

CERT WP/01/2018

CERT Working Paper

How can Digital Currency and Distributed Ledger Technology Alter the Payments Landscape in the Caribbean?

Preface

From a Caribbean Central Bank perspective, digital currencies and distributed ledger technology (DLT) could potentially disrupt the region's financial architecture and landscape. But they also offer potential for solving critical problems such as high remittance costs, low levels of financial inclusions, and inefficient settlement and payments systems. This paper was commissioned by the Central Bank Governors to assess the potential impact of digital currencies and DLT on the financial systems in the region and to develop a plan of action to address the issues. This paper was prepared through the collaborative efforts of the Caribbean Economic Research Team (CERT) for the CARICOM Central Bank Governors.

CERT WORKING PAPER

Number 1, 2018

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List of Abbreviations

ACH	Automated Clearing House
AML/CFT	Anti-Money Laundering and Counter - Terrorism Financing
BIS	Bank for International Settlements
CBDC	Central Bank Digital Currency
CPMI	Committee on Payments and Market Infrastructures
DLT	Distributed Ledger Technology
FAFT	Financial Action Task Force
FCA	Financial Conduct Authority
FinTech	Financial Technology
ICOs	Initial Coin Offerings
IOSCO	International Organization of Securities Commissions
KWh	KiloWatt hour
KYC	Know Your Customer
OECD	The Organization for Economic Co-operation and Development
RTGS	Real-Time Gross Settlement Service
VCs	Virtual Currencies

Abstract

The rise of digital currencies and distributed ledger technologies offers both risks and opportunities for Caribbean Central Banks. Through the use of a survey, it was revealed that regional central banks frameworks are not equipped to regulate the emerging entities, though the Central Banks are closely looking at the issue. Many have issued warnings about the potential risks that emanate from unregulated cryptocurrencies and some are also investigating the possibility of issuing their own digital currencies. The payment sector is the one being significantly affected by the developments, though there is interest in a wide range of activities related to virtual currencies. An examination of the various facets of payments system suggests that there is opportunity to reduce the use of cash in the region. This can possibly be done through the introduction of a central bank digital currency and improvements in the payments infrastructure which can affect intra-regional payments, remittances, and internal domestic payments.

JEL Classification: E42, E58, F65

Keywords: Cash, Caribbean, Central Bank Digital Currency, Payments Systems

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1. Introduction

The work of Satoshi Nakamoto (2008) described how a “*peer-to-peer version of electronic cash would allow online payments to be sent directly from one party to another without going through a financial institution*”. This system would facilitate non-reversible payments, with cryptographic proof instead of trusted third party. Based on this work in January 2009 the first decentralized cryptocurrency, Bitcoin, was launched; subsequently, hundreds of other cryptocurrencies have been developed. The emergence of cryptocurrency, more popularly referred to as virtual currency, while viewed by some as an interesting experiment, has gained the attention of the international organizations and regulators of the financial system¹. This development was facilitated by the use of distributed ledger technology (DLT) which allows for a decentralized system which utilizes multiple copies of a central ledger kept by individual entities.

Virtual currencies (VCs) and DLT are transforming the manner in which financial services are being offered. These financial technology (FinTech) developments are occurring at a rapid pace internationally and have also spilled over to the Caribbean countries. FinTech has been described by the Financial Stability Board (2017) as “*technology-enabled innovation in financial services that could result in new business models, applications, processes or products with an associated material effect on the provision of financial services.*”

Companies in the Caribbean have also shown interest in virtual currencies and DLT. Central banks in the region are grappling with how to treat these entities, and are also seeking to assess the potential implications for central bank operations. This paper provides regional Central Bank Governors with information on developments in this sector in the Caribbean as well as suggests potential actions that the Governors may wish to adopt. This paper summarizes information on recent developments in the FinTech sector in the Caribbean, and the specific actions of the regional Central Banks as it relates to the virtual currency developments. After the review the paper highlights a few areas where the new technology could be useful in the Caribbean, namely in the facilitation of payment systems hosted by the central banks, and for the transmission of remittances in the case of commercial banks. In addition, DLT can be used in the issuance of a central bank issued digital currency which can aid in the movement to a cashless or “less-cash” system, and potentially facilitate intra-regional payments for trade. The paper ends by providing some recommendations for moving forward in this arena. To start, the next section highlights some of the more recent international developments in virtual currency.

¹ International organisations such as the IMF, World Bank, Organisation for Economic Cooperation and Development, Bank of International Settlements and the Commonwealth Secretariat have established departments and working groups to further examine, expand and promote the discussion on FinTech with special interest in the DLT and cryptocurrencies.

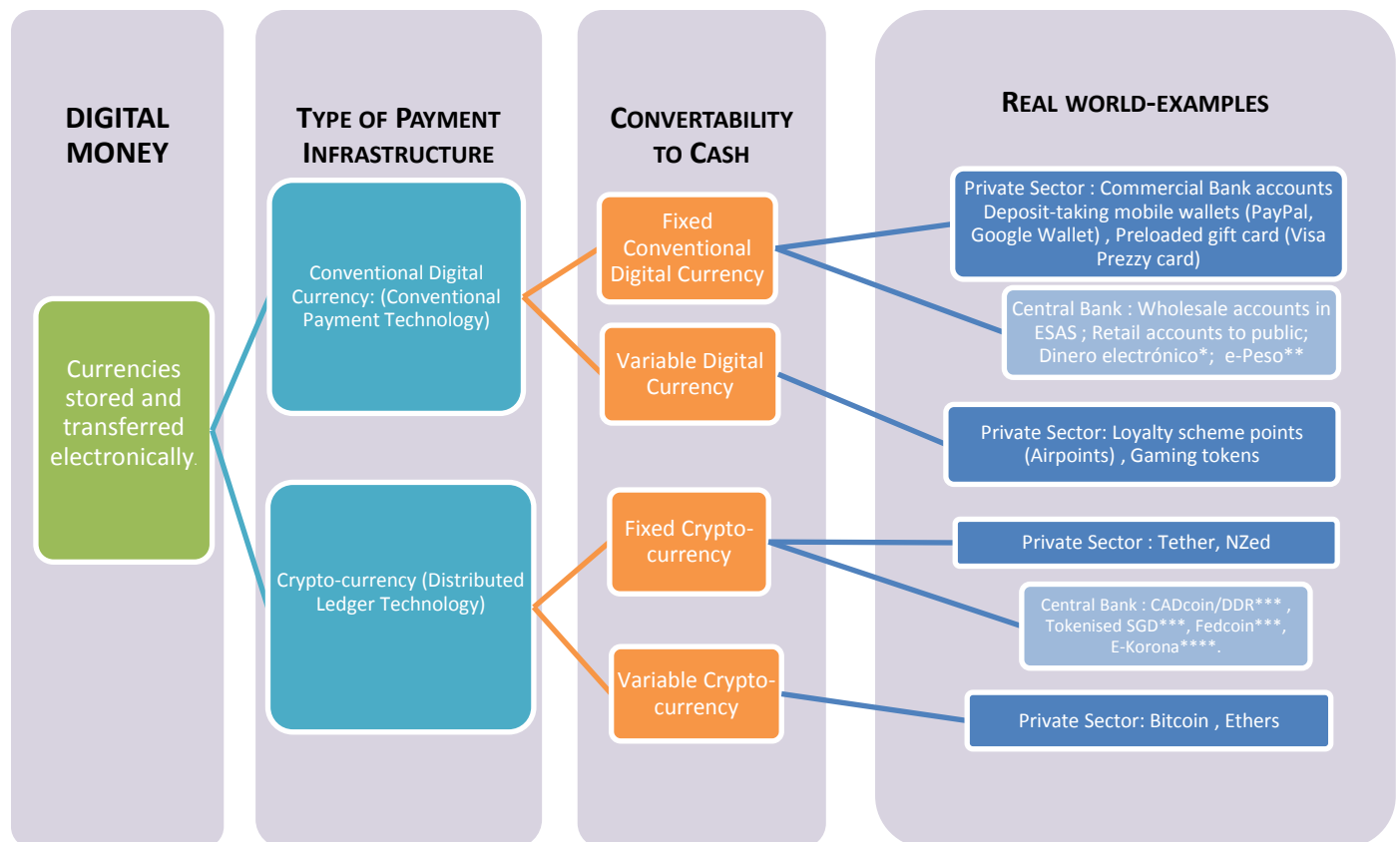
2. International Arena

2. a. Virtual Currencies

2. a. (1) Developments in Virtual Currencies

The literature distinguishes between virtual currency, which is crypto-currency issued by private individuals and firms, and central bank digital currency. While the technology behind both is the DLT, the main distinguishing feature is the legal tender status of the latter. The Financial Action Task Force² (FAFT) which in 2014 defined virtual currencies as “a digital representation of value that can be digitally traded and functions as (1) a medium of exchange; and/or (2) a unit of account; and/or (3) a store of value, but does not have legal tender status (i.e., when tendered to a creditor, is a valid and legal offer of payment) in any jurisdiction.”

Figure 1: Typology of Digital Currencies



Notes: *Discontinued; **e-Peso is a pilot project by the Central Bank of Uruguay; *** Currencies that are still either conceptual or experimental; **** reports suggest that Sveriges Riksbank has chosen the IOTA Protocol (DLT).

Source: Adapted from Wadsworth (2018).

² In 2018 FATF began using the term virtual assets.

One of the early debates about virtual currencies has been whether they should be classified as currencies or assets. In assessing how virtual currencies can be treated researchers and country authorities often look to the traditional functions of money: a store of value; a unit of account and a medium of exchange. The volatility of the bitcoins over the 2017/18 period (rising from around US\$1,000 at the start of 2017 to almost US\$20,000 in mid-December, before tumbling below US\$7,000 in February 2018); and remaining volatile since, illustrates the difficulty in using digital currency as a store of value. In respect of its use as a unit of account, goods and services are not typically priced in virtual currencies, making it difficult for persons to pay this way. In addition, the fees associated with making virtual currency transactions are not always clear, and can be high.

More recently with bitcoins and associated cryptocurrencies being used more as a form of wealth generation rather than as a payments system, the conversation has changed in 2018 from cryptocurrency to crypto-asset. In its 2015 report the Committee on Payments and Market Infrastructures (CPMI) noted that though they have zero intrinsic value, virtual currencies can be considered as assets since their values are determined by supply and demand. Since then, particularly with the advent of initial coin offerings (ICOs), several countries, for example Brazil³ and the USA⁴, have treated virtual currencies as assets which can be subject to capital gains tax.

The treatment of virtual currencies by financial sector regulators worldwide has both varied and evolved over time⁵. In the initial stages several countries regulated digital currency exchanges using legislation covering money remitter/money transfer services; as the situation evolved some countries developed specific legislation to address the growing phenomena mainly geared towards the monitoring of exchanges. At the other end of the spectrum several countries have banned the use of / investment in / participation in cryptocurrencies, and the establishment of exchanges. Examples of these include Nepal, Pakistan and Bolivia. Other countries, for example India, have restricted regulated financial institutions transactions with virtual currencies.

³ The Federal Revenue Service, known as Receita Federal, decided that Bitcoins must be declared as “others goods” when the value is higher than BRL 1,000. When more than BRL 35,000 is earned by the profit of selling, the amount must be subject to taxation as Income Tax. Pomela (2015).

⁴ On March 25, 2014 the Internal Revenue Service gave notice that virtual currency is treated as property for U.S. federal tax purposes.

⁵ In October 2018 the IMF and World Bank launched the Bali Fintech Agenda <https://www.imf.org/en/Publications/Policy-Papers/Issues/2018/10/11/pp101118-bali-fintech-agenda>

Box 1: Examples of Virtual Currency Regulation

Malaysia: The Bank Negara Malaysia issued a policy document (the Anti-Money Laundering and Counter Financing of Terrorism Policy for Digital Currencies (Sector 6)) on February 27th 2018 requiring that any exchange offering crypto-to-fiat, fiat-to-crypto and crypto-to-crypto trading must identify the customer and verify that customer's identity in both cases of new and existing accounts.

European Union (EU): In late 2017 an agreement was reached between the European Parliament and the Council of the EU to amend the 4th Anti-Money Laundry Directive (4AMLD) in order to cover digital currency. In particular the amendments (which as likely to come into force at the end of 2019) will bring custodian wallet providers ("CWPs") and virtual currency exchange platforms ("VCEPs") within the scope of the 4AMLD as obliged entities. These entities have to enact policies and procedures to detect, prevent and report money laundering and terrorist financing.

Australia: In December 2017 Australia passed its the Anti-Money Laundering and Counter-Terrorism Financing Amendment Act 2017 (Amendment Act) which expands the legislation to include the regulation of digital currency exchange providers. A digital currency exchange registry was created and exchanges are now required to register and fulfill compliance obligations.

Japan: Japan approved its Virtual Currency Act in March 2017 to subject digital currency exchanges to several added regulatory requirements. The new law defines Bitcoin and other virtual currency as a form of payment method. In September 2017, Japan's Financial Services Agency officially recognized 11 companies as registered cryptocurrency exchange operators.

India: In 2018, the Reserve Bank of India barred regulated entities from dealing with or providing services to any individual or business dealing in digital currencies. The Central Bank has given three months to regulated entities like banks to unwind their positions with the entities related to cryptocurrencies. However, the Central Bank is promoting the use of blockchain – a public ledger that serves as the backbone of bitcoin – in financial services for strengthening transparency and improving inclusion.

Mexico: In March 2018 the Law for Financial Technology Institutions (FinTech Law) was enacted. The purpose of the FinTech Law is to regulate services, such as crowdfunding, management of electronic payment funds and use of cryptocurrencies, provided by the Financial Technology Institutions. The Fintech Law also includes an option to obtain a special temporary authorization to offer financial services using technological tools or media through other than existing mechanisms (typically known as regulatory sandbox), subject to certain terms and conditions.

