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Full Length Article

Digital currency and blockchain security in accelerating financial stability: A mediating role of credit supply

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A B S T R A C T

This study examines how blockchain and digital currency have affected the supply of credit and financial stability. It pays particular attention to industry-based analyses and options presented by cryptocurrencies, stablecoins, and digital currencies for the credit supply and financial stability. A positivistic or quantitative research design is employed. The method of data collection is a survey-based questionnaire, as well as the time interval data method, from December 2021 to December 2022. The study sample comprises of five industrial zones of Punjab. The respondents are businessmen, managers, and employees ($N = 449$). The study finds that the use of various digital currencies quickly transforms business. The study shows that most industries do not require central banks and, instead, concentrate on modern digital currency and blockchain systems for monetary transfers. The private and public models of physical money will likely fail in the future. Rather, central banks should adopt digital currency and blockchain with an online technological payment strategy in order to enhance domestic financial stability and payment systems.

1. Introduction

The study focuses on digital currency (DC), blockchain security, and their influence on financial stability and the supply of credit. This is a new topic that examines the as-yet little-studied potential of digital currency and central bank digital currency (CBDC). Studies on DC began only a few decades ago. Similarly, the introduction of sovereign DC reveals a potential that central banks all around the world are currently exploring (Kim & Kwon, 2023). CBDC is an account-based liability, denominated in the national currency, at a central bank that may or may not earn interest. It may can be used for bank deposits as a medium of exchange and a store of wealth. This process converts available currency with the help of direct deposits at the central bank or commercial banks. The possibility of widespread flight from bank deposits to CBDC would drain financial institutions, and it is a serious concern for financial stability. These concerns are even more essential for a developing country. Bank deposits constitute a kind of "inside money" because they are supported by private credit. There is concern that banks will be unable to keep up with demand for withdrawals under this banking system as long as fractional reserve banking is in place (i.e., a bank panic). Because of this, the economy as a whole might suffer severe consequences if the quantity of inside money decreases. This calls for policy action in bank supervision, deposit insurance, and other measures (Kim & Kwon, 2019).

In recent years, with the help of cryptocurrencies and CBDCs, significant advances have been made in DC. CBDC is risk-free "outside money" that may be used as a payment method and a store of value, so it can help maintain economic stability. Nevertheless, changing bank deposits to CBDC may have unintended consequences for bank financing and credit availability, leading to monetary instability. Businesses and companies may find it advantageous to transfer their money from commercial banks to CBDC and the central bank, especially if the central bank establishes CBDC at a profitable interest rate (Kim & Kwon, 2019, p. 2022; Selgin, 2021). As Kahn (2022) rightly states, if banks do not have enough money to lend, they may become unstable and cut off the economy's access to the credit supply. Other studies on this topic have extensively investigated the role of Bitcoin and cryptocurrencies. In Uruguay, the cost of using cash comprises 0.58% of the gross domestic product (GDP) (Álvez et al., 2020), whereas in Sweden the use of cash is relatively low (Fish & Whymark, 2015), making payment and banking

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inexpensive for the broad public. In January 2020 the European Central Bank (ECB), along with many other central banks and the Bank for International Settlements (BIS), officially confirmed that they had formed a group to evaluate the possible future uses, processes, and engineering properties of CBDCs and highlighting the importance of DC (Klein et al., 2020). These studies focus on the movement of from a physical cash system to an online cash system, and this study focuses on the process of digital currency, blockchain security, and the impact on financial stability and the credit supply.

2. Literature review

The use of digital currency has been shown to improve the banking system and financial stability, but the literature has some debate over prediction of the credit supply. Several researchers believe that individual client bank accounts and financial stability increased due to digital currency (Huibers, 2021; Kiff et al., 2020; Mersch, 2020; Yamaoka, 2022). Because of Bitcoin and other cryptocurrencies, the matter has recently attracted more attention. Hence, this study measures the role of digital currency, blockchain security, and its impact on financial stability and the credit supply. One of the concerns about CBDC that was raised even before its implementation in large countries is that it may be too successful and result in bank disintermediation, which might become more severe in the event of a financial crisis (Amaral et al., 2021; Mooij, 2021). Furthermore, some claim that CBDC might crowd out private payment options more than would be ideal, given the relative merits of private and public sector money (Agur et al., 2022; Fantacci & Gobbi, 2021; Sethaput & Innet, 2023; Viñuela et al., 2020). For example, Bindseil et al. (2021) analyze the determinants of CBDC success and its potential danger for crowding bank deposits. After looking at strategies for avoiding excessive use of money as a store of value, the research highlights the significance of the functional scope of CBDC for the payment functions of money. Prior papers also raise the possibility that if user appeal is too low for functional scope, ease, or reachability, use can be too low. Finding an appropriate applicable degree that is neither too large to supplant private sector solutions nor too small to be of utility in a networked business involving payments may be challenging. The importance of the incentives for private sector service providers (banks, wallet providers, retailers, acquirers, payment processes, etc.) engaged in the distribution of credit supply, use, and processing of CBDC is explored, along with the associated costs and rewards for industry. Similarly, physical payment faces challenges, hindering financial stability and credit supply. Nowadays, physical payment is not possible everywhere in the world, Physical payments face significant challenges today, posing considerable obstacles to financial stability and credit supply. In our modern era, it is become increasingly difficult to rely solely on physical payments as they are not accepted everywhere globally. The rise of blockchain and the adoption of digital currencies have influenced this shift. As blockchain technology underpins digital transactions, Aysan et al. (2021a) it ensures faster, secure, and transparent payment methods, making physical payments seem outdated and less efficient in certain contexts Aysan et al. (2021b).

Digital money and its security have come a long way in recent years, primarily due to innovations such as Bitcoin and blockchain. The impact of digital money on financial stability and the credit supply is only one example of a method that has fueled recent progress. Many forthcoming applications will take advantage of this technique. Furthermore, digital central bank's financial stability is an important topic that needs further investigation. As several authors have pointed out, CBDC has existed for a while (Amaral et al., 2021; Chaum et al., 2021; Tobin, 1987). Central banks have been researching the idea and architecture of digital currency for some time (Auer et al., 2020). According to Boar et al. (2020), almost 80 percent of the central banks are working on CBDCs in some capacity. Despite significant advancements toward a progressive convergence of definitions, the term CBDC is often used to refer to different things. Another crucial factor is CBDC interoperability (including semantic interoperability), which is essential for enhancing cross-border and cross-currency payment (Cheng et al., 2021).

