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RESEARCH PAPER

The Effect of Macroeconomic Variables, Banking Variables, and Institutional Quality on Banking Lending Power in Iraq

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Abstract
The primary aim of this research is to examine the factors influencing the performance of banking loans in Iraq. The study utilizes unbalanced panel data over eighteen years, from 2005 to 2022, focusing on eighteen selected listed banks at the Iraq Stock Exchange (ISX) based on data availability. Data sources include annual financial reports from selected banks, the Central Bank of Iraq, and World Bank indicators (WDI) covering banking, macroeconomic, and institutional quality information. The relationship is estimated using a system generalized method of moment (SGMM) approach. The results indicate that certain banking variables such as bank assets, return on assets (ROA), and deposit-to-capital ratio have a positive and significant impact on lending power in Iraq, while the real deposit rate has a negative influence. Among macroeconomic variables, the inflation rate, real exchange rate, and liquidity growth have significant adverse effects on lending power, while economic prosperity and GDP growth yield positive effects. During economic booms, bank lending power increases, while it decreases during recessions. The study also highlights the positive and significant impact of institutional quality on bank lending power, indicating the importance of robust legal and regulatory institutions in establishing a stable and predictable financial environment, and fostering confidence among banks to engage in lending activities within the Iraqi economy.
Keywords: Banking lending power, Banking Variables, Iraq, Macroeconomic Variables, System GMM.
JEL Classification: C23, E44, G20.

1. Introduction
The economies of many countries, including Iraq, heavily rely on the banking system for various institutional and structural reasons. The banking system in these countries plays a pivotal role in providing financial resources to economic actors, facilitating the circulation of financial capital, directing liquidity towards

productive activities, and supporting economic growth. The significance of banks in the Iraqi economy lies in their crucial role as intermediaries between the supply and demand of financial resources. Any inefficiency or shortcomings in the banking sector can lead to disruptions in other economic areas.

An analysis of deposit amounts and loan balances of banks listed on the Iraq Stock Exchange reveals a declining trend in the loan-to-deposit ratio. This trend poses a significant challenge to the Iraqi economy, as it implies a reduction in the lending capacity of banks and a decrease in their ability to finance economic activities. The decline in the lending capacity of banks will have a profound impact on providing capital for existing production units and financing for new production projects in the Iraqi economy.

Since the 2008 financial crisis, there has been a renewed interest in studying the role of bank lending in the economy, particularly in the money creation process. The credit creation theory emphasizes the significant role of commercial banks in money creation, considering various constraints such as regulatory factors, credit demand, and the behavior of non-banks. Another area of literature, known as the credit channel, posits that bank lending activities are influenced by both credit demand and supply sides. Thus, maintaining and promoting the lending power of banks is essential for the country, especially in the face of economic fluctuations and challenges in the banking system.

Given the structural and institutional challenges in the banking system, the weak performance of the banking system in fulfilling its duties is a significant issue. Therefore, reforming the banking system is necessary, starting with identifying the fundamental roots of the problems and prioritizing these issues correctly for resolution.

The performance of banks in terms of receiving deposits and giving loans can be influenced by both banking and economic factors. Economic conditions, such as inflation, exchange rates, and money supply, play a crucial role in affecting banks' behavior. Additionally, internal bank factors, such as banks' assets and loan ratios, also can be effective on the banking system. Prudent lending practices are crucial for sustainable economic growth and stability, as inefficient lending practices may hinder economic progress and lead to financial instability. In addition, legal and regulatory framework, political stability, and transparency and accountability are critical for creating a favorable environment for banks to operate in. This will enable banks to assess the creditworthiness of borrowers more accurately, leading to a reduction in non-performing loans and an increase in lending power. So, it is clear that institutional quality can play a

critical role in determining the lending power of banks in Iraq. Improving institutional quality is essential for creating a favorable environment for banks to operate in, promoting economic growth and development, and increasing the confidence of investors and depositors in the banking system.

Given the limited discussions and insights within the Iraqi banking sector, and the substantial financial reforms and deregulation in recent years, this study aims to analyze the determinants affecting bank lending, with a specific focus on bank-specific characteristics, monetary policy stance, macroeconomic variables, and institutional quality. The research aims to provide valuable guidance for policymakers and regulators in Iraq.

The study is organized into five sections, beginning with a review of existing literature, followed by an explanation of the research methodology. The subsequent section presents a model estimation, summary of results and their interpretation, with the final section offering conclusions and recommendations.

2. Literature Review

The literature typically represents the supply of bank loans as a function of internal and external determinants. Internal determinants, also referred to as micro- or bank-specific determinants, pertain to factors within the control of the bank. External determinants, on the other hand, are variables unrelated to bank management that reflect the broader monetary, economic, and legal environment impacting the operations and performance of financial institutions (Latif et al., 2019). The relationship between macroeconomic factors and the lending behavior of commercial banks is a critical aspect of the overall bank lending function in an economy. The lending patterns of most banks are influenced by the signals emanating from the overall economy (Sanfilippo-Azofra et al., 2018). When banks perceive the macroeconomic environment as stable, they anticipate that borrowers across various sectors will have an enhanced capacity to repay loans. This expectation is based on the assumption that improved economic stability enables borrowers to more accurately predict their income streams throughout the loan period (Sashana, 2012). Gelen and Camilo (2011) conducted a study on the influence of business cycles on the lending power of commercial banks in developing countries, including Argentina, Brazil, Chile, Egypt, India, Indonesia, Pakistan, Peru, The Philippines, Thailand, Turkey, and Ukraine, during the period 1996-2008. The key variables considered were domestic gross product and loan interest rates, with macroeconomic variables serving as controls and factors related to commercial banks. The findings indicate that the most significant

variable affecting commercial bank lending was the growth of domestic product, with the loan interest rate being the most influential variable.