More country information can be found at:

<https://bitcoinmagazine.com/articles/cryptocurrency-regulation-2018-where-world-stands-right-now/>

While there is no consensus on the treatment of VCs there have been increasing calls for global cooperation. Following their March 2018 Summit the G-20 announced that the group had committed to apply appropriate Financial Action Task Force (FATF) standards to crypto-assets, and called for broader discussion on global regulation of crypto-assets⁶. The Organization for Economic Co-operation and Development (OECD) has indicated the need to develop a framework for the taxation of emerging technologies such as cryptocurrency; they have generated uncertainty around tax liabilities and the underlying technology that can be used to reduce tax transparency. In the UK the Financial Conduct Authority (FCA) has called for the development of a global regulatory sandbox⁷.

Notably, outside of the formal regulation, private institutions have begun to take action to limit the use of cryptocurrencies. For example, a number of commercial banks in the US⁸, Canada⁹, the UK¹⁰, and Australia¹¹ have prohibited the purchase of cryptocurrency using credit cards. Also in 2018 Google, Facebook and Twitter banned ads for initial offerings of cryptocurrency or sales of virtual currency tokens.

The emergence of Initial Coin Offerings (ICOs) is a development closely related to the increasing popularity of digital currencies. According to International Organization of Securities Commissions (IOSCO, 2018) ICOs typically “*involve the creation of digital tokens – using distributed ledger technology – and their sale to investors by auction or through subscription, in return for a crypto-currency ...or official fiat currency*”. An ICO can be described as an opportunity to invest in a new digital currency before it becomes available to the wider public; it can be viewed as a form of raising capital for an investment. Some of the concerns surrounding ICOs relate to price volatility, lack of standardisation of legal and regulatory status, potential for fraud and inadequate documentation. Regulators in some countries, such as the US, consider an ICO as a form of security that therefore needs to conform to the rules of the relevant securities and exchange agency.

Cryptocurrency mining has become another issue that countries need to consider as the computing resources make substantial demands on the electricity infrastructure. One estimate¹² is that Bitcoin’s estimated annual electricity consumption, as at 20 April 2018, stood

⁶ In July 2018 the Financial Stability Board produced a report for the G-20 on work by the FSB and standard-setting in regards to crypto-assets. Available at <http://www.fsb.org/wp-content/uploads/P160718-1.pdf>.

⁷ In a March 19th 2018 speech Chris Woolard, executive director of strategy and competition at the FCA noted that there was interest in the idea of cross-border testing and that suggestions for how a global sandbox could work included a ‘global dictionary’ which covers data needs across different countries, and a joint mission statement from participating regulators.

⁸ JPMorgan Chase & Co., Bank of America Corp. and Citigroup Inc.

⁹ Toronto-Dominion Bank and Bank of Montreal (BMO) Financial Group (BMO Financial Group) have banned credit and debit customers from buying cryptocurrencies.

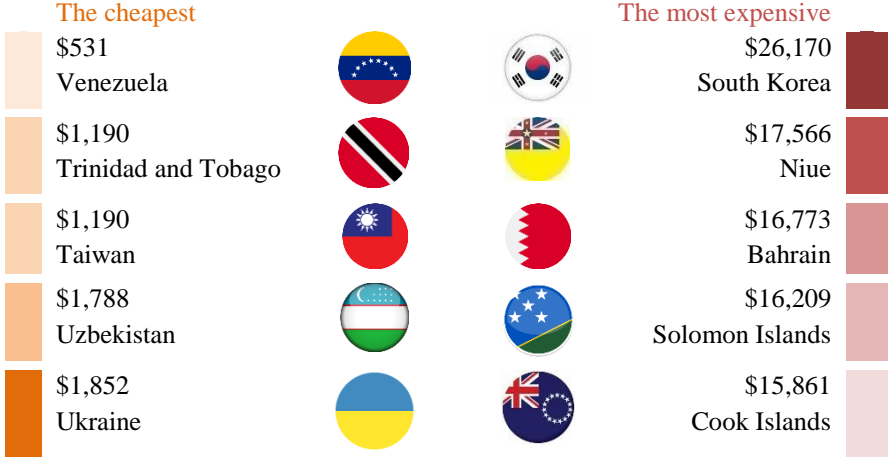
¹⁰ Lloyds Bank, Bank of Scotland, Halifax, and MBNA.

¹¹ Commonwealth Bank of Australia.

¹² Digiconomist (2018)

at 61.71 terawatt hour. To put it in perspective, to undertake 1 bitcoin transaction requires 952 kilowatt hour (KWh) while to process 100,000 Visa transactions would require 169 (KWh). Trinidad and Tobago has been identified as one of the cheapest places, as at January 2018 (2nd spot) to mine bitcoins, with Suriname coming in as the 12th cheapest spot in the world (Elitefixtures, 2018). In parts of the US mining operations have to be authorized due to risks such as fire hazards and damage to the electricity grids¹³. At the same time countries are aware that bitcoin mining could encourage investment, either domestic or foreign. Iceland has emerged as a destination for mining farms as the average tariff for the industrial connections are 0.043 USD per kWh, with the electricity being generated by renewable sources¹⁴.

Figure 2: The Cost to Mine 1 BITCOIN
(based on the average electricity rate per country)



Source: Bitcoin Mining Costs Throughout the World. Elitefixtures (2018)

2. a. (2) *Risks and Benefits of Virtual Currencies*

The proliferation of VCs has both benefits and risks¹⁵ First, the risks: As they allow for anonymity, cryptocurrencies have been used in illegal activities such as the sale of narcotics (e.g. Silk Road), ransomware payments and money laundering. To date, the value of cryptocurrencies has proven quite volatile and holders can be exposed to significant losses over short periods. Also, the unregulated nature of these currencies means that neither customers nor investors have recourse or consumer protection in cases where an exchange is compromised or the cryptographic keys are lost. In addition, while the technology is based on the affirmation of a transaction, there may be no way to undo an error in a transaction. Finally, there is the issue of cybersecurity. While the DLT technology itself is theoretically highly secure, phishing scams can

¹³ De (2018).
¹⁴ Mcquaid (2018).
¹⁵ Further details can be found in the 2014 FATF Report on Virtual Currencies – Key Definitions and Potential AML/CFT Risks and the 2016 IMF Staff Discussion Note on Virtual Currencies and Beyond: Initial Considerations.

entice persons to reveal passwords/location of their cryptographic keys. Also, stemming from the unregulated nature of the industry there have been fraudulent issues of virtual currency¹⁶. Such events have led the Central Bank of Samoa to issue an alert regarding scams associated with virtual currency investments, while the People's Bank of China (PBoC) has warned that some digital currency offerings “*may involve pyramid schemes*”. Most recently there has been the emergence of cryptojacking whereby cellphones and computers are, unknown to their owners, used to mine for virtual currency.

The emergence of virtual currencies brought with it concerns about the potential impact on monetary policy and financial stability. In the case of monetary policy, the major risk identified in the literature surrounds the disruption in the transmission of the central bank's policy rate changes to the rest of the economy. If a significant amount of lending is outside the banking system, movements in open market operations and changes in reserve requirements would have little impact on the amount of lending in the economy. The risks to the financial system from virtual currencies tend to emanate from the anonymity of the currency, the lack of application of AML/CFT regulations, interconnectedness and cyber security. Investigation by various central banks and international bodies¹⁷ concluded that for the moment the limited interaction of VCs with the financial system and their low usage mean that these concerns are not yet valid, though they should be monitored.

The benefits touted for the use of virtual currencies are lower costs, faster transaction times, reaching the unbanked (financial inclusion) and data privacy. According to the Commonwealth Secretariat (2015) the estimated cost of the average transaction in virtual currency is one per cent of the transaction value, compared to the eight or nine per cent for fiat money transmission services. According to a news report Ripple's Consensus Ledger can process 1,000 transactions per second, and settle an international payment in three seconds on average¹⁸ compared to four days using traditional methods. By not involving the banking sector and using instead mobile devices and other forms of technology, virtual currencies can reach the unbanked. For countries which have experienced de-risking, virtual currencies may be able to fill the gap of correspondent banking.

¹⁶ Two examples of this include Kapiton and CoinEX. Kapiton - A Swedish exchange trading platform site, launched for a limited client base on April 18, 2012. However, it started experiencing problems with payments in November 2013, prompting Reddit users to call it “a scam.” CoinEX - A Russian exchange launched in July 2013. Lasting almost a year, in March 2014 the company claimed its wallet got hacked and all of their bitcoins were stolen. By Dec 2015 the site went missing, and the service was pronounced another scam by Bitcoin talk users.

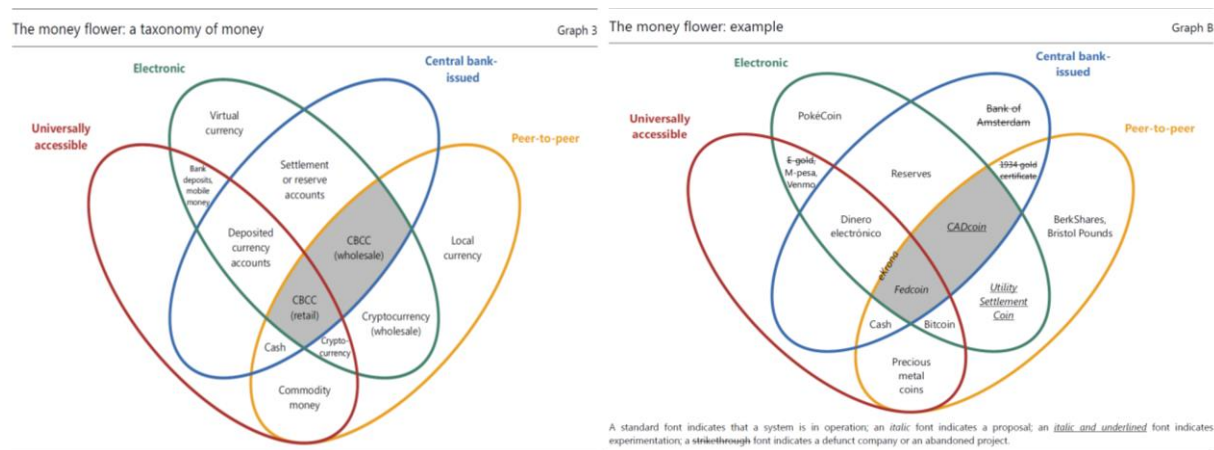
¹⁷ The Financial Stability Board (2017) found that at present there are “no compelling financial stability risks from emerging FinTech innovations”.

¹⁸ Roberts (2017).

2. b. Central Bank Digital Currencies

Given the emergence and rise of virtual currencies, central banks are considering introducing central bank issued digital currency. Several central banks across advanced and developing economies have investigated the possibility of issuing their own virtual currency, for example Canada (CAD-coin), Sweden (e-krona) and Ukraine (e-hryvnia). He *et al* (2017) notes that the issuance of a Central Bank Digital Currency (CBDC) can lead to more efficient provision of payment services, save on the cost of minting notes and coins, limit the impact of private virtual currencies on monetary policy and counter any monopoly type influence of private virtual currency issuers or exchanges. Bech and Garrett (2017) examine two possible forms of central bank cryptocurrencies (CBCCs/CBDCs): a widely available, consumer-facing payment instrument targeted at retail transactions; and a restricted-access, digital settlement token for wholesale payment applications. It is suggested that wholesale CBDCs may have the ability, when combined with DLT, to enhance settlement efficiency for transactions involving securities and derivatives. On the other hand investigations into a retail CBDC are taken in the context as an alternative payment instrument to cash, that is safe, robust and convenient. The four-ellipse money flower illustrates how the retail and wholesale CBDCs fit into the overall monetary landscape.

Figure 3: The Money Flower



Source: Bech and Garrett (2017)

However, the introduction of CBDC calls for weighing a raft of benefits and costs and operational adjustments. Some considerations include: whether CBDCs should be issued only to commercial banks—for settlements and interbank payments—or to the wider public; should CBDCs pay interests – should banks and non-banks receive the same interest rates; how should they be issued, for example, should the equivalent value of cash be destroyed. The BIS (2018) notes that a retail CBDC would have to fulfil anti-money laundering and counter-terrorism financing (AML/CFT) requirements. Further some central banks may not have the legal authority to issue a CBDC. Meaning et al (2017) provide a comparison of the possible elements

of a CBDC and monetary assets, and the questions a central bank would have to answer if it decided to issue a CBDC.

Table 2: Characteristics of CBDC and other money-esque assets

	Liability of central bank	Electronic	Universally accessible	Cryptocurrency	Interest bearing	Trades at par	Monetary policy instrument
CBDC	✓	✓	?	?	?	?	?
Reserves	✓	✓	x	x	?	✓	✓
Bank Notes	✓	x	✓	x	x	✓	x
Deposits	x	✓	✓	x	x	✓	x
Bitcoin	x	✓	✓	✓	x	x	x

Source: Meaning et al (2017)

Several studies point to the risks from the introduction of a CBDC. Grym *et al* (2017) note that while there are benefits to CBDC (they consider the form where the public has access to the CBDC) it could result in commercial banks having to offer higher interest rates on accounts or additional services to attract deposits away from the central bank or having to borrow funds. One interesting argument made is that a CBDC could also increase dollarization. The authors argue that consumers using a CBDC for on-line purchasing in a foreign currency may be more willing to use the same currency in other situations to avoid the use of two parallel currencies. Weidmann (2018) and Central Bank of Denmark (2017) have both noted that the creation of a CBDC raised the possibility of digital bank runs; where in a systemic crisis the public could transfer all their funds from commercial banks to CBDC, which could take place almost immediately with a click of a button. From an operational perspective the design and operation of a retail CBDC may be challenging.

