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The potential effect of a central bank digital currency on deposit funding in Canada

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Abstract

A retail central bank digital currency denominated in Canadian dollars could, in theory, create competition for bank deposit funding. We look at the potential implications increased competition for deposit funding could have on income and liquidity for the six largest Canadian banks, using regulatory data from 2018 and 2019.

Bank topics: Digital currencies and fintech; Financial institutions; Financial stability
JEL codes: G, G1, G10, G17, G21, G32, E5 E41, E44, O

Résumé

Une monnaie numérique de banque centrale de détail libellée en dollars canadiens pourrait, en théorie, susciter une concurrence quant au financement des banques par les dépôts. Nous examinons les répercussions potentielles qu'une concurrence accrue dans le domaine du financement par les dépôts pourrait avoir sur les revenus et la liquidité des six grandes banques canadiennes à l'aide de données réglementaires de 2018 et 2019.

Sujets : Monnaies numériques et technologies financières; Institutions financières; Stabilité financière
Codes JEL : G, G1, G10, G17, G21, G32, E5 E41, E44, O

Introduction

Consumers can hold money in the form of cash or as deposits in commercial banks. Both cash and bank deposits can be used a method of payment as well as a store of value. In this sense, we can say that for consumers, cash "competes" with bank deposits.

We expect a central bank digital currency (CBDC) would compete with bank deposits. This would be true even if a CBDC were designed not to create competition, for example by limiting the size of transactions or by not earning interest. The increased competition occurs because a CBDC is a new safe asset that can be used, like cash, as a store of value and as a method of payment for transactions.

Bank deposits are a relatively inexpensive and stable source of funding for banks. Increased competition for deposits could provide incentives for banks to consider other sources of funding. Net income and liquidity (net cash inflows) could decrease, and business models could change over time to reflect the new normal. These changes could affect financial stability, all else being equal, by reducing funding maturity and banks' internal capacity to generate capital.

To examine this possibility, we conduct a sensitivity analysis using regulatory data from 2018 and 2019 (before COVID-19) to assess how introducing a CBDC could affect net income and liquidity as a result of increased competition. We find that the six largest Canadian banks[1] could absorb the potential shock to net income and liquidity but experience temporary declines in profitability.

For our analysis, we consider three hypothetical scenarios of CBDC adoption and assume that the CBDC is designed to have similar features to cash. Using these adoption scenarios, we analyze how:

- increased funding costs would affect profitability, and
- decreased funding stability (shorter-term funding) would affect funding liquidity.

To isolate the specific impact on income and liquidity, we make the following assumptions:

- Banks maintain their lending book or fee income.
- Banks maintain their business model.
- Banks can replace deposit funding with other sources of funding.
- Funding costs are not sensitive to deposit demand.

[1] The six largest Canadian banks are Royal Bank of Canada (RBC), Toronto Dominion Bank (TD), Bank of Montreal (BMO), Canadian Imperial Bank of Commerce (CIBC), Bank of Nova Scotia (Scotiabank) and National Bank of Canada. These banks are federally regulated deposit-taking institutions and are designated as domestic systemically important banks (D-SIBs) by the Office of the Superintendent of Financial Institutions. Throughout this note, we use the terms "D-SIBs" and "banks" to refer to these institutions collectively.

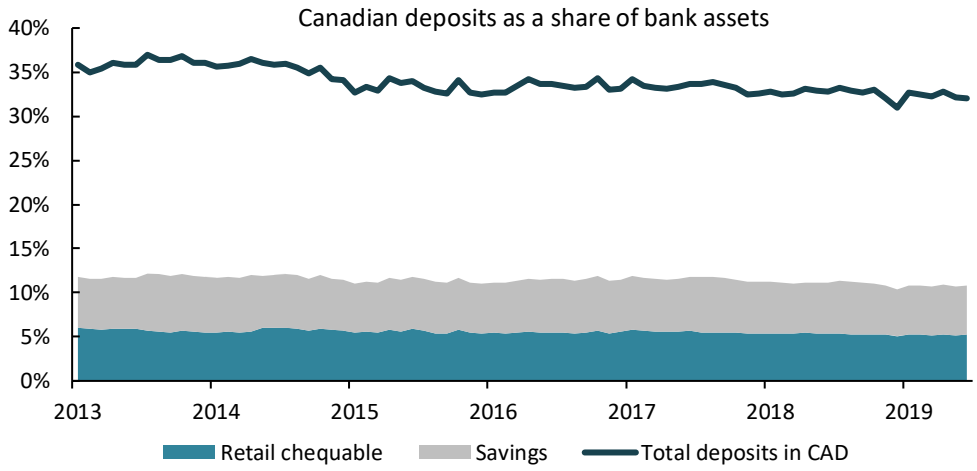
A CBDC would compete with retail bank deposits

