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Exchange rate and financial inclusion

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Abstract

The relationship between financial inclusion and exchange rate has not received any attention in the literature. This study investigates the effect of the official exchange rate on the level of financial inclusion. A sample of 17 countries were analysed from 2012 to 2020. Four financial inclusion indicators were used in the analysis: the number of ATMs per 100,000 adults variable, the number of bank accounts (or depositors) per 1,000 adults variable, the number of commercial bank branches per 100,000 adults variable, and a financial inclusion index. The correlation result shows that financial inclusion and exchange rate are negatively correlated while the regression result shows that a weakening official exchange rate or currency depreciation has a significant positive impact on financial inclusion through increase in the number of bank depositors (or bank accounts) and increase in the number of commercial bank branches. The findings support the argument that currency depreciation will lead people to take more loans which will increase bank profitability and encourage banks to expand to new locations to acquire new depositors, thereby increasing financial inclusion. The implication of the study is that currency depreciation is beneficial effect for financial inclusion. It is recommended that policymakers should determine the right level of currency depreciation (or devaluation) that is needed to support national financial inclusion efforts and they should manage the exchange rate around that level.

Keywords: financial inclusion, exchange rate, bank branch, depositors, depreciation, devaluation

1. Introduction

This study examines the effect of exchange rate on the level of financial inclusion. Financial inclusion refers to access and use of affordable formal financial services (Ozili, 2021). Financial inclusion is an important development policy objective in many developing countries. Policymakers want high levels of financial inclusion because it contributes to economic growth (Younas, Qureshi and Al-Faryan, 2022; Ozili and Mhlanga, 2023; Ozili, Lay and Syed, 2023). Research on the determinants of financial inclusion is still emerging. But little attention has been paid to exchange rate as a potential determinant of the level of financial inclusion.

Exchange rate affects banks through the structure of assets and liabilities denominated in foreign currency (Beck et al, 2022). Understanding the link between financial inclusion and exchange rate is important because a weak exchange rate or currency depreciation (i.e., the rising local currency unit relative to US dollar) may lead to higher domestic credit and higher economic growth when the domestic banking sector has a high net foreign currency asset exposure (Agarwal, 2018; Beck et al, 2022). The increase in domestic credit may increase bank profitability through higher interest income and it can encourage banks to expand to new locations to acquire new depositors, thereby increasing financial inclusion.

This study analyses 17 countries over a 9-year period. The results indicate that currency depreciation has a significant positive effect on financial inclusion. The findings of this study contribute to the financial inclusion literature by showing that the exchange rate is a potential macroeconomic determinant of financial inclusion. The study also contributes to the literature that examines the effect of exchange rate fluctuations on the economy. The findings show that currency depreciation leads to a high level of financial inclusion.

The rest of the study is structured as follows. Section 2 presents the review of the literature. Section 3 presents the methodology used to analyse the data. Section 4 discusses the results while section 5 presents the conclusion of the study.

2. Literature review

Existing studies have examined the effect of changes in exchange rate on the financial sector while other studies have examined the determinants of financial inclusion. But these studies have not examined the association between exchange rate and financial inclusion.

For instance, Hajilee and Al Nasser (2014) examined the impact of exchange rate uncertainty on financial market development. They used stock market development as a proxy for financial market development. They analysed twelve emerging economies from 1980 to 2010. They found that exchange rate volatility has a significant effect on stock market development in the short-run and long-run in majority of the countries. Zhao (2010) analysed the relationship between China's real effective exchange rate and stock price from January 1991 to June 2009. The study did not find a stable long-term relationship between real effective exchange rate and stock price. Bahmani-Oskooee and Hajilee (2013) examined the relationship between exchange rate uncertainty and domestic investment in 27 countries and found that exchange rate volatility has a significant short-run effect on domestic investment. Khan (2019) investigated the influence of exchange rate on the stock returns of Shenzhen stock exchange from January 2008 to December 2018 using the ARDL model. They found that exchange rate has a significant negative impact on stock returns in the Shenzhen stock exchange. The author argued that policymakers should make policies that stabilize the exchange rate. Tanasković and Jandrić (2015) investigated the macroeconomic and institutional determinants of nonperforming loans in Central and Eastern European (CEE) and Southeast European (SEE) countries from 2006 to 2013 and found that exchange rate has a positive impact on nonperforming loans, implying that currency depreciation worsens nonperforming loans. Castro (2013) analysed the relationship between macroeconomic developments and bank credit risk in Greece, Ireland, Portugal, Spain and Italy from 1997 to 2011. The author found that currency appreciation decreases bank credit risk. Lin (2012) examined the co-movement between exchange rates and stock prices in the Asian emerging markets and found that the positive association between exchange rates and stock prices is stronger during crisis periods. Reboredo, Rivera-Castro and Ugolini (2016) examined the risk spillovers from exchange rate to stock prices in emerging economies. They found a positive relationship between stock prices and currency values in emerging economies with respect to the US dollar and the Euro. Ehrmann, Fratzscher and Rigobon (2011) analysed the financial

