

Determinants of Bank Interest Spreads in Tajikistan

Pietro Calice



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Abstract

Despite far-reaching banking sector reforms over the past few years, financial intermediation in Tajikistan continues to lag behind structural peers and the Caucasus and Central Asia region. At the same time, bank interest rate spreads, a standard measure of financial intermediation costs, have remained significantly higher than those of peers, ranking among the highest in the world. This paper examines the determinants of interest rate spreads in Tajikistan using a bank-level panel data set for the first quarter of 2011 to the

fourth quarter of 2022. The findings show that bank-specific factors, particularly income diversification, loan size, risk aversion, market power, credit risk, and the macroeconomic and institutional environment within which banks operate, explain a large proportion of cross-bank, cross-time variation in spreads. The results suggest that there is ample room to promote economies of scale and enhance competition in the banking system while strengthening the operating environment.

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Pietro Calice[†]

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Author's E-Mail Address: pcalice@worldbank.org

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I. INTRODUCTION

Despite significant structural reforms over the past few years, financial intermediation remains low in Tajikistan, representing an important obstacle to sustainable and inclusive growth. At the end of 2023, private credit to the economy, a typical proxy for financial intermediation, accounted for a meager 12.4 percent of GDP, which is low compared to structural peers (Figure 1).¹

There is a considerable body of evidence showing that financial intermediation is not only associated with economic development (Figure 2), but it is a causal factor in explaining overall economic performance (see, for example, Levine 2005), poverty reduction (e.g., Beck, Demirgüç-Kunt and Levine 2007) and reduced inequality (e.g., Demirgüç-Kunt and Levine 2009). Despite recent evidence that private sector credit has a diminishing effect on growth once it reaches a high level (Cecchetti and Kharroubi 2012; Arcand, Bekes and Panizza 2015; Mian, Straub and Sufi 2021), Tajikistan is comfortably in the region where further expansion of private credit would help boost growth.

At the same time, bank interest spreads, that is, the difference between what banks charge borrowers and what they pay depositors—a widely used measure of financial intermediation costs—have remained consistently high in Tajikistan, ranking the highest in the Caucasus and Central Asia (and the fourth highest in the world) and comparing unfavorably with structural peers (Figure 3). High costs of financial intermediation are associated with credit rationing and thus a lower level of credit channeled to borrowers (Stiglitz and Weiss 1981). Countries with higher interest spreads experience lower levels of financial intermediation (Figure 4).

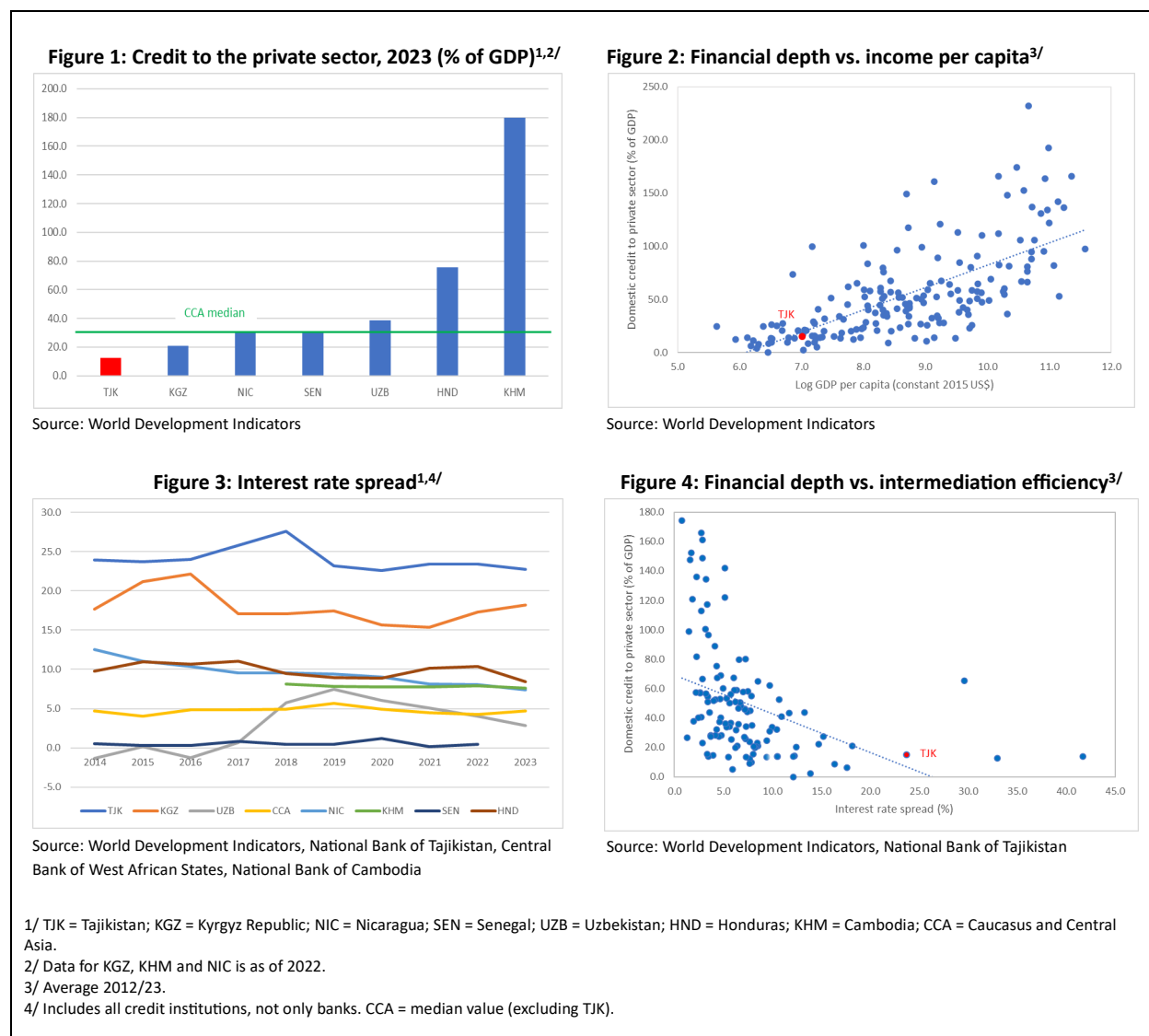
Understanding why bank interest rate spreads are high is essential for policy makers concerned with advancing inclusive and sustainable growth. This paper investigates the factors behind stubbornly high bank interest rate spreads in Tajikistan. The objective is to highlight policies needed to lower financial intermediation costs. These lower costs will help spur growth and boost private investment by deepening the financial system.

The starting point for analyzing the determinants of bank interest spreads is the seminal work by Ho and Sanders (1981). In this pioneering study, banks are seen as mere intermediaries between lenders and borrowers, with intermediation spreads depending on four essential components: (i) the degree of bank risk aversion; (ii) the degree of competition in the banking market; (iii) the average size of bank transactions; and (iv) interest rate risk.

This model was subsequently extended to incorporate additional factors explaining net interest spreads. McShane and Sharpe (1985) incorporated money market rates. Allen (1988) considered loan heterogeneity in the model and showed that margins can be reduced as a result of diversification of banking services. Angbazo (1997) introduced credit risk (and its interaction with interest rate risk).

¹ Structural peers were selected based on the following criteria (as of 2023): (i) classified as a lower middle-income country; (ii) population between 7 million and 37 million; (iii) agricultural value added of more than 9.5 percent of GDP and remittance inflows of at least 5 percent of GDP; and (iv) Human Capital Index above 0.48.

Maudos and Fernandez de Guevara (2004) considered the importance of operating costs as a determinant of banks' spreads. Carbó Valverde and Rodriguez (2007) included both traditional and nontraditional banking activities in order to study the effect of specialization on net interest spreads.



While the model by Ho and Sanders (1981) and its subsequent extensions remains the workhorse of the theoretical literature, its empirical verification is challenging due to the influence of macroeconomic and institutional variables which are difficult to capture in the theoretical model. To circumvent this problem, some authors (see, for example, Ho and Saunders 1981; and Saunders and Schumacher 2000) use a two-stage estimation procedure.

