ECONOMETRIC ANALYSIS AND FORECASTING OF THE TRANSFORMATION OF STATE-OWNED BANKS IN UZBEKISTAN

Salamov Islam Tashkazakovich
Independent Researcher
Tashkent State University of Economics
E-mail: islamsalamov@gmail.com

Abstract

The study examined how macroeconomic conditions related to the transformation of state-owned banks in Uzbekistan, taking JSCB Turonbank as its case. The author combined descriptive statistics, Pearson correlation and ordinary least squares regression, drawing on monthly banking indicators and annual macroeconomic series for 2018-2025. The analysis identified a strong positive association between the refinancing rate and capital adequacy, and an inverse association between inflation and non-performing loans. Predicted values for 2025 came close to reported outcomes, which confirmed a satisfactory in-sample fit. The author interpreted the estimates as statistical associations, since the annual series remained short. The conclusion proposed measures on capital management, credit monitoring, corporate governance and digitalisation that strengthen financial resilience and support evidence-based transformation decisions.

Keywords: state-owned banks, bank transformation, Turonbank, capital adequacy, non-performing loans, macroeconomic factors, econometric analysis.

Annotatsiya

Tadqiqotda O‘zbekistonda davlat ulushi mavjud banklar transformatsiyasining makroiqtisodiy sharoit bilan bog‘liqligini Turonbank misolida o‘rganildi. Tavsifiy statistika, Pearson korrelatsiyasi va eng kichik kvadratlar usulidagi regressiyani uyg‘unlashtirish, oylik bank ko‘rsatkichlari hamda 2018-2025-yillardagi yillik makroiqtisodiy qatorlarga tayangan. Tahlillarda qayta moliyalash stavkasi bilan kapital yetarliligi o‘rtasida kuchli musbat, inflyatsiya bilan muammoli kreditlar o‘rtasida esa teskari statistik bog‘liqlikni aniqlandi. 2025-yil uchun hisoblangan qiymatlar haqiqiy natijalarga yaqin chiqib, modelning namuna ichidagi moslashuvi qoniqarli ekanini tasdiqladi. Muallif yillik kuzatuvlar soning cheklanganini hisobga olib, natijalarni statistik bog‘liqlik sifatida talqin qildi. Xulosada kapital boshqaruvi, kredit monitoringi, korporativ boshqaruv va raqamlashtirish bo‘yicha takliflar ishlab chiqildi.

Kalit so‘zlar: davlat ulushi mavjud banklar, bank transformatsiyasi, Turonbank, kapital yetarliligi, muammoli kreditlar, makroiqtisodiy omillar, ekonometrik tahlil.

Аннотация

Исследование изучило связь трансформации банков с государственным участием в Узбекистане с макроэкономическими условиями на примере Туронбанка. Автор объединил описательную статистику, корреляцию Пирсона и регрессию методом наименьших квадратов, опираясь на ежемесячные банковские показатели и годовые макроэкономические ряды за 2018-2025 годы. Анализ выявил сильную положительную связь ставки рефинансирования с достаточностью капитала и обратную связь инфляции с проблемными кредитами. Расчётные значения на 2025 год оказались близки к фактическим результатам, что подтвердило удовлетворительное качество подгонки модели. Автор интерпретировал оценки как статистические связи, учитывая ограниченную длину годовых рядов. В заключении предложены меры по управлению капиталом, кредитному мониторингу, корпоративному управлению и цифровизации.

Ключевые слова: банки с государственным участием, трансформация банков, Туронбанк, достаточность капитала, проблемные кредиты, макроэкономические факторы, эконометрический анализ.

INTRODUCTION

The rapid advance of the digital economy and of financial technologies has reshaped the operating environment of commercial banks. In Uzbekistan these developments have opened a favourable window for transforming state-owned banks: raising financial and operational efficiency, strengthening corporate governance and preparing institutions for wider participation of private and foreign investors. National development priorities reinforce this direction, since the strategic agenda for the period to 2030 places results-based assessment of public institutions, a modern service-oriented state and the digitalisation of administrative processes among its central objectives [1]. Reliable analytical and forecasting instruments therefore acquire growing practical value for evaluating how effectively transformation proceeds.

