**Project 5: Exploring the Interconnections and Future Prospects of Money, Digital Assets, Cryptocurrency, Central Bank Digital Currencies and DLT**

**Annotated Bibliography**

A. A. Monrat, O. Schelén and K. Andersson, (2019) "A Survey of Blockchain from the Perspectives of Applications, Challenges, and Opportunities," in IEEE Access, vol. 7, pp. 117134-117151, Doi: 10.1109/ACCESS.2019.2936094. <https://doi.org/10.1109/ACCESS.2019.2936094>

Blockchain serves as the foundational technology for numerous digital cryptocurrencies. It is essentially a chain of blocks that store information with digital signatures in a decentralized and distributed network. The distinctive features of blockchain, such as decentralization, immutability, transparency, and auditability, enhance the security and integrity of transactions, making them tamper-proof. Beyond cryptocurrency, blockchain technology finds applications in financial and social services, risk management, healthcare, and more. Numerous research studies investigate the potential of blockchain across various fields. This paper provides a comparative analysis of blockchain's trade-offs, describes its taxonomy and architecture, compares different consensus mechanisms, and discusses challenges like scalability, privacy, interoperability, energy consumption, and regulatory issues. Additionally, the paper explores the future prospects of blockchain technology.

Ammous, Saifedean, Blockchain Technology: What is it Good for? (August 8, 2016). SSRN: <https://ssrn.com/abstract=2832751> or [http://dx.doi.org/10.2139/ssrn.2832751](https://dx.doi.org/10.2139/ssrn.2832751)

This paper provides an explanation of blockchain technology and critically evaluates its potential to enhance services in banking, contracts, and database systems. The analysis compares blockchain to current best practices in these fields, identifying several obstacles to its successful commercial application: high redundancy costs, irreversibility issues, serious scaling challenges, significant regulatory compliance barriers, and security risks unless secured by its own freely traded currency. A survey of the blockchain industry reveals that, in the eight years since its inception, blockchain technology has yet to find commercial use beyond digital cash.

Ammous, S. (2018). Can cryptocurrencies fulfil the functions of money? *The Quarterly Review of Economics and Finance*, *70*, 38–51. <https://doi.org/10.1016/j.qref.2018.05.010>

This paper examines the monetary characteristics of five cryptocurrencies to assess their ability to function as money. While theoretically and practically all cryptocurrencies can act as a medium of exchange, they are unlikely to become widely accepted and liquid unless they prove useful in other monetary roles. The rigid supply and highly volatile demand of digital currencies render them too unstable to serve as a unit of account in the near future. Among the five, only Bitcoin shows potential as a store of value, due to its strict adherence to low supply growth, supported by the network's distributed protocol and the clear absence of any authority capable of changing the supply schedule. Other cryptocurrencies, with their centralized control and use as application-specific tokens, are unlikely to fulfill the roles of money.

Barontini, Christian and Holden, Henry, Proceeding with Caution - A Survey on Central Bank Digital Currency (January 8, 2019). BIS Paper No. 101, SSRN: <https://ssrn.com/abstract=3331590>

The authors conducted a survey of 63 central banks, representing nearly 80% of the world's population, to explore their work and perspectives on central bank digital currencies (CBDCs). The findings reveal that most central banks are collaboratively researching CBDCs but are proceeding cautiously, with few planning to issue a digital currency in the near to medium term. The study highlights the rapid evolution of payment methods, with users demanding faster and more convenient options, challenging traditional bank-based systems. While paper-based payments remain significant, new technologies are driving change. The survey indicates that central banks are mainly in the conceptual phase of CBDC research, considering how these digital currencies could potentially replace traditional money.

Bhimani, A., Hausken, K., & Arif, S. (2022). Do national development factors affect cryptocurrency adoption? *Technological Forecasting and Social Change*, *181*. <https://doi.org/10.1016/j.techfore.2022.121739>

The authors examine the uneven adoption of cryptocurrencies across various businesses, industries, and countries, driven by different national development factors. They empirically analyze the relationship between specific macro-national developmental indicators and cryptocurrency deployment in 137 countries using linear regressions. The results indicate that cryptocurrency adoption (CA) is positively correlated, in decreasing order, with Education, the Human Development Index, Democracy, Regulatory Quality, and Gross Domestic Product. Conversely, CA is negatively correlated, in decreasing order, with Control of Corruption, the Corruption Perception Index, and the Economic Freedom Index. The authors discuss policy implications related to the broader use of cryptocurrencies and blockchain technologies and suggest areas for further research based on their findings.