Baum et al. (2005), suggest that, given the necessity for banks to gather costly information on borrowers before extending loans to new or existing customers, uncertainty about economic conditions and the likelihood of loan default can significantly impact their lending behavior, influencing the allocation of available funds. Banks tend to issue more loans during periods of economic expansion and reduced macroeconomic uncertainty, while restricting lending during economic downturns. The economic environment serves as a systematic risk factor affecting all participants in the economy. The state of the economy is typically assessed through macroeconomic aggregates, encompassing variables such as gross domestic product (GDP), employment levels, industrial capacity utilization, inflation, money supply, and changes in the exchange rate (Talavera et al., 2006). The fluctuations in these macroeconomic factors, among others, indicate that banks adapt their lending behavior based on signals from these factors, influencing the volume of lending by commercial banks to different sectors in the economy. Fawad and Taqadus (2013) noted that when banks anticipate a positive trajectory in sector balance sheet growth due to favorable macroeconomic performance, they tend to support these sectors through increased credit growth. Historical banking crises, particularly those in Latin America (1994) and South-east Asia (1997), have revealed a close association between business cycles and the lending behavior of banks. Experimental investigations on this matter have indicated that the lending behavior of major European banks is not cyclical, whereas it tends to be cyclical in smaller banks.

The bank lending channel theory is a concept that provides insights into the relationship between monetary policy, bank lending, and the broader economy. According to this theory, changes in monetary policy, particularly those related to interest rates set by the central bank, have a direct impact on the lending behavior of commercial banks. Expansionary monetary policy, which involves lowering interest rates, typically stimulates an increase in the availability of loans from banks. This is because lower interest rates make it cheaper for banks to borrow funds, encouraging them to extend credit to businesses and individuals. On the other hand, contractionary monetary policy, which involves raising interest rates, can lead to a decrease in the amount of loans offered by banks, making it more challenging for borrowers to access funds. (Sanfilippo et al., 2018). Matemilola et al. (2015) undertook a time series investigation employing the momentum threshold autoregressive method and an asymmetric error correction model. Their

findings indicated that the lending rate of banks tended to align with a decrease in the South African money market rate. Additionally, the study observed that most commercial banks in South Africa typically adjusted lending rates downwards, while demonstrating rigidity in raising lending rates, thereby aligning with the customer reaction proposition. In a separate study, Manamba (2014) utilized co-integration technique analysis with macro-level quarterly data spanning from 1986 to 2012. The study revealed that the interest rate spread was notably influenced by the lack of intense competition among financial institutions, as well as other factors such as the presence of diseconomies of scale within the broader financial system. Furthermore, the study highlighted that an increase in the proportion of liquid assets led to a reduction in bank liquidity risk, consequently resulting in a lower interest rate spread. Krylova (2002) asserted that the implementation of a restrictive monetary policy results in a decrease in bank deposits, consequently reducing banks' lending power. The decline in bank credit availability leads to a reduction in investments, ultimately impacting real GDP negatively. In essence, a restrictive monetary policy triggers a reduction in bank deposits, which cannot be easily offset by alternative sources. Consequently, this outcome may result in some loan applicants being excluded from the process, leading to a subsequent decrease in investment and production. Gunji and Yuan (2010), conducted an analysis of bank profitability and lending behavior in China during the period 1985 to 2007. Their findings suggested that the impact of monetary policy on the lending of large banks and banks with lower cash reserves is weaker, and their responses to monetary policy in terms of finance are not distinct. Additionally, to gain a clearer understanding of the bank lending channel, they examined whether the impact of monetary policy, considering profitability, differs. The results indicated that profitable banks are less sensitive to monetary policy, as cash restrictions leading to deposit reduction result in higher financing costs for less profitable banks. Bernanke and Blinder (1988) demonstrated that a cash-restricted policy results in cost reduction by lowering loan payments, as cash restriction diminishes deposits on the debit side of the bank's balance sheet. Assuming that loans and bonds on the right side of the assets' balance sheet are imperfect substitutes, there is no inherent inclination for them to adequately compensate for the drawbacks of reduced deposits through reductions in holding bonds. Consequently, cash restriction leads to a reduction in the lending power of commercial banks.

In developing countries, where bank financing is a critical source of funding for businesses and individuals, the bank lending channel plays a

significant role in influencing economic activity. The theory also emphasizes the role of bank deposits in influencing lending activities. When there are policies that result in high lending interest rates, the amount of loans offered by banks tends to decrease, impacting the overall availability of credit in the economy. Furthermore, the theory highlights the importance of bank reserves and liquidity in influencing lending activities. Studies have shown that banks with higher levels of liquidity are better able to maintain their credit supply despite changes in monetary policy. This suggests that the level of bank reserves and liquid assets can impact the ability of banks to continue lending during periods of monetary policy tightening. (Vo and Nguyen, 2014) Understanding the Bank Lending Channel Theory is crucial for policymakers, economists, and market participants as it provides valuable insights into how changes in monetary policy and banking variables can influence the lending power of banks and, consequently, the overall functioning of the economy. By considering the dynamics of the bank lending channel, policymakers can make informed decisions regarding monetary policy and its potential impact on credit availability and economic growth (Vo, 2018).