State-owned commercial banks operate under the combined influence of internal and external conditions. Internal conditions include capital adequacy, asset quality, the size of the credit portfolio, liquidity, profitability, operational efficiency and the depth of digital transformation. External conditions include GDP growth, inflation, exchange-rate dynamics, the policy rate of the Central Bank, investment activity and the implementation of structural reforms in the banking sector. Their interaction shapes both financial stability and the capacity of a bank to transform.

The monetary framework deserves separate mention. From 1 January 2020 the Central Bank introduced the policy rate as the principal target indicator of monetary operations in place of the refinancing rate; the refinancing rate remains effective in practice and is equal to the policy rate, and the policy rate itself is calibrated to keep inflation within the 5 per cent target [2]. This arrangement gives the rate a clear analytical meaning as a summary measure of monetary conditions facing banks.

Econometric modelling makes it possible to quantify the direction and strength of relationships between macroeconomic variables and indicators of banking transformation. Correlation and regression models identify statistically meaningful links and supply an empirical basis for comparing alternative development scenarios. Such analysis is particularly informative for state-owned banks, whose performance responds simultaneously to market conditions, regulatory requirements, government programmes and internal restructuring.

The purpose of the study is to examine the relationship between selected macroeconomic factors and key transformation indicators of the Uzbek banking sector, with particular attention to JSCB Turonbank. Capital adequacy and non-performing loans serve as the focal indicators, since both summarise financial resilience and the effectiveness of transformation. On the basis of the empirical findings, the study formulates recommendations for strengthening the transformation of state-owned banks and advancing their market-oriented development. The empirical work draws on two complementary datasets: monthly observations covering January 2020 to January 2026, and annual macroeconomic and banking indicators for 2018-2025.

LITERATURE REVIEW

The transformation of state-owned commercial banks has become a well-established research field in the context of financial liberalisation, digitalisation and intensifying competition. The literature treats transformation not merely as a technological undertaking but as a comprehensive institutional and financial restructuring that encompasses corporate governance, capital management, asset quality, operational efficiency and market orientation.

A substantial body of work links macroeconomic conditions to banking-sector stability. Mishkin showed that shifts in inflation, interest rates and broader macroeconomic conditions materially influence financial intermediaries and their risk-taking behaviour [3]. Demirgüç-Kunt and Detragiache demonstrated across a wide country sample that macroeconomic instability, and elevated inflation in particular, raises the probability of banking-sector distress [4]. These contributions provide the theoretical justification for including macroeconomic variables in models of banking transformation.

Interest rates form a second strand. Movements in the central bank rate transmit to funding costs, lending rates, interest income, credit demand and ultimately to profitability and capitalisation. Albertazzi and Gambacorta found that monetary policy and interest-rate conditions exert a significant influence on bank profitability over the business cycle [5]. The channel carries additional weight for state-owned banks, where credit allocation also reflects government programmes and regulatory requirements.

Asset quality constitutes a third strand. Berger and DeYoung applied Granger-causality techniques to the relationship between problem loans, cost efficiency and capital, and concluded that cost efficiency can serve as an early indicator of future loan-quality outcomes [6]. Louzis, Vouldis and Metaxas, using dynamic panel methods across mortgage, business and consumer portfolios, established that macroeconomic fundamentals together with management quality account for the greater part of variation in non-performing loans [7]. These results support the use of NPL indicators when the effectiveness of transformation is assessed.

A fourth strand addresses ownership and restructuring. La Porta, Lopez-de-Silanes and Shleifer documented the scale of government ownership of banks across countries and analysed its association with financial development and institutional incentives [8]. Building on this evidence, transformation and privatisation programmes are increasingly regarded as instruments for improving corporate governance, strengthening market discipline and raising operational efficiency.