There are several benefits from the introduction of a CBDC. It can aid in fulfilling AML/CFT requirements through digital records and traces. One of the arguments in the literature is that a retail CBDC can strengthen the transmission mechanism for policy rate changes to other rates, as well as allow for negative interest rate in the pursuit of monetary policy objectives. The CPMI (2018) paper also notes that a wholesale CBDC “*would be akin to interest-bearing central bank reserves or reverse repo facilities, yet widely tradeable, could function as a safe asset comparable in nature to short maturity government bills*”.

Central banks across the globe are actively investigating the different possibilities of using DLT and issuance of CBDC. The available information suggests experimentation is taking place with different versions of the DLT platforms currently available (Appendix 1). The CPMI (2018) notes that there remain several areas in which the impact of a CBDC is unknown and needs to be further researched. These areas include the possible effects on interest rates, the structure of intermediation, financial stability and financial supervision, exchange rates and other asset prices.

3. The Caribbean Experience

Virtual currencies and ICOs have been a very topical issue. Thus it can be inferred that there is some level of awareness in the Caribbean. Wood and Braithwaite (2016) conducted a survey in Barbados to gauge public awareness of virtual currency and the likelihood of its use as a means of payment. They found that 66 per cent of the respondents (50 persons) were aware of virtual currencies, with bitcoin being the most recognized. The majority of respondents had neither encountered a business (whether online or brick and mortar) which used virtual currency (90 per cent) nor had they used a virtual currency to purchase anything (94 per cent). Nevertheless respondents were generally willing to use a virtual currency if it were safe to do so, if government openly endorsed its use and if their peers were using it. There was much ambivalence about owning virtual currency and there were differing views on whether it would become widespread in the Caribbean. Even in advanced economies utilization of virtual currencies can be low. Henry, Huynh, and Nicholls (2018) found while some 85 per cent of Canadians had some knowledge about bitcoins, only 5 per cent owned bitcoins. In an earlier paper they noted that other surveys conducted in the US and Canada had similar results.

In the Caribbean the evolution of DLT and the impact it can have for service providers, has remained at the forefront of discussions within the private sector and government. In several of the Caribbean countries there have been private sector initiatives to raise the awareness of the public of these developments. The Central Bank of The Bahamas has partnered with financial stakeholders to conduct workshops, seminars and financial literacy campaigns to effectively educate the public on this topic.

It is difficult to estimate the use of/ investment in virtual currency by Caribbean citizens. A Commonwealth Secretariat report (2015) provides some idea of the number of bitcoin wallets that have been downloaded in the Caribbean; of course, this does not mean that persons are engaging in activity. Additionally, persons can hide their country information by using proxies or the “*dark web*”. There are some indications that there is limited use of virtual currencies in the region. In Trinidad and Tobago one business owner indicated that at his restaurant and bakery bitcoins would be accepted for payments, while in Jamaica there was a newspaper report indicating that businesses were accepting bitcoin for medical services. The Central Bank of

Table 3: Downloads of Bitcoin Core Client by Member Country

Country	Downloads per 100,000 internet users	Country	Downloads per 100,000 internet users
Dominica	348	Belize	150
Antigua & Barbuda	216	St. Lucia	117
Barbados	180	Jamaica	93
Bahamas	160	St. Kitts & Nevis	86
St. Vincent and the Grenadines	157	Guyana	37
Trinidad & Tobago	156		

Source: Commonwealth Secretariat (2015)

Note: Data correct as of 30 July 2015 (attempts to update using the original source were not successful).

Aruba estimates that 7 to 10 per cent of the business community in Aruba is currently using cryptocurrencies.

Caribbean countries are at different stages in the evolution of virtual currency within their jurisdictions. From a regulatory perspective many have issued at a minimum an information bulletin informing the public of risks and benefits of digital currency generally and/or have issued warnings about specific companies which promote the use of digital currencies.

Table 4: Advisories Issued By Caribbean Institutions

Countries	Institutions Issuing Advisory
Aruba	Advisory issued by Centrale Bank van Aruba (Oct 2017)
Belize	International Financial Services Commission issued warning on specific entities – (November 2016, August 2017)
Barbados	Preparing an advisory to be issued in 2018
Curacao and Sint Maarten	Centrale Bank van Curacao and Sint Maarten (March 2017) issued a general advisory, and in May 2017 issued an advisory relating to a specific company. In May 2018 issued a warning on Initial Coin Offerings.
Eastern Caribbean Central Bank	In June 2018 issued an advisory on FinTech operations. July 2018 warning on Bitcoin ATM
Jamaica	Advisory issued by the Central Bank (Feb 2018) Advisory issued by the Financial Services Commission (July 2018)
Suriname	No advisory issued to date
Trinidad and Tobago	Advisories issued by the Ministry of Finance and the Securities and Exchange Commission (Feb 2018)

Sources: Respective Central Banks.

For many of the Caribbean islands the current financial sector legislation does not explicitly cover virtual currency, while for others there is some scope under regulations covering activities in the financial sector, including the payments systems. In The Bahamas, for example, the financial technology companies can utilize the regulations and guidelines for the licensing of Electronic Payment Service Providers (2017) to access the market and in some cases the FinTech companies can fall under the regulation of the Securities Commission of The Bahamas. In Trinidad and Tobago there is scope for the regulation of transactions in digital currencies under various pieces of legislation including the Financial Institutions Act 2008 and the Central Bank Act¹⁹ (though it is recognized that dedicated legislation may be needed). Similarly in Jamaica, the Bank of Jamaica Act and the Payment Clearing and Settlement Act, while not specifically designed to address virtual currencies can be utilized in regulating them. The Bank of Jamaica also plans to update its existing Guidelines for Electronic Retail Payment

¹⁹Section 17(2) of the Financial Institutions Act 2008 (“FIA”) requires all persons conducting business of a financial nature which includes the issuance of electronic money to be licensed by the Central Bank. Section 17(4) of the FIA provides for the Minister (of Finance) by Order on the advice of the Central Bank to prescribe the category of persons other than (licensees) who may issue electronic money, subject to the approval of the Central Bank as well as the requirements and criteria applicable to such persons. Additionally, section 36(cc) of the Central Bank Act, Chap 79:02 authorizes the Central Bank to “supervise the operations of payments systems in Trinidad and Tobago generally, Interbank Payment Systems in accordance with the Financial Institutions Act and the transfer of funds by electronic means including money transmission or remittance business”.

Services. While in Aruba at present there is no legislation that covers the regulation of virtual currencies, the possibility of regulating virtual currency is being discussed. In Curacao and Sint Maarten while the current legislation does not cover digital currencies, work is ongoing regarding the drafting of legislation and/or amendment of current legislation to cover digital currencies. On the other hand the legislative system in Belize provides for one form of legal tender (Belize currency issued by the Central Bank) and recognizes foreign currencies for foreign exchange purposes. These foreign currencies are also the legal tender (the official, State issued and recognized currency) for the foreign jurisdiction. Thus the Belize legislation does not provide for digital currencies and there are currently no plans to amend legislation to allow for activities related to digital currencies in the country. Guyana is in a similar situation.

Many of the regional Central Banks have taken a wait and learn approach to the development of regulations for the sector. Others have been considering adopting a sandbox approach (Barbados²⁰ and Jamaica) which allows FinTech companies limited operation under the keen observation of the regulatory authorities, who will determine what regulations and adjustments would be necessary to allow companies to operate fully. The Bank of Jamaica is in the process of finalizing its Guidelines for Sandboxing. At least one central bank has indicated it is contemplating whether FinTech companies should be allowed to hold accounts at the central bank.

Interest in virtual currencies and their related entities varies across the region. Some Central Banks have reported great private sector interest in areas such as the setting up of bitcoin ATMs and exchanges, the issuance of ewallets, cryptocurrency and ICOs, and the setting up of securities trading platforms, KYC databases and FinTech cambios. According to news reports²¹ the Antiguan Government is seeking to set up a cryptocurrency exchange, issue an ICO and is to allow the construction of a resort that will only accept payment in cryptocurrency. In The Bahamas, the FinTech companies have largely identified, as possible customers, individuals who do not qualify for commercial bank loans. Some countries have seen little interest in the development of a domestic FinTech sector, while in others there is an embryonic sector mostly targeting payments. However one area that remains opaque is the interaction between the regional FinTech companies and the commercial banks operating in the Caribbean.

There appears to be a moderately increasing pace towards FinTech adoption in the Caribbean. Barbados seems to have one of the more active FinTech sectors in the region. In Barbados one company has established various facilities which can utilize digital currencies. These are: a mobile wallet, an exchange and merchant payment processing software. According to Gómez (2016), Barbados has experienced a surge of media coverage regarding the adoption of blockchain technology and FinTech innovations. In order to diversify its economy, Barbados aims to become the FinTech capital of the region, propelled by changes in domestic laws to

²⁰ In October 2018 the Central Bank of Barbados and the Financial Services Commission launched the sandbox. Details are available at <http://www.centralbank.org.bb/regulatory-sandbox>.

²¹ Tassev (2018) – Bitcoin.com.

incentivize innovation in the financial sector. FinTech companies such as Bitt, AION, Shyft and Polymath are based in Barbados and aim to facilitate the adoption of Digital National Currencies within the Caribbean region.

Box 2: FinTech Companies in Barbados

Bitt

Bitt is a financial technology company that utilizes blockchain and distributed ledger technology to facilitate secure peer-to-peer transactions with seamless mobile money across a suite of Bitt's software and mobile applications. The company was founded in 2013 by Gabriel Abed and Oliver Gale, partnering with Avatar Capital to assist in the expansion of Bitt's core services, and was officially launched in Barbados on Monday 30th March, 2015. Bitt aims to provide an infrastructure within the Caribbean that supports financial access among all generations, stimulating economic growth. The FinTech company offers the ability to trade Bitcoin for local currency and vice-versa, allow merchants to accept digital payments while minimizing transaction costs and cater to segments of the population that lack adequate access to financial products and services by reducing barrier fees associated with foreign exchange transactions.

Bitt successes thus far:

- * Integration of the company's platform with Colu, allowing Bitt to digitize fiat currencies and transact them on the bitcoin blockchain. Caribbean fiat currencies can now have digital equivalents that are linked in a 1:1 ratio with their Central Bank issued counterparts (The Merkle, 2016)

- *Inclusion of the Netki platform, aiming to give every Bitcoin or Ethereum address an easily readable name

- *Launching of the mmoney wallet and merchant

AION

Aion is a third-generation blockchain network that enables both private and public sector organizations to send data and value between any Aion-compliant blockchain and Ethereum, provide fast transaction processing and increased data capacity to all Aion block chains and create customized public or private block chains, allowing publishers to choose governance, consensus mechanisms, issuance, and participation. According to the founder of the company, "Aion provides a performant enterprise centric network that allows organizations to interconnect permissioned blockchain systems, even if, they are built on different architectures in a transparent and secure manner". On November 2nd 2017, Bitt welcomed Aion to the blockchain hub in Barbados and stated its interest in partnering with the company to achieve Bitt's goals to achieve financial inclusion. Aion has partnered with many other international companies and has raised sufficient capital while aiming to achieve its objectives.

Shyft

Shyft is a credible blockchain network for the global economy that utilizes an open and unified framework to achieve greater standardization and efficiency in regulatory compliance and due diligence mandates. The company aims to provide a new paradigm for digital identity, focused on leveraging reputation as collateral and setting a new standard in the attestation process. Shyft enables the reduction of transaction costs and provides personal data protection for consumers. On February 8th 2018, the company announced an open and unified blockchain framework for the standardization of regulatory, compliance, and due diligence mandates for Know Your Customer (KYC) and Anti-Money Laundering (AML). This blockchain-based system will assist users in reducing costs and increasing effectiveness by allowing them to securely obtain, store, inquire into, and work with compliance-satisfying data.

Polymath

Polymath is a financial technology company that lowers the barriers to entry for businesses looking to launch tokenized securities on the blockchain and for investors looking to gain exposure to regulated, asset backed tokens. The company aims to provide guidance to venture capitalists and investment funds through the legal process of launching successful tokens. During the Polycon gathering in The Bahamas from February 28th 2018 to March 3rd 2018, Polymath announced its potential partnership with the Barbados Stock Exchange (BSE), pending shareholder approval. The company aims to provide a channel to list security tokens on the BSE, creating a path for retail investors. Polymath will so be launching the world's first security token fund, known as Polymath Capital.

Source: Central Bank of Barbados

Three Central Banks in the region have indicated their intention to issue a CBDC, while some others are still at the assessment stage. The Governor of the Central Bank of The Bahamas in March 2018²² suggested that a pilot version of a CBDC could be in circulation within 24-30 months. The Central Bank of The Bahamas is actively exploring the introduction of a digital currency that could be used by individuals and businesses to conduct their everyday transactions. The idea of a central bank digital currency can be executed using an account-based system, thereby avoiding the resources-consuming ‘mining’ operations involved in creating virtual currencies like bitcoin for example. The Central Bank of The Bahamas is also looking at any risk involved, in different options, in order to develop the appropriate supervisory approach. As part of the potential move to a CBDC, new digital identification system for use within the financial services sector will also be tested²³.

Most recently the Eastern Caribbean Central Bank signed a memorandum of understanding (MOU) with BITT to undertake a pilot using DLT focusing on data management, compliance and a transaction monitoring system²⁴. The pilot can aid in the development of a secure, resilient digital payment and settlement platform, and the issuance of a digital EC currency, which will operate alongside the fiat currency. The pilot project will thus look at a CBDC along with the use of the DLT in enhancing KYC utilities. The Bank of Jamaica has indicated that it is the process of reviewing and finalizing an MOU with a company to pilot a central bank digital currency. The Central Bank of Aruba is currently undertaking a feasibility study and proof-of-concept for the potential of a CBDC, the results of which are expected in 2019. The Central Bank of Curacao and Sint Maarten has initiated work on the potential issuance of a CBDC.

