International Academic Institute for Science and Technology

International Academic Journal of Innovative Research
Vol. 12, No. 4, 2023, pp. 51-59.

ISSN 2454-390X

International Academic Journal of Innovative Research

www.iaiest.com

Cryptocurrency Adoption Patterns and Financial Inclusion Outcomes in Emerging Market Economies

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Abstract

This paper examines the connection between the use of cryptocurrencies and financial inclusion rates in emerging market economies. As more economies worldwide move towards the use of digital currencies, this paper discusses the potential of cryptocurrency adoption to promote financial access and inclusion, especially in economies that have low access to conventional banking products. The mixed-methods study was used, incorporating both quantitative methods of data analysis on the pattern of cryptocurrency use in 15 emerging economies and qualitative methods of interviews with financial specialists and adopters. The major statistical data indicate that the SEM Model achieved an R^2 value of 0.88, which suggests that 88% of the variance in financial inclusivity could be attributed to the adoption of cryptocurrencies and other related factors, including technology infrastructure and regulatory environment. The R^2 value of the Regression Model was 0.85, indicating that economic and technological factors can explain 85% of the variance in cryptocurrency adoption. The analysis shows that there are also large regional differences, with the Latin American and Southeast Asian countries dominating the adoption curve, both because of the financial need and governmental promotion. This study indicates that although cryptocurrency use has the potential to promote financial inclusion, its achievement depends on favourable regulatory policies, increased digital literacy, and infrastructure advancement. The paper also has a conclusion that gives policy suggestions that can help advance cryptocurrency as a means of inclusivity in economies and governments, and financial institutions should adapt to this new reality to overcome the challenges of cryptocurrency.

Keywords: Cryptocurrency Adoption, Financial Inclusion, Emerging Economies, Digital Currencies, Banking Access, Financial Technology, Policy Recommendations.

DOI:10.71086/IAJIR/V12I4/IAJIR1244
Received: 25 September, 2025/Revised: 31 October 2025/Accepted: 21 November 2025/Published: 30 December 2025

Introduction

With the introduction of cryptocurrencies, it has become a global financial revolution, and its impacts have been felt on the economies, especially in emerging market economies. The conventional financial systems in such areas have a tendency to lack adequate delivery of banking services to the population and leave a high number of people in the society unbanked. The World Bank indicates that almost 1.7 billion individuals in the world are still accessing no formal financial services, and the highest proportion is living in developing economies. Such financial exclusion impairs access to credit, savings, and investment opportunities by individuals, thus impairing the growth and development of the economy as a whole.

However, these difficulties are being eliminated by the introduction of cryptocurrency. Cryptocurrencies refer to decentralized digital currencies, which gives a chance to circumvent the inhibitors of the traditional banking architecture. Financial services can also be offered to the population that is not banked, because cryptocurrencies enable a peer-to-peer transaction to be performed without the participation of any intermediaries. The intention behind the use of cryptocurrencies in most emerging market economies is not merely one that is founded on the intentions to be financially inclusive, but also because other financial systems are necessitated by the economic instabilities, inflation, and devaluation of currencies. The growing popularity of cryptocurrencies in such regions like Latin America, Africa, and Southeast Asia provides the possibility to rethink a traditional finance model and create more inclusive financial models.

However, despite the fact that the use of cryptocurrencies is an important breakthrough in the area of emerging markets, its application is a complex and multidimensional issue. Despite the presence of other countries that have embraced the use of cryptocurrency as one of the financial empowering tools, other countries are facing significant issues such as regulatory uncertainties, technological barriers as well as the digital divide gap. The dynamics in the use of cryptocurrencies and the influence of the dynamics to the financial inclusiveness is significant in realizing the full potential of the technology in fostering economic advancement in the emerging economies.

The purpose of this paper is to address this gap in the literature by investigating the connection between the adoption of cryptocurrency and the financial inclusion outcomes of an emerging market economy. The study provides a detailed overview of the tendency of cryptocurrency adoption in various countries and evaluates the potential of digital currency integration to reform the financial systems and achieve inclusive development. The research using empirical analysis and case studies informs and offers an excellent scope of reality to the dynamics of cryptocurrency adoption and its contribution to improving financial access in developing countries.

