



INSTITUT **C.D. HOWE** INSTITUTE

**COMMENTARY**

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# Two Sides of the Same Coin: Why Stablecoins and a Central Bank Digital Currency Have a Future Together

*Unlike other cryptocurrencies, stablecoins are linked to fiat currencies. Canadian-dollar-linked stablecoins could become attractive to Canadians by making them convertible into cash issued by the Bank of Canada via a digital currency and by ensuring that the stablecoins are well designed and well regulated.*

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## THE STUDY IN BRIEF

Canada is on the cusp of a new chapter in its monetary history. The emergence of crypto assets like Bitcoin and stablecoins, such as Facebook's Diem, offer the promise of major gains in the efficiency and safety with which Canadians pay for goods and services and invest their savings. But a way needs to be found to reap those microeconomic rewards without jeopardizing Canada's ability to manage future economic and financial crises. In this *Commentary*, we explain why the Bank of Canada should adopt a central bank digital currency, not simply for defensive reasons, but as a way to facilitate the emergence of stablecoins that are tightly linked to the Canadian dollar. That way, the Canadian dollar would continue to serve as the unit of account for most transactions in a crypto world, and Canadians would be able to reap the benefits of stablecoins without ceding control over key macroeconomic and financial stability policy levers.

Canadian-dollar-linked stablecoins could become attractive to Canadians if they are convertible into cash issued by the Bank of Canada and are well designed and well regulated. Bank of Canada-issued digital Canadian dollars could also encourage the private sector to introduce Canadian-dollar-linked stablecoins by enabling convertibility to take place digitally without having to rely on physical banknotes. Stablecoin platforms could also be given access to central bank liquidity facilities to ensure that transactions settle in good times and bad, and access to deposit insurance to help mitigate the risk of runs.

We believe that such a Bank of Canada digital currency should be issued in token form, with decentralized technology for settling transactions. That way most of the benefits Canadians currently enjoy with paper banknotes can be retained. Our preference is for an "indirect CBDC," one that is allowed to pass over the balance sheet of payment providers, mimicking cash/banknotes on the Bank of Canada's balance sheet today. As such, the CBDC would be a claim on the Bank of Canada, not on a financial intermediary.

The *Commentary* concludes by noting that governments should never lose sight of the fact that, while they can encourage Canadians to use crypto assets that are replications of the Canadian dollar, they cannot compel them to do so. But Canadians are more likely to favour those stablecoins if (i) governments facilitate innovation in the payments world so that Canadians can benefit from ongoing advances in payments systems and crypto-technology, and (ii) the purchasing power of the Canadian dollar is maintained by keeping inflation low.

Policy Area: Policy Areas: Monetary Policy; Financial Services and Regulation.

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## Money and other financial assets of one form or another have been circulating for thousands of years. In Canada, prior to the establishment of the Bank of Canada in 1935, the country's relationship with money was a tumultuous one.

Before Confederation, paper notes and coins of different colonial governments and private banks circulated (see Powell 2005). After that, banknotes issued by the federal government and private banks were in circulation, with their values fixed to the price of gold for most of the period prior to the onset of the Great Depression in the 1930s. As a result, throughout this period, Canada did not enjoy the benefits of conducting an independent monetary policy.

The Bank of Canada itself was established as a result of the Great Depression, alongside frustration with the banking system, which, until then, had been the provider of the bulk of notes in circulation. Today, money exists in Canada in its purest form as coins issued by the Royal Canadian Mint and banknotes issued by the Bank of Canada – what we refer to as cash. It circulates alongside private-sector-generated financial assets such as commercial bank deposits that are digital in form but whose funds are readily convertible on demand into paper banknotes issued by central banks.

Cash is a liability of the central bank, making it relatively risk free to users,<sup>1</sup> while trust and confidence in the ability of users to convert commercial bank deposits into cash helps to

alleviate any concern over the risk that comes from the fact that commercial bank deposits are liabilities of a private intermediary. Commercial bank deposits make up the vast majority of money in most economies, including Canada's, but they are anchored by their convertibility to banknotes issued by the central bank.<sup>2</sup>

Canada is now on the cusp of a new chapter in its monetary history. The emergence of crypto-assets such as Bitcoin, and various stablecoin proposals, including Facebook's Diem, seek to change fundamentally the monetary landscape in which Canada and other advanced countries have operated for many years. Bitcoin, as part of its proposed alternative decentralized payment system, aims to improve the efficiency of transactions by eliminating any reliance on fiat currency like the Canadian dollar and intermediaries such as commercial banks. Stablecoins promise a similar efficiency, but with the added benefit of a much more stable value through their backing by an underlying asset – often fiat currency-denominated assets.

Such proposed improvements to the payment system come with consequences. The link between monetary and fiscal policy, and the economy, requires Canadians to use the Canadian dollar, at

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- 1 Two potential risks of holding cash are the risk of loss (including theft) and authenticity (distinguishing real from counterfeit currency).
- 2 As well as by the regulation and supervision these financial intermediaries face and the deposit insurance that covers a portion of their deposit base.

## Key Concept Explainer

### Linking Stablecoins to a Central Bank Digital Currency:

Unlike other types of cryptocurrencies, newly emerging stablecoins are linked to varying degrees with current fiat money such as the US or Canadian dollar, or other conventional assets.

To extract the greatest benefit from stablecoins while minimizing the risks, it will be important to maintain the Canadian dollar as the primary unit of account for financial transactions within Canada. Canadians' willingness to conduct their economic and financial affairs in Canadian dollars is supported by the monetary stability provided by Canada's inflation-targeting framework. Consequently, the vast majority of Canadians at this stage are likely to be more interested in conducting transactions using a cryptocurrency tightly linked to the Canadian dollar than one tethered to other currencies or benchmarks.

A key ingredient in maintaining public confidence would be full and unconditional legal convertibility between these assets and Canadian dollars issued by the Bank of Canada. That way, holders of stablecoins – much like those who hold commercial bank deposits – would know they could convert their crypto stablecoins immediately into Canadian dollars issued by the Bank anytime they wished.

If Canadians largely saved in some form of private cryptocurrency that was not closely tethered to the Canadian dollar, the Bank of Canada would be able to provide only limited emergency liquidity in a crisis, as it would be restricted to the reserves it held in the cryptocurrency. This, in turn, could hinder the federal government's ability to borrow in Canadian dollars in times of stress to stabilize the economy.

Having the Bank of Canada issue digital Canadian dollars could play an important role in facilitating the emergence of cryptocurrencies in Canada while helping to retain the Canadian dollar as the country's principal unit of account. There would be a direct digital bridge between privately issued cryptocurrencies and a digital Canadian dollar issued by the Bank of Canada.

a minimum, as their primary unit of account. If Canadians largely saved in some form of private cryptocurrency that was not closely tethered to the Canadian dollar, the Bank of Canada would be able to provide only limited emergency liquidity in a crisis, as it would be restricted to the reserves it held in the cryptocurrency. This, in turn, could hinder the federal government's ability to borrow in Canadian

dollars in times of stress to stabilize the economy. This would be similar to fiscal policy before the establishment of the Bank of Canada, when most borrowing was done via London and New York, with the funds mainly used for investment purposes. Governments in those days were not actively engaged in macroeconomic stabilization policies the way we know today. The public-good

functions of monetary, fiscal and financial stability policies, therefore, would be limited at best.<sup>3</sup>

The time is ripe to consider how best to reap the benefits of privately issued cryptocurrencies – in particular, stablecoins – without losing some of the important advantages from having a currency issued by the central bank serve as a lynchpin of Canada’s monetary and financial system. In this *Commentary*, we explain why the Bank of Canada should adopt a central bank digital currency, not simply for defensive reasons, but as a way to create a supportive environment for private-sector payments innovation.

## A QUICK PRIMER ON CRYPTOCURRENCIES

The emergence of Bitcoin and its supporting blockchain technology has been at the forefront of what is commonly known as the fintech revolution. That revolution is spawning the introduction of a plethora of different types of crypto assets. Some, like Bitcoin, do not have any inherent intrinsic value, while others, known as stablecoins, are linked to varying degrees with current fiat money such as the US or Canadian dollar or other conventional assets.

Stablecoins are crypto tokens that serve as digital replications of those assets. In contrast to current digital assets such as commercial bank accounts, the decentralized blockchain technology underpinning crypto assets offers the promise of being far more efficient and secure than the current information technology (IT) systems that underpin our financial institutions, markets, and their supporting payments and trading infrastructure.

We thus might find ourselves in the future holding and trading crypto replications of money and other conventional assets, rather than the underlying assets themselves. Indeed, we could be on the edge of witnessing a major disruption of financial systems, whereby firms offering crypto assets on decentralized blockchain platforms seek to displace traditional financial intermediaries and their supporting markets and payments infrastructure. The crypto firms are seeking to profit by exploiting the information contained in the transactions flowing through their platforms.

