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Explaining Unusual Cash Patterns in 2018



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Abstract

There was an unusually large decline of bank notes in circulation in October 2018. Some have argued that this was due to the legalization of cannabis in Canada in mid-October. We consider whether that explanation is consistent with the evidence and conclude that the unusual cash patterns observed in 2018 are more likely the result of an operational event specific to Toronto. Nevertheless, it would be useful to continue monitoring developments in cannabis consumption and its impact on the demand for cash.

Bank topics: Bank notes; Digital currencies and fintech; Financial services
JEL codes: E4, E41, E42, E5, E58

Résumé

La valeur des billets de banque en circulation a accusé une baisse exceptionnellement marquée en octobre 2018. Certains ont avancé que cette baisse était imputable à la légalisation du cannabis au Canada à la mi-octobre. Nous nous penchons sur cette explication pour déterminer si elle concorde avec les données disponibles et en venons à la conclusion que les fluctuations inhabituelles de la valeur des billets de banque en circulation en 2018 sont probablement davantage attribuables à un incident opérationnel survenu à Toronto. Il serait tout de même utile de continuer à suivre l'évolution de la consommation de cannabis et son incidence sur la demande de billets de banque.

Sujets : Billets de banque; Monnaies numériques et technologies financières; Services financiers
Codes JEL : E4, E41, E42, E5, E58

Introduction

The use of cash as a share of retail transactions has been declining in Canada for a number of years. At the same time, however, the value of notes in circulation (NIC) has been increasing steadily since the early 2000s. More specifically, NIC relative to gross domestic product (GDP) has been stable for decades and has even increased in recent years (Engert, Fung and Hendry 2018). Although yearly growth is smooth, the value of NIC fluctuates greatly within any given year, following a predictable seasonal pattern. For example, the growth of NIC spikes in December, corresponding to the holiday season, and is followed by a decline in January. Monthly NIC growth tends to be positive and increasing from February to June, while in late summer and fall, growth of NIC slows before spiking again in December.

Unusual seasonal patterns in 2018

In 2018, the monthly growth pattern of NIC deviated substantially from those seen in previous years and from typical seasonal patterns. The value of NIC rose in August by 1.8 percent (\$1.5 billion) and then fell in October by 1.4 percent (\$1.2 billion). **Chart 1** shows that these changes are large relative to typical monthly NIC growth rates since 2001: the August growth rate is near the 97.5th percentile, and the October growth rate is well below the 2.5th percentile. In fact, the latter represents the largest October decline since collection of these data began in 1935. It is important to understand the reasons for these unusual changes in NIC because there could be implications for the Bank of Canada's understanding of the demand for cash and for the Bank's cash forecasts.

In this note, we use data on financial institutions' cash deposits and withdrawals from the Bank Note Distribution System (BNDS) to study these events. The Bank of Canada distributes bank notes through the BNDS to financial institutions at regional distribution centres (RDCs) located in 10 regional distribution points (RDPs) across Canada.¹ Financial institutions can withdraw notes from the BNDS to meet the demand for cash, or they can deposit surplus notes. (For a description of the BNDS, see Bilkes 1997.) Therefore, current NIC reflect past NIC plus note withdrawals minus note deposits. That is, $NIC_t = NIC_{t-1} + W_t - D_t$, for each period t , where NIC is notes in circulation, W is total withdrawals of notes and D is total deposits. Net withdrawals ($W_t - D_t$) are available at the RDP level and therefore provide an indication of the demand for cash in each region. This refinement is important for understanding the central issues considered here.

¹ The RDPs are Calgary, Halifax, Montréal, Ottawa, Québec, Regina, St. John's, Toronto, Winnipeg and Vancouver. The RDPs roughly correspond to the provinces of Canada; so, for example, the Toronto RDP can be considered the main supply centre of bank notes for Ontario.

Regional patterns in cash distribution

Looking at net withdrawals across the 10 RDPs, we see that the strong growth in August and the large decline in October 2018 occurred at the Toronto RDP (**Chart 2**) but not at other RDPs. For example, there were no unusual seasonal patterns in net withdrawals at the Montréal RDP (**Chart 3**) or the Vancouver RDP (**Chart 4**). Moreover, the strong growth in August and the large decline in October in Toronto was observed across all note denominations, as illustrated in **Chart 5** and **Chart 6** for the \$20 and \$100 bank notes, respectively. (Net cash withdrawals at other RDPs and across other denominations were also examined but are not shown here for brevity.)