Because of the advent of blockchain technology, encryption, and distributed ledger technology (DLT), Bitcoin has become a viable contender as a decentralized (permissionless), completely peer-to-peer electronic money network. Bitcoin and stablecoins have sped up the long-term trend toward converting monetary systems into digital (account- and token-based) forms (Adrian & Griffoli, 2019; Andolfatto, 2021; Taskinsoy, 2019a). This situation has recently encouraged central banks globally to conduct theoretical and conceptual research on CBDC (Taskinsoy, 2019b). However, whether cryptocurrencies, stablecoins, and digital currencies supported by central banks can coexist alongside fiduciary (fiat) currencies is a critical concern for central banks (Cheng et al., 2021; Di Lucido, 2020; Elsayed et al., 2022a). Although paper money–based payment systems currently play a significant role, they may soon be superseded by CBDCs, representing the digitization of money. According to the Federal Reserve and the Bank of England, a CBDC should be "minimally invasive," adopted if the advantages (e.g., lower transaction costs, better monitoring of the money flow, and more robust monitoring of tax evasion and financial crimes) offset the disadvantages (Engert & Fung, 2017; Gozgor, Demir, et al., 2019; Rennie & Steele, 2021; Rizk, 2022). Most central banks in developed countries advocate a cash-based, privately mediated two-tier monetary system (wholesale and retail) with CBDCs. Run-on deposits and secrets (data privacy), emerging dangers, and unsolved technology and design issues (e.g., central banks' lack of technical skills) make CBDC research a work in progress (Taskinsoy, 2021). Therefore, an online cash payment system works with different technological methods to ensure financial stability.

The development of digital currencies jeopardizes financial sovereignty norms and affects the global financial system (Aysan et al., 2019; Bordo, 2021; Buckley et al., 2021; Gozgor, Tiwari, et al., 2019; Zetzsche et al., 2021). For instance, Huang and Mayer (2022) examine the rivalry between China and the United States over and within the international financial system by relying on current credit supply discussions regarding the public-private character of digital currency and blockchain. The regulatory stances toward cryptocurrencies and CBDC by the two largest economies are remarkably different. China outright forbade cryptocurrency, yet it emerged as a leader in creating a CBDC. It seeks to increase the influence of the RMB on the world without sacrificing monetary control. Instead, US governments have hesitated about regulating cryptocurrency. Discussions about a hypothetical digital US dollar (USD) officially started only in 2020. Washington wants to maintain the current offshore infrastructure and cross-border financial channels for credit production. Such as, exorbitant privilege concentrates on financial stability and supporting the private sector's innovation dynamics. The new technology terrain in the fight between the US and China concerning the currency market is about emerging financial credit supply and standards for digital currencies.

Bateman and Allen (2022) investigate the legal and constitutional aspects of central banks' ability to generate reserves through monetary policy actions or "central bank operations." Bateman (2021) clarifies that, during a financial crisis, financial stability, the function of law in constructing constitutional authority over money, and the law supporting the development of central bank reserves are relatively ambiguous. The crucial issues are the financial system and economic growth, monetary systems, and central bank reserves. Alexander (2021) demonstrates that central banking's legal framework enables the constitutional state to exercise its control over the currency through various aspects of the financial system, emphasizing well-known policy initiatives such as the development of CBDC. Houser and Baker (2021) reveal that electronic payments and digital currency increased concern about financial stability. Loh (2020) argues that the potential social and financial benefits of CBDCs and sovereign cryptocurrencies are increasingly recognized by countries all over the world. The Association of Southeast Asian Nations (ASEAN) should consider a regional digital currency to stay ahead and further integrate its regional economy for the purpose of financial stability. Bansal and Singh (2021) state that newly created, state-managed digital currencies are expected to transform how people buy, supply trade, and invest worldwide because they are more traceable than cash and transactions with them are completed more quickly, and they provide more financial stability.

Arauz and Garratt (2021) investigate the macroeconomic ramifications of CBDC issuance. It is a central bank currency that can be accessed anywhere in the world and earns interest, making it a rival to bank deposits as an instrument of transaction. Barrdear and Kumhof (2022) find a 30 percent increase in GDP due to CBDC issuance as government bonds, forecasting model for the US before 2008. They recommended that policymakers consider DC a second monetary policy tool for financial stability. Kumhof and Noone (2021) propose countercyclical CBDC policy guidelines, which would significantly enhance the central bank's capacity to stabilize economic and financial cycles with a high credit supply and blockchain security. Tan (2019) and Morales-Resendiz et al. (2021) claim that the adoption of a digital currency for consumer goods is related to an underdeveloped retail payment market, a sharp decline in the use of hard currency, and financial inclusion initiatives. The COVID-19 pandemic and plans for global stablecoins have increased interest in digital currency and blockchain security for financial stability. Khalfaoui et al. (2022) analyze the effect of media coverage on the conflict between Russia and Ukraine and cryptocurrency returns proxied by Google Trends. Using daily statistics and a percentile cross-spectral inquiry, researchers find that the degree to which war coverage and cryptocurrency prices move in tandem depends on the investor's time horizon and current market conditions. Morales-Resendiz et al. (2021) examine recently initiated financial stability pilots in three jurisdictions that adopted digital currency and blockchain to increase the credit supply before, during, and after their prospective implementation. The results show that the dissemination of helpful knowledge on developing, administering, and using digital forms of fiat currency is associated with financial stability.

Since the beginning of human civilization, money, technology, and payment methods have been intertwined. But technology has recently transformed cash and payment systems at a speed and scale that have never been seen before: examples of blockchain security include mobile payment in Kenya in 2007 (Uwamariya & Loebbecke, 2020), Bitcoin payment in 2009, the blockchain announcement for the payment in 2019 (Kulkarni et al., 2019), and the launching of China's CBDC or DC electronic payment (EP) in 2020 (Elsayed et al., 2022b; Fanusie & Jin, 2021; Parasol, 2022). Therefore, this sequential rollout shows that during the COVID-19 crisis most central banks concentrated on modernizing their payment supply systems because doing so helped to overcome problems and maintain financial stability (Hsu & Tsai, 2020; Tronnier, 2021). The private and public financial stability models are likely to succeed the performance of blockchain and central bank technology. Other studies show that central banks anticipate collaborating with (both new and old) private firms to reshape domestic financial stability and payment systems (Van Roosebeke & Defina, 2021; Virtanen, 2021). The financial and payment methods combine blockchain and the supply credit for the first time (Oehler-Sincai, 2022; Priyadarshini & Kar, 2021). The role of the central bank and CBDC are vital for digital currency and blockchain security because they enhance financial stability in the entire financial system.

Many studies have validated the concept of trust transfer based on the technology in online transactions. It is a reliable paradigm for boosting financial stability and confidence in the credit supply among users of digital currency and blockchain. The three regulating processes in the trust transfer method are trust between the technological source and the receiver, the receiver's level of trust in the technology security, and the source's credibility (Wang et al., 2013). In the future, consumers may transfer their interest in blockchain security. Online businesses and their customers can learn a new approach to creating trust through a process called "trust transfer" (Xiao et al., 2019). Supporters assert that trust transfer will be the primary means of adopting technologies (Stewart, 2003). Internet service provider credibility, digital currency, and central banks are concrete examples of past transaction supply related to the industry confidence's trustworthiness and security (Belanche et al., 2014). As a theoretical debate, trust can be related to security and foster excited "trust transfer" (Zhang et al., 2018), in a study that portrays users as technology trustees, and financial corporations as trustors. Therefore, Zhang et al. (2018) assert that the trust transference mechanism includes a variety of sources and methods associated with the technological development of trust.

