Drivers of Commercial Banks Interest Rate Spread: Empirical Evidence from Suriname

Xanegay Huur – xhuur@cbvs.sr
Central Bank of Suriname
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Abstract

The paper aims at identifying factors driving interest rate spread of commercial banks in Suriname. The study applied an ex-ante and an ex-post interest rate approach using single-stage least square regression analysis and panel regression techniques on a dataset from 1999 to 2021. Preliminary results indicate that bank specific factors (previous interest rate spread, ROA, non-performing loans, operating cost), the market structure (market concentration), regulation policy (required reserve) and macroeconomic factors (inflation, government borrowing and real exchange rate) influenced the interest rate spread of commercial banks in Suriname. Monetary and fiscal policy should be aimed at enhancing macroeconomic conditions as this contributes in narrowing the interest rate spread. Based on the positive impact of the regulation policy variable on the spread, monetary authorities should take into account the possible trade-off existing between price stability and enhancing financial efficiency.

Keywords: interest rate spread; financial efficiency; banks; panel regression.

1. Introduction

The banking sector has an import role in fostering a countries economic development and growth process. This is practically the case in most developing countries, where financial markets are underdeveloped and banks are the main providers of financial intermediation services. Given their critical role in these economies, identifying and assessing risk and threats that could hamper the banking sectors soundness and stability is important for policy makers. One of the key indicators used to assess the banking sector is the interest rate spread (IRSP).

The spread provides information on the cost of finance or cost of financial intermediation. An increase in the spread signifies a rise in the cost of finance from a borrowers perspective. On the other hand, from the bank perspective, higher interest rates could increase banks profitability level as a substantial part of bank profits comes from interest received on outstanding loans. However, a persistently high IRSP can indicate banks performing their intermediation activities of mobilizing investible resources in an inefficiently manner, which can cost financial disintermediation with negative implication for long-term economic growth (Demirgüç-Kunt et al., 2004; Bhattarai, 2020; Damane, 2020). The spread also reflects the degree of competitiveness in the financial system. Ahokpossi (2013) mentioned that countries with a relative small, concentrated and shallow financial sector tend to have high IRSP because banks may not have the benefits of economic scale and face large fixed costs like setting up a network of branches to be close to clients, cost to collect deposits and to extend loans. In addition, banks will charge high interest rates because of their dominant position in the market.

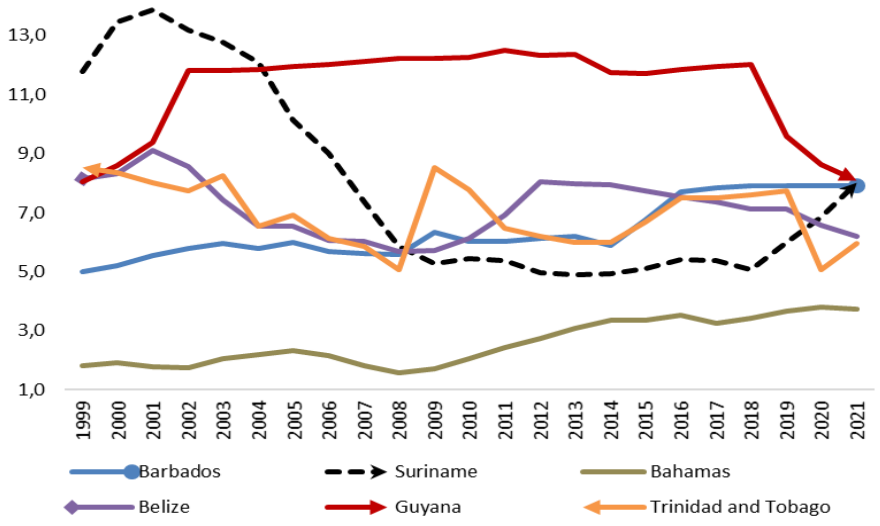
Furthermore, the spread is also important for central banks as it also reflects the impact of monetary policy. Central banks typically implement policy by changing the availability of credit (via decrease/increase of reserve requirement) and/ or the price of credit (by increasing/reducing the discount rate) to the banking system in order to guide market determined short-term terms. The IRSP is also important for central banks as it is marked as a financial soundness indicator (IMF, 2019), which central banks uses along with

other financial soundness indicators to monitor the soundness of the financial system in light of maintaining financial stability (Požlep, 2023).

Research aim

This study aims to determine the main drivers of interest rate spread in Suriname during the period 1999-2022. When we compare Suriname with other Caribbean countries (Barbados, Belize, The Bahamas, Guyana and Trinidad and Tobago) with a similar economic structure and per capita income, the country had the highest IRSP at the beginning of the new millennium (Figure 1), which means that cost of financial intermediation was high in Suriname compared to the other countries. After 2001, the IRSP started narrowing. Between 2008 and 2019, the country, with the exception of Bahamas, had the lowest IRSP among the selected Caribbean countries.

Figure 1: Interest rate spread developments in selected Caribbean countries



Source: World Bank (2022)

Despite the improvement, results of the 2014 PROTEqIN Caribbean Enterprise Survey conducted by the World Bank show that most surveyed firms in Suriname highlighted costs of finance (referring to high lending rate) and access to finance (because of the lack of adequate collateral) as a major obstacle for firm-level productivity and performance. Moreover, Orie's (2020) study on financing obstacles for micro, small, and medium-sized

enterprises (MSMEs) established that these firms, whom are considered vital to promote inclusive growth and reduce poverty in developing countries, experienced high interest rates as the main obstacle to access finance. In addition, the recent financial education and financial inclusion study conducted by the Central Bank of Suriname (2022) shows that high banking costs and low deposits rate are possible driving factors of financial exclusion in Suriname.

The IRSP has been widening in recent years form a level of 5.1 percentage points in 2014 to 8.0 percentage points in 2021. This raises concerns about the cost of finance, access to formal finance, financial inclusion, the stability of the banking sector and inclusive growth. This study can hence provide insights on how to tackle the issue of high IRSP in Suriname by highlighting the underlying factors driving IRSP in Suriname. An analysis on the determinants of IRSP is also imperative to understand the behavior of banks in setting and adjusting their interest rates. To the best of our knowledge, this is the first study that analyzed the drivers of IRSP in Suriname.

According to Robinson (2002), there are two broad approaches to calculate the IRSP namely the *ex-ante* and the *ex-post* approach. The *ex-ante* approach uses the rates quoted on loans and on deposits and draws inferences from the difference between them. This is the conventional definition of IRSP found in most papers (e.g. Bhattarai, 2020; Požlep, 2023). The *ex-post* approach compares the effective rate paid on deposits with the effective rate earned on loans. This is an accounting based approach and requires in depth information, which is usually found in banks income and losses statements and therefore comes after the fact.

This study used both the *ex-ante* and the *ex-post* approach to calculate IRSP. Both approaches were employed to complement each other and were necessary to meet the study objective. For example, due to confidentiality reasons individual bank rates for loans and deposits are not publicly disclosed. The interest rates published by the Central Bank of Suriname are weighted average rates for the aggregated banking system. Limiting the study to include only the *ex-ante* IRSP observed in the banking system, we would not be able to account for the observed and unobserved heterogeneity across banks that can influence

their interest rate policy. For example, Demirguc-Kunt, Laeven & Levine (2003) show that small banks tend to have higher IRSP. Likewise, Peria, Soledad and Mody's (2004) concluded that foreign banks have lower IRSP than domestic banks. This is because foreign banks, relative to domestic banks, are able to charge lower spreads by decreasing their costs of operation. To fill in the gap, the study also collected individual banking data from six banks. The *ex-ante* IRSP is calculated as differences between the weighted average lending rate and deposit rate observed in the banking system. The *ex-post* is calculated based on the accounting method and decomposed the IRSP into cost and profit components as proposed by Randall (1998). The *ex-post* IRSP eventually equals to the difference between interest income over loans and interest expense over the deposit.