²² Governor John Rolle’s Remarks at the Blockchain Seminar “Digital Currency - Extending the Payments System Modernisation Initiative” on 1st March, 2018.

²³ Hartnell (2018).

²⁴ Eastern Caribbean Central Bank (2018).

4. The Potential Implications of DLT and CBDC for the Caribbean

DLT and CBDC²⁵ can impact the manner in which the payment systems in the Caribbean operate. The DLT impact can be transmitted through the reformation of the respective Central Bank's Real Time Gross Settlement Service (RTGS) which traditionally conducts large value payments, and/or the Automated Clearing House (ACH) system which is for small value payments. In addition DLT can be applied to the operations of commercial banks for transactions such as remittances and trade financing. The implementation of a CBDC can be seen as part of a strategy to move towards a less cash based payment systems or potentially as a way to facilitate regional trade.

4. a. Overview of Payment Systems in the Caribbean

The payment systems in the Caribbean are at different stages of development. Among the Caribbean Central Banks most have in place an RTGS and an ACH system to address large and small value payments as well as automatic cheque clearing systems. There are also systems to deal with the ATM transactions and Point of Sales for debit and credit cards. Some countries, however, have only recently begun to develop some of these facilities (see Appendix 2). The settlement time differs among the Central Banks. In the Central Bank-owned Bahamas Inter-Bank Settlement System (BISS), which facilitates real time settlement of large value payments greater than B\$150,000 through the RTGS system, transactions can take between 1 and 7 milliseconds to be processed. In Trinidad and Tobago the settlement in the RTGS is same day while the ACH is by the end of the next day (T+1). In Belize the RTGS processes high value payments within an hour. In addition the country has an electronic payment (Instant Funds Transfer) that is available 24/7 where transactions are done within a few minutes, while the automated clearing and processing of cheques is completed by the end of the next day (T +1). The ECCU region is currently upgrading its payments system. One project that is carded for completion in May 2018 is the implementation of Electronic Funds Transfer (EFT) in XCD throughout the participating Banks of the ECCU. One issue facing the ECCU is that ATM interoperability is somewhat limited, to the extent that not all the banks have transitioned to international debit cards. Information from Suriname indicates that the length of time for settlement has been increasing. The Central Bank of Aruba is in the process of redesigning its national payments infrastructure into a digital payments railway. Currently, the system is relatively decentralized with separate payment platforms, which are controlled by different commercial banks. In June 2018 the Central Bank of Aruba signed a contract with equensWorldline SE, to provide an Instant Payments Clearing and Settlement Mechanism (IP CSM), beginning January 2019. With this new system, all interbank payments, including credit

²⁵ The respective central banks would have to assess if their legal frameworks would allow them to issue a CBDC.

transfers, batch processing and request for payment messages, in Aruban florin initiated in Aruba will be instantly processed 24/7/365. The Central Bank of Curacao and Sint Maarten operates the RTGS and ACH systems, with automated real time settlements; there is however the need for faster payments.

4. b. Distributed Ledger System

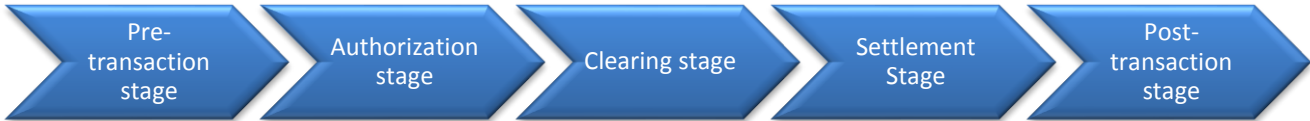
The CPMI (2017) defines the Distributed Ledger Technology (DLT) as “the processes and related technologies that enable nodes in a network (or arrangement) to securely propose, validate and record state changes (or updates) to a synchronised ledger that is distributed across the network’s nodes”. The DLT system can be divided into permissioned and unpermissioned systems, with virtual currencies using the unpermissioned version (Table 5).

Table 5: Potential Configuration of DLT arrangements

Description of arrangement	One entity maintains and updates the ledger (for example a typical FMI)	Only approved entities can use the service; entities can be assigned distinct restricted roles	Only approved entities can use the service, entities can play any role	Any entity can use the service and play any role
Operation of the arrangement	Single entity	Multiple entities		
Access to the arrangement	Restricted			Unrestricted
Technical roles of nodes	Differentiated		Not differentiated	
Validation of consensus	Within a single entity	Within a single entity or across multiple entities	Across multiple entities	

Source: CPMI (2017)

Central banks in advanced economies such as the Bank of England and the European Union have investigated using DLT to enhance and/or replace traditional payments systems, which are in general, complex and expensive. However, while acknowledging the potential of DLT the general conclusion has been that the technology is not mature enough to replace the current RTGS systems (though they continue to investigate possible applications). To get a noticeable enhancement of the payment services infrastructure from DLT application would require a “technological disruption” in payment mechanisms and reconstruction of the stages in the so called ‘value-chain’:



Two of the much-touted benefits of the DLT are its speed and low cost of transactions. However experimentation by some central banks suggests that conventional technology may be more efficient and cheaper. Indeed in a 2018, speech the ECB's Yves Mersch noted that while new euro settlement system (TIPS) takes 10 seconds, and costs 0.2 cents, DLT transactions are at best 30 euros and take at least one hour. Additionally a 2018 report by the Central Bank of Taiwan²⁶ illustrated that two different tests using the blockchain proof of concept were able to process 4 and 26 transactions per second, respectively, significantly fewer than the 2,700 transactions per second managed by the ACH system. The potential use of DLT by a central bank raises a number of operational as well as regulatory issues including the interoperability of the systems and the legal validity of financial instruments issued on a DLT. He *et al* (2017) have also suggested that some regulation or oversight of the algorithms used in the evolving technology may be needed.

The available information would suggest that before any regional central bank moved to adopt DLT for their payments systems that adequate testing be done to ensure that the cost and speed of DLT are improved. In addition the particular DLT algorithm used should be one to which there is some convergence in the international environment, for example SWIFT has reported some success in using DLT for certain types of accounts. Experimentation using different DLT platforms may be helpful in assisting a central bank gauge the potential risks and benefits in adopting a particular algorithm (Karaindrou, 2017).

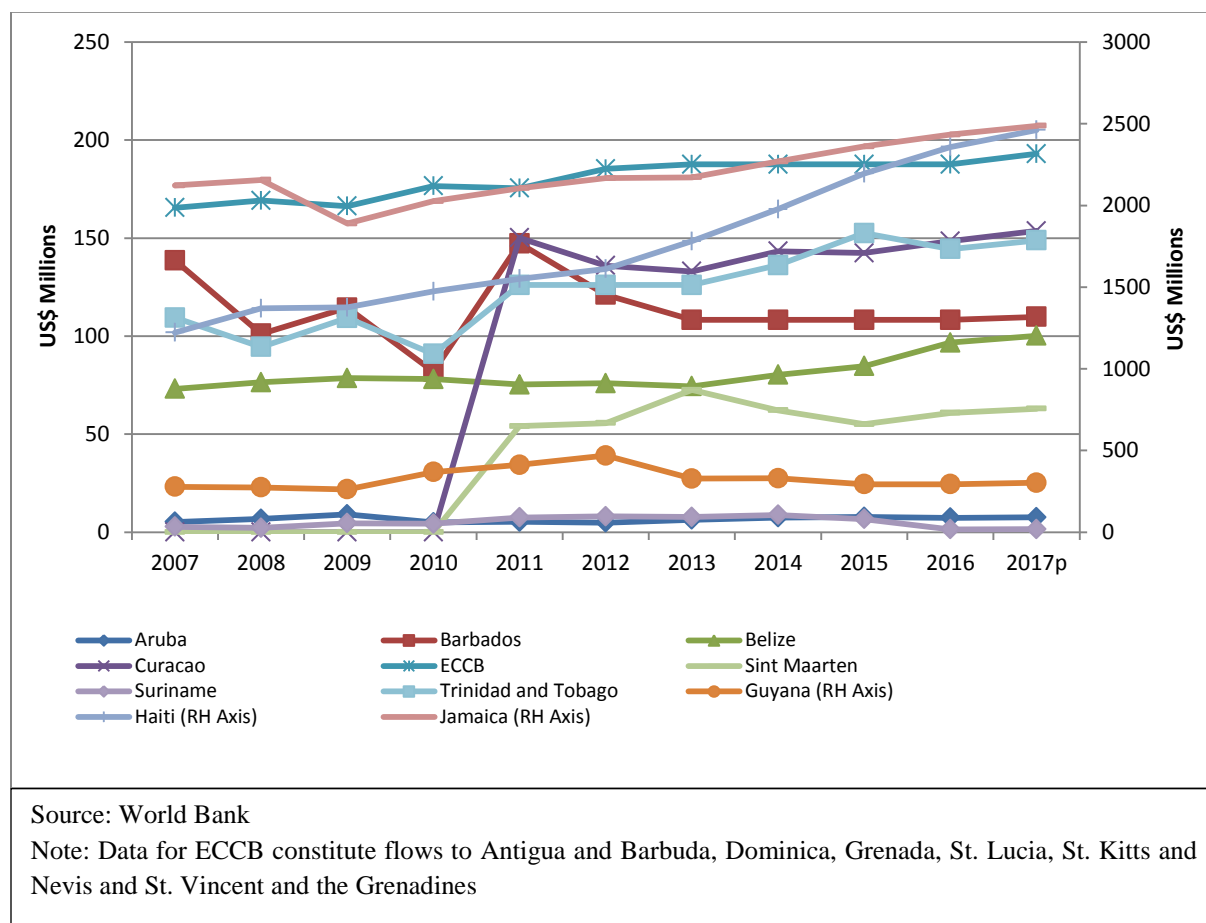
The CPMI (2017) has advanced a framework to help central banks and other authorities understand DLT arrangements for payment, clearing and settlement activities. The framework comprises four core components: (i) scope: understanding the arrangement - which includes its functionality and nature of service, and the factors for its effective implementation; (ii) efficiency: analyzing the arrangement's implications for efficiency; (iii) safety: analyzing the arrangement's implications for safety; and (iv) broader implications: analyzing the arrangement's broader financial market implications.

Various commercial banks in several advanced economies have begun to use DLT technology for remittances. Reports would suggest that it is cheaper and faster to transmit funds through DLT than through traditional means such as electronic wire. Financial technology start-ups such as BitPesa and Rebit are leveraging the blockchain networks to facilitate lower remittance fees of 3 per cent or less (of the amount being transferred). Additionally, remittances via blockchain networks are quicker: received immediately as opposed to after a few days using other services. Through a customer-friendly interface, a DLT system can be used to improve the efficiency of money transfers to individuals and entrepreneurs. Given the importance of remittances to several of the Caribbean economies (Figure 4) – for example Jamaica and Haiti – reducing the cost of sending/receiving remittances could possibly mean higher inflows. According to the World Bank the global average cost of sending remittances was 7.13 per cent in

²⁶ Zhao (2018).

the first quarter of 2018; however for the Caribbean the World Bank noted that some remittance corridors were as high as 10 per cent. Costs also differ by the methods of sending/disbursing the funds, with banks being the most expensive and mobile money the cheapest. In Belize the average cost of remitting by Money Transfer Organization (MTO) per US\$200 is BZ\$13.25 while the average costs through the commercial banks is BZ\$55.00. Meanwhile, for receiving funds there is no cost through the MTOs, while the average fixed cost (not dependent on the amount) through the commercial banks is BZ\$20.00.

Figure 4: Remittance Inflows To Caribbean Countries

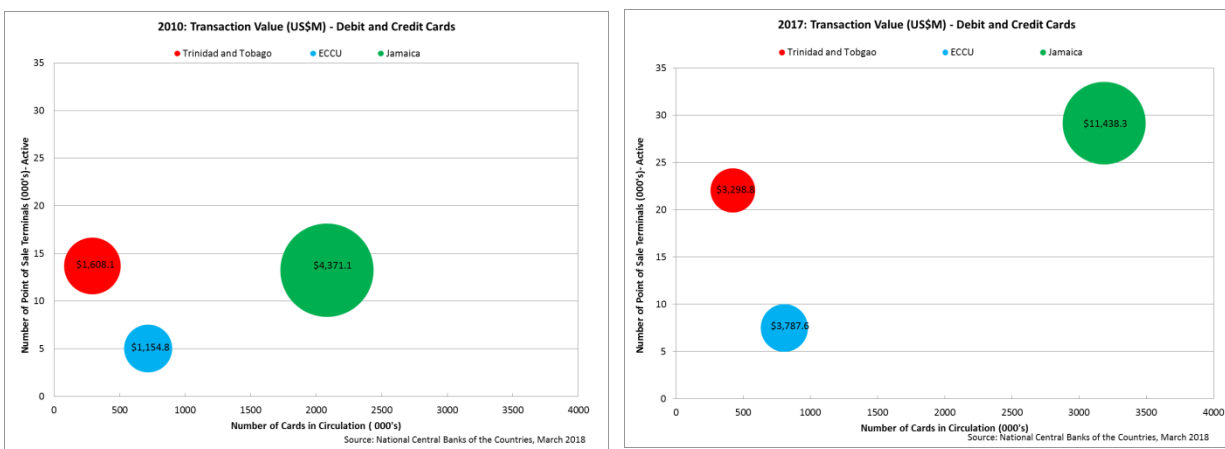


4. c. Adoption of Technology in Retail Payments

In addition to the RTGS and ACH systems, payments for/by individuals and businesses can also be facilitated via debit and credit cards, as well as via online, mobile and telebanking. In the Caribbean debit and credit card use has been growing both in terms of the number of cards and the volume of transactions (Figures 5-6). There are, however, some differences in the use of these payment methods regionally. Information suggests that credit cards are used more than debit cards in the ECCU, while in Jamaica and Trinidad and Tobago the reverse is true. In The

Bahamas the growth seen in the credit and debit card use of some 18.4 per cent and 24.6 per cent over 2008 to 2016, occurred alongside a fall of 3.4 per cent year-over-year in the use of cheque payments. In Aruba over 90 per cent of the households have a basic (transaction account) and use their debit card on a daily/weekly basis. The growing popularity of credit and debit cards may be owing to their ease of use and security. In general, in the Caribbean the growing use of cards has occurred alongside the growth in the number of point of sales machines available, despite associated fees and charges for their use. In the ECCU area interchange fees average around 3.0 to 4.0 per cent. In Belize there is a huge disparity in fees, as the fees for debit transactions varies from USD\$1.50 - \$12.50 for consumers and businesses. Most credit transactions are free for individuals, but range from USD\$2.50 - \$12.50 per transaction for businesses. In Jamaica debit cards attract a fee of J\$30 at the ATM and J\$15 at point of sale machines. In Trinidad and Tobago the use of debit cards can attract a minuscule fee for the individual – (if not using own bank point of sale terminals), while the costs to the business can vary.