According to Al-Hussaini et al. (2019), consumers' faith in game-changing technologies, such as digital currency and Bitcoin, bolsters their faith in security in the intermediary network. If users are convinced that the mediator network is reliable and receives a positive response from the central bank about the technology, this might immediately impact their trust and security. This is similar to how active participation in technological processes has long been seen as an essential component of digital currency for promoting inventiveness and making the financial system stable (Treiblmaier & Sillaber, 2021). Nonetheless, digital currency experts address confidentiality, information, use, creation, and safety issues in the supply of credit for transactions and payments. The foundational framework's potential impact on emerging technology is discussed as follows: "Machine-to-machine (M2M) communication, artificial intelligence (AI), cloud computing, big data analytics, and internet of things (IoT) are the best generator of the online credit supply for the non-physically quick payment to the global world" (Paliwal et al., 2020).

The papers mentioned earlier do not discuss the issue of digital currency and blockchain security with respect to financial stability, and credit supply intervened in the industrial sectors. For instance, Kshetri (2018) argues that although digital currency technology can function without the assistance of a third party, its security may play a crucial role in the industry's financial stability. Concerns over blockchain security are closely related to financial stability issues. The digital currency is safeguarded, although it is not kept in a single place, and industries do not have complete control over data that could decrease financial stability. Data generated on blockchains may be routed through various operating systems because of the decentralized nature of digital technology. The data on a blockchain is vulnerable and open to others on the online network.

Our main contribution is in addressing the complexity of financial stability and credit supply have not found yet with the relationship of digital currency and blockchain security. Hence, we find that digital currency and blockchain technology are factors that could improve financial stability with the help of the supply of credit.

The study offers a conceptual framework for examining the performance of financial stability in business and the use of blockchain security. For example, the mediating factors include the supply of credit. To perform the mediation analysis, we use SEM and give our findings from the predictive analysis. The mediation hypothesis illustrates the direct and indirect connections between financial stability, blockchain security, and DC. However, we did not collect data on demographic factors because data was taken indirectly from industrial personnels. We test the supply of credit as a mediator, digital currency and blockchain security as exogenous variables, and financial stability as an endogenous variable. Fig. 1 illustrates the conceptual framework for the proposition and hypotheses proposed.

3. Research design

The study is positivistic, which is associated with the quantitative research methodology. Every research process includes some elements of ontology, epistemology, and quasi-experimental research, which serve as the foundation for analysis. The universal aspect of objectivity is measured through quantitative research, involving rigorous research procedures (Babbie et al., 2007; Sekaran, 2000, 2006; Singleton, 1999).

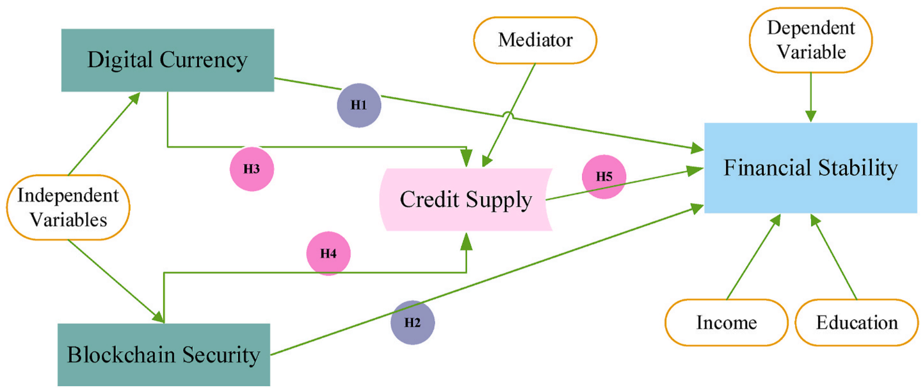

Fig. 1. Conceptual framework.

The study sample comprises Pakistan, Punjab, and five industrial zones, which use digital currency and blockchain ledger technology in their industrial operations for credit supply purposes. These zones include the Quid-Azam industrial zone, Raiwind road Lahore, Sialkot industrial zone, Gujranwala industrial zone, and Sheikhupura industrial zone. The research is survey based, and researchers collected data from December 2021 to December 2022 at fixed time intervals using modified questionnaires with constructs and items for them. The data are analyzed using descriptive and inferential statistical methods (Awang et al., 2016, 2017). Similarly, SPSS and structural equation modeling (SEM) tools are used for the measurement and precision of the instruments. These measurement and structural models for construct validity and reliability are essential tools (Babbie et al., 2007; Hair et al., 2014). Lai (2018) state that statistical or scientific measurement of the elements is a suitable method in a quantitative approach. The integrated conditions are created to balance the analysis-related software, designs, and applications. Likewise, numerical and financial management make substantial use of the quantitative approach to determine the objectivity of the phenomenon (Babbie, 2020; Miles & Huberman, 1994). This approach has unquestionably been demonstrated to be effective in numerous studies.

Participants were asked to fill in a consent form, which took into account ethical considerations, made participants aware of the research scope, and followed the Covid-19 standard operating procedures. Furthermore, inferential statistics are used to assess the quantitative data developed, and the items are chosen based on academic literature. This work tests ideas using a positivistic approach, and the quantitative findings are compared to the previous literature. The quantitative questionnaire includes items modified from earlier empirical research. Indigenous language gatekeepers circulated a self-administered questionnaire to industrial personnels.

This paper constructs a linear model to investigate the interplay between exogenous and endogenous constructs. Data are collected using previous valid and reliable dimensions, factors, elements, and indicators from previous literature. For instance, we adopt and adapt a financial stability scale (with 7 items) (Oosterloo & De Haan, 2004), a digital currency scale (with 3 items) (Löber & Houben, 2018), a credit supply scale (with 3 items) (Wośko, 2016), and a blockchain security scale (with 4 items) (Koroma et al., 2022; Shin, 2019) (see Table 1). All the items are structured and data collected through a self-administrated questionnaire.

Table 1
Constructs and items in the study.

Construct	Supporting Literature	Items	Likert Scale
Financial stability	Oosterloo and De Haan (2004)	7	5
Digital currency	Löber and Houben (2018)	3	5
Credit supply	Wośko (2016)	3	5
Blockchain security	Koroma et al. (2022); Shin (2019)	4	5

The questionnaire's reliability and validity are its most important measurements, and this study took results from 120 pilot tests to confirm the scales' reliability and validity. Four indicators were selected to learn more about digital currency, blockchain security, and credit supply as well as their relationship to financial stability in Pakistani industrial regions. These concepts were transformed into variables. The study uses a nonprobability purposive sampling strategy, with a sample size of 449 and G*Power software, which is used for a "power analysis" (Faul et al., 2007) (see Appendixes 1 and 2 and Equation (1)). Data were collected from industry personnel, managers, and employees, which are the units of analysis. The businessmen and their managers, as well as their employees, provided data on digital currency and blockchain transactions. Similar information was gathered from people who use digital currency and blockchain in their respective businesses. The sample size is generated with Equation (1):

$$Y = X\beta + \varepsilon \tag{1}$$

$$X = (1X_1, X_{2......}X_m) \ and \ N \times (m+1, matrix = X_i)$$

$$\beta \text{ of length} = (m+1)$$

$$\varepsilon \text{ of length N} = (\varepsilon i \sim \mathrm{N}(0, \sigma)$$

If

$$\text{H0}: R^2 Y.B = 0$$

$$\text{H1}: R^2 Y.B > 0.$$

The model has four predictor variables and an analogous noncentrality parameter (λ = 17.9600). The critical F value of 2.392 is significant for measuring the sample and F-squared effect is 0.04. Similarly, the sample size is measured, and its actual power is (1-β = 0.94). The sample size is 449. Equation (3) describes the detailed statistical measure in the regression used in this study. The effect size of the sample size was measured with the help of Equation (2)

$$f^2 = \frac{R^2\ Y.B}{1 - R^2\ Y.B} \tag{2}$$

$$R^2\ Y.B = \frac{f^2}{2 + f^2}$$

$$Outcome\ i = \frac{(}{\text{model})} + \text{error } i \tag{3}$$

$$Y = (b_0 + b_1 X_{i1} + b_0 + b_2 X_{i2} + \dots b_0 + b_n X_n) + \epsilon_i$$

The use of applied statistics and its outcome employ structural modeling. SEM is used to assess the degree of dependence in a linear equation model. As a result, the basic formula for SEM is given in Equation (4).