Bossu, W., Itatani, M., Margulis, C., Rossi, A., Weenink, H., & Yoshinaga, A. (2020). *Legal Aspects of Central Bank Digital Currency: Central Bank and Monetary Law Considerations*. <https://ssrn.com/abstract=3758088>

This paper examines the legal foundations of central bank digital currency (CBDC) within the realms of central bank and monetary law. The lack of robust legal frameworks can lead to legal, financial, and reputational risks for central banks issuing CBDCs. Although the design of the legal framework will partly depend on the specific features of the CBDC, some general conclusions are drawn. Firstly, most central bank laws currently do not permit the issuance of CBDC to the general public. Secondly, from the perspective of monetary law, it is unclear whether CBDCs can be granted "currency" status. While the issue with central bank law can be addressed through straightforward legal reforms, the monetary law issue presents more fundamental legal policy challenges.

Bryson, D., Penny, D., Goldenberg, D. C., & Serrao, G. (n.d.). *Blockchain Technology for Government*.

This article discusses the rapid evolution of blockchain technology and the critical role of understanding its core components, particularly consensus mechanisms. It emphasizes the importance of selecting the right consensus algorithm based on desired trust and security levels for successful blockchain applications. While public blockchains offer maximum security in a trustless environment, permissioned blockchains are more suitable for government users. However, these require careful governance to avoid centralizing key functions and compromising security. The article highlights ongoing research in privacy, transaction scalability, and inter-blockchain connectivity, noting that permissioned blockchains must evolve to meet governmental needs fully. This paper provides valuable insights into the governance and technological challenges faced by permissioned blockchains and underscores the need for continuous advancement to meet specific user requirements.

Catalini, C., & Gans, Joshua. S. (2020). *Some Simple Economics of the Blockchain*. <https://doi.org/10.1145/3359552>

This paper delves into how blockchain technology influences innovation and competition by reducing two key costs: verification and networking. Verification costs involve the ability to authenticate information cheaply, while networking costs pertain to creating and operating markets without centralized control. Blockchain technology facilitates decentralized trust, minimizes intermediaries, and automates processes, thus enhancing financial inclusion and reducing market power of intermediaries. The authors discuss the implications for cryptocurrencies like Bitcoin, highlighting both benefits such as lower barriers to entry and potential drawbacks like volatility and misuse. They conclude that blockchain's impact on reducing networking costs has been instrumental in scaling digital assets and could lead to productivity gains across various sectors, similar to other general-purpose technologies like electricity and the internet

Cheng, Mikayla (2024) "Advantages and Disadvantages of the Chinese Digital Yuan," *Sigma: Journal of Political and International Studies*: Vol. 41, Article 4.  
<https://scholarsarchive.byu.edu/sigma/vol41/iss1/4>

Cheng's research investigates the pros and cons of China's digital yuan system, examining whether its implementation is overall beneficial or detrimental for Chinese citizens. The study posits that the digital yuan's advantages include lowered domestic transaction costs, increased financial inclusion, and the potential for internationalization. However, it also highlights the significant drawback of centralized transaction data. Cheng emphasizes the existing comprehensive surveillance capabilities of the Chinese government, such as the Social Credit System and advanced facial-recognition technologies, which already facilitate extensive monitoring and control. Thus, the digital yuan's additional transaction data is unlikely to significantly enhance the government's ability to surveil and punish citizens. The research concludes that the digital yuan's benefits—more efficient transactions, international economic integration, and greater financial inclusion—outweigh the privacy concerns related to data centralization. As China aims to lead in modern payment technologies, the digital yuan represents a critical development, with both domestic and international implications. Continuous assessment will be necessary to monitor the impact of centralized financial data as the digital yuan gains wider adoption.

Chainalysis. (2020). *The 2020 Geography of Cryptocurrency Report Analysis of Geographic Trends in Cryptocurrency Adoption, Usage, and Regulation*.

Chainalysis provides a comprehensive analysis of global cryptocurrency adoption, emphasizing grassroots usage over speculative trading. The report introduces the Global Crypto Adoption Index, quantifying adoption disparities across countries based on cryptocurrency activity relative to population and economic size. Highlighting developing countries like Venezuela, Kenya, and Nigeria, the study illustrates how economic instability drives adoption, particularly for remittances and savings preservation amid currency devaluation. P2P platforms play a crucial role in these regions by circumventing traditional banking constraints. Additionally, the report examines cryptocurrency's impact in Africa, Central & Southern Asia, Latin America, and Oceania, revealing varying patterns of adoption influenced by economic factors, regulatory landscapes, and cultural contexts. Despite challenges such as currency instability and regulatory concerns, cryptocurrency emerges as a transformative tool for financial inclusion and value preservation in underserved regions.

Claeys, G., Demertzis, M., & Efstathiou, K. (2018). *Cryptocurrencies and monetary policy* (No. 2018/10). Bruegel Policy Contribution.