In the first stage, the effect of the explanatory variables of the interest margin not explicitly introduced in the theoretical model is controlled for in order to estimate a “pure” margin. In the second stage, the relationship between the “pure” spread and the factors posited by the theoretical model is analyzed. The

application of a two-stage approach has the advantage that it allows a “pure” net interest margin to be estimated, although it requires long time series.

Other authors (see, for example, McShane and Sharpe 1985; Angbazo 1997; Maudos and Fernandez de Guevara 2004; Carbó Valverde and Rodriguez 2007), however, employ a single-stage estimation procedure, where all the variables of the theoretical model along with the other additional variables used to estimate the “pure” spread are included in the explanation of the net interest margin.

The empirical literature using cross-country samples or focusing on a single developed or developing country broadly confirms the predictions of the theory. Interest spreads are found to be positively related to banks’ operating costs, suggesting that banks pass on to their customers their higher costs (see, for example, Maudos and Fernandez de Guevara 2004; Carbó Valverde and Rodriguez 2007; Williams 2007; Beck and Hesse 2009).

There is also a consensus that intermediation spreads tend to increase with market power and low competition (see, for example, Angbazo 1997; Saunders and Schumacher 2000; Dabla-Norris and Floerkemeier 2007; Williams 2007; Almarzoqi and Ben Naceur 2015). Finally, evidence shows a consistently positive relationship between bank spreads and interest rate risk (see Maudos and Fernandez de Guevara 2004; and Maudos and Solis 2009, among others), indicating that banks facing uncertainty and volatility require a higher premium to compensate for reinvestment risk and refinancing risk.

With regard to other determinants of interest spreads, findings are more mixed. For example, some studies (Ho and Saunders 1981; and Maudos and Solis 2009, among others) find a positive association between net interest margins and the size of the operations (proxied by the log of total assets or total loans), suggesting that the larger the transaction, the larger the expected loss. Other studies (for example, Angbazo 1997; and Maudos and de Guevara 2004) report a negative relationship, pointing to the presence of economies of scale and risk diversification in financial intermediation.

Similarly, while most of the papers find that credit risk exerts a positive effect on margins (see, for example, Angbazo 1997; Maudos and Fernandez de Guevara 2004), suggesting that banks charge a risk premium to compensate for credit risk, others (for example, Williams 2007; Fungáčová and Poghosyan 2011) find a negative relationship between credit risk and interest margins, interpreting this result as evidence that banks are unable to accurately price risk or that depositors require a higher risk premium for putting their money in riskier banks.

Some studies find that banks with well-developed noninterest income sources have lower net interest margins, suggesting that banks may tend to offer loans with small or even negative margins to attract clients and compensate with higher fees (LePetit and others 2008; Maudos and Solis 2009; and Carbó and Rodriguez 2007, among others). Others, such as Elsas (2005) and De Gryse (2007), find that higher bank competition reinforces banks’ focus on traditional loan activity, increasing net interest margins.

Finally, Saunders and Schumacher (2000) and Brook and Rojas (2000), among others, find that risk aversion, proxied by the capitalization ratio, positively determines interest margins, implying that those banks that are more risk averse demand a higher premium to compensate for the higher costs of equity

financing compared to external financing. However, other authors (for example, Dabla-Norris and Floerkemeier 2007; and Horvath 2009) find a negative association between capitalization and net interest margins, suggesting that less capitalized banks have to take on more risks (translating into higher margins) to receive higher returns and internally boost their reserves.

Studies have also explored the potential impact of bank ownership on net interest margins. Micco, Panizza and Yanez (2007) and Fungáčová and Poghosyan (2011) find that the form of bank ownership has a strong impact on bank margins in developing economies. Martinez and Mody (2004) find that in Latin America foreign banks can charge lower spreads relative to local banks, while the opposite conclusion is obtained by Schwaiger and Liebig (2008) for a sample of Central and Eastern Europe economies. Ben Nassar, Martinez and Pineda (2014) find that in Honduras, foreign banks are pressured to consolidate and reduce operating costs to offer competitive interest margins. No effect of foreign ownership is found by Dabla-Norris and Floerkemeier (2007) in Armenia, and by Beck and Hesse (2009) in Uganda.

Few papers examine the role of macroeconomic conditions and the regulatory framework in explaining banks' intermediation spreads. For example, Demirgüç-Kunt, Laeven and Levine (2004) and Claey's and Van der Venet (2008) find a positive relationship between inflation and bank margins, while Brock and Rojas Suarez (2000), Saunders and Schumacher (2000) and Gelos (2006) show that higher reserve requirements are associated with higher spreads. Others (for example, Demirgüç-Kunt, Laeven and Levine 2004, Gelos, 2006, and Poghosyan, 2012) control for the quality of the institutional and legal setup and find that in general, less supportive environments are associated with higher spreads.

The literature on the determinants of banks' net interest spreads in the Caucasus and Central Asia is scant. Since banks are the major source of financing in this region, the level of net interest margins and spreads is an important policy variable. Dabla-Norris and Floerkemeier (2007) examine the determinants of interest rate spreads in Armenia during 2002–2006 and find that spreads are mostly explained by bank-specific factors such as bank size, liquidity, and market power. Teodoru (2020) studies the drivers of bank spreads in the Kyrgyz Republic and finds that low levels of competition, credit risk, interest rate risk and the legal environment are the key explanatory variables. Finally, in a cross-country setting, Almarzoqi and Ben Naceur (2015) analyze the determinants of intermediation spreads in the countries of the Caucasus and Central Asia over the period 1998–2013 and find that operational efficiency is by far the main driver of intermediation spreads. When the analysis is performed on only a small sample of Tajik banks, operational costs remain the key determinant, followed by risk aversion and income diversification.

This paper investigates the factors associated with high interest spreads in Tajikistan's banking sector during 2011Q1– 2022Q4. It makes several contributions to the literature on interest spreads and margins. First, it contributes to a limited literature on financial development in Tajikistan. Second, it uses a unique panel dataset comprising balance-sheet and income statement quarterly data of Tajikistan's commercial banks provided by the National Bank of Tajikistan (NBT), the country's central bank and banking supervisor. Third, as in Ben Nassar, Martinez and Pineda (2014), it uses Beck and Katz's (1995) OLS-based panel corrected standard errors (PCSE) procedure, which is more appropriate than alternatives (e.g., feasible generalized least squares) given the structure of the panel dataset.

Our results provide strong support for the importance of bank-specific factors in explaining net interest spread variation in Tajikistan. Key determinants include operational efficiency, where higher operating costs lead to wider spreads, and perceived credit risk, which prompts banks to increase spreads to offset potential loan defaults. The opportunity cost of holding excess reserves at the central bank also contributes to spread variations. Bank size and market power turn out to be critical factors, indicating potential benefits from sector consolidation and the need for effective competition policies. Risk aversion is another important variable, with higher capital adequacy ratios leading to higher spreads as banks seek to mitigate perceived risks and boost internal capital generation. Results also show that bank ownership matters in explaining variations in net interest spreads. In particular, state-owned banks are associated with higher spreads, while foreign ownership is correlated with lower spreads. Finally, the macroeconomic and institutional environment, particularly interest rate risk and regulatory quality, further shapes interest rate spreads.

The results have important policy implications. To reduce interest rate spreads and achieve financial deepening, it would be important to (i) accomplish further banking sector consolidation to realize economies of scale and improve efficiency of financial intermediation; (ii) enhance competition by strengthening the regulatory framework, promoting fintech innovation and capital market development, and leveling the playing field for all banks; and (iii) improve the operating environment by promoting macroeconomic stability, further enhancing monetary policy credibility, modernizing the legal framework for corporate insolvency, and strengthening enforceability of contractual and property rights.