$$C\ (\alpha.\alpha) = [N-r]\left[\sum_{g-1}^{G} \frac{(N)^{g\ f\left(\mu^g, \sum g, x^{(g)}, S^{(g)}\right)}}{N}\right] = [N-r]\ F(\alpha.\alpha) \tag{4}$$

$$\text{fkl}\ \left(\mu^g \sum (g) x^{(g)} S^{(g)} = \log\left[\sum g\right] + tr\left(S^{(g)} \sum (g-1) + \left(x^{(g)} - \mu^g\right) \sum (g-1)\ \left(x^{(g)} - \mu^g\right)\right.\right.$$

$$c = \left(N^1 - 1\right) F^{(1)} = (N-1) F$$

$$C = \sum_{g=1}^{(G)} N^{(g)} F^{(g)} = FN$$

$$(D1) CMIN\ Initial\ Model = \chi^2 df = 10.123$$

$$CMIN\ Model\ Fit = \chi^2 df = 5.829$$

$$\Delta\chi^2 = 10.123 - 5.829 = 4.294$$

$$D2\ fml\ \left(\mu^g \sum (g) x^{(g)} S^{(g)} = fkl\ \left(\mu^g \sum (g) x^{(g)} S^{(g)}\right) - fkl\ \left(\mu^g \sum (g) x^{(g)} S^{(g)}\right.\right.$$

$$= \log\left[\sum g\right] + tr\ \left(s^g \sum (g-1) + \left(x^{(g)-} \mu^{(g)}\right) \sum (g-1)(x^{(g)} - \mu^{(g)}\right).$$

$$Initial\ Model = \chi^2/df = 10.137$$

$$Model\ fit = \chi^2/df = 2.914$$

$$GFI = 1 - \frac{\dot{F}}{\dot{F}_b} \tag{5}$$

$$f\ \left(\sum (g), s^{(g)}\right) = \frac{1}{2}\ tr\ [K^{(g-1)}\left(x^{(g)} - \sum (g-1)\right)\Big)2.$$

$$Model\ fit\ value\ of\ GFI = .996$$

$$CFI = 1 - \frac{\max(\hat{C} - d, 0)}{\max(\hat{C}_b - d_b, 0)} = 1 \frac{NCP}{NCP_b}\Big)$$

$$RNI = 1 - \frac{\hat{C} - d}{\hat{C}_b - d_b}$$

$$Model\ fit\ value\ of\ CFI = .991$$

$$TLI = 1 - \frac{\frac{\hat{C}_b}{d_b} - \frac{\hat{C}}{d}}{\frac{\hat{C}_b}{d_b} - 1}$$

$$Model\ fit\ value\ of\ TLI = .929$$

$$SRMR = \sqrt{\sum_{g-1}^{G}, \left\{\sum_{i-1}^{pR}, \sum_{j-1}^{j \le i}, \left(\dot{s}^{gij} -;\ \sigma^{(gij)}\right)\right\} / \sum_{g-1}^{G} p^*(g)}$$

$$Model\ fit\ value\ of\ SRMR = .061$$

$$Population\ RMSEA = \sqrt{\frac{\frac{F}{0}}{d}}$$

$$Estimated\ RMSEA = \sqrt{\frac{\frac{F}{0}}{d}}$$

$$LO\ 90 = \sqrt{\frac{\delta L/n}{d}}$$

$$HI\ 90 = \sqrt{\frac{\delta U/n}{d}}$$

4. Data analysis

Data were analyzed in a few key steps, using measurement and a structural model with the help of inferential statistics. The first model has four variables, RMSEA = .242 (not significant), and SRMR = 0.379. In contrast, model fitness is not significant, and it indicates poor goodness of fit (e.g, GFI = 0.737, CFI = 0.561 and NNFI = 0.701). However, the values of ($\chi^2 df = 10.123$ and $\chi^2/df = 10.137$) are not significant. The model requires modification of the second analysis. SEM is advised to add two compound variables (income and education) and run the model with six indicators for an inferential measure of the perceptions of Pakistani industry personnel regarding financial stability with the help of digital currency and blockchain security. Furthermore, the model is normalized further in a second attempt at measurement. Equation (2) illustrates how to minimize the multiple regression statistical measurement with few predictors. In addition, the data are prepared for a normal distribution, and all outliers are eliminated with the help of statistical tools and applications, which is the fundamental principle of a regression. Using the equations mentioned earlier, the final training dataset is assessed in terms of model fit (second model) and the bootstrapping technique to obtain precise findings and the future effectiveness of financial stability.

This study generates an equation for each indicator and experimentally tests each one using confirmatory measurement factor analysis (statements). Similarly, validation of the constructs was accurate and the goodness of fit measurement of the second model was significant (see Fig. 2). Additionally, the initial fit of the first model and the fit of the second model are evaluated for their accuracy in predicting financial stability. Likewise, the proposed model is modified with two control factors for demographic aspects (income and education) with direct arrows and added covariate paths for achieving good model fitness. The results of the preliminary model do not achieve goodness of fit, which means they do not fit well with Equation (4) criteria. These additional variables improve the level of model fit, as shown in Figs. 2 and 3.

Path analysis is a way to identify any causal connections between the variables (Fig. 4). Path analysis is a more sophisticated methods for establishing the cause-and-effect relationship among constructs (Hair et al., 2017). Linear association is the best logic for path analysis to show diagrammatic theoretical interpretation of causal relations or simulation of the direction of cause-and-effect. In a similar context, path analysis estimates simultaneous quantification between direct and indirect causal model and predicts the best model to forecasts the future phenomenon. As a result, the SEM model gives graphical and theoretical justifications for causation. As a result, the connections between several constructs have quantitative results in the form of variables, ratios, and percentages. According to Agresti and Finlay (1997), one characteristic of path analysis is its ability to create causal effects among exogeneity and endogeneity. Identification of the mechanism of indirect effects is helpful for obtaining scientific knowledge. SEM measured the level of exogenous construct effects intervening construct and also endogenous construct with direct and indirect causality (Hair et al., 2014). SEM was developed and used to assess how credit supply works, with digital currency, blockchain security, and financial stability as mediators when other extraneous variables are controlled. The statistics for the model and model fitness are listed in Table 2.