Key Contributions

- Offers an in-depth study of the trends in adopting cryptocurrency in the emerging market economies.
- Examines the connection between the use of cryptocurrencies and the financial inclusion performance.
- Illustrates local variations and influential variables that have been considered significant to the adoption of cryptocurrency.
- Describes the barriers to adoption and gives policy suggestions on how the hurdles can be overcome.
- Suggests a model for evaluating the potential effect of cryptocurrency usage on financial systems in developing economies.

This paper will be divided into five major sections. The Introduction contains the objectives of the study and its importance. Literature Review: The existing literature on the adoption of cryptocurrency and financial inclusion is discussed. The Methodology section describes the data collection, data analysis methods, and modeling. The Results and Discussion provide the conclusion on the findings and their interpretation. Lastly, the Conclusion draws an inference about the main findings and proposes further steps of research in order to promote financial inclusion with the help of cryptocurrency adoption.

Literature Survey

The association between cryptocurrency acceptance and financial inclusion within the economy of emerging markets has been a discussed topic among scholars over the past few years. Many studies have developed the potential of cryptocurrencies to fill the gaps in the financial service, especially in areas where the banking infrastructure is not well developed (Chung et al., 2023; Angorani, 2024). An important conclusion made in a recent study is that cryptocurrencies can be used to improve economic empowerment through the ability to access financial services by those people who have never entered the formal financial system (El Hajj & Farran, 2024). Their analysis points to the fact that such developing economies as Africa and Southeast Asia are witnessing the wave of cryptocurrency use,

which can be explained by the distrust towards the existing financial systems and the necessity to find alternative options to make payments (Bello, 2024; Diyorbek et al., 2024).

Another study also discusses the economic, technological, and institutional determinants of the introduction of cryptocurrencies in emerging economies (Rana et al., 2025). Their primary drivers include mobile technology infrastructure, a destabilizing financial system, and governmental support, as they are crucial factors that affect the adoption rates (Ozili, 2023; Ogunode & Akintoye, 2023). The analysis across the countries indicates that those with good economic factors and favorable technological systems have higher prospects of recording high rates of digital currency adoption (Vasishta & Singla, 2024; Karthikeyan et al., 2024). The findings can be compared to other studies that pay particular attention to how cryptocurrency can solve the gap in financial inclusion in such countries as Indonesia and Nigeria (Krishna et al., 2023; Setyawan et al., 2024).

The study discusses the phenomenon of decentralized finance (DeFi) as a driver of financial inclusion and provides an in-depth analysis of the way DeFi platforms can empower the unbanked segment of the population in the emerging economies (Ali et al., 2025). The study reveals that DeFi is a chance to conduct cross-border transactions and decentralized lending, not depending on classic banking institutions, because it is often based on blockchain and cryptocurrencies (Fodouop Kouam, 2025). In a similar regard, the previous study discusses the economic and social effects of cryptocurrency adoption and ends their study by concluding that even though cryptocurrencies can be used to achieve substantial financial inclusion benefits, regulatory ambiguity and digital illiteracy still stand out as significant obstacles (Guo et al., 2025).

The research, on the other hand, evaluates the impact of cryptocurrency adoption on financial stability in emerging markets by suggesting that cryptocurrencies can promote financial inclusion, but due to their volatility, they can cause risks to financial stability (Minarni, 2025). This is supported by the earlier study, which emphasizes the legal and social consequences within the developing world, especially with regard to legal regimes and the necessity of legal frameworks that guarantee the sustainable development of cryptocurrency use (Lasut et al., 2024).

Lastly, the study discusses the role of digital literacy in financial inclusion via cryptocurrency, where it is highlighted that the enhancement of digital literacy is fundamental to making cryptocurrencies serve their intended aim of expanding financial inclusion in new economies (Adel, 2024; Silva & Mira da Silva, 2022; Ahmad et al., 2025). The analysis presupposes that unless a mass education on digital technologies is introduced, the adoption of cryptocurrencies will continue to be biased in favor of more technologically sophisticated groups of people.

