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Decrypting "Crypto"

Introduction

Good afternoon.

Some of you here today may have purchased bitcoins or one of the other cryptocurrencies or products that have launched in recent years. I'm not here to give you investment advice about them. Rather, I want to share with you our current thinking about these virtual products.

Investors worldwide have taken an increasing stake in them over the past few years, even as their market values have fluctuated widely. Around 2,000 crypto products are now available, with dozens more launching every month.[1] Trading volumes have grown almost 100-fold in just the past two years. Media interest in them has inflated at a similar pace, often including a thick layer of hype. The recent collapse in the market valuations of many cryptoassets—almost 40 per cent of those originally launched are now worthless—seems to have done little to dampen enthusiasm.[2]

Some investors see these products as potentially world-changing; others as an example of "popular delusions and the madness of crowds."[3] Possibly both are right. New financial or technological innovations often ignite market bubbles as users race to discover their most popular and profitable applications. Think of the "dot-com" bubble of the late 1990s, when prices of many Internet-related stocks shot into the stratosphere. While that period ended in tears for many investors, a handful of new companies that rose at that time, such as Google and Amazon, have brought about profound changes in the way we work, play, shop and live.

The Bank of Canada is not responsible for regulating these crypto products. Indeed, the term "cryptocurrencies" is a misnomer. We prefer to call them

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[1] See coinmarketcap.com.
[2] There is now even a website, deadcoins.com, that lists the failed cryptoassets and the reasons they collapsed.
[3] C. Mackay, *Memoirs of Extraordinary Popular Delusions and the Madness of Crowds* (London: Richard Bentley,1841).

I would like to thank James Chapman and Scott Hendry for their help in preparing this speech.

"cryptoassets" because, as I will discuss in a moment, they don't do a good job of performing the basic functions of money. But as they evolve, they may touch on the Bank of Canada's core functions: monetary policy, financial stability, payments and currency.

In my remarks today, I'll put these crypto developments in context, discuss the need for globally harmonized regulations and highlight the Bank's research and responses to public interest in cryptoassets.

Currency and trust

Bitcoin and many similar products were created in the hope that they would become the money of the future. How well do they stack up against the money of the past and present? This includes bank notes as well as bank deposits that can be accessed with a debit card or—for your parents' generation—by cheque.[4]

Let's consider bank notes. One of our core functions at the Bank of Canada is to provide bank notes that Canadians can use with confidence. This is perhaps the most visible aspect of our work.

We all take for granted that if you want to buy a coffee you can pay with cash. The coffee shop deposits the cash in the bank and uses the funds to pay for beans and baristas' wages. The cash is universally accepted by all parties. Why is that?

First, bank notes are a simple but effective technology for keeping track of who is paying how much to whom. Because a bank note is a physical thing, you can't spend the same note twice. Many Canadians still prefer the simplicity of cash for small transactions. And cash works even when systems are down.

Second, bank notes offer privacy for your transactions. You can use them without giving anyone your personal or banking information. Using cash avoids the risk of being hacked or having your card compromised. Privacy is a controversial attribute given that bank notes are a preferred medium of exchange for all kinds of illicit transactions. But for entirely legitimate reasons, most people place a high value on the privacy of their financial transactions.

Third, we incorporate into our bank notes the most advanced security features to ensure they are difficult to fake and easy to authenticate. We also work closely with law-enforcement agencies to deter counterfeiting.

Fourth, the acceptance of money is a matter of social convention. People accept cash as a means of payment because they know that others will do the same. This convention is enshrined in law: Canadians understand that we and the Royal Canadian Mint have a monopoly on the issuance of what's called legal tender, the official money used in Canada.

Finally, bank notes are denominated in dollars that offer stable purchasing power. The Bank of Canada helps preserve their value by keeping inflation low, stable and predictable. Since the early 1990s, when we adopted our inflation-

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[4] Credit cards are another popular method of payment in Canada, but they are not considered money because they do not store value. They only commit the card holder to pay later using another method.

targeting monetary policy framework, we have maintained inflation close to the midpoint of our 1 to 3 per cent target range. This has allowed Canadians to make spending and investment decisions with the confidence that the future purchasing power of their money is secure and predictable.

After a quarter century of successful inflation control in Canada, overall price stability has become the new norm. But some of us can recall the impact on households of spiralling inflation during the 1980s, when the interest rate on mortgages hit 20 per cent. Even today, while many countries have tamed inflation, some like Venezuela are coping with hyperinflation that is causing widespread hunger and hardship.

