



Digital Mutual Stimulation Theory for Strengthening Islamic Finance in China

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Abstract

Central Bank Digital Currencies (CBDCs) represent a very important innovation in the digital and payment space affecting the participants in the global financial services industry. A CBDC is an innovation and is a digital payment instrument that is denominated in the national unit of the account. Islamic finance has similarly experienced significant growth in the last several decades, but challenges remain in terms of transaction processing speed and cost. Given the significant opportunities of central bank digital currencies in reducing transaction costs, and increasing transaction speed, the interrelationship between the promotion of Islamic finance and CBDCs is of significant interest. The conceptualized theory digital mutual stimulation outlines the growing relationship between the strengthening of Islamic finance and the utilization of the digital yuan. Specifically, the theory provides an outline that the ease in the conduct of transactions, as well as reduction in transaction cost and greater democratization will significantly strengthen the provisioning of Islamic financial products. The article utilizes a grounded theory approach integrating empirical research data from interviews and surveys. The digital nature of the digital yuan acts as a stimulus for smart contract execution and reduces the need for an intermediary as well as increases trusts between the contracting parties. This becomes especially important for international trade and transfers, as well as for asset purchases. Given the connection in Islamic finance between financing and real assets, the digital Yuan can play an important role in strengthening this interconnection and support Islamic finance in China and beyond.

Keywords: Digital mutual stimulation theory, Islamic finance, Central bank digital currencies, Economic growth, Grounded theory

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1. Introduction

Central Bank Digital Currencies (CBDCs) represent a very important innovation in the digital and payment space affecting the participants in the global financial services industry. A CBDC is a new innovation and a digital payment instrument that is denominated in the national unit of the of the account. This is a direct liability for the Central Bank. This represents the legal tender that is issued by the Central Bank in a digital form. This shall represent a medium of exchange, store of value and represent a unit of account. The CDDBC is a fiat currency that is issued in a digital form and amounts to the same value as the fiat currency (Auer et al., 2022).

Commercial banks and financial institutions are permitted to hold reserves of the central bank money, and the retail public can hold the money issued by central bank in the form of physical banknotes. This enables CBDC to be widely used by wholesale institutions, households, and businesses as a storage of value and to execute secure payments. This helps in streamlining and maintaining a Central Banks' function of money provisioning, financial stability and ensuring continued access to the digital economy. Table 1 provides an overview of the CBDCs, cash and alternative private currencies.

Table 1: Comparison of CBDCs with physical cash and alternate private currency

Aspect	CBDCs	Cash	Alternate private currency
Issuing Authority	Issued and backed by a central monetary authority	Issued and backed by a central monetary authority	Privately owned, governed by algorithms
Form	Electronic/Digital	Paper/Physical	Electronic/Digital
Guarantee	Issued by the Central Bank as their liability	Issued by the Central Bank as their liability	Privately issued
Payment acceptance	Legal Tender	Legal Tender	Limited acceptance
Know Your Customer (KYC)	Required in most cases	Transfer doesn't require KYC	May not be required Anonymity is high
Structure	Centralized or permissioned decentralization	Centralized issue	Decentralized
Risk	Very low market, counterparty, liquidity risk	Very low market, counterparty, liquidity risk	Relatively medium to very high market, counterparty, liquidity risk

Source: [Yu \(2022\)](#)

There has been a global drive for faster payments, greater digitization, improved mitigation for clearing and settlement risk. Finally, there is significant demand for efficient domestic and cross-border value transfers in addition to financial inclusion. This has necessitated the increased focus on the exploration of a digital version of the fiat currency. Besides the leverage of CBDCs to enhance monetary and fiscal policies, there are four key drivers for Central Banks to evaluate CBDCs ([Belke and Beretta, 2020](#)).

The first driver is the need to ensure that Central Banks are the primary currency creators and provide trust into their currencies. Central Banks face the challenge that new forms of digital money and the utility of non-fiat cryptocurrencies may pose challenges to conventional fiat currencies. This implies a need to provide the public with digital currencies that provide similar benefits as any alternative private currencies but avoid any economic repercussions arising from the provisioning ([Agur et al., 2022](#)).

The second main driver is that CBDCs may deliver efficiencies in the financial system. This is because the CBDCs are executed in real-time and represent the final gross amount. The real-time and final execution helps in reducing any settlement risks in the financial system and both interbank settlement and reconciliation is not anymore needed. Additionally, the digital currencies may allow for real-time and cost-effective globalization of payment systems given that different time zones are no longer an impediment (Herstatt risk). Additionally, CBDCs may provide programmable money that can enable atomic transactions ([Agur et al., 2022](#); [Allen et al., 2022](#)). Atomic transactions represent a transfer of CBDCs against another asset, where the transaction is contingent on that the asset is transferred in real-time. This may enable Payment versus Payment (PvP) for cross-currency transactions, as well as Delivery versus Payment (DvP) for where the asset may be a physical or financial asset. Utilizing cash can cost more than 0.5 % of the GDP for developed nations, while even increasing to up to 1.7 % for countries such as India. This cost is born by households, businesses, banks, and the Central Bank, and is not including any cost related to the environment, social and governance factors of printing money ([Agur et al., 2022](#)). CBDCs can increase the efficiency of clearing and settlements, as well as post-market activities. Currently, there may be a multi-day lag in the security clearing and settlement process. Hence, a digital currency could reduce this to an instantaneous transaction.

The third key driver is the improvement of financial access and financial inclusion. Many nations face the challenge that financial participation of a significant amount of the population is relatively limited, and CBDCs may provide an opportunity to achieve greater financial inclusion. This results from the reduction of intermediaries as well as physical boundaries. Nevertheless, there may be technological challenges and cost related to a digital currency that may keep some individuals outside financial system ([Barrdear and Kumhof, 2021](#)).

The final driver is the enhancement of monetary and fiscal policy. These CBDCs offer high efficiency solutions to the problem of the cost of remittances. The transfer of remittances plays a key role for many countries, and costs associated with the transfer can be significant. Furthermore, this allows to broaden the financial inclusion of individuals (Náñez Alonso et al., 2021).