To model the *ex-ante* and the *ex-post* IRSP, the study used two different model techniques. Following early studies, this paper used a single-stage model to examine the drivers of the *ex-post* IRSP. The drivers of ex-ante IRSP in previous studies were retrieved from the contribution of different cost and profit components of the IRSP. These studies did not ascertain any causal effect relationship or behavioral patterns between IRSP and its various components. This study, however, did used econometric techniques to model *ex-post* IRSP. To control for heterogeneity among the banks, in line with Perez (2011) the *ex-post* IRSP was modeled using panel regression techniques.

A limitation of this study is that the research is restricted to only the IRSP observed in the banking sector. The restriction, however, is validated based on the following reasons: First, Commercial banks are the predominant financial institutions with roughly 75 percent of the total assets of the financial system, excluding the Central Bank. Second, mobilization of savings from and provision of credit to households, firms and government is primarily done by banks.

The paper is organized as follows. Section II, present some stylized facts regarding the evolution and performance of the banking system in Suriname. Section III, displays a brief theoretical and empirical literature review on the determinants of IRSP. Section IV, highlights the data and empirical models. The results are presented in section V, followed by the conclusions and recommendations in section VI.

2. Stylized Facts: Banking Sector in Suriname

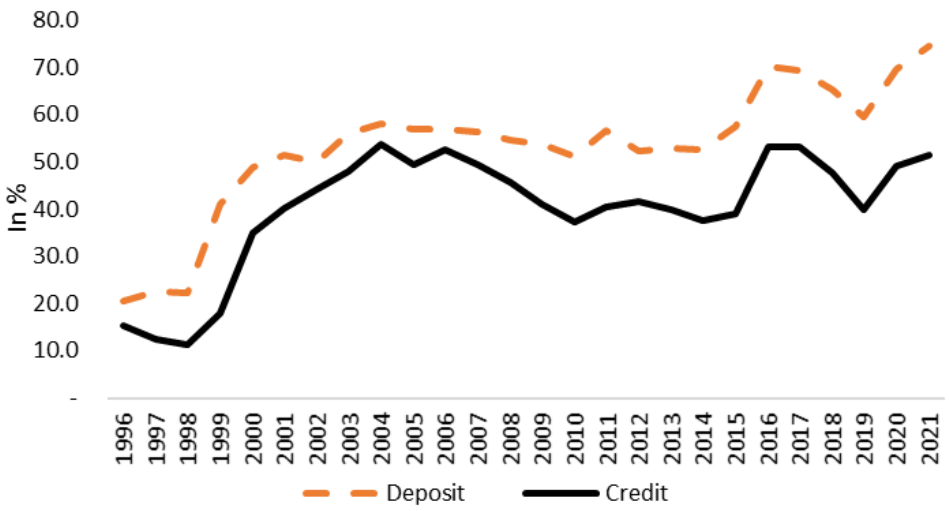
2.1 General Remarks

The Central Bank of Suriname (CBoS) is authorized with the supervisory task of the financial system as regulated in Article 10 under the Banking Act 2023 and the Banking and Credit System Supervision Act 2011. As of 31 December 2022, the list of financial institutions under active supervision of the Bank consisted of 10 commercial banks, 6 finance and investment companies, 25 credit unions and 12 insurance companies (4 life insurance, 6 non-life insurance, 2 funeral insurance). The CBoS also supervised 29 active pension funds, 2 provident funds, 17 foreign exchange offices, 6 money transfer houses and 1 stock exchange (Central Bank of Suriname 2022). The CBoS adopted several of the requirements contained in the Basel Committee's Core Principles for Effective Banking Supervision to comply with international standards. In 1995, the Bank adopted the Basel 1 risk-weighted capital requirement of 8%, while in July 2014, a capital adequacy rule was adopted to raise the minimum capital adequacy ratio to 10% and strengthen provisioning requirements. The CBoS also uses a 3% minimum requirement for Banks leverage ratio in accordance with Basel III guidelines from 2011.

The financial system in Suriname is categorized as underdevelopment and is more centered towards bank activities. Lacking alternative investment segments restricts households, small, medium and micro firms to depend significantly on banking finance. The financial system has been through a process of liberalization. The authorities liberalized banking transactions in foreign currency in the early 1990s (for foreign currency deposits in 1992 and loans in 1995). This, however, resulted in increased dollarization of the financial system (Figure 2.1). The authority's decision to eliminate foreign exchange surrender requirements, except for the bauxite and oil sectors, in 2002 triggered exporters to hold export incomes in foreign currency deposits. This decision accelerated the pace of dollarization of the financial system. Moreover, dollarization in Suriname also show strong correlation with the country's macroeconomic conditions as suggested by Adhin (2011). Financial dollarization is usually high during periods of macroeconomic instability and may persist long after macroeconomic stability has been restored says Adhin (2011). Over the

years, the accelerated dollarization rate has pushed the country to become one of the highly dollarized economies in the region (FritzKrockow et al, 2009).

Figure 2.1: Financial dollarization ratios



Source: Central Bank of Suriname (2023)

2.2 Development of the Banking Sector in Suriname (1990-2021)

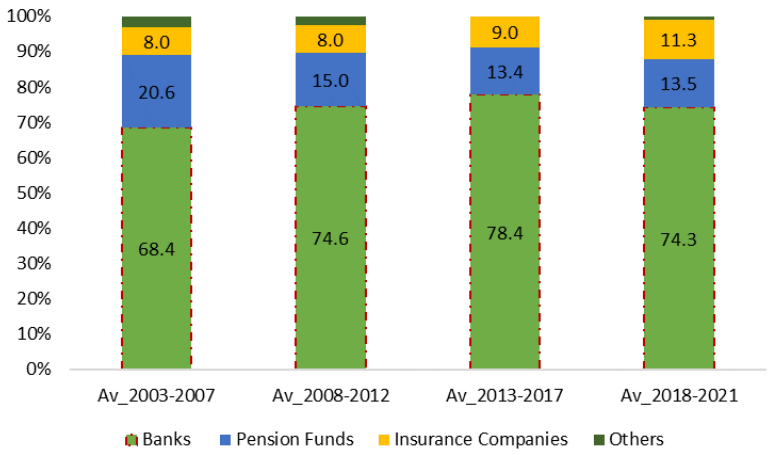
2.2.1 Banking sector size, ownership and structure

Over the years, the banking sector of Suriname has grown in number and size. In the 90's, other banks started to penetrate the market elevating the number of banks from 3 in 1957 (when the CBoS was establish) to 10 as of December 2021. Three of these banks are categorized as large banks and the other banks are revered to as small banks. The size of the banking system, measured by the value of assets, had grown from SRD 0.4 billion in 1999 to 53.9 billion in 2021. The dominancy of the banking sector is reflected in their share in total financial system assets that was around 75% at end-2021 excluding the CBoS (Figure 2.2) while banks assets in percentage of Gross Domestic Product (GDP) equaled 95%. Furthermore, contrary to other Caribbean countries whose banking sector is dominated by foreign-owned banks, Suriname's banks are domestically owned with a strong government ownership. Three of the commercial banks[1] - these banks are categorized as small banks-are

[1] It is important to note that these three banks are nonprofit-driven institutions with social development aims.

fully state owned, four are fully private domestically owned banks, two are partly private and government owned and one is a foreign subsidiary.