The trust and confidence that Canadians have in our notes and in their purchasing power is based on our track record and reputation.

Cryptoassets: what's their story?

So where do cryptoassets fit into this picture?

Their proponents argue that the great benefit of Bitcoin and other forms of crypto cash is that they eliminate the need for public institutions like a central bank or large commercial banks. People using this system, they argue, don't have to trust an individual or institution. That's true, but they do have to trust the technology.

Cryptoassets are so called because they use cryptography to validate transactions and prevent fraud. Records are kept through blockchain technology—a digital ledger stored on thousands of computers worldwide that keeps track of every coin or token issued. Anybody trying to fraudulently use their crypto cash multiple times will likely be caught by the validation process on all these computers.

The use of encryption gives cryptoassets a similar level of privacy as bank notes. And they are as light and borderless as air. You can transfer them across town or across continents much more easily than you can a suitcase filled with $100 bills.

A key feature of most cryptoassets is that their value is not tied to the dollar or other national currencies but has its own unit.

Blockchain provides a mechanism for creating new tokens that makes it difficult to generate more in any way other than as prescribed by its underlying software. To create new units of value, cryptoassets must typically be "mined" by running energy-intensive computer computations. This is, in effect, a form of pre-programmed monetary policy: the purchasing power of the crypto tokens is determined by supply and demand, where the supply is limited by the enabling software.[5] This pre-programmed mechanism for creating cryptoassets was originally a key selling point. Those who believed that central banks could not be trusted to maintain the value of money were attracted by the idea of a money that is untouched by any public institution or individual.

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[5] However, Bitcoin allows the possibility of "forking" or the creation of two separate versions of the blockchain and two different cryptoassets. This implies that Bitcoin's claim to complete control of monetary growth is overstated. See J. Abadi and M. Brunnermeier, "Blockchain Economics," August 25, 2018.

Ironically, this very mechanism has turned out to be its fundamental flaw. When the limited supply of tokens meets large flows of demand from enthusiasts, the result—as we have seen—is wild fluctuations in the value of cryptoassets. These fluctuations have drawn in even more speculative money, which has further amplified the price movements. Indeed, many Canadians who purchased bitcoins in 2017 reported that they did so for "investment" purposes—and that really means speculation.[6]

The implication of these price movements is that the purchasing power of cryptoassets is far less stable than that of almost any sovereign money. The value of a bitcoin in US dollars topped $20,000 in the last year and is now down to around $6,000. Such wide price movements make it unlikely that the current crop of cryptoassets would ever be used as money for ordinary purposes when there is a stable national currency.

Cryptoassets are also very expensive to use. Transaction costs were high in 2017—as much as $55 per transaction—compared with almost zero for cash.[7] These costs have come down since then, but if transaction volumes push the limits of the network again, costs will jump back up.

In short, the current crop of cryptoassets is not about to replace the Canadian dollar or other national currencies. They are products that may be largely of interest to three kinds of users:

- investors, who should be fully aware of the risks they are taking;
- residents of countries where there is no trustworthy national currency; and
- those undertaking illicit transactions, including tax evasion, money laundering and terrorist financing, for which the property of pseudonymity makes them an ideal way to move funds.

The crypto ecosystem

So far, I have been talking about digital tokens launched with the ambition of becoming a form of currency. Now, many digital tokens are being created without any such ambition.

Every month, dozens of new crypto products are launched through initial coin offerings (ICOs). In an ICO, investors purchase a new digital token in exchange for cash or for other, more established cryptoassets. Some of these resemble the initial public offerings that private companies use to raise capital by offering their stock to the public for the first time. In this way, they are like crowdfunding—a means to raise equity capital without jumping through all the regulatory hoops needed to issue publicly traded securities. Other ICOs offer the purchaser the right to use services on a platform that has yet to be built—and are thus more like the economic equivalent of a gift card. In yet other cases, the promised benefits to the purchaser are more nebulous.

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[6] See the results of the 2017 Bitcoin Omnibus Survey conducted by the Bank of Canada.
[7] See Bitcoin average transaction fee.

Those ICOs that function in a similar way as shares in a new company raise all the same issues as any other stock offering. Their value is based on the profits from some enterprise, so investors need to be able to verify that the enterprise actually exists and keep track of what it is doing with the funding it raises.

