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Theories supporting central bank digital currency development and its usefulness

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Abstract

This paper presents some theories that support central bank digital currency development and its usefulness. The theories provide useful explanations for the development and use of central bank digital currency in the economy. Some theories show that information about central bank digital currency, as well as the perceived usefulness and ease of use of central bank digital currency, are crucial for its success. Other theories show that central bank digital currency can facilitate the flow of funds to economic agents, and enhance the functioning of the economic system, thereby contributing to economic growth. These theories are useful to economists, policymakers and researchers who are interested in how central bank digital currency affects economic activities.

Keywords: CBDC, central bank digital currency, theories.

JEL Codes: E21, E31, G28, E58.

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1. INTRODUCTION

Academic research into central bank digital currency (CBDC) is growing. But existing studies have not used theories to explain central bank digital currency development or its usefulness. Existing academic research into central bank digital currency have not identified the relevant theories that support CBDC development or its usefulness. The reason for this is not far-fetched.

Some might think that '*we don't need a theory to explain* central bank digital currency *development or its usefulness*'. Others might think that '*building a theory to explain* central bank digital currency *development or usefulness is a waste of time*' or that '*a theory that explains the role of* central bank digital currency *in economic processes will not be relevant to practitioners and policymakers*'. Such opinions or conclusions might be wrong because theories play an important role in establishing a set of principles to help us understand how central bank digital currency fits into existing economic processes and economic relationships.

Theories can help us understand who will benefit from central bank digital currency development and its use. Theories can also help us understand how economic agents might be affected by central bank digital currency development and use. Therefore, it is important to identify existing theories that can explain or support central bank digital currency development and use. Neglecting the role of theory in CBDC debates might create a disconnect between 'practical' economic policymaking and the monetary economics academic literature. Therefore, it is important to understand how existing theories support central bank digital currency development and its usefulness. Such understanding can help to create a synergy between central bank digital currency policymaking and the economic literature.

In this study, I present some theories that support central bank digital currency development or its usefulness. This study contributes to the CBDC literature by articulating how existing theories support central bank digital currency development and its usefulness in the economic system. Policymakers and academic economists can use these theories to provide believable explanations for central bank digital currency objectives and outcomes in the economy.

The remainder of the paper is organized as follows. Section 2 discusses the theories that support central bank digital currency development and its usefulness. Section 3 discuss the possibility of developing a central bank digital currency theory. Section 4 presents the future insights and future research direction. Section 5 presents the conclusion of the study.

2. THE THEORIES

There are eight theories that support the development and use of a central bank digital currency. The theories are the Schumpeter finance and development theory, the innovation-growth model, the innovation diffusion theory, the technology acceptance model, the endogenous growth model, the theory of finance and growth, the dependency theory of development and the concerns-based innovation adoption theory. The theories are explained below.

2.1. The Schumpeter finance and development theory

The Schumpeter finance and development theory was developed by Joseph Schumpeter in 1911. The theory establishes a link between finance and development. Schumpeter (1911) states that the presence of uncertainty in an economy gives innovators an incentive to develop financial innovations and technological innovations that influence the level of economic development. The theory also states that the services provided by financial intermediaries – mobilizing savings, evaluating projects, managing risk, monitoring managers, and facilitating transactions – are essential for technological innovation and economic development (King and Levine, 1993). The implication of the theory for central bank digital currency is that the use of central bank digital currency would stimulate financial sector agents to deploy technological innovations and innovative financial services that are interoperable with the central bank digital currency in order to support financial intermediaries in their savings mobilization, project evaluation and risk management activities for greater economic development.

2.2. The innovation-growth model

The innovation-growth model was developed by Paul Romer in 1994. The theory states that economic forces influence the willingness of firms (including researchers and entrepreneurs) to produce new ideas and innovation (Romer, 1994). With the right economic conditions in place, firms, researchers and entrepreneurs will develop innovations that support economic activities and increase economic output (Rivera-Batiz and Romer, 1994). In other words, Romer (1994) states that innovation is the result of efforts by researchers and entrepreneurs who respond to economic incentives, and their innovative ideas lead to technological changes that contribute positively to economic growth in society. The implication of this theory is that innovation is significantly linked to economic growth.

This theory supports central bank digital currency development because the need to sustain a desired level of economic growth could provide incentives for innovators to develop new digital innovations, such as the central bank digital currency, that help to achieve a desired level of economic growth. The theory therefore supports central bank digital currency development because a central bank digital currency is a potential central bank innovation that could contribute to economic growth by facilitating the efficient flow of funds to consumption, production, investment and trade activities that contribute to economic growth.