Recent work adds digital transformation as an integral component of modernisation. Digital banking, automated decision-making, data analytics and financial technologies reduce transaction costs and improve both customer service and operational efficiency, provided that data management, risk governance, cybersecurity and organisational capabilities advance in step.

For Uzbekistan, research and policy analysis concentrate on raising the efficiency of state-owned banks, strengthening corporate governance and preparing institutions for wider private and foreign participation. A research gap nevertheless remains in the quantitative assessment of how macroeconomic factors relate to specific transformation indicators of individual state-owned banks. The present study addresses that gap by applying correlation and OLS regression to inflation, interest rates and exchange-rate dynamics in relation to capital adequacy and non-performing loans, with particular emphasis on JSCB Turonbank.

METHODOLOGY

This study employs descriptive statistics, Pearson correlation and ordinary least squares (OLS) regression to examine the relationship between macroeconomic conditions and the transformation indicators of state-owned commercial banks in Uzbekistan.

The analysis uses two datasets. The first contains monthly banking indicators for January 2020-January 2026 ($n = 73$), including total assets, the share of state-owned banks, capital adequacy ratio (CAR), ROA, ROE and NPLs, based on Central Bank data [9, 10]. The second covers annual macroeconomic and banking indicators for 2018-2025, including GDP, inflation, the refinancing rate and the USD/UZS exchange rate, using official statistical and Central Bank sources [11, 12].

Pearson correlation is used to identify significant relationships at $p < 0.05$, followed by bivariate OLS regression. Model performance is assessed using regression coefficients, p-values and R^2, while predicted values are compared with reported 2025 outcomes for internal validation.

Given the limited annual sample, the results are interpreted as statistical associations rather than causal effects.

ANALYSIS AND RESULTS

The macroeconomic background of the period under review was favourable for the banking sector. Table 1 summarises the principal indicators.

Table 1

Main macroeconomic indicators of Uzbekistan, 2018-2025 [2], [11].

Indicator	2018	2019	2020	2021	2022	2023	2024	2025
GDP, trillion UZS	407.5	554.29	580.2	734.6	888.34	1204.49	1454.57	1849.7
Inflation, %	14.3	15.2	11.1	9.98	12.3	8.77	9.80	7.30
Refinancing rate, %	16.0	16.0	14.0	14.0	15.0	14.0	14.0	14.0
USD/UZS rate, UZS	8336	9508	10477	10838	11225	12339	12920	12025

Nominal GDP rose from 407.5 trillion UZS in 2018 to 1,849.7 trillion UZS in 2025, a more than fourfold expansion in nominal terms. Inflation moved along a generally descending path, easing from 15.2 per cent in 2019 to 7.30 per cent in 2025 and approaching the medium-term target more closely than at any earlier point in the period. The refinancing rate stayed within a narrow 14-16 per cent corridor, which gave banks a predictable pricing environment, and the exchange rate strengthened in 2025 after several years of gradual depreciation. Together these developments formed a supportive setting for the transformation of state-owned banks.

