

# Cashless society: Is it the future?

Bank of Finland conference on “Going Cashless”

Helsinki, June 14, 2016



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# Cash is no longer accepted or available everywhere

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- Online purchases are increasingly popular and cash is not accepted
- Air Canada flights accept cards only for in-flight purchases
- In the Netherlands, some retail chains (e.g. Marqt, cashless supermarket) do not accept cash for cost and security reasons or have a limited number of cashiers that accept cash
- In Hong Kong, parking meters accept only Octopus cards
- In Sweden, many banks branches don't carry or accept cash ("cash-free"), cash available only from ATMs

# Some claim that Sweden is on the verge of becoming the world's first cashless society ...

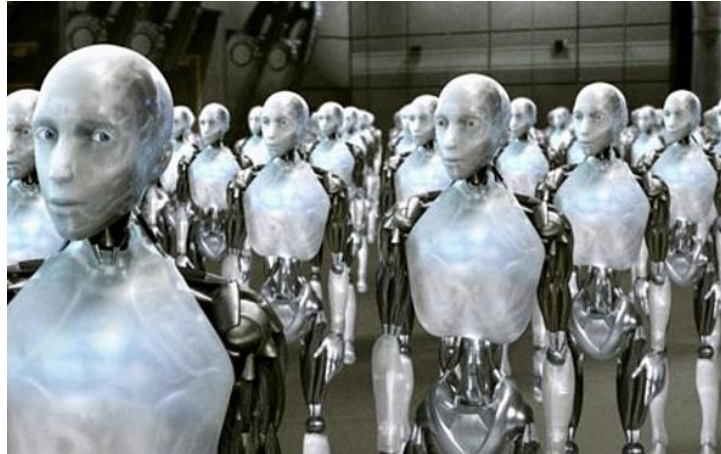
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- “Welcome to Sweden - the most cash-free society on the planet,” The Guardian, Nov 12, 2014.
- “Sweden on way to becoming cashless society’,” Euronews, Dec 14, 2015
- “In Sweden, A Cash-Free Future Nears,” The New York Times, Dec 26, 2015;
- “Why Sweden Is Going Cash-Free?” Fortune, December 26, 2015.
- “Could Sweden become the first cashless society?” ComputerWeekly.com, accessed March, 20, 2016;

“We don't accept cash”