In return, privately issued cryptocurrencies offer the prospect of settling financial transactions in real time in a highly secure fashion, with, as former Bank of Canada governor Mark Carney said in a recent lecture, “checkout to become a historical anomaly, and payments across borders to be indistinguishable from those across the street” (Carney 2021). Carney further noted that “major efforts are underway to organize money and payments to exploit the potential of smart contracts that improve the efficiency of existing processes (such as trade finance) and enable new transformative innovations (such as a distributed green grid) but potentially at the cost of fragmenting money to the point that it loses its ‘moneyness.’”

Although crypto assets come in various shapes and sizes, it is important to focus on those that are most concerning to the public-good nature of monetary, fiscal and financial stability policies – specifically, those that offer the best prospect of serving as a widely accepted payment instrument or medium of exchange.

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3 Canadians – households and businesses – also hold foreign currencies, especially the US dollar, in Canada. However, these amounts are small relative to banking system deposits (about \$512 billion versus \$2.51 trillion in August 2021, according to Bank of Canada chartered bank month-end statistics). Same with investments in US dollars. Many Canadian merchants also accept US dollars, though this is mostly to service tourists rather than the average Canadian.

Perhaps the best known, and certainly the largest (at US\$1.2 trillion<sup>4</sup> of a total cryptocurrency market cap of approximately US\$2.6 trillion<sup>5</sup> at time of writing) is Bitcoin. It is a cryptocurrency that aspires to be a widespread medium of exchange. It is even gaining some traction in developing countries, including El Salvador, which recently included it alongside the US dollar as legal tender. In most countries, however, including Canada, the percentage of those using Bitcoin for transactions is very small (3.89 percent in 2019).<sup>6</sup> New bitcoins are added to the system when a transaction occurs, with the winner of a competition to confirm the transaction and update the blockchain receiving the new coin. In the long run, however, the Bitcoin code (at present) imposes a ceiling of 21 million in the stock of bitcoins that can be outstanding at any point in time – in other words, money supply in Bitcoin is finite.<sup>7</sup>

Even if there was not a ceiling on the money supply, and Canada allowed Bitcoin to be used as a widespread medium of exchange, its correlation with money is tenuous. It is not backed by any kind of conventional asset and, as a result – especially when combined with its fixed supply – its value is proving to be highly unstable as investors speculate on the likelihood of it becoming a widespread medium of exchange around the world, making it a poor low-risk store of value. Making matters worse, the computing power involved in mining Bitcoin is immense, leaving a wasteful carbon footprint that

could undermine global efforts to tackle climate change.<sup>8</sup>

Stablecoins would rectify this problem by pegging themselves to fiat money – and, occasionally, to commodities or other cryptocurrencies.<sup>9</sup> The fiat money that backs the stablecoin is often, but not always, held by a regulated third-party financial institution. There is a direct ratio of currency held at the financial institution in relation to the amount of stablecoins circulating in the economy. While this would seem to solve the store-of-value problem, central banks are less likely to be concerned from a monetary policy perspective if stablecoins in their jurisdiction are all fully backed by their own currency.

The introduction of stablecoins backed by fiat currency and large social platforms – such as Facebook's Diem (not yet in circulation) – is, however, a concern for central bankers from a monetary policy perspective because of the global nature of the platforms and the sheer size of the user base. As noted by Brunnermeier, James, and Landau (2021), stablecoins backed by large platforms would combine the role of money with data gathering/social networking, which might end up linking these cryptocurrencies with specific platforms rather than with a specific country or jurisdiction. That said, Facebook Diem's most recent white paper suggests it will include, alongside its multi-currency stablecoin, single-currency stablecoins backed by the respective domestic

4 <https://www.tradingview.com/markets/cryptocurrencies/prices-all/>

5 <https://coinmarketcap.com/charts/>

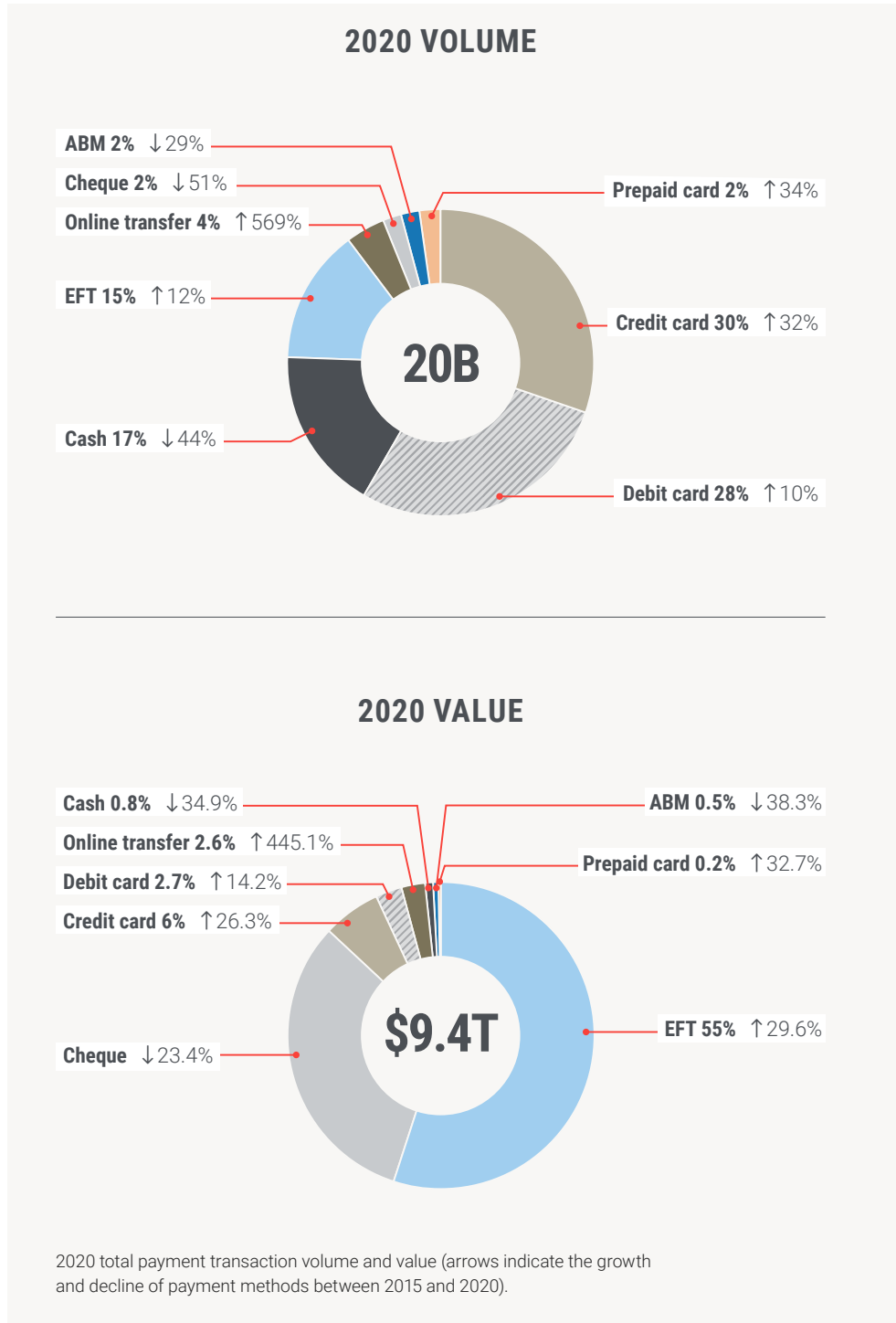
6 <https://www.statista.com/statistics/1104229/cryptocurrency-usage-canada/>

7 At time of writing, there are a little over 18.5 million bitcoins outstanding, with each transaction adding 6.25 bitcoins to the outstanding stock. The amount that gets rewarded halves over time, so that the 21 million ceiling is not expected to be hit until 2140.

8 See, for example, the story of the Alberta mining power plant that was secretly opened, then forced to shut down – at least temporarily – and the debate surrounding its environmental impact (Rieger 2021).

9 There are also non-collateralized stablecoins that increase or decrease supply on a demand basis, with the goal of achieving a stable price.

Figure 1: Total Payment Transactions Volume and Value by Type, Canada, 2020



Note: ABM is automated banking machines; EFT is electronic funds transfer.

Source: Payments Canada 2021.



fiat currencies (see Diem 2020). However, if cash disappears as a result of the proliferation of privately issued cryptocurrencies, payments might centre around social platforms instead of bank intermediation of credit, potentially disrupting traditional credit allocation (and breaking the link with monetary policy).