The CBDC can improve the monetary policies for Central Banks and the architecture and structure may enable seamless and transparent distribution of government benefits. This may significantly enhance the control of the transactions and support the financial stability. Liquidity squeezes may represent significant challenges to banking institutions and cause potentially bank runs. CBDCs may provide significant opportunities for identifying theft risk. The digital trail enhances traceability and enhancing the security of the transaction. Furthermore, the central banks may also protect the purchasing power of money via an indexation scheme. For example, the nominal value of a holding of CBDCs can be incentivized during periods of higher inflation, and this provides a more targeted approach to fighting inflation. Another key aspect is that the central banks can collect more granular payment flow data, which may enable to gather macroeconomic data with higher integrity and better analytics. Commercial adoption may be increased by the adoption of a large economy, and this may even assist with the large-scale roll out of the CBDCs (Chorzempa, 2021).

There have been several initiatives across the world to utilize CBDCs and countries such as China, Cambodia and Bahamas that have implemented their CBDCs. Table 2 provides a summary of the CBDC currently in implementation in China, Bahamas, Cambodia, Eastern Caribbean and Nigeria. The implementation in China is by far the most advanced with several pilots having been completed in both 2021 and 2022. Several other countries, such as Cambodia, Bahamas, Eastern Caribbean and Nigeria have launched their own CBDCs (Chorzempa, 2021).

Table 2: Summary overview about selected CBDC implementations

	Description	CBDC Form and Access Technology	Issuance and Distribution of Currency
China	The project was initiated in 2014 with intention to enhance the retail payment system. Pilot has been launched in 2021.	Aimed towards retail based leveraging account-based technology for circulation	E-CNY follows a centralized approach with the Central Bank issuing the CBDC, while commercial banks are responsible for distributing it to general public
Cambodia	Project Bakong has been sponsored by the National Bank of Cambodia with the goal to improve financial inclusion reach rural unbanked population	Retail based CBDC leveraging DLT on a hyper ledger platform	The currency is issued by the Central Bank and 16 banks are currently supported through the system and 10,000+ users adopting it, with a retail throughput of 2000 transactions/second
Bahamas	Central Bank of Bahamas launched its digital currency Sand Dollar for financial inclusion and interoperability of payments	Retail based CBDC leveraging DLT	While the currency will be issued by the Central Bank, banks, credit unions, PSPs or MTBs can circulate it to customers. Customer can also download the application to make transfers
Eastern Caribbean	Eastern Caribbean launched its CBDC involving 4 of the 8 member countries to reduce cost of transaction and make transactions possible to individuals without bank accounts	Retail based CBDC leveraging DLT	Dcash will be issued to Eastern Central Caribbean Bank (ECCB) and will be distributed by licensed banks and non-banks in the region
Nigeria	Central Bank of Nigeria launched its digital currency, eNaira, to facilitate financial inclusion, ease remittances, promote traceability and promote inclusion and security, among others	Retail based CBDC leveraging DLT	CBN will issue eNaira and the financial institutions will act as intermediaries between CBN and customers

Source: Yu (2022)

There are several major projects that are currently ongoing and there are several additional initiatives that aim to develop CBDCs with India starting its efforts to develop its own CBDCs. The Singaporean project Ubin represents a collaborative project between different industry bodies and incorporated a multi-phase approach. Each phase provides a solution to address some of the industry challenges. The first two phases addressed domestic payments and building the technologies for the support of the CBDCs. The next two phases focused on the interoperability of network and the cross-border facilities. The final phase of project focused on the development of a common platform to achieve greater efficiencies in payment systems and conduct faster and quicker transactions. The focus was on utilizing blockchain technology to solve existing payment challenges and may be utilized for international, multi-country and multi-currency settlements (Nabilou, 2020).

This implies that both the Monetary Authority of Singapore (MAS) and Bank of Canada (BOC) linked their networks to demonstrate how CBDCs can reduce pre-existing settlement risk in cross-border, cross-currency transactions. This is achieved via the synchronization of payment actions where the third-party platform is irrelevant. An expansion was conducted in 2020, where several digital currencies were investigated in terms of how they could be issued and transacted on a single platform. The solution was to utilize a distributed ledger technology for a multi-currency payment network to enhance commercial cross-border clearing and settlements globally. The project Partior, which is a joint venture between DBS Bank, JP Morgan and Temasek, is based on a digitized commercial bank money to facilitate this initiative (Nabilou, 2020).

Cambodia launched the project Bakong that aims at reducing its dependency on the USD Dollar. The project is adopted by more than 18 financial institutions and provides a legacy payment solution. Specifically, more than 5.9 million users were onboarded in the first year and conducted more than 1 million transactions with a total value of 500 million USD. The objective is to ease cross-border transactions to lower the transaction cost and provide instant settlement. This eliminates the dependency on a bank account as funds are directly transferred to the Bakong wallet. Bakong wallet also utilizes a leveraged blockchain technology for the setup of the platform (Kumhof and Noone, 2021).

China was a primary adopter of the CBDCs already back in 2014 where they set up a task force to investigate the digital fiat currency. 2016 led to the establishment of a first prototype and by 2017 several financial institutions were involved in testing the fiat currency. The pilot has been initiated in several regions to evaluate the performance of the digital currency. The objective is to utilize it for retail customers and leverage account-based hybrid payment instruments. The central bank issues the digital currency to the financial institutions and manages it throughout the lifecycle. This represents a centralized management model with a two-tier operational system (Kumhof and Noone, 2021).

Japan conducted a study, called project Stella, for assessing the applicability of a distributed ledger technology solution for the cross-border payment system. The study was conducted jointly with the European Central Bank in two phases, where the first focused on operations within the DLT environment, and the second explored opportunities for the operation and design of a security settlement framework. While the reports were published by 2018, there has been little progress by the central bank of Japan in the development of a CBDC. A critical focus of the bank was on offline CBDCs that were explored on basic feature phones in addition to smartphones. The five readiness criteria included the storing of monetary value, communication between users, verification of the transaction and ability to provide payment instructions. Finally, the offline feature requires the transfer to be conducted without access to the internet. One of the major concerns by the central bank was the security issues and avoiding double transactions by the users. There have been Offline Payment System (OPS) protocols that prevent such double transactions utilizing a trusted execution environment, which can be both used on a basic feature phone and smartphone (Kumhof and Noone, 2021).