The concept of the credit channel of monetary policy was originally developed by Neo-Keynesians, positing that the transmission mechanism of monetary policy is influenced by a credit shortfall. This idea is rooted in the presence of asymmetric information and disparities in credit markets. The credit channel can impact the transmission of monetary policy through both the balance sheet and bank lending channels. According to the bank lending channel, it is presumed that bank credits serve as the primary source of funding for small and medium-sized enterprises, playing a crucial role in facilitating the flow of money and connecting the monetary, financial, and real economic sectors (Filardo et al., 2020). It is expected that a bank with higher assets is better positioned to extend loans. The levels of a bank's capital and assets play a determining role in their lending capacity. A higher volume of assets corresponds to a greater inclination to provide loans. Various regulations and constraints governing loan disbursement are associated with the size of a bank. Consistent with prior research, under restricted credit conditions, the magnitude of a bank's assets plays a critical role in determining its lending capacity. Previous studies have demonstrated that the quantity and scale of a bank's reserves significantly impact its lending capacity (Bernanke and Gertler, 1987; Kashyap and Stein, 2000). Deposits constitute the primary inflow of cash for banks. The deposit-to-assets ratio signifies the degree to which a bank relies on customer deposits. A higher deposit-to-assets ratio corresponds to an increased lending capacity for a bank.

Banks typically establish the loan-to-asset ratio within a framework stipulated by the central bank. This ratio serves as a risk-taking criterion, indicating the bank's asset level without factoring in credit risk coverage. Generally, banks with larger assets possess greater flexibility to extend more loans, particularly when not under acute pressure or financial constraints.

3. Data and Methodology

3.1 Model and Data Description

The analysis of the determinants of lending power in the Iraqi banking sector involves an examination of bank portfolio behavior across banks and over time. Employing a panel data regression model, this study utilizes data spanning an eighteen years period from 2005 to 2022, encompassing eighteen banks in Iraq. The model specification aligns with the approaches of Lee et al. (2022), Roulet (2018), Maurin and Toivanen (2010). The nexus between bank's financial position, monetary and macroeconomic variables, and its lending power can be conceptually elucidated as follows: during stable periods, banks seize perceived investment opportunities and respond more precisely to loan demand, leveraging their understanding of their balance sheet position and regulatory landscape. Conversely, in times of uncertainty where predicting returns on bank lending is challenging due to an environment lacking identifiable profitable lending opportunities, lending activity diminishes. The estimation strategy explores the interplay where lending capacity is contingent on monetary policy stance, economic activities, institutional quality, and bank-specific characteristics. Following the methodology of Adams and Amel (2005) and other mentioned literature, the lending power of bank i in period t serves as the dependent variable as follow:

$$LOA_{it} = \alpha_0 + \alpha_1 DUM_{it} + \gamma_0 Z_{it} + \delta_0 M_{it} + IQ_{it} + \varepsilon_{it} \quad (1)$$

where LOA is the dependent variable of the model and it equals to the total loan to bank's asset ratio at time t. DUM is the dummy variable and it is an indicator of economic boom (business cycle). We filter GDP by using Hodrick -Prescott Filter in order to determine business cycle. This method separates time trend element from variability element of GDP. Variability element of GDP called business cycle. It is shown in Fig.1. According to the pro-cyclicality theory of bank lending, banks tend to increase their lending due to economic prosperity.

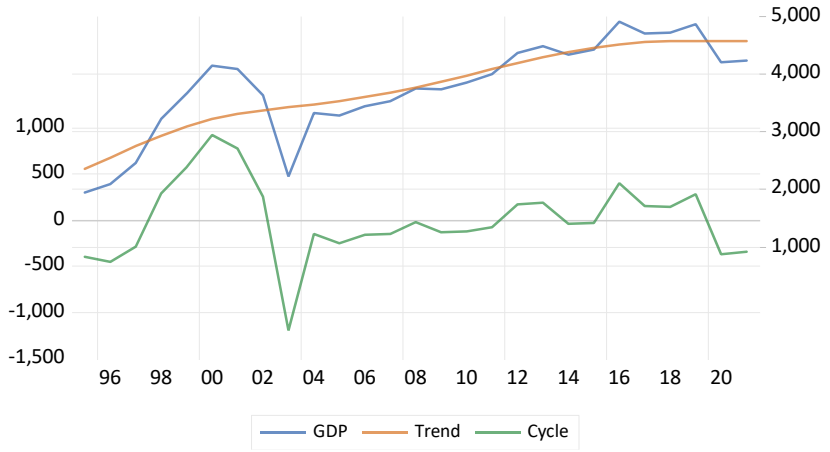

Figure 1. Hodrick-Prescott Filter
Source: Research finding; source of data: WDI.

Z_{it} is a vector of variables describing characteristics of the entire commercial banking system include, LnA_{it} is the natural logarithm of Assets for bank i at the time t, ROA_{it} is the bank's return on assets (ROA), and measured by the ratio of net income to total assets at the time t, and DOK_{it} is the bank deposit to capital ratio at the time t, R_{it} is a real interest rate on saving deposits. M_{it} is a vector of macroeconomic variables describing other dimensions of the economy over time, include: INF_{it} is the percentage of variation in consumer price index (CPI) as an inflation rate, EXR_{it} is the real exchange rate and GM_{it} is the liquidity growth. IQ_{it}, represents the institutional quality index. Institutional quality is a multi- dimensional one that cannot be measured with just one index. Therefore, in this research, in order to accurately measure this index from the six global sub-indices of the governance indices provided by the World Bank, Such as the stability of the government and its effectiveness, political stability, lack of violence, terrorism, quality of legislation, rule of law and accountability. The sub-indices used have been combined to reach one index using the PCA method (Dogan et al., 2020a). The data utilized for this research was sourced from the central Bank of Iraq, Iraq Stock Exchange (ISX) and the World Bank Indicators, encompassing a comprehensive array of indicators and indexes pertaining to the country of Iraq. The analytical framework employed panel data spanning over a period of eighteen years, from 2005 to 2022. The regression equation of the research based on all research variables of Model 1 can be written as follows:

$$LOA_{it} = \alpha_1 LOA_{it-1} + \alpha_2 DOK + \alpha_3 ROA_{it} + \alpha_4 LnA_{it} + \alpha_5 INF + \alpha_6 EXR_{it} + \alpha_7 GM_{it} + \alpha_8 R_{it} + \alpha_9 IQ_{it} + \alpha_{10} DUM_{it} + \eta_i + \lambda_t + \varepsilon_{it} \quad (2)$$

η_i and λ_t express individual fix effects (sectional) and time effects (virtual time variable) respectively, and ε_{it} is the disturbance term. In equation 2, η_i is sectional effects (bank) that contains unseen and immeasurable variables Which are effective on the loan to bank's asset ratio of Iraq banks. A summary of used variables and statistical references is presented in Table 1.