Figure 2.2: Financial System-Asset Distribution



Source: Central Bank of Suriname (2011, 2015, 2022)

The banking sector in Suriname has an oligopolistic character in which the leader-follower method is applicable and despite liberal entry into the market, competition within the banking sector continues to be imperfect. The three large banks dominate the banking sector and together they had a market share of more than 80% in total banking assets as of December 2021. The activities of the banks are predominantly traditional, including: facilitating domestic payments, foreign payments, extracting corporate and consumer loans, mortgages, motor vehicle loans, local and foreign currency deposits (demand, savings and time), buying and selling of foreign currency and transfers. Loans are the main assets on the balance sheet of banks while deposits dominate the liability side. Loans and therefore interest is the main source of banks' revenues. The loan portfolio has a superior role in the business policy of banks and their risk profile.

Over the past years, as digitalization in the financial sector is evolving consumers demand, banks have been introducing new and innovate banking products and services. The new innovative services include issuance of debit and credit cards, Automated Teller Machines (ATM), Point of Sale (POS), phone, mobile and internet banking as well as digital wallets and e-commerce platform for consumers and entrepreneurs.

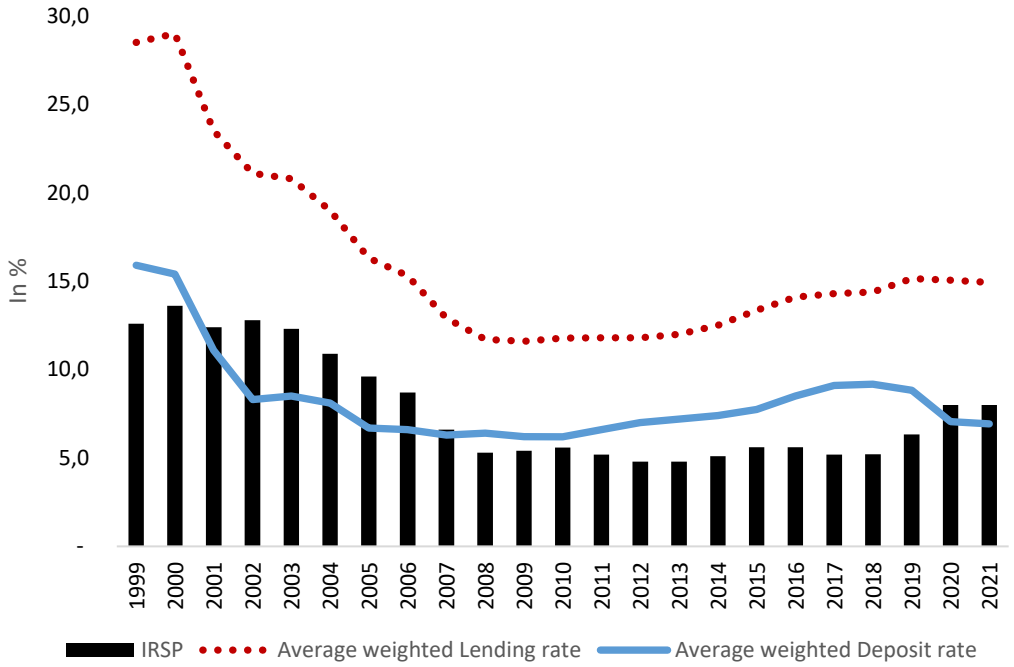
2.2.2 Banking sector performance

In analyzing the banking sector performances, the study uses financial soundness and stability indicators. The evolution of these indicators, if applicable, are brought in perspective with the minimum or maximum required level as demanded by the Central Bank of Suriname. The banking sector performances between 1999 and 2021, evolved largely in accordance with macroeconomic developments. The study period covers several periods, namely 1) a period in which the economy transitioned from macro-economic instable to a more stable period (1999-2000). 2) A long period of relatively stable economic conditions (2001-2014). 3) Two economic recessions (2015-2016 and 2020-2021) and 4) a short period of economic recovery (2017-2019).

Figure 2.3 shows the evolution of the weighted average lending rate[2] and weighted average deposit rate[3] as reported by the CBoS as well as the calculated IRSP. During the study period, the average interest rates on loans were double-digit while single-digit deposits rates were reported. In the transitioned period, the discrepancy between the weighted average lending and deposit-banking rate was high (Figure 1). However, as macroeconomic conditions started to improve, the wedge between the lending and deposit rate narrowed remarkably. In tandem with the economic crisis in 2015-2016, IRSP widened slightly but fell once the economy started recovering after 2016. In the 2020 and 2021 crisis, the IRSP increased significantly due to a fall in the average weighted deposit rate while adjustments in the weighted lending rate were small.

[2] The weighted average lending rate is makeup of the weighted rates charges for mortgage loans, current account credit, personal loans, car loans and installment credit.
[3] The weighted average deposited rate is makeup of the weighted rates given on current account deposits, saving deposits, time deposits of ≤ 1 year and > 1 year.

Figure 2.3: Evolution of the average weighted lending and deposit rates

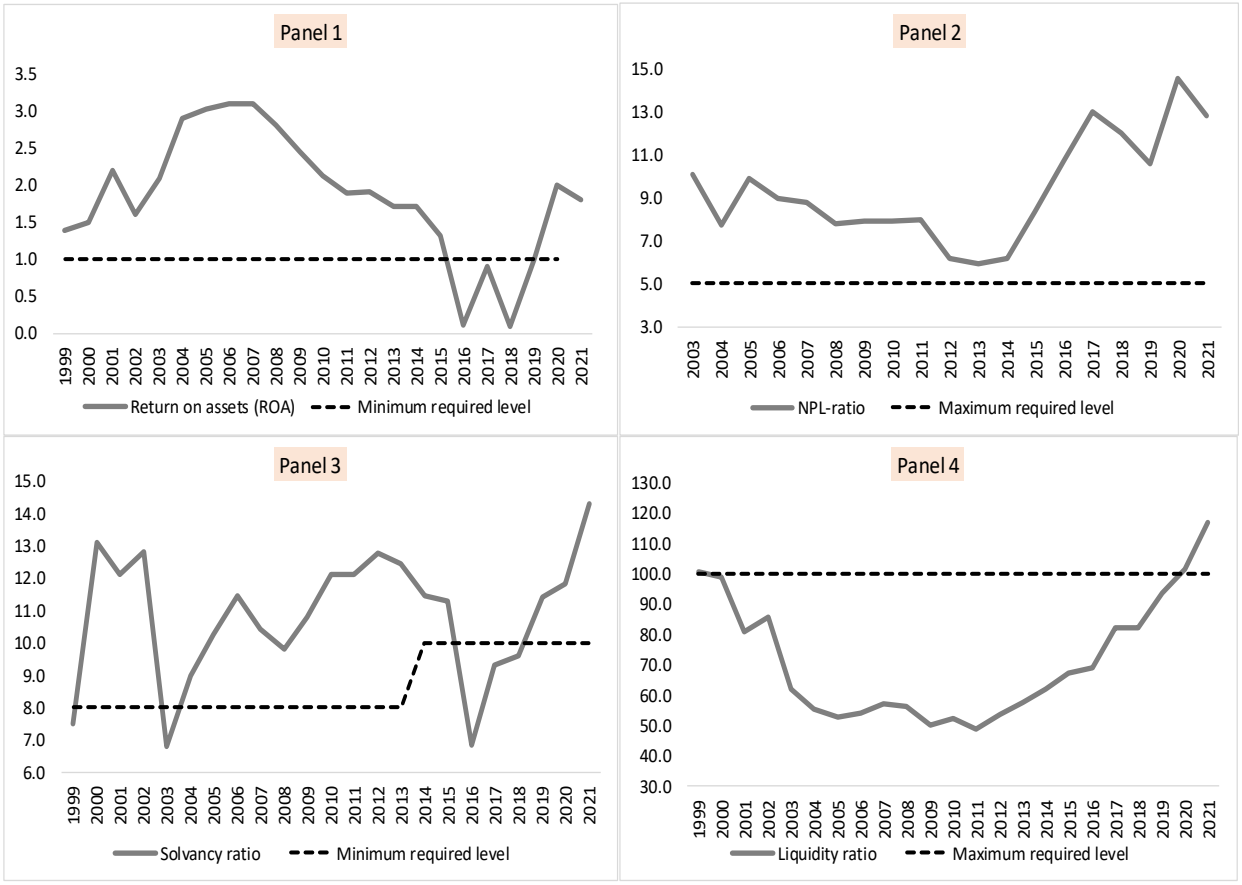


Source: Central Bank of Suriname (2023)

The return on assets ratio (ROA), another profitability ratio, remained well above the minimum required level of 1.0% in the research period (Figure 2.4, Panel 1). During the economic crisis in 2015 and 2016 the ROA declined below the required level.