As a contingency, the Bank of Canada is building the capability to issue a cash-like retail CBDC (Bank of Canada 2020). The CBDC will be denominated in Canadian dollars, not earn interest and be geared to retail customers (individuals and small businesses).

The adoption of CBDC will depend on the design, how the banking sector reacts to competition from CBDC, how consumers respond and how the financial system evolves as new technologies are introduced. Under the current design assumptions, the deposits most sensitive to the introduction of CBDC appear to be retail deposits denominated in Canadian dollars (i.e., chequable deposits).

Chequable deposits denominated in Canadian dollars fund approximately 5 percent of total bank assets (**Chart 1**). To account for potential spillover effects, we also consider alternative scenarios that include non-chequable retail deposits (savings) that may be sensitive to a CBDC, assuming bank customers use them as a store of value. The size of deposits in chequing and savings accounts is slightly more than 10 percent of total bank assets.

Chart 1: Retail deposits sensitive to central bank digital currency fund 5 to 10 percent of bank assets



Sources: Regulatory fillings of deposit liabilities (K4) and balance sheet (M4) Last observation: December 2019

The rate of adoption determines how much deposit funding is at risk

To explore the possible effects of a CBDC on bank funding, we consider three levels of adoption using the current demand for bank notes, balances of personal bank deposits and comparable payment methods (**Table 1**). These are scenarios to explore the potential impact on banks and are not meant to be adoption forecasts.

Table 1: Adoption scenarios based on cash and deposit balances (as at April 2019)

Adoption scenarios		Balances (Can$ billions)	Share of bank assets (%)	Share of total Can$ deposits* (%)
A	Cash outstanding	90	2	5
B	Chequable deposits	280	5	16
C	Chequable and savings deposits	585	10	33

*Including retail, small business and wholesale deposits
Sources: Regulatory filings of deposit liabilities (K4)

The scenarios that we consider are the following:[2]

- **Scenario A** assumes that the quantity of deposits that could be vulnerable to a CBDC is approximately the same as the quantity of cash outstanding: Can$90 billion.[3] This could occur, for example, if outstanding cash remained in circulation at the current level and an additional Can$90 billion of CBDC was issued, reducing bank deposits. Given that cash represents only about 2 percent of bank assets and 5 percent of deposits denominated in Canadian dollars, it is unlikely that this scenario would have a significant impact on bank funding.
- **Scenario B** assumes that all retail chequable deposits denominated in Canadian dollars would face competition from a CBDC. This is equal to approximately Can$280 billion. Despite being a traditional source of bank funding, these deposits contribute to a relatively small share of assets (5 percent) and Canadian-dollar deposit funding (16 percent). Increased competition for chequable deposits therefore appears to be manageable for D-SIBs. This scenario would occur if a CBDC had all the features, convenience and trust of chequing accounts.
- **Scenario C** speculates that all retail chequable and savings deposits denominated in Canadian dollars would be vulnerable to a CBDC (Can$585 billion). Consumers in this scenario choose to give up interest on their savings, this may take place if there were a loss of confidence in the Canadian banking system and Canadians looked to a CBDC for the safety of central-bank backing.