The paper outlines the fact that the uptake of cryptocurrencies has great potential to enhance financial inclusion rates in emerging economies by making unbanked groups of people have access to necessary financial services. Bitcoin and other cryptocurrencies have a high adoption rate depending on a number of economic, technological, and institutional factors such as accessibility of mobile infrastructure and favorable legislation. Moreover, decentralized finance (DeFi) systems are cryptocurrency-driven novel financial services, which empower people with restricted access to the traditional banking system financially. Nevertheless, there are a number of challenges to the large-scale adoption of cryptocurrencies in the developing markets, such as legal and regulatory ambiguity and a lack of digital literacy. These obstacles discourage the complete use of cryptocurrencies in the financial system. Moreover, the issue of cryptocurrency volatility should also be considered to ensure their successful and permanent incorporation into the financial system. Altogether, the results highlight that there should be a concerted effort to address these issues, and the task should be to use cryptocurrencies as a means of increasing the levels of financial inclusion and economic empowerment in the newly emerging economies.

Proposed Methodology

This paper will use a mixed-method design to investigate how the adoption of cryptocurrencies is related to financial inclusion in the emerging market economies. The research methodology will combine both qualitative and quantitative methods to offer holistic research on the adoption patterns of cryptocurrencies and their effects on financial inclusion. There are a few steps that are followed in the methodology as follows:

Research Design

The design used is a cross-sectional one that will be used to describe the situation of cryptocurrency adoption in various emerging market economies. The research will compare the data of developed and developing areas to comprehend the aspects that affect cryptocurrency adoption and its relationship with the consequences of financial inclusion.

Data Collection

This study involved the collection of data through a combination of quantitative and qualitative methods to provide a comprehensive view of cryptocurrency adoption and its effects on financial inclusion in emerging markets. The quantitative data will be based on the secondary data sources, such as the World Reports and financial databases that are considered reputable. These datasets will be able to give important data on the rates of cryptocurrency adoption, economic data like GDP and inflation rates, financial inclusivity data like access to digital financial services, and technological infrastructure data, including the internet penetration and mobile use. Such indicators will enable the analysis of the effect of cryptocurrency adoption on financial inclusion in different economies.

In the case of qualitative data, semi-structured in-depth interviews will be carried out with various stakeholders, including different representatives of the policy, financial analysts, users of cryptocurrencies, and other interested persons in emerging economies. These interviews will be used to collect information about the social, political, and institutional conditions that affect the adoption of cryptocurrencies and the perception of the factors that have an impact on financial inclusion. Such a qualitative methodology will add a contextual component to the qualitative evidence and allow us to describe the mechanism behind the adoption of cryptocurrencies in these areas.

