Economic policy uncertainty, bank nonperforming loans and loan loss provisions: are they correlated?

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Economic policy uncertainty, bank nonperforming loans and loan loss provisions: are they correlated?

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Abstract

This paper investigates the correlation of economic policy uncertainty (EPU) with nonperforming loans and loan loss provisions for 22 developed countries from 2008 to 2017. The findings reveal that economic policy uncertainty is negatively correlated with nonperforming loans and loan loss provisions in the banking sector of EU countries. Also, economic policy uncertainty is negatively correlated with nonperforming loans in the banking sector of the G7 countries while loan loss provision is more responsive to changes in EPU in EU countries. The implication of the findings is that the correlation of economic policy uncertainty with loan loss provisions and nonperforming loans is influenced by regional characteristics.

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1. Introduction

This paper investigates the correlation of economic policy uncertainty (EPU) with bank nonperforming loans and loan loss provisions.

Understanding why policy uncertainty matters for financial institutions and markets is important because it can explain the behavior of financial sector agents in times of rising uncertainty such as the high levels of uncertainty witnessed during and after the 2008 global financial crisis. Financial economists have been studying the reasons why policy uncertainty rises, and why there is policy uncertainty-induced volatility from one financial market to another (Karnizova and Li, 2014; Albulescu et al, 2019; Belke et al, 2018). High policy uncertainty can influence financial institutions to hoard liquidity, reduce cash outflow, reduce lending and reduce risk due to uncertainty about what future economic policies might be. Bank managers constantly face a panoply of correlations between macroeconomic indicators and bank performance indicators as events in the macro economy often affect the activities and performance of banks. Yet the literature has paid little attention to the correlation between bank performance indicators and macroeconomic indicators.

Many studies have been published on the effect of policy uncertainty on banks using econometric models (see, for example, Bordo et al, 2016; Berger et al, 2020). Only few studies have examined the correlation of policy uncertainty and financial performance indicators, and how such correlations change with time, and how correlation tends to increase in times of high policy uncertainty (Ashraf and Shen, 2019). The correlation between macroeconomic indicators, such as policy uncertainty, and bank performance indicators is important to investors or portfolio managers who wish to invest their assets in banks or in financial markets. Investors or managers need to assess whether their investments or assets can withstand times of crisis and correlated events that affect asset prices.

Existing studies on the relationship between EPU and financial performance suffer from several important empirical limitations. One major concern is that these studies sometimes use models that are mis-specified in the sense that they omit variables that have been shown to be important determinants of financial performance. There are two types of empirical studies on the relationship between EPU and financial performance. The first set of studies use event study methodology to assess the short-run impact of EPU on financial performance (see, for example, Ferguson and Lam, 2016; Ait-Sahalia et al, 2012; Ulrich, 2011; Rigobon et al, 2004). The second set of studies investigate the nature of the relationship between some measures of EPU and some measures of financial performance using accounting or financial indicators of bank performance (see, for example, Drobetz et al, 2018; Hu and Gong, 2019; Jin et al, 2019; Ng et al, 2020; Phan et al, 2021). The findings of these studies have also been mixed. The inconsistency of the findings of these studies about the relationship between EPU and bank performance is not surprising,

given the nature of the models that form the basis for empirical estimation. The present study avoids these problems by utilizing correlations to assess the association between EPU and a set of bank performance indicators. Employing correlation analysis can help to verify or invalidate the results from empirical studies that use regression models to estimate the relationship between EPU and bank performance variables.

This study uses correlation analysis to analyze the correlation of economic policy uncertainty (EPU) with bank performance. The findings reveal that economic policy uncertainty is negatively correlated with nonperforming loans and loan loss provisions in the banking sector of EU countries. Also, economic policy uncertainty is negatively correlated with nonperforming loans in the banking sector of G7 countries while loan loss provisions are more responsive to changes in EPU in EU countries. The present study is the first to analyse the association of EPU with nonperforming loans and loan loss provisions under regional classifications such as the EU, non-EU and the G7 countries. This study provides insights on how regional differences might explain the co-movement of EPU with bank nonperforming loans and loan loss provisions.