Table 1. Definition of Variable

Variable	Definitions	references
Banking Variables		
Loan to assets Ratio(LOA)	It is measured by the ratio of total loan to total assets of banks	ISX
Deposit to capital Ratio (DOK)	It is measured by the ratio of total Deposit to total capital of banks	ISX
Bank's Return on Assets (ROA)	It is measured by the ratio of net income to total assets	ISX
Log of Total Asset(A)	logarithm of total assets	ISX
Real Interest rate(R)	Indicates the interest rate on saving deposits is the rate paid by commercial or similar banks for demand, time, or savings deposits.	CBI
Economic Variables		
GDP	Indicates rate of growth of GDP	WDI
Liquidity Growth (GM)	Indicates the growth rate of broader measure of money supply	WDI
Inflation (INF)	Indicates the rate of inflation	WDI
Real Exchange Rate (EXR)	The exchange rate of Iraqi Dinar to Us Dollar	WDI
Institutional Variable		
Institutional quality (IQ)	The stability of the government and its effectiveness Political stability Absence of violence Terrorism The quality of legislation and the governance of accountability law	WDI

Source: Research finding.

Some of the descriptive statistics of the variables have been presented in Table 2.

Table 2. Descriptive Statistics

variable	Mean	Maximum	Minimum	Standard Deviation
Banking variable				
L (Loan)	192656	11201156	82.1	413144.5
A (Assets)	10152231	20937886	2013.7	344485
K (Capital)	16121.4	108270/7	9.1	31084.4
D (Deposit)	196401.9	1117432	729.2	306071.8
Real deposit rate	6.72	10.54	4.77	1.8011
Deposit to capital Ratio (DOK)	116.48	1968.9	.01	350.64
Bank's Return on Assets (ROA)	66.05	1068.25	6.47	192.9
Loan to assets Ratio (LOA)	0.36	0.44	0.23	0.05
Natural Logarithm of asset	11.11	16.85	7.19	2.54
Macroeconomic variable				
GDP Growth	1.57%	11.02%	-13.39%	5.32%
Liquidity Growth (GM)	25.8	41.3	6.02	8.7
Inflation (INF)	4.42%	12.82%	-0.4555%	3.345
Real Exchange Rate (EXR)	1230.19	1457.41	1166	106.93
Institutional Variable				
Institutional Quality (IQ)	-1.48	2.037490	-3.120600	1.091031

Source: Research finding.

A summary of descriptive statistics has been provided in Table 2. Based on the data presented in this Table, a significant observation pertains to the notable disparity in the standard deviation between capital and loan, as well as assets and deposits within the banking sector. On average, the banks' lending surpasses their capital reserves. The average loan to asset ratio stands at 0.36, indicating that during the research period, the banks allocated a sum equivalent to 36% of their asset to lending. This discrepancy highlights a substantial concern, suggesting that Iraqi commercial banks consistently faced challenges related to capital

intensification. The deposit rate had a minimum value of 4.77%, a maximum value of 10.54% with a mean of 6.72% and a deviation from the mean of 1.80%. Inflation rate ranged from a minimum of -0.45 % to 12.82% with a relatively low deviation from the mean of 3.345% and a mean value of 4.42%. The GDP growth rate was observed to have almost low dispersion from the mean of 5.32. it has been found to have a range of minus 13.39% to 11.02% with a mean value of 1.57.

3.2 Econometric Methodology

As stated before, the Equation 2 is used in order to investigate the effect of macroeconomic, banking and institutional variables on banking system lending power in Iraq. By assuming that ε_{it} follows a one-way disturbance term model (i.e., only one factor causes the variations between cross sections), we can then conclude that: $\varepsilon_{it} = \mu_i + v_{it}$ which $\mu_i \approx IID(0.\delta_\mu^2)$ and $\mu_i \approx IID(0.\delta_\mu^2)$, they are independent of one another in each section. In the estimation of panel data models, the initial consideration pertains to the nature of η_i (or section effects), whether it is fixed or random. The fundamental assumption in the random effects model posits that the section effects are unrelated to the explanatory variables. Islam (1995) contends that given the rejection of this assumption in estimation of Model 2, the utilization of the random effects method is deemed inappropriate. While the fixed effects method does not encounter issues with the relationship between section effects and explanatory variables, it is unable to address the endogeneity bias of the explanatory variables. Conversely, owing to the dynamic structure of the model, Hsiao (1986), and Arellano and Bound (1991) have demonstrated that the fixed effects method yields incompatible estimations. In line with the findings of Baltagi (2001) and Arellano and Bound (1991), the application of the Two-stage least squares (2SLS) method or the generalized method of moments (GMM) is recommended, as model (2) exhibits endogeneity of explanatory variables and dynamic structure issues. In the context of the Two-stage least squares method, the use of certain types of instruments may lead to overestimated coefficients variance and yield incompatible results. Consequently, the most suitable estimator for panel dynamic models is the generalized method of moments (GMM) estimator. Within the GMM estimation method, the bias stemming from the relationship between explanatory variables and fixed effects expression is eliminated by taking the first order of difference from equation 1, thereby omitting the fixed effects expression. To address the endogeneity issue of independent variables, their lags can be employed as instruments. Generally, the

GMM estimator is categorized into two groups: the first-order difference estimator (introduced by Arellano and Bound, 1991) and the system generalized method of moments estimator (introduced by Blundell and Bound, 1998).