The payment methods a CBDC most closely resembles are debit, cheque and cash. In 2018, payments by consumers using these three methods, both in stores and online, amounted to Can$243 billion, Can$65 billion and Can$93 billion, respectively (see **Appendix** for details, TSI 2019).[4] Another large payment category ("other") comprises pre-authorized bill payments, wire transfers and other bank transfers. The combined value of these "other" payment methods is Can$264 billion, part of which could be replaced by a CBDC if the

[2] This is not an exhaustive list of all possible scenarios. Others may be considered; however, these provide a range of outcomes that can help us get an appreciation of the impact on banks of the introduction of CBDC in terms of profitability and liquidity.
[3] Bank of Canada note liabilities (formerly K1) as at December 31, 2018.
[4] The values reported are for stock of payment, not flows or turnover of payment accounts and therefore should be regarded as rough estimates.

design allowed for these types of payment. The combined value of debit, cheque and "other" payment methods is Can$571 billion.

Profitability and funding liquidity could be negatively affected

To reduce the outflow of deposits, banks could increase the interest paid to those depositors that have high price elasticity of demand. Banks would also need to replace lost deposits with other sources of funding that could be costlier and more volatile. These actions could result in reduced profitability for banks, all else being equal (see also Chiu et al. 2019).

Profitability

To evaluate how sensitive net income would be to CBDC, we analyze an increase in the effective interest rate for deposits affected in each scenario by 25 basis points (bps), 50 bps and 184 bps. The largest increase reflects the effective wholesale term deposit rate[5] as at the fourth quarter of 2018. **Table 2** reports the impact on net interest margins, net income before taxes and return on equity (ROE) across the D-SIBs. We assume that bank clients adopt CBDC within one quarter and that banks do not have chance to pass these increased funding costs on to borrowers.

Table 2: Average impact on interest income for the six largest Canadian banks

		Average		
Adoption scenario	Increase in effective interest rate on retail deposits (bps)	Impact on net interest margins (bps)	Impact on net income before taxes (%)	Impact on return on equity (bps)
A	25	-1	-0.6	-2
	50	-1	-1.0	-4
	184	-4	-3.0	-15
B	25	-2	-1.4	-6
	50	-3	-2.6	-13
	184	-11	-8.8	-48
C	25	-3	-2.7	-13
	50	-7	-5.2	-27
	184	-23	-18.1	-99

Note: Impact on return on equity is expressed in annual terms; other impacts are expressed in quarterly terms.
Sources: Regulatory filings of Canadian banks' balance sheet (M4) and income statement (P3) as at 2018Q4.

[5] The effective wholesale term deposit rate is approximately six times the effective rate on chequing and saving deposits and is therefore an extreme scenario.

In scenario A, net income before taxes would decrease by between 0.6 and 3.0 percent. Decreases in net income only surpass 5 percent in three out of nine instances, primarily when adoption is high and interest rates are significantly increased (scenario B, +184 bps; scenario C, +50 bps or greater). These results suggest that the increase in the cost of deposits affects net income more than the level of CBDC adoption does. Even with a significant decline in the net income under the most extreme conditions, all else being equal, D-SIBs would remain highly profitable with average ROE declining by less than one percentage point. The average ROE for D-SIBs stood at about 15 percent for the past two years (2018–19).

Although we focus on interest income, fees could also be affected because banks may have fewer accounts held by customers, reducing the associated revenue. Chequing accounts are also an important product that help banks acquire customers and lead to cross-selling of other products. If customers were to move their chequing accounts out of banks, it could have a broader impact on earnings than higher interest costs and reduced revenue from fees. However, cross-subsidization from other products could maintain the demand for transactional accounts, reducing the outflow to a CBDC. Higher interest rates would also reduce the outflow of deposits but would have a negative impact on net income, as we have already shown.

The silver lining of reduced deposit-taking activity would be lower costs associated with maintaining a network of branches. These costs may be fixed in the short term, but fewer depositors would likely cause banks to have less branches, resulting in lower expenses in the long run.[6]

Funding liquidity

A bank's liquidity standing is assessed, in part, by the stability of its funding sources. Stable funding is generally long term, has low price volatility and is less likely to be withdrawn. Stable funding ensures that cash inflows continue to exceed cash outflows so banks can meet their funding needs for an extended period, even during situations of high financial stress.