This study makes three contributions to the literature. First, it extends the literature that examines the consequences of EPU for the banking sector. Prior research in this literature focus on the effect of EPU on bank lending, liquidity and cash holdings (see. Berger et al, 2020; Ashraf, 2020; Bordo et al, 2016; Hu and Gong, 2019; Chi and Li, 2017). The study enriches the literature by shedding light on the effect of EPU on bank balance sheet by analyzing the co-movement of EPU with bank nonperforming loans and loan loss provisions given the difficulty to estimate a more direct cause-and-effect relationship between economic policy uncertainty and nonperforming loans or loan loss provisions. Secondly, this study contributes to the evaluation of the effect of EPU on credit risk management in banks. Frequent changes in economic policies can produce uncertainty shocks which can put risk managers under undue pressure to revalue their asset portfolio and re-estimate the riskiness of banks' loan portfolio on a continuous basis. Thirdly, the study contributes to the literature by analyzing whether regional differences can explain the co-movement of EPU and bank performance indicators.

The rest of the paper is organized as follows. Section 2 presents the literature review. Section 3 present the data and research design. Section 4 present the empirical results. Section 5 concludes.

2. Conceptual framework and related literature

2.1. Understanding economic policy uncertainty

Economic policy uncertainty (EPU) is defined as uncertainty about the effect of new economic policies on the private sector (Ozili, 2021a, Baker et al. 2016). The sources of economic policy uncertainty include inflation uncertainty, negative economic growth, financial crisis, abnormal lending cuts, pandemics, rising unemployment rate, foreign exchange volatility, and unexpected changes in monetary policy rate (Zhang et al, 2019; Chen et al, 2020; Ozili, 2021a). Economic policy uncertainty may manifest as unexpected changes in monetary policy, fiscal policy and regulatory policy (Danisman et al, 2021; Ozili, 2021a). High EPU may affect firms through its effect on the production, investment and hiring decisions of firms (Drobetz et al, 2018; Ozili, 2021a). For instance, high EPU can make firms delay investment which affects the level of output in the private sector (Wang et al, 2014; Kang et al, 2014; Ozili, 2021a). EPU also affects banks. High EPU give bank managers incentives to reprice their loan portfolio and increase interest rate on loans (Ozili, 2021a; Ng et al, 2020; Danisman et al, 2021).

EPU is often measured using the economic policy uncertainty (EPU) index developed by Baker, Bloom and Davis (2016). The EPU index is an aggregated index consisting of four components (Ozili, 2021a). The first component captures EPU using a newspaper-based approach based on the frequency of keywords in 10 leading US newspapers that contain the following terms: ''economic'' or ''economy''; ''uncertain'' or ''uncertainty''; ''Congress'', ''deficit'', ''Federal Reserve'', ''legislation'', ''regulation'' or ''White House'' (Ozili, 2021a). The second component captures EPU using tax code expirations (Ozili, 2021a). The third component captures EPU using disagreement over consumer price index (CPI) forecasts (Ozili, 2021a). The fourth component captures EPU using disagreement over government purchase forecasts (Ozili, 2021a). Many studies have used the EPU index to examine the economic consequences of EPU (see, Drobetz et al, 2018; Hu and Gong, 2019; Jin et al, 2019; Ng et al, 2020; Phan et al, 2021; Ozili, 2021a).