The remainder of the paper is organized as follows. Section II provides a background of the Tajik banking sector. Section III describes the empirical strategy and the data. Section IV presents the estimation results. Finally, Section V contains concluding remarks and a number of policy recommendations.

II. THE TAJIK BANKING SYSTEM

The Tajik banking sector has been undergoing fundamental reform and restructuring during the last decade. The collapse of energy prices in 2014-15, through its impact on the Russian economy, was a major shock for the Tajik economy and financial sector. Remittances dropped by more than 10 percentage points of GDP between 2014 and 2016, putting pressure on the external position and resulting in a large currency depreciation (over 20 percent in real effective terms).

Nonperforming loans (NPLs), which were already very high (25 percent of total loans at end-2014), jumped to 54 percent by end-2016, and several banks became insolvent. The authorities were forced to take drastic steps: the National Bank of Tajikistan (NBT) removed licenses from several banks, launched asset quality reviews of all systemic banks, and eventually liquidated two systemic banks. These steps averted a full-blown bank run and strengthened banks' capital positions.

In addition to the steps taken to address the immediate fallout of the banking crisis, the authorities initiated a number of financial sector reforms. These reforms, many of which still need to mature, would, if fully implemented, make a major contribution toward safeguarding the stability of the financial system and deepening financial intermediation, although their effects will manifest themselves only gradually over the medium term. They include:

- A new banking law in 2020, raising governance standards for banks (notably fit-and-proper requirements for management, professional competence requirements for supervisory board members, and conflict of interest rules).
- Improvements to prudential supervision in line with the Basel Core Principles, issuance of recommendations to increase provisions, and hikes in minimum capital requirements.
- Amendments to the NBT law to give the central bank the mandate for macroprudential policy, followed by the establishment of an inter-agency National Council on Financial Stability, a Financial Stability Committee, and a Financial Stability Department within the NBT. The NBT also developed a conceptual framework for macroprudential policy, a toolkit with three macroprudential instruments (debt service coverage ratio, loan-to-value ratio, and credit-to-stable-funding ratio), and a simple model for bank stress tests.
- A strengthened bank resolution and crisis management framework broadly aligned with the FSB Key Attributes for resolution regimes, including legal amendments establishing the NBT as the resolution authority; the creation of a special resolution regime that enables irreversible resolution actions without court involvement; and an expanded resolution toolkit for failing banks, including provisional administration, purchase and assumptions transactions, bridge banks, and asset management companies.
- Improvements in depositor protection through successive increases in the limit of deposits covered by the Deposit Insurance Fund (DIF), as well as a strengthening of the DIF through memoranda of understanding between the DIF and the Ministry of Finance (on emergency backup funding) and the NBT (on information sharing and cooperation).
- The establishment of a Real Time Gross Settlement System and an Automated Clearing House in 2019, with the NBT as the licensing and oversight authority for payments systems and payment services providers.
- The preparation of a National Financial Inclusion Strategy by the government with four broad priorities: improving the reach of financial services, including digital financial services; diversifying the available financial products; protecting consumers of financial services; and expanding financial literacy.
- The enactment of an updated anti-money laundering and countering the financing of terrorism (AML/CFT) law, which has brought the national system in line with international standards.
- The implementation of a monetary policy strategy aimed at improving liquidity management and forecasting to enhance monetary policy transmission and facilitate the transition to an interest rate-based framework.

Despite significant progress, the Tajik banking sector remains comparatively small. As of June 2024, the market comprised 15 commercial banks, two of which were state-owned banks, following a significant sector consolidation in recent years. The banking sector is the dominant player in the financial system, accounting for about 80 percent of total assets. However, banking sector assets are the lowest in the

Caucasus and Central Asia and lower than structural peers—amounting to about a quarter of GDP at end-2023—constraining financial intermediation.

The banking system is only moderately concentrated, with the three largest banks holding a combined market share by assets of about 50 percent as of end-2023, while the system remains fragmented at the lower end. Although the NPL ratio has declined after the 2016 banking crisis, it is still elevated at 12.5 percent as of December 31, 2023 (though NPLs are well provisioned for).² Moreover, credit is highly concentrated, with large exposures, especially to state-owned enterprises, accounting for about 40 percent of regulatory capital as of June 2024. Though on a declining trend, dollarization remains high. About one-third of total loan exposures are denominated in foreign currency, generating indirect credit risk associated with unhedged borrowers. Deposit dollarization is even higher at about 40 percent of total deposits.

The credit infrastructure—the set of laws and institutions that enables efficient and effective financial intermediation through credit reporting, secured transactions and collateral registries, and insolvency and debt resolution—presents some important gaps. While Tajikistan has made some progress in strengthening the credit information environment and the secured transaction regime, the legal framework for corporate insolvency is outdated and misses key creditors’ protections. The implementation of the insolvency law is practically non-existent, and there is minimal insolvency practice. Only two insolvency cases involving companies from the same corporate group have been reported since 2020. No successful restructurings have been observed recently. The few bankruptcy cases that have been observed all ended in piecemeal liquidations of the borrower. As a result, to the extent possible creditors and debtors alike avoid the formal insolvency system.

III. METHODOLOGY AND DATA

To estimate the determinants of bank interest spreads in Tajikistan, we utilize an unbalanced panel of 19 commercial banks’ quarterly data for the period 2011–2022 ($T = 48$) provided by NBT, complemented by macroeconomic and institutional variables (see the Appendix for variable definitions). We originally collated data on 24 commercial banks, but after careful examination, we dropped banks with fewer than 20 observations across the sample period. This is because during the sample period eight banks were liquidated or became insolvent, while two banks merged during 2019Q4. In the latter case, we used consolidated data of the newly created entity thereafter. All in all, we were left with $N = 19$ groups in our panel.

We estimate the following model:

$$Y_{i,t} = \alpha + \beta' \mathbf{B}_{i,t} + \gamma' \mathbf{C}_{i,t} + \delta' \mathbf{D}_{i,t} + \varepsilon_{i,t} \quad (1)$$

where Y is the dependent variable (net interest spread) for bank i at time t ; \mathbf{B} is a set of time-varying bank-specific variables for bank i at time t ; \mathbf{C} is a vector of time-varying macroeconomic variables; \mathbf{D} is a vector of time-varying institutional variables; and ε is the error term.

² NPLs in Tajikistan are defined as loans overdue for more than 30 days.

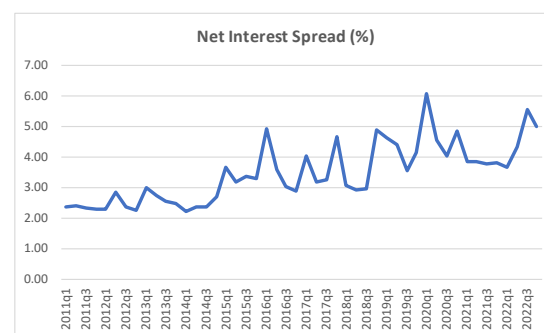
As in Ben Nassar, Martinez and Pineda (2014), equation (1) is estimated using a single-stage estimation procedure that employs an OLS-based Panel-Corrected Standard Errors (PCSE) approach, which is appropriate for time series cross-section data where $N < T$.³ In estimating equation (1), it is necessary to settle the complications associated with error terms. First, the error terms for each bank are interdependent over time (autocorrelation). Second, as banks operate in the same industry and country, there is the possibility that the error terms are correlated between banks (contemporaneous correlation). Third, the errors tend to have non-constant variances between banks (heteroskedasticity).⁴ For these reasons, the model is estimated using an OLS-based PCSE procedure, which improves parameter efficiency and generates more accurate z-statistics by correcting residual correlation between equations and cross-sectional heteroskedasticity (Beck and Katz 1995).

Dependent variable

Bank interest spreads can be measured using both ex-ante and ex-post spreads.⁵ The ex-ante spread is the difference between contractual rates charged to borrowers and those paid to depositors. The ex-post spread is the difference between banks' actual interest revenue and their actual interest expense, usually divided by loans and deposits, respectively, or earning assets. The ex-post spread differs from the ex-ante spread by the amount of loan defaults. Therefore, ex-post spreads allow for a broader examination of the costs of financial intermediation.

