The Role of Non-Banks as Payment Providers[1]

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[1]Any opinions and conclusions expressed in this article are those of the authors and do not necessarily represent the views of the Bank of Canada.

Motivation (I)

- Commercial banks have traditionally played a dominant role as providers of retail payment services
- Non-banks (i.e. retailers) have become increasingly important as providers of different retail payment services
- Currently, about 25% of all credit cards in Canada are
    - directly issued by retailers (Canadian Tire, Loblaws/President's Choice) or,
    - they are marketed by a retailer and issued by a bank (Sears, The Bay, and others)
- Retailer credit cards:
    - give rewards related with the retailer, give easier access to credit, etc
    - some cards are "private credit cards" (cannot be used with other merchants)

Motivation (II)

- Both firms sell different retail payment products in terms of rewards and conditions offered: **Products are different**

- Also, they may sell these products to different types of market segments (by income, age, education,...): **Customers are different**

- Banks and non-banks are different types of firms, with different products and relationship with customers

- Proximity to the customer should play an important role for retailer cards, specially in the case of private cards

- We focus on identifying variables that explain the adoption and usage by consumers of these payment services

- **Our question:** What variables explain the adoption and usage of these payment instruments by consumers?

- We consider cash, bank credit cards, retailer credit cards (widely used=co-branded), retailer-only credit cards (private credit cards), and debit

- Study the effect of bank/retailer network proximity on adoption and usage

- Also consider other aspects:
  - Demographics: Do banks and retailers target different market segments?
  - Credit limits, and financial stress

What we find

- Network proximity plays a significant positive role in
  - Usage of retailer private cards.
  - Adoption of bank issued credit cards, and debit cards.

- Significant variation in the effect of demographic variables on the adoption and usage across payment instruments
  - For example, age and employment affect positively adoption of bank issued credit cards. Income and education, affect negatively.

- Increasing credit limits
  - Affect positively usage of retailer private cards
  - But surprisingly, affect negatively the other credit cards

- Also: Past financial stress increases significantly the adoption of bank credit cards

Outline

- Related research

- Data sources

- Canadian Payments Industry

- Econometric model

- Estimation Results

Related research

- Our model is based on the adoption/usage framework from Koulayev, Rysman, Schuh and Stavins (2012)
- Discrete appliance choice and electricity use model in Dubin and McFadden (1984)
- Arango, Huynh and Sabetti (2011) studies probability of payment choice for cash, debit and credit, and look at elasticity of credit usage with respect to rewards
- Small literature that studies these non-banks: A few marketing papers on retailer credit cards: Hirschman (1979), Lee and Kwon (2002), Erasmus and Lebani (2008)

- Canadian Financial Monitor 2009-2012 that include:
  - Detailed household location
  - Demographics
  - Adoption and usage of cash, credit, debit cards (with provider name, credit limit, etc...)

- Bank branch locations compiled from Canadian Financial Services 2009-2011 (extended to 2012)

- Retailer locations for Sears, Canadian Tire, HBC, Loblaws (President's Choice), Petro Canada and ESSO from respective websites

- We use geocode program to count how many of each retailer/bank are within a given radius around each household

Data sources (II): Network effects
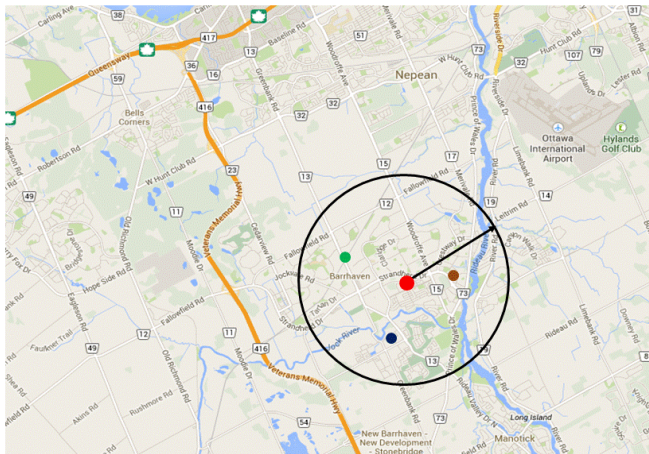
● Location of household
● Location of bank A
● Location of bank B