The Reserve Bank of India (RBI) made the announcement of introducing CBDC in a phased approach, and the investigation revolved around several factors such as security, impact on financial institutions, monetary policy, and currency in circulation (Mohamed, 2020). During the design and implementation of CBDCs, there are several key decisions that must be evaluated during different stages. These stages relate to technology, access, privacy, and the distribution model. The CBDCs require the formation of payment infrastructure to cover aspects from the database based on which the CBDCs are recorded. This requires that the point-of-sale devices and applications have to be properly formed. From a regulatory point of view, the underlying technology and access has to be investigated in greater detail (Altwijry et al., 2021). Many CBDCs focus on a distributed ledger technology, but in many instances, such as in China, a centrally controlled database approach may be more feasible. A distributed form may be able to incorporate several useful innovations and

functionalities, which includes decentralized and the use of smart contracts. Challenges arise from the adoption of these features; regulatory trade-offs have to be investigated wisely. Most commonly, a central ledger is utilized that can store the data in different physical nodes but is controlled by a trusted administrator (Cunha et al., 2021).

New developments in Web 3.0 and decentralized finance (DeFi) may also produce interesting and important developments. Web 3.0 supports the facilitation of users to conduct financial transactions directly with others utilizing a smart contract. The lack of an intermediary brings several benefits, such as greater inclusion and easier access and cost reductions (Ahmed et al., 2022). A critical choice is whether the central bank shall adopt a token-based or account-based approach. For token-based structures, the distribution of the currency will involve the transfer of an object of value from one wallet to another. This ensures that the transaction is approved by the originator and the beneficiary based on digital signatures and public-private key pairs. The advantage of the system is that it provides significant level of privacy but makes the prevention of money laundering and fraudulent transactions a challenge. Furthermore, the customers are required to remember their access keys as otherwise they will lose access to their funds (Cunha et al., 2021).

In contrast, account-based CBDC involve the transfer from one account to another and the model ensures that the transaction is verified based on the verification of the user identities. This requires that the central bank has an account for every user (Fantacci and Gobbi, 2021). Another critical challenge is the choice between a retail CBDC and wholesale CBDC. Generally, token-based approaches have been preferred by regulators for cross-border transactions, where both entities solely need to have a wallet that facilitates the transaction. Furthermore, it helps in terms of financial inclusion as solely an internet connection is required to complete the payment. Furthermore, a token-based approach enables to achieve high anonymity. For regulator this poses challenges as transactions can be monitored only on a limited basis, and there is limited degree of involvement in the end-to-end process (Fantacci and Gobbi, 2021).

Retail-based CBDC focuses on the issue of households that have financial inclusion at its core as the main benefits. Furthermore, it strengthens to shift a cashless economy and reduces overall the cost of printing and management. The indirect retail CBDCs leads to a direct issuance of the digital currency by the financial institutions and those are responsible for backing the issued money. This also leads to the responsibility for sending payment messages to other financial institutions and convey the payment instructions to the central bank for the settlement of these payments (Fantacci and Gobbi, 2021).

The alternative direct retail CBDC model implies that the individuals and businesses hold the digital currencies in private accounts at the central bank. This eliminates the intermediaries but also affects the structure of the current financial system and increases the role and responsibilities of the central bank (Opore and Kim, 2020). In contrast to retail based CBDCs, wholesale CBDCs are used for interbank transactions for the payments between financial institutions. This covers the settlement of cross-border payments and improves the settlement efficiency, security and generally reduces the risk related to credit and settlement (Opore and Kim, 2020). The decision of the approach requires an evaluation of the macro-economic conditions and the payment maturity of the region. For financial inclusion, a retail-based approach may be the best approach. In case there is already a Faster Payment System (FPS), then introducing another retail-based payment system may not be a good solution. Conventional CBDC may be either interest-bearing or non-interest bearing. For Islamic finance applications, such interest bearing is entirely forbidden, and digital currencies can only be non-interest bearing (Kosse and Mattei, 2022).

When focusing on the issuance and circulation, there are single-tier and two-tier models. In a single-tier model the central bank distributes the CBDCs and requires a scale-up in the manpower and infrastructure to support this ecosystem. In a two-tiered approach, the central bank issues the digital currency, but the financial institutions are still charged with the distribution (Kosse and Mattei, 2022). For a single tier approach, the central bank has full visibility on the data for every payment, and there are serious implications on financial services institutions. Their deposits would decrease significantly. Such a single-tier approach can be either account or token-deposit. This requires customer-facing infrastructure and deal with the stability risk. In contrast, a token-based approach requires a digital wallet for customers to store currencies (Kosse and Mattei, 2022).

The two-tier approach is similar to the normal distribution of currencies and banks can provide token-based accounts to customers and also enable cross-selling financial products to them. The challenge with a single-tier approach may lead to a move of deposits and account from the financial institutions to the central bank. While

this may help for countries where there are only a few banks available, it may reduce economic growth and reduce competition in conventional and Islamic economies (Kosse and Mattei, 2022).

A central bank may design an ecosystem with various categories of CBDCs wallets. These wallets may have varying transaction, balance, and time limits. The tiered approach has the benefit to prevent any mass withdrawal of bank deposits in the case of stressful conditions and it maintains the economic stability. The design of digital wallets may be implemented in a distributed manner, where the central banks design the rulebook for the development and the use of the wallets. The engagement with a private entity for the provisioning and development of such digital wallets may be rather beneficial and will support the development. These wallets may vary by nature, be it personal, corporate, software and hardware wallets. These CBDCs program shall incorporate a comprehensive risk management framework that define the roles and responsibilities for the identification of risk and management. Furthermore, it establishes a rigid risk tolerance policy and the required controls to mitigate risks (Bian et al., 2021).

The CBDC may lead to a shift of global and domestic economic operation model, and this may significantly affect conventional and Islamic banks, and their profitability as well as operations. The main benefit may be the disruption of existing value transfer paradigms, which may enhance value creation leverage customer data. Specifically, CBDCs may reduce cost, improve service, and reduce settlement risk in addition to fuelling innovation. Additionally, the customer data and spending pattern may provide support and protection for individuals, preventing abuse and fraud. This is a critical element of Islamic finance given the strong focus on trustworthiness (Bian et al., 2021).

The e-CNY plays a critical role in the implementation of a CBDC in China and beyond. The e-CNY is a centralized, cash-like digital currency that shall become a mainstay for retail payments in China (Zheng et al., 2020). There have been several large-scale e-CNY pilot programs in several cities and on multiple e-commerce platforms. The e-CNY is an account-based CBDC form, where the PBOC centralized ledger maintains the information where each issued e-CNY is currently stored. The main objective of the PBOC in introducing the e-CNY are two-fold. The first long-term objective is to create a digital currency that competes with other digital currencies, such as bitcoins, stablecoins and other CBDCs. Furthermore, this shall ensure the renminbi maintains its primary presence in China. Furthermore, the objective is to reshape China's existing payment system via the provisioning of cash-like digital payment methods. This shall be accessible to all, low-cost, anonymous and facilitate the competition among payment service providers. Anonymous in this regard implies that the transaction participants do not share complete information about the wallets of one another. However, the account-based system implies that the central bank maintains an overview of the transactions conducted utilizing the e-CNY (Zheng et al., 2020).