Moreover, ex-post spreads allow for an analysis of the driving factors of financial intermediation efficiency in a general equilibrium setting, taking into account all bank operations. For example, banks may compensate for the high taxation of a certain form of intermediation by charging lower rates on other forms. This effect would not be captured by ex-ante spreads.

For all these reasons, this paper uses ex-post spreads. Specifically, ex-post spreads are narrowly calculated as the difference between interest received on loans divided by (net) loans and interest paid on deposits divided by total deposits. The text figure depicts the behavior of our dependent variable during the sample period (quarterly data are weighted averages of bank-specific net interest spreads, with weights given by banks' total assets).



Source: Author's elaboration on NBT data.

³ Given the structure of the panel dataset, an alternative procedure that could be used is the feasible generalized least squares (FGLS). When comparing the performance of both estimators, the rule of thumb is that the OLS-PCSE estimator is preferable to its FGLS counterpart when $\frac{1}{2}(N^2 - N) > T$ (Jönsson 2005). For this paper, $\frac{1}{2}(19^2 - 19) = 171 > T = 48$.

⁴ Standard tests confirm the presence of autocorrelation, heteroskedasticity and contemporaneous correlation in our panel data. Results are available upon request.

⁵ See Brock and Rojas-Suarez (2000) for a detailed discussion of the definitions of interest rate spreads.

Bank-specific variables

In line with the theoretical and empirical literature, we use a variety of bank-specific control variables to explain variations in net interest spreads. In particular, we use:

- **Operating costs:** This variable captures cross-bank differences in the organization and operation of the bank. Banks incurring higher staff and administrative costs are likely to pass on these costs to their clients by increasing spreads. Therefore, a positive sign is expected for this variable. We proxy operating costs by the ratio of operating expenses to total assets.
- **Credit risk:** The risk of default on a credit requires the bank to apply a risk premium to the interest charged to clients. We proxy credit risk by the ratio of loan loss provisions to gross loans: higher provisions are expected to be associated with higher credit risk and, therefore, higher margins; hence, we anticipate a positive relationship between this covariate and our dependent variable.
- **Opportunity cost of excess bank reserves:** This is proxied by the ratio of cash and balances held at the central bank over total assets. The opportunity cost of excess bank reserves arises from the foregone interest the banks can earn from investing in higher-yielding assets the money it keeps in excess reserves. A positive association is therefore expected between this variable and net interest margins (spreads) because banks have to compensate for the foregone interest.
- **Size of operations:** This is proxied by the log of total net loans. The benchmark theoretical model posits a positive relationship between the size of bank operations and margins since, for a given credit and market risk, the larger the operation, the larger the potential loss and hence the higher the margin the bank will demand. However, the presence of economies of scale would suggest that the fixed costs associated with the transaction are spread over a larger base, enabling the bank to achieve a smaller margin. Therefore, we do not have a particular prior on the expected sign of this covariate.
- **Risk aversion:** Following existing studies (e.g., Maudos and Fernandez de Guevara 2004; Maudos and Solis 2009; Fungáčová and Poghosyan 2011; Almarzoqi and Ben Naceur 2015), we proxy the bank's degree of risk aversion by the ratio of equity to net loans. As equity is more costly than other sources of funding, a higher proportion of equity in the bank's capital structure indicates greater risk aversion and is expected to be reflected in higher margins. However, less capitalized banks may have an incentive to take on more risks to increase their profits and boost internal capital generation, which would be reflected in higher spreads. Hence, we do not have a prior on the sign of the estimated coefficient.
- **Income diversification:** A diversified bank is able to attract new customers and offer a wider array of products and services, benefiting from fee-based income. By doing so, the bank is expected to provide interest-dealing services with lower margins (spreads), as these will be compensated for by higher fees and commissions due to cross-selling and cross-subsidization.

We proxy bank product diversification by the ratio of noninterest income to interest revenue and expect a negative sign for its coefficient.

- **Market power:** To proxy the competitive structure of the Tajik banking market, we estimate the Lerner index for each bank in each quarter. We use the Lerner index instead of the more traditional market structure measures such as the Herfindahl-Hirshman index or the share of loans and deposits held by the top three largest banks because the latter cannot provide a satisfactory measure of the degree of market competition in the banking sector (see Beck and Hess 2009). The Lerner index is a widely used direct measure of market power in banking studies and is defined as the difference between output prices and marginal costs relative to prices. Therefore, it measures the capacity to set prices above the marginal cost. The value of the index ranges from 0 (perfect competition) to 100 (monopoly). Following the approach in Maudos and Fernandez de Guevara (2004), who proxy banking production by total assets, the price is derived by total bank revenue over assets and the marginal cost is calculated by taking the derivative from a *translog* cost function as specified in the equation below:

$$\begin{aligned} \ln(C_{i,t}) = & \alpha_0 i + \beta_1 \ln(Q_{i,t}) + \frac{1}{2} \beta_1 \ln(Q_{i,t})^2 + \alpha_1 \ln(w_{1,i,t}) + \alpha_2 \ln(w_{2,i,t}) + & (2) \\ & \alpha_3 \ln(w_{3,i,t}) + \frac{1}{2} \beta_2 \ln(Q_{i,t}) \ln(w_{1,i,t}) + \frac{1}{2} \beta_3 \ln(Q_{i,t}) \ln(w_{2,i,t}) + \\ & \frac{1}{2} \beta_4 \ln(Q_{i,t}) \ln(w_{3,i,t}) + \alpha_4 \ln(w_{1,i,t}) \ln(w_{2,i,t}) + \alpha_5 \ln(w_{1,i,t}) \ln(w_{3,i,t}) + \\ & \alpha_6 \ln(w_{2,i,t}) \ln(w_{3,i,t}) + \frac{1}{2} \alpha_7 \ln(w_{1,i,t})^2 + \frac{1}{2} \alpha_8 \ln(w_{2,i,t})^2 + \frac{1}{2} \alpha_9 \ln(w_{3,i,t})^2 + \\ & \delta_1 trend + \delta_2 trend^2 + \delta_3 trend \ln(Q_{i,t}) + \delta_4 trend \ln(w_{1,i,t}) + \\ & \delta_5 trend \ln(w_{2,i,t}) + \delta_6 trend \ln(w_{3,i,t}) + \mu_{i,t} \end{aligned}$$

where i denotes banks and t denotes years. C is total operating plus funding costs, Q is total assets, w_1 is the ratio of interest expense to deposits (input price of deposits); w_2 is the ratio of personnel expenses to total assets (a proxy for input price of labor); and w_3 is the ratio of other operating and administrative expenses to total assets (proxy for input price of equipment/fixed capital). We also include a trend to capture the influence of technical change leading to shifts in the cost function over time. The cost function is estimated by introducing fixed individual effects to capture the influence of variables specific to each bank. The estimation is done under the restrictions of symmetry and degree one homogeneity in the price of inputs.

A lower value of the Lerner index indicates stronger competition in the banking sector, which should be reflected in lower spreads. Therefore, a positive relationship between the Lerner index and our dependent variable is expected, reflecting that banks with greater market power set higher spreads than they would in a competitive situation.

- **Ownership:** Given that bank ownership has the potential to affect net interest spreads, we include dummy variables. Specifically, the dummy variable *public* indicates state ownership; *private* indicates domestic private ownership; and *foreign* indicates foreign ownership. By introducing these variables (one by one), we can test whether the average interest spreads for public, private, and foreign banks, respectively, are significantly different from the average spread for the rest of the market. We do not have a prior on the sign of the coefficient.

