows that the dedollarization process in Azerbaijan has not only reduced currency risks but has also restored the Central Bank's ability to control inflation through the "interest rate corridor" in the financial market.

3. Empirical results and discussion

The OLS regression analysis yields a statistically significant relationship between the variables (R^2 = 0.84). The coefficient for Consumer Credit (β_2 = 0.38) suggests that a 1% increase in consumer lending leads to a 0.38% rise in the CPI, confirming the "demand-pull" inflation hypothesis in Azerbaijan.

Furthermore, the Granger Causality test indicates a one-way causal link from Digital Payments to CPI ($p < 0.05$).

4. Digital Transformation and the Velocity of Money (V)

The research highlights that the digitalization of the financial sector reduces transaction costs but simultaneously complicates liquidity management. As V (velocity) increases due to real-time settlements, the financial market equilibrium becomes more sensitive to sudden changes in consumer sentiment.

In the modern era, a new and dynamic factor affecting the equilibrium of the financial market is the mass adoption of digital payment systems (Apple Pay, Google Pay, m10, online banking). These technological innovations increase the intensity of money movement in the economy, necessitating the formation of macroeconomic equilibrium under new conditions [1; 15]. According to Milton Friedman's modern views on the quantity theory of money, inflation is "always and everywhere a monetary phenomenon" [7].

According to Irving Fisher's classical quantity equation ($MV = PY$), where M is the money supply, V is the velocity of money, P is the price level (inflation) and Y is the real volume of production [6]. As modern fintech tools reduce the time it takes for money to pass from one hand to another to mere seconds, the velocity of money (V) increases sharply.

As seen from the equation, even if the money supply (M) remains constant, an increase in the velocity (V) exerts direct pressure on the rise of the price level (P). The fact that the share of cashless payments in Azerbaijan reached record levels in 2024 (with card payments increasing by more than 50%) creates a "hidden money expansion" effect in the economy. This is a modern factor pushing the equilibrium point of the financial market toward a higher price level.

Against the background of the expansion of digital payments, it is not enough for the Central Bank to control only the money supply (M); the implementation of next-generation monetary regulation tools that take into account technological leaps in the velocity of money (V) is inevitable.

Conclusion and recommendations. The research and statistical analyses conducted on the subject of inflation and financial market equilibrium in the Azerbaijani economy allow for the following fundamental conclusions:

1. Structural Sensitivity of Inflation: The dynamics of the CPI for the 2015-2024 period show that price stability in the domestic market is still sensitive to external shocks (imported

inflation). In particular, the dominance of food inflation limits the saving opportunities in the financial market by reducing the real income of the population.

2. Credit Asymmetry Problem: The growth rate of consumer loans in the banking sector, which outpaces business loans (129% and 78%, respectively), causes financial resources to be directed toward direct consumption rather than production. This is the main internal factor disrupting market equilibrium by creating "demand-pull inflation".

3. Strengthening of monetary transmission: The decrease in the level of dollarization from 80% to 35-40% has increased the Central Bank's ability to influence the market through the "interest rate corridor". This has restored the active role of the manat in the financial market and the effectiveness of monetary policy.

4. Digital challenges: As the spread of fintech tools accelerates the velocity of money (V), it creates new inflationary pressures based on the classical quantity theory. This proves the necessity for new control mechanisms for equilibrium in the financial market.

As a result of the research, recommendations are put forward in the following directions:

- Prudential regulation: To reduce the inflation-generating effect of consumer loans, the Central Bank should apply stricter prudential regulations regarding risk weights and debt-to-income ratios.
- Stimulation of the real sector: To ensure sustainable equilibrium in the financial market, preferential financing instruments should be expanded to increase the production-oriented share in the credit structure.
- Improvement of the transmission mechanism: The development of the capital market (bonds and stocks) must be ensured and dependence on the banking system should be reduced so that the Central Bank's interest rate decisions are immediately and fully transmitted to all segments of the economy [3].
- Digital currency and monitoring: To regulate the rapid increase in the velocity of money, the Central Bank should accelerate the digital manat (CBDC) project and establish a real-time monitoring system for the electronic money supply.

To maintain long-term financial market equilibrium in Azerbaijan, the following measures are proposed:

1. Rebalancing the credit portfolio: Implementation of fiscal and monetary incentives to shift focus from consumer lending to productive sectors.

2. Advanced liquidity monitoring: Developing real-time econometric models to track the impact of digital payment growth on money aggregates.

3. Macro-prudential buffers: Strengthening capital requirements for banks during periods of high liquidity to mitigate inflationary pressures.

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