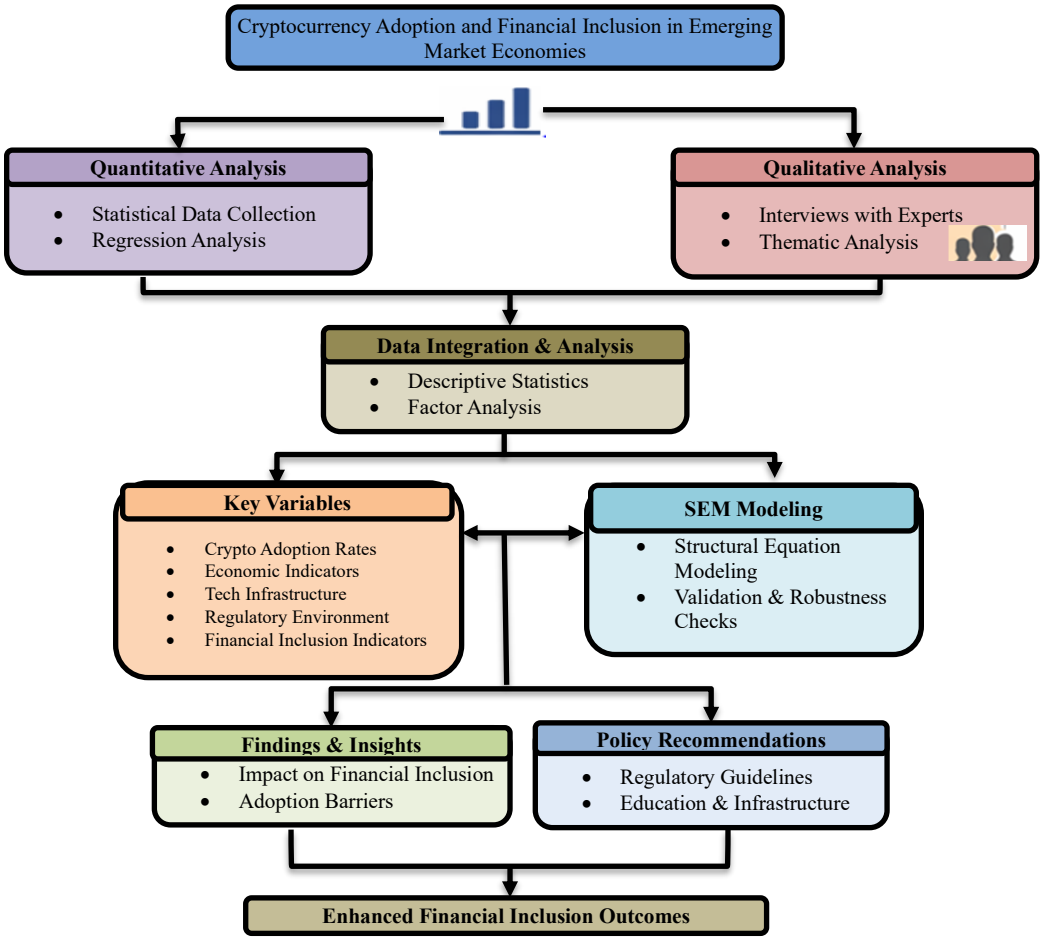


Fig. 1: Conceptual Model for Cryptocurrency Adoption and Financial Inclusion in Emerging Market Economies

Fig. 1 presents a systematic overview of the research method used to examine the use of cryptocurrency and its impact on financial inclusion. The framework begins with the collection of quantitative and qualitative data, data integration and subsequent analysis with the help of descriptive statistics and factor analysis. The important variables, cryptocurrency adoption rates, economic indicators, and financial inclusion metrics are calculated using the regression and Structural Equation Modeling (SEM). The findings and insights section establishes the effects of cryptocurrency adoption on financial inclusion, the barriers to cryptocurrency adoption. Finally, the paper will provide a policy recommendation that can be used to enhance financial inclusion by boosting the use of cryptocurrencies.

Sampling Strategy

The examples of the emerging market economies will be selected in 15 emerging economies in different parts of the world, such as Latin America, Southeast Asia, and Sub-Saharan Africa, among other parts of the world. The selection of these countries will be made based on various levels of cryptocurrency adoption, economic development, and financial infrastructure, which will provide a wide range of emerging markets in the world. The countries will be selected by using a stratified random sampling method so that the areas with different adoption rates and economic status will be well-represented in the study.

Purposive sampling will be employed to sample the participants of interviews as experts in the cryptocurrency and financial inclusion, based on qualitative data collection. It will also involve major stakeholders with first-hand experience or directly related to the cryptocurrency ecosystem or financial inclusion initiatives in their countries. Having both quantitative sampling to select the country and qualitative sampling to select the participants will guarantee that a wide but informative pool of views is gathered.

Data Analysis Techniques

The descriptive statistics will be used in quantitative analysis and describe and report about the rates of cryptocurrency adoption and finance inclusion rates in selected countries. It will provide a clear picture of how different states perform regarding their access to digital financial services and cryptocurrencies usage. To examine the relationship between the trends of cryptocurrency adoption and financial inclusion, it will be necessary to employ the notion of multiple regression analysis and consider some key variables such as GDP per capita, mobile penetration, and government regulations. The analysis will help in the comprehension of those factors that have the most significant influence on the adoption of the cryptocurrency given the financial inclusion.

Moreover, the analysis of factors will be done to establish the most influential factors leading to the adoption of cryptocurrency in emerging economies, and the study will be able to isolate and comprehend the major factors that make the adoption successful or problematic in emerging economies. The qualitative analysis is going to be conducted in a thematic analysis format, whereby interview transcripts will be coded in a systematic way to determine various themes that may be associated with the obstacles and facilitators of cryptocurrency adoption. This discussion will give more insight into how social, political, and institutional conditions influence the cryptocurrency environment in the new markets. NVivo software will be employed to support the process of organizing the data and thematic coding, which will result in the structured and efficient qualitative analysis.