● Location of merchant C
○ Circle of radius 10 km

Note: All locations use 6-digit postal codes

Canadian Payments Industry (I)

- Define retailers as firms whose financial services are secondary to other operations
- Retailer-issued credit cards account for 25% of credit cards on issue and 15% of credit purchases by value
- Major retailers offering credit cards include: Canadian Tire, Loblaws (President's Choice), Sears, HBC, and a few gas stations
- All retailer issued credit cards are backed by either a bank owned by the retailer or a separate bank

Canadian Payments Industry (II): Retailers offering credit cards

Table: What financial institutions back retail credit cards

Retailer	Backing Bank	Additional Info
Sears	JP Morgan Chase Bank	Originally Sears Canada Bank, purchased in 2005
Canadian Tire	Canadian Tire Bank	Also offers online-only savings accounts
Hudson's Bay Company/Zellers	Capital One	
President's Choice	President's Choice Bank	Other banking services offered by CIBC
Petro Canada	CIBC	
ESSO	RBC	

Table: Key Statistics - Credit Cards

	Mean	SD	25%	Median	75%	99%
Number of Credit Cards	2.1	1.6	1.0	2.0	3.0	7.0
Number of Premium Cards	0.5	0.8	0.0	0.0	1.0	3.0
Number of Regular Cards	1.6	1.5	0.0	1.0	2.0	6.0
Number Rewards Cards	0.5	0.9	0.0	0.0	1.0	4.0
Total Credit Limit ($)	17,181	31,863	2,000	11,000	24,900	92,500
Highest Credit Card Limit ($)	11,726	27,664	5,000	10,000	16,000	50,000
Lowest Credit Card Limit ($)	5,480	7,306	1,000	3,500	7,500	26,200
Number of Credit Purchases	16	34	1	8	23	95
Total Value of Credit Purchases ($)	1,551	2,890	89	668	2,000	12,018
Highest Credit Card Purchases ($)	1,459	2,487	200	732	1,842	10,000
Lowest Credit Card Purchases ($)	449	1,213	0	55	380	5,011
Current Outstanding Balance ($)	2,253	6,502	0	0	1,500	32,000
Highest Outstanding Balance ($)	1,994	4,343	0	0	1,500	22,500
Lowest Outstanding Balance ($)	699	2,226	0	0	300	12,500
Premium Card Annual Fees ($)	21	74	0	0	0	240
Regular Card Annual Fees ($)	10	41	0	0	0	149
Rewards Card Annual Fees ($)	16	74	0	0	0	220
N	46,945					

Source: CFM 2009-2011

- Considerable variation in total credit limits
- Substantial difference between highest and lowest card limits

Canadian Payments Industry (IV): Credit cards

Table: Total Number of Credit Cards Held

	Total Number	Percent Share
Banks	58331	59.1580
Credit Unions	6030	6.1155
Retailers	24176	24.5188
Other	5634	5.7139
Canadian Tire	5158	5.2311
Sears	441	0.4473
Walmart	4	0.0041
The Bay	201	0.2038
Zellers	45	0.0456
Presidents Choice	4720	4.7869
Eatons	0	0.0000
ESSO	8	0.0081
Shell	3	0.0030
Petro Canada	17	0.0172
N	46945	.

Source: CFM 2009-2011

- 25% of all cards are issued by retailers
- Canadian Tire and PC dominate in retailer cards

Table: Probability of Having Each Branch Within Given Radius (%)

Bank	Within 5km	Within 10km
BMO	71.65	79.34
CIBC	71.75	81.20
Desjardins	31.42	40.29
National Bank	37.55	51.89
RBC	74.01	82.14
TD	69.43	76.89
Scotiabank	65.02	73.57
ATB	6.03	6.65
CWB	7.35	12.82
Laurentian	11.92	15.86
Vancity	5.09	5.92
HSBC	26.53	39.49
Alterna Savings	6.70	10.74
Coast Capital CU	5.26	6.68
Meridian CU	5.90	10.00
N	46945.00	.

Source: CFM 2009-2011

Postal codes were used to calculate geographic coordinates, then distances between branches and houses were calculated. Probabilities represent the proportion of households with at least one of the specified branches within given radius.

