Payment Habits during COVID-19
Evidence form High-frequency Transaction Data[1]

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[1]The views expressed here are those of the authors and do not necessarily represent the views of the Bank of Canada.

Introduction

- The pandemic accelerated the need for alternative, high-frequency data available in real time.
- In response, lots of central banks now gained access to and use more unconventional data.
- Transaction data (card providers, payment processors, settlement system) comes at high frequency and informs us about consumer behavior: How much do they spend? When and how often? How do they pay?

$\rightarrow$ Real-time high-frequency assessment of

1. cash usage and demand
2. economy (consumption)

This Paper

Research Question:

- How has Covid-19 affected payment habits in Canada?

This Paper:

- Employs data on Interac and ACSS ABM and point-of-sale (POS) transactions.
- Obtains daily measures of payment habits: share of cash transactions, average transactions values, share of on-us transactions.
- Studies the effects during 1st two waves of the pandemic using dummy regressions and local projection models.
- Shows how shifts in payment habits may influence the reliability of transaction data for economic monitoring.

Related Literature

Cash usage and demand following shocks:

- Greek government's imposition of daily ATM withdrawals: European Payments Council (2019), Esselink and van Gijsel (2017).
- Indian demonetization: Lahiri (2020), Chodorow-Reich et al. (2019), Bhandari (2020).
- Covid-19 pandemic: Chen et al. (2020), Ardizzi et al. (2020), etc.

Macroeconomic forecasting using high-frequency transaction data:

- Galbraith and Tkacz (2018), Chapman and Desai (2021) for Canada, Aastveit et al. (2020) for Norway, Cavallo (2020) for the US, and Aprigliano et al. (2019) for Italy.

Transactions data (Interac and ACSS)

Cash transactions:

- Withdrawals (and adjustments) at ATMs in Canada, volume & value.
- ATM can be on premise of a financial institution, off premise bank-owned, or white-label.

Card transactions

- Debit card payments (and refunds) at brick and mortar point-of-sales in Canada, volume & value.
- Chip&Pin, contactless transactions (tap).

Terminology

- Issuing bank: Bank of the cardholder,
- Acquiring Bank: Bank of the ATM owner, or merchant.
- Issuing bank $=$ acquiring bank: the transaction is called "on-us."

Transactions data (Interac and ACSS)

Interac

- Operates the main debit card network in Canada, Inter-Member Network (IMN).
- All ABM withdrawals and debit purchases, on-us and non-on-us, are processed.
- Data is available for every day incl. weekends and holidays.

ACSS

- ACSS operated by Payments Canada further clears the non-on-us transactions that are processed by the IMN.
- Data is available for business days and ACSS clears with a delay.

COVID-19 Data

- Indicator variables for lock-down and reopening periods.
- Oxford Covid-19 Government stringency index combines nine indicators (closures, restrictions, controls, communication)
- Confirmed cases from Centre of Systems Science and Engineering(JHU).

New COVID-19 cases (left scale)
Stringency (right scale)
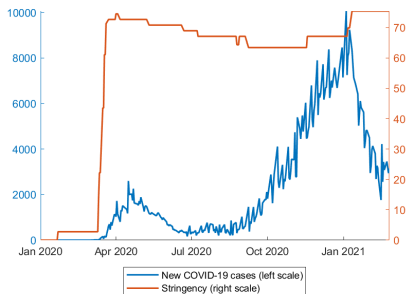
Measures of Payment Habits

- Cash/card ratio: cash withdrawals divided by card transactions,
- Average transactions value: value of transactions divided by volume of transactions,
- ACSS/Interac: ACSS transactions (non-on-us) divided by Interac transactions (non-on-us and on-us).
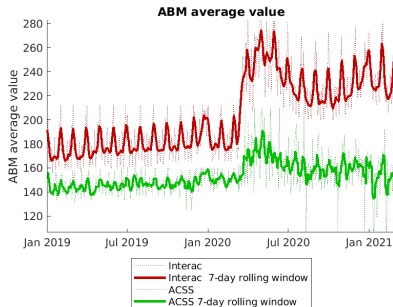
Harmonization of Interac and ACSS:

- Aggregate Interac transactions.
- Next business day if ACSS is open on authorization date; second next business data if ACSS is closed on authorization day.
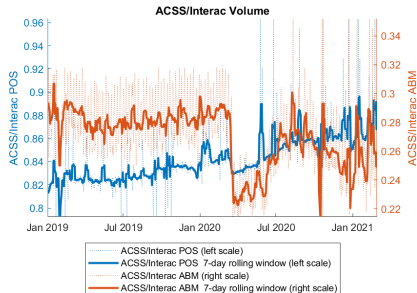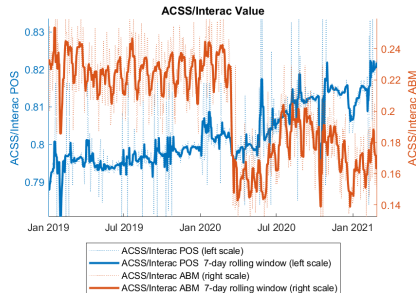- Example: Tuesday aggregates Saturday, Sunday, and Monday, etc.