This Policy Contribution examines whether cryptocurrencies can fulfill the roles of money and the implications for central banks and monetary policy. Money, traditionally, is a social institution functioning as a unit of account, a medium of exchange, and a store of value. Cryptocurrencies, enabled by decentralized ledger technology (DLT), introduce a form of money that is privately issued and digital, allowing peer-to-peer transactions. Historically, currencies are effective when their value is stable and widely accepted. Currently, cryptocurrencies fall short, behaving more like speculative assets due to their volatility, which is attributed to their inelastic supply. Despite this, cryptocurrency protocols could theoretically evolve to mitigate volatility, enhancing their role as a medium of exchange. If successful, this evolution could challenge official currencies, potentially pressuring central banks to improve monetary policies. However, widespread substitution of fiat currency by cryptocurrencies poses risks to monetary policy effectiveness, financial stability, and economic growth. The likelihood of cryptocurrencies becoming a serious threat remains low as long as major central banks maintain trust in their currencies. For cryptocurrencies to replace fiat currencies, they must overcome challenges related to economic impact, financial stability, and accountability. Official currencies managed by inflation-targeting, independent central banks remain superior in fulfilling money functions.

Cong, W. L., Li, B., Zhang, T. Q. (2021). Internet of Things: Business Economics and Applications. *Review of Business*, *41*(1).

Cong, Li, and Zhang provide a comprehensive examination of IoT's impact on business and economics, highlighting its role in generating valuable alternative data. Their analysis underscores the practical applications and benefits of IoT in various sectors, particularly finance, while also addressing the challenges of data privacy and the need for regulatory measures. This study is essential for understanding the potential of IoT in transforming business processes and enhancing data-driven decision-making. The authors effectively argue for the continued exploration of IoT's capabilities, making their work a valuable resource for academics, industry professionals, and policymakers interested in the intersection of technology and business innovation.

Danho, S., & Habte, Y. (2019). Blockchain for Financial Inclusion and Mobile Financial Services: A study in sub-Saharan Africa (Dissertation). Retrieved from <https://urn.kb.se/resolve?urn=urn:nbn:se:kth:diva-264126>

Danho and Habte explore the historical centralization of financial services, which has often led to wealth inequality, and highlight the transformative potential of blockchain technology in promoting transparency and democratization. They emphasize that financial inclusion is crucial for reducing poverty and argue that blockchain can significantly contribute to this goal, particularly in sub-Saharan Africa where 550 million people lack access to financial services despite widespread mobile phone usage. This situation has catalyzed the growth of mobile financial services in the region, beginning in Kenya. The study investigates the perceived usefulness of blockchain for mobile financial services and its potential to enhance financial inclusion. Interviews with representatives from start-ups, government agencies, and telecom companies, along with insights from the Blockchain Africa Conference 2019 in Cape Town, reveal that blockchain is seen as beneficial due to cost reduction, process automation, and decentralized trust. However, challenges such as the lack of common protocols and definitions currently limit its effectiveness in significantly improving financial inclusion.

De Filippi, P., Mannan, M., & Reijers, W. (2022) The alegality of blockchain technology. *Policy and Society*, *2022*(3), 358–372. <https://doi.org/10.1093/polsoc/puac006>

The authors examine the concept of alegality in relation to blockchain technology, describing it as operating beyond current legal frameworks. They argue that blockchain's decentralized and autonomous nature inherently challenges existing legal norms and regulatory capacities. The paper introduces "alegality by design," highlighting blockchain's features like resilience, tamper-resistance, and pseudonymity that support actions outside traditional legal boundaries. It discusses how blockchain systems disrupt legal orders by transcending temporal, spatial, material, and subjective legal constraints. To address these challenges, the authors suggest using regulatory sandboxes to test blockchain applications for functional and regulatory compatibility, advocating for innovative regulatory approaches that integrate blockchain's unique characteristics while maintaining legal compliance.

De Filippi, P. (2016). The interplay between decentralization and privacy: the case of blockchain technologies. *Journal of Peer Production, Issue*, (7).

This paper examines the growing popularity of decentralized architectures as a means to safeguard privacy against pervasive surveillance by states and corporations. While these systems offer significant benefits in terms of data sovereignty, they also present challenges that can undermine user privacy, particularly through the analysis of metadata. Using Bitcoin and other blockchain-based networks as case studies, the paper highlights the dual nature of these decentralized infrastructures. The pseudonymous transactions on blockchain networks enhance privacy, yet their inherent transparency allows for comprehensive transaction history retrieval, posing risks to sensitive information. The analysis concludes that transparency and privacy are not inherently conflicting. Advanced cryptographic techniques can reconcile the need for transparency in validating transactions with the preservation of individual privacy. Techniques like blind signatures and emerging methods such as homomorphic encryption demonstrate that it is feasible to prove transaction legitimacy without exposing transaction details. The paper underscores that decentralized technologies, especially blockchain, offer new forms of disintermediation that can variably affect privacy and data confidentiality. By exploring the complex interplay between transparency and privacy, the study argues that these elements can be compatible and potentially complementary, provided both technical and social factors are considered.