The e-CNY is entirely backed by the PBOC and operationalized via payment service providers. This enables to achieve greater anonymity and better personal information protection but ensures that records are kept for tracing illegal activities. This includes amongst others money laundering and tax evasion. An interesting aspect is that the PBOC has stated that the e-CNY is defined as cash in circulation, or part of the M0 (cash) money supply. The implication of being M0 rather than M1 or M2 has several implications. First, the M0 definition implies that the e-CNY is a direct liability to the PBOC, while M1 and M2 also include liabilities from commercial banks. This implies that the e-CNY is entirely risk free (Knoerich, 2021). Furthermore, the digital wallets that keep the e-CNY are not to be considered bank accounts. Specifically, there is currently only a mobile phone number required for the maintenance of the e-CNY wallet.

Another key point is that the e-CNY does not pay any interest, as no interest is paid on M0 (cash). This contrasts with interest paid on M1 or M2 (bank deposits). This stands in significant contrast other intended digital currencies that have not ruled out interest payments. Finally, the e-CNY can be converted into bank deposits and cashed out only at banks. The main objective of the M0 definition is the prevention of disintermediation of banks. The objective is to avoid the replacement of bank deposits for the e-CNY and the objective is to have a limited number of e-CNY in circulation (Knoerich, 2021).

The e-CNY introduced a two-tier structure where the PBOC is at the top tier and plays a top-level role. For the opening of an e-CNY account/ digital wallet, the user has to approach a second-tier institution. This includes the six largest state-owned banks, and two internet banks. These internet banks are MYBank and WeBank, and the opening can be done both online and offline (Kurien and Geoxavier, 2020). As soon as the e-CNY wallet is setup, the users have access to the services provided by the bank, other banks, and payment services. These 2.5 tier institutions are not e-CNY exchanges but enable to provide payment and other services to e-CNY

holders. The bottom tier consists of merchants, corporates, and consumers. This allows peer-to-peer e-CNY transfers between consumers but most merchants will utilize a tier 2 or tier 2.5 institution to set up the infrastructure to receive these e-CNY payments both online and offline. Therefore, the PBOC shifts the delegation of responsibilities to tier 2 institutions. Tier 2 institutions will provide customer service and protect customer privacy, also enforce the know your customer requirements, and invest in the hard and soft infrastructure for retail e-CNY use. There may be some cost associated with this for tier 2 institutions, but this will be a welcomed alternative to provide better payment services and new opportunities, such as Islamic finance. Another key aspect is that the e-CNY will be more anonymous to avoid that online platforms can easily collect user information, and trace illegal transactions (Kurien and Geoxavier, 2020).

3. Research Questions

The research question revolves around whether the e-CNY has an impact on the provisioning of Islamic finance products and what the impact is going to be. All the research hypotheses are formulated in terms of a null hypothesis, which will be disproven. This assists the solid development of the theory surrounding the impact of the Digital Yuan on Islamic Finance both within China and abroad.

The null hypotheses are outlined below:

1. Individuals are indifferent about whether to use the digital yuan or paper-based currency.
2. There is no positive impact of the digital yuan on the provisioning of the Islamic finance products.
3. Trade between China and Muslim-majority countries has not grown within the last 20 years.
4. The impact of the digital yuan on cross-border trade with Islamic countries will be minimal.
5. There is no change in the ease of access to Islamic finance products
6. Cross-border payments are not affected by the digital yuan

The null hypothesis about whether the digital yuan is attractive to new individuals to use and whether they prefer paper-based currency or the digital yuan. This enables researcher to determine the preferences of individuals and obtain an indication about the general acceptance level of the digital yuan amongst the population. The next hypothesis on the impact between the digital yuan and Islamic financial products aims to demonstrate that there is an impact between the digital yuan and the provisioning of new Islamic financial products in China.

The subsequent hypothesis on the trade relationship between China and Muslim countries has not changed in real terms. If the null hypothesis can be rejected, this implies that the trade relationship between China and Muslim countries has increased within the last 20 years, which justifies stronger engagement between Chinese and Muslim nations. This has an impact on the utilization of the Digital Yuan in addition to the growing importance of Islamic financial products to satisfy the demands of Shariah compliant financial products.

The hypothesis related to cross-border trade focuses on determining whether the digital yuan is expected to have an impact in fostering cross-border trade with these Islamic countries. The hypothesis plays a critical role in determining the impact the digital yuan has on the provisioning of Islamic compliant cross-border financial products, and whether it will ease transaction processing. Another hypothesis determines whether the ease of access to Islamic financial products is reduced when utilizing the digital yuan. This hypothesis addresses whether the digital yuan helps in equalizing opportunities for the access of Islamic finance products within China. The final hypothesis revolves around whether the digital yuan will impact the cross-border payment system, and whether this will affect existing cross-border payment services and instruments. These questions determine a comprehensive analysis and validation of the research problem, thereby supporting the development of the theory.

4. Grounded Theory

For the development of the theory, a grounded theory (GT) approach is utilized. GT is a structured but flexible approach to analyse a phenomenon to develop an explanatory theory to support the processes occurring in inquiry. A key aspect of GT that makes it very suitable for a variety research objective, is its being grounded in data. This data basis makes it ideal to have a solid foundation that is supported by data. Below, there will be an outline of the history behind GT, and how a conventional approach is conducted (Wolfswinkel et al., 2013).

The main founders of GT are generally recognized as Barney Glaser and Anselm Strauss (Glaser and Strauss, 1967), who were two sociologists collaborated on research on dying hospital patients. Strauss was well versed with symbolic interactionism, and Glaser had strong expertise in statistics, which led them to combine their strengths for the initial constant comparative method development (Birks et al., 2013). Their research on the study in the 1960s on the experience of terminally ill patients that had different knowledge of their health status, was of critical interest to the community with relatively little firm understanding of the individual behaviours and effect on these patients. Some of the patients had the suspicion that they were dying and did either confirm or disconfirm this suspicion. Other patients aimed to understand the situation by interpretation of the treatment by their care providers and family members. The key question was how these patients dealt with the knowledge of going to pass away, and how the healthcare staff reacted in terms of caring for these patients (Dunne, 2011).