Arellano and Bound (1991) originally proposed using the lag of dependent variables as instruments at the level, but subsequent studies by Blundell and Bound (1998), as well as Jaeger and Bound and Baker (1995), demonstrated that lagged variables at the level are weak instruments for the regression equation in difference. To address this issue, Blundell and Bound (1998) recommended the use of the system GMM estimator, which combines a regression in the level with a regression in differences within a system. It is important to note that the validity of results obtained from the GMM method relies on the accuracy of the underlying hypotheses. The m_j statistic is employed for testing autocorrelation in the error term, while the Sargan statistic is utilized to assess the validity of the applied instruments.

The Generalized Method of Moments (GMM) approach is widely acknowledged as a superior method for estimating economic models. In particular, due to the presence of individual fixed effects in Model 2, which are correlated with the system, the GMM approach is considered to be more efficient than other methods. Additionally, the inclusion of the dependent variable lag (LOA_{it-1})) in the model estimation can result in incompatibility. To address the issue of individual fixed effects in Model 1, a first-order difference is taken from Model 2.

$$\begin{aligned}\Delta \mathrm{LOA}_{\mathrm{it}} = {} & \alpha_1 \Delta \mathrm{LOA}_{\mathrm{it-1}} + \alpha_2 \Delta \mathrm{DOK} + \alpha_3 \Delta \mathrm{ROA}_{\mathrm{it}} + \alpha_4 \Delta \mathrm{LnA}_{\mathrm{it}} + \alpha_5 \Delta \mathrm{INF} \\ & + \alpha_6 \Delta \mathrm{EXR}_{\mathrm{it}} + \alpha_7 \Delta \mathrm{GM}_{\mathrm{it}} + \alpha_8 \Delta \mathrm{R}_{\mathrm{it}} + \alpha_9 \Delta \mathrm{IQ}_{\mathrm{it}} + \alpha_{10} \mathrm{DUM}_{\mathrm{it}} \\ & + \Delta \eta_{\mathrm{i}} + \Delta \lambda_{\mathrm{t}} + \Delta \varepsilon_{\mathrm{it}}\end{aligned} \quad (3)$$

Δ represents the operator for the first-order difference in the model. Using the OLS method as an estimator for the first-order difference in the model is not appropriate, as the estimates will be incompatible and upward biased due to the correlation between the lag of the model's dependent variable (ΔSDG_{it-1}) and the individual fixed effects (Δv_{it}). modified to include the lagged dependent variable as an instrumental variable in the level equation, and the model is estimated using the GMM approach, as suggested by Arellano and Bound. This estimator is known as the first-order difference GMM estimator. However, this approach has a weakness in terms of non-stationary instrumental variables. To address this issue, Blundell and Bound (1998) proposed the system GMM estimator, which was originally introduced by Arellano and Bover (1995). This estimator employs different types of lagged dependent variables in the instrumental variables'

matrix. Based on simulation results, the system GMM estimator is more efficient when the coefficient of the lagged dependent variable is closer to 1. Therefore, the same estimator has been used in this study, with the inclusion of controlling variables. The modified general research model is as follows:

$$\begin{aligned}\Delta LOA_{it} = {} & \alpha_1 \Delta LOA_{it-1} + \alpha_2 \Delta DOK + \alpha_3 \Delta ROA_{it} + \alpha_4 \Delta LnA_{it} + \alpha_5 \Delta INF \\ & + \alpha_6 \Delta EXR_{it} + \alpha_7 \Delta GM_{it} + \alpha_8 \Delta R_{it} + \alpha_9 \Delta IQ_{it} + \alpha_{10} DUM_{it} \\ & + \Delta\lambda_t + \Delta v_{it}\end{aligned} \quad (4)$$

4. Empirical Result

In this section of the study, the research model will be estimated using the system GMM method. A series of pre-estimation tests and post-estimation tests will be conducted before each estimation. The results of all these diagnostic tests will be presented. The system GMM according to Roodman (2009) exploits the time series element of the data, controls for bank-specific effects, allows for the inclusion of lagged dependent variables as regressors and controls for the endogeneity of explanatory variables. As a result, diagnostic tests are conducted to check the validity of the results.

4.1 Cross-Sectional Dependence Test

Prior to estimating panel models, it is essential to assess the stationarity of variables. To select the appropriate unit-root test, a cross-section dependence test should be conducted before the panel's stationary test. Various unit-root tests, such as the Generalized Dickey Fuller (ADF), Levin, Lin and Chu (LIC), Fisher Generalized Dickey Fuller (ADFF), Phillips-Peron-Fisher (FPF), Im-Pesaran-Shin (IPS), Breitung, Haudry, and Pesaran (2003), and Pesaran Unit-Root test, are available for investigating the stationarity of panel variables. The choice of a suitable test requires an initial cross-section dependence test (Baltagi, 2005). To examine cross-section dependence, the Pesaran (2015) test, an enhanced version of Pesaran (2004) applicable to both balanced and unbalanced panels, is employed. null and alternative hypotheses for this test are:

$H_0: \rho_{ij} = \rho_{ji} = E(u_{it}v_{it}) = 0$ for all $i \neq j$

$H_1: \rho_{ij} = \rho_{ji} = E(u_{it}v_{it}) \neq 0$ for some $i \neq j$

v_{it} and u_{it} are the error terms of the estimated model. For balanced panels, CD is calculated as following:

$$CD = \sqrt{\frac{2T}{N(N-1)}}\left(\sum_{i=1}^{N-1}\sum_{j=i+1}^{N}\hat{\rho}_{ij}\right)$$

In which $\hat{\rho}_{ij}$ is Pearson correlational coefficients as a pair of residual terms (Pesaran, 2004). Using conventional panel unit-root tests such as Levin test, Lin and Chu (LIC), Im and Pesaran and Shin (IPS) and etc.The presence of cross-section dependence in panel data can lead to spurious unit-root test results. To address this issue, several panel unit-root tests, such as the Pesaran unit-root test, are recommended, even in the presence of cross-sectional dependence. Table 3 presents the results of the Pesaran cross-section dependence test for the research data.

Table 3. Pesaran Cross-Section Dependence Test

Variables	CD-test	p-value	average joint T	mean ρ	mean abs(ρ)	Test Result
Real deposit rate	1.245	0.013	10.83	0.04	0.47	cross-sectional dependence
Deposit to capital Ratio (DOK)	13.613	0.000	10.19	0.30	0.30	cross-sectional dependence
Bank's Return on Assets (ROA)	-1.657	0.007	10.64	-0.06	0.35	cross-sectional dependence
Loan to assets Ratio (LOA)	1.674	0.004	10.00	0.06	0.44	cross-sectional dependence
Natural Logarithm of asset	1.782	0.005	9.80	-0.06	0.24	cross-sectional dependence
Macroeconomic variable	1.486	0.037	10.83	0.05	0.44	cross-sectional dependence
Liquidity Growth (GM)	-1.487	0.037	10.64	-0.05	0.36	cross-sectional dependence
Inflation (INF)	1.487	0.038	10.89	0.05	0.41	cross-sectional dependence
Real Exchange Rate (EXR)	7.776	0.001	10.29	0.16	0.17	cross-sectional dependence
Institutional Quality	-1.455	0.038	10.67	-0.05	0.37	cross-sectional dependence

Source: Research finding.

4.2 Panel Unit-root Test

Next step is to investigate variables stationary. in order to test the stationary of some variables in which cross section dependence is confirmed, we use a unit-root test presented by Pesaran (2003) that considers sectional dependency. This test is based on the generalized T-bar statistic of dicky fuller in each section and is aligned with the presented test by Im, Pesaran, and Shin (IPS, 2003).

Critical amounts of T-bar statistic are calculated by Pesaran[1]. In this test, the null hypothesis is the existence of unit-root. The results of Pesaran unit-root test are shown in table 4. Based on these results, if the probability is less than 0.05, the null hypothesis is rejected and considered variable is stationary.

The next step involves examining the stationarity of variables, particularly those for which cross-sectional dependence has been confirmed. To test the stationarity of such variables, we will employ a unit-root test proposed by Pesaran (2003), which accounts for cross-sectional dependency. This test is based on the generalized T-bar statistic of the Dickey-Fuller test applied to each section and is in line with the test presented by Im, Pesaran, and Shin (IPS, 2003). Critical values of the T-bar statistic are calculated by Pesaran. In this test, the null hypothesis posits the existence of a unit root. The results of the Pesaran unit-root test will be presented in table 4. Based on these results, if the probability is less than 0.05, the null hypothesis will be rejected, indicating that the variable is stationary. The results indicate that some of variables are stationary at level and some of them are stationary with one difference.

Table 4. Pesaran Unit-Root Test

Variable	Z[T-bar]	P-value	Test Result
Real deposit rate	-2.716	0.003	I(0)
Deposit to capital Ratio (DOK)	-1.677	0.047	I(1)
Bank's Return on Assets (ROA)	-2.563	0.005	I(0)
Loan to assets Ratio (LOA)	-2.217	0.013	I(0)
Natural Logarithm of asset	-1.424	0.007	I(0)
GDP Growth	-1.456	0.008	I(1)
Liquidity Growth (GM)	-4.489	0.001	I(0)
Inflation (INF)	-4.524	0.000	I(1)
Real Exchange Rate (EXR)	-1.656	0.009	I(0)
Institutional Quality (IQ)	-4.867	0.002	I(1)

Source: Research finding.

[1]. Pesaran (2007) recommended a test statistic to investigate the unit-root and to consider cross-section dependence by changing IPS and ADF tests, which is known as CIPS and is as follows:

$$CIPS(N.T) = \frac{1}{N}\sum_{i=1}^{N} \tau_j \, (N.T)$$

In which τ_j is CADF pattern statistic for each individual section in the panel. The value of test Statistic will be compared with calculated critical value by Pesaran and if the statistic is more than critical value, null hypothesis will be rejected and stationary of variable will be accepted. With respect to the fact that the research panel is unbalanced and CIPS is only applicable in balanced panels, therefore we use the Pesaran test (2003) in this research.

4.3 Co-integration Test

to ensure the validity of the results, it is important to assess the long-term relationship between variables, especially if some of the variables are non-stationary. There are several tests available to investigate co-integration relationships between variables in panel data, such as the Pedroni co-integration test (1999; 2004), Westerlund co-integration test (2007), and Kao co-integration test (1999). The choice of the appropriate test depends on the number of sections and time series and whether the panel is balanced or unbalanced. For instance, if the number of time series is less than the number of sections, then Pesaran's cross-section independence test would be appropriate, while the Breusch-Pagan cross-section dependence test would be suitable if the number of time series is more than the number of sections (Pesaran, 2004). In this research, since the panel data is unbalanced, the Kao co-integration test will be used to investigate the long-term relationship between variables. The Kao co-integration test is based on the Engle-Granger two-step procedure and considers the homogeneity of panel data in testing co-integration. The null hypothesis, which posits the absence of a co-integration relationship, will be tested using the ADF test in this research.