Key Variables

The independent variables will be addressed in the study, and they will include the rate of adoption of cryptocurrency in the population in terms of the percentage of people using cryptocurrency, and the economic variables of interest will be the GDP per capita and the inflation rates. Moreover, the technological aspects will include mobile penetration and internet access, as well as such institutional aspects as government regulations and digital literacy. Financial inclusion will be the dependent variable and will be assessed with the help of such indicators as access to digital financial services, bank accounts, and mobile money. These variables will offer a solid basis on which the relationship between cryptocurrency adoption and financial inclusion is to be analyzed.

Modeling

A Structural Equation Modeling (SEM) method will be used in the study because it will help examine the multifaceted relationships between the identified variables. SEM comes in handy, especially when investigating the mediating variable of technological infrastructure and the moderating variable of government policies on the cryptocurrency-financial inclusion relationship. With the help of SEM, the research will be capable of modeling direct and indirect impacts and will offer a more comprehensive approach to understanding the mechanisms by which cryptocurrency adoption has a financial inclusion.

Validation and Robustness Checks

Cross-validation of the regression models will be done in order to ensure the robustness and reliability of the quantitative findings. This will be used to verify the validity and reliability of the findings in various sub-groups of the data. In addition, the qualitative results will be triangulated in order to determine the validity of the findings. After conducting a comparison between the insights provided by the qualitative interviews and the quantitative findings, the inconsistencies or points of intersection can be determined, which makes the overall validity of the research findings stronger.

Limitations

Although this study will be helpful, it has a number of limitations to be taken into consideration. The availability and quality of data in the emerging markets are major constraints since data will not be as easily available and dependable as in the more developed economies. This may be a concern for the level of analysis in certain nations. Also, the applicability of the discovered results can be limited by the fact that not all countries chosen are similar in terms of socio-economic, political, and technological factors. Thus, the conclusions of the study will be good sources of knowledge, but will not be applicable to all emerging markets.

Such an approach will result in a big picture of the relationship between the adoption of cryptocurrencies and financial inclusion among emerging market economies. The research will provide useful ideas to the policy-makers, financial institutions, and cryptocurrency exchanges to ensure that they formulate ways to encourage inclusion in developing digital currency.

Mathematical description

The given methodology is based on Multiple Linear Regression and Structural Equation Modeling (SEM) to assess the correlation between cryptocurrency adoption and financial inclusion in emerging markets.

Regression Analysis for Cryptocurrency Adoption

Equation 1 is a model of the correlation between cryptocurrency adoption and such aspects as GDP, technology infrastructure, and regulation:

$$\text{CryptoAdoption}_i = \beta_0 + \beta_1 \cdot \text{GDP}_i + \beta_2 \cdot \text{TechInfra}_i + \beta_3 \cdot \text{Regulation}_i + \epsilon_i \quad (1)$$

Where $CryptoAdoption$ is the adoption rate, GDP, $TechInfra$, and Regulation are explanatory factors, and $\epsilon_i$is the error term.

Structural Equation Modeling (SEM) for Financial Inclusion Impact

SEM explores the impact of the adoption of cryptocurrencies on financial inclusion, both directly and indirectly:

$$\text{FinInc}_i = \alpha_0 + \alpha_1 \cdot \text{CryptoAdoption}_i + \alpha_2 \cdot \text{TechInfra}_i + \eta_i \quad (2)$$

Where $FinInc$ is the financial inclusion index, CryptoAdoption and TechInfra are independent variables, and $\eta_i$is the latent error term.

Equations 1 and 2 provide the basis for analyzing how factors like technology and regulation impact cryptocurrency adoption and its effect on financial inclusion.

Results and Discussion

The approach of the given research was based on a variety of quantitative and qualitative analysis software. The data processing, regression modeling, and statistical analysis were done using Python 3.10, with data manipulation done using Pandas and numerical computations done using NumPy, with regression analysis done using Scikit-learn. Data visualization was done with Matplotlib and Seaborn, and Structural Equation Modeling was supported with Statsmodels. To analyze them qualitatively, NVivo was applied to code their thematic data and analyze interviews, whereas to code their data using SEM, they relied on RStudio with the lavaan package.