# Are we nearing a cashless society?



# Outline of presentation

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1

Some observations about cash

2

Five key players that will influence the future of cash

- Governments/central banks
- Banks
- Innovators
- Merchants
- Consumers

3

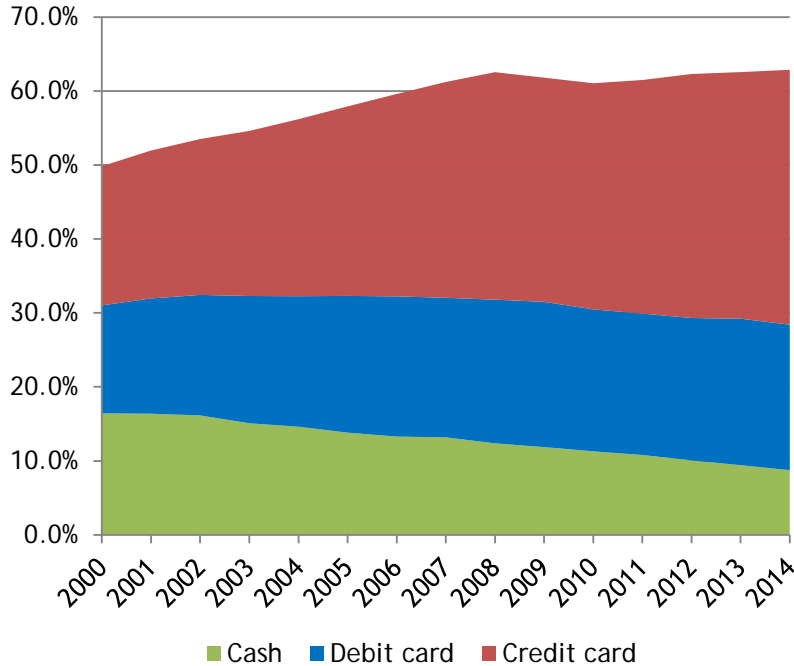
Final thoughts

4

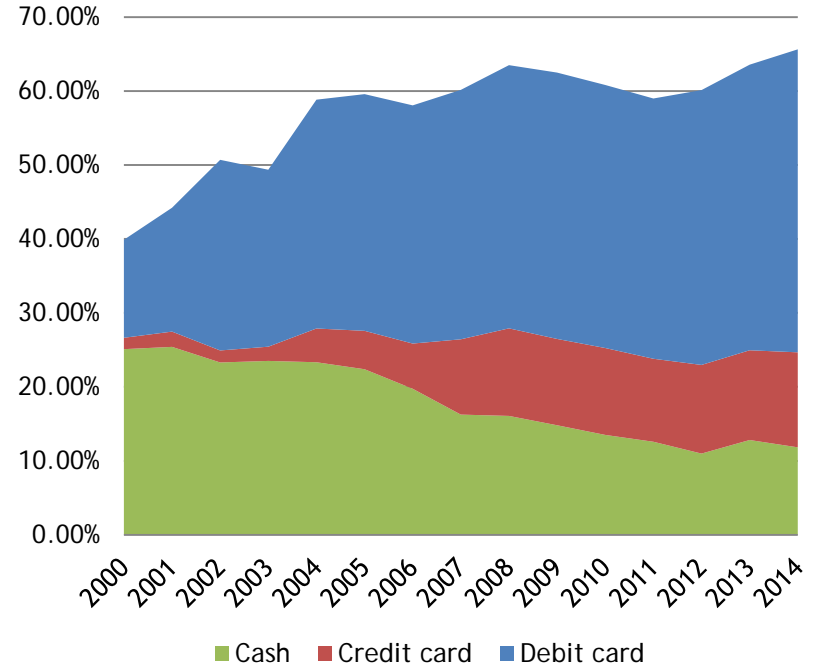
Conclusions

# Cash over total spending is shrinking compared to payment cards

Dollar value of spending relative to household expenditure in Canada



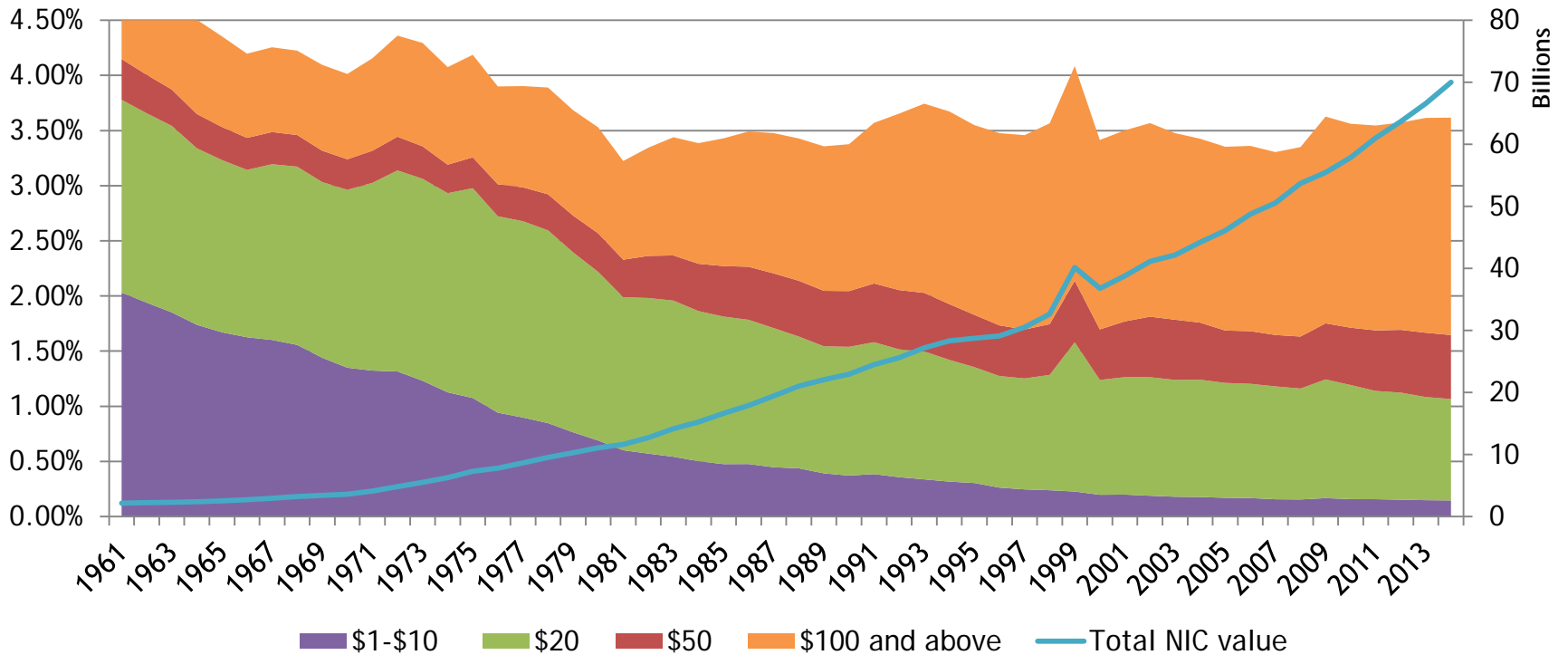
Dollar value of spending relative to household expenditure in Sweden