Didenko, A. N., Zetzsche, D. A., Arner, D. W., & Buckley, R. P. (2020). *After Libra, Digital Yuan, and COVID-19: Central Bank Digital Currencies and The New World of Money and Payment Systems*. <http://dx.doi.org/10.2139/ssrn.3622311>

The authors explore the transformative impact of technology on money and payment systems over recent decades, focusing on innovations such as M-Pesa, Bitcoin, Libra, and China's Digital Yuan. They highlight how these advancements have reshaped global monetary affairs and payment infrastructures, particularly noting the acceleration of electronic payments due to the COVID-19 pandemic. The paper delves into the benefits and challenges of distributed ledger technologies (DLT) and blockchain, emphasizing the potential disruption posed by global stablecoins like Libra. It also examines the likely widespread adoption of central bank digital currencies (CBDCs), driven by the Digital Yuan and pandemic-related factors, and the design choices influenced by the efficiency versus safety paradigm. The authors argue that the future of digital monetary and payment systems will likely involve public-private partnerships rather than being purely public or private. Despite the initial impetus provided by DLT and blockchain, governance issues may lead to the adoption of more traditional technologies similar to existing payment systems, structured as semi-private, semi-public, and mutualized organizations.

Duffie, D. (2021). Building a stronger financial system: Opportunities for a digital dollar. CEPR Press *Central Bank Digital Currency Considerations, Projects, Outlook*.

Duffie argues that the United States should initiate the development of a digital dollar, a process that could take several years. The design should focus on enhancing payment efficiency, ensuring privacy, fostering interoper ability, promoting financial inclusion, and enabling compliance monitoring. The decision to launch the digital dollar should be postponed until its design, costs, and benefits are better understood. Duffie cautions against delaying the development until the need for a central bank digital currency (CBDC) is unmistakable, deeming this strategy ineffective. The U.S. should also lead international discussions on the domestic and cross-border use of CBDCs. Concurrently, efforts to improve the existing U.S. payment system's competitiveness and efficiency should continue. Success in this area could negate the need for a CBDC.

Engert, W., & Fung, B. S. C. (2017). *Central Bank Digital Currency: Motivations and Implications*. <https://doi.org/10.34989/SDP-2017-16>

In this discussion paper, Engert and Fung explore the potential for central banks to issue digital currencies (CBDCs) and the various motivations behind such an initiative. The authors examine key reasons for considering CBDCs, such as enhancing retail payment systems and promoting financial inclusion, while also addressing concerns about preserving central bank seigniorage and reducing the effective lower bound on interest rates. The paper outlines a benchmark CBDC model with features similar to physical cash and delves into its potential implications on monetary policy, financial stability, and the broader banking system. A significant focus is placed on the risks associated with anonymity in digital currencies, suggesting that complete anonymity could facilitate criminal activities and thus be undesirable. The analysis underscores the importance of cautious and incremental implementation of CBDCs, highlighting the need for ongoing research and monitoring to understand their broader impacts and technological feasibility

Feyen, E., Frost, J., Natarajan, H., & Rice, T. (2021). *What does digital money mean for emerging market and developing economies?* BIS Working Papers No. 973 [www.bis.org](http://www.bis.org)

This paper examines the impact of digital money, particularly global stablecoins and central bank digital currencies (CBDCs), on emerging market and developing economies (EMDEs). Feyen et al. highlight that while stablecoins could potentially enhance financial inclusion and improve cross-border payments and remittances, they are not a comprehensive solution and present significant challenges and risks, especially in EMDEs. The authors emphasize that stablecoins have not been tested at scale and might not offer competitive advantages over existing fintech innovations that build on or enhance the current financial infrastructure, such as digital IDs, mobile banking, and faster payment systems. The paper argues that authorities in EMDEs might need to restrict or prohibit the use of stablecoins due to these challenges and risks. Additionally, while some EMDEs are exploring CBDCs, the paper suggests that the necessity and desirability of CBDCs for all jurisdictions remain uncertain and warrant further investigation.

Fridgen, G., Radszuwill, S., Urbach, N., & Utz, L. (2018). Cross-Organizational Workflow Management Using Blockchain Technology-Towards Applicability, Auditability, and Automation. In *United States of America* (pp. 1147–1156). [www.fim-rc.de](https://doi.org/www.fim-rc.de)

This paper examines the integration of blockchain technology with business process management (BPM) by developing and evaluating a blockchain prototype for cross-organizational workflow management in partnership with a German bank. The focus is on the use case of a documentary letter of credit. Implementing a blockchain solution significantly improves the current manual, paper-based process by enhancing auditability with a tamper-proof process history, automating manual steps, and leveraging the system's decentralized nature. The study suggests that blockchain can offer substantial advantages for cross-organizational workflow management systems (WfMSs), potentially transforming other workflows by removing the need for a central authority and enabling standardized, decentralized operations. Challenges noted include choosing between private and public blockchain solutions and managing access and rights within a decentralized system. The research underscores blockchain's potential as an infrastructure for WfMSs, with important implications for future BPM and internal auditing processes.