2.2. EPU-banking literature

Many studies have emerged in the EPU-banking literature. For instance, Ozili (2021b), in a survey of EPU literature, finds that economic policy uncertainty affects banks through loan re-pricing and a reduction in credit supply, and banks respond to high EPU by distorting bank financial reporting in ways that help them to mitigate the depressing effect of economic policy uncertainty on their profitability. He and Niu (2018) examine how EPU affects bank valuations using a large sample of banks. They find that EPU has a negative effect on bank valuations and the negative effect of EPU on bank valuation is more pronounced for banks with a higher ratio of loans to total assets. They show that EPU reduces bank loan growth, and lower loan growth then leads to lower bank valuations. Phan et al (2021), in a cross country study, investigate the impact of EPU on financial stability. They find that EPU has a negative impact on financial stability, and the negative

impact is stronger for countries with higher competition, lower regulatory capital, and smaller financial systems. Athari (2021) examines the effects of domestic political risk and global EPU factors on the profitability of Ukrainian banks from 2005 to 2015. They find that domestic political stability and global EPU have a significant positive and negative effect on Ukrainian banks' profitability, respectively. Karadima and Louri (2020) examine the effect of EPU on bank nonperforming loans for 507 banks from four major euro area countries (i.e., France, Germany, Italy and Spain) from 2005 to 2017. They find that EPU has a positive impact on nonperforming loans but the impact is significantly moderated by higher bank concentration. Tran et al (2021) investigate the impact of EPU on banks' business model using a large sample of U.S. banks from 2000 to 2017. They find that banks are more likely to diversify their income stream into new activities that generate non-interest income in times of high EPU. Tran (2020) examines the effect of EPU on bank dividend policy using a large sample of US bank holding companies using quarterly data from 2000 to 2015. They find that banks decrease dividend payouts as a precautionary behavior during periods of high EPU, and this behavior is more pronounced in large banks that seem to experience the largest impacts. However, banks are more likely to increase their dividends during crisis times than during normal times.

Some studies examine the effect of EPU on bank managers' discretion. For example, Ng et al (2020) examine whether banks keep higher loan loss accruals in response to rising EPU. They find a positive association between EPU and loan loss accruals, and the positive association is more pronounced for banks with a riskier loan portfolio and for banks that have a history of lower loan loss reserves. Danisman et al (2021) examine the effect of EPU on loan loss provisions using a large sample of US banks from 2009 to 2019. They find that, in times of higher EPU, banks tend to increase their loan loss provisioning. Also, they show that the majority of the explanatory power on loan loss provisions originates from the news-based and tax expiration components of the EPU index. Their findings imply that EPU is an additional procyclical factor that influence bank LLP behavior. Jin et al (2019) investigate whether EPU is systematically related to bank earnings opacity. They argue that when economic policy is relatively uncertain, it is easier for bank managers to engage in earnings management. The results show that EPU is positively related to earnings opacity, proxied by the magnitude of discretionary loan loss provisions and the likelihood of just meeting or beating the prior year's earnings, and negatively related to the level of accounting conservatism. Tran and Houston (2021) investigate the relationship between economic policy uncertainty and U.S. bank loan loss provisions. They examine 2483 U.S. bank holding companies, and find a positive relationship between economic policy uncertainty and discretionary loan loss provisions, and the positive relationship is contingent on bank holding company characteristics and stakeholder oversight.

Other studies focus on the effect of EPU on bank liquidity. Berger et al (2020) examine the channel through which EPU influences bank liquidity hoarding. They find that, in response to EPU,

banks hoard liquidity. Ashraf (2020) examines the effect of government economic policies (GEPU) on bank liquidity hoarding from 21 countries from 1998 to 2018. They find that GEPU positively affects bank liquid assets holdings. The findings suggest that GEPU lead banks to hoard higher amount of liquid assets as a precautionary motive. They also show that banks reduce lending and attract higher deposits to build up liquid assets in response to increasing GEPU.

Some studies examine how EPU affects banks' lending decisions. Ndou and Mokoena (2019) show that positive EPU shocks leads to an increase in bank lending rate margins while the negative EPU shock lowers bank lending rate margins. Bordo et al (2016) examine the impact of EPU on aggregate bank credit growth using data from several decades including the Great Recession. They find that EPU has a significant negative effect on bank credit growth. Their results suggest that high policy uncertainty from the Great Recession restrain overall credit growth through the bank lending channel. Hu and Gong (2019) find that EPU significantly hinders the growth of bank credit. The negative effect of EPU on loan growth is greater for larger-sized banks and riskier banks, while weaker for more liquid banks and more diversified banks. However, the negative effect is alleviated by both macro-prudential and micro-prudential policies. Chi and Li (2017) examine the effect of EPU on banks' credit risks and lending decisions in China from 2000 to 2014. The results show a positive association among EPU and non-performing loan ratios, loan concentrations and the normal loan migration rate.