### PRIVATE-SECTOR FINANCIAL SERVICES FLOURISH WHEN ANCHORED TO CURRENCIES ISSUED BY CENTRAL BANKS AND SUBJECT TO STRICT REGULATION

Thanks to major advances in banking computer technology over the past 60 years, most payments today are conducted in digital form using the IT platforms of banks and supporting payments systems such as those operated by Payments Canada. While 17 percent of all transactions in Canada by number in 2020 were conducted in cash, those transactions represented less than 1 percent of all transactions in dollar-value terms (Figure 1). Banknotes and coins are mainly used these days for small transactions, while most other transactions are conducted electronically in one form or another using accounts held at private-sector deposit-taking financial institutions.

What happened, then, with the almost \$107 billion in banknotes<sup>10</sup> the Bank of Canada issued as of December 2020 if they were not used for cash payments? A clue is provided by the fact that about 60 percent of them in value terms (about \$61 billion) were in the form of \$100 banknotes. Those banknotes are not used very often for payment transactions, suggesting two possibilities: either their use is for illegal or nefarious activities or, in this exceptionally low interest rate environment,

they serve as a store of value for savings purposes without much loss of interest income.

That said, the amount held in banknotes represents a very small fraction of Canadians' savings; it is dwarfed by the more than \$1.2 trillion that Canadian households held on deposit with Canadian banks at the end of 2020, not to mention other assets Canadians held either directly in the form of investment funds, bonds, equities and other securities or as funds placed on deposit with other types of financial institutions.

At first glance one might then think that paper banknotes and their Bank of Canada issuer play only a marginal role today in the Canadian financial system, given that Canadians mainly rely now on digital forms of assets such as bank accounts to conduct payments and hold their savings. But appearances can be deceiving.

### Privately Issued Stablecoins Should Be Convertible Fully and Unconditionally into Central Bank Currency

Lost in these statistics is the vital role that central banks and their banknotes play in promoting public confidence in the private financial system. Canadians rely on private-sector systems to conduct payments, and they invest their savings with the help of private-sector financial institutions. Why? Because they know those payment systems and financial institutions are closely supervised by the Bank of Canada and other regulatory agencies. Canadians also know that the Bank stands ready each day to ensure that critical services provided by systemically important payments systems and other financial market infrastructure will continue to function (Bank of Canada 2020), they know their deposits are publicly insured within transparent

10 See the Bank of Canada's Banking and Financial Statistics month-end report, online at <https://www.bankofcanada.ca/rates/banking-and-financial-statistics/bank-of-canada-assets-and-liabilities-month-end-formerly-b1/>.

pre-specified limits and they know that, if all else fails, they can readily convert their financial assets into Canadian dollar banknotes issued by the Bank.

As a recent discussion paper by the Bank of England (2021) argues, “[c]ommercial bank money is widely used as both a means of payment and a store of value. But use of commercial bank money, in turn, relies on both its relative efficiency and public confidence that it can be exchanged for central bank money in the form of cash.” Similarly, Carney (2021) notes that, “although the vast amount of money in circulation is private money, it is anchored in public money. . . . The paradigm of strict banking regulation and supervision with central banks overseeing the financial system has proven the most effective way thus far to avoid the instability and high economic costs associated with the proliferation of private and public monies.”

This suggests that a key ingredient in maintaining public confidence in any future privately issued cryptocurrency – by which we mean stablecoins tightly tethered to the Canadian dollar<sup>11</sup> – would be full and unconditional legal convertibility between these assets and Canadian dollars issued by the Bank of Canada. That way, holders of stablecoins – much like those who hold commercial bank deposits – would know they could convert their crypto stablecoins immediately into Canadian dollars issued by the Bank anytime they wished.

Some commentators argue that allowing such full and unconditional convertibility between the two types of currency could result in bank runs in times of stress that could seriously disrupt the flow of credit in the economy, as happened in

countries such as Iceland and the United Kingdom during the 2007–08 global financial crisis. We believe, however, it is important to keep that risk in perspective. Anyone with a reasonable amount of financial resources can already tap a few keystrokes and quickly convert bank account balances into, say, Government of Canada treasury bills at any time.

Allowing full and unconditional convertibility between stablecoins and money issued directly by the central bank would, in a digital world, simply make it easier for people with more modest financial resources to continue enjoying the option of holding currency issued by the Bank of Canada whenever they wished. In addition, if a run on stablecoins ever occurred, it would be far better that the money run to the domestic banking system or to the central bank than to a crypto platform outside Canada.<sup>12</sup> It would also conveniently enable the Bank to recirculate the funds it receives and provide support to liquidity challenged but solvent entities within the financial system.

### **Stablecoin Platforms Should Be Strictly Regulated**

While full and unconditional convertibility into a central bank issued currency is a necessary condition for public confidence in a future stablecoin, it is not sufficient. To limit the risk of a future run on the currency, stablecoin holders need to be confident that holding some of their savings in that form would not expose them to risk of loss due to failure to perform or default by the issuer of the cryptocurrency. They would also want assurances that they would be unlikely to experience any risk

11 We limit our further discussion of privately issued cryptocurrencies to Canadian-dollar-linked stablecoins, as we anticipate convertibility would require backing in some kind of high-quality, Canadian-dollar-denominated asset and/or strict regulation.

12 Money running to commercial banks in Canada would occur due to the long-standing trust Canadians have in their large domestic banks.

of loss or delay in making or receiving payments due to an operational failure or sabotage of the cryptocurrency platform. And they would need to be confident that their cryptocurrency transactions and holdings would remain anonymous to the extent permitted by law.<sup>13</sup>

Together, the preceding points suggest that stablecoin cryptocurrency platforms should be strictly regulated and supervised from both a business conduct and a prudential perspective if the stablecoin represented a claim on or legal liability of the private-sector operator of the cryptocurrency platform.<sup>14</sup> The need for such tight oversight would be reinforced by the likely high systemic importance of these platforms in the Canadian financial system.<sup>15</sup> History has shown that Canadians and the firms with which they transact prefer using only a small number of payment platforms: VISA and Mastercard, for example, replaced a plethora of credit cards issued in the 1960s and '70s, while Interac dominates debit card payments. As a result, major network economies are likely to favour

a small set of private cryptocurrency platforms for payments purposes. In addition to potential competitiveness concerns, if most payments flow through those platforms, a failure of any one of them could seriously disrupt the financial system, with major economic and financial consequences for Canadians.

From a prudential perspective, the problems encountered by money market funds in some advanced economies during the global financial crisis suggest that stablecoins should be tightly linked to their underlying assets so that the cryptocurrency's market value closely tracks that of its underlying asset, even in times of systemwide stress (see Box 1). This is especially true if stablecoins were to be widely used by the public for payment purposes.

There are two ways such a link could be enforced in practice. One option would be to insist that such cryptocurrencies be fully backed by deposits with the Bank of Canada or very high grade, liquid short-term debt instruments such as Government

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- 13 The amount of anonymity permitted by law for both cash transactions now and crypto transactions in the future is likely to recede in any event because rules and regulations in the area of anti-money laundering, countering the financing of terrorism and tax-reporting requirements for fairly large transactions in any form are becoming more stringent over time.
- 14 A recent US report by the President's Working Group on Financial Markets, the Federal Deposit Insurance Corporation, and the Office of the Comptroller of the Currency put out specific recommendations in this regard (see President's Working Group 2021). On the flip side, over-regulation that limits the attractiveness of stablecoins should be avoided. For example, if a stablecoin is clearly tightly linked to the Canadian dollar, it would not make sense to treat it as a separate currency from a tax perspective and expect the public and business community to compute capital gains and losses on the stablecoin every time they transacted in it. Such a requirement clearly would disincentivize the use of stablecoins or other cryptocurrencies for most payments.
- 15 The Financial Stability Board has issued recommendations to deal with regulatory, supervisory and oversight concerns with respect to the development of global stablecoins – that is, stablecoins that become mainstream as a means of payment and/or as a store of value in multiple jurisdictions. See Financial Stability Board (2021) for these recommendations and the status of implementation in different jurisdictions. Many of these recommendations would apply in the case of single-currency stablecoins tethered to the Canadian dollar.

### Box 1: Ensuring Confidence in Stablecoins

Money market funds were first introduced in the United States in the 1970s; over time, they have become popular in many other jurisdictions. Initially, their portfolios consisted of government treasury bills and other highly rated, short-term debt instruments. As interest rates declined, however, many of these funds began investing in more complex and opaque instruments such as highly rated, structured finance products and in assets with longer duration in order to generate higher returns for their unit holders while still offering the ability to redeem their units on demand. A loss of confidence in the ratings of some of those assets during the 2007-08 global financial crisis led to losses in those funds that triggered major investor runs. The funds had to liquidate assets quickly to meet those redemptions, which served to disrupt the functioning of short-term debt markets in Europe and North America in the midst of the crisis.