Explaining the outliers: Reduced cash demand for illegal cannabis?

Goodhart and Ashworth (2019) suggest that the decline in NIC in October 2018 reflected a reduction in the use of cash for illegal cannabis purchases following the legalization of cannabis on October 17, 2018. The authors argue that cannabis consumers switched from cash purchases in the illegal market to electronic methods of payment in the legal market following legalization, so NIC declined accordingly. They also suggest that this likely represents a permanent reduction of the demand for cash in Canada.²

The Canadian cannabis market (legal and illegal) is large: Statistics Canada (2019) estimates in the national accounts that total cannabis-related expenditures amounted to more than \$2 billion in the fourth quarter of 2018. At first glance, legalization could appear to have had a significant impact on cash use. The evidence, however, does not support a cannabis-based explanation for several reasons: (i) the geographic location of the change in NIC; (ii) the size of legal cannabis sales relative to the change in NIC; and (iii) the pattern of changes in NIC over time and across denominations of bank notes.

(i) As discussed above, the data indicate that the sharp decline of NIC in October 2018 was recorded exclusively at the Toronto RDP, and there is no evidence of unusual NIC declines in other regions. However, a reduction of NIC associated with the legalization of cannabis would be expected to be evident, at least to some degree, in regions across the country. Further, according to Statistics Canada's Cannabis Stats Hub (Economy, Retail Trade tabs), Ontario accounted for only one-fifth of legal cannabis sales reported by merchants in the fourth quarter of 2018.³ Taken together, these findings suggest that the reduction in NIC in October 2018 was unlikely related primarily to the legalization of cannabis.

(ii) The decline of NIC in October is too large to be explained by legal cannabis purchases. Statistics Canada estimates that the legal retail sales of cannabis totalled \$153 million in the fourth

² Note that the October NIC decline is small compared to the total value of NIC, which was about \$89 billion in 2018.

³ See also Statistics Canada Retail trade sales by province and territory.

quarter of 2018 (reported in the Cannabis Stats Hub). And, according to the national accounts, which measures the cannabis market somewhat differently, household final expenditures on legal cannabis products totalled \$307 million in the fourth quarter. Both these measures are much less than the \$1.2 billion decline in NIC.⁴

Including inventory change in the legal cannabis market (from the national accounts) does not change this conclusion. That is, the sum of household consumption (\$307 million) plus inventory accumulation (\$461 million) is much less than the decline in NIC in October. Note that this simple comparison assumes that all of the fourth quarter household consumption and inventory accumulation was financed exclusively with electronic means of payment (instead of cash) and that all of these fourth quarter expenditures occurred only in the last two weeks of October after legalization. (These assumptions considerably overstate the possible impact of cannabis legalization on demand for cash. Further, some part of inventory accumulation would be financed from previous sales for household consumption.)

Finally, most cannabis activity remained in the illegal market immediately after legalization: Statistics Canada (2019) estimates that only about 20 percent of total cannabis sales were in the legal market in the fourth quarter of 2018 (up from 10 percent in the third quarter).⁵

(iii) Looking more closely at the data for the Toronto region, we see that the distribution of note withdrawals across denominations in August was similar to the reversal in October. As shown in **Chart 5** and **Chart 6**, for example, there were large net increases in August in both the \$20 notes and \$100 notes in circulation, followed by reversals in both of these denominations in October. Other denominations follow a similar pattern. Here, it is not clear why the legalization of cannabis in October would have been consistent with increases across denominations of bank notes in August (only in Toronto), followed by symmetric reversals in October (again, only in Toronto).

In sum, expenditures on legal cannabis spread across the country in the latter part of 2018 cannot explain the much larger \$1.2 billion decrease in NIC seen exclusively at the Toronto RDP in October 2018. The legalization of cannabis in mid-October also cannot account for the \$1.5 billion increase in NIC in August 2018.

⁴ Statistics Canada national accounts reports quarterly cannabis supply and use estimates of the legal and illegal economic activities related to cannabis production, distribution and consumption for non-medical and medical uses. The Statistics Canada survey, "Retail trade sales by industry," provides monthly retail trade data directly from a sample of merchants engaged primarily in retailing cannabis and cannabis products, including online sales. This survey excludes, for example, other retail outlets selling cannabis products (such as head shops, liquor stores and pharmacies).