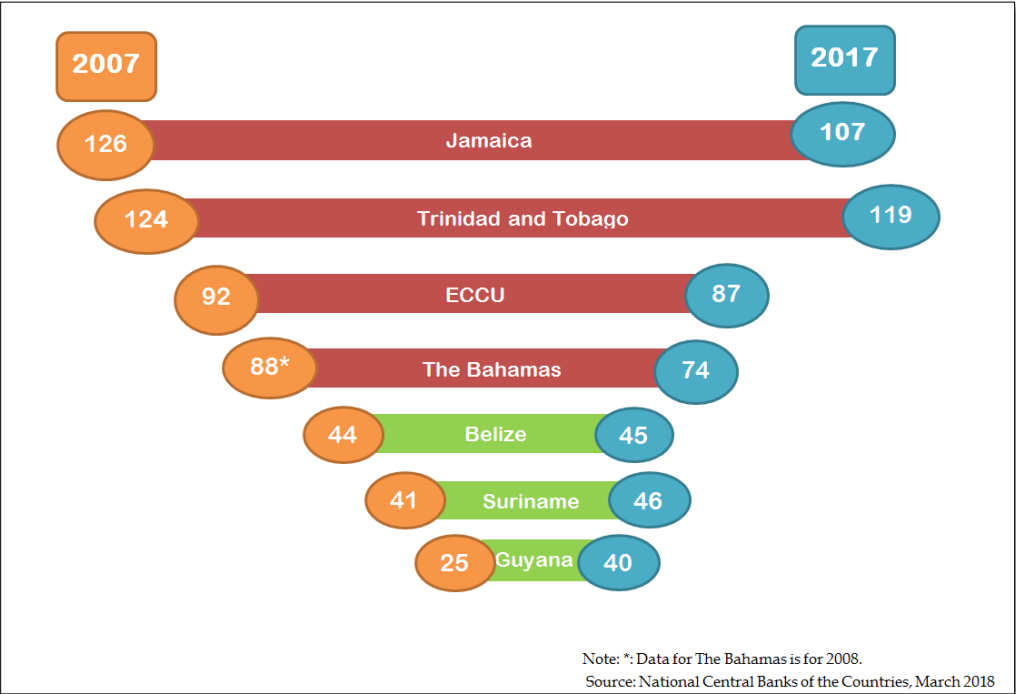
Figures 5-6: Use of Debit and Credit Cards



More recently financial institutions have accelerated the introduction of online and mobile banking, which tend to attract no or low fees. While data on the use of these methods is not traditionally collected by the regional central banks, available information would suggest that in some countries the use of these payment methods is embryonic, while in others it is more prevalent. According to the Central Bank of The Bahamas’ 2017 payments survey, the total users of digital banking, which includes residential, business, public sector and other users, grew by 11.1 per cent to 84,212 accounts, compared to 75,819 accounts in 2016. Information from the Central Bank of Aruba suggests that in 2016 and 2017 over half of the consumers surveyed have never used a smart phone or mobile app to conduct financial transactions. Available information suggests that the mobile banking has also begun to grow in some of the countries in the region.

Some of this growth can be linked to the increased penetration of the internet and mobile smart phones; the actions of some of the banks have had a direct impact on the use of these new methods. Over the years 2007 to 2017 some Caribbean countries have recorded a decline in the number of bank branches (Figure 7). Pre-emptive closures and mergers across the major banks left residents in some countries with limited or no access to financial services. Across the region, RBC has ushered its customers towards its digital platform for the majority of services such as international wires, bill and credit card payments, and approving payments and transfers, as they have limited the services offered over the counter. Scotiabank has introduced technology within the branches so that customers could become familiar with the technology before being guided to the mobile and internet interfaces. Increasing fees for some services also influence customers towards the cheaper digital interfaces.

Figure 7: Number of Bank Branches 2007 / 2017



In Haiti the destruction of the financial infrastructure during the 2010 earthquake led to the rise in the use of mobile money through Digicel’s TchoTcho Mobile and VoilÃ;’s T-Cash²⁷. While TchoTcho (which was rolled out in December 2010) initially offered only domestic transfers, payroll and deposit/withdrawal services, in 2015 it was relaunched as MonCash and expanded into mobile bill payment, point-of-sale purchases and electronic disbursement of assistance programs²⁸. A GSMA (2017) report indicates that between July 2015 and July 2017 in Haiti there was a significant increase in the number of active mobile money

²⁷ In 2012 Digicel acquired Voila, and retired T-Cash, transferring all active accounts to its TchoTcho Mobile platform.

²⁸ The Economist (2013).

accounts (from 83,000 to 795,000, an increase of 860 per cent) and the value of transactions increased by 950 per cent.

Some Central Banks such as the Central Bank of Suriname and the Central Bank of Belize have also encouraged the use of electronic banking in their jurisdictions, partly to reduce costs associated with printing and managing cash. Outside of the traditional commercial banking sector there has been the emergence in Jamaica of electronic payment providers offering services such as peer-to-peer transfers; top-up (air time); bill payment; business-to-customer payments; and remittance disbursements via mobile. In Trinidad and Tobago there are a number of bill payment providers that facilitate utility payments— including electricity, telephone/mobile payments— and other expenses. In Curacao and Sint Maarten bill payment service (agents at which utilities can be paid with cash or cards) is widely used.

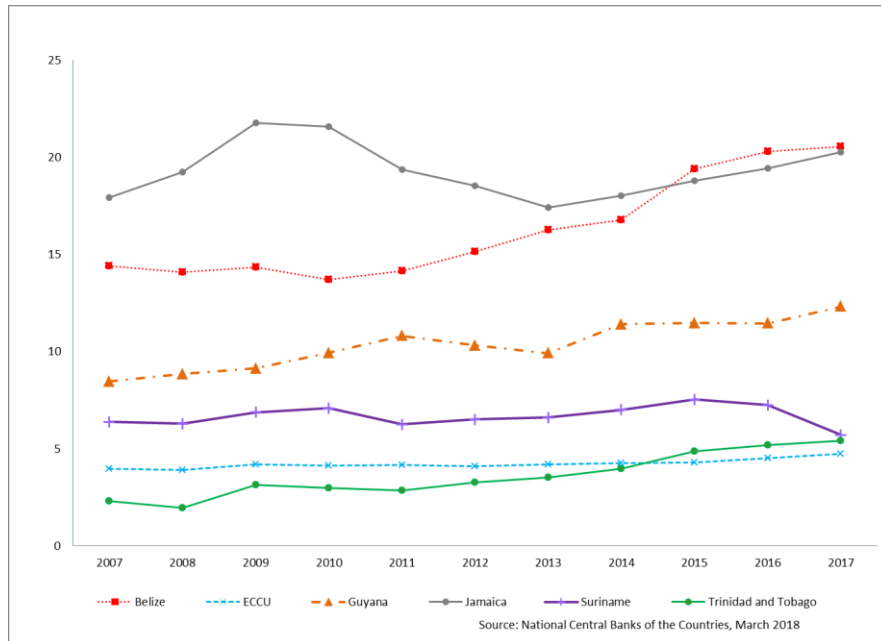
Despite the advances in technology, cash remains the dominant payment instrument in the Caribbean. A report on a 2016 study by MasterCard on transactions in several Caribbean countries found that that 90 per cent of transactions in Jamaica are conducted via cheques and cash and only 10 per cent through electronic payments. The study estimates that Jamaica²⁹ and Trinidad and Tobago³⁰ economies could grow by an additional 0.7 per cent and 3.5 per cent respectively if cash transactions were reduced by 30 per cent over four years.

Data provided by the respective central banks show that the value of cash in circulation continues to increase (Figure 8), as well as the volume and value of cash withdrawals from ATMs (Figure 9-10). In The Bahamas cash in the hands of the public continued to increase over 2007-2017. At the end of 2016, currency in circulation stood at \$280.5 million, or approximately 4.1 per cent of the money supply (M3), in comparison the ratio was an estimated 3.1 per cent of M3 at the mid-point of the decade and 4.0 per cent of M3 in 2007. The Central Bank of The Bahamas anticipates that the use of cash will fall as individuals and businesses utilize digital forms of payment offered by service providers under the new Retail Payment-Electronic Money Service Providers licence. In the ECCU, Guyana and Trinidad and Tobago the volume of cash in circulation has increased over the last decade (more than doubling in the cases of Guyana and Trinidad and Tobago), while as a per cent of Gross Domestic Product (GDP) the ratio remained relatively stable for the three regions. Suriname is the only country in the region which has recently recorded a fall in the ratio as the growth in GDP overshoot the growth in cash in circulation.

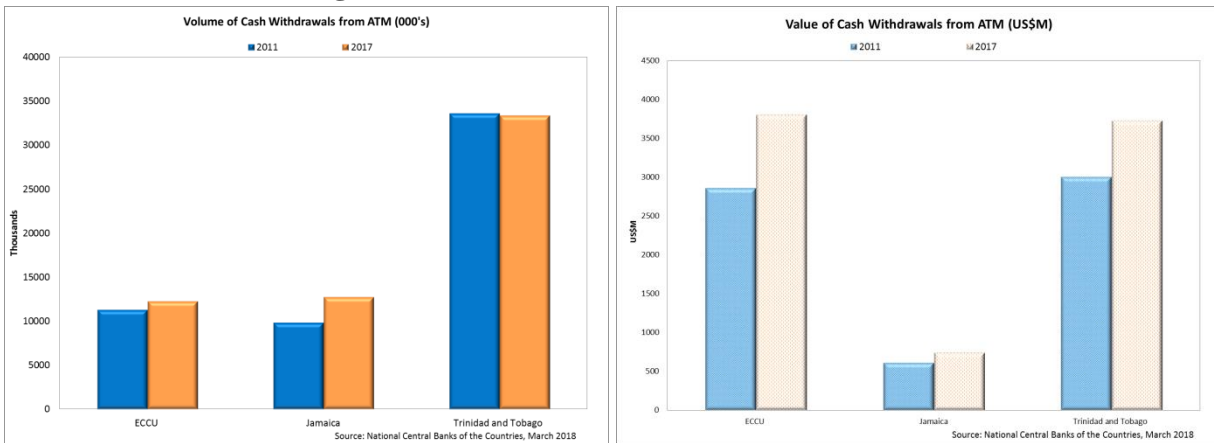
²⁹ Jackson (2016).

³⁰ Trinidad and Tobago Guardian (2016).

Figure 8: Cash in Circulation (per cent of GDP)



Figures 9-10: Cash Withdrawals from ATMs



Some central banks collect data on consumer spending habits which also provide information on cash usage and the thresholds for using cash. Bagnall *et al* (2016) used information from payments diaries from Canada, Australia, Austria, France, Germany, the Netherlands, and the US to assess the factors which influence the use of cash as a payment option. They found that factors such as transaction size (use of cash decreases with transaction size), demographics (cash usage decreases with education and income, but varies across age categories), and point of sale characteristics influenced the use of cash. Chen *et al* (2017) note that in Canada for payments of less than \$25 cash is the preferred payment method. Esselink and Hernández (2017) found that in the euro countries on average cash remained the dominant payment method both in terms of value and volume, with the average value of a cash transaction

being €12.38³¹. The Bundesbank's 2017 survey found that consumers settled around three-quarters of payments (74 per cent) using banknotes and coins, with most purchases costing up to €50 being settled with cash. Further the study found that 88 per cent of the survey respondents strongly rejected the idea of abolishing cash or limiting its use. Doyle *et al* (2017) found that consumers in Australia were migrating away from using cash and cheques for making payments towards using debit and credit cards (in particular contactless cards). Nevertheless cash payments still account on average for 37 per cent of payments (number of payments), with this number rising for certain segments of the population especially the older generation.

There is limited information on the threshold for cash usage in the Caribbean. Anecdotal evidence for Trinidad and Tobago from the merchant side indicates that in many small eating establishments and vegetable markets for example only cash is accepted. Of course this may be related to the cost of accessing the financial infrastructure (renting of the machines, and related transaction processing fees). Of note some large stores may offer a lower price to the customer if he pays in cash even though some of these items could be extremely expensive. In Belize the Point Of Sale machines are set at a minimum of USD\$10.00; thus one can infer that purchases valued below USD\$10.00 are on a cash basis. According to the Central Bank of Curacao and Sint Maarten cash is mostly used for amounts below NAf 25 (US\$ 14).

Globally several countries have expressed their desire to move to a cashless economy. In such a system there will be reduced or no need for cash, as payments would be made over the internet, point of sale, using a mobile device, via debit and credit cards, merchant cards, contactless wearable devices (e.g. Apple watch) and other electronic payment systems. Mukhopadhyay (2016) noted that the literature supports the idea that a move to a cashless society is associated with an increase in GDP, in large part due to the lower costs of storing and processing physical currency, and increased tax collection. He notes that for India the cost of printing and distributing cash through ATMs amounts to about 0.2 per cent of India's GDP, while only 1 per cent of the population pays income tax. Mukhopadhyay notes that moving to a cashless economy should also improve financial inclusion. Banka (2017) in looking at 76 countries (over 1998 to 2014) found that on average a 1 per cent increase in card penetration is associated with a 0.006 per cent increase in GDP. The promotion of a cashless society can also aid countries in achieving compliance with Anti-Money Laundering / Combating the Financing of Terrorism (AML/CFT) guidelines.