While there are much studies on EPU, there is no study that examine the correlation between EPU, bank nonperforming loans and bank loan loss provisions. This creates a gap in the EPU literature. This paper fills this gap in the literature by investigating the correlation of economic policy uncertainty (EPU) with nonperforming loans and loan loss provisions. The research question is: Is EPU correlated with bank nonperforming loans and loan loss provisions? I predict that an increase in economic policy uncertainty can lead to an increase in nonperforming loans and loan loss provisions of bank due to high uncertainty about the loan repayments in times of high EPU. Therefore, the statement of hypothesis is that:

H1: EPU is positively correlated with bank nonperforming loans and loan loss provisions.

3. Data and Methodology

3.1. Data

Data was collected for 22 developed countries, namely: Australia, Brazil, Canada, Chile, China, Colombia, France, Germany, Greece, India, Ireland, Italy, Japan, Korea, Mexico, Netherland, Russia, Singapore, Spain, Sweden, UK and US. These countries were selected because the EPU index data is available only for these countries and unavailable for other counties. Data for EPU index was collected from the EPU database which is available at: https://www.policyuncertainty.com. The sample period covers 1998 to 2017.

Bank balance sheet information for the 22 countries was collected from the World Bank database. Bank nonperforming loan ratio information was collected from the global financial development indicators in the World Bank database. Loan loss provisions ratio information was computed as a derivative of two variables as the loan loss provision ratio information is not directly observable in the global financial development indicators. See Appendix 1 for variable definition and sources.

3.2. Methodology

Pearson correlation statistic is used to test the correlation between EPU, nonperforming loans and loan loss provisions. The Pearson correlation statistic measures the statistical relationship or association between two continuous variables (Ozili, 2021a). It also measures the strength of the association between two variables (Gujarati, 2009). There are three variables in analyses.

The first variable is the EPU variable. The EPU variable is the economic policy uncertainty (EPU) index based on Baker, Bloom and Davis (2016)'s methodology. The EPU index developed in Baker, Bloom and Davis (2016) consists of four components: (i) disagreement over government purchases forecasts components, (ii) the news-related component, (iii) tax code expirations component, and (iv) disagreement over consumer price index (CPI) forecasts (Ozili, 2021a). The four components of EPU are then aggregated into a single EPU index using the following approach: ½ weight on the news-based component, and a weight of 1/6 for each of the remaining three components: the CPI forecast disagreement index, the tax expiration code index, and the federal, state, local purchases disagreement index (see Baker et al, 2016; Ozili, 2021a). Recent studies have used the EPU index to investigate the consequences of policy uncertainty under several contexts (see Beckmann and Czudaj, 2017; Bernal et al, 2016; Drobetz et al, 2020; Ozili, 2021a).

The second variable is the NPL variable. The NPL variable is the nonperforming loans to gross loan ratio. It is a measure of credit risk and a measure of asset (or loan) quality in the banking sector (Ozili, 2019). Prior studies have used the NPL ratio as a measure of bank performance and as a

measure of the non-discretionary determinant of loan loss provisions (see Bushman and Williams, 2012; Peterson and Arun 2018; Boussemart et al, 2019).

The third variable is the LLP variable. The LLP variable is the loan loss provision to gross loan ratio. The LLP variable reflects the amount that banks set aside as a cushion to absorb expected loss on banks' loan portfolio (Ozili and Outa, 2017). It is commonly used as a measure of expected loss in banks (Beatty and Liao, 2011; Bushman and Williams, 2015, Peterson and Arun, 2018). It is derived by multiplying the nonperforming loan (NPL) ratio with the loan loss coverage (LLC) ratio[1], using the formula below:

$$LLP \ / \ GL \ = \ (NPL \ ratio) \ * \ (LLC \ ratio)$$

$$LLP \ / \ GL \ = \ (NPL \ / \ GL) \ * \ (LLP \ / \ NPL)$$

Where, the NPL ratio is nonperforming loans divided by gross loan; and loan loss coverage ratio is loan loss provisions divided by nonperforming loans.