Fullerton, E. J., & Morgan, P. J. (2022) *The People’s Republic of China’s Digital Yuan: Its Environment, Design, and Implications. ADBI Discussion Paper 1306. Tokyo: Asian Development Bank Institute. https://www.adb.org/publications/the-peoplesrepublic-of-chinas-digital-yuan-its-environment-design-and-implications*.

This paper explores the rapid advancements in financial inclusion within the People's Republic of China (PRC), primarily driven by the adoption of financial technology (fintech) by large-scale platforms such as Ant Group and Tencent. Initially focusing on digital payments, these companies have expanded into various financial services, including investment products and loans. Concurrently, the People's Bank of China (PBC) has been developing the digital yuan, a central bank digital currency (CBDC) designed to facilitate retail digital transactions within a centralized payment system. The paper delves into multiple facets of this transformation, including the current landscape of digital payments and finance in the PRC, the state of financial inclusion, and the specifics of the digital yuan project. It provides a detailed analysis of how the digital yuan is expected to contribute to financial stability and inclusion. Key areas of focus include the digital yuan's impact on commercial banks' assets and liabilities, private borrowing behaviors, and the operations of non-bank firms like Ant Group and Tencent. Additionally, the paper evaluates the anticipated benefits for retail users, highlighting how the digital yuan could enhance financial inclusion beyond the capabilities of the existing system.

Fung, B. S. C., & Halaburda, H. (2016). Central Bank Digital Currencies: A Framework for Assessing Why and How. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.2994052>

The authors examine the increasing interest in digital currencies and the potential implications for central banks considering issuing their own digital currencies. The authors propose a framework to evaluate the rationale and methodology for central bank digital currencies (CBDCs) aimed at enhancing the efficiency of the retail payment system. They argue that the rapid technological advancements in payment systems necessitate a thorough analysis of whether CBDCs could address current payment gaps and improve overall efficiency. The framework also considers the essential attributes that a central bank digital currency should possess to ensure widespread adoption and effective usage. While the primary focus is on the retail payment system, the authors acknowledge that other important considerations, such as broader economic and financial system impacts, require further research. This paper contributes to the ongoing discussion among public authorities and central banks regarding the potential benefits and design considerations of CBDCs.

Jiang, Jiaying, Digital Dollar: Privacy and Transparency Dilemma (February 9, 2024). UC Law Journal (Forthcoming), Available at SSRN: <https://ssrn.com/abstract=4774186>

Jiang examines the concerns that a digital dollar, a digital form of central bank currency, might lead to increased government surveillance and loss of user privacy. Challenging these worries, Jiang explores technical designs from leading think tanks, central banks, and scholars, concluding that a digital dollar could potentially provide better privacy than current digital payment systems. The article identifies two incorrect assumptions held by critics: that digital dollar data is entirely transparent regarding personal information and transactions, and that government authorities have unrestricted access to this data. Contrary to these assumptions, proposed designs ensure some level of anonymity—whether for payers, transactions, or both—while restricting government access to identity and transaction details. However, these privacy-focused designs conflict with existing anti-money laundering (AML) and countering the financing of terrorism (CFT) regulations, which demand data transparency to combat financial crimes. Consequently, Jiang proposes that financial institutions update their record-keeping and reporting methods, and advocates for modernizing AML/CFT requirements to balance privacy protection with public safety objectives.

Keister, T., & Sanches, D. (2021). *Should Central Banks Issue Digital Currency?* (Working Paper (Federal Reserve Bank of Philadelphia) 21–37; Working Paper (Federal Reserve Bank of Philadelphia), pp. 21–37). Federal Reserve Bank of Philadelphia. <https://doi.org/10.21799/frbp.wp.2021.37>

Keister and Sanches investigate the effects of central bank digital currencies (CBDCs) on interest rates, economic activity, and overall welfare in economies that use both central bank money and private bank deposits for transactions. They highlight a key policy tradeoff: while CBDCs can make exchanges more efficient, they might also reduce bank deposits, increase banks' funding costs, and lower investment levels. The authors identify conditions under which targeted digital currencies, competing solely with either physical currency or bank deposits, can enhance welfare. If targeted currencies are not feasible, they explore the policy tradeoffs of issuing a universal digital currency. Using a model from the New Monetarist tradition, the paper provides insights into the macroeconomic consequences of widespread CBDC adoption, emphasizing the intricate balance central banks must achieve to enhance financial inclusion, investment efficiency, and prevent illicit activities. This paper is crucial for policymakers and researchers focused on the future impact of digital currencies on financial systems and economies.