4. d. The scope for a CBDC in the Caribbean

One option for reducing the use of cash in the region may be through the issuance of a CBDC for retail (public use). Given that a CBDC will be backed by a central bank and the value of the token would not be volatile it is more likely that persons would use this medium for

³¹ They also found that in 2016 euro area consumers carried on average €65 in their wallet with men holding on average €12 more than women, while the most senior age cohort carried up to €43 more than the youngest.

payments. In addition it can be seen as just another form of electronic fiat currency, but built on DLT technology. There are, however, pertinent considerations before such a move could be made. These include: A central banks willing to assume a CBDC as a liability on the central bank accounts? What will be the impact on commercial banks? And what will be the benefit of introducing a CBDC as opposed to promoting emoney or mobile money? In addition central banks will have to consider the costs for undertaking this initiative, whether they have the IT infrastructure, and whether the telecommunication infrastructure is sufficiently developed, stable and reliable to sustain an increased load. Apart from the willingness of consumers to adopt this technology, the perspectives of the businesses, especially small enterprises, need to be taken into account.

The introduction of a CBDC should be part of digital financial inclusion infrastructure. While several Caribbean countries have a policy or initiatives for financial inclusion, so far digital financial inclusion remains a buzzword. According to the G20 an inclusive digital payments ecosystem consists of several building blocks and an enabling environment.

Box 3: G-20 High Level Principles for Digital Financial Inclusion.

PRINCIPLE 1. Promote a Digital Approach to Financial Inclusion: Promote digital financial services as a priority to drive development of inclusive financial systems, including through coordinated, monitored, and evaluated national strategies and action plans.

PRINCIPLE 2. Balance Innovation and Risk to Achieve Digital Financial Inclusion: Balance promoting innovation to achieve digital financial inclusion with identifying, assessing, monitoring and managing new risks.

PRINCIPLE 3. Provide an Enabling and Proportionate Legal and Regulatory Framework for Digital Financial Inclusion: Provide an enabling and proportionate legal and regulatory framework for digital financial inclusion, taking into account relevant G20 and international standard setting body standards and guidance.

PRINCIPLE 4. Expand the Digital Financial Services Infrastructure Ecosystem: Expand the digital financial services ecosystem—including financial and information and communications technology infrastructure—for the safe, reliable and low-cost provision of digital financial services to all relevant geographical areas, especially underserved rural areas.

PRINCIPLE 5. Establish Responsible Digital Financial Practices to Protect Consumers: Establish a comprehensive approach to consumer and data protection that focuses on issues of specific relevance to digital financial services.

PRINCIPLE 6. Strengthen Digital and Financial Literacy and Awareness: Support and evaluate programs that enhance digital and financial literacy in light of the unique characteristics, advantages, and risks of digital financial services and channels.

PRINCIPLE 7. Facilitate Customer Identification for Digital Financial Services: Facilitate access to digital financial services by developing, or encouraging the development of, customer identity systems, products and services that are accessible, affordable, and verifiable and accommodate multiple needs and risk levels for a risk-based approach to customer due diligence.

PRINCIPLE 8. Track Digital Financial Inclusion Progress: Track progress on digital financial inclusion through a comprehensive and robust data measurement and evaluation system.

Source: G20 Global Partnership for Financial Inclusion (GPFI, 2017)

Distributed Ledger Technology, and by extension, digital currencies may impact on financial inclusion in the following ways:

- It is costly and challenging for low-income segments of the population to open a bank account. Identification, as well as supporting documents need to be provided. The use of DLT enables customers to open accounts on their phones thus avoiding travel costs. Third party agents allow the depositing of money into the accounts, making it easier to get money into the system.
- High transactional costs also prevent individuals from opening bank accounts. Additionally, making payments via national payment systems may take days and there are a number of fees involved. Thus, the use of digital currency networks reduces costs on a whole and increases the speed of payments. Transfer fees are applied as a percentage of the transfer's value rather than a fixed rate, and the transfer requires no minimum payment amounts.

Table 6: Financial Inclusion Indicators for 2016

Country	Depositors with commercial banks (per 1,000 adults)	Number of Bank Branches(per 100,000 adults)	ATMS (per 100,000 adults)	Internet Access ^a (% of population)	Mobile cellular subscriptions (per 100 persons)
Aruba	n.a.	19.8	126.0	93.5	135.7 ^b
Antigua and Barbuda	n.a.	27.5	65.4	73.0	194.1
Bahamas	1259.8	29.6	129.24	80.0	91.8
Belize	777.8	20.4	40.1	44.6	63.9
Barbados	n.a.	16.5	23.9	79.6	114.9
Curacao	n.a.	n.a.	n.a.	61.9	112.1
Dominica	n.a.	17.4	39.9	67.0	107.4
Grenada	n.a.	27.8	45.6	55.9	111.1
Guyana	953.9	8.4	19.1	35.7	66.4
Haiti	279.0 ^c	2.7 ^c	1.3 ^c	12.2	60.5
Jamaica	1091.6	5.1	31.8	45.0	115.6
St. Kitts and Nevis	n.a.	41.2	89.3	76.8	136.9
St. Lucia	n.a.	18.1	37.6	46.7	94.8
St. Vincent and the Grenadines	n.a.	16.8	34.9	55.6	102.9
Sint Maarten	n.a.	n.a.	n.a.	n.a.	155.2 ^b
Suriname	1692.3	11.2	49.6	45.4	145.9
Trinidad and Tobago	1530.8	12.9	42.1	73.3	160.6

Source: World Bank, 2017.

Notes

a. Internet users are individuals who have used the Internet (from any location) in the last 3 months.

b. Data for Sint Maarten is 2012, data for Aruba is 2015.

c. Data for Haiti is 2015.

In the Caribbean the indicators suggest that the level of financial inclusion is at or above the world average (Table 6). However, the level of financial inclusion in Haiti is likely to be lower than the rest of the Caribbean. Of course the numbers do not tell the whole story. In the rural / low population density areas persons may have less access to credit. In The Bahamas the number of islands that constitute the country increases the difficulty of ensuring financial access for all. Notably the numbers are not gender or aged divided. Evidence would suggest that females may be more affected by financial exclusion than the general population. The World

Bank's 2017 Global Findex Report revealed that globally 72 per cent of men had a bank account compared to 65 per cent of women, a gender gap of 7 per cent. For developing countries this gender gap has persisted at 9 per cent. Anecdotal evidence would also suggest that the elderly may also have a lower level of financial inclusion.

While the proponents of a cashless society tout the benefits, there are possible negative effects which could occur. Indeed according to media reports the rise in signs on businesses in Sweden indicating that cash is not accepted is of concern (Sweden's government has commissioned a review of the potential consequences of a cash-free economy³²). One concern is that it could lead to increased financial exclusion. The move to a cashless society assumes that all persons have access to the financial system, and as digital financial services progress that all persons have access to the internet.

The push to a cashless society may further marginalize certain vulnerable groups. For example the elderly who may be unwilling/unable to adapt to the technological advancements; those who do not have a bank account because they do not have adequate documentation to open such an account; those with low income flows – where banks fees and charges may negatively impact the amount of funds they hold, the homeless – not only they may not have a bank account but it will become difficult to give them financial assistance. It should also be noted that in the move to a cashless society the anonymity of cash transactions can disappear, all expenditure including small ones such as gifts and tips can be tracked.

There are other concerns about the issuance of a CBDC. While the advent of virtual currency was intended to enhance anonymity, regulators have frowned on this aspect as it has implications for Anti-Money Laundering/ Combating the Financing of Terrorism (AML/CFT). Indeed a CBDC (if issued to the public) will need the users to be identified. This will mean the central bank would have knowledge of all transactions, and while this would be of benefit to the central bank not everyone is comfortable with such a scenario. Another argument against a CBDC is that while gold and cash cannot be expropriated by a government, on the other hand electronic accounts can be bailed in by a government³³. Another point to note is that the move to a cashless society increases the risks of cybercrime. The use of a CBDC represents a single node (that is, the central bank), if it fails due to a cyber-attack or another issue, it will be catastrophic for the whole system. One further consideration for the Caribbean is its vulnerabilities to natural disasters. If one examines the 2017/2018 Puerto Rico experience, where electricity for some has taken many months to be restored, persons relying on electronic payments would have faced significant difficulty. Berentsen and Schar (2018) note that with cash, payments are immediately settled so there is no counterparty risk.

³² Savage (2018).

³³ An example of such expropriation occurred during the European financial crisis when bondholders in Cyprus banks and depositors with more than 100,000 euros in their accounts were forced to write-off a portion of their holdings.

Berentsen and Schar (2018) argue that instead of issuing CBDC, central banks can simply allow the public to hold central bank accounts only to facilitate payments. This could be done by expanding existing infrastructure to take additional account holders, or by mandating that commercial banks open at least one central bank money account for each of their customers. These accounts would be subject to the KYC and AML requirements.

Outside of possible use of a CBDC in the reduction in the use of cash in the respective domestic economies is the consideration for use in intra-regional payments. It may be possible to use such a currency to facilitate inter-Caribbean trade. While for many of the regional countries intra-regional trade is a small part of overall trade, having a CBDC opens the opportunity for reducing the usage of US currency for payments. However careful consideration would have to be given to the mechanisms for conducting this type of payments, for example—would this mean a regional CBDC; which central bank would assume the liability; and if each bank were to have its own CBDC would this mean that all have to be operating on the same DLT algorithm; and what would happen in cases where one country has a persistence trade surplus/deficit with another. On average intra-regional exports account for approximately 20 per cent of a country’s trade, with outliers such as Haiti where it is less than 1 per cent, and Dominica where it is 53 per cent.

Table 7: Intra-regional exports in 2016 (US millions)

	Antigua and Barbuda	Aruba	Bahamas, The	Barbados	Belize	Curacao	Dominica	Grenada	Guyana	Haiti	Jamaica	Montserrat	Sint Maarten	St. Kitts and Nevis	St. Lucia	St. Vincent & Grens.	Suriname	Trinidad and Tobago
Antigua and Barbuda		0.00	0.81	13.01	0.08	0.43	1.37	0.88	3.88	0.00	6.55	0.20		1.18	1.80	6.77	1.60	41.74
Aruba	0.00		0.05	1.19		14.57	0.00		0.04	0.03	1.70	0.05		0.00	0.01	0.07	2.53	76.67
Bahamas, The	0.03	0.00		5.04	0.01	0.54	0.06	0.00	0.39	0.22	2.97		0.01		0.43		1.07	19.99
Barbados	2.29	0.00	1.21		13.31	1.59	1.55	2.04	16.62	0.07	12.71		0.05	0.11	6.65	8.33	7.42	149.65
Belize	0.21		0.00	1.61		66.71	0.02		0.91	0.01	5.62	0.00		0.39	0.95	1.46	0.03	11.19
Curacao	3.94	8.25	0.00	3.11			0.01		1.33		2.43			0.01		0.07	1.65	5.24
Dominica	1.09	0.00	0.01	4.52	0.01	0.33		3.29	1.78	0.01	6.84	0.00		0.51	5.50	4.31	0.19	12.91
Grenada	0.20	0.01	0.00	10.57	0.05		0.13		7.30	0.00	2.50			0.55	1.40	2.69	0.20	35.53
Guyana	0.07		0.18	23.26	1.00	2.63	3.09	0.95			11.70			0.06	2.74	0.16	66.94	198.26
Haiti		0.15	0.09	0.37	0.19		0.30	0.05	8.82		4.29						0.00	4.70
Jamaica	0.50	0.03	0.14	21.59	13.48	1.96	4.01	0.60	43.64	0.55			0.08	0.01	2.22	0.39	27.06	238.95
Montserrat	1.67			0.42		0.32	0.05	0.11	0.06		0.35			0.23	0.02	0.27	0.20	1.50
Sint Maarten				0.30	0.03						2.04			0.33		0.05	0.12	12.20
St. Kitts and Nevis	2.47	0.10	1.03	7.72	0.11	0.24	3.54	1.99	1.40		2.28	0.64	2.75		0.96	3.35	1.39	15.20
St. Lucia	1.11	0.00	0.06	19.38	0.11	0.05	0.63	3.16	7.95	0.02	10.14	0.02		1.21		8.05	0.82	44.46
St. Vincent & Grens.	1.95	0.00		13.72	0.03	0.32	0.28	0.94	5.11	0.03	3.07		0.08	0.40	1.97		0.22	26.40
Suriname		1.14		3.80	0.02	12.64	0.44	0.07	11.60	0.01	5.39		0.02		0.17	0.21		111.31
Trinidad and Tobago	2.20	0.13	0.01	39.95	9.76	1.47	4.63	1.23	164.89	0.13	22.46	0.29	0.02	1.36	10.10	5.62	60.64	
ROW	229.37	84.30	559.45	292.95	162.85	736.80	16.86	25.03	1178.70	1046.73	1114.56	3.16	51.05	44.07	76.49	36.53	1066.87	7070.47

Source: IMF Direction of Trade database.

Note: Columns are country, and rows are counterpart countries

5. Findings and Policy Implications

The small open economies of the Caribbean are not immune to the developments in the area of crypto-assets in the international environment. These countries must seek not only to keep abreast of these developments but also use the advancements to propel themselves forward. While there is limited data on the actual use or investment in virtual currency in the Caribbean, available information suggests that Caribbean citizens are participating in this product. Further while still in the early stages there is activity in the FinTech sector in the Caribbean, though much of it is focused on the payments aspect. While there is increasing use of debit and credit cards, and mobile and on-line banking, cash in circulation continues to increase. Central Banks can possibly use DLT to improve the payments system, as well as to introduce a CBDC to lower cash usage.

