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DOES ECONOMIC POLICY UNCERTAINTY REDUCE FINANCIAL INCLUSION?

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ABSTRACT

This study investigates whether the level of economic policy uncertainty (EPU) would reduce the level of financial inclusion. It was predicted that a high level of EPU could have a negative effect on the level of financial inclusion. It was argued that a high level of EPU would discourage financial institutions from providing basic financial services to low end customers and unbanked adults, and this would lead to a decrease in the level of financial inclusion. Using a sample of 22 countries, the study found that the level of EPU did not have a significant impact on financial inclusion. None of the nine indicators of financial inclusion were found to have a significant direct relationship with EPU. However, there was some evidence that the combined effect of a high level of EPU and high nonperforming loans could reduce financial inclusion, particularly through bank branch contraction and a reduction in the use of electronic payments. Furthermore, the use of formal accounts and credit cards would increase in times of high credit supply and when there was a high level of EPU.

Keywords: Financial inclusion, policy uncertainty, economic policy uncertainty, non-performing loan, unbanked adults.

JEL Classification: D14, D18, G21, G28.

INTRODUCTION

In recent years, economic policy uncertainty has become the focus of economic policy debates. Such debates were mostly focused on how policy uncertainty had affected economic agents in the real and financial sectors. Economic policy uncertainty (EPU) has been seen as uncertainty about changes in fiscal, monetary and regulatory policies of the government (Baker et al., 2016). EPU might arise from whether there would be unexpected changes in existing government policies (Ashraf & Shen, 2019; Ng et al., 2020).

The recent EPU literature has shown that EPU could affect corporate decisions, financial institutions and the real economy (e.g., Caglayan & Xu, 2019; Lee et al., 2017; Gulen & Ion, 2016). However, the literature has not examined how EPU might affect access to finance or the level of financial inclusion. The present study will contribute to the literature by examining whether EPU could reduce or improve the level of financial inclusion.

In the financial inclusion literature, financial inclusion has been broadly defined as the provision of affordable formal financial services to households, individuals and small businesses (Ozili, 2018; Zins & Weill, 2016; Ozili, 2020b). The goal of financial inclusion is to reduce the number of unbanked adults, and this has been mostly achieved by expanding financial services to unbanked adults in remote areas (Collard, 2007; Demirgüç-Kunt & Klapper, 2013; Neuberger, 2015; Ozili, 2020a).

The international development community has considered financial inclusion to be the most significant way to expand financial services in developed and emerging economies (Neuberger, 2015; Ozili, 2020a). As such, the present study has focused on financial inclusion in developed and emerging economies for two reasons. Firstly, individuals or households in developed and emerging economies have not been immune to financial exclusion. The rising cost of

basic financial services, low income, personal bankruptcy and the desire for financial privacy have led to increased financial exclusion. Secondly, financial inclusion has been a major component of the social inclusion programs in most developed and emerging economies. For instance, many social inclusion programs, such as having access to social welfare, community participation, infrastructure, housing, employment or education, are dependent on owning a formal account which individuals could use to receive welfare benefits or to make payment for services.

Understanding how financial inclusion can be affected by EPU is important because individuals and households rely on financial institutions for the supply of basic financial services, and these financial institutions may be severely affected by a high level of EPU. Such a situation may affect their willingness to reach the unbanked adults, and to serve existing low end customers in times of high levels of EPU. In other words, uncertain economic policies can affect the level of financial inclusion through its effect on the financial sector. Recent studies have documented that a high level of EPU negatively affected the financial sector. Such studies showed that financial institutions would increase interest rates, re-price loans, reduce credit supply, and have liquidity shortages in times of high levels of EPU (Bordo et al., 2016; Yung et al., 2019; García-Kuhnert et al., 2015). High levels of EPU could affect a financial institution's incentive to supply basic financial services to low-end customers and households.

Financial institutions can increase the interest rate on loans and credit cards, and charge high fees for basic services such as the ATM card maintenance fees and other fees, in response to high levels of EPU in the business environment. Basic financial services will become costly and will severely affect low-income individuals and households, which can make them exit the formal financial sector, thereby reducing financial inclusion. More importantly, high levels of EPU in the business environment can lead to difficult business conditions for financial institutions, creating problems such as fewer demand for loans, higher nonperforming loans and liquidity shortage. Due to these difficulties, financial institutions will be drawn into providing better financial services to high-end customers who can pay a premium for financial services and reduce the provision of financial services to low-end customers. They will begin to ignore their poorer customers who cannot afford to pay a premium for basic financial

services induced by high levels of EPU in the business environment. Therefore, financial inclusion is likely to be lower during periods of high levels of EPU.

It can therefore, be predicted that, if financial institutions perceive high levels of EPU in the business environment and take into account its expected depressive effects in the provision of basic financial services, financial institutions will reduce the supply of basic financial services. In other words, the level of financial inclusion can be seen as being negatively associated with the level of EPU. On the other hand, if financial institutions do not take into account the expected depressive effects of EPU in the provision of basic financial services, then the level of financial inclusion can be seen as positively associated with the level of EPU. Using data for 22 countries from 2011 to 2017, the findings revealed that EPU has an insignificant effect on financial inclusion. None of the nine indicators of financial inclusion showed a significant direct relationship with EPU. In addition, the combined effect of high levels of EPU and high non-performing loans lead to bank branch contraction and a reduction in the use of electronic payments. Meanwhile, the use of formal accounts and credit cards increased in times of high credit supply and high EPU.

