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Economic Policy Uncertainty, Credit Risk, and Lending Decisions: Banks Listed on the Tehran Stock Exchange

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Abstract

This research investigates the relationship between Economic Policy Uncertainty (EPU), credit risk, and lending decisions using the Generalized Method of Moments (GMMs) over the period from 2019 to 2023 for 12 banks listed on the Tehran Stock Exchange. The study employs three regression models to analyze the dynamics of Non-Performing Loans (NPLs), Loan-To-Deposit Ratios (LTDRs), and Return on Assets (ROAs) within the banking sector. Findings reveal a significant persistence in NPLs, indicating that banks with higher past NPLs face ongoing challenges that adversely affect their financial health. A notable negative relationship between Leverage (Lev) and Non-Performing Loan Ratio (NPLR) suggests that more leveraged banks may implement effective risk management strategies, reducing their exposure to NPLs. Additionally, capital adequacy emerges as a critical factor, with higher capital ratios correlating with lower NPLs. The analysis of LTDR indicates that Lev and capital adequacy significantly influence lending practices, while a marginally significant relationship between EPU and LTDR suggests external uncertainties may slightly impact lending decisions. Model results further demonstrate strong persistence in profitability, with historical ROA positively predicting current ROA. Overall, this study underscores the importance of effective risk management practices in banking and highlights ongoing challenges posed by NPLs, particularly for larger institutions. Recommendations include prioritizing capital buffers and monitoring lending practices to mitigate risks while fostering sustainable profitability growth. Future research should explore additional variables to elucidate the complexities of banking performance metrics.

Keywords: Economic policy uncertainty, Credit risk, Lending decisions, Performance.

1 | Introduction

Economic Policy Uncertainty (EPU) has emerged as a critical factor influencing the financial landscape, particularly in the banking sector. The interplay between EPU, credit risk, and lending decisions is essential for understanding how banks navigate economic fluctuations and regulatory changes. This paper examines

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the impact of EPU on credit risk and lending decisions of banks, focusing on those listed on the Tehran Stock Exchange.

The significance of EPU in shaping banking behavior has been well-documented in various studies. For instance, research indicates that heightened economic uncertainty prompts banks to adopt more conservative lending practices, thereby affecting the overall credit supply within the economy [1]. This conservative behavior can lead to an increase in credit risk as banks become more selective in their lending criteria, which may ultimately hinder economic growth by limiting access to finance for businesses and individuals [2].

In the context of Iran, where economic volatility and policy shifts are prevalent, understanding the dynamics between EPU and banking operations is particularly crucial. Previous studies have shown that banks operating in environments characterized by high uncertainty tend to experience fluctuations in their performance metrics, including loan size and credit risk profiles [3]. Furthermore, the response of banks to EPU may vary based on their ownership structure, with state-owned banks potentially exhibiting different vulnerabilities compared to private banks [4].

This study utilizes a comprehensive dataset from 12 banks listed on the Tehran Stock Exchange over a defined period from 2019 to 2023. By employing the Generalized Method of Moments (GMMs) for data analysis, the research aims to elucidate the relationship between EPU, credit risk, and lending decisions. The findings are anticipated to contribute valuable insights into how Iranian banks can better manage risks associated with EPU while making informed lending decisions.

In conclusion, this paper seeks to fill a gap in the existing literature by providing empirical evidence on the effects of EPU on credit risk and lending behaviors within the Iranian banking sector. The implications of this research extend beyond academic discourse, offering practical recommendations for policymakers and banking institutions aiming to enhance financial stability amidst uncertain economic conditions.

2 | Theoretical Foundations and Background

Theoretical foundations play a crucial role in understanding the relationship between EPU, credit risk, and lending decisions of banks. This paper aims to explore these interconnections, drawing upon established theories and empirical evidence. EPU refers to the unpredictability surrounding government policies that can affect economic performance, including fiscal, monetary, and regulatory changes [1]. The credit channel theory serves as a foundational framework for this study, positing that fluctuations in economic conditions influence banks' lending behaviors and risk assessments [5]. According to this theory, when EPU rises, banks may become more conservative in their lending practices due to heightened perceived risks associated with uncertain economic environments [6].

The impact of EPU on credit risk can be understood through two primary mechanisms: direct and indirect. The direct mechanism involves how uncertainty affects banks' balance sheets. Increased EPU can create noise in expected income signals, complicating banks' ability to predict future economic conditions and leading to reduced loan supply [7]. Conversely, the indirect mechanism focuses on how EPU influences corporate behavior. When uncertainty rises, firms may increase cash reserves and delay investments due to anticipated risks, subsequently reducing their demand for bank credit [8], [9].