Stablecoins could pose similar issues. Fitch Ratings (2021) cites the example of Tether, the largest stablecoin issuer, which is backing its stablecoin with a wide range of assets. As a result, Fitch Ratings opines that the rapid growth in stablecoins might give rise to potential asset contagion risks that could have implications for the functioning of short-term credit markets.

of Canada treasury bills to ensure they retain their full value in good times and bad.<sup>16</sup> Alternatively, more liberal investment strategies could be tolerated provided the issuer of the cryptocurrency were willing to submit itself and its cryptocurrency platforms to the same prudential oversight that is applied to systemically important banks and financial market infrastructure. That would include regulatory capital and liquidity requirements for stablecoin

issuers, so that they have some “skin in the game” to cover losses and runs before accessing central bank liquidity facilities or deposit insurance. In return, the cryptocurrency holdings should also be backed by deposit insurance, and the issuer should be granted access to central bank lender-of-last-resort facilities to help contain the risk of runs. After all, by their very nature, these cryptocurrencies likely would be highly systemic from a financial stability perspective.

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16 The Basel Committee for Banking Supervision (2021) suggests that the regulatory capital treatment for digital replications of traditional assets, such as a crypto stablecoin, should depend on how closely the market value of the crypto asset tracks that of the traditional asset it is meant to replicate. The most favourable capital treatment proposed would require that the difference in market value between the digital crypto asset and its replicated traditional asset should not exceed 0.10 percent, or 10 basis points, on more than three days over a one-year period. If that condition is not met, then the capital requirements would be revised up accordingly. The problem with such a definition for a stablecoin meant to be widely used for settling transactions is that it is most likely to break down in times of stress, when public confidence most needs it to hold. Hence, such a definition is potentially highly procyclical and not a suitable framework for defining how tight a link should be in place between a private crypto replication of the Canadian dollar meant to serve as a widely accepted medium of exchange and Canadian dollars issued by the Bank of Canada.

Hence, there should be virtually no tolerance for risk of loss to users from a failure of the underlying assets or of the issuer of a stablecoin.<sup>17</sup>

Operational risks associated with the issuer or operator of a cryptocurrency platform also should be tightly managed and supervised, given the likely high systemic importance of cryptocurrencies. This is especially true in the current environment, where operational risks are on the rise due to the increasing complexity of crypto platforms and currencies, combined with the growing threat of state-sponsored and private cyber attacks that could disrupt the operations of any crypto platform.

The same holds true with respect to conduct, where, in our social media world, there is very limited public tolerance for misconduct by businesses or governments. Consequently, stablecoin users likely will want and expect public authorities to provide assurances on an ongoing basis that there are tight safeguards over the handling of individuals' financial and personal information and that the information contained in financial transactions is not being used without the explicit consent of the parties to the transactions. Refusal to provide such consent should not be considered grounds for denying anyone the use of the currency.

At the same time, regulation should ensure it does not lead to monopolistic silos. One step in this direction is for legislation, regulation and standards setting to guarantee interoperability. Tighter privacy legislation and open and effective competition

laws are but a couple examples of areas Canadian policymakers and regulators should investigate to create a more contestable market for stablecoins.

Finally, users and holders of stablecoins will want to be confident that the currency will be accepted unconditionally as a form of payment by their counterparts – including for transferring funds back and forth between a cryptocurrency and accounts with a regulated financial institution and between cryptocurrencies issued in different jurisdictions around the world – whenever they wish to conduct a transaction. They will also want to be assured that those payments will be settled immediately in real time with no risk of being reversed at a later date.

This all argues in favour of having the Bank of Canada stand ready to ensure that the critical services provided by systemically important Canadian-dollar-linked stablecoin platforms will continue to operate even if the stablecoin issuer encounters stress, and be prepared to provide immediate liquidity support when needed to ensure the smooth functioning of real-time cryptocurrency payment systems. But the price of supplying such guarantees should be requiring that stablecoin issuers and their cryptocurrency platforms agree to submit themselves to central bank oversight to give Canadians comfort that such platforms operate in accordance with international best practices.<sup>18</sup>

For example, in the foreign-exchange market, an institution known as the CLS Bank guarantees settlement of foreign currency transactions on a global basis between banks in what is called a

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17 In providing public support for stablecoin platforms, the federal government should be mindful of the increase in contingent liabilities to which such support could give rise on its balance sheet, so that it would continue to be seen as financially credible in its ability to support the financial system of tomorrow. Central bank interventions in the global financial crisis and, more recently, in the pandemic led to significant reductions in the average term of government debt and hence increased exposure to interest-rate risk. This could also arise if the central bank and the government needed to intervene to support a systemically important stablecoin platform or if there were a large public demand for a central bank digital currency. The government should also bear this risk in mind when setting the maturities for new debt issues.

18 This is especially important, as the Bank of Canada will be in charge of overseeing the new retail payments oversight framework, according to the 2021 federal budget (Canada 2021).

payment-versus-payment scheme. That institution is based in the United States and its lead supervisor is the Federal Reserve Bank of New York, but its supervision is conducted on behalf of a network of central banks, including the Bank of Canada, whose currencies are settled through that system. A similar system could oversee any foreign network, such as the one planned by Facebook that proposes to offer stablecoins convertible into (digital) currencies outside its home country.

### MAINTAINING THE CANADIAN DOLLAR AS CANADA'S UNIT OF ACCOUNT TAKES ON ADDED IMPORTANCE IN A CRYPTOCURRENCY WORLD

To extract the greatest benefit from stablecoins while minimizing the risks, it will be important to maintain the Canadian dollar as the primary unit of account for financial transactions within Canada. Most Canadians earn their income in Canadian dollars, pay for goods and services in Canadian dollars, pay taxes in Canadian dollars and invest most of their savings in financial assets denominated in Canadian dollars. Their willingness to conduct their economic and financial affairs in Canadian dollars is supported by the monetary stability provided by Canada's inflation-targeting framework. The Bank of Canada's conduct of monetary policy within that framework has served to keep inflation low, giving Canadians confidence that their savings will not be eroded away unexpectedly by runaway inflation. Consequently, the vast majority of Canadians at this stage are likely to be more interested in conducting transactions using a cryptocurrency tightly linked to the Canadian dollar than one tethered to other currencies or benchmarks.<sup>19</sup>

Canadian authorities should not, however, take that preference for granted. As Carney (2021) points out, the emergence of cryptocurrencies is being driven by advances in cryptography and artificial intelligence, as well as by powerful network effects in social media. The danger is that these forces could combine to offer significant microeconomic benefits that might entice Canadians and Canadian businesses into shifting their financial transactions to cryptocurrency platforms where the units of account bear little or no relation to the Canadian dollar. Although these microeconomic benefits might appeal to some Canadians, they could pose serious risks to Canadian society as a whole from a macroeconomic and financial stability policy perspective.

Consider fiscal policy, for example. If the Canadian dollar ceased to function as the principal unit of account in Canada, governments in Canada would have more difficulty borrowing in Canadian dollars because most of the country's savings effectively would be denominated in another currency – one issued directly by stablecoin platform operators in accordance with the rules governing their platform structures or, more likely, one implicitly controlled by central banks in other countries if the cryptocurrency were closely tethered to a foreign currency such as the US dollar or the euro or to some basket of fiat currencies. In that event, the Bank of Canada would no longer be able to fully support the federal government should it encounter difficulties issuing debt. That could seriously constrain, in turn, the ability of government to support the economy in times of stress. This is not simply a theoretical argument: in the early days of the current pandemic, the Bank was able to provide the federal government liquidity support while keeping a lid on interest rates.

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19 Remember above when we noted that only 3.89 percent of Canadians (in 2019) were using Bitcoin – by far the largest cryptocurrency – in transactions.

In such a world, Canada would also lose its monetary sovereignty. The Bank of Canada effectively would no longer be the monopoly supplier of the currency used by Canadians and in the economy more generally. As a result, the Bank would no longer be able to conduct monetary policy by exerting control over the amount of liquidity circulating in the financial system or over the level of interest rates in Canada. Those parameters instead would be determined by whichever entity controlled the amount of cryptocurrency in circulation (or by the relevant foreign central bank in the case of cryptocurrencies tethered to existing foreign currencies). Canadians would no longer be able to count on a made-in-Canada monetary policy to help the economy absorb shocks.<sup>20</sup>

Making matters worse would be the implications for financial stability in Canada. The loss of the Canadian dollar as the country's primary unit of account would limit the Bank of Canada's ability to backstop the financial system from a liquidity perspective, because it would no longer have the unlimited power to generate the needed liquidity in the required unit of account. The result would be a less stable private financial system that would cease to enjoy the benefits of the public money backstop.