The present study contributes to the EPU and financial inclusion literatures. in three ways. Firstly, the study contributes to the EPU literature that explore the effects of EPU (Gulen & Ion, 2016; Karadima & Louri, 2020; Ozili, 2021a). This study has extended the scope of the EPU literature by focusing on how EPU affects the level of financial inclusion. The findings of the present study have shown that high levels of EPU had some depressive effects on financial inclusion. Secondly, this study contributes to the financial inclusion literature (see, Mindra et al., 2017; Ozili, 2020a; Zins & Weill, 2016; Ozili, 2020b). The study showed that EPU is a determinant of the level of financial inclusion. The study is the first in the literature to identify the level of EPU to be a determinant of the level of financial inclusion. Finally, this study has also contributed to the literature on the effects of financial inclusion on financial institutions (Demetriades & Hook Law, 2006; King & Levine, 1993; Rioja & Valev, 2004; Ozili, 2021c). The findings of the present study have shown that the level of EPU, through its effect on banks, would have implications for financial inclusion.

The rest of the paper is structured in the following way. Section 2 reviews the literature and develops the study hypothesis. Section 3 presents the data and methodology. Section 4 presents the results, and Section 5 the conclusions.

LITERATURE REVIEW

Determinants and Consequences of Financial Inclusion

The literature has documented some determinants and consequences of financial inclusion. For example, López and Winkler (2019) examined whether financial inclusion could mitigate credit downturns and upturns. They found that higher levels of financial inclusion led to a decrease in credit growth. Chen and Jin (2017) analyzed data from the 2011 China Household Financial Survey, and observed that over half of the sample (53.21%) reported using credit, and only 19.77 percent of the sample used formal credit. They also observed that the use of formal credit was associated with being employed, educated, having a high income, and having a high net-worth.

Evans and Alenoghena (2017) tested whether the GDP per capita translated into higher financial inclusion. They examined 15 African countries from 2005 to 2014. They found that GDP per capita had a positive relationship with financial inclusion, but the relationship was not significant. Omar and Inaba (2020) investigated the impact of financial inclusion on poverty reduction. They used the GDP per capita to measure poverty. They found that the per capita real GDP had a positive influence on the level of financial inclusion in developing countries. Ozili (2020b) investigated financial inclusion through the business cycle. The study used the GDP growth rate to measure the state of the business cycle. The study documented evidence of increased formal savings and active formal account ownership in periods of economic prosperity, and a decrease in formal savings and active formal account ownership in recessionary periods.

Vo et al. (2019) investigated the linkages between financial inclusion and macroeconomic stability in 22 emerging and frontier economies from 2008 to 2015. They found that financial inclusion, measured as the growth rate in the number of bank branches over 100,000 account holders, improved financial stability only to some extent.

Similarly, Machdar (2020) analyzed the effect of financial inclusion on the financial stability of banks in Indonesia, and found a negative relationship between financial inclusion and the level of nonperforming loans (NPLs). Morgan and Pontines (2018) examined the relationship between financial stability and financial inclusion. They found that increased lending to small and medium-sized enterprises (SMEs) reduced the size of NPLs and lower the probability of default by financial institutions. Ozili (2021b) showed that greater levels of financial inclusion would improve the cost efficiency of the financial sector in developing countries. Markose et al. (2020) examined the economic viability of financial inclusion programs in India, and showed that higher financial inclusion programs, under the Pradhan Mantri Jan-Dhan Yojana (PMJDY) scheme, led to cost inefficiency among public sector banks.

EPU and Financial Institutions

A substantial body of literature has examined the effects of economic policy uncertainty (EPU) on financial firms, and the firms' response to policy uncertainty. Nguyen et al. (2020) examined the impact of EPU on aggregate bank credit growth at domestic and global levels. Using different measures of EPU, they studied this issue in 22 countries from 2001 to 2015, and documented evidence that a high level EPU led to low credit growth, and the negative impact was stronger in emerging economies than in advanced economies. Ashraf and Shen (2019) examined the effect of government economic policy uncertainty on the pricing on bank loans in 17 countries from 1998 to 2012. They found that banks repriced loans by charging higher interest rate in times of high levels of EPU. The implication of their findings was that EPU is an important risk factor that banks would take into account when making loan pricing decisions. Bordo et al. (2016) examined the impact of EPU on bank credit growth for a 50-year period from 1961 Q4 to 2014 Q3. They found that policy uncertainty, through its effect on loan supply, had a significant negative effect on bank credit growth. Hu and Gong (2019) empirically tested the association between bank lending and EPU. They found that high levels of EPU would reduce credit growth, and the negative effect was greater for larger-sized banks and riskier banks. Luo and Zhang (2020) examined the impact of EPU on firm-specific crash risk among Chinese listed firms. They found that high levels of EPU would increase the likelihood of firms experiencing stock price crash. Karadima and Louri (2020) investigated the effect of EPU on nonperforming loans. They found

that high levels of EPU would lead to an increase in nonperforming loans. Caglayan and Xu (2019) examined the effect of EPU on loan loss provisions in 18 countries. They found that high levels of EPU was associated with the increase in loan loss provisions. Berger et al. (2020) found that high levels of EPU led to liquidity hoarding by banks.

Hypothesis Development

In developed and emerging economies, financial institutions have been the main agents of financial inclusion (Chakrabarty, 2011; Ghosh, 2013; Brown et al., 2016). Uncertain economic conditions and uncertainty about economic policies could present difficult business conditions for financial institutions, and this could dampen their incentive to supply basic financial services to unbanked adults and low end customers. When faced with high levels of EPU, financial institutions may become unwilling to serve poor individuals and households in order to reduce operating cost and manage risks. Rising operating costs, high nonperforming loans, inefficiencies in the distribution of financial services and diseconomies of scale, can hurt financial institutions and create a disincentive to supply financial services to low end customers and unbanked adults in remote communities, thereby reducing the level of financial inclusion. Therefore, the present study has predicted that high levels of EPU would reduce the level of financial inclusion. As such the following hypothesis was proposed.