Source: Author's calculation using the BIS Red Book

# Bank notes are growing at a similar rate as GDP in Canada over the last 30 years

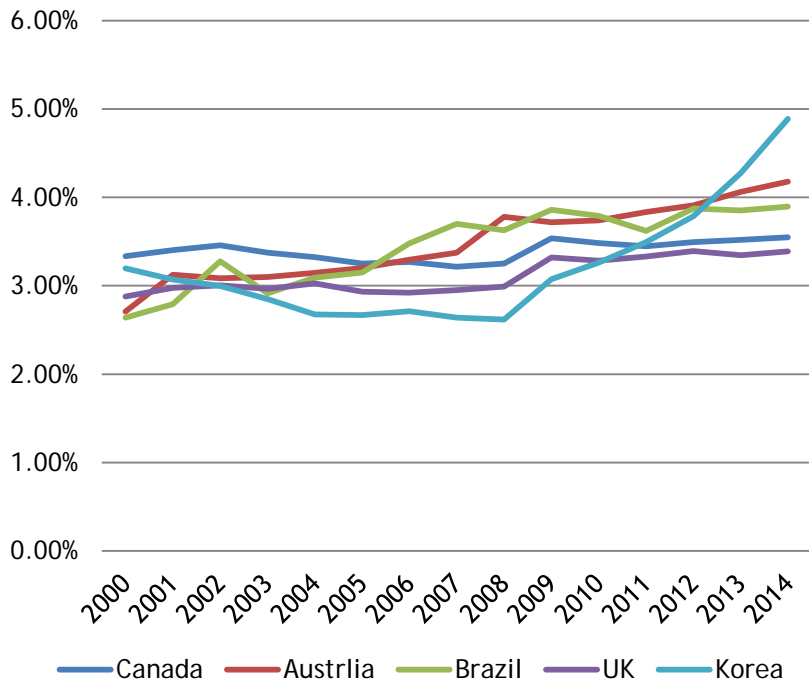
## Banknotes outstanding over GDP



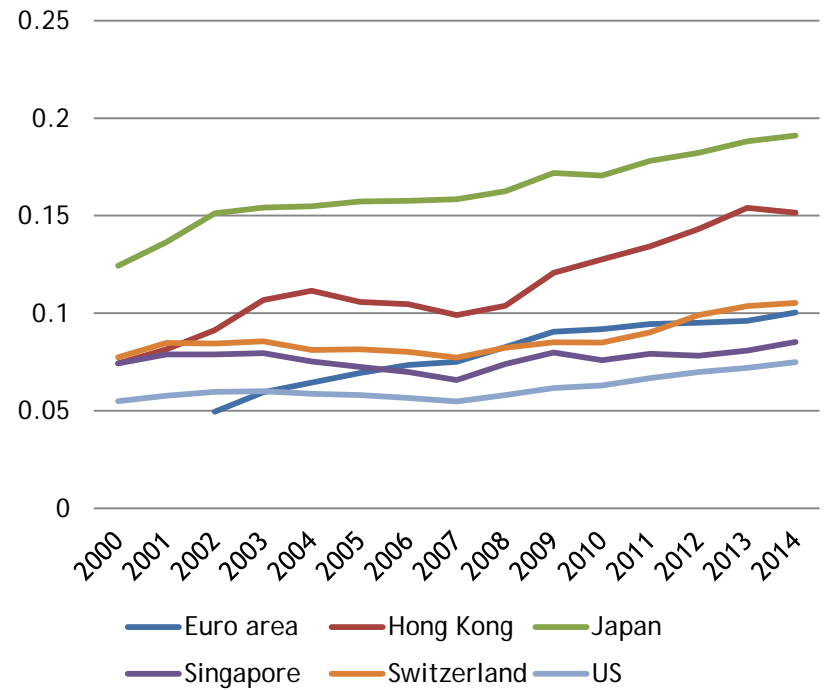
Source: Bank of Canada

# Bank notes continue to grow in a number of countries

Notes in circulation over GDP in selected countries



Notes in circulation over GDP in selected countries