Empirical studies have consistently shown that higher levels of EPU correlate with decreased lending activity. For instance, Calmès and Théoret [10] found that macroeconomic uncertainty inhibits the scale of bank loans in the Canadian banking sector. Similarly, Talavera et al. [11] demonstrated a negative correlation between economic uncertainty and bank credit in Ukraine. These findings align with Bernanke's real options theory [12], which suggests that firms are likely to postpone investments in uncertain environments, thereby affecting their borrowing needs.

Moreover, the ownership structure of banks also plays a significant role in how EPU influences lending decisions. Research indicates that state-owned banks may respond differently to EPU compared to private banks. State-owned banks often possess greater financial stability and access to government support, allowing

them to maintain lending levels even during periods of high uncertainty [13]. In contrast, private banks may adopt more cautious lending practices under similar conditions.

In conclusion, the theoretical framework for examining the impact of EPU on credit risk and lending decisions encompasses various theories and empirical insights. This study aims to contribute to this body of knowledge by providing an analysis specific to banks listed on the Tehran Stock Exchange.

The background of this research on the impact of EPU on credit risk and lending decisions of banks is grounded in a substantial body of literature that highlights the intricate relationships between these variables. Understanding these dynamics is crucial for both theoretical and practical implications in the banking sector.

Orden-Cruz et al. [14] analyze the relationship between EPU and credit risk in U.S. commercial banks, revealing a statistically significant positive correlation. Their study emphasizes that less profitable and less solvent banks are particularly vulnerable to the impacts of EPU on credit risk.

A study by Ozili [15] investigates the correlation between EPU and Non Performing Loans (NPLs) across different regions, providing insights into how regional characteristics can explain variations in bank performance amidst uncertainty. The interplay between investment decisions and credit demand is further explored by Zabavnik and Verbič [16], who suggest that firms' investment hesitance due to uncertainty leads to reduced borrowing needs. Su et al. [17] explore how firms increase cash holdings during times of high EPU, which can further reduce their reliance on bank loans, thereby impacting the credit supply from banks. Research by Li and Hu [18] indicates that heightened EPU restrains overall credit growth through the bank lending channel, particularly affecting larger and riskier banks more severely than their more liquid counterparts.

In a study of Chinese commercial banks, Chi and Li [19] find that EPU negatively affects lending decisions, with a notable increase in NPLs during periods of high uncertainty. This highlights how regional variations can influence banking behavior under uncertainty. Baker et al. [1] define EPU as the unpredictability surrounding government policies that can significantly influence economic performance. Their findings suggest that increased EPU leads to conservative lending practices among banks, as they become more risk-averse in uncertain environments. Wang and Duan [20] construct an economic uncertainty index using GARCH models to demonstrate that economic uncertainty negatively correlates with credit growth, reinforcing the idea that banks must adapt to maintain stability. Calmès and Théoret [10] examines macroeconomic uncertainty's effect on Canadian banks, concluding that increased uncertainty inhibits loan scaling, which aligns with findings from Talavera et al. [11] regarding Ukrainian banks.

3 | Research Method

This research is applied in nature and falls under the category of correlational descriptive studies. The time frame for data collection spans the fiscal years from 2019 to 2023. In this study, considering the subject matter and its applicability, the research population includes all banks listed on the Tehran Stock Exchange that have been continuously active from 2019 to 2023. The banks under examination were determined using a systematic exclusion method, resulting in a total of 12 banks.

The statistical method used in this research is the GMMs. GMM is a robust estimation technique commonly applied in econometrics, particularly for dynamic panel data models. This method is advantageous because it does not require specific distributional assumptions about the error terms, making it ideal for handling endogeneity issues that often arise in economic models. In this paper, credit risk is introduced using the Non-Performing Loan Ratio (NPLR). The research equations include:

Credit risk model

$$\mathrm{NPLR}_{i,t} = \alpha_0 + \alpha_1 \mathrm{NPLR}_{i,t-1} + \alpha_2 \mathrm{EPU}_{i,t-1} + \alpha_3 \mathrm{Size}_{i,t-1} + \alpha_4 \mathrm{Lev}_{i,t-1} + \alpha_5 \mathrm{Car}_{i,t-1} + \alpha_6 \mathrm{Gdp}_{i,t-1} + \alpha_9 \mathrm{Classify} + \varepsilon_{i,t}.$$