While collaboration, the two questioned the adequacy of the scientific methods they utilized for the verification. This led them to the development of the constant comparative method in addition to the theory of dying. The constant comparative method is original in terms of organizing and analysing the qualitative data (Holland, 2005). This led to the subsequent development of the discovery of the GT. The work outlined how the data can be utilized to inductively generate the theory. This led to the challenging of traditional methods of testing and refining a theory via deductive testing. Specifically, the GT questioned the view at that time that a quantitative methodology is only valid and enables an unbiased way of determining the truth about processes in the world (O'Reilly et al., 2012). The work was especially critical in supporting qualitative research and show that it has rigour and can provide a solid comparative analysis to generate a theory from it. While the GT was jointly developed by Glaser and Strauss (1967), they later held different views on how to apply the GT approach. The philosophical perspective has diverged for the positivist versions of Glaser, and the post positivism stance of Strauss and Corbin. Additional philosophical perspectives have since emerged that influenced the methodological development in time (Xiao et al., 2004).

There have been several philosophical continuums for grounded theorists. These range from the theoretical perspective of symbolic interactionism to the constructivist perspective of Charmaz. While different philosophies arose, there is a general approach to utilize GT adequately. There are different methodological genres that are based on the traditional, evolved and constructivist GT. The traditional GT is based on the views by Glaser. The evolved GT considers the developments by Strauss, Corbin and Clarke. The constructivist GT went along the path of Charmaz and plays a critical role in going beyond the initial approach by Glaser and Strauss. While each variant is based on the original GT and extends it to more circumstances. The traditional or classic GT aims to create a conceptual theory that considers behaviour that is relevant and challenging for the participants (Qureshi and Ünlü, 2020).

The evolved GT is based on symbolic interactionism based on the work by Strauss, Corbin and Clarke and is incorporating a sociological perspective relying on symbolic-meaning individuals that are connected to the processes of the social interaction. This symbolic interactionism addresses the subjective views that individuals have in terms of objects, behaviours and events depending on their belief of the truth. The third genre developed is the constructivist GT that was explicated by Charmaz. This theory has its roots in constructivism and focuses on how the participants construct meaning within their area of inquiry. This implies that the experience and the meanings are co-constructed together with the participants (Elhaei Sahar et al., 2020).

While all these genres share significant similarities there are different factors that distinguish them, which also includes the philosophical position of the researcher. Additionally, the use of literature, and coding, analysis and theory development are incorporated (Qureshi and Ünlü, 2020). GT plays a dual role as both a method of inquiry and being the product of that inquiry. Specifically, there is a set of integrated conceptual hypotheses that are systematically generated to produce the inductive theory for the area under consideration. Additionally, this can be articulated as a theory derived from systematically gathered data and analyzed through a rigorous research process. This allows the researcher to begin an area of the study and then the theory gradually emerges from the data. The most important part is the view that the theory is not discovered but constructed by the researchers that view the area with their own lens. The latter clearly outlines that GT has a strong data foundation, whose interpretation and the constructed theory will still depend on the researcher. While this may raise concerns of bias or improper derivation of conclusions from a developed theory, the strong data foundation provides sufficient support in general to develop a theory that is accepted as legitimate considering the interpretations of the researcher (Dunne, 2011).

5. Analysis and digital mutual stimulation

This chapter will provide a comprehensive summary of the qualitative and quantitative research results that will then be integrated with other data sources for the development of a comprehensive grounded theory approach. The first step of the research was the conduct of the interviews and evaluate the responses.

5.1 Interview results

For the qualitative interview, 25 different individuals were interviewed from various regions and age groups. These individuals are located both in China, Africa, Europe, and North America, and were selected based on their expertise with cryptocurrencies and either living or having lived in China. This ensured that there is sufficient diversification in the view's representative of the overall population, and to maximize information retrieval.

The first question revolves around the digital renminbi. While most of the respondents referred to the digital renminbi as a digital currency that is similar to the conventional renminbi, only a few outlined that there exists a different technology as compared to the existing renminbi. Several respondents assumed that the digital renminbi is identical with the existing mobile payment services, such as utilizing WeChat or AliPay. A few comments also related the digital renminbi to a digital footprint by the government to control which funds are allocated to which individuals. This implied that the assumption is that the government will provide direct services to the consumers via the digital yuan and may become a competitor to commercial banks.

The question revolving around the purpose of the digital renminbi, was mostly reasoned by the growing digitalization of the currency environment. Furthermore, many respondents replied that the government aims to have greater control about the allocation of funds. This assumption is associated primarily with the news indicating that the Chinese government aims to strengthen control over its currency and focus on reducing money laundering associated crimes. While security concerns are a factor, many commented that the purpose of the digital yuan is to enhance payment options for individuals and strengthen the payment ecosystem both within China and abroad. Currently, Alipay and Wechat Pay make up most payments in China, which hinders the growth of other payment providers. Additionally, many respondents commented that the digital yuan strengthens the ability of individuals to have easy access to banking services and reduce the necessity and risks associated with cash payments.

When inquiring about the challenges that the digital renminbi faces, many respondents mentioned that general acceptance of the digital renminbi is a challenge, with individuals having sometimes concerns that they may lose access to their funds. This is primarily because of potential technical issues as well as the lack of having the physical cash in hand. Additionally, several respondents outlined that the technological ecosystem still has to be developed in order to support the digital yuan both within China and abroad. While the expectation by the respondents is that within the China the technological integration and acceptance will be rather rapid, fostered by the government, being able to pay for cross-border trade and services will still encounter significant technological challenges.

The question about whether the digital renminbi is compatible with Islamic law, most of the respondents commented that it will be given that the existing Chinese yuan is a valid, state-backed currency. Some respondents viewed the digital nature as a challenge, but for most of them the fact that it is a legal tender in the country will not cause any challenges to its acceptance under Islamic law.

When asking between cryptocurrencies and the digital renminbi, most respondents assumed that the difference is marginal with the only aspect being that the digital yuan is owned by the People's Bank of China while cryptocurrencies are decentralized. Only three to four respondents outlined that the underlying technology behind the digital yuan is different from other decentralized cryptocurrencies such as bitcoin. Specifically, the respondents mentioned that the digital yuan utilizes a centralized technological framework that is not utilizing blockchain.