transmission between money, bond and equity markets and exchange rates in the USA and the Euro Area. They found that asset prices react strongest to other domestic asset price shocks. They observed that US financial markets explain around 30% of movements in Euro Area financial markets, whereas Euro Area markets explain only about 6% of US asset price changes.

Other studies examined the economic determinants of financial inclusion but did not consider exchange rate as a potential economic determinant of financial inclusion. For instance, Ediagbonya and Tioluwani (2023) examined the role of financial technology in advancing financial inclusion in developing and emerging markets and focusing on Nigeria. In the study, it was argued that financial technology may help to improve financial inclusion. Their study showed that digital financial technology through smartphones, mobile money, and automated teller machines (ATMs) helped to increase financial inclusion in Nigeria. The authors conclude that achieving financial inclusion through fintech is essential for developing and emerging markets. Ozili (2024) examined the impact of gender equality on financial inclusion in 14 developing countries from 2005 to 2021 and found that gender equality has a significant positive effect on financial inclusion in developing countries and the effect is more pronounced in African countries but is non-existent in non-African countries. Shaikh, Glavee-Geo, Karjaluoto and Hinson (2023) investigated whether mobile money stimulate digital financial inclusion. They argued that mobile money agents encourage the continuous use of digital financial services, and it advances financial inclusion. They further argued that mobile money agent encourage the continuous use of mobile money services for the benefit of the less financially empowered customer segment. Ozili and Mhlanga (2023) showed that financial inclusion is popular because it is related to microfinance, digital finance, inclusive finance, financial exclusion, and Fintech. They also found a uni-directional causality running from financial inclusion to fintech and inclusive finance. Bekele (2023) analysed the factors affecting financial inclusion in Kenya and Ethiopia and found that financial inclusion is higher in Kenya than in Ethiopia. They also found that the macro factors affecting financial inclusion are financial liberalization policy, gross domestic product, size of the rural population and mobile money service penetration, while the micro factors affecting financial inclusion include the literacy rates and means of receiving payments. Ozili (2023a) investigated the impact of monetary policy on the level of financial inclusion in emerging market countries from 2004 to

2020 and found that a high monetary policy rate has a significant negative impact on financial inclusion through a reduction in the number of depositors in commercial banks, while a high monetary policy rate has a significant positive impact on financial inclusion through greater bank branch expansion. Kouladoum, Wirajing and Nchofoung (2022) investigated the relationship between digital technology and financial inclusion in 43 Sub-Saharan African countries from 2004 to 2019. They found that financial inclusion is positively affected by digital technology in terms of mobile telephone users, fixed broadband, and number of internet users in Sub Saharan Africa. Ozili (2023b) examined the correlation between corporate governance and financial inclusion and found that strong corporate governance is associated with better financial inclusion outcomes especially in Asian countries and in Middle East countries. But a mixed association was found in European countries, North American countries, South American countries, African countries and in Middle East and North Africa (MENA) countries. While these studies examined the relationship between financial inclusion and other economic indicators, they did not examine the relationship between financial inclusion and exchange rate. This study adds to the literature by investigating the effect of exchange rate on financial inclusion.