Table 5. Kao Co-Integration Test

Test statistic	Model
Modified Dickey-Fuller t	-2.0793 (0.0188)
Dickey-Fuller t	-3.7566 (0.0001)
Augmented Dickey-Fuller t	4.8529 (0.0000)
Unadjusted modified Dickey-Fuller t	-2.1794 (0.0147)
Unadjusted Dickey-Fuller t	-3.7869 (0.0001)

Source: Research finding.

Note: The probability of statistics is presented in parenthesis.

It is evident that the co-integration relationship is confirmed in all of the estimated regressions, as indicated by the probability values of the Kao statistic.

4.5 Result and Discussion

The estimation of effects of macroeconomic, banking and institutional variables on banks' lending power in Iraq was conducted with the System GMM. The results provided in Table 6.

Table 6. Long-run Relationship between Variables

Dependent variable is Loan to Asset ratio (LOA)		
Variables	**Variable explanation**	**Coefficient (t statistics)**
LoA(-1)	The lagged value of dependent variable	0.0526 (4.45)
LnA	Natural logarithm of Banks' asset	0.0516 (7.35)
ROA	Bank's Return on Assets (ROA)	0.0134 (3.25)
DOK	Deposit to capital Ratio (DOK)	0.0765 (3.21)
R	Real deposit rate	-0.056 (-3.25)
INF	Inflation rate	-0.0120 (-5.75)
EXR	real exchange rate	-0.0002 (-5.27)
GM	liquidity growth(M2)	-0.0234 (-3.77)
DUM	Dummy variable (business cycle)	0.115 (6.49)
IQ	Institutional Quality	0.056 (3.25)
C	Intercept	0.82 (1.45)
R-squared	0.6387	
Adjusted R-squared	0.5432	
Sargan test	41.128 [0.2946]	
Wald test	235.12 [0.000]	
Arellano–Bond tests	-1.37 [0.172]	

Source: Research finding.

Note: Figures in parenthesis are the t statistic for coefficients. p values for diagnostic tests (Wald, Arellano-bond and Sargan) are reported in brackets. The Sargan test for over identification restriction (which the null hypothesis is that instruments are exogenous); the Arellano–Bond tests for first and second order serial correlation in residuals (which null hypothesis is that there is no serial correlation; and the Wald test for joint significant of parameters.

Table 6 provides the results of the Arellano-Bond test, Wald test and Sargan test, which are diagnostic tests conducted subsequent to estimation. The Wald test assesses the significance of the entire regression, while the Sargan test evaluates the validity of instrumental variables in the model and tests the over-identifying restrictions. The null hypothesis for the Sargan test is the validity of instrumental variables based on the chi-square distribution. The results of this test indicate that in estimated model, instrumental variables are not correlated with model error terms. Therefore, these variables have been correctly chosen, and the model results can be trusted. The Arellano–Bond test, conducted to examine first and second-order serial correlation in residuals, yields results indicating the absence of serial correlation in the model. The null hypothesis, suggesting no serial correlation, is not rejected based on the test outcomes[1].

The results indicate the lagged dependent variable positively influences banking lending power in Iraq. Indeed, the current year banks' lending is influenced by the previous year's results. Thus, the significance of the coefficient on the lagged lending power proxy in our equations confirms the dynamic nature of the model.

Banks performance influenced by their environmental conditions, and their lending behavior is mostly subject to macroeconomic factors such as gross domestic product (GDP), employment levels, inflation, and exchange rates. Therefore, banks adjust their lending behavior in response to these economic indicators. Positive (negative) indicators encourage banks to increase (decrease) lending. Additionally, the loan portfolio of banks may be influenced by their expectations of economic performance. In accordance with the results, the boom in the Iraq's economy accompanies with increasing in the lending power of banking system and the boom dummy variable has a positive and significant effect on banking lending power. It indicates that during different economic periods in Iraq, banks systematically adjust their lending standards in the business cycle. This means that they restrict the provision of facilities during economic recessions due to the potential non-repayment risk, and conversely, facilitate it during economic expansions. During economic boom periods, the economy experiences growth and prosperity, leading to an increase in deposit

[1]. In addition to the estimation of SGMM model, in order to ensure the results obtained in this research, research models were also estimated using dynamic ordinary least squares estimation (DOLS). The results of the DOLS estimation aligned with the findings of the previously estimated model, providing further support for the research's outcomes.