Regarding the credit supply and financial stability, a statistical equation of SEM is proposed to determine the independent relationship between blockchain security and digital currency. The results, CMIN, are displayed in Equation (4), the covariance-based model formula. Model

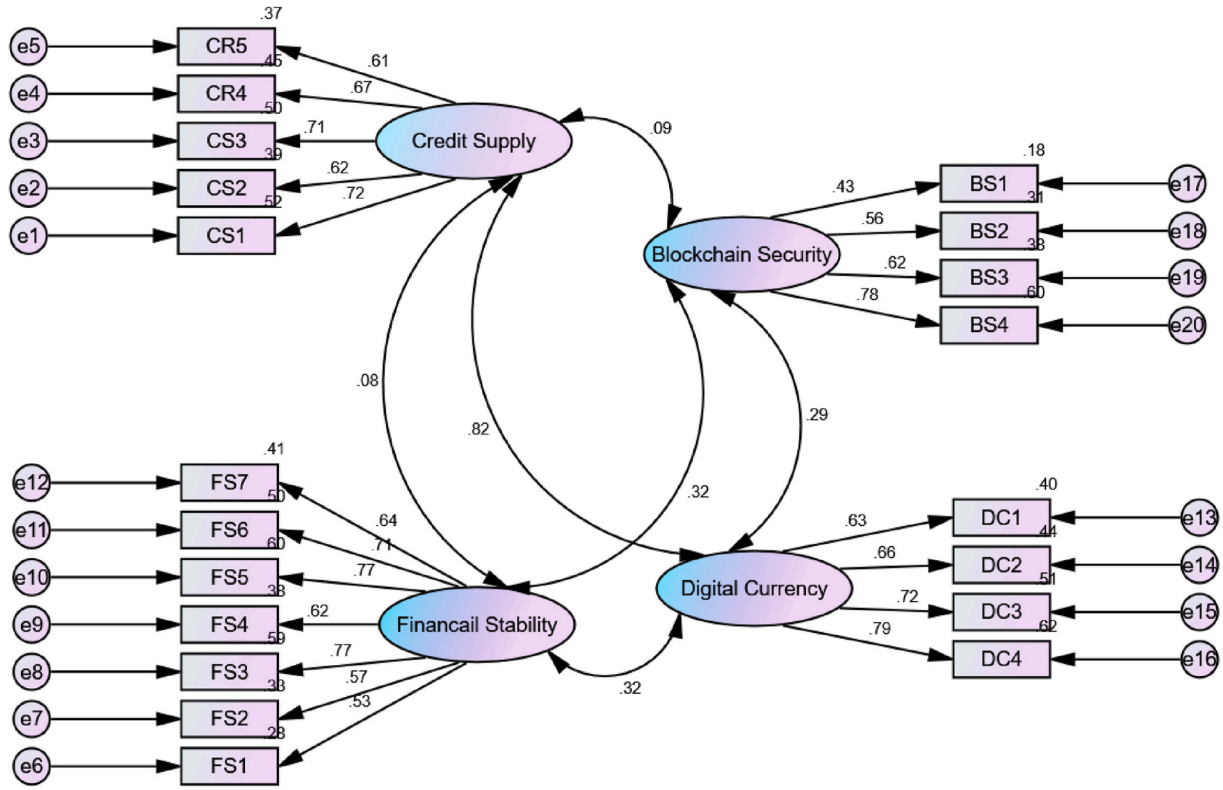

Fig. 2. Interaction of measurement with digital currency and financial stability ($n = 449$).

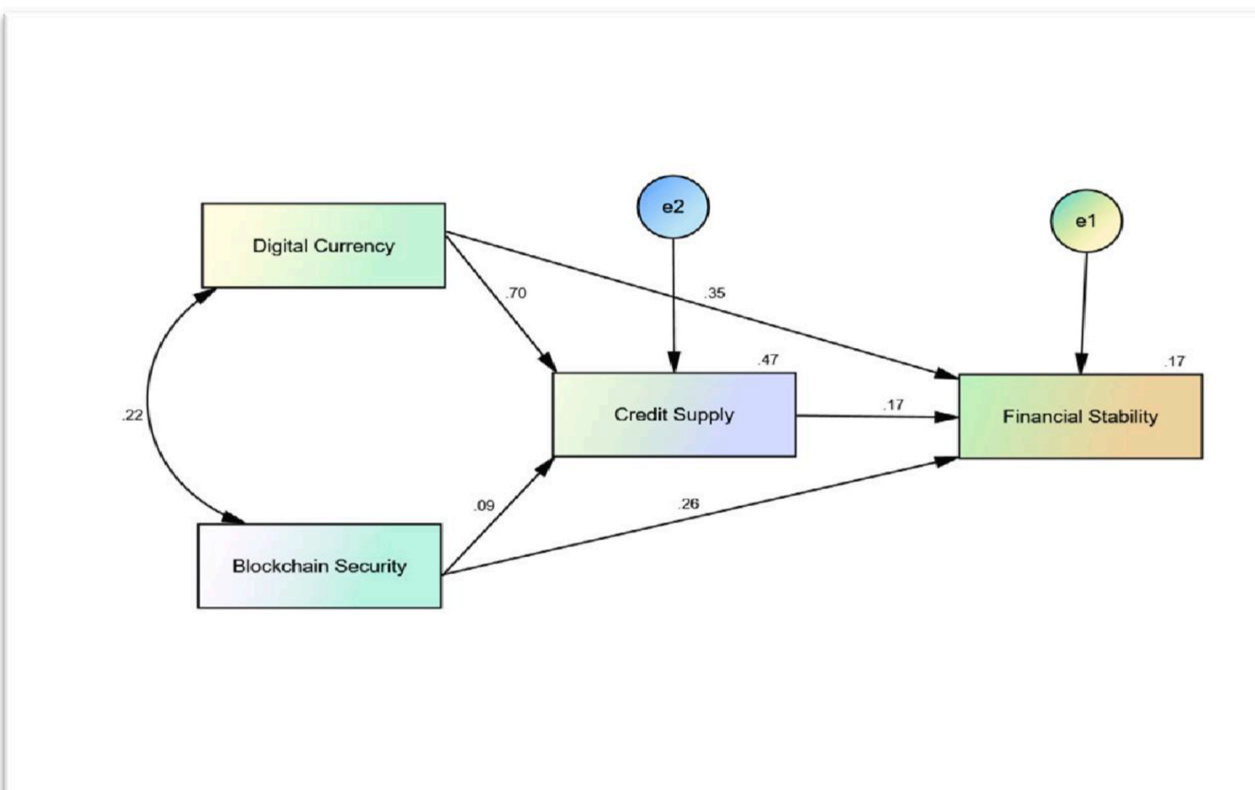

Fig. 3. Empirical results from complex multivariate initial model representation with beta measure ($n = 449$).
Note: A complex multivariate model of two exogenous constructs, one mediator and one endogenous indicator. Completely standardized maximum likelihood parameter estimate for financial stability.