⁵ This could be due, in part, to price differences between the illegal and legal cannabis markets. Statistics Canada (2019) estimates that the price of illegal cannabis remained about \$3 per gram below the price of legal cannabis. Privacy concerns might also have inhibited a transition from the illegal to the legal market; see, for example, The Canadian Press (2018).

An alternative, simpler explanation: Operational event in Toronto

In early August, two banks lost access to their bank notes in their Toronto RDC due to severe flooding in the city. As a result, these banks were unable to make their regular deposits of surplus notes. In addition, the Bank of Canada issued contingency notes to the affected banks so they could rebuild their inventories while their notes were quarantined due to the flood. Thus, there was a large increase in net note withdrawals from the Bank of Canada in August, in Toronto only, across all denominations. Then, in early October, the affected banks regained access to their notes and were able to resume depositing the notes they were holding in the RDC as well as their regular surplus notes. Consequently, there was a large drop of NIC across all denominations in October, recorded only at the Toronto RDP. Indeed, if we consider net cash withdrawals at the Toronto RDP excluding the two banks that were affected by the flooding, the sharp drop of NIC in October (and the increase in August) evident in the preceding charts disappears (**Chart 7** and **Chart 8**).

Conclusion

There was an unusually large increase of NIC in August 2018, followed by a similarly large decline in October. While the legalization of cannabis in October could have had an impact on the demand for cash, the unusual patterns observed in August and October 2018 are more likely due to an operational event in Toronto. Put differently, at this point, the evidence does not support an explanation driven primarily by a movement of cannabis sales from the illegal (cash) market into the legal (electronic) market. Nevertheless, it would be useful to continue monitoring developments in cannabis consumption and its impact on the demand for cash. An important way to improve understanding of these developments would be to collect data specifically on the means of payment for (legal and illegal) cannabis purchases.

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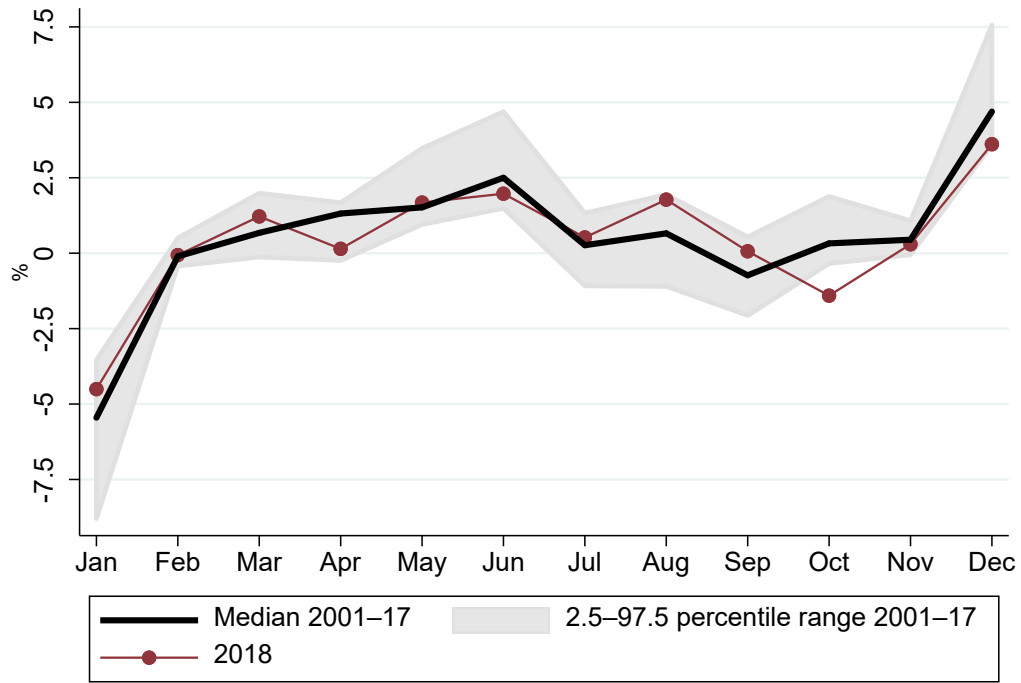
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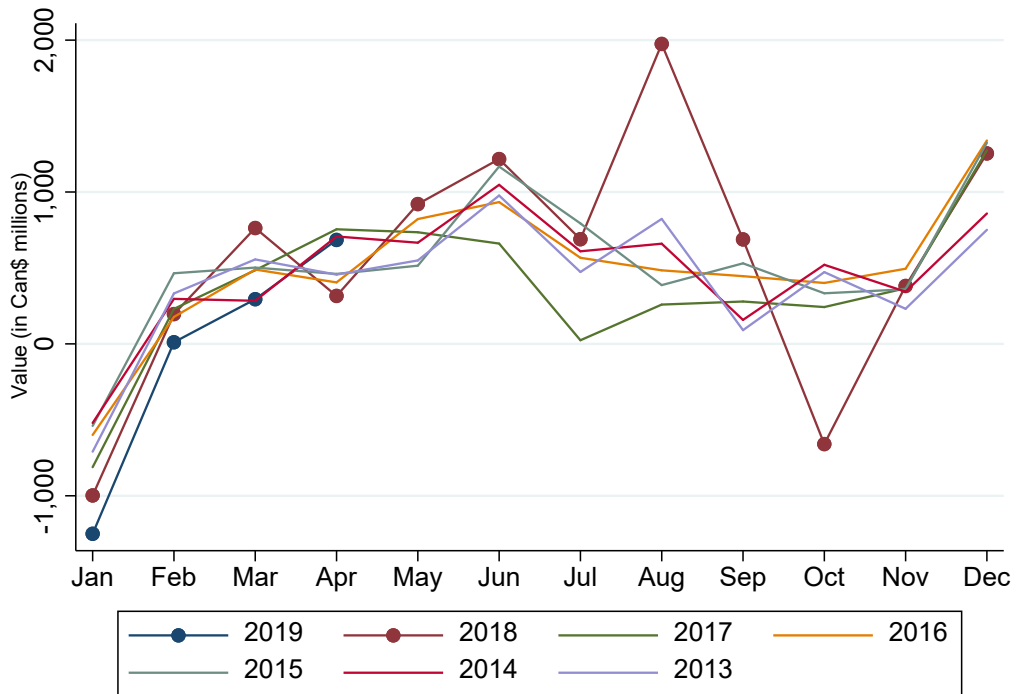
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Chart 1: Month-over-month median and quantile growth in value of notes in circulation, 2001–18