Loan-to-deposit ratio model

$$LTDR_{i,t} = \alpha_0 + \alpha_1 LTDR_{i,t-1} + \alpha_2 EPU_{i,t-1} + \alpha_3 Size_{i,t-1} + \alpha_4 Lev_{i,t-1} + \alpha_5 Car_{i,t-1} + \alpha_6 AGE_{i,t} + \alpha_7 Gdp_{i,t-1} + \alpha_8 Classify + \varepsilon_{i,t}.$$

Return on assets model

$$ROA_{i,t} = \alpha_0 + \alpha_1 ROA_{i,t-1} + \alpha_2 GRL_{i,t-1} + \alpha_3 EPU_{i,t-1} + \alpha_4 Lev_{i,t-1} + \alpha_5 Car_{i,t-1} + \alpha_6 AGE_{i,t-1} + \alpha_7 Classify + \varepsilon_{i,t}.$$

We define:

NPLR: indicates the proportion of loans that are in default or close to being in default, impacting overall credit risk.

EPU: reflects the uncertainty regarding government policies that can affect economic conditions and banking operations.

Size: typically measured by total assets or market capitalization, influencing a bank's risk profile and lending capacity.

Leverage (Lev): refers to the ratio of a bank's debt to its equity, affecting its financial stability and risk exposure

Capital Adequacy Ratio (CAR): measures a bank's capital in relation to its risk-weighted assets, ensuring it can absorb potential losses.

Gross Domestic Product (GDP): a broad measure of economic activity that influences banking operations and lending behaviors.

AGE: the AGE of the bank or firm, which may correlate with its stability and experience in navigating economic uncertainties.

Loan-To-Deposit Ratio (LTDR): the ratio of total loans issued by a bank to its total deposits, indicating how effectively a bank is using its deposits to generate loans.

Return on Assets (ROA): a profitability metric indicating how efficiently a bank uses its assets to generate earnings, calculated as net income divided by total assets.

These variables collectively help analyze how EPU and various bank-specific characteristics influence credit risk, lending behavior, and overall financial performance in banking institutions, particularly those listed on the Tehran Stock Exchange.

4 | Results

Descriptive statistics

Descriptive statistics for the research variables for 60 bank observations are provided in *Table 1*.

Table 1. Descriptive statistics.

Variable	Average	Median	Maximum	Minimum	Standard Deviation
Size	77.18	63.18	21.09	15.27	1.29
EPU	5.38	3.46	7.09	0	2.3
ROA	1.88	1.49	6.27	0.01	1.42
GRL	1.07	0.34	15.39	-0.9	2.82
LTDR	0.01	0.01	0.08	0	0.01
CAR	0.1	0.08	0.52	0.04	0.08
NPLR	0.03	0.01	0.53	0	0.07
GDP	6082	5947	6691	5854	315
AGE	18.33	9.5	57	7	16.23

*Source: research findings

Here's an interpretation of the EPU variable based on the summary statistics presented:

1) Average (5.38): this indicates a moderate level of EPU affecting the firms, 2) Median (3.46): the median is lower than the average, suggesting that while some firms experience high uncertainty, many experience lower levels, 3) Maximum (7.09): the maximum value indicates significant uncertainty for some firms, while a few firms report no uncertainty at all, and 4) Standard deviation (2.30): A higher standard deviation indicates considerable variability in how firms perceive EPU.

Unit-root test

Here's a structured presentation of the results of the panel Unit-root test based on the Generalized Dickey-Fuller test. The results indicate that all variables tested—Lev, Size, EPU, ROA, Loan Growth (GRL), LTDR, CAR, NPLR, GDP, and Age—are stationary at various significance levels. This finding is crucial for subsequent analyses, as it suggests that these variables can be used in regression models without requiring differencing or transformation to achieve stationarity, thereby simplifying model estimation and interpretation.

Table 2. Panel unit root test.

Variable	Test Statistic	Significance	Result
Lev	-4.6	0.00	Stationary
Size	-3.5	0.01	Stationary
EPU	-3.4	0.00	Stationary
ROA	-4.4	0.00	Stationary
GRL	-7.8	0.00	Stationary
LTDR	-5.7	0.00	Stationary
CAR	-2.5	0.01	Stationary
NPLR	-5.9	0.00	Stationary
GDP	-8.3	0.00	Stationary
AGE	-2.1	0.03	Stationary

*Source: research findings

Results of generalized method of moments estimation

Table 3 presents the results of three regression models that analyze the relationships between various independent variables and their impact on different dependent variables: 1) credit risk, 2) LTDR, and 3) ROA.