All in all, jettisoning the Canadian dollar as the unit of account would leave the Canadian economy more vulnerable to shocks, much as it was prior to the establishment of the Bank of Canada

in the 1930s. Before Canada had independent monetary policy, fiscal policy had limited ability to smooth macroeconomic business cycles, and bank failures and consolidation were more prominent. This was a world in which shocks generally were painfully absorbed through adjustments to prices and wages in the real economy and much higher unemployment rates when workers resisted wage cuts, rather than smoothed by government fiscal actions and adjustments to interest rates and exchange rates. Such a world is no longer socially acceptable because the economic pain is unlikely to be equitably distributed, but largely borne by the most vulnerable people in our society. Canadians thus should think twice before abandoning the Canadian dollar as the unit of account in their economic and financial dealings: the microeconomic gain might not be worth the macroeconomic pain.

In short, if the important benefits of privately issued cryptocurrencies are to be captured without destabilizing Canada's economy and financial system, any such currencies offered in Canada should be very tightly tethered to the Canadian dollar if they are to be widely used for payments and to satisfy all debts and obligations.

Governments cannot compel Canadians to transact in one currency or another. But what they can do is make it attractive for Canadians to continue conducting their affairs using the Canadian dollar as their unit of account by granting

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20 Brunnermeier, James, and Landau (2021, page 27) emphasize the importance of controlling the unit of account above all other money functions: "As long as transactions are made using that unit of account, the central bank will keep its power in all circumstances. It can fix the overnight interest rate on its own liabilities and, by arbitrage, influence the whole set of monetary and financial parameters. This will be the case even if no payment was made using central bank money, and if (almost) no value was stored in the central bank balance sheet." In an economy based on banking, where banks settle some payments with central bank money, it therefore makes sense for them to write contracts in the same unit of account as their reserves. The bigger concern is if agents were to begin to write contracts in a unit of account specific to a platform rather than the central bank's unit of account – that is, payments no longer linked to provision of bank credit. This would, according to Brunnermeier, James, and Landau (2021, page 28), "destroy the link between the interest rate set by the central bank and the arbitrage that allows monetary policy to have real effects on provision of credit." On this front, we view it as positive that Diem will now include single-currency stablecoins backed by the respective domestic currency where it operates (see Diem 2020).

Canadian-dollar-linked stablecoin platforms access to the Bank of Canada's liquidity facilities, along with full and unconditional convertibility to Canadian dollars issued by the Bank.

The federal government and the provinces could also foster demand for Canadian-dollar-linked stablecoins by ensuring that platforms offering such currency are tightly regulated and backed by deposit insurance. And the federal government and the Bank should continue to ensure that the Canadian dollar retains its purchasing power by maintaining the successful inflation-targeting framework, so that Canadians are not tempted to seek out other cryptocurrencies as a means of avoiding the consequences of inflation in Canada.

## WEIGHING THE TRADE-OFFS FOR A BANK OF CANADA DIGITAL CURRENCY

If stablecoins need to be supported by full and unconditional convertibility into Canadian dollars issued by the Bank of Canada, does that mean the Bank should begin issuing Canadian dollars in digital form?

Even though most payments have migrated to the digital world, there continues to be some demand for paper currency, as we noted earlier. This is no accident. Paper currency offers many features that have been hard to replicate in a digital world. Anyone can use it regardless of their personal circumstances because there is no need to identify the holder of the currency or the parties to a cash transaction; paper money is a direct obligation of the central bank, so there is no concern about the financial condition of the issuer of the money (in Canada, at least); and, because it is in paper form, there is no dependence on any IT systems to hold the currency or conduct transactions. Thus, it is not surprising that some commentators question why a central bank needs to issue its own digital currency. Quarles (2021), for example, likens central bank digital currencies to parachute pants, a (fortunately) quickly passing fad in the 1980s.

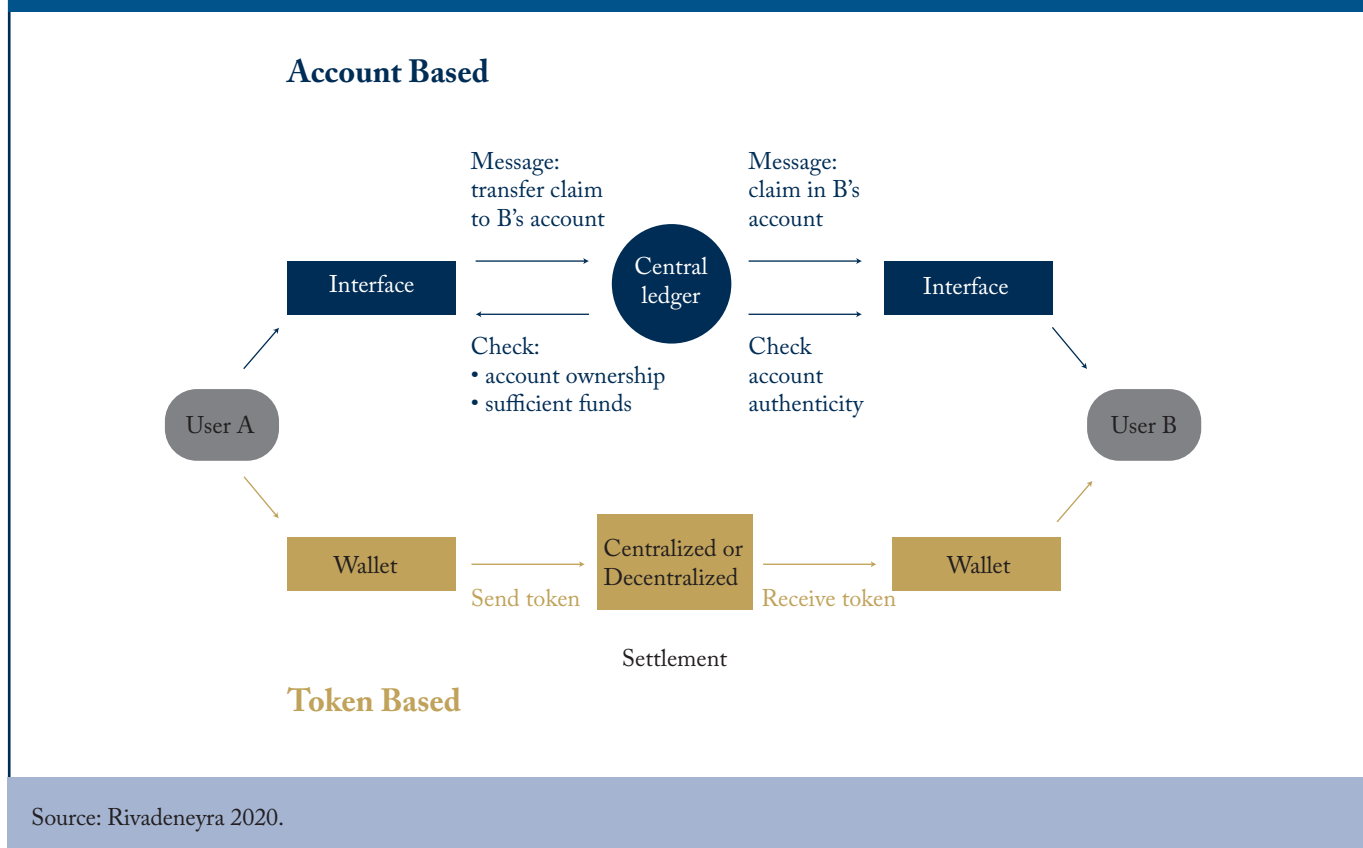
But paper money also has its drawbacks. It is costly to produce and counterfeiting risks need to be managed; the anonymity benefits also might help to facilitate money laundering, terrorism financing and tax evasion; there is no recourse if paper money is lost or damaged; most transactions need to be conducted in person; and it requires access to deposit-taking institutions or at least their automated teller machines to move funds into and out of digital form. With more and more transactions conducted online and across borders, it is no surprise that many people are calling on the Bank of Canada to start issuing Canadian dollars in digital form so that all Canadians can participate in the digital financial world.

Those might be good reasons, but we would like to offer another, compelling one. Having the Bank of Canada issue digital Canadian dollars could play an important role in facilitating the emergence of cryptocurrencies in Canada while helping to retain the Canadian dollar as the country's principal unit of account. Basically, it would make it more attractive for private issuers of cryptocurrencies to issue Canadian-dollar-linked stablecoins because full and unconditional convertibility with the Canadian dollar could be applied in practice in a digital world without necessarily having to involve conventional financial institutions in the process. No longer would conventional financial institutions be needed to move funds between paper money and digital forms – although they too could begin offering their own stablecoins tethered to the Canadian dollar and other assets or currencies. There would, instead, be a direct digital bridge between privately issued cryptocurrencies and a digital Canadian dollar issued by the Bank of Canada.

While it is possible that the issuance of a central bank digital currency (CBDC) might harm the stablecoin business model, as we discuss below, much depends on how such a currency is designed. Moreover, history suggests that the public prefers private offerings that are well designed and regulated (for example, commercial bank deposits).