Figure 5: Operating costs (%)

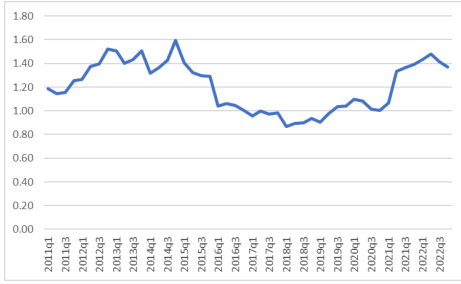


Figure 6: Risk aversion (%)

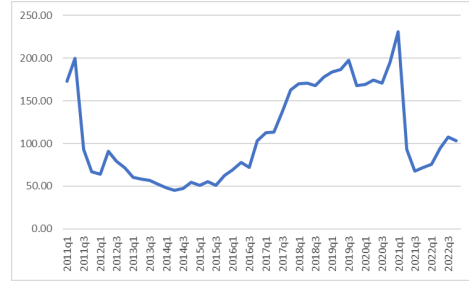


Figure 7: Credit risk (%)

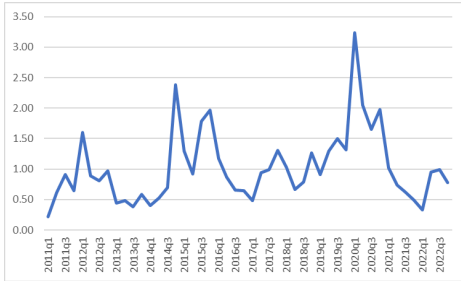


Figure 8: Opportunity cost of bank reserves (%)

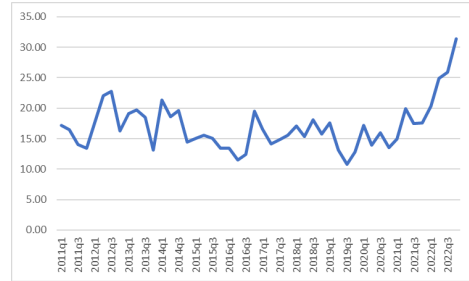


Figure 9: Size of operations

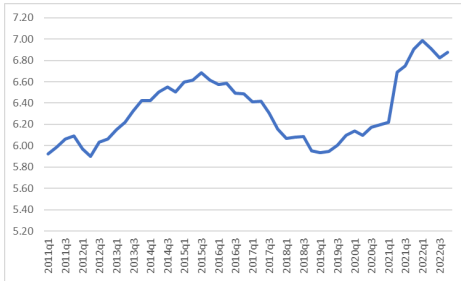


Figure 10: Income diversification (%)

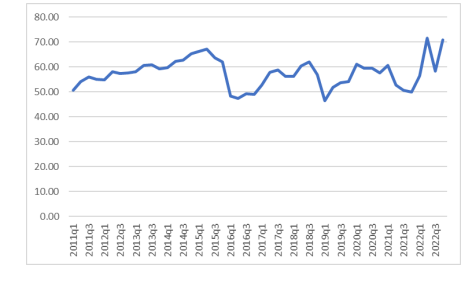


Figure 11: Market power (%)

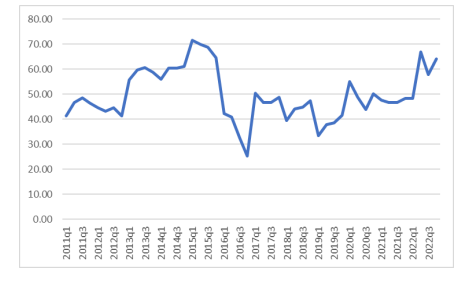


Figure 12: Legal environment^{1/}

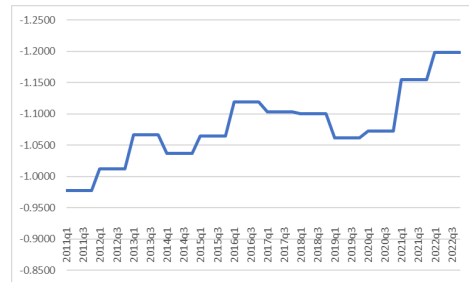
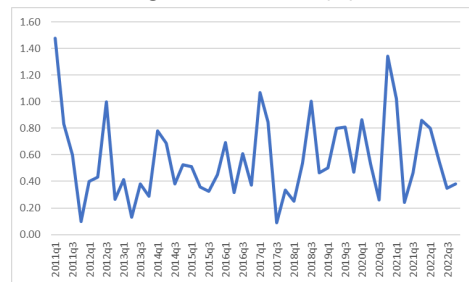


Figure 13: Interest rate risk (%)



Figure 14: Inflation (%)



Source: Author's elaboration on NBT and World Bank data.

1/ Values in reverse order.

Macroeconomic variables

- **Interest rate risk:** Uncertainty in market rates is expected to translate into higher spreads as banks try to hedge interest rate risk by applying a risk premium. We use the NBT refinancing rate (in level) to proxy for interest rate risk and expect a positive sign for this variable.
- **Inflation:** This is a widely used variable to proxy for macroeconomic volatility. It is expected to have a positive relationship with net interest spreads because higher inflation introduces economic uncertainty that needs to be compensated for by higher margins. We use quarterly changes in the Consumer Price Index rate.

Institutional variable

- **Legal environment:** One important factor that may limit credit supply in Tajikistan is insufficient investor protection and bottlenecks in the credit infrastructure, especially insolvency and debt resolution. To reflect this feature in the empirical analysis, we use the Regulatory Quality index compiled by Kaufmann, Kray and Mastruzzi (2006). This is an index capturing perceptions of the ability of the government to formulate and implement sound public policies and regulations. The index, which ranges from -2.50 (weak) to 2.50 (strong) covers general aspects of government regulation in all areas of economy (not only banking) that permit and promote private sector development. A higher index value indicates better regulatory quality and is expected to be associated with lower margins; hence, we expect a negative sign for this variable.

Figures 5 to 14 provide an overview of the independent variables used in the analysis (quarterly bank-level data are weighted averages, with weights corresponding to banks' total assets).

IV. ESTIMATION RESULTS

We present the estimation results of Equation 1 in three steps. In the first step, we run the model on only the bank-specific variables (Table 1, columns 1–4). In the second step, we run the model, including the macroeconomic variables (Table 1, columns 5–8). In the third and final step, we run the full model (Table 1, columns 9–12).⁶ As Table 1 shows, the R-squares for the three steps are practically the same, suggesting that bank-specific variables explain almost all the variability in banks' net interest margins.

As expected, less efficient banks charge higher interest spreads. The coefficient for the operating costs variable is positive and highly significant, indicating that a bank with an inferior organizational structure and less efficient management will pass its higher overhead on to consumers through wider margins. A one percentage point decrease in operating costs (as a share of total assets) is associated with a reduction of almost 500 basis points in the spread, holding all other factors constant. This result is

⁶ As a robustness check, we estimate the model using the FGLS procedure, the regression with Driscoll-Kraay standard errors, and the dynamic system GMM estimator developed by Arellano and Bover (1995) and Blundell and Bond (1998). The results, which are available upon request, are fully aligned with our baseline model.

consistent with the theory and the empirical literature (see section I). Three factors may contribute to explain this outcome:

- Deficiencies in the credit infrastructure contribute to the high cost of credit. Outdated bankruptcy procedures increase the cost of asset recovery, while lengthy civil procedures related to contract enforcement and adjudication of claims make lending operations riskier and more expensive (see also below the results for credit risk and the legal environment). For example, in Tajikistan, the cost of enforcing contracts is higher than in its peer countries, while the recovery rate of secured creditors is lower. Moreover, limitations in remote identification, digital signatures, and physical documentation requirements constrain banks' operations, increasing loan supply costs, especially for digital lending (USAID 2023).
- High costs of monitoring borrowers. Commercial and retail banking traditionally involves the establishment of a large number of branches, equipment, and personnel to serve clients. These higher costs usually translate into higher intermediation spreads. This can be exacerbated by inferior organizational structures and a low level of automation of loan and deposit production. Yet Tajik banks are embracing digital technologies that, in the medium term, should lead to a reduction of monitoring costs, among others.
- High operating costs may reflect the country's geographical position. More than 20 percent of bank branches are located in the low-density populated regions of Gorno-Badakhshan and Region of Republican Subordination. Operating branches and ATMs in remote areas is expensive due to relatively poor infrastructure development, highlighting the importance of scaling up the adoption of digital finance and banking agents.