To effectively develop a strategy for the implementation of DLT and/or a CBDC in the Caribbean there are several activities which Central Banks need to engage in:

1. With regard to bitcoins, altcoins and the various versions of cryptocurrency/ crypto-assets, central banks should at the very least **monitor** the use of these within the domestic economies. In addition, the respective tax authorities may wish to tax not only the gains from these investments, but also revenue earned from mining.
2. One of the key observations is that the region needs more **data** that it can use to develop strategies moving forward. Information on usage and the willingness of both consumers and merchants to accept and utilize digital currencies, and new payment methods should be sought. One suggestion here would be to undertake a **consumer payment diary** project alongside a similar project for merchant acceptance of payments. Information on **activities of the FinTech companies and their penetration into the public domain** is also needed.
3. There needs to be **collaboration** not just with international central banks but also with Fintech start-ups that can provide solutions to the commercial banks. The shared services and knowledge from these collaborations can assist the central banks to understand what has been done in other jurisdictions, what works and what does not work.
4. Increased **participation in international working groups** should also be pursued. Regionally there also needs to be increased collaboration – at present there is a regional Central Bank FinTech Working Group, and this engagement could be increased to not only look at the legislative and regulatory needs, but also technical developments (including sharing of the proof of concept).
5. Central banks should **assess the possible impact** of digital currencies on their economies, and the potential implications for monetary policy and financial stability. Depending on the type and level of development of the financial system and regulatory framework, countries may introduce the use of digital currencies in part or gradually.
6. The introduction of a CBDC and/or the transition to DLT should only be undertaken after **experimentation** with different DLT platforms and investigations as to the use and implications for the Central Bank, the financial system and the public. Here Central

Banks can collaborate with each other as well as with extra-regional central banks such as in Canada, Singapore and Japan who are engaged in extensive investigation on the issue.

7. The developments of digital currencies and the associated DLT have the potential to positively impact the economic welfare of Caribbean economies and populations. However care needs to be taken as central banks are currently on the wrong side of asymmetric information on these advancements. **Knowledge and technical capability need to be developed** in-house, to ensure that central bankers are able to effectively fulfill their mandate both by utilizing the technology as well as protecting the monetary and financial system.
8. Finally in seeking to participate in and benefit from the advancements in the technology, central banks should seek to develop a **digital financial inclusion policy**.

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Appendices

Appendix 1: Central Banks Investigations into Central Bank Digital Currency and DLT

Project	Status	Conclusions/Next Step
Bank of Canada - Project Jasper (with Payments Canada and R3)	This project, which was launched in March 2016, to test the viability and feasibility of using Distributed Ledger Technology (“DLT”) as the basis for wholesale interbank payment settlements has completed two phases. Phase 1 of Project Jasper employed the Ethereum platform as the basis for the DLT, while Phase 2 employed the custom-designed R3 Corda platform	<p>A proof-of-work consensus protocol, as was built in Phase 1, do not deliver the necessary settlement finality and low operational risk required of core settlement systems. Phase 2 built a distributed ledger platform that employed an alternative consensus model using a “notary node” and could deliver improvements in settlement finality scalability and privacy, but does not adequately address operational risk requirements.</p> <p>On October 17, 2017 the third phase of the project was announced. This phase will involve developing a proof of concept for the clearing and settling of securities. The objectives are to reduce the cost of securities transactions, increase efficiency, and reduce settlement risk.</p>
Monetary Authority of Singapore (with R3, and a consortium of financial institutions) - Project Urbin	<p>This project was announced on 16 November 2016 as a proof-of-concept project to conduct inter-bank payments using Blockchain technology. The successful conclusion of Phase 1 was announced on 9 March 2017.</p> <p>MAS and The Association of Banks in Singapore (ABS) announced on 5 October 2017 that the consortium which they are leading has successfully developed software prototypes of three different models for decentralised inter-bank payment and settlements with liquidity savings mechanisms.</p>	<p>There are two spin-off projects that will leverage the lessons of the prototypes developed. The first project, driven by the Singapore Exchange (SGX), focuses on making the fixed income securities trading and settlement cycle more efficient through DLT. The second project focuses on new methods to conduct cross border payments using central bank digital currency.</p>
Central Bank of Brazil	<p>On 31st August 2017, the Central Bank published a research paper outlining its initiative in the area of block chain. It described the outcome of an Alternative System for Transactions Settlement (SALT) project. The objective of this project was to create a "minimal" backup system for funds transfer in the event of a failure of its RTGS system</p>	<p>The authors indicate that the design of this system includes a permissioned blockchain network in which financial institutions and the central bank itself are the validating nodes.</p> <p>The study concludes that, although privacy is a potential issue, DLT "could make possible to create a unique shared view of a large variety of information fed and replicated across institutions."</p> <p>In November 2017 it was revealed that the Bank was developing proofs-of-concept (PoCs) on four different platforms, trialing ethereum, JPMorgan's Quorum and Hyperledger Fabric alongside its Corda work.</p> <p>The PoCs broadly focus on using blockchain to both back-up the central bank's current real-time gross settlement system (RTGS), as well as better align the organization with</p>

Project	Status	Conclusions/Next Step
		the growing momentum for central banks to innovate using blockchain technology.
European Central Bank and the Bank of Japan – Project Stella	<p>In December 2016 a joint research project entitled “Stella” to assess the applicability of DLT solutions in the area of financial market infrastructures was launched. In September 2017 a report on the project was published.</p> <p>In March 2018 a report on phase 2 of Stella was published. The objective of Stella phase 2 was to explore how the settlement of two linked obligations, such as the delivery of securities against the payment of cash (DvP).</p>	<p>The analysis found that a DLT application could process volumes of payment requests comparable to those routed to RTGS systems in the euro area and Japan. Further the system had the potential to withstand issues such as (i) validating node failures and (ii) incorrect data formats. However increasing the number of nodes and the distance between validating nodes increased the transaction time. While promising the banks concluded that given the immaturity of DLT, it is “not a solution for large-scale applications like BOJ-NET and TARGET2 at this stage of development.”</p> <p>The main findings of phase 2 are: DvP can run in a DLT environment though the exact form would depend on the DLT platform being used, and while the technology could allow for DvP between ledgers without requiring a connection between the individual ledgers, additional operational impediments and risks may arise.</p>
Sweden -ekrona	This project was started in March 2017. The results of Phase 1, whose objective was to Draw up a general proposal for an e-krona and a potential design for an e-krona system, was presented in an interim report in September 2017.	<p>According to the 2017 Interim report:</p> <p>The e-krona is primarily intended for smaller payments between consumers, companies and authorities. The e-krona constitutes a direct claim on the Riksbank, is specified in Swedish kronor and can be held by the general public, financial institutions and companies. It is accessible in real time, 24 hours a day, seven days a week, 365 days a year. The e-krona does not accrue any interest, but should have a built-in function to make it possible to accrue interest at a later point.</p> <p>A register-based e-krona is combined with a value-based solution that makes offline payments of small amounts possible and increases their availability for groups that do not want to or cannot have e-krona accounts.</p> <p>The aim of Phase 2 of the project, to be conducted in 2018, is to refine the e-krona concept and begin developing a structure for regulations and agreements</p> <p>Phase 3, which is still to be decided upon, will either aim to develop & implement an e-krona system or continue analysis. Phase 3 will occur in 2019</p>
Venezuela - Petro	The Government of Venezuela launched its version of a cryptocurrency in 2018.	The Petro's "presale" launched February 20 2018 and is expected to run through March 19 2018. The Petro's price will depend on the price of a barrel of Venezuelan oil from the previous day ³⁴ . Comments suggest that Venezuela is

³⁴ “Petro - White Paper 1.0 Financial Proposal”, Government of Venezuela. 2018.

Project	Status	Conclusions/Next Step
		also considering launching a second cryptocurrency – petro gold.
Marshall Islands (with Israeli company Neema)	On February 26 2018, the Republic of the Marshall Islands (R.M.I.) passed a law (the Declaration and Issuance of the Sovereign Currency Act 2018) approving the launch of Sovereign (SOV), the first cryptocurrency issued as legal tender by a sovereign nation.	<p>The R.M.I. would distribute SOV via an initial coin offering (ICO), however . The SOV will be recognized in law as legal tender, holding equal status as the US dollar, however it will not be equivalent to a CBDC. The SOV will require currency holders to identify themselves.</p> <p>Half of the 24 million coins will go to the government and the other half to the Israeli financial technology startup helping with the plans. Six million SOVs will be made available to international investors. Residents will receive 2.4 million SOVs.</p> <p>According to reports Neema will develop the underlying technology of the new cryptocurrency using a public protocol called "Yokwe." The protocol is designed to mitigate know-your-customer and financial crime concerns by linking accounts to real, government-verified identities.</p>
Uruguay – e-Peso	In November 2017 the Central Bank of Uruguay initiated a six month pilot programme for the digitization of its currency.	The plan “consists of a test with 10,000 mobile phone users of ANTEL. To take part, Uruguayans must download the application for phones from the epeso.com.uy website, access the digital wallet, register and make the first charge in Red Pagos to create the digital wallet (Cash In).

Sources: Bank of Canada³⁵ (2017), Monetary Authority of Singapore, Central Bank of Brazil, Coindesk³⁶, European Central Bank³⁷, Bank of Japan, Riksbank, Central Bank of Uruguay

Note:

A DvP transaction involves the settlement of two linked obligations, namely the delivery of securities and the payment of cash. Principle 12 of the PFMI requires that "[...] the final settlement of one obligation occurs if and only if the final settlement of the linked obligation also occurs, regardless of whether the FMI settles on a gross or net basis and when finality occurs".

³⁵ White Paper prepared by: Payments Canada, Bank of Canada and R3 (2017).

³⁶ Pomela (2015).

³⁷ Project Stella Payment systems: liquidity saving mechanisms in a distributed ledger environment- European Central Bank and Bank of Japan. 2017.

APPENDIX 2

PAYMENT SYSTEMS IN THE CARIBBEAN		
Country	Current National Payment Systems	Recent Developments and On-going Reforms to the National Payments System
Aruba (Source: Central Bank of Aruba Website)	Large-Value Funds Transfer Systems	No RTGS
	Retail Payment Systems	Aruba adopted the Automated Clearing House (ACH) rules and regulations as established by the NACHA (National Automated Clearing House Association) to fit their environment and signed a special contract with the commercial banks to determine the rules of the game when conducting transactions. The Central Bank of Aruba clearing system complies with the following requirements: – communication device; – MICR transfer (cheques); – electronic funds transfer.
	Foreign Exchange Settlement Systems	Not Applicable
	Securities Settlement Systems	Not Applicable
Bahamas (Source: Payment Systems Department, Central Bank of The Bahamas,)	The Bahamas Payment System Modernization Initiative (PSMI) is being directed by the National Payments Council (NPC), established in 2003, after an extensive survey of the economy’s needs and expectations for banking and retail transactions (Phase 1). The NPC formally broadened ownership of the modernization process to the clearing banks, and collaborated closely with the Government and public corporations, as they are important stakeholders in the payments system.	
	Large-Value Funds Transfer Systems	Established in May 2004 The Bahamas Interbank Settlement System (BISS) Real Time Gross Settlement (RTGS) Scheme - allows clearing banks to electronically transmit and settle large value payments among each other, on a real time basis, with operational hours between 8:30 a.m. and 4:00 p.m. each business day. Payments submitted, which include large value and time sensitive transactions on behalf of bank clients and the public sector, are settled through bank balances maintained at the Central Bank, on an individual basis, in the order in which they are transmitted. Consistent with international best practices, funds transferred through BISS are immediate, final. BISS participants communicate in a Closed User Group (CUG) environment via the S.W.I.F.T network and access the system via a web browser.

	Retail Payment Systems	The Bahamas Automated Clearing House (BACH) was operationalized in Jan 2010. It is a clearing and settlement system for small value payments (under B\$150,000) between clearing banks. Effectively, the system allows next day clearing of Bahamian dollar cheques through confidential, automated clearing.	The Central Bank of The Bahamas is working on preparing guidance on simplified due diligence for low value payments instruments.
	Foreign Exchange Settlement Systems	Not Applicable	Not Applicable
	Securities Settlement Systems	The Securities Commission of The Bahamas maintains surveillance over capital markets and fosters timely, accurate, fair, and efficient disclosure of information to the investing public and capital markets. Currently, settlement of securities is semi-manual, whereby, the transference of securities is recorded in the system. However, the settlement against cash is not recorded in the existing system.	May 2017: Draft of consultation paper on the proposed new amendments to the Banking Act 2002. A key action step for the Central Bank and the Securities Commission is to establish an MOU between both parties to, inter alia, facilitate settlement synchronization between the cash and securities legs of transactions.
Barbados (Source: Central Bank of Barbados Website)	Large-Value Funds Transfer Systems	On October 11, 2002, the Central Bank of Barbados broke new ground with the introduction of the Central Bank Real Time Gross Settlement System (CBRTGS).	
	Retail Payment Systems	The Barbados Automated Clearing House (BACHSI) system began operations in 2001.	
	Foreign Exchange Settlement Systems	Not Applicable	
	Securities Settlement Systems	Not Applicable	
Belize (Source: Banking and Currency Department Central Bank of Belize)		October 2016, the Central Bank of Belize, in collaboration with Central Government and local financial institutions, will launch the Automated Payment and Securities Settlement System (APSSS) as a major part of the effort to reform Belize's national payment system (NPS).	July 2017 the Central Bank of Belize announced their plans to launch 'Automated Cheque Processing', which is a new component of the Automated Payment and Securities Settlement System (APS3). Starting on Friday, July 7th, all cheques deposited countrywide will now be processed electronically, allowing for faster clearing time. As APS3 seeks to reform Belize's national payment system, it provides the groundwork to facilitate the electronic transfer of funds domestically, for both large and small value payments, including an instant funds transfer feature.
	Large-Value Funds Transfer Systems	Real Time Gross Settlement (RTGS)	
	Retail Payment Systems	Automated Clearing House (ACH)	
	Foreign Exchange Settlement Systems	Not Applicable	
	Securities Settlement Systems	Securities Settlement System (SSS) and updated legal and regulatory framework.	