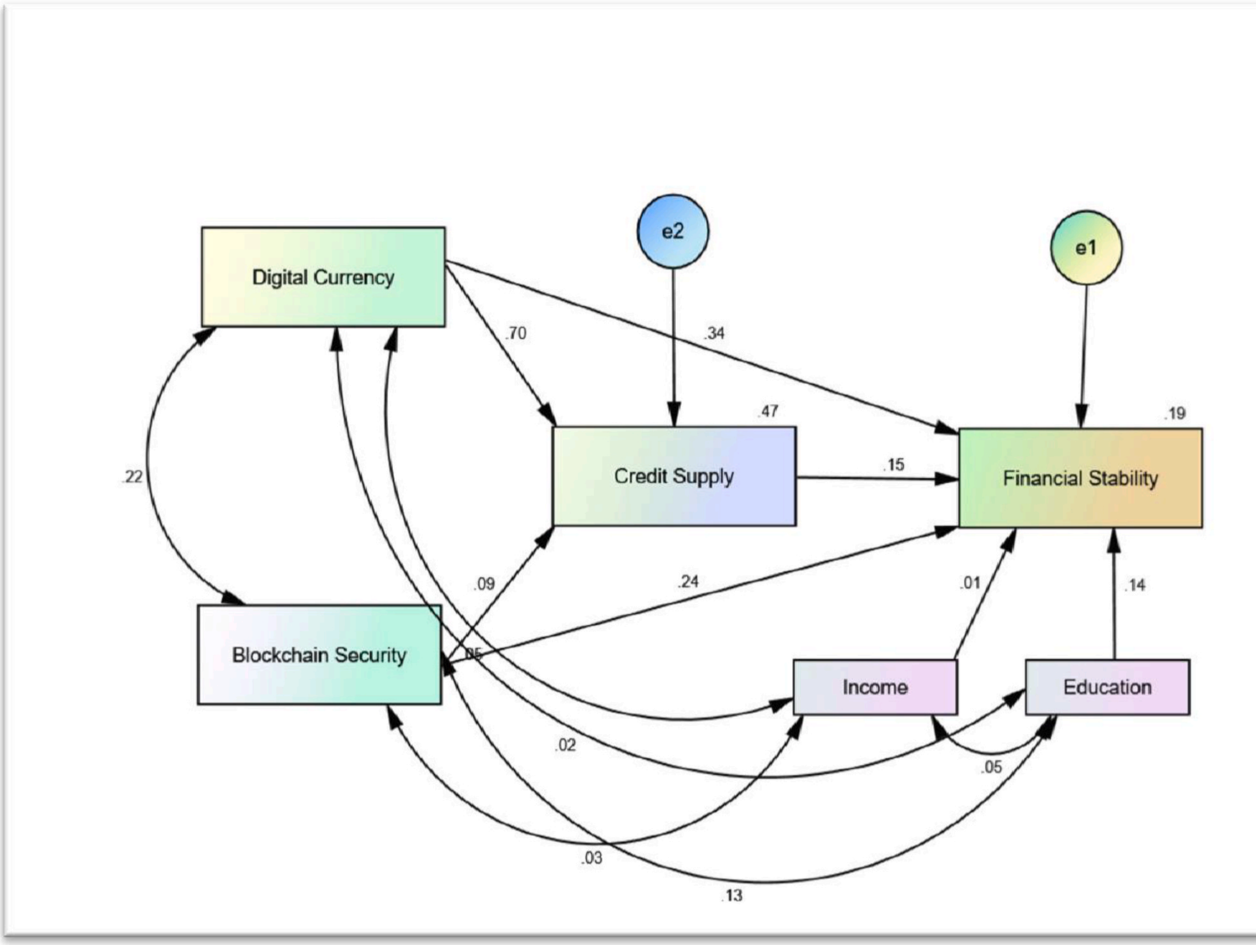

Fig. 4. Empirical results from complex multivariate model fit representation, standardized estimate for financial stability ($N = 449$).
Note: A complex multivariate model of two exogenous constructs, one mediator and one endogenous factor, along with two control factors (income and education). Completely standardized maximum likelihood parameter estimate the financial stability among industries.

Table 2
Fit indices for digital currency, blockchain security, credit supply, and financial stability ($n = 449$).

Model	χ^2df	χ^2/df	GFI	CFI	NNFI	RMSEA	SRMR
Initial Model	10.123	10.137	.737	.561	.701	.242	.379
Model Fit	5.829	2.914	.996	.991	.929	.065	.061
$\Delta\chi^2$	4.294						

Notes: All the changes in χ^2 values are calculated relative to the model; $\chi^2 > 0.05$, GFI = goodness of fit index, CFI = comparative fit index, NNFI (TLI) = non-normed fit index, RMSEA = root mean square error of approximation, SRMR = standardized root mean square, $\Delta\chi^2$ = chi square change.

fit in Table 2 is satisfactory. We investigate the model fit in two main stages, with the fit indices serving as indicators of a good match in the statistics. Equation (5) gives a quantitative evaluation of the exactness and precision of the fit. The value is χ^2df = 2.914, χ^2/df = 5.829. The fitness of both models is evaluated with key indicators of SEM, such as GFI, CFI, NNFI, RMSEA, and SRMR. The χ^2 test is very sensitive to sample size and the number of parameters, and it was significant in the second-stage analysis. The absolute and relative degrees of model fit can be determined with Equation (5).

Hu and Bentler (1999) find that χ^2/df values should between 1 and 2. For example, RMSEA and SRMR are 0.08, and GFI, CFI, and NNFI are more than 0.90. Also, RMSEA and SRMR in the model are suitable for model fit. The model fit is measured on the basis of GFI (0.996), CFI (0.991), NFI (0.929), and χ^2/df (2.914) (see Table 2). Because the p values are less than 0.05, the model is considered fit based on the descriptive measure of model fitness. In addition, the modification process for the model began, which predicts change in the financial stability indices with digital currency and blockchain security. Tomás et al. (1999) demonstrate that the variance in survey-based research can be obtained from the covariance of error components. Error covariance criteria modification indices must be or above 4.0 (Byrne, 2016). In addition, the results reveal that $\Delta\chi^2 = 4.294$ during the modification. In the second stage of the SEM modeling process, all the insignificant paths are removed, and some covariance paths of the control variables are added (income, education). Then, the absolute and relative model fit indices are repeatedly calculated and compared. After the covariance results are mapped and unimportant lines omitted, the model is a good fit. The mediation model made the optimal framework for predicting financial stability. As a result, the model is fit, and no more adjustments are made based on the data (see Fig. 3).

The direction of the arrows on the path demonstrate which linear line coefficients are significant and which are insignificant. As a result, the mediation model measure of credit supply mediates the relationship between digital currency and financial stability with beta values (credit supply < — digital currency: β = .626***, financial stability < —credit supply: β = 0.148***). Alternatively, the mediation model measure of credit supply intermediates the relationship between blockchain security and financial stability with beta values (credit supply < — blockchain security: β = .086**). Likewise, digital currency directly influences financial stability (β = 0.304***). For example, blockchain security directly influences financial stability (β = 0.224***). The inferential statistics show the privacy factor relationship between digital currency, blockchain security and financial stability in industry. Correspondingly, the change in R^2 is 100 × .333 = 33% for digital currency and blockchain security. R^2 measures credit supply as a mediating effect with a variance of 100 × .291 = 29%. Similarly, financial stability and the credit supply path coefficient is positively influenced by digital currency and blockchain security. The proposed hypotheses are empirically tested, and credit supply intervened in the association between digital currency, blockchain security, and financial stability (see Fig. 3).