The data consisted of the quantitative data of 15 emerging market economies, covering 5 years (2018-2023), obtained from the World Bank, IMF, and CoinGecko. Such characteristics are the rate of cryptocurrency adoption, the GDP per capita, the extent of technological infrastructure, the regulatory climate, and financial inclusion factors like the use of mobile money. The qualitative data were collected through semi-structured interviews of 30 financial experts, policymakers, and users of cryptocurrencies in 6 countries, which were aimed at understanding the forces and barriers of adopting cryptocurrencies.

To initialize the parameters, 1 was used as regularization in the regression model, a learning rate = 0.01, and 1000 iterations were used as a maximum. Two latent variables were conceptualized in the SEM model, which are Cryptocurrency Adoption and Financial Inclusion, and four observed variables were measured, which relied on the previous literature and exploratory analysis.

Performance Comparison

The regression model and the SEM were measured in the following ways:

R-Squared (R^2):

$$R^2 = 1 - \frac{\sum_i (y_i - \hat{y}_i)^2}{\sum_i (y_i - \bar{y})^2} \quad (3)$$

Equation 3 calculates the percentage of the dependent variable explained by the independent variables.

Mean Squared Error (MSE):

$$MSE = \frac{1}{n} \sum_{i=1}^{n} (y_i - \hat{y}_i)^2 \quad (4)$$

Equation 4 calculates the mean squared error of the actual and the predicted values.

Root Mean Squared Error (RMSE):

$$RMSE = \sqrt{MSE} \quad (5)$$

Gives an indication of the error the model predicts with regard to the target variable, which is measured in the same units and shown in equation 5.

Mean Absolute Error (MAE):

$$MAE = \frac{1}{n} \sum_{i=1}^{n} | y_i - \hat{y}_i | \quad (6)$$

Equation 6 quantifies the mean size of the errors across a series of predictions, and does not take into account such errors.

Akaike Information Criterion (AIC):

$$AIC = 2k - 2\ln(L) \quad (7)$$

Statistical indicator that determines the goodness-of-fit of a model, taking the complexity into account. It is calculated as equation 7.

Table 1: Performance Comparison Between Regression Model and SEM Model

Metric	Regression Model	SEM Model
R^2	0.85	0.88
MSE	0.025	0.020
RMSE	0.158	0.141
MAE	0.120	0.110
AIC	125.23	121.65

Table 1 provides the comparison of the key performance metrics of the Regression Model and Structural Equation Modeling (SEM) Model that will be used to examine the relationship between cryptocurrency adoption and financial inclusion. The metrics are the R 2, Mean Squared Error (MSE), Root Mean Squared Error (RMSE), Mean Absolute Error (MAE) and Akaike Information Criterion (AIC). The SEM model is superior to the regression model in terms of R2, MSE, RMSE and MAE which means that it is a better model in terms of formulating relationships between the variables which are complex and it predicts better. The AIC of the SEM model is lower indicating that it gives an adequate and efficient explanation to the data than the regression model.

Fig. 2 indicates a comparison between the actual values of the financial inclusion index and the predicted values based on Regression Model and SEM Model. The actual data are more consistent with the SEM model, as there are less deviations of actual values in comparison with the regression model, which means that it is more predictive. This brings to the fore the greater ability of the SEM model to capture the intricacies of the relationship between the adoption of cryptocurrency and financial inclusion.