Canadian Payments Industry (VI): Network effects (retailers)

Table: Probability of Having Each Retailer Within Given Radius (%)

Retailer	Within 5km	Within 10km
Sears	50.50	72.73
Canadian Tire	67.60	78.92
HBC	41.71	54.97
Presidents Choice	72.73	81.10
Zellers	51.96	69.91
Petro Canada	73.94	80.45
ESSO	76.10	83.94
N	46945.00	.

Source: CFM 2009-2011
Postal codes were used to calculate geographic coordinates, then distances between retailers and houses were calculated. Probabilities represent the proportion of households with at least one of the specified retailers within given radius.

- 2 Stage Model: Adoption and usage of various payment instruments from Koulayev, Rysman, Shuh and Stavins (2012)
- Payment instruments include cash, bank credit card, widely accepted retailer credit card (co-branded card), retailer-only credit card (private card) and debit card
- We assume every consumer adopts cash
- In stage 1 consumer i chooses $b_i \in B$, where b_i is a bundle of payment instruments
- In stage 2 the consumer is confronted with a payment opportunity l, and selects payment instrument $j \in b_i$ in order to maximize utility

Econometric model (II): Usage

- Consumer i using payment technology j for payment opportunity l results in utility

$$u_{ijl} = \delta_{ij} + \varepsilon^u_{ijl}$$

- δ_{ij} and ε^u_{ijl} are known to the consumer in usage stage

$$\delta_{ij} = x_{ij}\beta_\delta + \nu_{ij}$$

- x_{ij} is a set of observable characteristics for consumer i and payment choice j, and ν_{ij} is unobservable
- Consumer i chooses payment technology j such that

$$\upsilon_{il}(b) = \max_{j \in b_i} u_{ijl}$$

- The value of adopting bundle b is the cost of adopting b (λ) plus the expected value of usage:

$$V_{ib} = \sum_{j \in b} \lambda_{ij} + \upsilon_i(b) + \varepsilon_{ib}^a$$

where $\upsilon_i(b) = E[\upsilon_{il}(b)]$

- Consumer knows δ_{ij} and the distribution of ε_{ij}^u (Type 1 Extreme Value), thus knows $\upsilon_i(b)$
- Consumer observes λ_{ij}, but researcher observes only z_{ij}, where:

$$\lambda_{ij} = z_{ij}\beta_\lambda + \omega_{ij}$$

Econometric model (IV): Estimation

- ε_{ijl}^a is i.i.d. as Type 1 Extreme Value, thus the probability of adopting bundle b_i^* is:

$$\Pr(b_i^*|\nu_i^s, \omega_i^s, \theta) = \frac{\exp(\overline{V}_{ib^*}^s)}{\sum_{k \in B} \exp(\overline{V}_{ik}^s)}$$

- The probability of y_i^* payments is:

$$\Pr(y_i^*|b_i^*, \nu_i^s, \omega_i^s, \theta) = \prod_{j \in b_i^*} \left(\frac{\exp(\delta_{ij}^s)}{\sum_{k \in b_i^*} \exp(\delta_{ik}^s)} \right)^{y_{ij}^*}$$

- We construct the likelihood function (solved using numerical methods)

$$L_i(y_i^*, b_i^*|\theta) = \int_{\nu_i} \int_{\omega_i} \Pr(y_i^*, b_i^*|\nu_i, \omega_i, \theta) f(\nu_i, \omega_i) d\nu_i d\omega_i$$

Table: Estimates - Usage Equation

Parameter	Estimate	Standard Deviation
Network		
Cash	0.019961	0.0069028
Retailer Only Credit Card	0.27214	0.041496
Credit Limit		
Bank Issued Credit Card	-0.00604	0.0006534
Widely Accepted Retailer Credit Card	-0.00323	0.0003238
Retailer Only Credit Card	0.00090705	3.8614e-05

Source: CFM 2009-2012

Table: Estimates - Usage Equation

Parameter	Estimate	Standard Deviation
Constant		
Cash	-1.7023	0.068169
Bank Issued Credit Card	-3.5509	0.73858
Widely Accepted Retailer Credit Card	-1.946	0.90015
Retailer Only Credit Card	-4.0048	0.74353
Debit Card	-0.71337	0.31966
Income		
Cash	0.27694	0.014865
Bank Issued Credit Card	1.2989	0.53341
Widely Accepted Retailer Credit Card	-0.2439	0.16079
Retailer Only Credit Card	0.41091	0.27025
Debit Card	0.59471	0.05973
Age		
Cash	-0.1139086	0.0092493
Bank Issued Credit Card	-0.00905	0.0018914
Widely Accepted Retailer Credit Card	-0.012796	0.001757
Retailer Only Credit Card	-0.01068	0.0039399
Debit Card	-0.1573	0.03253
Employment		
Cash	0.12915	0.031131
Bank Issued Credit Card	0.44725	0.056193
Widely Accepted Retailer Credit Card	-1.2825	0.18004
Retailer Only Credit Card	-1.0574	0.39985
Debit Card	0.18205	0.010461