H_1: Economic policy uncertainty reduces the level of financial inclusion.

METHODOLOGY

Sample

Financial inclusion data was extracted from the global financial development indicators. Financial inclusion information in the database was available only for the year 2011, 2014 and 2017. This was because the World bank's financial inclusion survey was conducted triennially (i.e., every three years). Information on the EPU index was extracted from the EPU database at: https://www.policyuncertainty.com. The EPU database develops indices of economic policy uncertainty for

major developed and emerging economies of the world. The EPU index was constructed based on the methodology described in Baker, Bloom and Davis (2016). Macroeconomic data was extracted from the World Bank database, and the data collected covered the period from 2011 to 2017. The sample consisted of 22 countries. The countries included Australia, Brazil, Canada, Chile, China, Colombia, France, Germany, Greece, India, Ireland, Italy, Japan, Korea, Mexico, Netherland, Russia, Singapore, Spain, Sweden, UK and the US. Table 1 shows the description of the variables.

Method

Model

The model has conceptualized financial inclusion as a function of a financial institution's performance, macro-financial linkage, and the macroeconomic variable, and has been expressed in Equation (1):

$$FIi,t = \beta O + \beta 1EPUDi,t + \beta 2NPLi,t + \beta 3OCTAi,t + \beta 4DCPi,t + \beta 5GDPRi,t + \beta 6NPL * EPUDi,t + \beta 7OCTA * EPUDi,t + \beta 8DCP * EPUDi,t + \beta 9GDPR * EPUDi,t + ei,t \quad (1)$$

Where i = country, t = year. FI is a vector of dependent variables. FI includes: ATM, BBPA, MPB, ELP, ACC, DC, CC, SAV and BOR. Specifically, ACC = adults who own a formal account. DC = debit card ownership. CC = credit card ownership. SAV = adults who have formal savings. BOR = adults who have formal borrowings. ATM = ATMs per 100,000 adults. BBPA = Bank branches per 100,000 adults. MPB = adults using a mobile phone to pay bills. ELP = adults who use electronic payments to make payments. For the explanatory variables, EPUD = year-end value of the EPU index. NPL = ratio of nonperforming loans to gross loans. OCTA = the ratio of bank overhead cost to total asset ratio. DCP = credit supply to the private sector by banks to GDP ratio. GDPR = real GDP growth rate.

Variable Justification

The dependent variables were the financial inclusion variables, namely: ATM, BBPA, MPB, ELP, ACC, DC, CC, SAV and BOR. These variables are commonly used in the literature to measure financial inclusion (Imaeva et al., 2014; Chakrabarty, 2011; Ozili,

2018; Célerier & Matray, 2019). The explanatory variables were: EPUD, NPL, DCP, OCTA and GDPR. The EPU variables (i.e., EPUD and EPUA) and the associated interaction variables (in Equation 1) were the explanatory variables of interest in the model.

The EPU variables were the EPUD and EPUA variables. The EPUD variable has been measured as the year-end value of the monthly EPU index, i.e., the December value of the monthly EPU index. The EPUA variable is the average of the monthly EPU index values. A negative relationship between the EPUD and the EPUA variables is expected because high levels of economic policy uncertainty would negatively affect the performance of financial institutions. As a result, these financial institutions would be compelled to adjust their business decisions to reduce costs (Caglayan & Xu, 2019; Lee et al., 2017), and this would in turn, affect the supply of basic financial services to individuals and households possibly through the closure of bank branches, discontinuation of certain financial services, higher fees for services, high interest rates, etc. Thus, a negative sign on the EPUD or the EPUA coefficient would indicate that high levels of EPU in the business environment would lead to lower levels of financial inclusion.

The NPL variable was introduced as a control variable. The NPL variable measured the asset quality of the banking sector. A negative relationship between the NPL and financial inclusion is expected because large NPLs would negatively affect bank profitability (Ghosh, 2015; Ozili, 2019). Banks with large NPLs would expect low profits levels, and can proactively take steps to reduce costs, possibly by reducing the supply of costly financial services, such as, reducing the cost of maintaining bank branches and closing some branches in some rural and urban areas. This would lead to lower financial inclusion.

The third explanatory variable is the OCTA variable, measured as the ratio of bank overhead cost to total asset ratio. The OCTA was introduced into the model to capture whether the propensity to supply financial services by banks was driven by overhead cost considerations. A negative relationship between OCTA and the financial inclusion variables was expected because high overhead costs would negatively affect bank profitability (Camanho & Dyson, 2005; Perera et al., 2007), and banks that had high overhead costs would take proactive steps to reduce overhead costs possibly by closing bank branches, thereby, leading to lower financial inclusion.

The fourth explanatory variable is the DCP variable which measured credit supply by banks to the private sector. A positive relationship between the DCP and the financial inclusion variables is expected because the high supply of bank credit to the private sector would stimulate the growth of credit-related financial services that are beneficial to households, individuals and small businesses, such as payday loans, instant loans, overdraft, etc.

The fifth variable is the GDPR variable which measures the real GDP growth rate. It captures fluctuations in the business cycle. Ozili (2020b) found evidence for a positive effect of the GDPR variable on the level of financial inclusion.

Finally, all models were estimated using the fixed effect regression. All the regression estimations included country and year fixed effects. A number of studies on financial inclusion have used the fixed effect regression approach to investigate the determinants and/or consequences of financial inclusion such as studies by Markose et al. (2020), Oz-Yalaman (2019), Anson et al. (2013) and Le et al. (2020). Accordingly, the present study has also made use of the fixed effect approach.