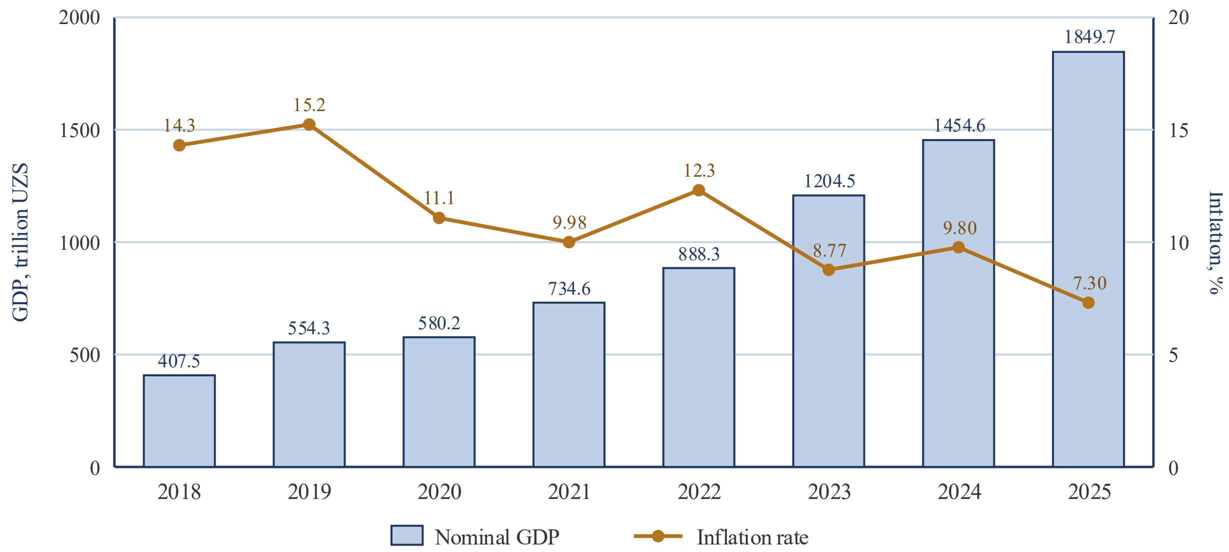

Figure 1. Dynamics of GDP and inflation in Uzbekistan, 2018-2025[2], [11].

Figure 1 brings out two tendencies that matter for the banking sector. Nominal GDP expanded without interruption, including in 2020, when growth slowed but remained positive in nominal terms. Inflation, after the peak of 15.2 per cent in 2019 and a temporary rise to 12.3 per cent in 2022, resumed its decline and reached 7.30 per cent in 2025. Since nominal GDP reflects price and exchange-rate movements alongside real activity, the two series are read together when the financial position of banks is assessed.

Pearson correlation analysis produced several statistically meaningful results. The refinancing rate shows a strong positive association with the capital adequacy ratio of the banking system ($r = 0.865$, $p = 0.012$). Inflation is likewise positively correlated with the system-wide CAR ($r = 0.761$, $p = 0.047$). At the level of JSCB Turonbank, the refinancing rate again moves positively with CAR, while inflation, the refinancing rate and exchange-rate changes each display an inverse association with the NPL ratio.

The regression estimates give these associations a quantitative form. A one percentage-point increase in the refinancing rate corresponds on average to a 2.41 percentage-point increase in the capital adequacy ratio of the banking system, with $R^2 = 74.8$ per cent. For JSCB Turonbank the corresponding coefficient equals 3.38 with $R^2 = 70.7$ per cent, so movements in the rate account for a substantial share of the observed variation in capital adequacy within the sample.

Internal validation for 2025 confirms a satisfactory fit. The model placed the capital adequacy ratio of JSCB Turonbank at 14.62 per cent against a reported value of 14.03 per cent, a difference of 0.59 percentage points. The proximity of the two figures indicates that the specification captures the main regularity present in the observation window.

The NPL model yields a comparably informative result. Inflation accounts for approximately 66.6 per cent of the variation in the NPL ratio of JSCB Turonbank, and the relationship is statistically significant ($p = 0.013$). The 2025 prediction of 3.47 per cent stands against a reported value of 3.41 per cent, a difference of 0.06 percentage points. The structure of explained and unexplained variation is presented in Figure 2.

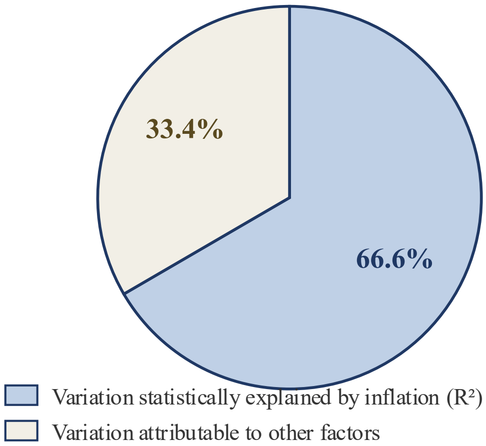

Figure 2. Distribution of factors explaining variation in Turonbank NPL, % [9], [12].