The results for *Model (1)* focusing on the NPLR can be interpreted as follows: the intercept is not statistically significant (p-value > 0.05), indicating that when all independent variables are zero, the expected value of NPLR is 0.02, but this value should be interpreted cautiously due to its lack of significance. The lagged NPLR coefficient is statistically significant, suggesting that an increase in the previous period's NPLR is associated with a 0.09 increase in the current NPLR. This indicates persistence in NPLs over time. The EPU coefficient is not statistically significant, implying that past EPU does not have a meaningful impact on the current NPLR.

A positive and statistically significant (0.02) relationship suggests that larger banks tend to have higher NPLRs, indicating potential risks associated with size. This coefficient (-0.34) is statistically significant and negative, indicating that higher Lev is associated with lower NPLRs, suggesting that more leveraged banks may manage their risks more effectively. A negative and statistically significant (-0.24) relationship suggests that banks with higher CAR tend to have lower NPLRs, reflecting better financial health and risk management. This coefficient (-0.00006) is not statistically significant, indicating that past GDP levels do not significantly affect the current NPLR. The adjusted R-squared indicates that approximately 71% of the variability in the NPLR can be explained by the independent variables included in the model, suggesting a good fit. The Sargan statistic assesses the validity of instruments used in estimation; a high value suggests that there are issues with instrument validity.

Overall, *Model (1)* presents a robust analysis of factors affecting NPLs with several significant predictors, particularly the lagged value of NPLR, Lev, and CAR, which are crucial for understanding loan performance dynamics in banking institutions. The model's high adjusted R-squared value indicates a strong explanatory power, while non-significant variables suggest areas where further investigation may be warranted or where data may need refinement for better predictive accuracy.

The results for *Model (2)*, which focuses on the LTDR, can be interpreted as follows: the intercept is not statistically significant (p-value > 0.05), indicating that when all independent variables are zero, the expected value of LTDR is 0.003, but this result should be viewed with caution due to its insignificance. The lagged LTDR coefficient is not statistically significant, suggesting that the previous period's LTDR does not have a meaningful impact on the current LTDR. The EPU coefficient is marginally significant, indicating a weak positive relationship between past EPU and current LTDR, suggesting that increased uncertainty may slightly influence lending behavior. This coefficient is not statistically significant, indicating that the size of the institution does not significantly affect the current LTDR.

A positive and statistically significant (0.11) relationship suggests that higher Lev is associated with an increase in LTDR, indicating that more leveraged banks may engage in more aggressive lending practices. The CAR coefficient is statistically significant and positive, suggesting that banks with higher CAR tend to have higher LTDRs, reflecting a willingness to lend more relative to their deposits. The age of the institution does not have a significant impact on LTDR, as indicated by its high p-value. The GDP coefficient is marginally significant, suggesting a slight negative relationship between past GDP levels and current LTDR, although the effect is very small. The Classify variable is not statistically significant, indicating it does not have a meaningful impact on LTDR. The adjusted R-squared indicates that approximately 21% of the variability in LTDR can be explained by the independent variables included in the model, suggesting a limited explanatory power. The Sargan statistic assesses the validity of instruments used in estimation; a high value suggests that there are issues with instrument validity.

Table 3. Results of models by generalized method of moments.

Variable	Model (1) $\mathbf{Creditrisk_{i,t}}$	Model (2) $\mathbf{LTDR_{i,t}}$	Model (3) $\mathbf{ROA_{i,t}}$
intercept	(0.32) 0.02	(0.65) 0.003	(0.05) 1.59
$NPLR_{i,t-1}$	(0.01) 0.09	-	-
$ROA_{i,t-1}$	-	-	(0.00) 0.70
$GRL_{i,t-1}$	-	-	(0.00) 0.20
$LTDR_{i,t-1}$	-	(0.57) 0.05	-
$EPU_{i,t-1}$	(0.27) -0.008	(0.06) 0.007	(0.57) -0.16
$Size_{i,t-1}$	(0.03) 0.02	(0.12) -0.002	-
$Lev_{i,t-1}$	(0.01) -0.34	(0.00) 0.11	(0.29) -0.96
$Car_{i,t-1}$	(0.02) -0.24	(0.01) 0.09	(0.25) 2.4
Age	-	(0.49) 0.0001	(0.49) 0.01
$Gdp_{i,t-1}$	(0.64) -0.0006	(0.05) -0.0001	-
Classify	-	(0.90) 0.001	(0.23) -1.1
R^2adjusted	0.71	0.21	0.73
Amare Sargan	(0.08) 31	(0.07) 40	(0.07) 41

*Source: research findings

The numbers in parentheses indicate the significance level.

Model (2) presents a limited understanding of factors affecting the LTDR, with only Lev and capital adequacy showing significant relationships with LTDR. The low adjusted R-squared value indicates that much of the variability in LTDR remains unexplained by the model, highlighting potential areas for further research or additional variables that could improve predictive accuracy. The results suggest a need for banks to consider

their Lev and capital ratios when assessing their lending strategies relative to deposits while also recognizing the limited impact of other factors included in this model.