RESULTS

Descriptive Results

NPL was found to average 5.5 percent of the gross loans. The NPL ratio was at a double-digit higher in Greece, Ireland and Italy, but was much lower in Canada, Korea and Sweden. The DCP ratio was 105 percent, but exhibited substantial differences across countries in the sample. For instance, the DCPs were much lower in Mexico, Russia and Colombia, and higher in the US, UK and Japan. On average, the GDPR was 2.5 percent and was higher for banks in China, Ireland and India, but lower in Greece and Italy. The OCTA ratio was 2.3 percent on average, and was higher in Russia and Colombia, but lower in Japan, Singapore and Australia. The EPUD and the EPUA were higher in the UK, Brazil and France compared to the readings in Mexico and Italy. Overall, the mean of the explanatory variables was higher than the median values except for the DCP. Finally, all the financial inclusion vector variables were higher in Australia, Canada and Japan compared to those in the other countries in the sample.

Table 1

Descriptive Statistics (Mean Values of the Variables)

Country	NPL	DCP	GDPR	EPUD	EPUA	OCTA	ELP	MPB	ACC	ATM	BBPA	CC	DC	SAV	BOR
Australia	1.3	130	2.7	135	120	0.9	93.3	19.4	99	164	29	61	84	61	20
Brazil	2.9	63	0.3	236	220	3.8	46.6	1.5	68	127	21	36	58	17	11
Canada	0.8	101	2.5	187	188	1.8	95.4	14.7	90	197	22	68	82	53	22
Chile	1.8	110	3.7	187	131	2.1	49.3	3.4	58	54	16	24	44	17	11
China	1.5	131	7.2	175	172	1.8	43.8	5.3	67	59	9	13	45	33	9
Colombia	3.2	56	3.1	152	131	4.5	25.0	0.7	45	49	19	16	32	16	14
France	3.8	95	1.5	252	251	1.0	89.8	3.4	96	108	34	40	79	51	16
Germany	4.8	85	0.1	153	162	1.4	94.1	4.0	95	113	17	39	82	51	15
Greece	30.0	103	-0.5	127	118	1.5	31.1	0.9	77	54	26	11	44	14	7
India	7.5	60	6.1	125	111	1.6	16.7	0.4	57	27	15	10	26	19	8
Ireland	17.5	77	6.8	172	151	1.5	86.2	11.5	91	91	27	47	74	44	15
Italy	14.3	98	-0.1	114	124	1.6	71.2	2.1	84	99	48	39	51	32	10
Japan	1.5	159	1.6	130	118	0.7	82.5	0.8	96	149	31	64	62	56	8
Korea	0.9	123	2.9	157	131	1.9	85.1	6.9	84	246	16	51	59	44	16

(continued)

Country	NPL	DCP	GDPR	EPUD	EPUA	OCTA	ELP	MPB	ACC	ATM	BBPA	CC	DC	SAV	BOR
Mexico	2.5	42	2.5	62	56	3.2	24.6	1.7	43	51	15	18	35	17	9
Netherland	3.3	103	1.6	115	107	3.7	96.6	10.5	91	59	18	33	89	51	11
Russia	6.8	62	1.7	245	185	7.8	48.6	2.9	67	150	30	19	41	20	10
Singapore	1.7	128	3.1	143	140	0.9	85.1	3.9	96	72	20	38	68	51	12
Spain	6.0	127	1.4	132	128	1.3	89.7	4.6	96	110	62	50	78	46	16
Sweden	1.4	136	1.9	131	120	1.1	97.6	14.2	99	50	20	48	95	67	23
UK	2.3	147	1.9	284	298	1.7	95.2	12.4	96	128	27	59	89	51	17
US	2.2	189	2.1	143	135	2.7	88.4	17.6	91.	-	33	61	74	53	22
Mean	5.5	105	2.5	162	150	2.3	69	6.5	81	103	25	39	64	40	14
Median	2.71	111	2.2	142	137	1.6	84	3.7	94	96	21	38	69	48	13
S.D.	7.8	42	3.3	84	72	2.5	27	6.9	22	63	15	20	27	21	6
Observations	145	147	154	154	154	154	88	88	154	147	149	154	154	154	154

Note. ACC = adults who own a formal account. DC = debit card ownership. CC = credit card ownership. SAV = adults who have formal savings. BOR = adults who have formal borrowings. ATM = ATMs per 100,000 adults. BBPA = Bank branches per 100,000 adults. MPB = adults using a mobile phone to pay bills. ELP = adults who use electronic payments to make payments. EPUD = year-end value of the monthly EPU index. EPUA = average value of the monthly EPU index. NPL = nonperforming loans ratio. OCTA = the ratio of bank overhead cost to total asset ratio. DCP = credit supply to the private sector by banks to GDP ratio. GDPR = real GDP growth rate

Correlation Analysis

Table 2 reports the Pearson correlation results. The NPL was negatively correlated with the EPUD and the EPUA variables. This indicated that a high NPL was associated with a low EPU. The GDPR was negatively correlated with the EPUD and the EPUA variables. The GDPR was significantly correlated with the EPUA, which seemed to suggest that a high EPU was associated with economic downturns. The DCP was positively correlated with the EPUD and the EPUA, but the correlation coefficient was insignificant. Similarly, the OCTA was positively correlated with the EPUD and the EPUA variables, but the correlation coefficient was insignificant. Overall, the correlations were low, and indicated that multi-collinearity was not a problem in the analysis.