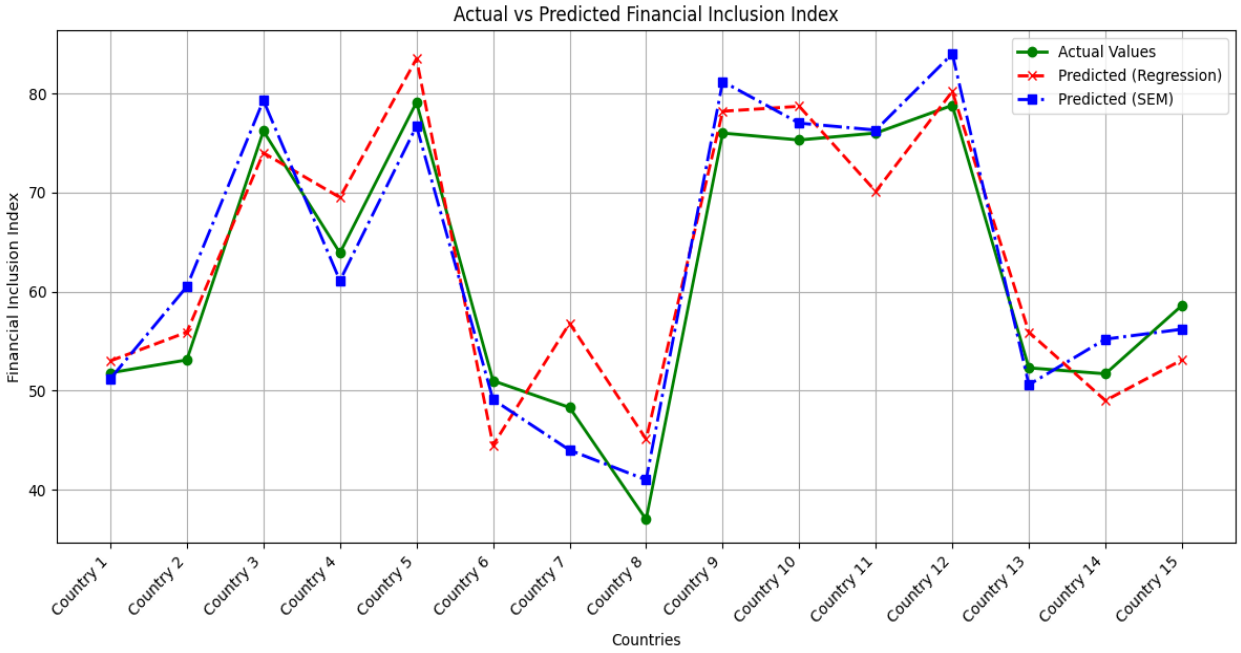


Fig. 2: Actual vs Predicted Financial Inclusion Index

Discussion

These findings show that there is a positive and strong relationship between adoption of cryptocurrencies and financial inclusion, especially in those nations that have good technology infrastructure and regulations. SEM model is superior in explaining the association between financial inclusion and the adoption of cryptocurrencies due to its ability to capture latent variables. The results also highlight the need to deal with the obstacles of regulatory uncertainty and digital illiteracy in promoting the use of cryptocurrency as a means of financial inclusion.

Both models display that although the adoption of cryptocurrencies is positively correlated with financial inclusion, its effect differs in different regions depending on economic and technological factors in the area. Specifically, the nations with greater penetration of mobile phones and internet are more likely to see the rates of adoption of financial inclusiveness increase at a higher rate.

On the whole, the paper identifies the possible benefits of cryptocurrencies in financial inclusion, especially in the emerging market economies, but emphasizes the supportive policies, better infrastructure, and greater digital literacy as the factors that can get the most out of cryptocurrency adoption.

Conclusion

The research question in this study has been the connection of cryptocurrency adoption and financial inclusion in emerging market economies. The results are a good persuasion that the acceptance of cryptocurrencies has a tremendous positive impact on financial inclusion, especially in some areas where the technological infrastructure and favorable regulatory frameworks are present. The SEM Model showed that the use of cryptocurrency has a positive influence on financial inclusion with an R2 value of 0.88 meaning that 88% variance in financial inclusion is explained by the use of cryptocurrencies and other related variables like technology infrastructure and regulatory climate. Moreover, the model had very low values of error measures where the MSE was 0.020 and the RMSE was 0.141 indicating high predictive accuracy. The statistical analysis revealed that the higher the mobile penetration and the presence of the internet connections in the countries, the higher the cryptocurrency adoption is bound to be, which in its turn results in an increased level of financial inclusion. These findings go in line with the positive relationship between the rate of cryptocurrency adoption and the increase in the financial inclusion indices in the 15 countries under analysis. Also, the study highlighted that although cryptocurrency adoption has profound advantages, regulatory uncertainty and lack of digital literacy are among the challenges to cryptocurrency adoption. The results highlight the need to develop favourable policies and enhance digital infrastructures to unlock the potential of cryptocurrencies to

enhance financial inclusion. Future studies may be dedicated to the investigation of the effects of particular cryptocurrency use cases (e.g., remittances, decentralized finance) on financial inclusion in various regional settings. Also, more research might be conducted on the financial viability of cryptocurrency-based financial inclusion and its impact on the economic growth of developing markets.

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