We also find that our measure of credit risk (loan loss provisions to gross loans) is positively and significantly correlated with banks' net interest margins. A one percentage point increase in loan loss provisions relative to gross loans leads to a 0.25 percentage point increase in the spread, holding all other factors constant. This indicates that higher perceived credit risk, as reflected in greater loan loss provisions, leads banks to widen spreads to compensate for the increased risk of loan defaults. This result suggests that structural reforms aimed at promoting prompt expedition of legal cases and further improving the information environment could improve risk assessment, reducing NPLs and the cost of credit risk.

The ratio of cash and reserves held at the central bank over total assets, which serves as a proxy for the opportunity costs of excess bank reserves, shows a marginally significant positive relationship with interest rate spreads (a one percentage point decrease in our variable is associated with a 16 basis point decrease in the interest rate spread, other factors being constant), suggesting that holding cash and central bank reserves in excess of minimum liquidity and reserve requirements, while contributing to financial stability, may come at the cost of higher costs of financial intermediation. Since cash and central bank reserves yield minimal returns, banks are compelled to compensate for this low yield by increasing the interest rates they charge on loans or reducing the interest rate they pay on deposits, thereby widening the interest rate spread. This helps banks maintain profitability despite the low returns on their liquidity surplus. This result may reflect the constrained operating environment in Tajikistan, where

mutual distrust among commercial banks coupled with regulatory and institutional shortcomings depress interbank market activity. Banks prefer to park excess liquidity at the central bank at submarket rates and far in excess of minimum reserve requirements rather than lend to each other. Moreover, despite recent reforms, government securities markets remain relatively underdeveloped in Tajikistan, compounded by the traditional practice of issuing securities at below-market rates, which until recently has made this alternative form of investment and liquidity management unattractive for banks. However, since January 2024 the government has been regularly holding auctions of short-term and long-term government securities at close to market rates, which over time should attract the interest of banks.

Table 1: OLS-PCSE Panel Estimation Results
(Dependent variable: Banks' Net Interest Spread)^{1/}

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Operating costs	0.467*** (0.0841)	0.487*** (0.0847)	0.466*** (0.0844)	0.484*** (0.0834)	0.467*** (0.0826)	0.489*** (0.0834)	0.467*** (0.0826)	0.484*** (0.0814)	0.470*** (0.0803)	0.494*** (0.0813)	0.469*** (0.0807)	0.487*** (0.0795)
Credit risk	0.246*** (0.0285)	0.243*** (0.0283)	0.246*** (0.0285)	0.243*** (0.0285)	0.248*** (0.0286)	0.244*** (0.0284)	0.248*** (0.0286)	0.246*** (0.0286)	0.249*** (0.0288)	0.244*** (0.0286)	0.249*** (0.0288)	0.246*** (0.0288)
Opportunity cost of excess bank reserves	0.0153* (0.00831)	0.0153* (0.00830)	0.0151* (0.00831)	0.0153* (0.00827)	0.0155* (0.00826)	0.0155* (0.00826)	0.0156* (0.00825)	0.0158* (0.00821)	0.0142* (0.00827)	0.0140* (0.00829)	0.0142* (0.00827)	0.0143* (0.00823)
Size of operations	-0.811*** (0.110)	-0.948*** (0.125)	-0.820*** (0.112)	-0.879*** (0.124)	-0.784*** (0.107)	-0.923*** (0.122)	-0.779*** (0.107)	-0.829*** (0.118)	-0.781*** (0.105)	-0.942*** (0.122)	-0.786*** (0.106)	-0.845*** (0.119)
Risk aversion	0.00148*** (0.000140)	0.00146*** (0.000140)	0.00148*** (0.000140)	0.00148*** (0.000139)	0.00148*** (0.000140)	0.00146*** (0.000140)	0.00148*** (0.000140)	0.00148*** (0.000139)	0.00146*** (0.000140)	0.00144*** (0.000142)	0.00146*** (0.000141)	0.00145*** (0.000140)
Income diversification	-0.0692*** (0.00591)	-0.0722*** (0.00622)	-0.0694*** (0.00591)	-0.0716*** (0.00615)	-0.0691*** (0.00584)	-0.0723*** (0.00618)	-0.0688*** (0.00581)	-0.0708*** (0.00606)	-0.0687*** (0.00576)	-0.0726*** (0.00615)	-0.0687*** (0.00575)	-0.0710*** (0.00602)
Market power	2.825*** (0.325)	2.971*** (0.328)	2.839*** (0.325)	2.847*** (0.326)	2.855*** (0.322)	3.009*** (0.326)	2.857*** (0.321)	2.860*** (0.321)	2.838*** (0.321)	3.020*** (0.327)	2.854*** (0.320)	2.861*** (0.322)
Interest rate risk					0.117*** (0.0435)	0.119*** (0.0439)	0.117*** (0.0433)	0.118*** (0.0426)	0.0873* (0.0452)	0.0871* (0.0457)	0.0877* (0.0453)	0.0853* (0.0448)
Inflation					0.00729 (0.185)	-0.00375 (0.183)	0.00620 (0.185)	0.000399 (0.185)	0.0547 (0.187)	0.0476 (0.185)	0.0544 (0.187)	0.0533 (0.187)
Legal environment									-5.076** (2.493)	-5.627** (2.539)	-5.063** (2.500)	-5.384** (2.485)
State-owned bank dummy		1.288** (0.586)				1.274** (0.567)				1.354** (0.556)		
Domestic (private) bank dummy			-0.0595 (0.358)				-0.0968 (0.339)				-0.123 (0.329)	
Foreign bank dummy				-0.735* (0.414)				-0.640 (0.394)				-0.659* (0.388)
Constant	9.254*** (0.751)	9.755*** (0.806)	9.336*** (0.760)	9.898*** (0.917)	7.866*** (0.830)	8.369*** (0.880)	7.872*** (0.831)	8.331*** (0.956)	2.673 (2.548)	2.724 (2.580)	2.768 (2.559)	2.960 (2.539)
Observations	748	748	748	748	748	748	748	748	748	748	748	748
R-squared	0.600	0.604	0.601	0.601	0.603	0.607	0.603	0.603	0.604	0.609	0.604	0.605
N	19	19	19	19	19	19	19	19	19	19	19	19

1/ Standard errors in parentheses; * p<0.1; ** p<0.05; *** p<0.01

Source: Author's calculations.

The coefficient for the size of operations (log of net loans) is negative and significant, implying that larger banks that manage higher volumes of loans can afford to offer more competitive interest rates. While this finding may *prima facie* be at odds with the hypothesis that large banks may exercise their market power and exhibit larger spreads (see below), in Tajikistan, economies of scale and better risk diversification brought about by a larger size of operations could lead to lower spreads, other things being equal. This highlights that there is room for further consolidating the banking system. The Tajik

banking market remains moderately concentrated at the top and relatively fragmented at the lower end. As a matter of fact, the standard deviation of net loans (TJS 527 million) is significantly larger than the average value of loans in our sample (TJS 374 million). Not only could consolidation (e.g., through mergers and acquisitions) help increase the size of operations, thus contributing to more efficiency of financial intermediation; it could also help improve productivity, rationalize costs, and advance technology adoption, reducing operational expenses (which, as discussed above, has a strong and significant positive effect on spreads). To provide a concrete interpretation of our result, a one standard deviation increase in average total loans (from TJS 374 million to approximately TJS 900 million) would decrease the interest rate spread by more than 400 basis points, other factors being constant.

Risk aversion, proxied by the equity to net loans ratio, has a small but highly significant positive effect on interest rate spreads. This indicates that banks with higher risk aversion tend to set higher net interest rate spreads, which is in line with previous studies (see section I). Although the coefficient is small, its significance suggests that more capitalized banks tend to charge slightly higher spreads, potentially reflecting a conservative approach to risk management as a result of more capital at risk.