In practice, ICOs have not always met that standard. For example, failure to meet funding targets hasn't always resulted in the return of money to investors. And in cases where funding targets were exceeded, it's not always clear how ICOs are using the extra money.

Thus, while there are certainly advantages to a flexible, technologically advanced method of funding innovative enterprises, investors in ICOs need to be wary of fraud and misrepresentation.

Given the steady introduction of new types, crypto products are often hard to classify. Many will prove to be short-lived.

Yet it would be a mistake to dismiss all these innovations as fleeting fads. Some products may turn out to be smart and useful—by finding better, cheaper, more competitive ways of filling an actual need. If they do that, they could also challenge the existing business models of established financial institutions. For example, if the risks are properly managed, cryptoassets could potentially serve as a new funding tool, allowing small businesses to find the capital they need. Some also argue that cryptoassets could deliver financial services to segments of the population that are underserved by existing financial institutions.

Even if the products themselves ultimately fail, they advance the development of technologies that are likely to be useful for a range of other purposes. Cryptoassets spurred the development of distributed ledger technology (DLT), which may have many valuable applications. At the Bank of Canada, through our Project Jasper, we have been exploring the potential use of DLT to streamline the settlement of financial transactions and the associated back-office activities.[8] This technology may have many other uses, such as registries for anything from land to commodities, trade finance and parolees in China.

Although cryptoassets themselves exist only in cyberspace, they connect with the real economy and the financial system at various junctions—comprising a kind of crypto ecosystem. One point of contact is the direct use of these products to pay for goods and services over the Internet. A second is ICOs.

Third, certain investment products in the mainstream financial system are linked in some way to the valuations of cryptoassets. These include derivatives contracts that have been launched on some commodity exchanges and exchange-traded funds.

A fourth important point of contact is crypto exchanges, where cryptoassets are traded for money or for other cryptoassets. Crypto exchanges have been set up in different ways, which makes them hard to classify. Some exchanges have an

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[8] See Could DLT underpin an entire wholesale payment system?

economic function similar to banks: they hold cryptoassets on behalf of their clients, so the client gives up direct control of the cryptoassets themselves and has a claim on the exchange.[9] Other crypto exchanges function more like electronic trading platforms for cryptoassets.

The regulatory arena

The newness of crypto products and the fact that they claim to be delivering some of the same services provided by regulated financial institutions raises key questions. What risks could they pose? Should they be regulated? If so, how?

As I mentioned earlier, the Bank of Canada is not responsible for regulating crypto products. Nonetheless, we have been examining their potential impact on the stability of Canada's financial system. We've also been participating in international research on them, through the Financial Stability Board (FSB), G20 and G7.

Regulators need to examine cryptoassets from a number of angles:

- the potential risks to the stability of the financial system,
- the integrity of markets and protection of investors, and
- protection against abusive financial flows such as money laundering and terrorist financing.

The consensus of policy-makers is that crypto products do not yet pose financial stability risks.[10] This is in part because, despite their rapid growth, crypto products have a relatively small footprint in the financial system. The market capitalization of all cryptoassets was recently estimated at $230 billion and the volume of trading in these products at about $15 billion annually. While these seem like big numbers, they are dwarfed by other global financial markets: global equity markets alone have a market capitalization of around $100 trillion. Moreover, crypto products are not deeply interconnected with the mainstream financial system. For example, there is little evidence that commercial banks are investing in cryptoassets or accepting them as collateral.

In this context, the immediate priorities are to address the other two issues I mentioned: investor protection and abusive financial flows. In these areas, the relevant regulators are working hard to adapt their frameworks to cover these new products.

But things are evolving rapidly. Cryptoassets are growing in size, complexity and interconnectedness. As the underlying technologies and the design of crypto products evolve, we need to be ready to reassess how they might affect financial stability. Some potential aspects include the integrity of payment systems, bank business models, and the exposures of financial institutions and infrastructures. The FSB and related bodies are monitoring this evolution closely.

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[9] In such cases the crypto exchange holds the only copy of the key to the client's cryptoassets. The cryptoassets are thus accessible only to the exchange; the investor holds a claim on the exchange.

[10] See the recent FSB report and letter from the FSB Chair to G20 Finance Ministers and Central Bank Governors.