Table 2

Correlation of EPU and the Explanatory Variables (Pearson Correlation)

Variables	EPUD	EPUA	NPL	GDPR	DCP	OCTA
EPUD	1.000					

EPUA	0.839***	1.000				
	(0.00)	-----				
NPL	-0.079	-0.065	1.000			
	(0.35)	(0.44)	-----			
GDPR	-0.121	-0.156*	-0.205**	1.000		
	(0.15)	(0.06)	(0.02)	-----		
DCP	0.046	0.093	-0.129	-0.188***	1.000	
	(0.59)	(0.27)	(0.13)	(0.03)	-----	
OCTA	0.071	0.023	-0.027	0.020	-0.463***	1.000
	(0.41)	(0.78)	(0.74)	(0.81)	(0.00)	-----

Note. P-value is reported in parenthesis. ***, **, * represent statistical significance at the 1%, 5% and 10% levels. EPUD = year-end value of the monthly EPU index. EPUA = average value of the monthly EPU index. NPL = nonperforming loans ratio. OCTA = the ratio of bank overhead cost to total asset ratio. DCP = credit supply to the private sector by banks to GDP ratio. GDPR = real GDP growth rate.

Table 3

Correlation of EPU and the Dependent Variables (Pearson Correlation)

Variable	EPUD	EPUA	ATM	BBPA	MPB	ELP	ACC	CC	DC	SAV	BOR
EPUD	1.000										

EPUA	0.79***	1.000									
	(0.00)	-----									
ATM	0.30**	0.316***	1.000								
	(0.01)	(0.00)	-----								
BBPA	0.03	0.032	0.225**	1.000							
	(0.79)	(0.77)	(0.04)	-----							
MPB	-0.12	0.022	0.269**	-0.079	1.000						
	(0.29)	(0.85)	(0.02)	(0.48)	-----						
ELP	-0.02	0.12	0.42***	0.24**	0.572***	1.000					
	(0.85)	(0.28)	(0.00)	(0.03)	(0.00)	-----					

(continued)

Variable	EPUD	EPUA	ATM	BBPA	MPB	ELP	ACC	CC	DC	SAV	BOR
ACC	-0.01	0.13	0.38***	0.27**	0.463***	0.870***	1.000				
	(0.91)	(0.25)	(0.00)	(0.01)	(0.00)	(0.00)	-----				
CC	0.01	0.14	0.66***	0.32***	0.504***	0.848***	0.725***	1.000			
	(0.94)	(0.23)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	-----			
DC	-0.05	0.13	0.29**	0.19*	0.551***	0.951***	0.919***	0.791***	1.000		
	(0.66)	(0.27)	(0.01)	(0.08)	(0.00)	(0.00)	(0.00)	(0.00)	-----		
SAV	-0.15	-0.02	0.33***	0.103	0.578***	0.903***	0.837***	0.810***	0.878***	1.000	
	(0.16)	(0.89)	(0.00)	(0.35)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	-----	
BOR	0.03	0.10	0.38***	0.101	0.580***	0.646***	0.471***	0.654***	0.579***	0.626***	1.000
	(0.75)	(0.36)	(0.00)	(0.37)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	-----

Note. *p*-values are reported in parenthesis. ***, **, * represent significance at the 1%, 5% and 10% level. ACC = adults who own a formal account. DC = debit card ownership. CC = credit card ownership. SAV = adults who have formal savings. BOR = adults who have formal borrowings. ATM = ATMs per 100,000 adults. BBPA = Bank branches per 100,000 adults. MPB = adults using a mobile phone to pay bills. ELP = adults who use electronic payments to make payments. EPUD = year-end value of the monthly EPU index. EPUA = average value of the monthly EPU index

Table 3 shows the Pearson correlation result for each of the financial inclusion variables. The two EPU variables (i.e., the EPUD and the EPUA) were significant and negatively correlated with ATM, which seemed to suggest that a higher economic policy uncertainty was associated with a lower supply of ATMs per 100,000 adults. On the other hand, the EPUD and the EPUA were positively correlated with some BOR, CC and BBPA, but the correlation was insignificant. Similarly, the EPUD and the EPUA were negatively correlated with SAV and the correlation was insignificant. The remaining dependent variables (MPB, ELP, ACC and DC) showed conflicting signs when correlated with the EPUD and the EPUA. Overall, the correlations were low, and indicated that multi-collinearity was not a problem in the analysis.

Regression Results

Effect of EPU on Financial Inclusion

The results are reported in Table 4 and Table 5. Only the significant results were interpreted. The EPUD coefficient was insignificant in columns 1 to 9 in Table 4 and Table 5. This indicated that economic policy uncertainty was not significantly related to the nine financial inclusion indicators.

Regarding the control variables, the NPL coefficient was negative, as was expected in six of the nine models. This has confirmed the prediction that the NPL would have a negative relationship with financial inclusion. More specifically, a high NPL would lead to a decrease in ATM supply and bank branch contraction. In contrast, a high NPL was associated with an increase in formal accounts and the use of electronic payments. The GDPR coefficient was significant and negatively related to CC in column 7. This seemed to suggest that the use of credit cards was higher during periods of economic prosperity. The DCP coefficient was significant and positively related to the ACC and the BBPA. This result supported the *a priori* expectation, and indicated that a higher supply of credit to the private sector would lead to a significant increase in ATM supply and bank branch expansion, thereby, increasing financial inclusion.

In contrast, the DCP coefficient was significant and negatively related to the ELP and the CC, which indicated that a higher supply of credit to the private sector would lead to a significant decrease in the number

of adults using electronic payments and a decrease in credit card usage, thereby, decreasing financial inclusion.