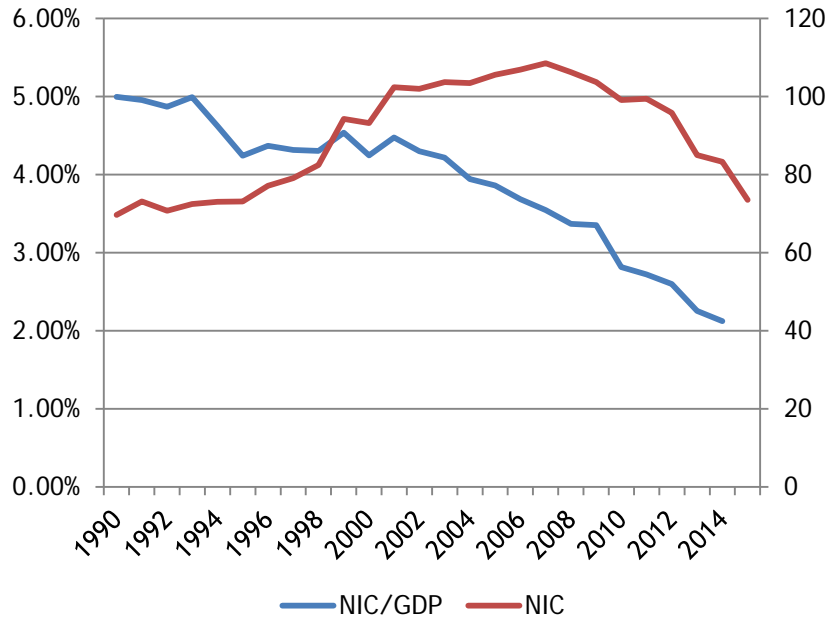


Source: BIS Red Book

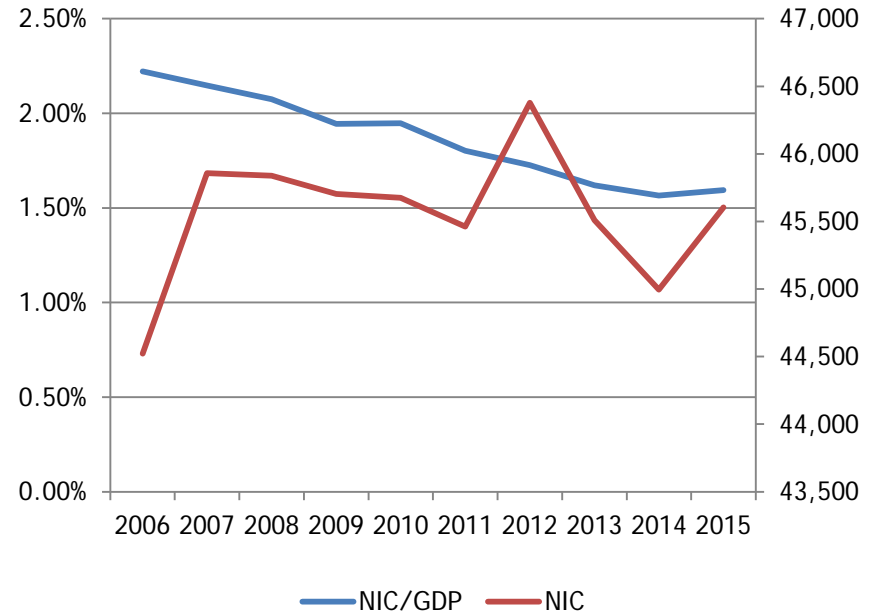


# Two advanced countries that have bank notes demand declining: Norway and Sweden

## Sweden



## Norway



Source: BIS Red Book and the Norges Bank.

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Five key players that will influence the future of cash

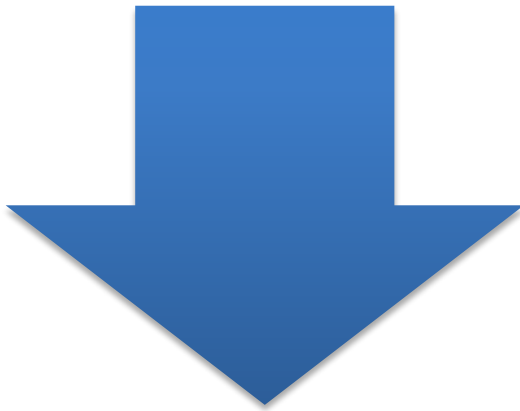
- Governments/central banks
- Banks
- Innovators
- Merchants
- Consumers