Figure 2: The Transactions Process under a Token- and Account-based Central Bank Digital Currency



There is also the chance that the modernization of Canada's retail payments system – which advanced significantly in the past year with, for example, the passing of the *Retail Payments Activities Act* – might make some of the benefits of private cryptocurrencies, such as access, efficiency and increased competition, somewhat redundant. If true, then perhaps a CBDC is not a requirement. With so much at stake in terms of Canada's monetary sovereignty, however, and given the speed with which stablecoins are emerging, we do not believe this is a risk worth taking.

If we accept the premise that the benefits of a CBDC would outweigh the costs, the question then is one of design. While there are many dimensions to the different options, at the heart of discussions is whether to issue it as a token – think of this as a digital token replacement for paper cash – or

whether Canadians should be offered their own deposit accounts at the Bank of Canada in what could be called an account-based system. Figure 2 provides an overview of the differences between the two systems.

Beginning with the token world, let's say I am User A and my sister is User B. We each have our digital wallets that store our tokens – much in the same way our physical wallets today carry cash (or, at least, used to). If I owed my sister \$100, I could send a token to her digitally, which would settle in real time and appear in her digital wallet, rather than having to meet in person to conduct the transaction or sending the cash by mail. Note that, at this point, my sister would have \$100 in public money, which would differ from her having \$100 in private commercial bank deposits via an e-transfer.

Settling the transaction could either be decentralized through a crypto-based distributed ledger technology (think blockchain) chosen by the Bank of Canada or centralized at the Bank itself. An obvious advantage of a decentralized settlement process is that it likely would be more resilient to operational disruptions and cyber-attacks because most transactions could carry on even if part of the network was disrupted. By contrast, a centralized settlement process at the Bank would increase the risk because a disruption of its facilities or IT systems could affect the entire payment system and, by extension, the broader financial system and economy.

Alternatively, with an account-based CBDC, Canadians could have their own accounts at the Bank of Canada. So, using the same example as above, I would perform the same digital transfer of funds to my sister as before, but I would do so from my own bank account at the Bank to my sister's account at the Bank. The Bank of Canada would be the central ledger checking that I am who I say I am, and that I have enough money in my account to transfer the funds to my sister, with the ledger also validating that she is who she says she is.

We can thus think of a spectrum for money, with paper cash on one side, commercial bank deposits on the other, and CBDCs somewhere in between.

In selecting the optimal form and design of a CBDC, we assume upfront that the Bank of Canada would not consider competing with private cryptocurrency platforms or with the current

banking system by making its tokens or accounts interest bearing.<sup>21</sup> Having the Bank compete with the private sector for funds would simply end up raising the cost of funds for those institutions – which they would pass down through the supply of credit to households and businesses in the economy – since private lenders would either have to pay higher interest rates on retail deposits or fund themselves with more expensive wholesale debt.<sup>22</sup>

What, then, are the advantages and disadvantages of the two primary designs for a CBDC, where the baseline is that both are non-interest bearing?

There are many dimensions on which to compare token-based and account-based CBDC frameworks. Under both scenarios, the public has a direct claim on the central bank, much like with cash, but unlike with commercial bank deposits, where the claim is on the financial institution itself. Similarly, under both scenarios, if a private cryptocurrency platform should fail, the Bank of Canada must have all necessary information with which to ensure the stream of payments would not be affected by the failure (we discuss this further below).

With no interest rate paid on either a token- or account-based CBDC, Canadians likely would want to take advantage of the features offered by stablecoins and the current electronic banking system, and keep most of their savings with private-sector institutions, rather than shift them into a Bank of Canada digital currency. To see why, consider two scenarios: good times and bad times.

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- 21 The argument for making a CBDC interest bearing is that, in theory, it would create more competition for deposits by forcing incumbents to offer better savings rates on retail deposits, eliminating current cross-subsidization of other expenses (as laid out in Murray 2019). Incumbents would then rely increasingly on term deposits and other forms of savings, which might better match the maturities of their assets and liabilities. While perhaps true, it would also put undue pressure on the central bank to compete with the private sector, as we discuss (among other counterarguments). That said, it will be important to ensure the stablecoin space remains contestable and does not simply end up being dominated by one or two big tech firms without adequate competition and privacy safeguards.
- 22 Alternatively, households and businesses might turn more toward non-bank credit, which has its advantages from a competitive standpoint, but potentially increases financial instability in bad times.

In good times, interest rates paid on savings held with private-sector institutions, while currently low, are still above zero. In bad times, there has been complete trust in private deposit-taking institutions – at least, the major banks – and underlying deposit insurance from the Canada Deposit Insurance Corporation and its provincial counterparts. These safeguards make deposit runs less likely, whether to a central bank-issued digital currency or to other safe assets such as Government of Canada treasury bills. In other words, with stablecoins there would be no change from the current situation, assuming stablecoin platforms were as well regulated and supervised as Canadian financial institutions have been up to now. Indeed, the system has been well tested over the past 15 years by the global financial crisis and now the COVID-19 pandemic. This is not to suggest that a deposit run would be impossible, but simply that recent experience suggests it would not be very likely.

Where the differences between the two types of central bank digital currency systems begin to emerge is with respect to anonymity. A token-based CBDC, mirroring paper banknotes, would allow for user anonymity in a way that the account-based system simply cannot match. This would be important for making digital currency accessible to all Canadians, regardless of their personal economic or social circumstances just as cash is today. It would also, like paper money today, maximize privacy in financial transactions to the extent permitted by law. But a token-based CBDC could make it even easier for illicit transactions such as money laundering or terrorism financing to take place, as well as helping to facilitate tax evasion. In a Bank of Canada account-based system, this anonymity would be curtailed or disappear completely, with loss of privacy the trade-off.

Fraud and operational risks, including cyber risk, would be present in both systems, but, as noted previously, the latter would be a bigger concern in a more centralized account-based system. A token-based CBDC would face the same risk of theft

or loss as cash does today: if lost, there would be no recourse. Such a risk would not exist with an account-based system.

Another dimension of significant divergence is with respect to operational costs for the central bank. Such costs likely would be lower under a token-based system, where they would focus on technology and the central bank's supervisory duties (as we discuss below). Under an account-based system, the much higher costs would include all the consumer-facing functions, such as on-boarding, know-your-client, anti-money laundering, servicing, processing transactions and so on.

An account-based CBDC might make cross-border payments simpler, though that is still unclear. With the central bank sitting on both sides of a transaction, and with some form of digital ID confirming the person or business undertaking the transaction, settlement could occur in real time with little risk. A token-based cross-border transaction that had to operate over different platforms using different currencies might make this more difficult, but not impossible: some private cryptocurrency platforms, such as Binance, already offer clients the ability to convert balances into multiple currencies.

Clearly, some operational trade-offs would need to be considered in determining the merits of the two primary forms of a CBDC. But there is also a broader public policy issue to consider. Some observers are keen to promote the account-based system because they believe it would give public policy makers more information on the finances of Canadians and Canadian businesses. That could then set the stage for more targeted monetary policy actions whereby monetary policy could be used to supply funds to, or withdraw funds from, certain segments of the population or particular industries depending on the policy priorities of the day.

We believe, however, that going down this path would blur the line between fiscal and monetary policy. In effect, it would introduce a *de facto* Modern Monetary Theory world where the central bank is relegated simply to carrying out liquidity

**Table 1: Dimensions of a Token- and Account-based Central Bank Digital Currency**

Dimension	Token-based	Account-based
<i>Claim</i>	<i>On central bank</i>	<i>On central bank</i>
<i>Backstop</i>	<i>Full</i>	<i>Full</i>
<i>Anonymity</i>	<i>Yes</i>	<i>No</i>
Interest-rate remuneration	No	No
Level of balance-sheet conversion from commercial banks	Mild	Mild
Operational costs for central bank	Low	High
<i>Risk</i>	<i>Loss, theft, fraud, cyber</i>	<i>Fraud and cyber</i>
Effect on payments innovation	Low	Depends on design
Ease of cross-border payments	Medium	High
Separation of fiscal and monetary policy	High	Low

Sources: Bank for International Settlements 2021 (in italics); authors' evaluation.

operations mandated by government. As argued in Omran and Zelmer (2021), such a path likely would result in inferior inflation control and would eliminate an important instrument – the independent conduct of monetary policy within an inflation-control framework – that helps give Canadian and foreign investors confidence that they can invest in Canada without fear that their investment returns will be eroded by inflation. In a cryptocurrency world, the lack of such a monetary policy instrument could quickly undermine Canadians' willingness to continue using the Canadian dollar or Canadian dollar stablecoins for their economic and financial transactions.