The OCTA coefficient was significant and negatively related to ATM, ACC and CC. This result supported the *a priori* expectation, and indicated that high overhead costs in banks would lead to a significant decrease in ATM supply, formal account ownership and credit card usage, thereby, decreasing financial inclusion. In contrast, the OCTA coefficient was significant and positively related to the BBPA, which indicated that high overhead costs in banks would lead to a significant increase in the number of bank branches.

Table 4

Effect of EPU on Financial Inclusion

Variable	(1) ATM	(2) BBPA	(3) MPB	(4) ELP
C	70.068***	11.577***	-3.323	70.109***
	(7.57)	(3.76)	(-0.53)	(8.56)
EPUD	0.018	-0.0005	0.001	0.011
	(1.31)	(-0.10)	(0.13)	(1.29)
NPL	-0.628**	-0.343**	-0.184	1.673***
	(-2.29)	(-4.12)	(-0.84)	(5.79)
GDPR	0.260	-0.074	0.040	0.135
	(0.74)	(-0.68)	(0.25)	(0.65)
DCP	0.266***	0.151***	0.101	-0.149*
	(3.21)	(5.73)	(1.66)	(-1.86)
OCTA	-1.400***	0.438***	-0.185	-0.107
	(-2.89)	(2.93)	(-0.68)	(-0.29)
Adjusted R^2	98.05	97.73	85.06	98.54
F-statistic	218.90	183.42	16.05	179.68
Observation	131	134	75	75

Note. Regression in Table 4 includes country and year fixed effect. T-statistic is reported in parenthesis. *, **, *** represent significance level at 10%, 5% and 1% level. ATM = ATMs per 100,000 adults. BBPA = Bank branches per 100,000 adults. MPB = adults using a mobile phone to pay bills. ELP = adults who use electronic payments to make payments. EPUD = year-end value of the monthly EPU index. NPL = nonperforming loans ratio. OCTA = the ratio of bank overhead cost to total asset ratio. DCP = credit supply to the private sector by banks to GDP ratio. GDPR = real GDP growth rate.

Table 5

Effect of EPU on Financial Inclusion

Variable	(5) ACC	(6) DC	(7) CC	(8) SAV	(9) BOR
β0	74.817***	57.946***	45.921***	43.506***	16.309***
	(13.18)	(3.28)	(10.43)	(8.79)	(6.54)
EPUD	0.012	-0.006	0.005	-0.005	0.003
	(1.51)	(-0.31)	(0.71)	(-0.70)	(0.73)
NPL	0.486***	0.445	-0.016	-0.139	-0.142
	(3.00)	(1.18)	(-0.13)	(-0.99)	(-1.99)
GDPR	-0.223	-0.225	-0.501***	-0.143	-0.091
	(-1.06)	(-0.46)	(-3.09)	(-0.79)	(-0.99)
DCP	0.024	0.012	-0.074*	-0.032	-0.019
	(0.49)	(0.11)	(-1.97)	(-0.76)	(-0.92)
OCTA	-0.685**	0.416	-0.573**	-0.095	-0.089
	(-2.36)	(0.62)	(-2.55)	(-0.37)	(-0.70)
Adjusted R^2	95.99	84.95	96.57	96.33	87.86
F-statistic	107.01	25.94	125.77	117.01	32.97
Observation	138	138	138	138	138

Note. Regression in Table 5 includes country and year fixed effect. T-statistics is reported in parenthesis. *, **, *** represent significance level at 10%, 5% and 1% level. ACC = adults who own a formal account. DC = debit card ownership. CC = credit card ownership. SAV = adults who have formal savings. BOR = adults who have formal borrowings. EPUD = year-end value of the monthly EPU index. NPL = nonperforming loans ratio. OCTA = the ratio of bank overhead cost to total asset ratio. DCP = credit supply to the private sector by banks to GDP ratio. GDPR = real GDP growth rate.

Interaction Analysis – Effect of EPU on Financial Inclusion

The interaction results are shown in Table 6 and Table 7. Only the significant results were interpreted. The NPL*EPUD coefficient was significant and negatively related to the BBPA and the ELP in columns 2 and 4. This seemed to suggest that the combined effect of high levels of economic policy uncertainty and high non-performing loans lead to bank branch contraction and a reduction in the use of electronic payments, thereby reducing financial inclusion. The GDPR*EPUD coefficient was significant and positively related with the ELP, and negatively related to the ACC in columns 4 and 5, respectively.

Table 6

Interaction Analysis – Effect of EPU on Financial Inclusion

Variable	(1) ATM	(2) BBPA	(3) MPB	(4) ELP
β0	93.949***	11.381**	3.789	68.598***
	(6.92)	(2.59)	(0.36)	(6.18)
EPUD	-0.099**	0.004	-0.021	0.012
	(-2.14)	(0.27)	(-0.67)	(1.13)
NPL	-0.395	-0.254**	-0.233	1.820***
	(-1.39)	(-2.58)	(-0.93)	(5.86)
GDPR	-0.411	0.022	0.014	0.237
	(-0.94)	(0.14)	(0.06)	(1.07)
DCP	0.157	0.152***	0.070	-0.077
	(1.36)	(4.21)	(0.79)	(-1.21)
OCTA	-6.008***	0.266	-1.894	0.077
	(-6.19)	(0.81)	(-1.24)	(0.91)
NPL*EPUD	-0.002	-0.001*	0.0001	-0.003*
	(-1.13)	(-1.85)	(0.11)	(-1.83)
GDPR*EPUD	0.005	-0.001	-0.0004	0.005**
	(1.52)	(-0.99)	(-0.21)	(2.17)
DCP*EPUD	0.0005	-0.0001	0.0001	-0.001**
	(1.42)	(-0.001)	(0.44)	(-2.09)
OCTA*EPUD	0.023***	0.001	0.006	0.004
	(5.18)	(0.49)	(1.15)	(0.62)
Adjusted R^2	98.46	97.73	84.49	98.68
F-statistic	246.03	164.75	13.59	174.32
Observation	131	134	75	75