Source: CFM 2009-2012

Table: Estimates - Usage Equation

Parameter	Estimate	Standard Deviation
Education		
Cash	0.028543	7.5894e-17
Bank Issued Credit Card	0.2835	0.086815
Widely Accepted Retailer Credit Card	0.57066	0.19695
Retailer Only Credit Card	0.017509	0.0095648
Debit Card	-0.14547	0.014398
Married		
Cash	0.096425	0.054401
Bank Issued Credit Card	0.25472	0.067666
Widely Accepted Retailer Credit Card	0.65763	0.19693
Retailer Only Credit Card	-0.09374	0.025264
Debit Card	-0.25313	0.015015
Homeowner		
Cash	0.14083	0.012592
Bank Issued Credit Card	-0.081156	0.0080701
Widely Accepted Retailer Credit Card	-0.11087	0.02018
Retailer Only Credit Card	0.28456	0.079483
Debit Card	0.42697	0.0093785

Source: CFM 2009-2012

Table: Estimates - Adoption Equation

Parameter	Estimate	Standard Deviation
Network		
Bank Issued Credit Card	0.081622	0.028119
Retailer-Only Credit Card	-0.0098925	0.0018747
Debit Card	0.12918	0.023341
Financial Stress		
Bank Issued Credit Card	0.14047	0.0099985
Widely Accepted Retailer Credit Card	-0.0092597	0.00016115
Retailer-Only Credit Card	-0.007075	0.001352

Source: CFM 2009-2012

Table: Estimates - Adoption Equation

Parameter	Estimate	Standard Deviation
Constant		
Bank Issued Credit Card	-0.069704	0.039731
Widely Accepted Retailer Credit Card	0.066565	0.029917
Retailer-Only Credit Card	0.064581	0.0063868
Debit Card	0.23705	0.074781
Income		
Bank Issued Credit Card	-0.096982	0.067504
Widely Accepted Retailer Credit Card	0.057077	0.0097321
Retailer-Only Credit Card	-0.0042879	0.00074554
Debit Card	-0.054242	0.019367
Age		
Bank Issued Credit Card	1.5571	0.56436
Widely Accepted Retailer Credit Card	0.83077	0.43058
Retailer-Only Credit Card	0.7733	0.14115
Debit Card	0.64784	0.23149
Employed		
Bank Issued Credit Card	0.13214	0.027169
Widely Accepted Retailer Credit Card	-0.046569	0.014248
Retailer-Only Credit Card	0.06488	0.020102
Debit Card	0.21214	0.0054752

Source: CFM 2009-2012

Table: Estimates - Adoption Equation

Parameter	Estimate	Standard Deviation
Education		
Bank Issued Credit Card	-0.015998	0.0015194
Widely Accepted Retailer Credit Card	0.085173	0.016974
Retailer-Only Credit Card	-0.010166	0.0028307
Debit Card	-0.076046	0.0123
Married		
Bank Issued Credit Card	0.086576	0.03977
Widely Accepted Retailer Credit Card	0.12868	0.012414
Retailer-Only Credit Card	0.045055	0.031253
Debit Card	-0.034808	0.007595
Homeowner		
Bank Issued Credit Card	0.21862	0.024589
Widely Accepted Retailer Credit Card	0.078022	0.027369
Retailer-Only Credit Card	0.037049	0.0036381
Debit Card	-0.018505	0.0076594

Source: CFM 2009-2012

- Large variation of demographic effects across instruments

- Network effects particularly high for usage of retailer-only cards

- Counterintuitive effect of financial stress

- Credit limits have positive effect

- Estimate adoption and usage of non bank payments

- Focus on effects of network proximity, demographics and credit limits

- Future extensions: Improve counterfactual experiment, add supply side effects.