Suriname's banking system has been coping with high levels of Non-performing loans (NPL-ratio) for a long time. The banking system NPL-ratio have consistently performed above the required level (Figure 2.4, panel 2) during the study period. The steady improvement made before 2014, with downward trending NPL- ratio, reversed into a sharp increase during the crisis period (2015-2016). Even though banks started to clean up their balance sheet after the crisis, NPLs remained high. Asset quality further deteriorated due to the Covid-19 pandemic that caused a sharp slowdown in economic activity. The slowdown in economic activity and elevated unemployment created income shortfalls for households and business and affected their ability to meet debt obligations. Banks have significant exposure to the public sector through holding of government securities and direct lending, with most of these exposures now non-performing.

Figure 2.4: Banking sector soundness indicators



Source: Central Bank of Suriname (2023)

During the period under review, the Capital adequacy ratio (CAR) of the bank system exceeded the regulatory minimum of 8%, which was increased to 10% in mid-2014 (Figure 2.4, panel 3). However, during the subsequent economic recession in 2015 and 2016, the banking system's solvency ratio fell below the required level.

Over the study period, the liquidity ratio (total liquidity/ total assets) has been well above the required minimum level of 20%. Indicating the banking sectors ability to meet short-term obligations. (Figure 2.4, panel 4).

3. A survey on the literature of the determinants of interest rate spread

There is extensive research on the determinants of IRSP, both for developed and developing countries. The dealership model proposed by Ho and Saunders in 1981 forms the theoretical model in most of the studies. In this model, banks are assumed to be risk-averse dealers in their role. The model shows that the optimal IRSP is a function of four factors: (i) the degree of bank risk-aversion. Banks as financial intermediaries typically ask for a positive interest rate spread as compensation for providing immediate liquidity service (loans) and risking a possible mismatch between the arrival of deposit surplus and loan demand. (ii) Market structure. In a market with relatively inelastic demand for loans and supply of deposits, banks choose to exercise their market power and set higher margins. (iii) the interest rate risk and (iv) the average transaction size. Over the years Ho and Saunders model has extended and augmented by many scholars such as McShane and Sharpe (1985), Allen (1988), Angbazo (1997), and Saunders and Schumacher (2000).

The empirical studies that are based on the Ho and Saunders models (e.g Brock and Rojas-Suarez, 2000; Saunders and Schumacher, 2000; Männasoo, 2013) used a two-step estimation procedure technique, which Ho and Saunders (1981) utilized to empirically test their own theoretical model. The first step includes an estimation of the "pure interest rate spread" by regressing the spread on a set of variables related to the specific features of a particular bank (mainly CAMELS indicators[4]). The intercept plus the time-fixed effects (if working with panel data) from the first regression are interpreted as the pure spread. In the second step, the pure spread is regressed against key macroeconomic indicators, as well as variables related to the market structure in which the banks operate.

Brock and Rojas-Suarez (2000) applied this method to a sample of five Latin American countries and concluded that interest rate spreads in these country is mainly driven by liquidity and capital adequacy developments at the micro-level and interest rate volatility, inflation and growth at the macro-level. The research by Saunders and Schumacher (2000) on a sample of seven OECD-countries for the 1988-1995 period

[4] CAMELS is an international rating system used by regulatory banking authorities to rate financial institutions, according to the six factors represented by its acronym. The CAMELS acronym stands for "Capital adequacy, Asset quality, Management, Earnings, Liquidity, and Sensitivity."

concludes that bank capitalization, market structure and interest rate volatility are the main determinants of interest rate spreads.

Other studies used a single-stage regression technique that is more eclectic in the sense that it is more oriented towards the specification of a behavioral model of banks through the inclusion of various potential determinants of interest rate spreads. These empirical studies used a battery of possible variables that can be group into five main clusters: bank-specific variables, system-wide measures of market structure, regulatory environment, legal and institutional environment and macro-economic variables.

Among the banking factors, there is consensus among studies that interest rate spread is positively related to operating costs (Maudos and Fernandez de Guevara 2004; Hess 2007; Anjom 2021). Banks would usually increase their income through higher lending rate, thereby increasing IRSP, to cover up for higher operational costs. Demirgüç-Kunt and Huizinga (1999); Were and Wambua (2013) and Randall (1998) among others, show that credit risk–proxy by nonperforming loans (NPLs) to total assets and loan loss provision to total assets–exert a positive effect on interest rate spread. Contrary, Hess (2007) found a negative association between credit risk and net interest margins, attributing this result to weak banks that decrease margins to cover expected loses. In terms of liquidity, Ghosh (2008) find that upswings in India interest rate spreads were the cause of excess liquidity in the banking system. Higher levels of excess liquidity represents a greater penalty for unused funds on which banks must pay interest to depositor.

In terms of market structure, literature presents contrasting results on the relationship between bank spread and market power. Chirwa and Mlachila (2004) and Ahokpossi (2013)) established that high monopoly power (or market power) contributed to high interest rate spreads in respectively Malawi and Sub-Saharan African countries (SSA). Likewise, the results of the study of Demirguc-Kunt, Laeven & Levine (2003) points at high net interest margins being associated with small banks; banks without substantial income from fee-based activity; banks that hold a low amount of capital and those with a large market share. In the Caribbean region, the low level of competition in the banking sector has been identified as key impediments that prevent interest spreads from declining in the

region (Mendoza (1997) and Martin (2010)). Contrary to the previous work, the study of Crowley (2007) provided evidence of a negative relationship between concentration and spreads suggesting that a country with a small number of powerful banks are able to restrict the level of competition by keeping spreads artificially low.

With respect to regulation, reserve requirements acts as tax on banks and is therefore assumed to be positively associated with a growth in interest rate spreads. Banks will pass on the cost of holding unloanable funds to consumers via an increase in lending rates or a reduction in deposit rates. Martin (2010) for example established that about 50% of the increase in the interest spread of Belize is attributable to reserve requirements. Chirwa and Mlachila (2004), for example found that wide interest rate spreads were associated with high reserve requirement rates and high inflation rates. On the other hand, Randall (1998) established in the Eastern Caribbean region that reserve requirements were found to have a marginal impact (less than 10%) on interest rate spread.

Yildrim (2002) pointed that economic theory as well as empirical evidence provided that instability in the macro economy of a country affect or may be associated with instability in the banking sector. This validates the use of macroeconomic variables as possible factors determining interest rate spread. Inflation, real GDP growth, interest rates, public debt and exchange rates are found to significantly affect interest rate spread. Eita (2012) investigated the determinants of interest rate spread for the case of Namibia. Macroeconomic variables such as inflation rate, treasury bills as well as the size of the economy were found to be important factors explaining interest rate spread. Likewise, Damene (2020) established that treasury bill rate and inflation had a positive impact on interest margins in Lesotho while the deposit rate effected the margin negatively. Birchwood (2004) examined the impact of macroeconomic influences on nominal and real interest spreads for several Caribbean countries including Suriname found that high inflation and liquidity conditions coincide with higher real interest spread. Growth was found to reduce the real interest spread while the exchange rate regime significantly affected the magnitude of the spreads in these countries. Contrary, Demirgüç-Kunt and Huizinga (1999), report that output growth did not seem to have any impact on bank spread in the countries under review.