Regulators also have to be forward-thinking about what kind of action may be required. That means putting in place a framework that is sufficiently adaptable so when new products emerge that potentially pose new risks, regulatory agencies will be ready.

Crypto products are already regulated in many countries at the national or regional level. But in many jurisdictions the regulatory framework is far from complete. Also, given that cryptoassets are global in scope and not confined by borders, an emerging problem is the gaps between regulatory regimes.

Different jurisdictions have adopted different regulatory approaches, depending on how they have defined these assets. When a new product is launched, is it classified as a payment instrument, a security, a commodity or none of the above? Should crypto exchanges be called banks, financial market infrastructures or something else? These classifications differ across jurisdictions and in some cases remain nebulous.

Beyond these differences in classification, the regulatory treatment of these assets differs. In China, the response has been to ban them. In Japan, authorities are creating a framework to manage the risks associated with their growth.

Such differences among regulations globally, together with the incompleteness of regulation in many jurisdictions, open room for promoters to engage in regulatory arbitrage, developing new products to exploit them. Regulators must decide how far they need to go in harmonizing their approaches with other countries. Differences in the regulatory treatment of these products for controlling money laundering and terrorist financing are a particularly pressing concern.

Such factors pose key challenges for regulatory agencies. Data and a consistent means of collecting them are required to assess emerging risks. And an agreed system is needed to classify new products by their attributes and economic functions.

At the same time, we need to avoid regulation that is so heavy-handed or cumbersome that it stifles innovation. New crypto products could deliver more of what the public wants and bring more competition and financial inclusion to the system. Developments in this space could spur the growth of technologies that have important positive spinoffs. These concerns must be carefully balanced.

The regulatory framework in Canada is still a work in progress, but a number of steps have been taken by the federal and provincial governments, which share jurisdiction in this area.

In 2014, the federal government amended Canada's anti-money laundering legislation to include businesses dealing in cryptoassets. Regulations based on the legislation are now being finalized. The Canada Revenue Agency also published a note on the tax laws that apply to cryptoassets. And the Financial Consumer Agency of Canada has a useful backgrounder on the risks and tips for using cryptoassets.

At the provincial level, the Canadian Securities Administrators issued a staff notice in 2017 on crypto offerings, warning investors about issues such as volatility, transparency, valuation, custody and liquidity, as well as the use of

unregulated cryptocurrency exchanges. The notice also offers guidance on the applicability of securities laws and what steps businesses should take if they are raising capital through ICOs.

Central bank digital currency

At the Bank of Canada, we are also considering the potential implications of these developments for our own core functions. In particular, we are assessing how we could respond if cryptoassets were to evolve in a way that undermines our ability to provide Canadians with a means of payment with stable purchasing power that they can use with confidence. This is related to our ability to implement effective monetary policy as well as to the security and finality of settlement we provide through our bank notes. While we do not have any doubts currently about our ability to fulfill our mandate, contingency planning is important: the changes driven by technology may be rapid.

In this context, one of our priorities is to explore under what conditions, if any, we might recommend to the government that we issue our own digital currency. At the same time, we are studying key design questions related to a central bank digital currency (CBDC), such as what form it might take and whether it would be anonymous like cash. As it turns out, the questions of “under what conditions” and “in what form” are closely intertwined.

The design of a CBDC has important implications for its risks and benefits. For example, some major reasons for caution about a central bank digital currency are concerns that it could become a vehicle for illicit transactions or that it could have significant negative implications for financial intermediation. Unless such risks could be managed through appropriate design, the Bank would not recommend issuing such a currency.

Ultimately, then, this exploration is going to require a unique combination of economics, technology and business strategy as well as thorough consultations with all stakeholders. We have assembled a multidisciplinary team to do this work and will provide more details as the research unfolds. We are also exchanging information with other central banks, notably the Swedish Riksbank, which is well along in examining CBDCs. The results of our work in this area are available on a special page on our website.[11]

Conclusion

It’s important that Canadians benefit from financial products and services that are better, cheaper and more flexible. At the same time, we will continue to keep a close eye on the risks associated with cryptoassets. We are working with our domestic and international partners to ensure they do not pose a risk to the Canadian or global financial system.

Canadians need universal access to means of payment that they can trust. As advances in technology open up new opportunities and transform the financial

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[11] See Digital Currencies and Fintech.

system, we at the Bank of Canada will continue to do what is needed to maintain that trust.