Table 1 summarizes this discussion on the relative merits of tokens and central bank accounts for a CBDC along the different dimensions. There is no clear, dominant case for one form of CBDC over the other and, of course, there are ways to mitigate the downsides presented for each. As such, some judgment will be required to select the way forward. We are left with the following questions:

- Is maintaining a degree of anonymity, privacy and social inclusion (a plus for tokens) more important than minimizing illegal activity (a plus for accounts)?
- Is maintaining the separation of fiscal and monetary policy (a plus for tokens) more important than possibly easier cross-border payments (a plus for accounts)?

In our view, one option to mitigate concerns over illegal activity would be to give token holders the option of registering their tokens with a financial institution or central bank – think of registering a Presto transit card before adding balances to it. In addition to giving holders peace of mind over the risk of losing their token wallet, it would make it easier to track the use of tokens for illegal activity, which presumably would involve unregistered tokens. This is not to say that all non-registered tokens would be used for nefarious activities, just that the registered tokens are not and so would eliminate a good portion of the need for calculation and tracking. In short, we believe the benefits of tokens outweigh concerns over

potential inconveniences with their use for cross-border payments.

Therefore, given the arguments above, we strongly prefer a token-based CBDC over an account-based version. How could a token-based system be designed to minimize any concern over the stability of stablecoin issuers, still allow for payments innovation, and ensure that both the central bank and the private sector are responsible for the activities they are both best suited to perform?

### DESIGNING A TOKEN-BASED BANK OF CANADA DIGITAL CURRENCY

For the Bank of Canada, the issue with a token-based design would be, as Auer and Bohme (2021, page 5) put it, whether to operate “a complex technical infrastructure or a complex supervisory regime.” Ideally, the design would see customer-facing operational costs borne by the private sector, in exchange for the potential to innovate and compete for the provision of payment services. At the same time, public trust would have to be maintained through the token’s convertibility to public money at all times, no matter the fate of the private-sector entity.

What Canadians face, then, is a fork in the road with respect to what they want their payment providers to be. Currently, the Bank of Canada ensures that the issuance of cash is demand driven and perfectly elastic, and it understands the size of the stock of cash in circulation. The Bank has no concern for the flow of banknotes between

households/businesses other than to ensure that critical services provided by systemically important payment systems continue to function in good times and bad. Households and businesses wanting to access cash can withdraw it from their accounts at commercial banks, and those commercial banks, as a result, have balance sheets that are heavily regulated, have accounts at the central bank and have access to liquidity facilities from the central bank.

This situation would be possible in a new world of private cryptocurrency issuers. Auer and Bohme (2021) label such a scenario “indirect CBDC.” In this case, the Bank of Canada would issue a CBDC through intermediaries, which would fully back households’ and businesses’ claims on the CBDC with accounts held at the Bank. This would mimic the current system of cash and commercial banks.<sup>23</sup> Auer and Bohme propose that claims should be on the intermediary itself, which would bring into question whether this truly was a CBDC, but we see no reason why the claim could not be on the central bank itself, as is the cash one currently takes out of a commercial bank.<sup>24</sup> Intermediaries in this scenario could be commercial banks, which would then involve a regulatory and supervisory system similar to the one we have now. If intermediaries were expanded to include payment service providers, this would, of course, require a significant expansion of the regulatory and supervisory model (in other words, a complex supervisory regime) to ensure that a bankruptcy would not compromise the ability of legitimate owners to access their

23 In Canada, the reserve requirement for banks is strictly speaking zero (in normal times there is a small settlement balance to grease the wheels of the overnight market). As a result, if full backing for private cryptocurrency issuers were required, the Bank’s balance sheet might grow, and we would have to determine what grows on the asset side of the balance sheet. Whatever assets they held, likely safe government debt, they would be competing with commercial banks for these assets, as the latter must hold assets as collateral.

24 See the Appendix for a review of the balance sheets of central banks, commercial banks, households/businesses and payment providers under our version of an “indirect CBDC” and other options. With an “indirect CBDC,” the full backing would be a combination of a CBDC on the payment provider’s balance sheet and reserves held at the Bank of Canada.

funds and to continue to use the payments systems (Bank of England 2021). This central bank support would entail not only heavy regulation, but the need for non-bank payment service providers to have accounts at the central bank.

To the extent that these payment providers were linked to banks, this would also increase interconnectedness, which could exacerbate the effects of the bankruptcy of a payment service provider. Here, it would be important for the assets side of a payment provider's balance sheet to include those held outside the banking system – for example, in Government of Canada treasury bills – to help contain the risk of contagion.

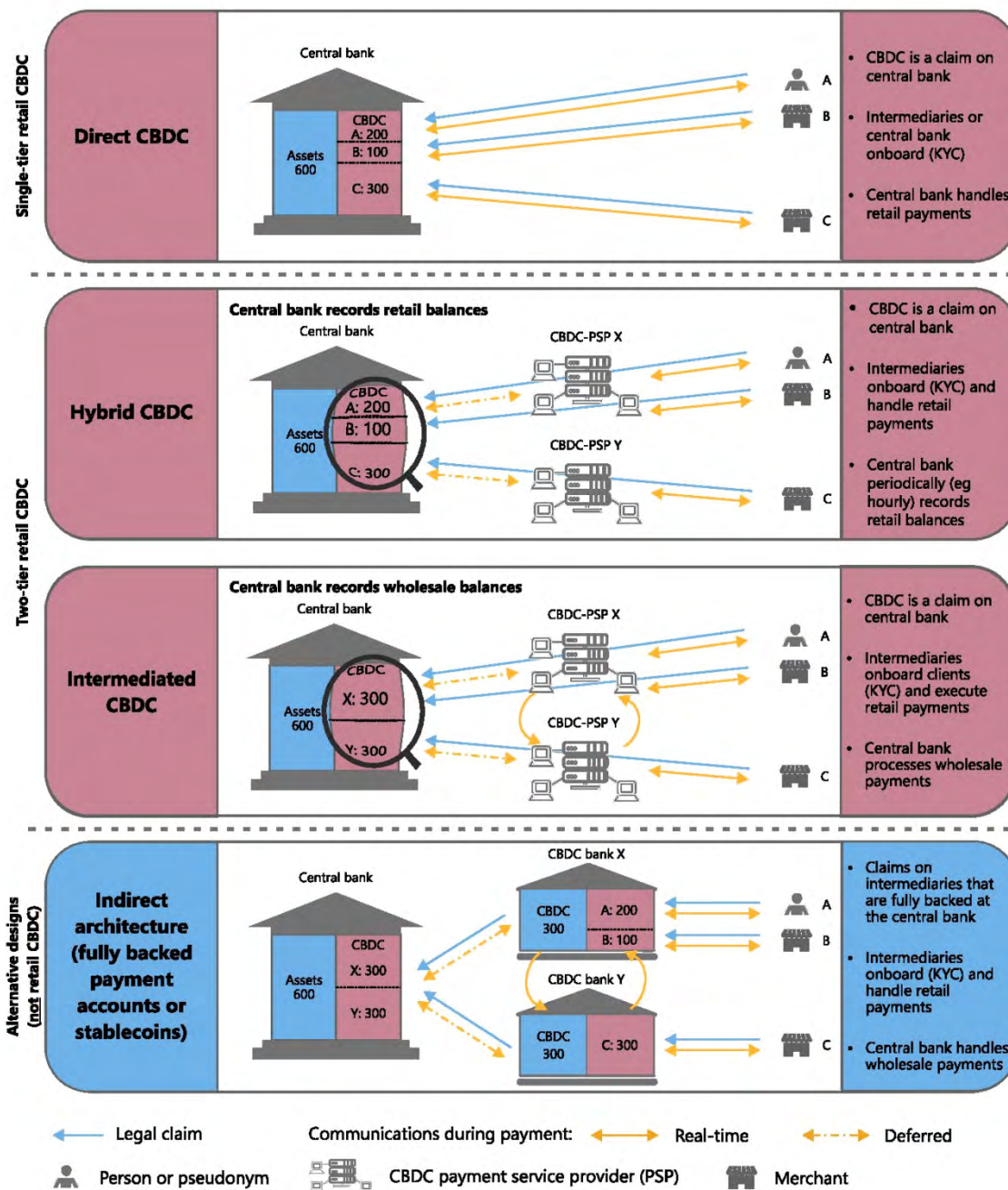
At the other end of the spectrum, the central bank would take centre stage. Here, a “direct CBDC” would involve the central bank's handling all payments, having all the retail information and updating the ledgers after each transaction (in other words, a complex technical infrastructure). The first problem is that this would put the central bank in the position of having to maintain all retail transaction information, which would create privacy concerns as well as public pressure on the bank. Furthermore, the current payments system deals with outages and offline payments (Auer and Bohme 2021). Intermediaries, like credit card networks, take on this risk and charge a fee; the central bank, if it took on this job, would also take on this risk, which would not be ideal for a public institution. Furthermore, payment providers often bundle and innovate services, including “automated financial advice, integration with consumer platforms, and connection to other financial products like consumer credit” (Auer and Bohme 2021, page 11). A central bank, again, is not well suited to take on these roles.