4. Results

4.1. Descriptive statistics

Table 1 reports the means of the EPU index, NPL and LLP variables for each country. The average EPU variable is higher in France, Russia and the UK, and much lower in Mexico and Sweden. On the other hand, the average NPL variable is higher in Greece, Italy and Ireland, and much lower in Canada, Korea and Sweden. Similarly, the average LLP variable is higher in Greece, Ireland and Italy, and much lower in Korea, Sweden and Canada. The results suggest that Korea, Sweden and Canada have low credit risk in their banking sectors as indicated by their low NPL and LLP values compared to countries like Greece, Ireland and Italy that have high nonperforming loan problems.

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[1] These two ratios are obtained from the global financial development indicators database

	Countries	Group	EPU	NPL	LLP
			Mean	Mean	Mean
1	Australia	Non-EU	131.7	1.4	0.3
2	Brazil	Non-EU	197.8	3.3	5.3
3	Canada	Non-EU, G7	195.9	0.7	0.2
4	Chile	Non-EU	151.2	2.1	2.2
5	China	Non-EU	179.7	1.4	2.4
6	Colombia	Non-EU	118.7	3.1	4.8
7	France	EU, G7	251.7	3.8	2.2
8	Germany	EU, G7	162.5	2.7	1.1
9	Greece	EU	108.9	24.2	13.3
10	India	Non-EU	127.1	4.6	2.1
11	Ireland	EU	176.3	15.2	6.6
12	Italy	EU, G7	113.6	13.4	5.8
13	Japan	Non-EU, G7	117.0	2.01	0.5
14	Korea	Non-EU	180.1	0.5	0.2
15	Mexico	Non-EU	55.4	2.5	4.1
16	Netherlands	EU	118.1	2.7	-
17	Russia	Non-EU	207.1	7.4	5.2
18	Spain	EU	129.8	5.9	3.6
19	Singapore	Non-EU	145.5	1.2	0.4
20	UK	EU, G7	261.4	2.5	1.1
21	US	Non-EU, G7	142.1	2.7	2.5
22	Sweden	EU	94.8	0.8	0.4

Table 2 reports the summary of the average (mean) values of EPU index, NPL and LLP variables for the country groups. The average EPU variable is higher in the G7 country group and much lower in the non-EU country group. On the other hand, the average NPL variable is higher in the EU country group and much lower in the non-EU country group. Similarly, the average LLP variable is higher in the EU country group and much lower in the G7 country group. The results suggest that the non-EU country group has low credit risk as indicated by its low NPL and LLP values compared to the EU country group that has a relatively high NPL and LLP.

Table 1: Descriptive statistics					

Table 2: Regional Descriptive Statistics											
	All countries (full sample)			EU countries			Non-EU countries			G7 countries		
Statistic	EPU	LLP	NPL	EPU	LLP	NPL	EPU	LLP	NPL	EPU	LLP	NPL
Mean	153.1	3.3	4.9	157.5	4.7	8.1	149.9	2.4	2.6	177.7	1.9	3.9
Median	136.7	2.4	2.8	137.5	2.6	3.9	136.5	2.2	2.1	155.1	1.4	2.8
Maximum	468	24.9	45.6	468	24.9	45.5	422.5	7.1	10	468	8.8	18.1
Minimum	15.3	0.07	0.4	56.5	0.3	0.5	15.3	0.07	0.4	62.1	0.1	0.4
Observation	220	185	211	90	70	86	130	123	125	70	62	66

4.2. Main results: Full sample correlation analysis

The data for each country was pooled together to obtain a full country sample data, after which I run the correlation analysis for all the variables and the full country sample. Table 3 reports the correlation result for the full sample consisting of the 22 countries in the sample.