3 Final thoughts

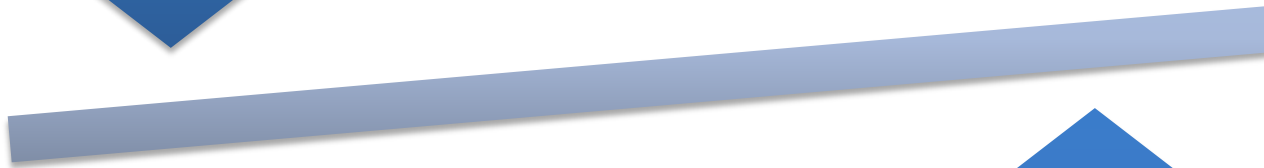
4 Conclusions

# Governments/central banks: cash policies

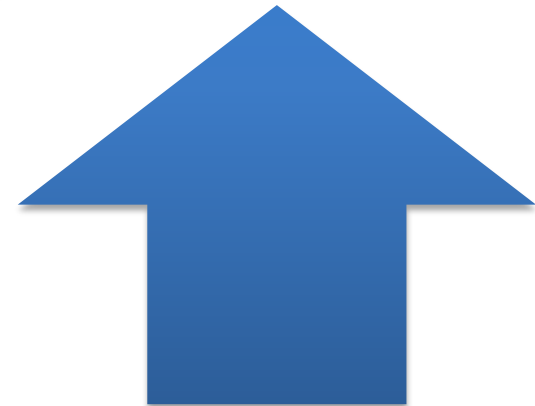
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- Stop producing and issuing notes of large denominations (e.g. CAN \$1000; EU €500)
- Ban the use of cash for certain transactions (e.g. Italy, France, Uruguay)
- Introduce e-money schemes to promote financial inclusion and reduce cash (e.g. M-PESA, Modelo Peru)



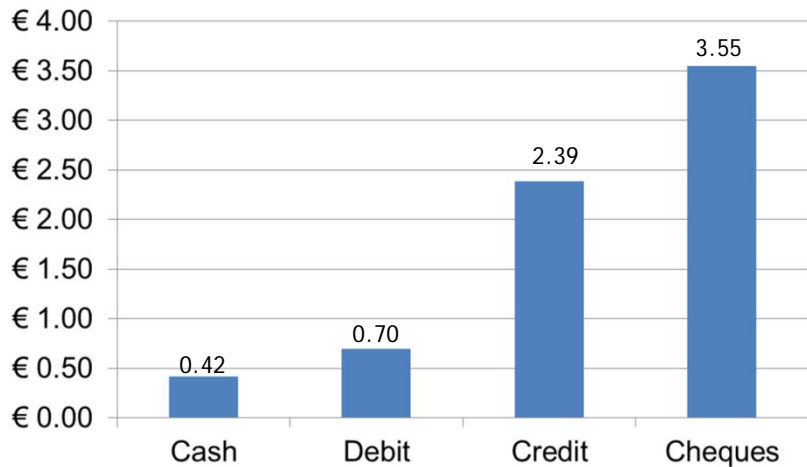
- Issuing new series of bank notes that are more secure and durable, e.g. Canada (2011), Euro area (2015), UK (2016), Sweden (2015) and Norway (2017)
- Issuing new large denomination note: South Korea issued the 50,000 won (US\$40) notes in 2009 (now 70% of NIC)



# Cost studies in several countries suggest that cash is actually the least costly to society

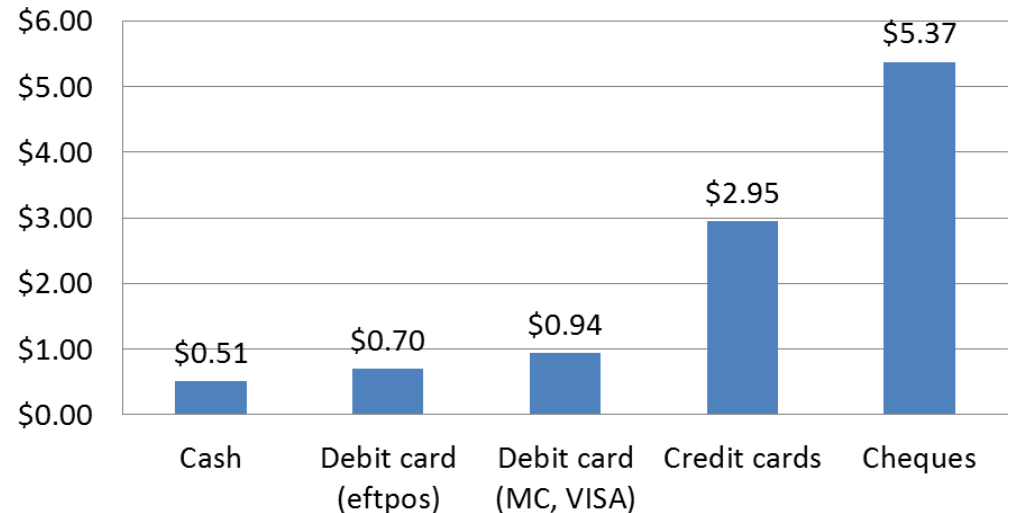
## Unit social cost per payment method

### ECB Study



Source: Schmiedel et al. (2013)