2.3. Innovation diffusion theory

The innovation diffusion theory was developed by Roger (2003). The theory describes the pattern and speed at which information about new innovations spread through a population (Roger, 2003; Wani and Ali, 2015). The theory explores the factors that influence an individual's interest in a new technology or innovation (Md Nor et al, 2010). The innovation diffusion theory identifies five factors that influence the adoption of any innovation. They are relative advantage, complexity, compatibility, trial-ability and observability (Md Nor et al, 2010). The theory further argues that information about new innovations are diffused or communicated through certain channels to members of a population (Roger, 2003), and the channel through which information about a new innovation is communicated can greatly influence people's interest in the innovation. And their response to information about the new innovation would give rise to early adopters, early majority adopters, late majority adopters and laggards (Roger, 2003).

The implication of the innovation diffusion theory for central bank digital currency development and its usefulness is that the communication channel through which people learn about the central bank digital currency plays an important role in influencing people's interest in central bank digital currency innovation. This means the central bank should carefully choose the channel of communication that is most appropriate to communicate information about the central bank digital currency.

2.4. Technology acceptance model

The technology acceptance model was developed by Davis (1989). This theory has emerged as a useful theory to explain why people accept a technology or innovation, and why other people reject another technology or innovation.

The technology acceptance model states that only two factors influence an individual's willingness to accept a technology or innovation (Davis, 1989). The factors are: perceive ease of use and perceived

usefulness of the technology or innovation (Davis, 1989; Lee et al, 2003). The theory argues that an individual who perceived a technology or innovation as too difficult to use or as a waste of time is unlikely to adopt the technology or innovation (Davis, 1989), while individuals who perceives the technology or innovation as easy to use, easy to learn, time-saving and valuable, will be more likely to accept and use the technology or innovation (Marangunić and Granić, 2015).

The implication of the technology acceptance model for the usefulness of central bank digital currency is that the perceived ease of use and the perceived usefulness of the central bank digital currency by citizens are significant determinants of whether the central bank digital currency will be accepted or rejected by the members of the population. Therefore, it is important for the central bank to embark on effective marketing or an information dissemination campaign to ensure that there is a positive perception about the ease of use and the usefulness of the central bank digital currency among members of the population.

2.5. Endogenous growth model

The endogenous growth model states that economic growth is primarily the result of internal forces, not external forces (Aghion et al, 1998). This means that increases in economic output is caused by factors within the economic system such as new and better innovation, increase in knowledge, greater research and development (R&D) expenditure, higher investment in human capital by government and private firms, and better government policies that encourage entrepreneurship (Shaw, 1992; Howitt, 2010). All these internal factors work together to increase productivity and increase economic output towards economic growth (Palley, 1996).

The implication of the endogenous growth model for central bank digital currency is that the central bank digital currency may be viewed as an innovation that arises from within the economic system, thereby making it an endogenous determinant of economic growth. The central bank digital currency, as an endogenous determinant of growth, can also be viewed as a new and better innovation that increase productivity and increase economic output towards economic growth. The central bank digital currency, together with enabling government policies and significant research and development (R&D) spending, can further improve the contribution of the central bank digital currency to economic growth.

2.6. Theory of finance and growth

The theory of finance and growth explains the role of the financial sector (and the payment system) in stimulating economic growth. The theory states that developing the financial sector to enable it ease financing conditions, and offer credit to deficit units, is the key to unlocking growth in an economy (Trew, 2006). Levine (2005) states that financial instruments, financial markets and financial institutions may arise to mitigate the effects of information and transaction costs (Levine, 2005). In doing so, financial arrangements will change the incentives and constraints facing economic agents (Levine, 2005). The change in incentives and constraints facing economic agents will influence saving rates, interest rates, investment decisions, technological innovation, and this will ultimately affect long-run growth rates (Levine, 2005).

The implication of the theory of finance and growth for central bank digital currency is that the central bank digital currency can be used to ease financing conditions by enhancing payments efficiency, and mitigating high transaction costs in the financial sector. As a result, the central bank digital currency can enhance credit allocation towards greater economic growth.

2.7. The dependency theory of development

The dependency theory of development emerged in the 1950s. The theory states that the development of society can be achieved through interdependencies among the various segments of society which includes interdependencies among the economic, social and political segments of society (Dos Santos, 1971; Marsh, 2014). The theory also states that, in order to create conditions of development within a country, it is necessary to (i) control the monetary exchange rate; (ii) place more governmental emphasis on fiscal policy; (iii) increase the role of government in national development; (vi) create a platform for investments; (v) increase the wages and salaries of workers to increase aggregate demand; (vi) provide adequate social services from the government to impoverished sectors in order to create conditions for those sectors to become more competitive; vii) and provide adequate coverage of social welfare from the government to impoverished people to improve their welfare (Dos Santos, 1971).

The implication of the theory for central bank digital currency development and use is that the central bank digital currency can be developed/designed and used to create efficient dependencies in society. For example, the central bank digital currency could be used to control the inflation rate. It can also be used to facilitate fiscal allocation by the fiscal authorities. It can also be used as a platform to enhance payments and the flow of funds to production and investment activities in the country. It can also be used to provide adequate economic stimulus to distressed businesses during economic downturns. It can also be used to

provide adequate coverage of social welfare from the government to impoverished people to improve their welfare (Arat, 1988; Brown and Long, 2018; Gilman, 2018).