As Auer and Bohme (2021) point out (and can be seen in Figure 3), there are options within these two extremes. In what they term a “hybrid CBDC,” the Bank of Canada CBDC would never be on the

balance sheet of a payment service provider, which would negate bankruptcy concerns (much as with a “direct CBDC”). Instead of maintaining all retail transaction information, the Bank would own only a backup copy, with associated digital signatures. If the Bank balked at taking ownership of any form of retail data, it could keep track only of wholesale transactions, but this would increase the cost of supervising private payment service providers to ensure that all retail records were appropriate and easy to deal with in the event of a bankruptcy – what Auer and Bohme (2021) call an “intermediated CBDC.” Either way, supervision here would be critical to ensuring that private payment providers perform all required customer-facing regulatory requirements. Figure 4 summarizes the trade-off a central bank faces between the supervision it must provide (complex supervision) and the information it must hold (complex infrastructure) under the three potential options: an indirect, direct or hybrid/intermediated CBDC.

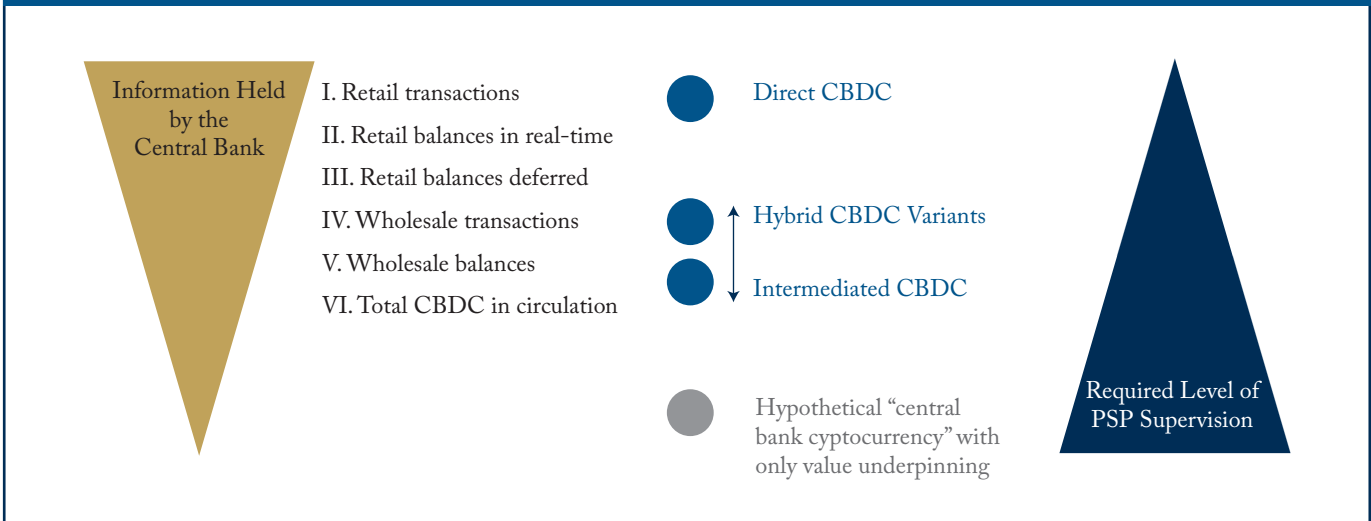
In our view, keeping a CBDC as close to cash as possible while allowing for the innovation and competitiveness of stablecoins is a critical consideration in the design of a token-based CBDC. We thus lean toward the “indirect CBDC” design side of the spectrum, with the caveat that it should be a claim on the central bank, not on the intermediary. Since that would allow the CBDC to be on the balance sheet of the payment provider, bringing bankruptcy concerns into play, prudential supervision/regulation would be critical. If policy makers decided it was too risky to allow a CBDC to sit on the balance sheets of these payment providers, we would favour an “intermediated CBDC,” as that would alleviate our concern over the central bank sitting on too much personal information, since its information set would focus only on wholesale transactions/balances. Regardless of design, however, financial institutions will play a critical role in convertibility to and from a CBDC.

Figure 3: Retail Central Bank Digital Currency Architectures and Fully Backed Alternatives



Source: Auer and Bohme 2021.

**Figure 4: Information and Supervision Requirements for Central Banks under Different CBDC Designs**



Source: Auer and Bohme 2021.

## CONCLUSION

The emergence of crypto assets, especially privately issued cryptocurrencies, offers the promise of major gains in the efficiency and safety with which Canadians pay for goods and services and invest their savings. But a way needs to be found to reap those microeconomic rewards without jeopardizing the important macroeconomic benefits that come with Canada’s current monetary sovereignty. Otherwise, Canadians might increasingly be tempted to use crypto assets for payments and savings purposes that are linked to foreign currencies or other assets through various foreign social-media platforms, as crypto issuers strive to exploit the network effects that could arise from exploiting the payment information flowing through their platforms.

This suggests facilitating the emergence of privately issued stablecoins that are tightly linked to the Canadian dollar, so that the Canadian dollar continues to serve as the unit of account for most transactions in Canada. That way, Canadians would be able to reap the benefits of stablecoins without

ceding control over key macroeconomic and financial stability policy levers.

Canadian-dollar-linked stablecoins could become attractive to Canadians by making them convertible into cash issued by the Bank of Canada and by ensuring that the stablecoins are well designed and well regulated from business conduct, competitive, operational, privacy and prudential perspectives. Bank-issued digital Canadian dollars could also encourage the private sector to introduce Canadian-dollar-linked stablecoins by enabling convertibility to take place digitally without having to rely on physical banknotes. Stablecoin platforms could also be given access to central bank liquidity facilities to ensure that transactions settle in good times and bad, and access to deposit insurance to help mitigate the risk of runs.

We believe that such a Bank of Canada digital currency should be issued in token form, with decentralized technology for settling transactions, so that most of the benefits Canadians currently enjoy with paper banknotes can be retained. From a design perspective, our preference is for the “indirect CBDC” version of Auer and Bohme



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(2021), whereby the CBDC mimics cash/banknotes on the Bank of Canada's balance sheet – that is, the Bank concerns itself only with the stock of the CBDC. The CBDC, therefore, could pass over the balance sheet of the intermediary, such as a financial institution or payment service provider. Our version of an “indirect CBDC” differs from that of Auer and Bohme in that the claim would be on the Bank, not on the intermediary.

Such a CBDC design comes with the need for an increased regulatory and supervisory burden on the intermediary, especially in the case of payment service providers, given the potential disruption to the financial system a failure would cause. As part of this increased regulatory and supervisory burden, payment services providers would be granted access to the Bank of Canada's balance sheet, as commercial banks are today.

Finally, governments should never lose sight of the fact that, while they can encourage Canadians to use crypto assets that are replications of the Canadian dollar, they cannot compel them to do so. But Canadians are more likely to favour Canadian-dollar-linked stablecoins if governments facilitate innovation in the payments world so that Canadians can benefit from ongoing advances in payments systems and crypto-technology, and if the federal government and the Bank of Canada continue to honour their commitment to maintaining the purchasing power of the Canadian dollar by keeping inflation low.

## APPENDIX:

This appendix details the balance sheets of different stakeholders in a new world of stablecoins and a token-based CBDC. For payment providers, we show their balance sheet under “Indirect CBDC” (our version) and “Direct CBDC.” Note that, for the “Hybrid” or “Intermediated” CBDC, the balance sheet would resemble the “Direct CBDC” case where the CBDC is never on the balance sheet of the payment provider. A *bold/italics* in the balance sheet represents a change in a new world of private crypto and central bank digital currencies.

Table A1: Balance Sheets of Stakeholders

	Assets	Liabilities
The Bank of Canada’s Balance Sheet	Government of Canada debt Loans to financial institutions	Banknotes (cash) <b>CBDC</b> Deposits Government of Canada Settlement balances – financial institutions <b>Settlement balances – payment providers</b> <i>(for our version of “Indirect CBDC” only)</i>
Commercial Bank’s Balance Sheet	Loans to households/businesses Cash Settlement balances <b>CBDC</b>	Deposits
Household/Business Balance Sheet	Cash Deposits Investments <b>Stablecoin</b> <b>CBDC</b>	Debt
Payment Provider (stablecoin issuer) – “Indirect CBDC”	<b>Settlement balances</b> <b>CBDC</b> <i>Government of Canada debt</i>	<b>Stablecoin</b> <b>Equity</b>
Payment Provider (stablecoin issuer) – “Direct CBDC”	<b>Settlement balances</b>	<b>Stablecoin</b> <b>Equity</b>

Source: Authors’ compilation.

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