Curacao and Sint Maarten <i>(Source: Central Bank)</i>			<p>CBCS starts a research to implement new Instant Payments with the new payment messaging format ISO 20022. Replacement of the current ACH payment messaging format.</p> <p>Local banking community is in the process to eliminate the use of cheques (Phase I: Personal cheques and Phase II: Corporate cheques).</p>
	Large-Value Funds Transfer Systems	<p>NACS2 RTGS (currency: ANG & USD)</p> <p>RTGS is the platform available for large-value payments processing. The RTGS functionality provides a mechanism for participants to settle large value and time critical payments on a gross basis with intra-day finality.</p>	
	Retail Payment Systems	<p>NACS2 ACH (currency: ANG & USD)</p> <p>ACH entry files are typically large-volume and contain small-value payment entries, based on the NACHA format. If a beneficiary institution is not a participant of NACS2 ACH, and has no settlement account at the CBCS, then the payment will be cleared through the correspondent relationship of the NACS2 operator.</p> <p>The CBCS operates a cheque clearing house in which only banks participate for the clearing of inter-bank cheques (currency ANG & USD). The following type of transactions occur via the Cheque Clearing house:</p> <ul style="list-style-type: none"> • TRC - “cheque truncation entry”, used to identify truncated cheques (MICR code) initiated by an originating institution in accordance with the cheque-processing procedure established by NACS2. • XCK - “destroyed cheque entry”, used to identify debit entries initiated by an ordering institution if a cheque cannot be processed according to the NACS2 cheque truncation program or the MICR code printed on the cheque does not comply with the approved standards established by NACS2. 	
	Foreign Exchange Settlement Systems	NACS2 settles local interbank transactions in ANG and USD currency	
	Securities Settlement Systems	Not Applicable	
ECCU <i>(Source: Banking and Monetary Operations Department, Eastern Caribbean Central Bank)</i>	<p>The Bank jointly with the licensed commercial banks in the Eastern Caribbean Currency Union (ECCU) established the Eastern Caribbean Automated Clearing House (ECACH). In order to transform the traditional paper based payment system into an electronic payment system based on international standards, the ECCB initiated the ECACH Project, which was divided into two phases.</p> <p>Phase one, the implementation of Cheque Imaging, was completed in March 2015 across the eight ECCU territories.</p> <p>The objective of phase two is to implement the use of Electronic Funds Transfer (EFT) in XCD throughout the participating Banks of the ECCU based on the NACHA standard by 2018.</p>		
	Large-Value Funds Transfer Systems	<p>In 2009, the ECCB implemented Straight Through Processing (STP) allowing XCD financial instructions received via SWIFT to be automatically uploaded and processed in its accounting system – real time gross settlement (RTGS) To facilitate this process, the Bank has formulated a set of SWIFT Message standards which are to be used by its clients when communicating with the ECCB. Note, non-XCD transactions are not processed STP.</p>	

	Retail Payment Systems	The Eastern Caribbean Currency Union adopted the National Automated Clearing House Association (NACHA) standards for processing electronic payments. ECCU Cheque Clearing Process (ACH): The ECACHSI operates the Eastern Caribbean Automated Clearing House (ECACH) which supports the clearings of retail transactions initiated by commercial banks under the authority of the ECCB: <ul style="list-style-type: none"> •Requires no physical exchange of cheques •Net positions are settled using accounts held at the Central Bank. •Two low value batch cheque clearing settlement sessions are effected at 9:00 a.m. and 2:30 p.m. daily. •VIP cheques valued at XCD150,000.00 and over are cleared from 8:00 a.m. to 2:30 p.m. 	
	Foreign Exchange Settlement Systems	The ECCU does not have foreign exchange controls. The ECCB holds balances in USD, CAD and GBP. The GBP and CAD balances are set at specific limits. The ECCB does not hold balances in regional and other international currencies. In order to facilitate payments on behalf of Participating Governments or on behalf of commercial banks wishing to fund correspondent bank accounts, the ECCB purchases foreign currency through foreign exchange brokers. ECCB's activity on the foreign exchange market is settled in USD.	
	Securities Settlement Systems	The Eastern Caribbean Securities Exchange (ECSE) was launched on 19 October 2001. The ECCB facilitates the settlement of Participating Government security auctions executed by the ECSE. The ECCB also facilitates payments to investors who hold security investments on the ECSE.	
Guyana <i>(Source: Research Department, Bank of Guyana)</i>			March 31, 2017 - The World Bank's Board of Executive Directors approved the following project: Guyana Payments System Project.
	Large-Value Funds Transfer Systems		June 2017: The development objective of the Payments System Project is to improve Guyana's national payments system by enhancing safety and efficiency of payments. It has three main components. (1) Developing payments system infrastructure will focus on financing the required hardware and software infrastructure by the Government in order to provide interbank clearing and settlement services for electronic payments. The component will finance the hardware and software for the Real-Time Gross Settlement System (RTGS) to be operated by the Bank of Guyana (BoG). The component will finance the hardware and software for the Central Securities Depository (CSD) to be operated by the Bank of Guyana. The project will also finance an information security audit of the payments systems' technical infrastructure and will finance activities to promote the engagement of the private sector's usage of electronic payments.
	Retail Payment Systems		(2) Capacity Building of the BoG is mainly focusing on the capacity building of

	Foreign Exchange Settlement Systems		BoG staff in the specific technical areas required for ongoing operation and management of the infrastructure systems. (3) Project implementation unit will focus on supporting the efforts of the implementing agency to effectively execute the Payments System Project. By 31-Mar-2021, the RTGS project is expected to be operational
	Securities Settlement Systems		
Haiti			
	Large-Value Funds Transfer Systems		
	Retail Payment Systems		
	Foreign Exchange Settlement Systems		
	Securities Settlement Systems		
Jamaica <i>(Source: Payment Systems Department, Bank of Jamaica)</i>	<p>The Bank of Jamaica established a National Payments Council, in 2005, which was charged with the task of modernizing the payments and settlement infrastructure in Jamaica in keeping with international standards and best practices.</p> <p>Bank of Jamaica has implemented a modern electronic payments and settlement infrastructure which operates in full compliance with international standards of safety, security and reliability. This new infrastructure is comprised of:</p> <ul style="list-style-type: none"> - a Real Time Gross Settlement (RTGS) system that facilitates immediate settlement of payment transfers; - a Central Securities Depository(CSD) for housing domestic issues of BOJ and GOJ instruments; - Electronic interfaces between the RTGS and the CSD, as well as a private network to guarantee communication with the JamClear systems; and - The legal and regulatory provisions to support and protect the stability of the financial systems. <p>This settlement infrastructure was branded JamClear, which connotes, settlement assured in real time, with JamClear-RTGS being the real time gross settlement system and JamClear-CSD being the central securities depository.</p>		<p>During 2016, several risk mitigation measures were implemented to improve the resilience of the national payment system. Of note, the Principles for Financial Market Infrastructures (PFMIs) were applied to the two systemically important payment systems owned and operated by the BOJ. These two systems are the Real Time Gross Settlement Systems (RTGS) and the Central Securities Depository (CSD). The application of the PFMIs involve the assessment of compliance of these systems against each applicable principle and the assignment of ratings to identify any concerns or issues to ensure overall observance with international standards.</p> <p>In an effort to reduce settlement risk posed by large value transactions processed through the ACH, for settlement on a deferred net settlement basis, in May 2016, the National Payment Council reduced the ACH value threshold to J\$1 million.</p>

Large-Value Funds Transfer Systems	<p>The JamClear®-RTGS is Jamaica’s main interbank and large value fund transfer system owned and operated by the BOJ. It is based on a real time gross settlement (RTGS) design to process large value and time critical transactions. It is seamlessly integrated with JamClear®-CSD and other related linkages, altogether SWIFT-based platforms. JamClear-RTGS was implemented in February 2009 effectively replacing the Customer Inquiry and Funds Transfer System (CIFTS), the Large value Transfer System.</p> <p>JamClear®-CSD was implemented in May 2009, replacing the paper-based issue of Government of Jamaica and Bank of Jamaica fixed income securities. With the introduction of JamClear®-CSD, all issues of BOJ and GOJ securities were dematerialized to eliminate the need for paper certificates, with the exception of treasury bills, thereby mitigating the risks associated with the holding, trading, clearing and settlement of paper-based securities. The electronic system provides the authentic record of ownership of BOJ and GOJ securities under the PDMA. This brings significant efficiencies to the processes for issuance, management and redemption to the domestic fixed-income securities market. JamClear®-CSD reduces settlement risk and improves the liquidity and efficiency of the secondary markets, with potential savings on public debt service. JamClear®-CSD is seamlessly integrated with JamClear®-RTGS to allow for Delivery versus Payment (DVP) settlement.</p>	
Retail Payment Systems	<p>The Automated Clearing House (ACH) is owned by the commercial banks and is managed by J.E.T.S. Limited through Automated Payments Limited (APL). The Jamaica Clearing Bankers Association was established as the oversight body to implement the rules and By-laws and ensure adherence to the rules governing the operations of the clearing house. The ACH was established to facilitate the electronic clearing of payment items between commercial banks operating in Jamaica on behalf of their customers. Settlement takes place on the books of the BOJ. The ACH net settles in the JamClear®-RTGS</p> <p>MultiLink™ is a retail payment system for payment cards. Its establishment constituted a major achievement in the Jamaican financial services industry due to the introduction of a service platform for debit card payment instruments that delivered non-cash retail banking services to/between financial institutions within the domestic market. The operation of this payment system is under J.E.T.S. Limited, an electronic banking service company which was registered on December 4, 1995. J.E.T.S. Limited’s primary objective is to reduce costs and increase efficiency for member institutions engaged in the retail payment space, and to provide shared platform services in the form of a joint venture among several of Jamaica’s financial institutions. MultiLink™ transactions net settles in JamClear®-RTGS</p>	
Foreign Exchange Settlement Systems	Not Applicable	

	Securities Settlement Systems	Not Applicable	
Suriname <i>Payment Systems Department, Central Bank of Suriname</i> <small>(Source: Payment Systems Department, Central Bank of Suriname)</small>			The CBvS is planning to draft an Electronic Payment Systems law which will allow the SNEPS to have a formal legal basis.
	Large-Value Funds Transfer Systems	The Suriname National Electronic Payment System (SNEPS) RTGS was established in August 2015. The legal support for the functioning of the system was based on the presidential resolution regarding Electronic Payment Systems and the bank act of 2005. The SNEPS RTGS enabled participants to settle high value payments in real time. The design of this system includes the BIS core principles for financial markets infrastructures. The operational hours for this system are from 7:30-15:00. During the first 2 months the central bank experienced a monthly increase of at least 90% in the volume of transactions sent through the system.	
	Retail Payment Systems	In November 2015 SNEPS ACH was launched. This enabled the processing of bulk credit transfers using designated time net settlement. In August 2016 the services offered by the system were expanded by including the processing of E-cheques. The ACH transfers are processed by clearing sessions at 10:00 and 11:45 each working day.	
	Foreign Exchange Settlement Systems	Not Applicable	
	Securities Settlement Systems	Not Applicable	
Trinidad and Tobago <i>Payment Systems Department, Central Bank of Trinidad and Tobago</i>	The Bank adopted the Principles for Financial Market Infrastructures (PFMIs) on the 20th October 2014, replacing the Core Principles for Systemically Important Payment Systems as its benchmark in conducting oversight assessments of systems. The PFMIs is a more robust and comprehensive risk based assessment of the payments system. It has been applied fully to the Systemically Important Payments System (SIPs), the RTGS and a modified version to the Significant Retail Payment Systems (SRPs). The National Payments System (NPS) consists of all systems which facilitate the clearance and settlement of payments. The more significant of these are the large-value systems such as the Real Time Gross Settlement (RTGS) system, the Government Securities Settlement (GSS) system, and retail payment systems such as the Cheques Clearing House, the Automated Clearing House (ACH) and card payment schemes.		

Large-Value Funds Transfer Systems	The RTGS system in Trinidad and Tobago was established by the Central Bank in October 2004. It is a fully automated system through which large value (\$500,000 and over) and time-critical payments are cleared and settled. Like some other countries, including the United States and the UK, we have given a name, safe-tt, to our RTGS. 'Safe-tt' stands for Settlement Assured for Financial Exchange in Trinidad and Tobago. Safe-tt uses the SWIFT messaging system, which is used internationally by central banks to send payment instructions. The entire process is completed within a couple of hours, allowing the beneficiary to make use of his funds on the same day.	
Retail Payment Systems	The Automated Clearinghouse (ACH), an electronic system for smaller value (retail) payments. The ACH, called Transach is jointly owned by the commercial banks and the Central Bank. A company, the Trinidad and Tobago Interbank Payments System (TTIPS), was established to operate the ACH which was launched in January 2006. Payments transmitted through the ACH are available to the beneficiary by the following day. Card Payment Schemes include internationally branded cards such as VISA /MasterCard and the only local debit card is called LINX. There is a manual cheque clearing house.	In late 2017 a draft policy on Virtual Currency was developed. Work currently in progress: 1-E-money policy; 2-Money remitters policy; 3-Automation of the cheque clearing house.
Foreign Exchange Settlement Systems	Not Applicable	
Securities Settlement Systems	Not Applicable	

Sources: National Central Banks of the countries