The larger segment of Figure 2 represents the share of NPL variation statistically explained by inflation within the estimated model. The remaining 33.4 per cent corresponds to variation associated with other influences, which confirms that loan quality at the bank responds to a combination of macroeconomic and bank-specific conditions rather than to any single determinant. The 66.6 per cent value is the coefficient of determination and describes co-movement within the specified model; it does not measure a direct causal contribution of inflation to loan quality. Extending the observation window and adding further explanatory variables would refine the estimates and improve predictive reliability.

Taken together, the results support three conclusions. First, the transformation of state-owned banks proceeds in close connection with the macroeconomic environment, so transformation planning benefits from explicit macroeconomic assumptions. Second, capital adequacy and loan quality respond to monetary and price conditions in a regular and measurable way, which makes both indicators suitable for monitoring purposes. Third, transformation policy is most effective when capital adequacy, asset quality, corporate governance, operational efficiency and market-oriented management advance simultaneously. The limited number of annual observations invites caution in interpretation and points towards panel, quarterly or monthly datasets in subsequent work.

CONCLUSION AND SUGGESTIONS

The study examined the transformation of state-owned banks in Uzbekistan using macroeconomic and banking indicators for 2018-2025, with particular attention to

JSCB Turonbank. The findings confirm that transformation reflects both external economic conditions and internal financial performance. Nominal GDP grew steadily, inflation declined over the later years of the period, and the exchange rate strengthened in 2025. These developments created a supportive macroeconomic setting for the further development of the banking sector.

The econometric analysis established measurable relationships among the refinancing rate, inflation, capital adequacy and non-performing loans. The refinancing rate explained 74.8 per cent of the variation in the capital adequacy ratio of the banking system and 70.7 per cent of that of JSCB Turonbank, while the NPL model reached $R^2 = 66.6$ per cent. Macroeconomic conditions therefore merit an explicit place in the design of transformation strategies for state-owned banks.

On the basis of these findings, the study proposes the following:

first, strengthen capital management and maintain capital buffers above regulatory minima, so that financial resilience remains robust across the interest-rate cycle;

second, reduce non-performing loans through more thorough borrower assessment, continuous credit monitoring and enhanced risk-management systems;

third, advance corporate governance by widening disclosure, reinforcing accountability and protecting the independence of decision-making bodies;

fourth, raise operational efficiency through digitalisation, which lowers costs and improves the quality and accessibility of banking services;

fifth, reinforce market-oriented principles by improving the transparency, targeting and measured effectiveness of directed lending programmes and by widening competitive banking practices;

sixth, improve econometric forecasting through larger panel datasets covering additional state-owned banks and through the inclusion of lagged macroeconomic and bank-specific variables.

The transformation of state-owned banks is best carried out as an integrated process that combines financial stability, effective risk management, sound corporate governance, digital development and market discipline. Further research based on longer and more detailed datasets would support more reliable forecasting and more effective transformation policy.

REFERENCES

1. Decree of the President of the Republic of Uzbekistan No. PF-158 of 11 September 2023 “On the Uzbekistan - 2030 Strategy”. URL: https://lex.uz/docs/-6600413

2. Central Bank of the Republic of Uzbekistan. Policy rate. Tashkent, 2026. URL: https://cbu.uz/en/monetary-policy/refinancing-rate/

3. Mishkin F.S. Understanding Financial Crises: A Developing Country Perspective. NBER Working Paper No. 5600. - Cambridge, MA: National Bureau of Economic Research, 1996.

4. Demirgüç-Kunt A., Detragiache E. The Determinants of Banking Crises in Developing and Developed Countries // IMF Staff Papers. - 1998. - Vol. 45, No. 1. - P. 81-109.