3. Methodology

Financial inclusion data were collected from the Global Financial Development Indicators while exchange rate data were collected from the International Monetary Fund's International Financial Statistics database. The sample period is from 2012 to 2020. Seventeen countries were analysed, namely, Argentina, Bangladesh, Cameroon, Costa Rica, Croatia, Estonia, Eswatini, Georgia, Ghana, Israel, Latvia, Lesotho, Malta, Moldova, Namibia, Nigeria, and North Macedonia. Four financial inclusion indicators were used in the analysis: the number of ATMs per 100,000 adults variable (ATT), the number of bank accounts (or depositors) per 1,000 adults variable (BAD), the number of commercial bank branches per 100,000 adults variable (BRC), and a financial inclusion index (FIF). The financial inclusion index is a weighted average of the ATT, BAD and BRC variables using the weights: $(0.3) * ATT$, $0.4*(BAD)$ and $0.3*(BRC)$. A panel univariate model was used for the regression analysis. The model estimates financial inclusion as a function of the official exchange rate as shown in equation 1.

$$\text{Financial inclusion indicators} = f(\text{official exchange rate})$$

$$(FIF, BAD, BRC, ATT,)_{i,t} = \beta_0 + \beta_1 EXR_{i,t} + e_{i,t} \dots \text{Equation 1}$$

Where i = country. t = year. ATT = number of ATMs per 100,000 adults. BAD = number of depositors with commercial banks per 1,000 adults. BRC = number of commercial bank branches per 100,000 adults. FIF = financial inclusion index. EXR = official exchange rate (local currency unit per US\$, period average). e = error term. The method used to estimate the data is the fixed effect panel regression to control for time-invariant omitted variables.

4. Results

4.1. Descriptive statistic

Summary of the descriptive statistics for the 17 countries is shown in Table 1. The average number of commercial bank branches (BRC) is higher in Moldova and lower in Cameroon. The average number of ATMs per 100,000 adults (ATT) is higher in Croatia and lower in Cameroon. The average number of depositors or bank account holders (BAD) is higher in Estonia and lower in Cameroon. The average FIF index is higher in Estonia and lower in Cameroon. The average official exchange rate (EXR) is higher in Cameroon and lower in Latvia. Overall, the descriptive statistics show that the level of financial inclusion is very low in Cameroon.

Countries	ATT	BAD	BRC	FIF	EXR
	Mean	Mean	Mean	Mean	Mean
Argentina	50.74	1055.61	13.34	441.47	22.82
Bangladesh	7.45	692.34	8.65	281.77	80.81
Cameroon	4.04	90.57	2.03	38.05	553.29
Costa Rica	67.07	1197.24	20.80	505.26	548.55
Croatia	131.07	1430.50	31.99	621.12	6.34
Estonia	72.04	2146.81	11.16	883.68	0.84
Eswatini	36.75	468.17	7.03	200.41	12.63
Georgia	75.19	932.64	32.02	405.22	2.29
Ghana	9.73	598.18	6.95	244.28	3.78
Israel	121.97	1021.87	19.02	451.05	3.66
Latvia	63.04	1321.75	16.63	552.61	0.79
Lesotho	12.82	360.81	3.67	149.27	12.63

Malta	50.51	1333.54	30.82	557.81	2.57
Moldova	45.48	1318.59	40.61	553.26	16.41
Namibia	63.77	947.77	12.46	401.98	12.64
Nigeria	15.61	867.21	5.002	353.06	244.10
North Macedonia	57.56	1001.69	24.66	425.34	51.98
Mean	92.61	994.67	17.01	418.65	92.61
Median	12.11	989.81	13.48	423.16	12.11
Maximum	592.61	2314.69	56.22	952.61	592.61
Minimum	0.52	52.68	1.83	22.39	0.53
Std. Dev.	178.81	495.71	11.93	206.77	178.81
Observations	153	153	153	153	153

ATT = number of ATMs per 100,000 adults. BAD = number of depositors with commercial banks per 1,000 adults. BRC = number of commercial bank branches per 100,000 adults. FIF = financial inclusion index. EXR = official exchange rate (local currency unit per US\$, period average).