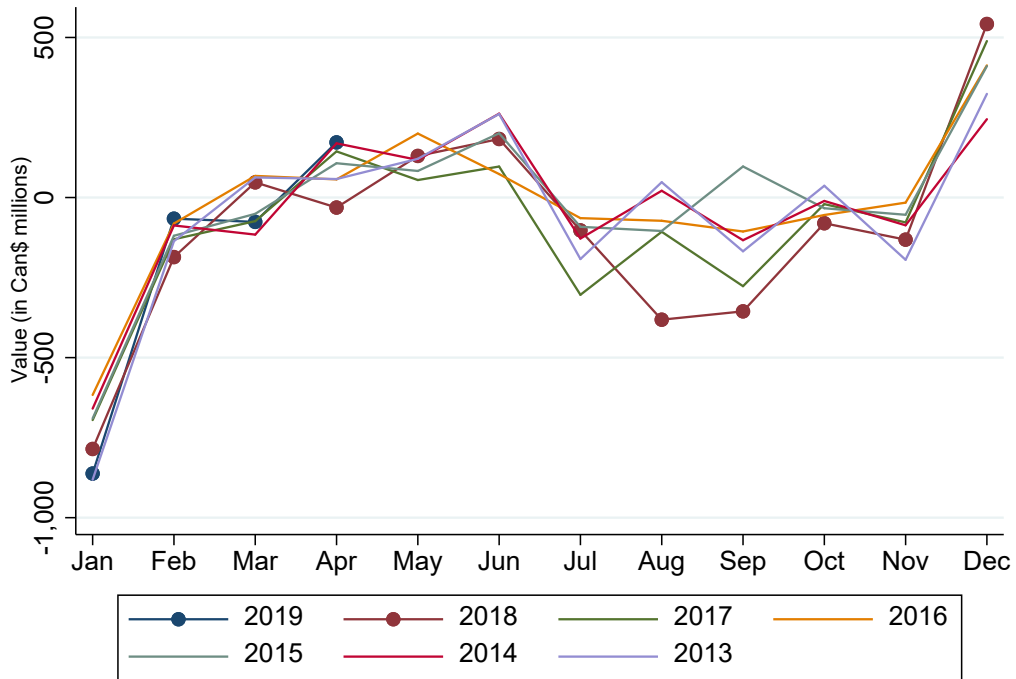
Source: Bank of Canada

Chart 2: Net withdrawal of bank notes in the Toronto regional distribution point



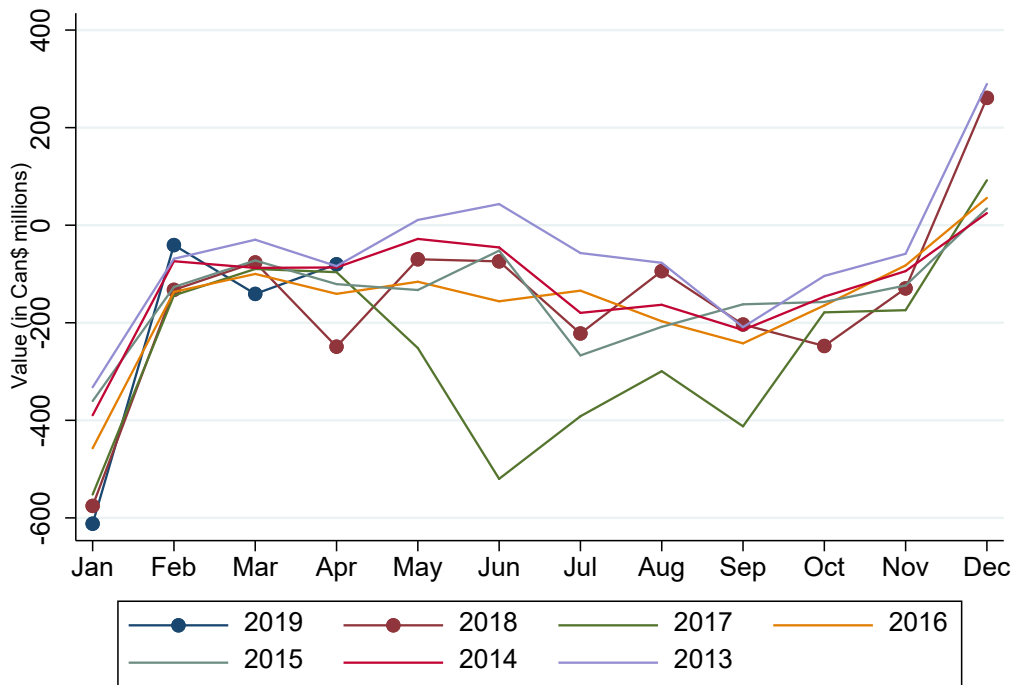
Source: Bank of Canada

Chart 3: Net withdrawal of bank notes in the Montréal regional distribution point