5. Albertazzi U., Gambacorta L. Bank profitability and the business cycle // Journal of Financial Stability. - 2009. - Vol. 5, No. 4. - P. 393-409. URL: https://econpapers.repec.org/RePEc:eee:finsta:v:5:y:2009:i:4:p:393-409

6. Berger A.N., DeYoung R. Problem loans and cost efficiency in commercial banks // Journal of Banking & Finance. - 1997. - Vol. 21, No. 6. - P. 849-870. URL: https://www.federalreserve.gov/pubs/feds/1997/199708/199708pap.pdf

7. Louzis D.P., Vouldis A.T., Metaxas V.L. Macroeconomic and bank-specific determinants of non-performing loans in Greece: A comparative study of mortgage, business and consumer loan portfolios // Journal of Banking & Finance. - 2012. - Vol. 36, No. 4. - P. 1012-1027. DOI: 10.1016/j.jbankfin.2011.10.012. URL: https://ideas.repec.org/a/eee/jbfina/v36y2012i4p1012-1027.html

8. La Porta R., Lopez-de-Silanes F., Shleifer A. Government Ownership of Banks // The Journal of Finance. - 2002. - Vol. 57, No. 1. - P. 265-301. URL: https://ideas.repec.org/p/hrv/faseco/30747188.html

9. Central Bank of the Republic of Uzbekistan. Financial Soundness Indicators. Tashkent, 2026. URL: https://cbu.uz/en/statistics/e-gdds/data/financial-soundness-indicators/

10. Central Bank of the Republic of Uzbekistan. Information on relative indicators of the banking system. Tashkent, 2026. URL: https://cbu.uz/en/statistics/bankstats/679865/

11. National Statistics Committee of the Republic of Uzbekistan. Official statistics: national accounts and consumer prices. Tashkent, 2026. URL: https://stat.uz

12. Central Bank of the Republic of Uzbekistan. Joint-Stock Commercial Turon Bank: registry data and reporting indicators. Tashkent, 2026. URL: https://cbu.uz/en/credit-organizations/banks/head-offices/goss/turonbank/

Marketing

ilmiy, amaliy va ommabop jurnali

Muharrir: Xakimov Ziyodulla Axmadovich
Ingliz tili muharriri: Tursunov Boburjon Ortiqmirzayevich
Rus tili muharriri: Kaxramonov Xurshidjon Shuxrat o‘g‘li
Musahhih: Karimova Shirin Zoxid qizi
Sahifalovchi va dizaynerlar: Sadikov Shoxrux Shuxratovich
Abidjonov Nodirbek Odijon o‘g‘li

2026-yil, sentabr, 9-son

Mazkur jurnalda maqolalar chop etish uchun quyidagi havolalarga murojaat qilish mumkin.
Ilmiy maqola, ommabop maqola, reklama, hikoya va boshqa ilmiy-ijodiy materiallar yuborishingiz mumkin.
Materiallar va reklamalar pullik asosda chop etiladi.

Elektron pochta: info@marketingjournal.uz
Bot: @marketinjournalbot
Tel.: +998977838464, +998939266610
Jurnalning rasmiy sayti: https://marketingjournal.uz

Marketing jurnali O‘zbekiston Respublikasi Oliy ta’lim, fan va innovatsiyalar vazirligi huzuridagi **Oliy attestatsiya komissiyasi rayosatining 2024-yil 04-oktabrdagi 362/5 sonli qarori** bilan milliy ilmiy nashrlar ro‘yxatiga kiritilgan

“Marketing” ilmiy, amaliy va ommabop jurnali 2024-yil 15-martdan O‘zbekiston Respublikasi Prezidenti Administratsiyasi huzuridagi Axborot va ommaviy kommunikatsiyalar agentligi tomonidan **C-5669517** reyestr raqami tartibi bo‘yicha ro‘yxatdan o‘tkazilgan. **Litsenziya raqami: №240874**

“Marketing” ilmiy, amaliy va ommabop jurnalining xalqaro darajasi: **9710.** ГОСТ 7.56-2002 " Seriyali nashrlarning xalqaro standart raqamlanishi" davlatlataro standartlari talablari. **Berilgan ISSN tartib raqami: 3060-4621**