### Australia



Source: Stewart et al. (2014)

Notes: excl. SMEs, incl. account overheads, incl. costs of credit & rewards

# Banks: where most people get their cash

<i>Cash withdrawal</i>	Canada		Australia		United States	
	Number per month <sup>a</sup>	Value per withdrawal	Number per month <sup>a</sup>	Value per withdrawal	Number per month <sup>a</sup>	Value per withdrawal
Automated banking machine	2.7	\$118	2.8	\$138	1.3	\$105
Bank teller	0.7	\$236	0.4	\$297	0.6	\$217
Cashback	0.7	\$43	1.6	\$71	0.5	\$30

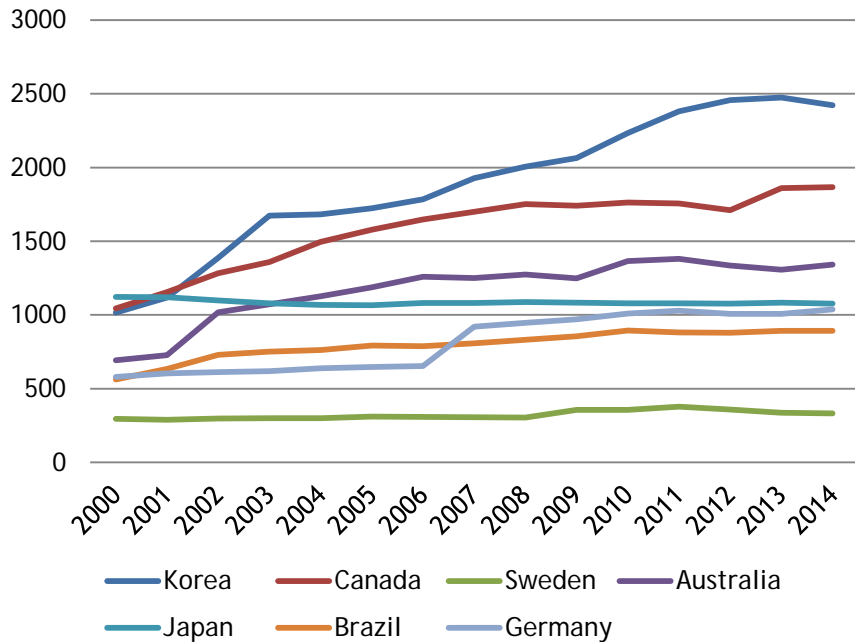
<i>Cash holdings</i>	Canada	Australia	United States
Average cash holdings in wallet	\$84	\$112	\$64
Average number of bank notes	4.4	5.0	5.7

Source: Australia (2013 SCUPM), Canada (2013 MOP Survey), and United States (Bos-Fed CPRC 2013 SCPC and 2012 Diaries).

# Banks: How easy to obtain cash?

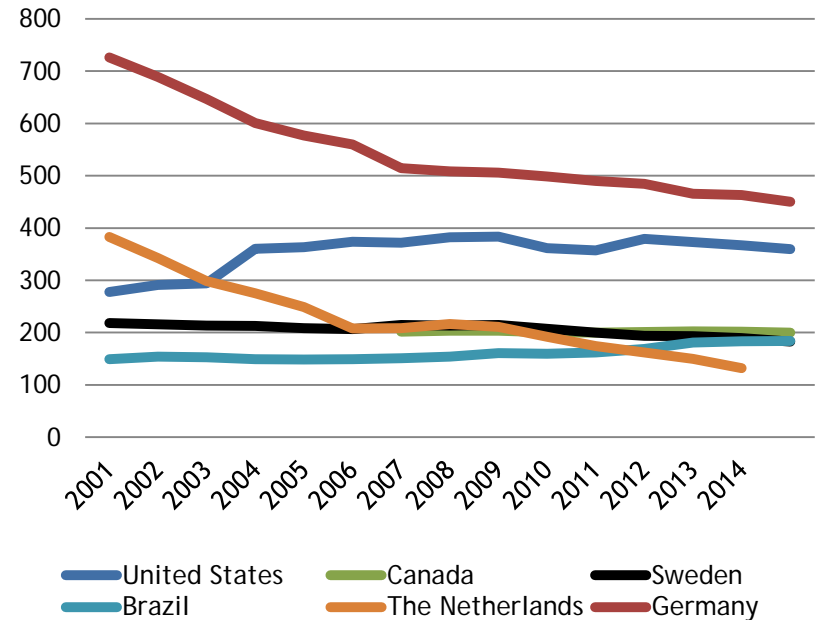
## ATMs

Number of ATMs per million inhabitants



## Bank branches

Number of bank branches per million inhabitants



In Sweden, many bank branches are now “cashless”: one cannot walk in to withdraw, deposit or pay in cash over the counter.