When questioning about the base technology, only a few respondents knew the base technology that underlies it. While several guessed that it utilizes blockchain technology, most respondents were not aware of the technology behind it. Only a few outlined that the technology is based on a centralized database approach, which requires an internet connection to conduct the transactions.

When asked about the impact of the digital yuan on Islamic financial products, most of the respondents claimed that individual would have easier access to financing options and perform the transaction automatically via the application without engagement with a bank. As explained by some respondents, the digital yuan also

reduces the threshold of financial service providers that do not necessarily need API connections to banks to provide the Islamic financial services. This reduces cost of provisioning of Islamic financial services and makes it more attractive to individuals. Given the greater control and traceability of transactions, this further reduces Shariah compliance concerns in terms of how funds are utilized.

When interviewed about the most likely countries for the adoption of the digital renminbi outside China, several interviewees said those countries along the Belt and Road initiative, such as Pakistan, Laos, Kazakhstan, Cambodia, Kenya and Middle Eastern countries will be the first to adopt the digital renminbi. Recent developments that oil is priced in renminbi for trade, and the growing investment into these countries by Chinese companies were given as the main reasons for such a development.

When it came to security challenges, most respondents focused on the potential compromise of the application may enable others to transfer the funds outside their wallet. Additionally, fake payment codes which lead to a transfer of funds to an illicit wallet may be another factor to be considered as mentioned by the respondents. This has been an issue with the existing Wechat and Alipay payments, and has led to significant fraud, where fraudsters replaced the QR codes to their wallets. Given that the transfers require internet access, outages related to internet drop-off as well as people utilizing insecure connections may lead to additional security compromises.

With respect to the impact of the digital yuan on Shariah non-compliant funds, most of the respondents explained that the traceability of the transactions will be a major safeguard against illicit utilization of funds. This implies that the central bank can trace transactions for each of the digital yuan, and with sufficient sharing of the data with the Islamic financial providers, this will enable tracing and taking adequate actions.

When inquired about which new financial instruments may be enabled by the digital yuan, various degrees of different views were outlined. The most common view was that it will ease the provisioning of Islamic microfinance options. Given the current challenges of costs associated with Islamic financial products, the digital yuan can lower transaction and finance costs due to its digital nature. Another tool is the development of customer-to-customer Islamic finance options, where individuals provide direct loans to others.

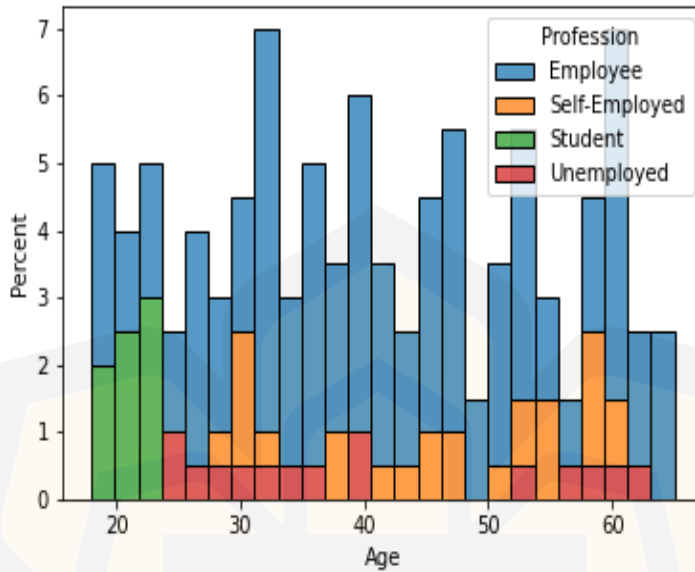
The final two interview questions focused on trade and the majority of respondent said that the digital yuan will significantly support trade and the belt-and-road initiative. Specifically, many respondents believed that the digital yuan would provide opportunities for lowering the investments for belt and road initiatives and provide greater opportunities for local cross-border initiatives. For example, it will enable the setup of local transportation services across the border between Myanmar and China, which can assist in increasing local trade. Additionally, the respondents explained that the digital yuan would enhance payment procedures for cross-border trade, and this will reduce the transaction costs. Hence, cross-border trade will become significantly more attractive.

Summarizing, the interview results provided some crucial insight into the individual views of the digital yuan, as well as its impact on Islamic finance. Based on the interviews, the first coding of the data and initial conceptualization of the grounded theory was established and related to the research hypotheses. While there were differences in the responses, the common view is that the digital yuan has a positive impact on Islamic finance services in China and may foster trading relationships. Hence, the interviews enable to form a first theory that the digital nature of the digital yuan spurs growth in the Islamic finance sector both within China and abroad.

5.2 Survey results

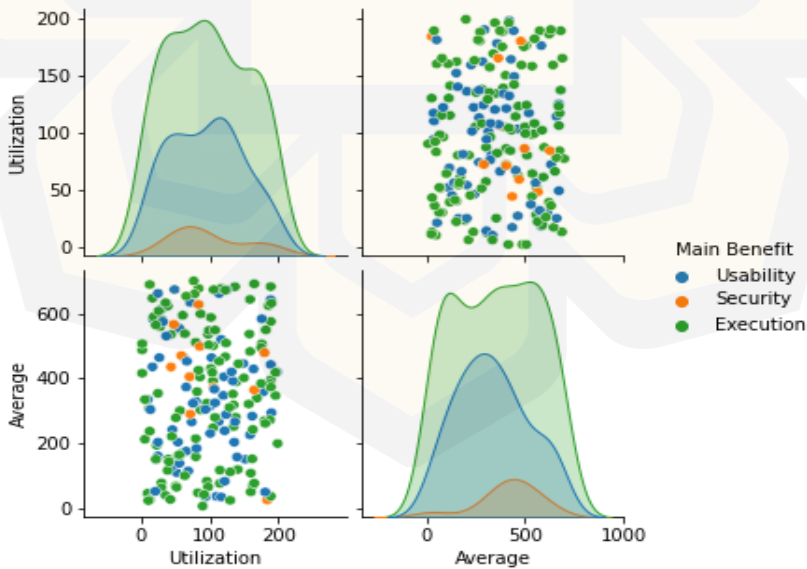
The interview questions were supplemented by a quantitative survey with more than 200 participants. The participants were located both in China, and abroad, with more than 50 % of the respondents being located within China. The individual questions are outlined in (Figure 1 – 7) but focussed on both the background of the participants as well as views towards and experience with the digital yuan and Islamic finance products. Figure 1 shows the distribution of the age of the survey participants and the profession in which they engage. Generally, the age distribution is quite diverse to cover as much the overall population tendencies as possible. As expected, most of the participants are employed, with a few individuals being unemployed or self-employed. For younger participants, almost half of the respondents were students, which is expected.