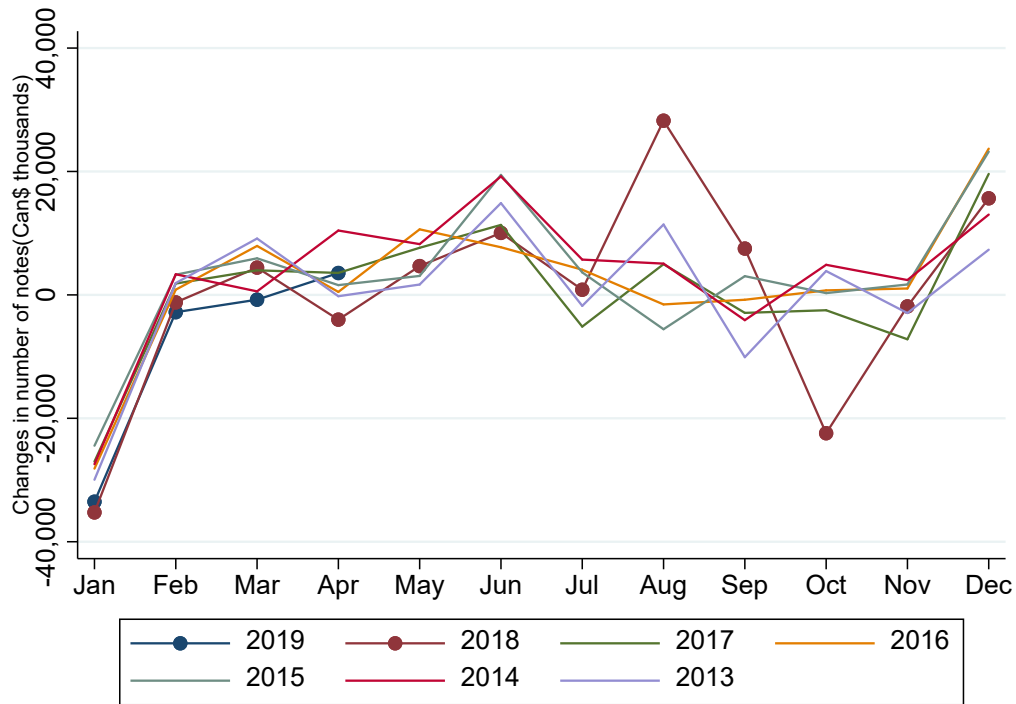
Source: Bank of Canada

Chart 4: Net withdrawal of bank notes in the Vancouver regional distribution point



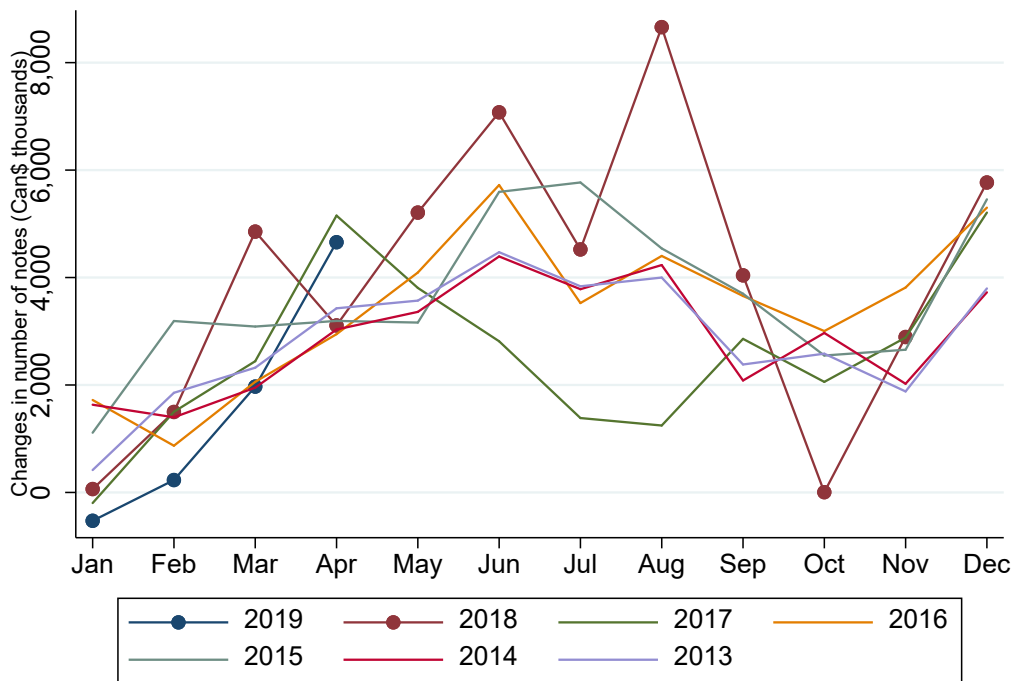
Source: Bank of Canada

Chart 5: Net withdrawal of \$20 bank notes in circulation in the Toronto regional redistribution point