4. Data and Methodology

4.1 Variables and Measurement

In line with previous studies, the IRSP is hypothesized to be a function of bank-specific, market- structure, regulation as well as macroeconomic factors. In selecting the explanatory variables, the study closely follows the work done in the region. Table 1 summarizes the measurements of the selected variables and the hypothesized relationship.

Table 1: Key Variables, Measurement and the Expected impact on Interest Rate Spread.

Variables	Measurement	Expectation
Dependent variable		
Interest rate spread (IRSP_exante)	Calculation based on the ex-ante approach, which is the difference between the weighted average interest rate banks charges on loans and the weighted average interest rate banks pay on deposits.	Positive
Interest rate spread (IRSP_expost)	The difference between interest income over loans and interest expense over the deposit.	Positive
Independent Variables		
Bank-specific factors		
Past Interest rate spread $(IRSP_{t-1})$	Calculated as the previous level of the difference between the weighted average interest rate banks charges on loans and the weighted average interest rate banks pay on deposits.	Positive
Operating Cost (OPC)	Measured as the ratio of operating expenses to operating income.	Positive
Credit risk: Non performing loan rate (NPL)	Measured as non-performing loans to gross loans. In absence of non-performing ratio, we used provision to gross loans as proxy.	Positive
Capital adequacy ratio (CAR)	Regulatory capital/Risk Weighted Assed.	Negative
Return on assets (ROA)	Measured as the ratio of bank's income to total assets.	Negative
Liquidity risk (LQR)	Measured as the ratio of bank's liquid assets to total assets.	Negative
Market- structure factor		
Bank size	To measure the level of market power, this study uses bank size, which is proxied by taking the natural logarithm of total assets *(LTA) or* Bank branches	Negative
Regulation factor		
Reserve requirement ratio in local currency (RR)	Yearly change of the reserve requirement ratio.	Positive

Macroeconomic specific factors		
Economic Growth (EG)	Measured as the growth rate of real gross domestic product.	Negative/Positive
Inflation rate (INFL)	Measured by the annual change in the Consumer Price Index.	Positive
Exchange rate (RER)	Measured as the yearly change in the real exchange rate.	Positive
Government borrowing from commercial (GDC)	Measured Government financing through the commercial banks to Gross Domestic Product.	Positive

To calculate the ex-ante IRSP the paper used data from the banking system as a whole, which is retrieved from the consolidated balance sheet of the banking system over the period 1990-2021. This database is also used to determine the IRSP determinants for the banking system in Suriname. The second database comprises of individual banking data of five commercial banks collected over a period of 15 years (2005-2019). The data is taken from banks income and losses statements reported in their annual reports. This database is used to calculate the *ex-post* IRSP and is utilized to examine the determinants of IRSP using a bank-level approach. Both approaches complement each other.

The data related to the banking factors is extracted from the consolidated balance sheet reported in the annual report of CBoS and financial statement of the commercial banks reported in their annual report. The macroeconomic variables as well as the required reserve ratios are retrieved from the Central Bank's database produced by the statistical department.

4.2 Econometric Models

4.2.1 The ex-ante interest rate spread empirical model

The majority of studies on the determinants of bank's interest rate spread utilize linear regression models. The study utilized a single-stage regression to model ex-ante interest rate spread. The impact of the macro-economic factors and regulation factor were estimated separately from the banking and market factors. Given the short study period, we have limited degrees of freedom, which disinclined to include all potential explanatory variables into a single regression.

The first model

Following previous studies, the impact of the selected bank factors and market-specific factor on the interest rate spread was analyzed using the following empirical regression model:

$$\gamma_t = \alpha_0 + \alpha_1 * \gamma_{t-1} + \alpha_2 * \beta_t + \alpha_3 * \delta_t + \varepsilon_t \qquad \textit{Equation 1}$$

Where γ_t is the depended variable IRSP. Because of the persistency in bank profitability (Carbó and Rodríguez, 2007), the first lag of the depended variable γ_{t-1} is included in the right-hand side of the equation. Banks that have been profitable in the previous period tend to be profitable even in the current period. β_t is a vector of bank-specific variables comprising of: *(OPC, NPL, ROA, CAR, LQR)*. δ_t is a vector containing the market factor *(LTA)*. ε_t is the residual term.

The second model

The analysis on the impact of the selected macroeconomic factors and regulation factor on the interest rate spread is conducted using the following empirical regression model:

$$\gamma_t = \alpha_0 + + \alpha_1 * \omega_t + \alpha_2 * \theta_t + \alpha_3 * \rho_t + \vartheta_t \qquad \textit{Equation 2}$$

Where γ_t is the depended variable IRSP. ω_t is a vector of macroeconomic specific variables comprising of: *(EG, INFL, RR, ER, GDC)*. θ_t is a vector containing dummy variables related to reserve requirement adjustments. To analyze the impact of reserve requirement adjustments a dichotomous quantitative variable was constructed. First, the three possibilities for the reserve requirement ratio in a given year are identified. The reserve requirement ratio could be adjusted either to a higher level (tight monetary policy) or to a lower level (loose monetary policy). However, it could have remained unchanged (neutral monetary policy). Based on these three alternatives, two dummy variables were constructed were: dum1 = 1 if the reserve requirement ratio increased and 0 if otherwise; dum2 = 1 if reserve requirement ratio decreased and 0 if it was otherwise. ϑ_t is the residual term of the regression and is assumed to be white noise.

In 2001, the reserve requirements arrangement on domestic currency was introduced for commercial banks by the Central Bank of Suriname[5]. In order to estimate the model the sample needed to be adjusted to 2001-2021. Moreover, to prevent further losses of degrees of freedom thereby making it difficult to obtain statically significant results, the second model does not include lag variables.

4.2.2 The ex-post interest rate spread empirical model

Because of the unavailability of average deposit and lending rates and thus a series on spreads for individual banks, the accounting or *ex-post* approach has been used for the calculation of IRSP for respective banks, which is the difference between interest income over loans and interest expense over the deposit.

Panel regression model

Most previous studies used a fixed effects model as this model is particularly suitable to account for the unobserved heterogeneity across banks. In this study, the fixed effect model is the baseline model and its outcome is compared with the pooled OLS and random effect panel model. The Breusch and Pagan (LM) test and Hausman test were employed to select the most appropriate to model. The *ex-post* IRSP was modeled using the following empirical fixed effect model:

$$\gamma_{it} = \alpha_i + + \alpha_1 * B_{it} + \alpha_2 * \rho_{it} + \alpha_3 * M_t + \alpha_4 * Z_i + \varphi_{it} \qquad Equation\ 3$$

Where i indexes bank and t denotes year. $i = 1,2, \dots, N$ and $t = 1, 2, \dots, T$. γ_{it} is the interest rate spread defined as the difference between interest income over loans and interest expense over the deposit. The constant term is represented by α_i, B_{it} is a vector of bank-specific variables (OPC, ROA, CAR, NPL[6]), ρ_{it} is the market-specific factor (number of workers, bank branches and credit-to-asset ratio). The vector of macroeconomic variables is Mt (Infl, EG, RER). Z_t is the bank-fixed effects that does not vary over time and φ_{it} is the error term.

[5] The reserve requirements arrangement replaced the system of credit ceilings applied since 1968.

[6] Since data on nonperforming loans are not available, provision for bad debts to gross credit has been used to substantiate asset quality of individual banks.

5. Empirical results

5.1 Preliminary analysis results

5.1.1 Preliminary analysis based on data for the ex-ante interest rate approach

Table A.2 in the Appendix presents the correlations between variables. In general, the results points that the variables LQR, NIR, LTA, RER and GDPR are strongly correlated with the dependent variable IRSP. As the variables ROA and OPR, ROA and EG, RER and LTA and GDC and RER are highly correlated (above 0.7). They will be added into the same regression as this will affect the regression parameters.