Figure 1: Histogram of age and profession of the survey participants.



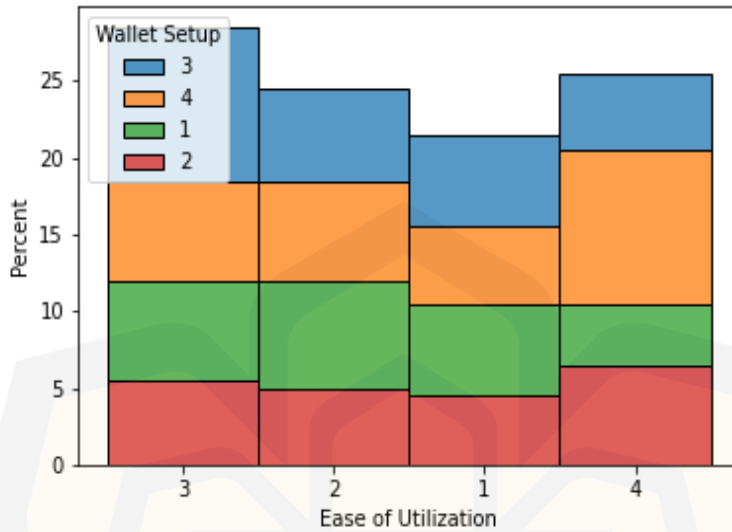
The next questions revolved around Figure 2 showing the utilization and average amounts spent with respect to the digital yuan. The data are categorized based on the main benefit of the digital yuan mentioned. Generally, most participants conducted several transactions being mostly between 100 to 200 and spent an average of more than 60 to 70 yuan in a single transaction. This implies that the digital yuan has been particularly attractive for small amount transactions, such as online shopping, as well as in convenience stores and restaurants.

Figure 2: Spending and utilization overview separated by the main benefits.



The questions related to the ease of utilization of the digital yuan, and the setup of the digital yuan wallet indicate that the majority of the survey participants feel that the digital yuan is relatively easy to use, and also that the wallet setup is fairly acceptable to be completed. As expected, participants stating that the utilization of the digital yuan is rather convenient and easy also imply that the digital wallet is convenient to set up.

Figure 3: Histogram of the ease of utilization categorized by the ease to set up the digital yuan wallet



A critical part of the survey was to determine the general trends related to the main benefits and associated challenges. Figure 4 displays that most individuals see the execution speed as well as usability within a variety of circumstances the greatest benefits of the digital yuan. Specifically, most of the respondents perceive the execution speed as the greatest benefit. Given that the payment is done immediately, and the transaction is automatically verified within a matter of milliseconds, this makes the transaction favourable as compared to other options such as credit and debit cards. While execution and usability are most preferred, most respondents felt that acceptance and potential fraud risk are the major impediments for the digital yuan. Acceptance both within China and abroad is a major challenge. Additionally, fraud risk, such as false payment QR codes, may represent another risk.

Figure 4: Histogram of the main benefits categorized by challenges

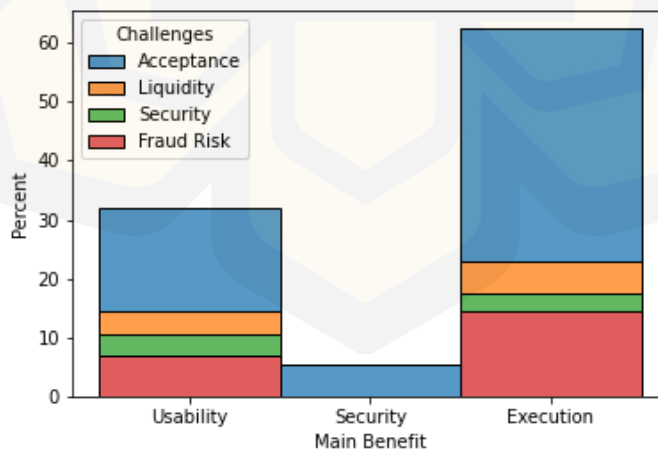


Figure 5 exhibits a comparison of the attractiveness of the digital yuan for Islamic project financing and takaful. The general trend is that most of the survey participants consider the digital yuan as supportive in project financing, and providing funds, in addition to helping with the provisioning of Islamic insurance options.

Figure 5: Histogram comparison of the scores for Islamic Project financing, and the takaful insurance opportunities

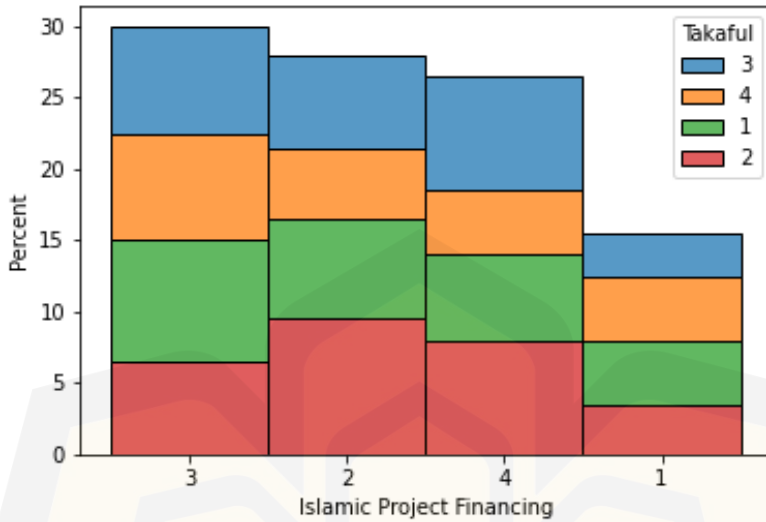
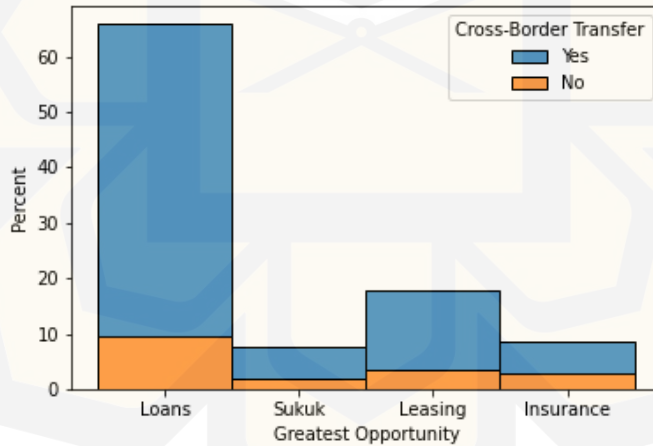