Note. Regression in Table 4 includes country and year fixed effect. T-statistic is reported in parenthesis. *, **, *** represent significance level at 10%, 5% and 1% level. ATM = ATMs per 100,000 adults. BBPA = Bank branches per 100,000 adults. MPB = adults using a mobile phone to pay bills. ELP = adults who use electronic payments to make payments. EPUD = year-end value of the monthly EPU index. NPL = nonperforming loans ratio. OCTA = the ratio of bank overhead cost to total asset ratio. DCP = credit supply to the private sector by banks to GDP ratio. GDPR = real GDP growth rate.

This seemed to suggest that high levels of the EPU in times of economic boom led to higher electronic payments and a decrease in formal account ownership.

The DCP*EPUD coefficient was significant and negatively related to the ELP, and positively related to the ACC and the CC in columns 4, 5 and 7, respectively. This seemed to suggest that a high credit supply in times of high levels of the EPU led to higher formal account ownership, higher credit card usage and a decrease in the use of electronic payments. The OCTA*EPUD coefficient was significant and positively related to the ATM, the ACC and the CC in columns 1, 5 and 7, respectively. This seemed to suggest that high overhead costs in banks in times of high levels of the EPU led to higher formal account ownership, greater ATM supply and higher credit card usage.

Table 7

Interaction Analysis – Effect of EPU on Financial Inclusion

Variable	(5) ACC	(6) DC	(7) CC	(8) SAV	(9) BOR
β0	90.816***	65.705***	55.823***	46.677***	16.465***
	(10.89)	(3.28)	(8.49)	(6.17)	(4.32)
EPUD	-0.049*	-0.028	-0.039	-0.019	0.001
	(-1.77)	(-0.41)	(-1.75)	(-0.78)	(0.09)
NPL	0.345*	0.452	-0.018	-0.108	-0.017
	(1.85)	(1.01)	(-0.12)	(-0.64)	(-1.99)
GDPR	-0.036	-0.072	-0.604**	-0.260	-0.099
	(-0.12)	(-0.10)	(-2.65)	(-0.99)	(-0.75)
DCP	-0.096	-0.077	-0.142***	-0.057	-0.019
	(-1.41)	(-0.47)	(-2.63)	(-0.92)	(-0.62)
OCTA	-1.718***	0.994	-1.475***	-0.268	-0.103
	(-2.76)	(0.67)	(-3.00)	(-0.48)	(-0.36)
NPL*EPUD	0.001	-0.001	-0.0001	-0.0004	0.0003
	(1.10)	(-0.25)	(-0.15)	(-0.44)	(0.68)
GDPR*EPUD	-0.003*	-0.003	-0.0001	0.0005	0.0002
	(-1.64)	(-0.68)	(-0.08)	(0.29)	(0.18)
DCP*EPUD	0.0004**	0.0004	0.0003*	0.0001	-0.00001
	(2.15)	(0.77)	(1.83)	(0.71)	(-0.07)
OCTA*EPUD	0.005*	-0.003	0.004**	0.001	0.0001
	(1.96)	(-0.45)	(2.03)	(0.29)	(0.10)
Adjusted R^2	96.19	84.58	96.63	96.23	87.45
F-statistic	99.89	22.48	113.31	100.82	28.26
Observation	138	138	138	138	138

Note. Regression in Table 5 includes country and year fixed effect. T-statistics is reported in parenthesis. *, **, *** represent significance level at 10%, 5% and 1% level. ACC = adults who own a formal account. DC = debit card ownership. CC = credit card ownership. SAV = adults who have formal savings. BOR = adults who have formal borrowings. EPUD = year-end value of the monthly EPU index. NPL = nonperforming loans ratio. OCTA = the ratio of bank overhead cost to total asset ratio. DCP = credit supply to the private sector by banks to GDP ratio. GDPR = real GDP growth rate.

Additional Analysis

An additional analysis was also performed in the present study. The EPUA variable – the average of the 12-month EPU index – was introduced into the model as a time-sensitive alternative proxy of economic policy uncertainty. This was expressed as Equation (2):

$$FIit = EPUAit + NPLit + OCTAit + DCPit + GDPRit + NPL * EPUAit + OCTA * EPUAit + + DCP * EPUAit + GDPR * EPUAit + eit \quad (2)$$

The results are reported in Table 8. The NPL*EPUA coefficient was significant and negatively related to the BBPA in column 3 of Table 8, and was consistent with the earlier result for the NPL*EPUD reported in column 2 of Table 6. The OCTA*EPUA coefficient was also significant and positively related to the ATM in column 2 of Table 6, and was consistent with the earlier result for the OCTA*EPUD reported in column 1 of Table 4. The GDPR*EPUA coefficient was significant and positively related to the ELP in column 9 of Table 8, and was consistent with the earlier result for the GDPR*EPUD reported in column 4 of Table 6.

Also, the GDPR*EPUA coefficient was significant and negatively related to the ACC in column 5 of Table 8, and was consistent with the earlier result for the GDPR*EPUD reported in column 5 of Table 7. On the other hand, the remaining results for the interaction analyses showed conflicting signs when the EPUD and the EPUA variables were used as alternative proxies for economic policy uncertainty (EPU).