The Augmented Dickey-Fuller (ADF) test (see Dickey and Fuller, 1979) and the Philips-Perron (PP) test (see Philips and Perron, 1988) were employed to test for stationarity. The outcome of these tests is presented in Table A.3 in the Appendix. Based on the ADF test the variables IRSP, CAR, LTA and INFL are stationary in level, while the PP- unit root test suggested that, the variables CAR, LTA and INFL are stationary in their level form. Based on the result of the two tests the variables CAR and INFL will enter the regression in their level form, as in both test results these variables were found to be highly statistically significant of order I(0).

5.1.2 Preliminary analysis based on data for the ex-post interest rate approach

A summary of descriptive statistics on the variables is presented in Table A.5 in the Appendix. The study covers data from six banks collected over a period of 19 years (2000-2018). Because some of the banks did not existed from the beginning of our study period and one of the banks was not considered a commercial bank, thus this study worked with an unbalanced panel dataset. The overall average IRSP during the reporting period is around 5%. The overall IRSP ranges from 0.8% to 21.7% indicating large disparity in IRSP among banks. Likewise, there is a wide spread among banks LQR, number of workers and credit-to-asset ratio. The macroeconomic variables are constant across individuals (banks in our case) but vary over time. Inflation and RGDP growth have the widest dispersion among macroeconomic variables.

We employed the Im, Pesaran, and Shin (2003) (IPS test) unit root tests to test for stationarity as this test is suitable for unbalanced panel dataset. Results of the IPS unit root test show that except from, LQR, CR, bank workers and bank branches, all variables are stationary in their level form (Table A.6 in Appendix). The non-stationary series were transformed in to first differences.

5.2 Regression Results

The results of the regression, based on bank-specific determinants are presented in Table 1 below. Due to strong correlation existing between some bank-specific variables, the analysis proceeded with the estimation of two regression models. In the first regression, the variable OPR is excluded, while ROA is excluded in the second regression. Furthermore, the diagnostics are presented in Table A.4 in the Appendix.

The empirical results shows that similar to the study of Papavangjeli and Leka (2016), the past interest rate spread explains a lot of the variation in the spread. The coefficient of lag IRSP is positive (0,368 and 0.269 percent point respectively) and statistically significant in both models. This suggested that past IRSP influences future IRSP.

The ROA indicator, which measured the profitability state of the banks, is negatively associated with the interest rate spread. In line with our expectations, the regression outcome provided that higher return on assets ratio caused interest rate spreads to deteriorate. This indicates that profitable banks will tend to charge lower lending rates to attract more customers to gain more market power. A 1 percent point increase in ROA spurs a -0.672 percent point change in the interest rate spread.

Table 1: Results first-stage regression model

Source: Authors' calculations. Note *** p<0.01, ** p<0.05, * p<0.1 significance levels. Robust standard errors in parentheses.

Independent variable: IRSP VARIABLES	**Model 1**	**Model 2**
$\Delta IRSP_{t-1}$	0.368***	0.269*
	(0.115)	(0.139)
ΔROA	-0.672***	
	(0.158)	
ΔNPL	0.0908*	0.0962*
	(0.0467)	(0.0483)
$\Delta LNTA$	-1.603***	-1.624***
	(0.421)	(0.473)
ΔCAR	0.0445	
	(0.0354)	
ΔOPR		0.0286**
		(0.0105)
ΔLQR		0.0154**
		(0.00665)
$Dum2007$	-1.257***	-1.314***
	(0.181)	(0.227)
$Dum2019$	1.879***	1.721***
	(0.138)	(0.226)
$Dum2020$	2.243***	2.038***
	(0.368)	(0.360)
$Observations$	21	21
$R-squared$	0.883	0.856

In both models, there is a positive and significant relationship between credit risk measured by non-performing loans ratio and interest rate spreads as expected. This is not surprisingly, as a higher volume of non-performing loans would require higher lending rates to make up for losses, leading to greater risks in lending. A 1 percent point increase in non-performing loans attributes to an increase of commercial banks interest rate spread by 0.091 percent point in model 1 and 0.096 percent point in model 2. The result is in line with the findings of Demirgüç-Kunt and Huizinga (1999), Brock and Rojas-Suarez (2000) and Randall (1998).

The capital adequacy ratio is positively but statistically insignificant associated with interest rate spreads. The result from the positive coefficient is in line with the dealership model of Ho and Saunders (1981). The dealership implies that, compared to their peers, more risk-averse banks (Banks with a higher capital adequacy ratio) desire higher margins

for each unit of risk they take. The regression outcome suggested that a 1 percent point increase in the capital adequacy ratio of banks causes interest rate spread to increase by 0.045 percent point respectively.

The negative sign and significant coefficient of the total asset in both models is not in line with our expectation. A 1 percent point increase in total asset, leads to a -1.603 and -1.624 percent point decrease in interest rate spread for model 1 and model 2 respectively. The result is contrary to the results found in studies done in the region where market power is present in the banking sector and causes interest rate spread to widen (see Mendoza (1997) and Martin (2010). Considering the market concentration with few banks dominating the banking sector in Suriname, it was expected that this would have an adverse impact on the interest rate spread. The outcome refutes the claims of the monopoly model, which suggest that a bigger market share would enable commercial banks to widen their interest spread because they are able to charge a price that is greater than their marginal cost. Contrary, the result shows to be consistent with the efficient markets hypothesis, which states that, as a commercial bank becomes bigger in terms of market share, it improves its operational efficiency and therefore gains economies of scale, which enables it to maintain narrower interest rate spread.

In consensus with the literature, higher operation costs contributes to higher interest rate spreads. The outcome is also statistically significant implying that as the cost of operating increases by 1 percent, commercial bank spread increases by 0.029 percent point. This result suggests that commercial banks which face increased operating costs do shift their burden to their consumers through wider interest rate spread.

The negative relationship between interest spread and liquidity is consistent with the expectation that high-levels of liquidity decreases the liquidity risk of banks as they become more equipped to deal with shocks. Liquid banks are willing to charge lower rates as they do not have to incur extra costs of sourcing funds when faced with increased demand for credit. A 1 percent point increase in the liquidity position of commercial banks leads to a 0.015 percent point decrease in the spread.

The results of the regression on macroeconomic variables factors and reserve requirement is presented in Table 2. In the first model, RER is excluded as it has strong correlation with the variable Government borrowing from the banking sector.

Regarding the impact of macroeconomic variables on the interest rate spread, results show there exists a positive and statistically significant relationship between inflation and interest rate spread as expected and broadly found in the literature. Higher inflation causes banks to increase their interest rates to maintain the real value of their profit margins. Moreover, higher inflation is often an indicator of growing economic uncertainty, for which the banks seek compensation via higher spreads. The estimated coefficient indicates that 1 percent point increase in inflation leads to 0.024 percent point increase in the interest rate spread in model 1, while a higher lower positive coefficient (0.027) is reported in model 2.

Table 2: Results second-stage regression model

VARIABLES	**Model 3**	**Model 4**
$INFL$	2.353**	2.071**
	(0.860)	(0.770)
EG	-3.444*	-3.218
	(1.852)	(2.574)
$\Delta GDPR$	0.0171*	
	(0.00982)	
$Dum1$	0.464**	0.383*
	(0.171)	(0.215)
$Dum2$	-1.277***	-1.068***
	(0.220)	(0.326)
RER		2.071**
		(0.770)
Constant		4.181*
		(2.180)
$Observations$	-0.473*	-1.791**
$R-squared$	(0.245)	(0.722)

Source: Authors' calculations. Note *** p<0.01, ** p<0.05, * p<0.1 significance levels. Robust standard errors in parentheses.