Liu, M., Wu, K., & Xu, J. J. (2019). How Will Blockchain Technology Impact Auditing and Accounting: Permissionless versus Permissioned Blockchain. *Current Issues in Auditing*, *13*(2), A19-A29. https://doi.org/10.2308/ciia-52540Liu and colleagues analyze the effectiveness of blockchain technology in maintaining data integrity and preventing tampering of historical transactions. They highlight that while altering one block in a blockchain invalidates subsequent blocks, recalculating the entire sequence in a closed, permissioned network can restore validity to the altered blocks. This undermines the security and integrity of such networks. The authors argue that only permissionless blockchains in open networks can truly safeguard transaction integrity and security. Although permissionless blockchains face issues like scalability and transaction throughput, the paper posits that permissioned blockchains are not a viable solution, as chaining transactions in a closed network is unnecessary. The study offers new perspectives on the longstanding debate over blockchain types.

Mäntymäki, M., Wirén, M., & Najmul Islam, A. K. M. (2020). Exploring the Disruptiveness of Cryptocurrencies: A Causal Layered Analysis-Based Approach. *Lecture Notes in Computer Science (Including Subseries Lecture Notes in Artificial Intelligence and Lecture Notes in Bioinformatics)*, *12066 LNCS*, 27–38. <https://doi.org/10.1007/978-3-030-44999-5_3>

The authors study investigates whether the diffusion of cryptocurrencies signifies a disruptive change and assesses the potential magnitude of such change through the lens of disruptive innovation theory. The authors utilize Causal Layered Analysis (CLA) to construct a four-layer analytical framework, which they use to conceptually evaluate the changes brought about by cryptocurrencies. The study illustrates how cryptocurrencies have instigated significant changes at various levels: at the company level by offering a cost-effective alternative for cross-border money transfers, thereby challenging intermediary-based business models; at the industry level, as evidenced by numerous central banks experimenting with digital currencies; and at the societal level, exemplified by cryptocurrencies' role in establishing a parallel financial system during Venezuela's political and economic crisis. This analytical framework aims to systematically assess the disruptive potential of cryptocurrencies and other blockchain technologies, providing a structured approach for evaluating their broader impact.

Mqamelo, R. (2022). Community Currencies as Crisis Response: Results from a Randomized Control Trial in Kenya. *Frontiers in Blockchain*, *4*. <https://doi.org/10.3389/fbloc.2021.739751>

Rebecca Mqamelo's study examines the world's first randomized control trial on community currencies, focusing on the Grassroots Economics Community Inclusion Currency (CIC) model used on the xDAI blockchain in Nairobi, Kenya. The research evaluates the impact of $30 worth of CIC tokens on local beneficiaries during crises such as the Covid-19 pandemic. Mqamelo reports significant positive outcomes, including a $93.51 rise in wallet balances, a $23.17 increase in monthly CIC income, a $16.30 boost in monthly CIC spending, a $6.31 growth in average trade size, and a $28.43 rise in spending on essentials like food and water. However, gender disparities in fund usage highlight the need for further research into economic gender imbalances. The study suggests CICs as effective tools for community-driven economic restructuring and advocates for their broader use to support local economies and humanitarian efforts. Mqamelo also calls for expanded research on the relationship between CIC transactions and national currencies, especially during crises impacting vulnerable populations.

Pohl, M., Degenkolbe, R., Staegemann, D., & Turowski, K. (2020). *Towards a Blockchain Technology Framework – Literature Review on components in blockchain implementations*.

This paper proposes the development of a framework to provide clear guidance on designing blockchain systems tailored to specific requirements for individual components and characteristics. By utilizing a feature tree from a software engineering perspective, the framework aims to detail how various components can be composed to meet diverse requirements. The paper suggests that future research should investigate more blockchain systems to expand the range of available technologies. It also mentions the potential implementation of a case study analysis, following the methodology of Eisenhardt (1989), to further this aim. Moreover, the paper discusses the importance of requirements engineering in determining the necessity of blockchain technology for specific application use cases.

Scott, B. (2016). *How can cryptocurrency and blockchain technology play a role in building social and solidarity finance?* <http://hdl.handle.net/10419/148750>

Brett Scott's working paper explores Bitcoin and blockchain technology's potential in advancing social and solidarity finance (SSF). It analyzes Bitcoin's decentralized currency and blockchain foundation, focusing on their use in remittances, financial inclusion, cooperatives, and micro-insurance. Scott contrasts Bitcoin's disruptive financial narratives with critiques of elitism and libertarianism in the tech community. He introduces "blockchain 2.0" technologies, which extend beyond transactions to support cooperative and communal ideals, envisioning decentralized organizations and trust-based systems. The paper highlights the need for further research on Bitcoin's global market growth, its potential in financial inclusion, and its integration with blockchain 2.0 smart contracts. Scott emphasizes culturally and politically sensitive blockchain implementations, advocating for tailored solutions and future research to harness cryptocurrencies' transformative potential in SSF contexts.