4.2. Correlation result

The Pearson correlation result is reported in table 2. The FIF variable has a significant negative correlation with the EXR variable. This indicates that the financial inclusion index is negatively correlated with exchange rate. This implies that financial inclusion and exchange rate are inversely correlated. The BAD variable is significant and negatively correlated with the EXR variable. This indicates that financial inclusion, in terms of number of depositors, has a significant negative correlation with exchange rate. The BRC variable is significant and negatively correlated with the EXR variable. This indicates that financial inclusion, in terms of bank branch expansion, is significant and negatively correlated with exchange rate. The ATT variable is significant and negatively correlated with the EXR variable. This indicates that financial inclusion, in terms of the number of ATMs, is significant and negatively correlated with exchange rate. Overall, the correlation result shows that financial inclusion and exchange rate are negatively correlated.

Table 2. Pearson correlation for exchange rate and financial inclusion

Variables	EXR	FIF	BRC	BAD	ATT
EXR	1.000 -----				
FIF	-0.291*** (0.00)	1.000 -----			
BRC	-0.262*** (0.00)	0.539*** (0.00)	1.000 -----		
BAD	-0.283*** (0.00)	0.998*** (0.00)	0.513*** (0.00)	1.000 -----	
ATT	-0.276*** (0.00)	0.622*** (0.00)	0.555*** (0.00)	0.583*** (0.00)	1.000 -----

*** denotes statistical significance at the 1% level. ATT = number of ATMs per 100,000 adults. BAD = number of depositors with commercial banks per 1,000 adults. BRC = number of commercial bank branches per 100,000 adults. FIF = financial inclusion index. EXR = official exchange rate (local currency unit per US\$),

4.3. Regression result

The regression result is reported in table 3. The EXR variable has a significant positive impact on the financial inclusion index (FIF) in column 1. This indicates that currency depreciation leads to higher financial inclusion. The EXR variable also has a significant positive relationship with the BAD variable in column 2. This indicates that currency depreciation leads to increase in financial inclusion through increase in the number of depositors (or bank accounts). The EXR variable has a significant positive relationship with the BRC variable in column 3. This indicates that currency depreciation leads to increase in financial inclusion through increase in the number of commercial bank branches. Meanwhile, the EXR variable has a negative but insignificant relationship with the ATT variable in column 4. This indicates that currency depreciation does not have a significant impact on financial inclusion through ATM penetration.

	Coefficient (p-value)	Coefficient (p-value)	Coefficient (p-value)	Coefficient (p-value)
	FIF	BAD	BRC	ATT
c	335.218*** (0.00)	787.27*** (0.00)	14.953*** (0.00)	52.733*** (0.00)
EXR	0.901*** (0.00)	2.239*** (0.00)	0.022* (0.07)	-0.005 (0.19)
R ²	93.38	92.97	94.63	97.467
F-statistic	71.67	67.13	89.56	195.47

*** and * represent statistical significance at the 1% and 10% levels. ATT = number of ATMs per 100,000 adults. BAD = number of depositors with commercial banks per 1,000 adults. BRC = number of commercial bank branches per 100,000 adults. FIF = financial inclusion index. EXR = official exchange rate (local currency unit per US\$, period average).

5. Conclusion

The relationship between financial inclusion and exchange rate has not received any attention in the literature. This study is the first to investigate the effect of the official exchange rate on the level of financial inclusion. A sample of 17 countries were analysed from 2012 to 2020. The Pearson correlation result showed that financial inclusion and exchange rate are negatively correlated while the regression results showed that a rising official exchange rate, or currency depreciation, has a significant positive impact on financial inclusion through the increase in the number of depositors (or bank accounts) and increase in the number of commercial bank branches. The findings indicate that currency depreciation has a positive effect on financial inclusion. The findings support the argument that currency depreciation may lead to increase in domestic credit which may increase bank profitability and encourage banks to expand to new locations to acquire new depositors, thereby increasing financial inclusion. The implication of the study is that currency depreciation has beneficial effects for financial inclusion. Policymakers should determine the right level of currency depreciation (or devaluation) that is needed to support national financial inclusion efforts and they should manage the exchange rate around that level. Currency depreciation may support financial inclusion efforts, but too much currency depreciation may harm trade and lead to other adverse economic effects. Therefore, there is a need for central banks to determine the

optimal level of currency depreciation that would be beneficial for financial inclusion. Future studies can extend this study by investigating the effect of trade on financial inclusion. Future studies can also extend this study by investigating the effect of exchange rate on financial inclusion using other measures of financial inclusion.

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