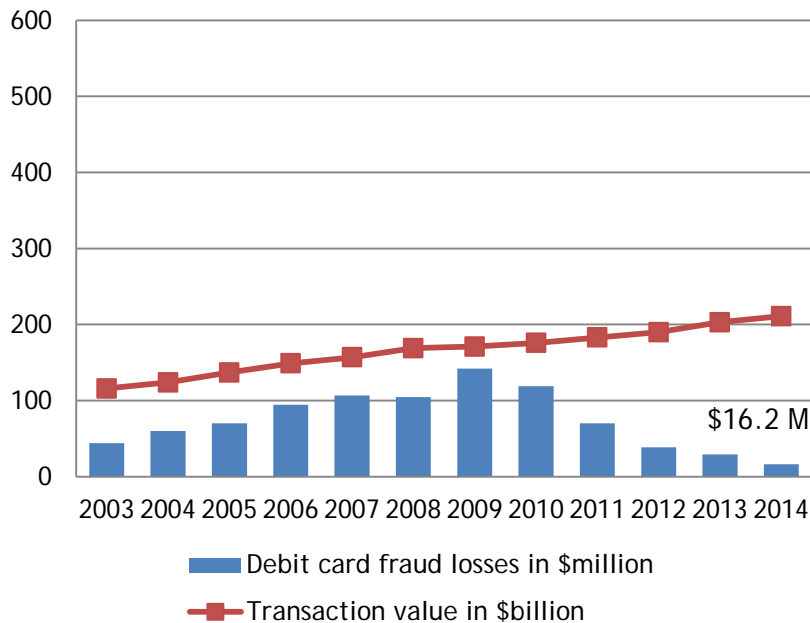
Source: BIS Red Book

# Innovators (banks and non-banks): Some examples of innovations in retail payments

	E-payments	E-money	Digital currency
POS	EMV/contactless cards; Mobile payments (Apple/Android Pay, Square), prepaid cards	Octopus card (Hong Kong), Suica (Japan), Alipay, WeChat Pay, PayPal, Bim	
Online	card tokenization; iDEAL, Interac Online, Braintree, Stripe	PayPal prepaid balance, Alipay, WeChat Pay	Cryptocurrencies e.g. Bitcoin; Coinbase
P2P	Venmo, WeChat, Interac e-transfer, Swish, Dwolla	M-PESA in Kenya, Bim, Facebook Messenger	Cryptocurrencies, e.g. Bitcoin
Remittance	MoneyGram Online, Global Money Transfer	PayPal, Alipay	Cryptocurrencies e.g. Ripple
Bill payment	Epost, Bpay, PPS, WU Pay		

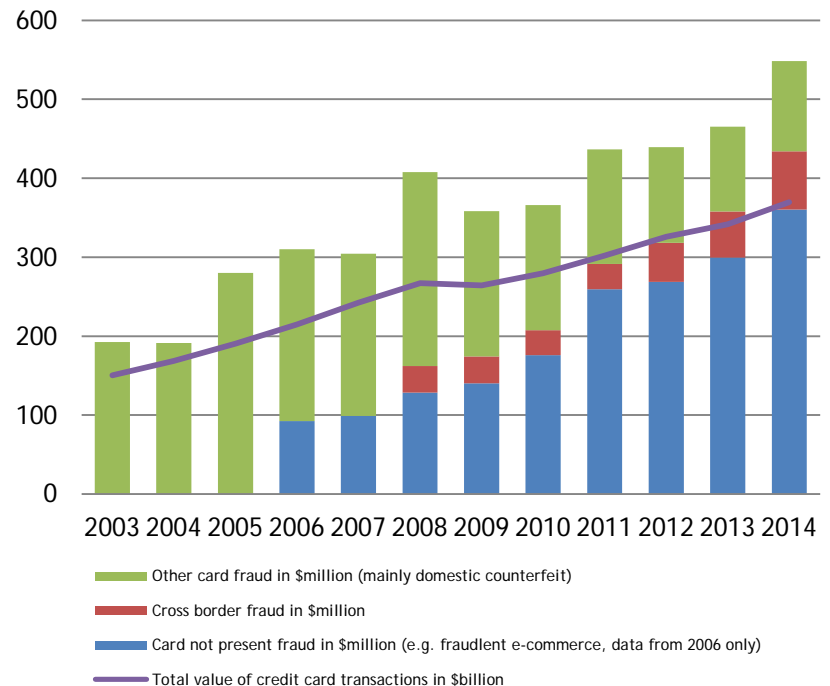
# Innovations: Chip and pin help reduce payment card fraud at the POS but not necessarily promote card use