In line with our expectation and previous studies (e.g. Yildrim, 2002; Birchwood, 2004) economic growth has a negative impact on IRSP. A 1 percent point increase in economic growth decreases the IRSP by 0.034 percentage point. In model 2, the coefficient (0.022) of economic growth is also negative but statistically insignificant.

Government borrowing is positively associated with higher spreads. A 1 percent point increase in government borrowing causes a 0.071 percent point increase in the interest rate spread. The outcome indicates that public sector involvement could cause inefficiency in financial intermediation. More government borrowing to finance debt could lead to a crowding out of private lending but can also be an incentive for banks to raise lending rates. Since the government almost have an unlimited capacity to take loans at relatively higher interest rates than the private sector coupled with the fact that government borrowings are treated as default risk free, private individuals and businesses will have to be prepared to pay higher rates to attract funds away from government. Sound fiscal management can attribute into narrowing the interest rate spread.

In both regressions, the two dummy variables have the expected sign. An increase in the required reserve ratio or a contractionary monetary policy increases the interest rate spread by 0.464 (for model 1) and 0.383 (for model 2) percent point more than a neutral monetary policy stance. On the other hand, a loose monetary policy decreases the interest rate spread by 1.277 (for model 1) and 1.068 (for model 2) percent point more than a neutral monetary policy stance. These outcomes indeed proposed that via the credit channel the main monetary objective (price stability) could be achieved when using the required reserve ratio as monetary instrument. On the other hand, higher reserve ratio causes the interest rate to widen, which may not stimulate financial efficiency.

Among the macroeconomic variables, the real exchange rate has a huge impact on the interest rate spread. In a small open economy like Suriname, exchange rate spikes often signals uncertainty. In addition, the pass-through of exchange rate to inflation is very high, which cause inflation to spike following adjustments in the exchange rate. Banks will than seek compensation for uncertainty via higher spreads. A 1 percent point increase in 0.042 percent point in IRSP.

5.3 Panel Regression Results

The results of the estimated panel models are reported in Table 3 below. The first two models are fixed effects models. The first fixed effect model was estimated using the fixed effect operation while we added bank dummies to estimate the second fixed effect model. The bank dummy variables indicate whether the level of IRSP is heterogeneous across Banks. The reported result show that bank 3 and bank 5 are statistically different from bank 1. These banks tend to have lower IRSP compered to Bank 1. The third model displays the results from the pooled OLS and the last model contains the result from the random effects panel model.

Furthermore, in the fixed effect model the coefficient of the CAR ratio, a solvency ratio, is negative and statistically significant. This result contradicts our early findings when we modeled the *ex-ante* IRSP and our expectation. A one percent point increase in CAR ratio causes IRSP to narrow by 0.818 percentage points, the negative coefficient stipulate banks with a higher solvency level to have lower IRSP. The pooled OLS model and the random effect model reported similar results like our baseline model (referring to the fixed effect model).

In addition, in line with our expectation, previous studies and our early findings, our baseline model suggested that higher operational cost is associated with wider IRSP. A similar result is found in the pooled OLS model and the random effect model. A one percent point increase in OPC leads to widening of the IRSP by 0.199 percent point. In case of the impact of asset quality on IRSP, in line with our previous findings the outcome of our baseline model shows that a deterioration in the asset quality of banks causes the IRSP to increase. A one percent point deterioration in the asset quality of banks causes the IRSP to increase by 0.070 percent point. The result is, however, statistically insignificant. A positive association between asset quality and ISP is also evident in the pooled OLS model and the random effect model but the result is also statistically insignificant.

Table 3: Panel regression outcomes*

VARIABLES	(1) Model Fixed effects	(2) Model Fixed effects2	(3) Model Pooled OLS	(4) Model Random effects
CAR	-0.818***	-0.818***	-1.571***	-1.588***
	(0.194)	(0.194)	(0.261)	(0.264)
OPC	0.199*	0.199*	0.486***	0.490***
	(0.105)	(0.105)	(0.150)	(0.152)
NPL	0.0700	0.0700	0.244	0.276
	(0.344)	(0.344)	(0.524)	(0.532)
RER	120.0***	120.0***	103.3**	96.68**
	(26.10)	(26.10)	(39.67)	(40.12)
ΔLQR	-0.108	-0.108	0.274*	0.03*
	(0.152)	(0.152)	(0.149)	(0.149)
ROA	-2.378*	-2.378**	-4.859***	-4.645***
	(1.203)	(1.203)	(1.617)	(1.637)
Branches	-16.83*	-16.83*	-10.23	-7.111
	(9.974)	(9.974)	(14.77)	(14.90)
BANK = 2		5.292		
		(3.257)		
BANK = 3		-9.006*		
		(5.049)		
BANK = 4		1.346		
		(2.919)		
BANK = 5		-29.38***		
		(3.286)		
BANK = 6		-4.244		
		(3.355)		
Constant	19.50	23.87*	-3.969	3.865
	(13.88)	(13.62)	(19.69)	(19.52)
Observations	84	84	84	84
R-squared	0.374		0.411	
Number of banks	6	6		6

*We excluded Number of workers, CR, Inflation and economic growth from the models, as they were statistically insignificant in all models. Source: Authors' calculations. Note *** p<0.01, ** p<0.05, * p<0.1 significance levels. Robust standard errors in parentheses.

The impact of the RER is in line with our expectations and previous findings. The coefficient of the RER is positive and statistically significant in the baseline model as well as in the pooled OLS model and the random effect model. The baseline model postulated that a one percent point in RER causes the IRSP to widen by 0.120 percent point.

In addition, similar to our early findings the result of the baseline model suggested that banks with higher liquidity ratio tend to have lower IRSP. A 1 percent point increase in the liquidity position of commercial banks leads to a 0.108 percent point decrease in the spread. The results is statically insignificant. Contrary to the fixed effect model, the pooled OLS model and the random effect model hinted that banks with higher liquidity ratio tend to have higher IRSP; the result is also statistically significant.

Moreover, in consensus with the literature and our previous findings the ROA indicator is negatively associated with the IRSP. This result is consistent among the various estimated panel models. A one percent point increase in ROA causes a decline of the IRSP of 2.378 percent point. This indicates that profitable banks will tend to charge lower lending rates to attract more customers to gain more market power. This also reflected in the result of the bank branches, which has a negative coefficient. The baseline model as well as the pooled OLS and random effects model show that larger banks tend to have lower IRSP. An addition bank branch causes the IRSP to narrow by 0.017 percent point.

The result of Breusch and Pagan (LM) test (Table 3) shows the Chibar2 value of 0.00 (p-value =1). The test is in favor of using the pooled OLS model. However, the result of the Hausman Test (Table A.7 in Appendix) presents the $\chi 2$ value of 48.85 (p-value 0.000) which indicates that the given set of data is suitable for the estimation of the model using fixed effect. The fixed effects model is considered to be the best model also because the F-test of the fixed effect model that tested that all individual specific effects are equal to zero could be rejected ($F(5, 71) = 22.97$; Prob > F = 0.000). This means there are individual specific effects.

6. Concluding Remarks

The paper aims at identifying the factors driving interest rate spread of commercial banks in Suriname. This study used both the *ex-ante* and *ex-post* approach to calculate IRSP. Both approaches were employed to complement each other and were necessary to meet the study objective. The study employs an ordinary least squared regression and panel data techniques with annual data from 1999-2021. Based on past empirical studies, several bank-specific and macroeconomic variables were selected.

Among the bank-specific factors, previous interest rate spread, ROA, non-performing loans, BIS-ratio and operational costs are the main factors driving interest rate spread in Suriname. Unlike previous studies done in the region, the study established that market concentration prevailing in the banking sector is negatively associated with interest rate spread. The reserve requirement as a regulation factor influences the spread significantly.