As can be observed, EPU is negatively correlated with NPL and LLP. The correlation coefficients for NPL and LLP are low at 8.5% and 9.7%, respectively. Also, the correlation of EPU with NPL and LLP is not statistically significant. The negative sign on the NPL correlation coefficient does not support the findings of Karadima and Louri (2021) who find that EPU has a positive relationship with the size of bank nonperforming loans. Also, the negative sign on the LLP correlation coefficient shows that the result contradicts the findings of Danisman et al (2021) who find that banks increase loan loss provisions in times of high economic policy uncertainty. Given the insignificance of the correlation coefficients, I do not draw any meaningful conclusion. Meanwhile, LLP and NPL reports a high positive correlation which is statistically significant at the 1% level, which confirms the expectation of a positive relationship between loan loss provisions and nonperforming loans in the literature as documented in Ozili (2018) and Caporale et al (2018).

Table 3: Correlation (All countries - full sample)

Variable	EPU	LLP	NPL
EPU	1.000		
LLP	-0.097 (-1.32) ((0.18))	1.000	
NPL	-0.085 (-1.15) ((0.24))	0.919*** (31.61) ((0.00))	1.000

T-statistic are reported in single parenthesis. P-values are reported in double parenthesis. *** indicates statistical significance at the 1% level.

4.3. Further analysis: regional and economic grouping

In this section, the full sample was divided into three subsamples: the EU subsample, the non-EU subsample, and the G7 subsample, to detect whether the correlation of EPU with NPL and LLP is driven by unique regional differences. Then, I run the correlation analysis with the three variables for the three subsamples.

4.3.1. European Union

Table 4 reports the correlation result for countries in the European Union. As can be observed, EPU is negatively correlated with NPL and LLP, and significant at the 5% level. This result suggests that an increase in economic policy uncertainty is not followed by an increase in nonperforming loans and loan loss provisions in the banking sector of EU countries. Rather, the result suggests that there is a negative correlation of EPU with NPL and LLP. One explanation for this is that the strict bank regulation and supervision in the EU possibly dampens the effect of rising EPU on the banking sector's nonperforming loan and loan loss provisions, thereby leading to a fall in the size of NPL and LLP as EPU increases. The negative sign on the NPL correlation coefficient does not support the findings of Karadima and Louri (2021) who find that EPU has a positive relationship with the size of bank nonperforming loans. Also, the negative sign on the LLP correlation coefficient shows that the result contradicts the findings of Danisman et al (2021) who find that U.S. banks increase loan loss provisions in times of high economic policy uncertainty. Meanwhile, LLP and NPL have a high positive correlation which is statistically significant at the 1% level, which confirms the expectation of a positive relationship between loan loss provisions and nonperforming loans in the literature (see. Ozili, 2018; Caporale et al, 2018).

Table 4: Correlation for EU countries

Variable	EPU	LLP	NPL
EPU	1.000		
LLP	-0.249** (-2.12) ((0.04))	1.000	
NPL	-0.269** (-2.31) ((0.02))	0.973*** (34.83) ((0.00))	1.000

T-statistic are reported in single parenthesis. P-values are reported in double parenthesis. ***, ** indicates statistical significance at the 1% and 5% level, respectively.

4.3.2. Non-European union

Table 5 reports the correlation result for countries outside the European Union. As can be observed, EPU has a positive correlation with NPL and LLP. The correlation of EPU with LLP and NPL is very low at 4.7% and 9.7%, respectively and is statistically insignificant. This result supports the hypothesis. Furthermore, the positive correlation coefficient for NPL and LLP is consistent with the findings of Karadima and Louri (2021) who find that EPU has a positive relationship with the size of nonperforming loans, as well as Danisman et al (2021) who find that U.S. banks increase loan loss provisions in times of high economic policy uncertainty. Meanwhile, LLP and NPL have a high positive correlation which is statistically significant at the 1% level, which confirms the expectation of a positive relationship between loan loss provisions and nonperforming loans in the literature (see. Ozili, 2018; Caporale et al, 2018).