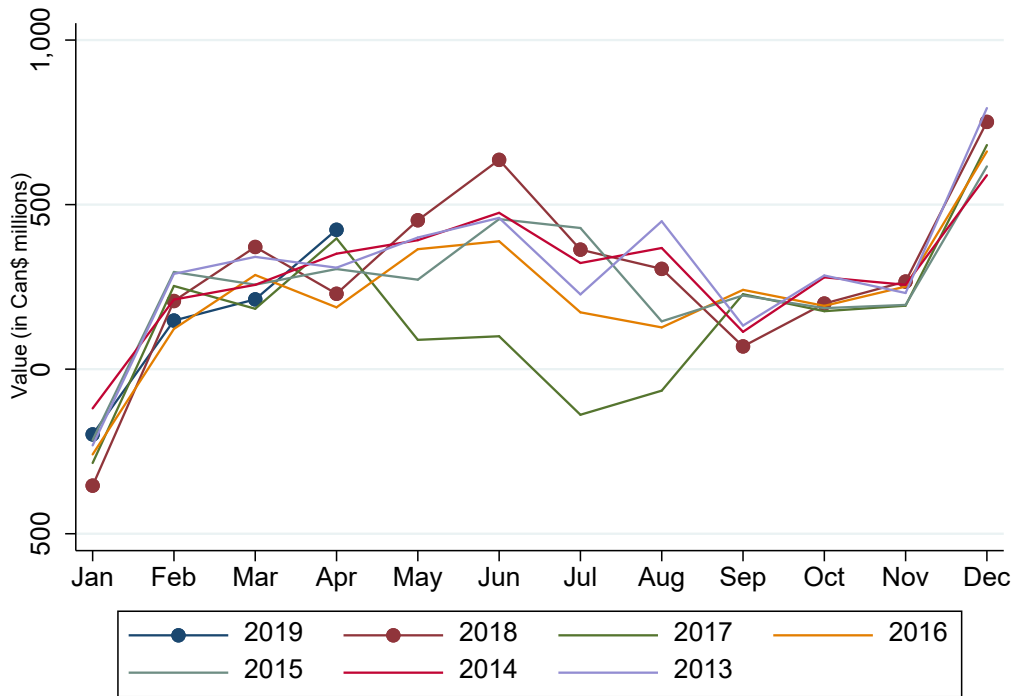
Source: Bank of Canada

Chart 6: Net withdrawal of \$100 bank notes in the Toronto regional distribution point



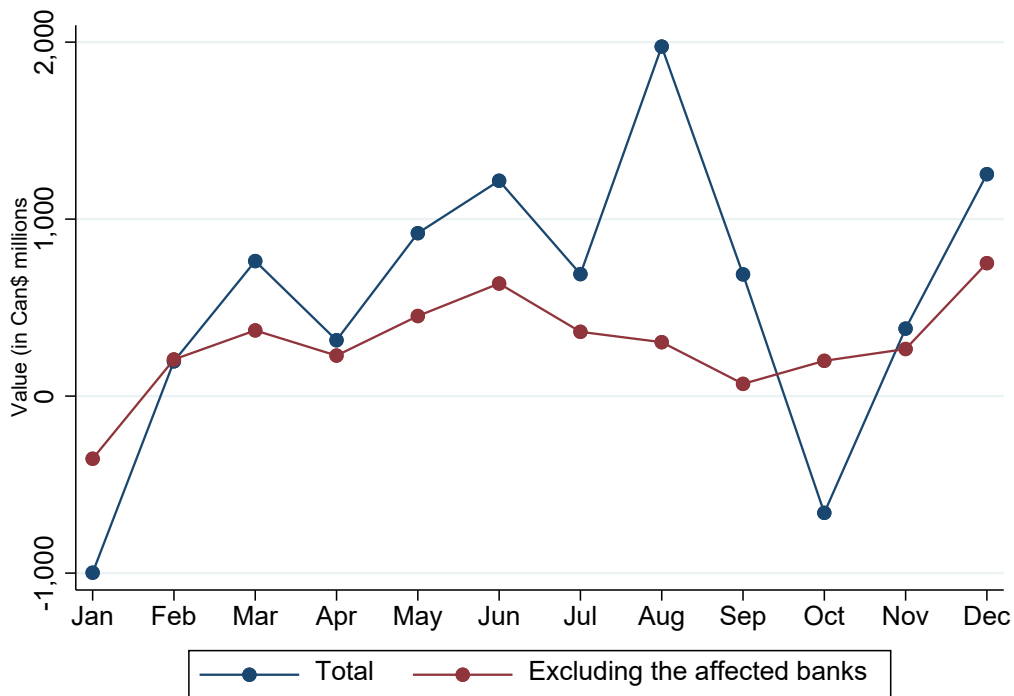
Source: Bank of Canada

Chart 7: Net withdrawal of bank notes in the Toronto regional distribution point, excluding the two affected banks



Source: Bank of Canada

Chart 8: Net withdrawal of bank notes in the Toronto regional distribution point in 2018



Source: Bank of Canada