Inflation, government borrowing at commercial banks and especially real exchange rate were statistically significant drivers of the interest rate spread. Policy should be thus aimed at keeping macroeconomic stability, which can broadly be achieved by building resilience to external shocks (such as commodity price shocks) and internal shocks, in particular fiscal shocks that can be minimized through sound fiscal management. Furthermore, thoughtful monetary policy should be conducted given that the reserve requirement ratio has a significant impact on the spread.

While the main monetary objective (price stability) could indeed be achieved, via the credit channel, when using the required reserve ratio as monetary instrument, higher reserve ratios causes the interest rate spread to widen, which may not stimulate financial efficiency on the other hand. When conducting monetary policy, policy makers should be aware of this trade-off between achieving price stability and enhancing financial efficiency that is of importance for financial inclusion and ultimately financial development.

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Appendix

Table A.1: Descriptive Statistics

Variables	IRSP	ROA	LQR	NPL	CAR	OPR	LTA	EG	RER	INFL	GDC
Mean	8.06	1.87	33.64	7.77	10.67	71.68	8.31	2.87	3.24	20.58	16.09
Median	5.64	1.90	32.47	7.90	11.21	66.47	8.46	2.97	3.17	9.30	14.20
Maximum	13.87	3.10	44.31	10.82	13.10	97.37	10.00	8.50	4.36	112.80	46.85
Minimum	4.89	0.11	26.40	2.12	6.80	57.40	5.96	-5.60	2.60	0.60	2.50
Std. Dev.	3.52	0.91	4.58	2.25	1.94	12.47	1.17	3.37	0.51	28.53	12.73
Skewness	0.57	-0.40	0.62	-0.84	-0.79	0.78	-0.34	-0.92	0.66	2.20	1.23
Kurtosis	1.58	2.37	2.68	3.51	2.57	2.42	2.13	3.64	2.46	6.99	3.80
Jarque-Bera	2.78	0.85	1.37	2.59	2.22	2.30	1.01	3.16	1.70	29.39	5.57
Probability	0.25	0.65	0.50	0.27	0.33	0.32	0.60	0.21	0.43	0.00	0.06

Source: Authors' calculations

Table A.2: Correlation Matrix

	IRSP	ROA	LQR	NPL	CAR	OPR	LTA	EG	RER	INFL	GDPR
IRSP	1.00										
ROA	0.21	1.00									
LQR	0.53	-0.43	1.00								
NPL	-0.37	-0.17	0.12	1.00							
CAR	-0.11	0.19	-0.40	-0.54	1.00						
OPR	0.20	-0.87	0.69	0.15	-0.37	1.00					
LTA	-0.90	-0.34	-0.43	0.45	0.05	-0.01	1.00				
EG	0.30	0.73	-0.18	-0.09	0.21	-0.60	-0.29	1.00			
RER	0.92	0.06	0.56	-0.34	-0.17	0.37	-0.73	0.24	1.00		
INFL	0.40	-0.45	0.62	0.00	-0.32	0.58	-0.52	-0.51	0.28	1.00	
GDC	0.74	-0.19	0.55	-0.32	0.14	0.48	-0.52	0.05	0.78	0.28	1.00

Source: Authors' calculations

Table A.3: Unit root test results

	ADF		PP	
Variables	**Level**	**First difference**	**Level**	**First difference**
	Intercept	**Intercept**	**Intercept**	**Intercept**
IRSP	0.070*	0.044**	0.791	0.047**
ROA	0.766	0.003***	0.763	0.003***
LQR	0.339	0.014**	0.136	0.014**
NPL	0.181	0.001***	0.169	0.000***
CAR	0.009***	0.000***	0.009**	0.000***
OPR	0.526	0.000***	0.502	0.000***
LTA	0.0258**	0.003***	0.009**	0.000***
EG	0.212	0.017**	0.212	0.004***
RER	0.635	0.006***	0.635	0.006***
INFL	0.001***	0.000***	0.000***	0.002**
GDC	0.490	0.000***	0.425	0.000***

Source: Authors' calculations. Note *** p<0.01, ** p<0.05, * p<0.1 significance levels.

Table A.4: Residual diagnostics

	Model 1	Model 2	Model 3	Model 4
	P-value:	P-value:	P-value:	P-value:
Test for heteroscedasticity H0: Constant variance	0.388	0.388	0.344	0.347
Durbin-Watson statistic	1.850	1.673	2.042	1.670

Source: Authors' calculations.

Table A.5: Summary of descriptive statistics

Variable		Mean	Std. Dev.	Min	Max	Observations	
IRSP	overall	4.961139	3.280221	0.782383	21.65511	N	90

	between		2.05588	1.866782	7.725253	n	6
	within		2.710136	1.057672	21.07516	T-bar	15
CAR	overall	11.428	7.380807	0	54.03	N	90
	between		4.318823	8.064706	17.68538	n	6
	within		6.401761	1.372615	47.77262	T-bar	15
OPC	overall	5.473121	3.543623	1.828045	22.08917	N	90
	between		2.365915	3.364453	9.740825	n	6
	within		2.724993	0.704235	17.82147	T-bar	15
LQR	overall	21.44677	9.111067	3.598836	42,77723	N	90
	between		8.666407	10.58503	36.17719	n	6
	within		5.900271	1.085072	34.52335	T-bar	15
ROA	overall	1.158696	0.867245	-3.1	4	N	90
	between		0.478984	0.458889	1.743529	n	6
	within		0.757011	-2.73446	3.415167	T-bar	15
NPL	overall	1.896402	2.905267	-0.06427	21.94062	N	90
	between		0.726411	0.932953	2.522171	n	6
	within		2.833389	-0.59998	21.49708	T-bar	15
CR	overall	53.08548	17.83297	22.09754	92.25871	N	90
	between		13.09424	40.10624	76.81938	n	6
	within		12.05156	7.88062	69.95857	T-bar	15
Workers	overall	203.9667	128.7667	36	496	N	90
	between		127.623	55.76923	389.6842	n	6
	within		39.37081	140.2825	310.2825	T-bar	15
Branches	overall	5.6	3.001123	1	10	N	90
	between		3.036767	1	8.736842	n	6
	within		1.099265	2.830769	7.830769	T-bar	15
INFL	overall	6.683747	2.602749	4.8	13.6	N	90
	between		1.081154	5.235874	7.616993	n	6
	within		2.417787	3.866754	12.66675	T-bar	15
EG	overall	2.88556	3.316101	-4.9	8.5	N	90
	between		0.626657	1.675345	3.249674	n	6
	within		3.276694	-5.26411	8.146378	T-bar	15

RER	overall	0.330722	0.037885	0.222545	0.384528	N	90
	between		0.012223	0.321383	0.349513	n	6
	within		0.036368	0.231885	0.393868	T-bar	15

Source: Authors' calculations.

Table A.6: Im-Pesaran-Shin unit-root test Panel Unit root test

Variable	Statistic	P-value
IRSP	-2.8511	0.0022***
CAR	-3.7350	0.0001***
OPC	-2.1724	0.0149*
LQR	-0.5575	0.2886
ROA	-2.2614	0.0119*
NPL	-1.6629	0.0482*
CR	-0.5429	0.2936
Workers	-0.9642	0.1675
Branches	0.1075	0.5428

Source: Authors' calculations. Note *** p<0.01, ** p<0.05, * p<0.1 significance levels.

Table A.7: Breusch and Pagan Lagrangian multiplier test for random effects and Hausman test.

Test	Null Hypothesis	chibar2/χ2	Probaility
Breusch and Pagan Lagrangian multiplier test for random effects	No random effects	0.00	1.000
Hausman test	Difference in coefficients not systematic	48.85	0.000

Source: Authors' calculations.