Table 8

Effect of EPU on Financial Inclusion - Additional Analysis

Variable	(1) ATM	(2) BBPA	(3) MPB	(4) ELP	(5) ACC	(6) DC	(7) CC	(8) SAV	(9) BOR
β0	73.375***	11.147***	0.189	77.78***	82.029***	60.825***	48.564***	43.383**	14.117***
	(7.67)	(3.33)	(0.03)	(8.88)	(13.14)	(4.10)	(9.85)	(7.75)	(5.09)
EPUA	-0.014	0.006	-0.013	-0.013	-0.012	-0.007	-0.007	-0.006	0.013
	(-0.59)	(0.68)	(-1.03)	(-0.84)	(-0.82)	(-0.19)	(-0.63)	(-0.43)	(1.92)
NPL	-0.278	-0.261**	-0.273	1.534***	0.420**	0.493	-0.039	-0.078	-0.176
	(-0.97)	(-2.72)	(-1.08)	(4.82)	(2.27)	(1.12)	(-0.27)	(-0.47)	(-2.14)
GDPR	-0.144	0.025	0.073	-0.363	0.092	-0.001	-0.499**	-0.212	-0.075
	(-0.33)	(0.17)	(0.34)	(-1.35)	(0.33)	(-0.002)	(-2.26)	(-0.84)	(-0.61)
DCP	0.315***	0.151***	0.099	-0.125	-0.031	-0.041	-0.089**	-0.032	-0.008
	(3.57)	(5.21)	(1.45)	(-1.45)	(-0.56)	(-0.32)	(-2.04)	(-0.64)	(-0.32)
OCTA	-4.851***	0.269	-1.128	-3.199**	-1.178**	1.294	-1.039**	-0.061	-0.023
	(-5.99)	(0.96)	(-0.89)	(-2.01)	(-2.23)	(1.03)	(-2.49)	(-0.13)	(-0.09)
NPL*EPUA	-0.003**	-0.001*	-0.0005	-0.002	0.0003	-0.001	-0.001	-0.0008	0.0005
	(-2.06)	(-1.78)	(-0.46)	(-1.34)	(0.33)	(-0.46)	(-0.91)	(-0.83)	(1.16)

(continued)

Variable	(1) ATM	(2) BBPA	(3) MPB	(4) ELP	(5) ACC	(6) DC	(7) CC	(8) SAV	(9) BOR
GDPR*EPUA	0.005 (1.51)	-0.001* (-0.98)	-0.001 (-0.45)	0.005* (1.99)	-0.003 (-1.69)	-0.003 (-0.70)	-0.0002 (-0.14)	0.0005 (0.25)	0.0003 (0.31)
DCP*EPUA	-0.0001 (-0.62)	0.0001 (0.12)	0.00004 (0.33)	-0.0001 (-0.54)	0.0002 (1.48)	0.0002 (0.83)	0.0008 (0.84)	0.00003 (0.27)	-0.0001 (-1.01)
OCTA*EPUA	0.017*** (4.89)	0.001 (0.56)	0.003 (0.85)	0.009** (2.05)	0.003 (1.25)	-0.005 (-0.84)	0.002 (1.03)	-0.0003 (-0.13)	-0.0004 (-0.35)
Adjusted R^2	98.39	97.74	84.71	98.62	96.19	84.57	96.54	96.21	87.88
F-statistic	235.54	165.42	13.81	166.09	99.89	22.45	110.37	100.40	29.38
Observation	131	134	75	75	138	138	138	138	138

Note. Regression in Table 6 includes country and year fixed effects. T-statistics are reported in parenthesis. *, **, *** represent significance level at 10%, 5% and 1%. ACC = adults who own a formal account. DC = debit card ownership. CC = credit card ownership. SAV = adults who have formal savings. BOR = adults who have formal borrowings. ATM = ATMs per 100,000 adults. BBPA = Bank branches per 100,000 adults. MPB = adults using a mobile phone to pay bills. ELP = adults who use electronic payments to make payments. EPUA = average value of the monthly EPU index. NPL = nonperforming loans ratio. OCTA = the ratio of bank overhead cost to total asset ratio. DCP = credit supply to the private sector by banks to GDP ratio. GDPR = real GDP growth rate.

CONCLUSION

The present study analyzed the effect of EPU on the level of financial inclusion. There were three main findings. One, EPU did not have a significant impact on financial inclusion. None of the nine indicators of financial inclusion were found to have a significant direct relationship with EPU. Two, the combined effect of high levels of EPU and high non-performing loans would lead to bank branch contraction and a reduction in the use of electronic payments. Third, the use of formal accounts and credit cards would increase in times of high credit supply and high levels of EPU. The implication of these findings is that economic policy uncertainty affects financial inclusion through its effect on financial institutions. As financial institutions intensified their effort to reduce cost in times of high levels of EPU, such cost reduction could affect the supply of basic financial services to customers and unbanked adults, thereby reducing financial inclusion.

Policy makers should design policies that promote high levels of financial inclusion in times of rising levels of EPU. Policy makers, particularly bank regulators, should formulate policies that prevent banks from closing rural bank branches in times of high EPU. However, the effect of such a policy in individual countries may differ due to differences in the national financial inclusion strategy, the current level of financial inclusion, the number of bank branch networks, and level of financial development and regulatory frameworks.

The main limitation of the study was the sample period. The sample period is small, and this was due to the few number of reported data in the existing database. Future studies should investigate the impact of each EPU component on the level of financial inclusion. Future studies should also examine whether strong bank supervision in times of high levels of EPU will have a positive or negative effect on financial inclusion. Finally, the analysis in the present study can be extended by investigating how the level of the EPU will affect the propensity of women to use financial services.

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