In recent history, retail deposits have been a stable source of funding. If banks need to replace retail deposits with less-stable, shorter-term sources of funding, the projected number of months that cash inflows exceed cash outflows during stress could be reduced.

For this part of our analysis, we use the net cumulative cash flow (NCCF) regulatory filings to assess the liquidity impact a CBDC would have on the projected number of months with positive cash flows.[7] We use the three adoption scenarios to approximate the volume of

[6] Some D-SIBs have started to reduce their branch networks to some extent, in part to reflect technologies and business models changes. A CBDC could accelerate this trend.

[7] Background information on the NCCF regulatory return can be found on the Office of the Superintendent of Financial Institutions' website.

deposits that could be replaced with less-stable sources of funding. We then assume that these deposits will be replaced with three decreasingly stable deposit products: uninsured deposits and two types of wholesale demand deposits (**Table 3**). The stability of deposits is measured by runoff rates, a measure of how quickly deposits could be withdrawn during a stress event.[8] An increase in runoff rates decreases the number of months into the future a bank's cash inflows exceeds its outflows. The intuition behind this measure is that the greater the months of net positive cash flows, the more time banks have to react to unexpected liquidity shocks.

Table 3: In most circumstance, banks can withstand the liquidity shock of CBDC

	Average projected number of months with positive cash flow (starting point: 6 months)		
Adoption scenario	Runoff rate 1	Runoff rate 2	Runoff rate 3
A	6	6	5
B	6	5	4
C	5	4	1

Sources: Regulatory filings of Canadian banks (net cumulative cash flow), April 2019

With a low rate of CBDC adoption, as in scenario A, the impact on bank liquidity is either null or minimal. If adoption scenario B occurred, there would still be little or no impact from runoff rate 1 and only a two-month decrease in projected positive cash flow from runoff rate 3. The projected cash flows fall materially only when scenario C is combined with decreased funding stability. These results suggest that, all else being equal, D-SIBs could withstand a liquidity shock in the form of shorter-term funding due to the introduction of a CBDC, under most circumstances.

Conclusion

Based on the sensitivity analysis and the assumed design of CBDC we find that DSIBs are well positioned to absorb potential temporary negative effects on profitability and liquidity associated to the introduction of CBDC. Banks have high ROE and liquidity levels, and thus could absorb the shock under plausible adoption scenarios. We only observe a sizable impact on net income in an extreme scenario—when all chequing deposits are affected and the interest expense grows drastically. This scenario is unlikely given the current cost of deposit funding and a CBDC design that does not bear interest . A small increase in interest rates combined with cash-like demand does not pose a threat to the stability of the financial system or to banks' competitiveness in terms of ROE. The results are similar when we look at liquidity: banks will maintain healthy liquidity levels, and liquidity could become a concern only in the most extreme scenario.

[8] The runoff rates are from the NCCF regulatory return, supervised by the Office of the Superintendent of Financial Institutions.

Appendix

Primary Payment Method in Canada

Indicator	2018	Growth (2017–18)	2023 (Forecast)	CAGR** (2013–18)
Value of payment transactions				
Cash	$92.6 bn	1%	$92.2 bn	-2%
Cheque	$63.8 bn	-4%	$49.6 bn	-7%
Debit card*	$242.8 bn	4%	$302.0 bn	5%
Credit card	$594.6 bn	9%	$828.5 bn	8%
All other	$263.8 bn	-3%	$241.8 bn	1%
Volume of payment transactions				
Cash	5.20 bn	0%	5.02 bn	-1%
Cheque	166.8 m	-6%	116.0 m	-9%
Debit card	6,042 m	4%	7,609 m	5%
Credit card	6,118 m	13%	9,351 m	11%
All other	2,602 m	-1%	2,638 m	4%

*The value of cashback transactions has been transferred to cash.
**Compound Annual Growth Rate
Source: Primary Payment Highlights, Canadian Payment Forecast 2019 Report, Technology Strategies International (TSI)

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