Cash/Card Ratios
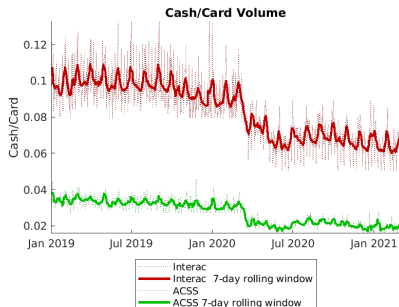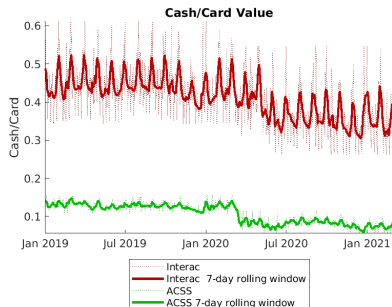
Average Transactions Values
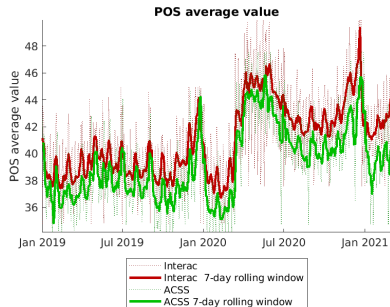
ACSS/Interac Ratios for ABM and POS

Static Model: Dummy Regressions

- Regress measures of payment habits on pandemic-phase dummies.
- Dummies for pandemic phases: lockdown 1 (March-April), reopening 1 (May-October), lockdown 2 (November-January), reopening 2 (February).
- We control for seasonal patterns and trends by including day-of-week, week-of-month, and month-of-year dummies.
- Sample: January 1st, 2019 – February 26th, 2020.

Cash/Card Ratio Lower During Pandemic, Transaction Values Higher

		Cash/Card Value Ratio	Cash/Card Volume Ratio	log(ABM Average Value)	log(POS Average Value)
Lockdown 1	Interac	-0.040*	-0.025*	0.306*	0.110*
	ACSS	-0.041*	-0.012*	0.154*	0.118*
Reopening 1	Interac	-0.085*	-0.029*	0.234*	0.091*
	ACSS	-0.045*	-0.012*	0.079*	0.083*
Lockdown 2	Interac	-0.081*	-0.027*	0.230*	0.093*
	ACSS	-0.050*	-0.012*	0.049*	0.049*
Reopening 2	Interac	-0.109*	-0.031*	0.231*	0.121*
	ACSS	-0.059*	-0.014*	0.051	0.114 *
# of observations	Interac	752	752	752	752
	ACSS	528	528	528	528

Notes: * denotes significance at the 1% level based on standard errors robust against heteroskedasticity and autocorrelation (HAC) in the residuals. Daily sample from January 1st, 2019 –February 26th, 2021.

Non-On-Us Share Decreased for Cash During Pandemic, Increased for Cards

	ABM Value	ABM Volume	POS Value	POS Volume
Lockdown 1	-0.057*	-0.040*	0.003	0.010
Reopening 1	-0.040*	-0.013*	0.016	0.030*
Lockdown 2	-0.057*	-0.025*	0.029*	0.044*
Reopening 2	-0.054*	-0.024*	0.044	0.055*
# of observations	528	528	528	528

Notes: * denotes significance at the 1% level based on standard errors robust against heteroskedasticity and autocorrelation (HAC) in the residuals. Daily sample from January 1st, 2019–February 26th, 2021.

Dynamic Model: Local Projections

- To evaluate the dynamic effects of the pandemic and their persistence, we use local projections:

$$y_{t+h} = a_h + \sum_{i=1}^{p} b_{i,h} y_{t-1} + c_h x_t + e_{t+h}, \quad h = 1, ..., 100,$$

- y_{t+h} is a measure of payment habits.
- x_t is log(Covid-19 cases) or log(stringency index).
- $p = 10$.
- Includes day-of-week, day-of-month, week-of-month, and month-of-year dummies.
- To render the responses of ACSS and Interac variables comparable, we use Interac data harmonized to business-day frequency.