volumes and subsequently, an expansion in loan activities. Consequently, the velocity of money undergoes a rapid upturn. Conversely, during recessionary phases characterized by a reduction in production and transactions, there is a decrease in the demand for bank transfers and loans. In periods of economic upturn, there is a notable increase in the transfer of banking documents. Conversely, during recessions, the frequency of transfers declines, accompanied by a rise in the number of protesting documents. To elaborate, during economic booms, businesses actively seek loans and credit, but during recessions, due to constrained cash flow, the repayment of these commitments encounters difficulties. So, the relationship between real GDP and banking lending power is positively correlated, as GDP serves as a measure of the economy, commercial banks should pay close attention to the overall macroeconomic situation of the country and the factors influencing GDP. During economic booms and impressive GDP growth, banks can confidently extend credit to the economic sectors. Conversely, during economic downturns, banks may exercise caution and limit lending. The growth of liquidity (M2) has a significant negative impact on the lending power of banks in Iraq. An increase in the money supply, represented by an increase in coins, bills, and current accounts, is associated with a decrease in the real interest rate due to rising inflation. This, in turn, increases the opportunity cost of depositing money in banks. Consequently, individuals are more inclined to invest in capital assets rather than making deposits in banks. Therefore, the expansionary monetary policies that result in an increased money supply have diminished the lending power of banks in Iraq. However, the negative and significant effect of inflation on the lending power of banks can provide further evidence for the negative relationship between bank lending power and liquidity growth and fully support this conclusion. Inflation rate also has a significantly negative effect on the lending power of banking system in Iraq. These results indicate that an inflationary environment impedes financial development by constraining borrowers from seeking external financing and prompting banks to prioritize holding liquid assets over engaging in long-term financial projects (Vo, 2018). An increasing in inflation triggers an upsurge in nominal interest rates, coupled with credit rationing by banks, consequently leading to a contraction in investment. This outcome aligns with the findings of Boyd, Levine, and Smith (2001), suggesting that heightened inflation is a sign of diminished long-term financial activity. In economies grappling with high inflation, financial intermediaries tend to curtail lending and allocate capital with

less efficiency. High long-term inflation is synonymous with diminished levels of real activity and/or slower growth rates in the long run.

The exchange rate significantly and negatively influenced the lending power of banks in the examined period in Iraq. A rise in the exchange rate is associated with a diminished ability of customers to repay loans, potentially leading to increased non performing loan. Consequently, there is a reduction in funds flowing into the bank, resulting in decreased liquidity and a constrained supply of facilities. Overall, fluctuations in the exchange rate, coupled with unstable economic policies, can disrupt the market system, contributing to financial crises. Such crises may trigger panic among depositors, prompting widespread withdrawals and diminishing the bank's stable resources, consequently impeding its capacity to extend facilities.

Real deposit rate has significantly negative impact on banking lending behavior in Iraq. The negative coefficients of the deposit rate as a policy rate in Iraq confirm the existence of the bank lending channel. This suggests that when the Iraqi authorities implement a tightening monetary policy, they are successful in reducing the supply of bank loans.

Results of the model reveal a positive and significant relationship between deposit to capital Ratio and banking lending power in Iraq, aligning with the loanable fund theory, which posits that bank loans are contingent on pre-existing savings. The natural logarithm of banks' asset which is a proxy of size of the bank, represents positive and significant impact on lending behavior of banking system in Iraq economy. This supports the idea that larger banks can achieve significant economies of scale, as suggested by Barth et al. (2013), thereby augmenting their credit supply, profitability, and operational efficiency. This aligns with prior research highlighting the connection between bank size and these financial metrics (Bikker and Hu, 2002; Goddard et al., 2004).

Concerning institutional quality, the study reveals a statistically significant and positive impact on the lending power of Iraqi banks. Institutional quality plays a critical role in shaping the environment in which banks operate. Strong institutions contribute to a stable, transparent, and predictable financial system, empowering banks to lend with confidence and efficiency. The relationship between institutional quality and bank lending power underscores the importance of effective governance, legal frameworks, and regulatory environments in fostering a robust financial sector.

5. Conclusion and Policy Implication

Today, economists consider achieving sustainable economic development contingent upon economic growth and the development of the financial sector in a country. The historical experience of developed countries indicates a consistent correlation between economic growth and financial sector growth. In other words, the economic growth and development of any country require the proper allocation of surplus financial resources from savers to investors. Given the current state of the capital market in Iraq, financing various economic sectors is primarily conducted by the banking system. Due to insufficient development of the capital market in Iraq, the banking industry can play a pivotal role in the development and economic growth of Iraq due to its provision of diverse financial and credit services. It can be regarded as a driving, accelerating, and balancing force in the economy. Therefore, identifying the factors influencing the credit allocation of the banking system is of utmost importance. This study investigates the impact of macroeconomic, banking and institutional variables on bank's lending power in Iraq economy. The research utilizes unbalanced panel data spanning eighteen years, from 2005 to 2022, encompassing eighteen selected listed banks at the Iraq Stock Exchange (ISX) based on data availability. The data sources consist of annual financial reports from selected banks listed in ISX, central bank of Iraq and World Bank indicators (WDI), capturing banking, macroeconomic and institutional quality information. The estimation of the relationship employs a system generalized method of moment (SGMM) approach. The findings indicate that within the realm of banking variables, bank asset, bank's return on assets (ROA), and deposit to capital ratio exert a positive and significant influence on the lending power in Iraq. Conversely, the real deposit rate exhibits a negative impact. Among macroeconomic variables, the inflation rate, real exchange rate, and liquidity growth demonstrate significant adverse effects on lending power, whereas economic prosperity/GDP growth yield positive effects. In boom time, the lending power of banks will be increased and when the economy is in recession, it will be decreased. The positive and significant impact of institutional quality on bank lending power is evident, as evidenced by the presence of robust legal and regulatory institutions.

Given the significant positive relationship between GDP and banking credit supply, it is essential that these institutions consider the overall macroeconomic situation and the factors that impact GDP when making lending decisions. Additionally, the liquidity ratio should be carefully evaluated. If the macroeconomic situation is favorable and supportive, banking performance can

be enhanced, and prudent lending behavior can be ensured. Thus, commercial banks must exercise caution and make informed lending decisions to promote sustainable economic growth and stability. To attain their objectives, Iraqi banks must identify the factors influencing successful bank performance, formulating policies to fortify and sustain the stability of the banking sector in Iraq. The evident correlation between banking sector well-being and economic growth underscores the significance of understanding the determinants of banking lending power. This awareness is crucial for regulators and bank administrators, enabling the development of effective strategies to enhance the profitability of Iraq's banking sector.

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