Table 5: Correlation for non-EU countries

Variable	EPU	LLP	NPL
EPU	1.000		
LLP	0.047 (0.52) ((0.60))	1.000	
NPL	0.095 (1.05) ((0.29))	0.718*** (11.36) ((0.00))	1.000

T-statistic are reported in single parenthesis. P-values are reported in double parenthesis. *** indicates statistical significance at the 1% level.

4.3.3. G7 countries (most advanced economies)

Table 6 reports the correlation result for the G7 countries. As can be observed, EPU has a negative correlation with NPL and LLP. The correlation between EPU and LLP is not significant. EPU is negatively correlated with NPL and statistically significant at the 10% level. This result suggests that NPLs falls as EPU increases in the G7 country group. The negative sign on the NPL correlation coefficient does not support the findings of Karadima and Louri (2021) who find that EPU has a positive relationship with the size of nonperforming loans. Also, the negative sign on the LLP correlation coefficient shows that the result contradicts the findings of Danisman et al (2021) who find that U.S. banks increase loan loss provisions in times of high economic policy uncertainty. Meanwhile, LLP and NPL have a high positive correlation which is statistically significant at the 1% level, which confirms the expectation of a positive relationship between loan loss provisions and nonperforming loans in the literature (Ozili, 2018; Caporale et al, 2018).

Table 6: Correlation for G7 countries

Variable	EPU	LLP	NPL
EPU	1.000		
LLP	-0.192	1.000	
	(-1.51)		
	((0.13))		
NPL	-0.219*	0.948***	1.000
	(-1.74)	(23.14)	
	((0.08))	((0.00))	

T-statistic are reported in single parenthesis. P-values are reported in double parenthesis. ***, * indicates statistical significance at the 1% and 10% level, respectively.

4.4. Additional analyses

Finally, in this section, I run a univariate correlation analysis to determine the individual correlation of each variable rather than the three variables all at once. I do this for the full sample and for the three subsamples.

4.4.1. Full sample univariate correlation

Table 7a&b reports the univariate correlation result for the full sample. As can be observed, EPU has a negative correlation with NPL and LLP in Table 7a and 7b, respectively. However, the correlation coefficients are very low and statistically insignificant.

Table 7a: Full sample (univariate correlation of EPU and LLP)

Variable	EPU	LLP
EPU	1.000	
LLP	-0.097	1.000
	(-1.32)	
	((0.18))	

T-statistic are reported in single parenthesis. P-values are reported in double parenthesis.

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Table 7b: Full sample (univariate correlation of EPU and NPL)

Variable	EPU	NPL
EPU	1.000	
NPL	-0.058 (-0.84) ((0.39))	1.000

T-statistic are reported in single parenthesis. P-values are reported in double parenthesis.

4.4.2. EU subsample univariate correlation

Table 8a&b reports the univariate correlation result for the EU subsample. As can be observed, EPU has a negative correlation with NPL and LLP in Table 8a and b, respectively. The correlation of EPU with LLP is statistically significant at the 5% level, which suggests that an increase in EPU is followed by a decrease in loan loss provisions in the banking sector of EU countries. On the other hand, the correlation between EPU and NPL is not significant. Overall, the results suggest that LLPs are more responsive to changes in EPU than NPLs in EU countries.

Table 8a: Table EU subsample (univariate correlation of EPU and LLP)

Variable	EPU	LLP
EPU	1.000	
LLP	-0.249** (-2.12) ((0.03))	1.000

T-statistic are reported in single parenthesis. P-values are reported in double parenthesis. ** indicates statistical significance at the 5% level.

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Table 8b: EU subsample (univariate correlation of EPU and NPL)

Variable	EPU	NPL
EPU	1.000	
NPL	-0.166 (-1.55) ((0.12))	1.000

T-statistic are reported in single parenthesis. P-values are reported in double parenthesis.