Solat, S., Calvez, P., & Naït-Abdesselam, F. (2021). Permissioned vs. Permissionless Blockchain: How and Why There Is Only One Right Choice. *Journal of Software*, 95–106. <https://doi.org/10.17706/jsw.16.3.95-106>

Solat et al.'s paper provides a critical analysis of blockchain models, challenging the efficacy of permissioned blockchains in maintaining transaction integrity and security. By highlighting the vulnerabilities in closed network systems, the authors make a compelling case for the adoption of permissionless blockchains in open networks. Their discussion addresses significant issues such as scalability and throughput, making this paper a valuable resource for researchers and practitioners in the blockchain field. The work is particularly relevant for those interested in the security and structural integrity of blockchain transactions, offering insights that underscore the importance of open, permissionless networks.

Tapscott, A. (2021). *Digital Asset Revolution: The Rise of DeFi and the Reinvention of Financial Services*. foreword by Don Tapscott, Blockchain Research Institute, 23 Nov. 2021, rev. 1 Dec. 2021. [www.blockchainresearchinstitute.org](http://www.blockchainresearchinstitute.org).

This book discusses the profound impact of blockchain and digital assets on the financial industry, likening the current transformation to the radical shifts experienced during the first era of the Internet. Tapscott highlights the challenges and potential of DeFi, noting that platforms like Ethereum and Solana face scalability and usability issues, and regulatory scrutiny poses additional obstacles. The narrative draws parallels with historical transformations, suggesting that the post-COVID era may mark the true beginning of the 21st century, driven by a new generation of crypto-native users. This cohort is seen as revolutionizing financial services, much like the counterculture movements of the 1960s. Tapscott posits that while Bitcoin sparked the financial revolution, DeFi and digital assets are accelerating it, potentially leading to the decline of centralized systems and the rise of a new decentralized economic framework

Teker, D., Teker, S., & Ozyesil, M. (2020). Macroeconomic Determinants of Cryptocurrency Volatility: Time Series Analysis. *Journal of Business & Economic Policy*, *7*(1). <https://doi.org/10.30845/jbep.v7n1a8>

In their study, Teker, Teker, and Ozyesil investigate the relationship between macroeconomic variables, specifically gold and oil prices, and the daily price movements of major cryptocurrencies such as Bitcoin, Tether, Ethereum, Litecoin, and EOS. The study concludes that the relationship between cryptocurrencies and traditional macroeconomic indicators such as gold and oil prices is minimal. Consequently, the authors suggest that, at present, investors do not need to consider cryptocurrencies as substitutes for gold and oil in their portfolio choices.

Toygar, A., Taipe Rohm Jr, C., Zhu, J., & Taipe Jr, C. (2013). A New Asset Type: Digital Assets. In *Journal of International Technology and Information Management* (Vol. 22). [https://scholarworks.lib.csusb.edu/jitimAvailableat:https://scholarworks.lib.csusb.edu/jitim/vol22/iss4/7](https://scholarworks.lib.csusb.edu/jitimAvailableat:https:/scholarworks.lib.csusb.edu/jitim/vol22/iss4/7)

Toyga et al. explore "Digital Assets," considering whether digital items like social media accounts, online photo albums, blogs, and cloud-stored data should be recognized as a new asset class due to their monetary and personal value. The study discusses the legal and regulatory challenges of digital assets, such as ownership, transfer, use, sale, and inheritance, emphasizing the lack of comprehensive cyber laws which cause conflicts between service providers and users. The authors note that few states have laws regarding digital assets and estate planning, with Oklahoma being an exception, but these laws are inadequate for broader issues. They call for a "Federal Cyber Law Act" in the U.S. and a "globally uniform cyber law" to manage digital assets effectively, suggesting the United Nations could facilitate this. The study concludes that as digital assets become more integral to daily life, comprehensive cyber laws are essential for their management and protection, underscoring their growing significance in the global economy.

Van der Merwe, A. (2021). A Taxonomy of Cryptocurrencies and Other Digital Assets. *Review of Business*, *41*(1).

Van der Merwe (2021) provides a detailed analysis of the cryptocurrency and digital asset landscape, emphasizing their roots in blockchain technology. The paper traces the evolutionary impact of the Bitcoin blockchain, which has spawned various digital assets and decentralized financial products. Cryptocurrencies are discussed as speculative investments rather than conventional money. Stablecoins, designed to maintain stable value by being pegged to assets, are explored, highlighting their complex management involving multiple entities (G7 Working Group on Stablecoins, 2019). The study also delves into decentralized finance (DeFi), which uses blockchain and smart contracts to offer financial services without traditional banking oversight, presenting new opportunities for innovation. The paper addresses the artificial scarcity of cryptocurrencies, which enhances their investment appeal but also brings high volatility risks, necessitating over-collateralization in DeFi platforms. Stablecoins are proposed as a solution to this volatility, with potential use in cross-border payments and broader economic applications (Lyons et al., 2020). The paper concludes by emphasizing the potential for diversification and innovation in digital assets, alongside the significant risks and complexities they entail.