The direct and indirect impacts on financial stability are investigated using the bootstrapping method, which expands the sample size statistically for model fit and estimates. Digital currency, blockchain security, and credit supply, for instance, can have both direct and indirect effects on financial stability at the industry level. In the SEM with multiple linear pathways, Valeri and VanderWeele (2013) propose that a sample size of 5000 bootstraps is credible and valid.

We hypothesize that digital currency and blockchain security influence financial stability through a credit supply mediating role. Also, the direct beta measure shows that the association with digital currency is positively significant in forecasting the credit supply and financial stability. In comparison, blockchain security is a significantly positive predictor between financial stability and the credit supply. The data show that digital currency and blockchain security can increase financial stability as well as the credit supply when they are used by industries (see Table 3).

In the context of digital currency and blockchain security, the effect of credit supply indirectly measures financial stability. The credit supply mediates the relationship and increases financial stability. For example, credit supply mediates between currency, blockchain security, and financial stability. As a result, the credit supply and financial stability are significant indicators that can increase using digital currency and blockchain security in industry (see Table 4). Furthermore, the proposed propositions are approved, and all the hypotheses are confirmed (see Table 5).

The statistics reveal some important results and confirmation of our hypotheses. For instance, income and education both are control variables in the study, as they control throughout the analysis. Similarly, the results of testing the hypotheses shows that digital currency and blockchain security significantly affect the credit supply and financial stability (see Table 5).

The method used in this paper is sufficiently generalized for industrial and business setups because the data analysis applies up-to-data techniques on digital currency and blockchain security and their influence on financial stability with a mediating role played by the credit supply. The full potential of digital currencies has not been established; hence, digital currencies threaten financial sovereignty norms in the global financial system (Bordo, 2021; Buckley et al., 2021; Zetzsche et al., 2021). This study explains several exciting aspects: digital currency has significantly improved financial stability in industries and businesses. One example of a digital currency application has global importance and is easily used for bank deposits and accessible interest-bearing accounts at the central bank (Arauz & Garratt, 2021). Barrdear and Kumhof (2022) agree that GDP increased 30 percent in two years due to CBDC issuance and permanently increases GDP 3 percent as well as reducing interest rate accuracy in the forecasting model of the US. Likewise, Tan (2019) and Morales-Resendiz et al. (2021) state that the adoption of a digital currency for goods is related to an underdeveloped retail payment market, hard currency, and financial inclusion initiatives. In this study, digital currency is a significant and positive predictor of financial stability. The study supports the empirical studies framework and hypotheses were accepted.

Table 3
Direct beta measured and linear paths for financial stability (n = 449).

Predictors	Credit Supply	Financial Stability
	β S.E.	β S.E.
Digital Currency	.626*** 0.031	.304*** 0.053
Blockchain Security	.086** 0.033	.224*** 0.042
R^2	0.333	

Table 4
Indirect beta measured and linear paths for financial stability (n = 449).

Predictors	Financial Stability
	β S.E. CR
Digital Currency	- - -
Blockchain Security	- - -
Credit Supply	0.148*** 0.058 2.560
R^2	0.291

Note: *$p < .05$, **$p < .01$, ***$p < .001$ …"

Table 5
Testing empirical paths for digital currency, blockchain security, financial stability (n = 449).

Hypotheses	Paths	Variables	Estimate	S.E.	C.R.	Decision
Credit Supply	<—	Digital Currency	0.626 ***	0.031	19.898	Sig
Credit Supply	<—	Blockchain Security	0.086**	0.033	2.570	Sig
Financial Stability	<—	Credit Supply	0.148**	0.058	2.560	Sig
Financial Stability	<—	Digital Currency	0.304***	0.053	5.734	Sig
Financial Stability	<—	Blockchain Security	0.224***	0.042	5.366	Sig

Digital currency and blockchain are widely used in the supply of financing. Uwamariya and Loebbecke (2020) claim that money, technology, and payment methods have all been transformed on the basis of trust. The online digital cash and payment systems are more rapid than ever seen before. China's CBDC, DC, and electronic payment (EP) are all examples of blockchain security (Fanusie & Jin, 2021; Parasol, 2022). Therefore, during the COVID-19 crisis, most central banks concentrated on modernizing their payment supply systems and maintaining financial stability (Hsu & Tsai, 2020; Tronnier, 2021). The future success of highly private and public financial stability models is likely due to the efficiency of blockchain and central bank technologies. Public central banks work with private enterprises to restore domestic financial stability (Van Roosebeke & Defina, 2021; Virtanen, 2021). Blockchain is the first concept in finance to unify financial and payment systems while providing a quick credit supply (Oehler-Sincai, 2022; Priyadarshini & Kar, 2021). Our results lead to the conclusion that blockchain security could increase the credit supply and financial stability. The framework of credit supply and financial stability are good key indicators for industries. For example, long-term financial stability can be based on a digital currency related to CBDC, which should be implemented only when the benefits (e.g., decreased transaction costs, credit, supply, improved tracking of money movement, and tighter control of tax evasion and financial crime) outweigh the costs (Engert & Fung, 2017; Rennie & Steele, 2021; Rizk, 2022). Our results reveal that the credit supply indirectly increases financial stability whenever digital currency and blockchain are used for online cash payment transactions. Similarly, the theoretical and conceptual model of trust transformation works as a proposition.

5. Conclusion and future remarks

The implementation of digital currency and its effects on financial stability are discussed in this paper. In a structural equation model, blockchain security is the main domain to provide more suitable financial stability with the help of digital currency. DC has one online-based account related to the central bank, which can be denominated in local currency as well as improve domestic financial stability. Deposits in the DC account fundamentally reduce financial stability, boosting the minimal interest rate as well as decreasing the stand-in-credit ratio for commercial banks. Digital currency banks, where commercial banks run out of cash reservations for depositors abrupt payment, and it has a detrimental impact on financial stability. However, digital currency functionally boosts financial stability and effectively develops private credit differentiation. Similarly, digital currency optimal results reduce the nominal interest rate of commercial banks. One of the earliest economic examinations of the connection between DC and blockchain currencies proved more beneficial for financial stability of the industries.

In conclusion, digital currency has a direct and significant effect on industries' credit supply and financial stability. Our study reveals that digital currency and blockchain security could increase the credit supply and financial stability when they are employed. Several recommendations can be made to policy makers. Such as, adding DC and a lending central bank would improve financial stability in the event of a bank panic. The overall effect of DC on financial stability is dependent on how economic agents behave over time regarding the credit supply, which likely depends on the unique characteristics of how DC functions. For instance, blockchain security can directly help commercial banks, and in the future it might be possible to deposit funds into DCaccounts.