Responses of Cash/Card Ratios

Cash/Card Value Ratio: Stringency
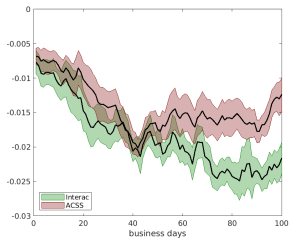
Cash/Card Value Ratio: Cases
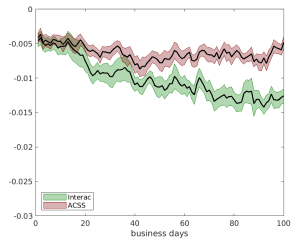
Cash/Card Volume Ratio: Stringency
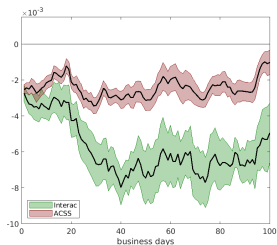
Cash/Card Volume Ratio:Cases
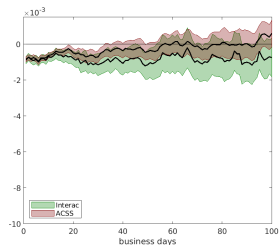
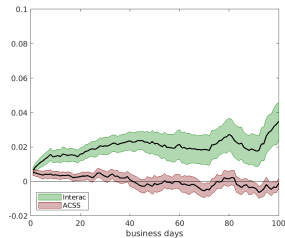# Responses of Average Transaction Values
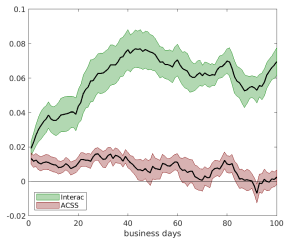
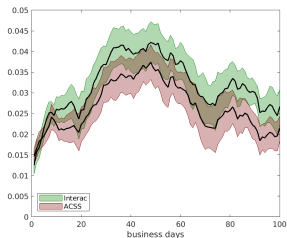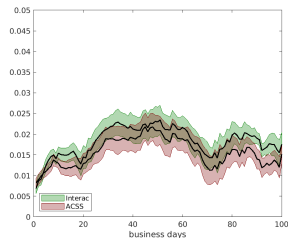# Responses of ACSS/Interac Ratios
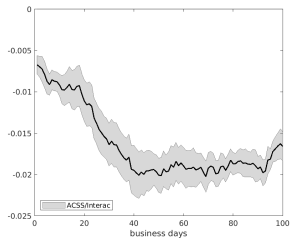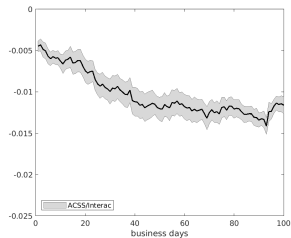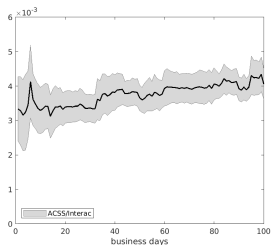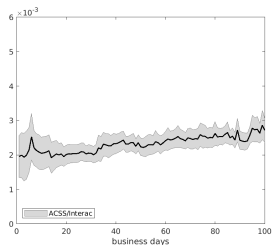
ACSS/Interac ABM Value: Stringency

ACSS/Interac ABM Value: Cases

### ACSS/Interac POS Value: Stringency

ACSS/Interac POS Value: Cases

Reliability of Card Transactions to Proxy Consumption

- Estimates of consumption based on card data alone may be biased if one abstracts from shifts in payment habits.
- Illustration: Two estimates of consumption growth:
  1. based on POS debit card transactions only
  2. based on card and cash transactions

Historical Daily y/y Growth of Consumption Estimates
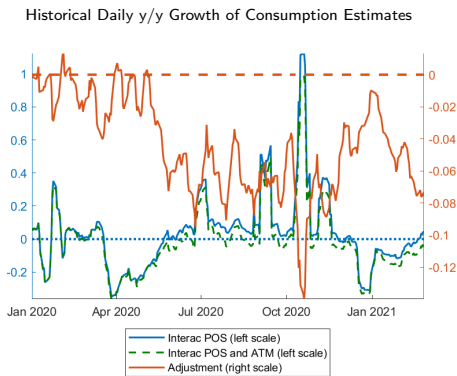
Conclusion

Consumer behaviour adjusted in response to the pandemic:

- Less frequent trips for cash withdrawals and point-of-sale purchases reflected in higher transactions amounts.
- Decline in cash-card ratio may suggest reduced use of cash for point-of-sale transactions.
- Consumers made more withdrawals from ATMs that are linked to their financial institution (on-us transactions).

Shifts in payment habits matter for economic monitoring:

- Estimates of consumption growth based on card data alone are biased during the pandemic.
- Interac debit card transactions might have overstated consumption growth by up to 7 pp.

Questions? Comments?
Thank you! Merci!