Walch, A. (2017) Blockchain's Treacherous Vocabulary: One More Challenge for Regulators Journal of Internet Law, Vol. 21, No. 2, Aug. 2017., SSRN: <https://ssrn.com/abstract=3019328>.

In her paper, Angela Walch discusses the challenges posed by the ambiguous and misleading vocabulary associated with blockchain technology. She argues that misunderstandings can lead to poor regulation and inappropriate adoption in crucial systems. Walch stresses the importance for regulators and policymakers to gain a clear and accurate understanding of blockchain technology before making decisions. The evolving and contested terminology complicates the regulators' task, often obscuring the true facts. She advocates for a critical and deliberate approach to learning about blockchain, recognizing that language issues can obscure reality and lead to misunderstandings. Walch suggests that regulators be aware of the problematic vocabulary, maintain skepticism towards all sources, and consider diverse viewpoints to make well-informed decisions. She concludes that thorough investigation and independent knowledge development are essential for effective regulation and adoption of blockchain technology. This paper offers valuable guidance for anyone involved in blockchain regulation or adoption.

Wissmann, P. (2022.). *Is Bitcoin a good asset for inflation hedging? A comparison between Bitcoin returns and the inflation rates of the USA, the Euro-Zone, India, Kenya, and Venezuela CC-BY-NC*. <https://purl.utwente.nl/essays/92741>

Patrick Wissman's study examines whether Bitcoin acts as an effective hedge against inflation in five economies: the USA, Euro-Zone, India, Kenya, and Venezuela, from October 2014 to May 2022. Using data from “The Chainalysis 2021 Geography of Cryptocurrency Report” and TripleA’s global crypto adoption calculations, the study explores the idea of Bitcoin as "digital gold" due to its limited supply and mining reward halving. Through the Fisher Coefficient and Fama-Schwert (1977) extension, the study finds no statistical evidence that Bitcoin hedges against inflation in any of the economies analyzed. Despite Bitcoin's high average returns, the study concludes it is not a reliable inflation hedge for the given period, economies, and model. Wissman acknowledges limitations such as Bitcoin's young age as an asset class and the scarcity of detailed inflation data outside the USA, which result in high standard errors in the analysis.

World Economic Update ECA (2018). *Cryptocurrencies and Blockchain*: A Hype or Transformational Technologies? <https://doi.org/10.1596/978-1> DOI: 10.1596/978-1- 4648-1299- 6

The World Bank's 2018 ECA Economic Update explores the transformative potential and challenges of cryptocurrencies and blockchain technologies within the trend towards peer-to-peer (P2P) commerce. Highlighting their rise post-global financial crisis and the influence of digital platforms like Amazon and Uber, the report identifies cryptocurrencies as the most advanced blockchain application, offering decentralized payment systems but facing issues of high costs and volatility. Key policy challenges discussed include the absence of regulatory frameworks for cryptocurrency transactions and smart contracts, tax code ambiguities, and potential impacts on financial stability. The report also considers central banks issuing digital currencies to meet the growing demand for stable digital tokens and the potential for blockchain to enhance government services. While acknowledging the benefits of cryptocurrencies, the report notes their volatility limits their effectiveness as a medium of exchange and store of value compared to legal tender. The World Bank advocates for cautious optimism and further exploration of these technologies in future economic systems.

Yaga, D., Mell, P., Roby, N., & Scarfone, K. (n.d.). *Blockchain Technology Overview*. <https://doi.org/10.6028/NIST.IR.8202>

The authors offer a thorough technical overview of blockchain technology, explaining its decentralized, tamper-evident, and tamper-resistant nature. Blockchain operates without central authorities, enabling users to record immutable transactions in a shared ledger.. The report underscores the hype around blockchain and the need for careful assessment of its suitability for specific applications, highlighting the importance of decentralization in scenarios requiring distributed trust. Key considerations for organizations include data visibility, transactional history, and node diversity. The document concludes with a caution about blockchain's inefficiency and advises adopting the technology only when its unique features are essential for operations.

Zhang, R., Xue, R., & Liu, L. (2020). Security and Privacy on Blockchain. *ACM Computing Surveys*, *52*(3), 1–34. <https://doi.org/10.1145/3316481>

This comprehensive article examines the security and privacy aspects of blockchain technology, considered a significant advancement in cryptography and cybersecurity. It discusses blockchain's applications in cryptocurrencies like Bitcoin, smart contracts, and the Internet of Things, while emphasizing ongoing security and privacy challenges. The article begins with an introduction to blockchains and their role in Bitcoin-like transactions, outlining essential security properties for cryptocurrency systems and additional features required for broader applications. It reviews techniques such as consensus algorithms, hash-chained storage, mixing protocols, anonymous signatures, and non-interactive zero-knowledge proofs. The authors argue that understanding these properties is crucial for building trust in blockchain systems and fostering innovation in security defenses. They advocate for the development of lightweight cryptographic algorithms and practical security methods to advance blockchain technology and its applications.