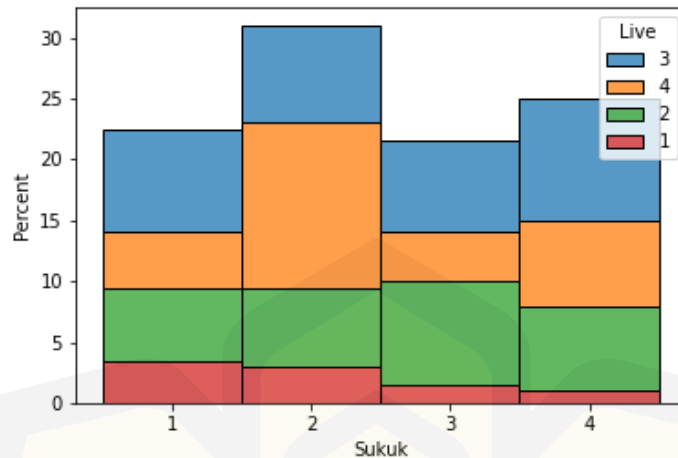
Figure 6 shows that most of the respondents think that the digital yuan will have a major impact on the provisioning of loan as compared to sukuk, leasing and Islamic insurance options. While most respondents view that the digital yuan will ease cross-border transfers, there are still a significant number of respondents with the opinion that there will be frictions.

Figure 6: Histogram comparison for the greatest opportunities and cross-border transfer usage



Finally, Figure 7 displays the impact on sukuk provisioning utilizing the digital yuan, and the impact the digital yuan will have on daily life. Most survey participants have a positive view towards the impact of the digital yuan on their daily life, and that it will improve transactions.

Figure 7: Histogram comparison of the impact on sukuk and the live of individuals



The analysis of the interview and survey results, in addition to economic data related to the impact of digital currencies on Islamic finance has given rise to a new theory on the digital mutual stimulation between digital currencies and Islamic finance. The new theory revolves around the research findings that both digital currencies and Islamic finance are stimulating each other and support their growth due to their intertwined characteristics. The survey and research results demonstrated that there is generally a positive trend between the growth of Islamic finance, and the digital currencies.

The main components of the theory indicate that the digital currencies and lowering of transaction costs stimulate the development of new Islamic financial products and reduces overall transaction costs for Islamic financial services, which makes these products more attractive and accessible to a large number of consumers. This significantly strengthens the economic financial system and encourages greater utilization of currencies. Likewise, the greater presence of Islamic financial services and the interest-free nature of digital currencies, will make digital currencies a trustworthy means of exchange, where individuals desiring an Islamic compliant currency and certainty that it can be traced how the money is utilized and invested.

The key factors for theory of digital mutual stimulation are the transaction costs, availability of sufficient Islamic financial products and the ease of transaction utilizing the existing digital infrastructure, such as wallets. Furthermore, the theory on digital mutual stimulation also states that the trust of the immediate transfer between parties supports international trade as there is no need to have an intermediary or trustee and the transaction can be performed in the form of smart contracts. This implies that as soon as the contract is fulfilled, the funds will be automatically released to the supplying party. Strengthened trust that the contracts are honoured will be very supportive of Islamic financial options given the importance of trust and honesty within the Islamic finance ecosystem.

6. Conclusion and Recommendation

As outlined in this article, the critical success factors for the utilization of Islamic finance for the Fintech environment in China vary. However, the most important factor is the political support and the willingness of the government to establish an effective framework for the Islamic compliant products and services for Fintech operators. This also implies that a strong focus on the establishment of sound regulations for China's financial market is critical for the success of Islamic finance. Islamic finance has significant opportunities in supporting the objectives of the government in terms of society, environment, and engagement with the Muslim world.

China is currently undergoing a rapid transitioning from a primarily infrastructure and export driven economy to one supported more strongly by domestic consumption. Given the significant indebtedness of the Chinese economy, Islamic finance may better align the real economy to the financial markets, reducing the potential opportunities for a detachment of the market values from the real values. Such a disconnect has been experienced in China in the real estate sector where excessive investment into the real estate market has led to significant speculation. Similar situations occurred in the Chinese stock market, where several companies were valued significantly above their real value becoming primarily a tool for speculation and gambling. Islamic Finance may play a critical role for assisting Macao in reducing its dependence on gambling revenues and

establish themselves as a hub for Islamic finance for small and medium sized enterprises.

Islamic finance for the financial technology industry may provide solutions to overcome some of the existing challenges caused by excessive leverage of companies in the financial market. Given its focus on real assets and the backing of it, Islamic finance may be well-suited for real-estate financing and micro and small loans for individuals and enterprises. The financial technology sector may specifically be well suited as it will allow to streamline the linking of Islamic financial services with real assets and the real-time access to the value of the underlying asset. As outlined, this will create a significant opportunity for financial services to become more digitalized and provide robust and sustainable financing solutions. Given the rapid rise of the e-CNY, the integration of Islamic financial services, such as Shariah compliant loans for domestic purchases or providing instantaneous options to invest into Shariah compliant forms of savings utilizing mobile payment technologies.

The Belt and Road initiative is particularly an accelerator for this trend, given the growing engagement of China with many Muslim countries and reduction in its reliance on nations such as the United States. This will become a boon for businesses that seek Shariah compliant financing forms when investing in China, as well as Chinese businesses seeking Shariah compliant financing options for performing business within these countries. Additionally, there will be the growing need to enhance financial services to stimulate economic growth and increase consumption.

The conceptualized theory digital mutual stimulation outlines the growing relationship between the strengthening of Islamic finance and the utilization of the digital yuan. Specifically, the theory provides an outline that the ease in the conduct of transactions, as well as reduction in transaction cost and greater democratization will significantly strengthen the provisioning of Islamic financial products. The digital nature of the digital yuan acts as a stimulus for smart contract execution and reduces the need for an intermediary as well as increases trusts between the contracting parties. This becomes especially important for international trade and transfers, as well as for asset purchases. Given the connection in Islamic finance between financing and real assets, the digital Yuan can play an important role in strengthening this interconnection and support Islamic finance in China and beyond.

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