Additionally, it is recommended that transformation trust for physical cash or money may be permitted but may require taxes, which decrease financial stability. On the other hand, digital currency could increase financial stability of the industries. The study recommended that DC and blockchain currency security relationship between monetary policy and ideal interest rate can be a best research for the future researchers. Hence, the interest rate and its connection to DC is the fundamental link to monetary policy in the high effect of credit supply and financial stability on any industry.

6. Limitations

The study is limited to the financial stability of industries' financial measures using digital currency. The connection between monetary policy, credit supply, and financial stability is limited to improvement in industries' financial security. Lastly, the interest rate of DC is not measured in terms of monetary policy and financial security.

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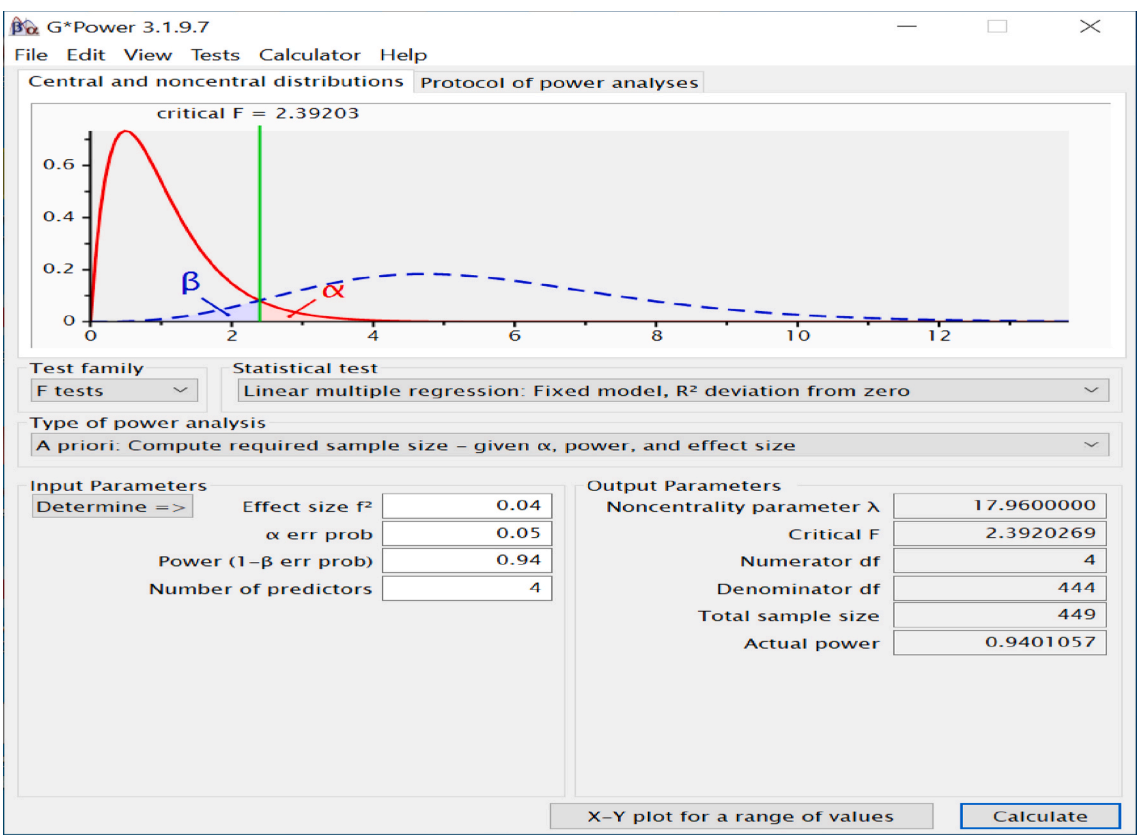
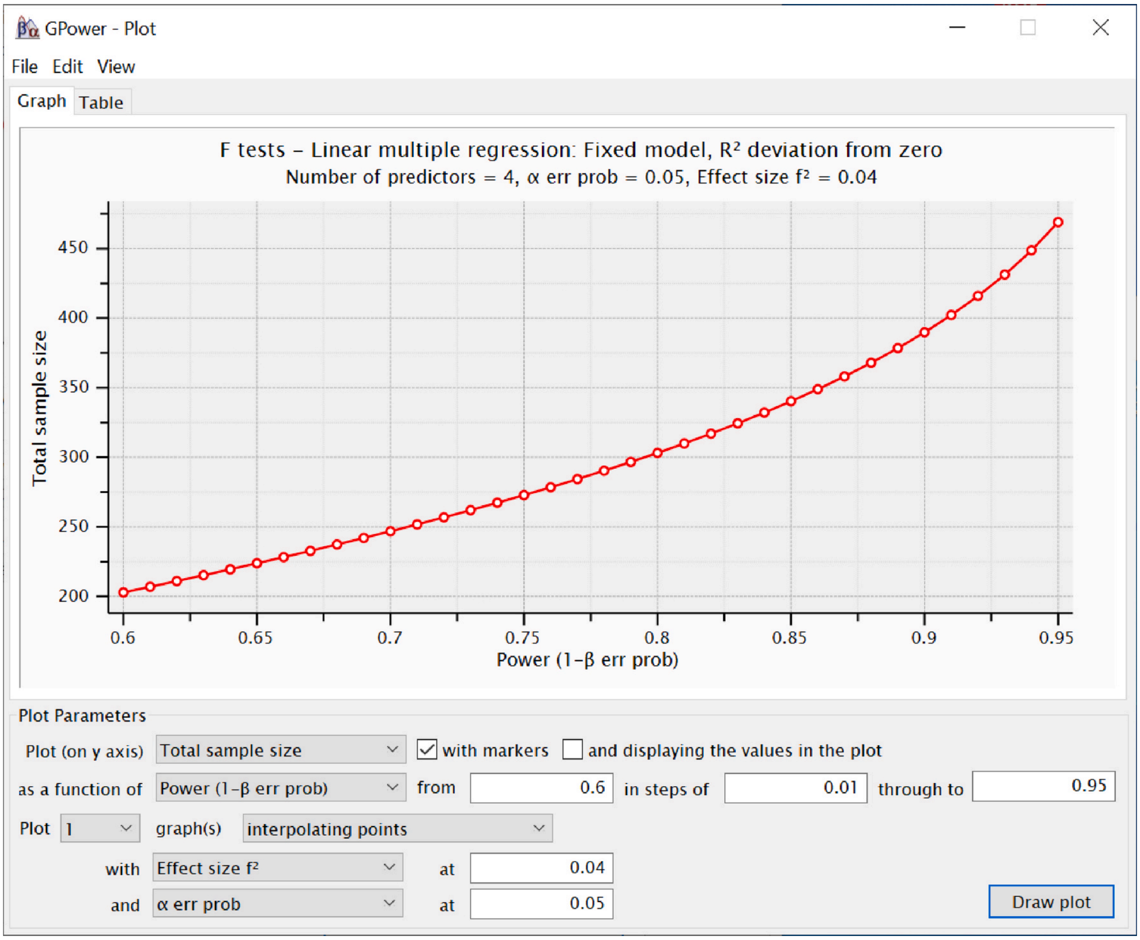
Appendix



Appendix 1. Sample size derivation.



Appendix 2. Graphical representation of sample size.

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