The income diversification variable (noninterest income to interest revenue) has a significant negative coefficient. This indicates that as banks diversify their income streams away from interest-based activities, they can afford to reduce their interest rate spreads, likely due to cross-selling and cross-subsidization of fee- and commission-generating activities with traditional lending activities. For example, banks may reduce lending rates to borrowers using other bank services, generating fees and commissions such as payment services. More diversified banks could charge lower spreads for loans to gain higher income from noninterest activities because they consider the two sources of income as substitutes for each other. These cross-selling strategies may be problematic as they may lead to mispricing credit risk and distorting competition (e.g., tying and bundling, market foreclosure, reduced transparency, etc.), raising nontrivial issues for bank regulation and competition policy.

The results also show the relative importance of market power in determining intermediation spreads. Again, in line with theoretical predictions, the sign of the coefficient for the Lerner index is positive and statistically significant, reflecting the fact that banks with higher market power set higher intermediation spreads. The large coefficient (a one percentage point increase in the Lerner index is associated with a 2.8 percentage point increase in the spread) suggests that banks with greater market power can command significantly higher spreads, emphasizing the role of competition in determining interest rates. High market power in the Tajik banking sector may be due to a number of reasons:

- The unintended presence of preferential terms in the market may give a competitive edge to a subset of banks. For example, while state-owned banks are subject to the same prudential rules as other banks, due to their legal status as state-owned enterprises (as opposed to a corporate organization) they enjoy a full government guarantee on their deposits held by individuals. This

creates an imbalance in the protection of depositors' rights and may result in access to cheaper deposits by state-owned banks (see below results on bank ownership).⁷

- Regulations or consumer behavior (e.g., driven by financial literacy) may affect consumer decisions in a way that limits their ability to choose among competing suppliers. Regulations or consumer behavior can also influence buyers' ability to switch suppliers by intervening (or not intervening) on switching costs. Early settlement fees on loans and closing charges for current accounts are typical examples of switching costs capable of dampening competition. Similarly, the inherent complexity of the banking products and the associated fees may discourage customers from shopping around for alternatives.

When adding the bank ownership dummies, the results clearly distinguish between different types of bank ownership in Tajikistan and their corresponding influence on interest rate spreads (Table 1, columns 2–4). In particular, state ownership is associated with significantly higher spreads, possibly due to less competitive pressure. In contrast, foreign ownership exerts downward pressure on spreads, potentially due to superior management practices or competitive strategies. Private domestic ownership does not appear to significantly affect spreads, suggesting that these banks may operate similarly to the benchmark group regarding pricing strategies. The results hold for extended versions of the model (Table 1, columns 6–8 and columns 10–12).

Turning to macroeconomic variables (Table 1, columns 5–9), we find that the refinancing rate, representing the NBT's monetary stance and used as a proxy for interest rate risk in our analysis, shows a positive and marginally significant impact on interest rate spreads. In particular, a one percentage point increase in the policy rate is associated with an approximately nine basis point increase in net interest spreads, holding other factors constant. When the NBT raises interest rates, banks can generally increase their interest margins because banks raise the rates that they charge on loans more and faster than they increase the rates they pay on deposits, thereby widening the spread. While asymmetric pass-through is to be expected, the result may also suggest that the monetary policy transmission mechanism in Tajikistan is muted, reflecting certain structural features of the financial system (e.g., structural excess liquidity, weak bank competition, the absence of a well-established benchmark yield curve, high dollarization, small and illiquid capital markets, and limited cross-border capital mobility) that impair traditional monetary policy transmission channels (see Poghosyan and others 2023). Interestingly, inflation does not have a significant impact on interest rate spreads. This could imply that inflation expectations are already embedded in other macroeconomic variables or that banks in Tajikistan are more responsive to real monetary policy signals than to inflation per se.

Finally, including institutional variables in our model (Table 1, columns 9–12), namely the Regulatory Quality index, which captures the quality of the legal environment, has a statistically significant negative impact on interest rate spreads. A stronger legal environment, reflected in a higher Regulatory Quality index, is associated with narrower spreads. For example, improving the Regulatory Quality index to the level achieved by the Kyrgyz Republic in 2022 (-0.633) is associated with a reduction in the interest rate

⁷ As a matter of fact, in our sample, state-owned banks remunerate depositors 55-59 basis points less than privately owned banks, both domestic and foreign banks, while they charge borrowers 86-135 basis points more.

spread by approximately 2.86–3.18 percentage points, other factors being constant.⁸ This suggests that strengthening the quality of the regulatory regime for private sector development can have a substantial impact on reducing interest rate spreads in Tajikistan.

Table 2 shows the economic significance instead of the statistical coefficients for each variable in all specifications using standardized variables.⁹ The advantage of this approach over statistical significance is that we can use comparable coefficients. The results indicate the comparatively large impact of income diversification, loan size, risk aversion, market power, and credit risk on net interest margins in Tajikistan.

Table 2: Economic significance of econometric results

Variable	Coefficient	Standard Error	z-value	p-value	Ranking
Income diversification	-0.516	0.043	-11.930	0.000	1
Size of operations	-0.421	0.057	-7.450	0.000	2
Risk aversion	0.404	0.039	10.390	0.000	3
Market power	0.333	0.038	8.850	0.000	4
Credit risk	0.310	0.036	8.630	0.000	5
Operating costs	0.183	0.031	5.840	0.000	6
Legal environment	-0.085	0.042	-2.030	0.042	7
Interest rate risk	0.082	0.043	1.930	0.053	8
Opportunity cost of excess bank reserves	0.055	0.032	1.720	0.085	9
Inflation	0.005	0.017	0.290	0.770	10

Source: Author's calculations.

V. CONCLUSIONS AND POLICY RECOMMENDATIONS

This paper provides empirical evidence on the determinants of banks' interest spreads in Tajikistan using a panel dataset for the period 2011Q1 – 2022Q4. To this end, we specify an empirical model constituting an extension of the model developed by Ho and Sanders (1981), which we estimate using Beck and Katz's (1995) OLS-based PCSE procedure. As predicted by the empirical model, all the explanatory variables, except for inflation, are significant and have the expected effect on banks' net interest spreads.

Our results provide evidence of the important role that bank-specific factors play in explaining the variation of interest rate spreads. Operational efficiency is a significant driver of interest spreads in Tajikistan. Higher operating costs are reflected in higher interest spreads. In addition, we find that higher perceived credit risk translates into higher net interest spreads as banks compensate for the increased risk of loan default. This signals the importance of legal and institutional frameworks for lending and debt resolution. The opportunity cost of holding cash and balances at the central bank is another significant determinant of net interest spreads, reflecting limited interbank market activity and underdeveloped capital markets.

Loan size is another important determinant of bank spreads, and we interpret this finding as evidence of the existence of room for consolidating the banking sector in Tajikistan to remove diseconomies of scale for small banks. Risk aversion is also associated with high spreads, whereby higher capital adequacy ratios are compensated for by higher spreads and margins. We also find that higher market power

⁸ Tajikistan's estimate of the Regulatory Quality index in 2022 (the latest available data point) was –1.198.

⁹ The economic significance coefficients are obtained by using standardized variables $z = (x - \mu) / \sigma$ where μ is the mean of the population; and σ is the standard deviation of the population.

significantly increases interest spreads, calling for an effective competition policy framework, especially if consolidation of the sector is pursued.

Another finding is that banks that rely heavily on fee-based activities have lower lending rates, which may underprice credit risk (cross-selling strategies may alter risk exposures) and distort competition, including with nonbank lenders. Interestingly, we also find that bank ownership has a significant impact on net interest spreads. In particular, state ownership is associated with significantly higher spreads, possibly due to less competitive pressure, whereas foreign ownership is associated with lower spreads, which may reflect better risk management or more competitive business strategies. Private domestic ownership does not appear to affect spreads significantly.