2.8. The concerns-based innovation adoption model

The concerns-based innovation adoption model was developed by Hall in 1975. The theory looks at innovation adoption from the perspective of those impacted by the adoption of the innovation and also from the perspective of those charged with implementing the subsequent change (Hall, 1975). The theory proposes that by addressing the concerns of adopters during the adoption process, the challenges they experience during the change process will be reduced if not eliminated.

The concerns-based innovation adoption model states that when people learn about a new innovation for the first time, the first set of questions they ask are self-oriented questions: What is it? and How will it affect me? When these questions are resolved, the next questions that emerge are task-oriented questions: How do I do it? How can I use this innovation efficiently? and Why is it taking so much time? Finally, when the self-oriented and task-oriented concerns are largely resolved, the implementers will ask questions that are impact-oriented: Is this change working for people? and Is there something that will work even better? (Hall and Hord, 1987).

There are six assumptions of the concerns-based innovation adoption model, namely, (i) change is a process, not an event; (ii) change is accomplished by individuals; (iii) change is a highly personal experience; (iv) change involves developmental growth; (v) change is best understood in operational terms, and (vi) the focus during implementation should be on individuals, innovation, and context (Straub, 2009). Based on these assumptions, there should be greater focus on the: stages of concern, innovation configuration mapping, and the levels of use, when implementing an innovation.

The implication of the concerns-based innovation adoption model for central bank digital currency is that a successful implementation of central bank digital currency will involve much more than providing staff with materials, resources, and training. It will also involve the human element — the people who are actually doing the work because each person involved in the central bank digital currency implementation process may respond to central bank digital currency adoption strategy with unique attitudes and beliefs.

3. DEVELOPING A CENTRAL BANK DIGITAL CURRENCY THEORY

Scholars can use case studies on central bank digital currency to develop a central bank digital currency theory. Building a central bank digital currency theory from case studies is a research strategy that involves using one or more cases to create theoretical constructs and propositions from case-based or empirical evidence. Case studies are often descriptions of particular instances of a phenomenon that are based on a variety of data sources (Yin, 1984). Cases can be historical or recent accounts of central bank digital currency success in countries. Each case study on central bank digital currency can serve as a distinct experiment that stands on its own as an analytic unit, while multiple case studies will serve as discrete experiments that serve as replications, contrasts, and extensions to the existing or emerging theories. Building theories from central bank digital currency case studies is likely to become a popular and more relevant research strategy for future studies on the central bank digital currency. Although case studies have some problems such as the small sample size associated with case studies and the one-sided interviews that increase informant bias, these issues can be mitigated by careful choice of sample and sample size, and by conducting fair interviews that limit informants bias.

4. FUTURE INSIGHTS AND FUTURE RESEARCH DIRECTION

CBDC theories can explain current and future trends in addiction to internet-based technologies. CBDC theories can explain why people accept digital technology which when over-used could lead to digital addiction. The growing addiction in using internet-based technologies in the modern age makes it more likely that society will embrace CBDCs sooner or later. When CBDCs replace physical money, its positive features can improve our lives in almost every area. While digital addiction has some positives, it also has its downsides which should be considered. Some of the downsides include the unhealthy dependence on digital technologies and the alienation and exclusion of members of society who do not want to embrace digital technology or digital innovation. The implication is that people who do not want to use CBDC may be excluded from the financial system or may not be able to access CBDC-based financial products and services. CBDC theories could also be used to explain why some people may refuse to accept digital technology.

Future research studies can examine whether CBDC adoption can lead to digital addiction and the possible remedies. Future research studies can also examine the additional theories that could explain CBDC adoption and its usefulness.

5. CONCLUSION

This paper presented some theories that support central bank digital currency development and its usefulness. The identified theories can be used in central bank digital currency research and policy debates. The purpose of this article has been to show that the central bank digital currency can be studied from a theoretical perspective. The theories presented in this paper may serve as a guide for what needs to be done to make the central bank digital currency become a potent tool to spur growth in an economy. Using these theories to explain the central bank digital currency will ensure that researchers are using the right theoretical constructs to explain the role of central bank digital currency in the economy.

A possible direction for future research is to develop a glossary of CBDC success stories across countries, and identify which theories have the highest explanatory power in explaining the success of CBDCs in these countries. Of course, many additional theories that explain CBDC development and its usefulness can be developed, and there is no limit to the number of theories or ideas that can be explored.

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KEY TERMS AND DEFINITIONS

- **Central Bank Digital Currencies**: a digital equivalent of physical cash that is issued by the central bank.

- **Theory**: a supposition or a system of ideas intended to explain something, especially one based on general principles independent of the thing to be explained.

- **Model**: a representation of a system, or, of reality.