4.4.3. Non-EU subsample univariate correlation

Table 9a&b reports the univariate correlation result for the non-EU subsample. As can be observed, EPU has a positive correlation with NPL and LLP in Table 9a and b, respectively. However, the correlation coefficients are low and statistically insignificant.

Table 9a: Non-EU subsample (univariate correlation of EPU and LLP)

Variable	EPU	LLP
EPU	1.000	
LLP	0.047 (0.52) ((0.60))	1.000

T-statistic are reported in single parenthesis. P-values are reported in double parenthesis.

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Table 9b: Non-EU subsample (univariate correlation of EPU and NPL)

Variable	EPU	NPL
EPU	1.000	
NPL	0.101 (1.12) ((0.26))	1.000

T-statistic are reported in single parenthesis. P-values are reported in double parenthesis.

4.4.4. G7 subsample univariate correlation

Table 10a&b reports the univariate correlation result for the G7 subsample. As can be observed, EPU has a negative correlation with NPL and LLP in Table 7a and b, respectively. However, the correlation coefficients are statistically insignificant.

Table 10a: G7 subsample (univariate correlation of EPU and LLP)

Variable	EPU	LLP
EPU	1.000	
LLP	-0.192 (-1.52) ((0.13))	1.000

T-statistic are reported in single parenthesis. P-values are reported in double parenthesis.

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Table 10b: G7 subsample (univariate correlation of EPU and NPL)

Variable	EPU	NPL
EPU	1.000	
NPL	-0.190 (-1.55) ((0.12))	1.000

T-statistic are reported in single parenthesis. P-values are reported in double parenthesis.

5. Conclusion

This paper examined the correlation of economic policy uncertainty with nonperforming loans and loan loss provisions. The findings show that there is no significant correlation of economic policy uncertainty with loan loss provisions and nonperforming loans. After dividing the sample into regional groups, the findings reveal that economic policy uncertainty is negatively correlated with nonperforming loans and loan loss provisions in the banking sector of EU countries. Also, economic policy uncertainty is negatively correlated with nonperforming loans in the banking sector of G7 countries while loan loss provisions are more responsive to changes in EPU in EU countries.

The implication of the findings is that regional characteristic may drive the correlation of EPU with nonperforming loans and loan loss provisions. Secondly, bank regulators should intensify

their supervisory and regulatory efforts to ensure that banks do not take excessive risks during times of high EPU so that the supervisory mechanisms in place can help to dampen the effect of rising EPU on nonperforming loans and loan loss provisions. Thirdly, risk managers in banks should pay more attention to policy uncertainty shocks. They need to conduct a more frequent adjustment of credit risk management indicators in response to expected and unexpected changes in economic policies. This will ensure that risk managers balance profitability with manageable risks when lending to borrowers in the real economy.

One limitation of the study is that it used a simple correlation test statistic rather than regressions. Another limitation of the study relates to the weaknesses of the EPU index. The EPU index is available only for major developed countries and unavailable for developing countries. Also, the EPU index does not take into account other components that may affect economic policy uncertainty such as government elections, trade wars and oil price crisis; and finally, the EPU index is majorly based on text-searching newspaper archives which may pose some comparability issues when analysing EPU in different countries due to language differences.

The findings also suggest potential topics for future research. More research on the correlation of EPU with other bank performance indicators are needed. Future research should also investigate the co-movement between EPU and performance indicators in nonbank financial institutions. Future research can offer more insight on the effect of EPU on financial inclusion.

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Appendix 1: Variable Description		
Indicator Name	Short definition	Source
LLP	Loan loss provisions to gross loan ratio	Global financial development indicators
LLC	Provisions to nonperforming loans (%)	Financial Soundness Indicators Database (fsi.imf.org), International Monetary Fund (IMF)
NPL	Bank nonperforming loans to gross loans (%)	Financial Soundness Indicators Database (fsi.imf.org), International Monetary Fund (IMF)
EPU	EPU index developed by Baker et al (2016)	https://www.policyuncertainty.com