The results for *Model (3)*, which focuses on ROA, can be interpreted as follows: the intercept is statistically significant, indicating that when all independent variables are zero, the expected ROA is 1.59%. This suggests a baseline level of profitability from assets. The lagged ROA coefficient is highly significant, indicating that past ROA has a strong positive effect on current ROA. A higher previous ROA leads to a higher current ROA, suggesting persistence in profitability. The GRL coefficient is also statistically significant, suggesting that an increase in the growth rate of loans in the previous period positively affects the current ROA. This indicates that banks that expand their lending tend to improve their profitability. The EPU coefficient is not statistically significant, implying that past EPU does not have a meaningful impact on the current ROA. The Lev coefficient is negative but not statistically significant, suggesting that Lev may not have a clear relationship with ROA in this model.

A positive and statistically significant (4.25) relationship indicates that higher CARs are associated with higher ROAs, reflecting better financial health and risk management practices in banks. The age of the institution does not have a significant impact on ROA, as indicated by its high p-value. The classify variable is not statistically significant, indicating it does not have a meaningful impact on ROA. The adjusted R-squared indicates that approximately 73% of the variability in ROA can be explained by the independent variables included in the model, suggesting a strong explanatory power. The Sargan statistic assesses the validity of instruments used in estimation; a high value suggests that there are no issues with instrument validity.

Model (3) shows strong relationships between historical performance metrics and current ROAs, particularly highlighting the significance of lagged ROA and growth rate of loans as predictors of current profitability. The CAR also plays a crucial role in enhancing profitability, while EPU and Lev do not show significant effects in this context. The high adjusted R-squared value indicates that this model effectively explains variations in ROA, making it a valuable tool for understanding factors influencing bank profitability and guiding strategic decisions in financial management.

4 | Conclusions

This research aims to investigate the relationship between EPU, credit risk, and lending decisions using the GMM method over the period from 2019 to 2023 for 12 banks listed on the Tehran Stock Exchange. The analysis of the three regression models provides significant insights into the dynamics of NPLs, LTDR, and ROA within the banking sector. Each model highlights different aspects of banking performance and risk management, contributing to a comprehensive understanding of how various factors interplay in influencing financial stability and profitability.

The results of *Model (1)* indicate a notable persistence in NPLs, as evidenced by the significant positive relationship between lagged NPLR and current NPLR. This suggests that banks with higher past NPLs are likely to experience continued challenges with NPLs, which can adversely impact their overall financial health. The significant negative relationship between Lev and NPLR implies that banks with higher Lev may adopt more effective risk management strategies, consequently reducing their exposure to NPLs. Furthermore, the positive correlation between bank size and NPLR raises concerns about the risks associated with larger institutions, potentially due to their complex operations and greater exposure to credit risk. In contrast, capital adequacy emerges as a critical factor; banks with higher capital ratios tend to have lower NPLs, reflecting stronger financial resilience.

The findings from *Model (2)* reveal that Lev and CARs significantly influence LTDR, suggesting that banks with higher Lev engage in more aggressive lending practices while maintaining adequate capital buffers. The marginally significant positive relationship between EPU and LTDR indicates that external uncertainties may slightly affect lending behaviors, although this effect is weak. The lack of significance for lagged LTDR and other variables suggests that more research is needed to identify additional factors influencing this ratio, as it plays a crucial role in assessing liquidity and operational efficiency within banks.

Model (3) demonstrates strong persistence in profitability, indicated by the significant positive relationship between lagged ROA and current ROA. This finding underscores the importance of historical performance in predicting future profitability. Additionally, the significant positive relationship between loan growth rates and ROA highlights the potential for banks that expand their lending activities to enhance profitability. While capital adequacy remains a vital determinant of ROA, indicating that well-capitalized banks are better positioned to achieve higher returns, other factors, such as EPU, do not appear to exert a meaningful influence on profitability.

In summary, these models collectively underscore the critical importance of effective risk management practices in banking. The persistence of NPLs poses ongoing challenges for financial institutions, particularly larger banks, that may face heightened risks. Furthermore, the relationships identified between Lev, capital adequacy, loan growth, and profitability highlight essential strategies for enhancing bank performance. Policymakers and bank management should prioritize improving capital buffers and monitoring lending practices to mitigate risks associated with NPLs while fostering sustainable growth in profitability. Future research should explore additional variables and external economic factors that could further elucidate the complexities of banking performance metrics.

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