Aside from the bank-specific variables, the macroeconomic and institutional environment—proxied by the policy rate, the inflation rate, and the Regulatory Quality index—significantly impacts interest spreads in Tajikistan, with the exception of the inflation rate. Generally, a stable macroeconomic environment with low interest rates and a legal environment that is conducive to private sector development exert downward pressure on banks' net interest spreads.

The findings of this study have important implications for policy makers aiming to reduce interest rate spreads, improve the efficiency of financial intermediation, encourage financial deepening, and promote sustainable and inclusive growth in Tajikistan. In particular, the results of this paper point to a three-pronged policy strategy:

- **Accomplish further consolidation of the banking industry.** The analysis suggests that it would be crucial to promote income diversification and generate economies of scale in the banking sector. This could be achieved through further consolidation, especially at the lower-end of the market. Because small banks in Tajikistan are operating with significant unrealized economies of scale, a market-driven process of mergers and acquisitions could contribute to reducing fragmentation, bringing about scale and cost rationalization. Market consolidation has already occurred on a significant scale in recent years, yet additional efforts may be needed to reduce the costs of financial intermediation. Well-designed and executed business combinations have the potential to increase risk diversification opportunities, promote noninterest activity, and strengthen risk management practices and internal controls, eventually putting downward pressure on interest spreads. Business combinations can also strengthen overall financial stability. They can also contribute to greater cost efficiency, facilitating the adoption of digital technologies to reduce the need for a large branch network, improving staff training and management practices, strengthening bank corporate governance, and introducing organizational changes (e.g., adopting blockchain and cloud computing). Greater cost savings could then be passed on to customers through lower interest rate spreads.
- **Enhance competition.** Further consolidating the banking sector would increase market concentration, which could compound the existing market power, potentially neutralizing efforts to bring down spreads. It would, therefore, be important to strengthen the competition policy framework, especially the merger control regime and the powers and capacity to deter anti-competitive practices such as abuse of dominance, tying and bundling, and market foreclosure.

This will require enhancing the capacity and resources of the Anti-Monopoly Service (the Tajik competition authority) while strengthening cooperation with NBT—given the relevance of mergers and acquisitions for financial supervision—addressing any residual gaps in the legal framework. Making IFRS 9 compulsory, at least for the largest banks, could help increase transparency in the market. Reducing loan concentration through stricter supervision of large exposures could also be beneficial. Given that the findings of our analysis show the significance of bank ownership in explaining variations of net interest spreads, it would also be important to foster full competitive neutrality principles to avoid any preferential treatment of state-owned banks and level the playing field. For example, the government guarantee enjoyed by state-owned banks could be gradually removed by changing their legal status. This would also pave the way to further strengthening their corporate governance. At the same time, foreign entry could be promoted, including as a means to encourage industry consolidation without compromising financial stability objectives. Competition could also be enhanced by supporting fintech innovation (e.g., creating regulatory sandboxes) and promoting capital market development. Finally, consumer protection and transparency could be further strengthened, promoting financial literacy, and accelerating the implementation of open banking.

- **Strengthen the operating environment.** Finally, it would be essential to continue promoting macroeconomic stability and private sector development. Low and stable interest rates hinge primarily on the credibility and effectiveness of the monetary policy framework. Considerable progress has been achieved in modernizing the monetary policy framework. However, anchoring inflation expectations remains a daunting task, given weak bank competition, the absence of a well-established benchmark yield curve, high dollarization, and small and illiquid capital markets, among others (Poghosyan and others 2023). These structural bottlenecks should be tackled while further strengthening the operational independence of NBT and stepping up efforts to disclose more and better information on policy measures. Other government policies would be needed to help improve monetary transmission, reduce interest rate risk, and lower net interest spreads. Chief among these is modernizing the legal framework for corporate insolvency, which is outdated and misses key creditors' protections. To help reduce credit risk and counter risk aversion in the banking system, a new Insolvency Law should facilitate the restructuring of viable firms and the liquidation of non-viable ones, while protecting creditors, speeding up court proceedings, and reducing the cost of enforcing judicial decisions. Such a revision of the Insolvency Law should be carried out in the context of a broader overhaul of legislation, with a view to improving the enforceability of contractual and property rights, particularly in relation to collateral realization and foreclosure.

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APPENDIX

Table 1: Variables definition and sources

VARIABLE	DEFINITION	SOURCE	EXPECTED SIGN
Net interest spread	Interest received on loans divided by (net) loans and interest paid on deposits divided by total deposits.	National Bank of Tajikistan	Dependent
Operating costs	Operating expenses divided by total assets.	National Bank of Tajikistan	+
Credit risk	Loan loss provisions divided by gross loans.	National Bank of Tajikistan	+
Opportunity cost of excess bank reserves	Cash and balances held at the central bank divided by total assets.	National Bank of Tajikistan	+
Size of operations	Log of total net loans.	National Bank of Tajikistan	?
Risk aversion	Equity divided by net loans.	National Bank of Tajikistan	?
Income diversification	Noninterest income to interest revenue.	National Bank of Tajikistan	-
Market power	Lerner index (difference between total revenue and total cost divided by the total revenue).	National Bank of Tajikistan	+
Interest rate risk	Central Bank refinancing rate.	National Bank of Tajikistan	+
Inflation	Quarterly rate of change in the average consumer price index.	National Bank of Tajikistan	+
Legal environment	Regulatory Quality index (perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development).	World Bank Worldwide Governance Indicators	-
State-owned bank dummy	Dummy taking value of 1 if a bank is state-owned, and zero otherwise.	National Bank of Tajikistan	?
Domestic (private) bank dummy	Dummy taking value of 1 if a bank is locally-owned, and zero otherwise.	National Bank of Tajikistan	?
Foreign bank dummy	Dummy taking value of 1 if a bank is foreign-owned, and zero otherwise.	National Bank of Tajikistan	?

Table 2: Descriptive statistics

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
Net interest spread	748	4.551	3.416	-2.952	45.070
Operating costs	748	1.579	1.330	0.147	15.390
Credit risk	748	1.434	4.262	0.000	80.320
Opportunity cost of excess bank reserves	748	17.050	13.260	0.002	65.250
Size of operations	748	4.688	1.840	-1.563	7.817
Risk aversion	748	288.500	945.100	1.730	13,639.000
Income diversification	748	60.450	25.640	5.369	99.930
Market power	748	0.524	0.400	-3.534	0.990
Interest rate risk	748	10.600	3.224	4.800	16.000
Inflation	748	0.567	0.306	0.088	1.480
Legal environment	748	-1.080	0.058	-1.198	-0.978

Table 3: Correlation matrix

	Net interest spread	Operating costs	Credit risk	Opportunity cost of bank reserves	Size of operations	Risk aversion	Income diversific.	Market power	Interest rate risk	Inflation	Legal environment
Net interest spread	1.0										
Operating costs	0.2085*	1.0									
Credit risk	0.6149*	0.045	1.0								
Opportunity cost of excess bank reserves	-0.0147	-0.0496	-0.0193	1.0							
Size of operations	-0.3918*	-0.0589	-0.26*	-0.0318	1.0						
Risk aversion	0.5489*	-0.0729*	0.5585*	-0.0192	-0.4835*	1.0					
Income diversification	-0.0204	-0.1351*	0.152*	0.3775*	-0.3954*	0.2481*	1.0				
Market power	0.0546	-0.1399*	-0.0102	0.1971*	-0.0442	-0.014	0.4845*	1.0			
Interest rate risk	0.1369*	0.0122	0.0386	0.0374	-0.0272	0.0288	-0.0068	-0.1093*	1.0		
Inflation	0.0455	-0.0093	0.0217	-0.0292	-0.031	0.0766*	-0.0246	-0.0512	0.1242*	1.0	
Legal environment	-0.1526*	0.0251	-0.0532	-0.1289*	-0.0836*	-0.0326	-0.0131	0.0425	-0.5486*	0.0745*	1.0

* p<0.05