## Debit card fraud is declining



Source: Interac Association

## Credit card fraud remains high as card-not-present fraud is rising

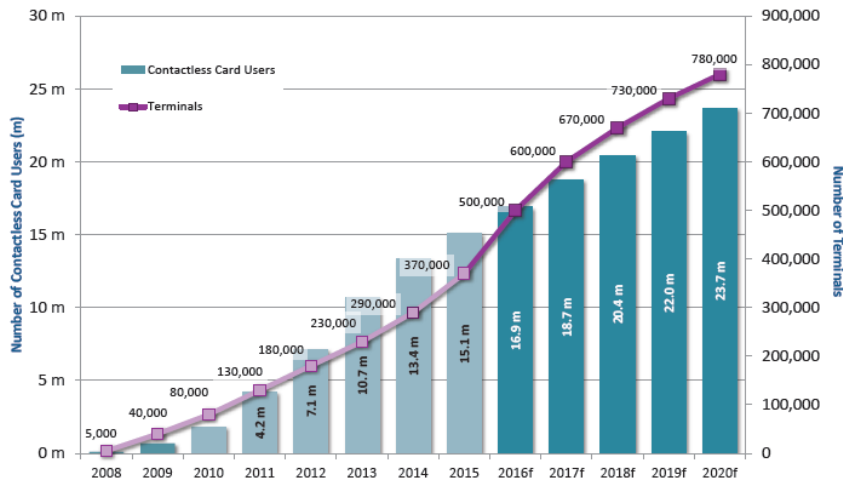


Source: Canadian Bankers Association

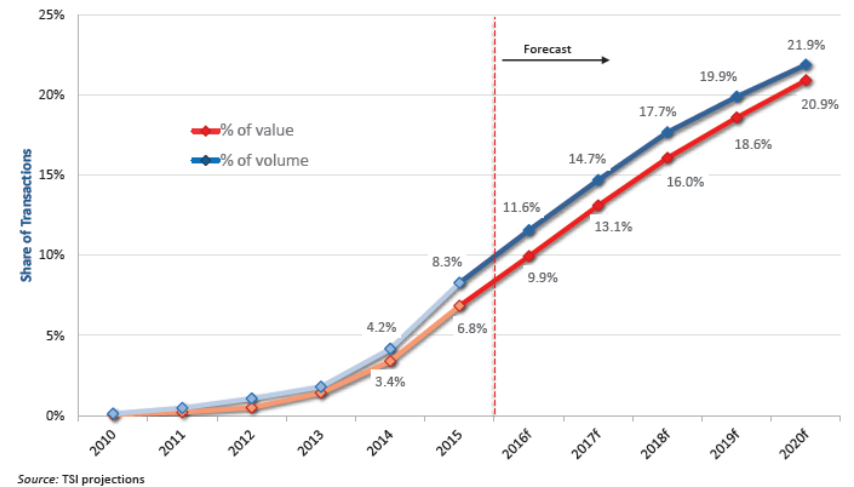


# Innovations such as contactless cards are growing very quickly in Canada

**Forecast Contactless Payment Card Users and Terminals (2015 - 2020)**

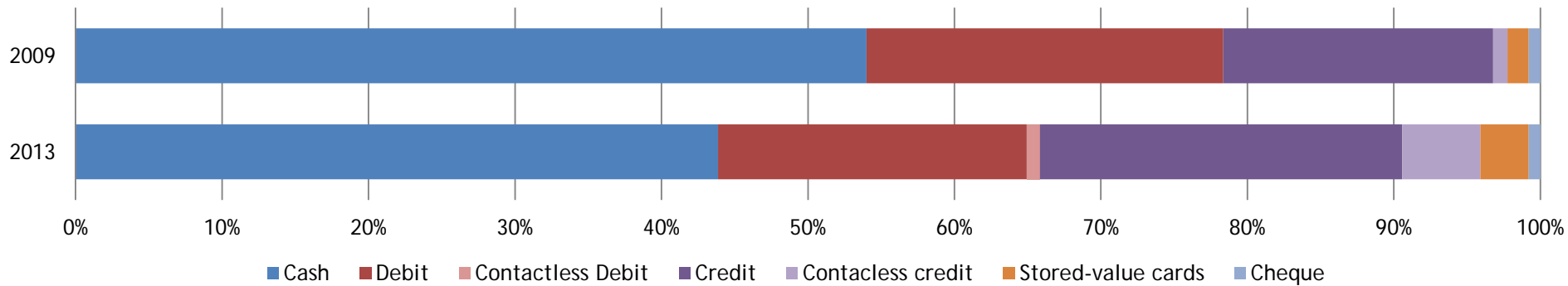


**Contactless as a Proportion of Total Cash, Debit and Credit Transactions**

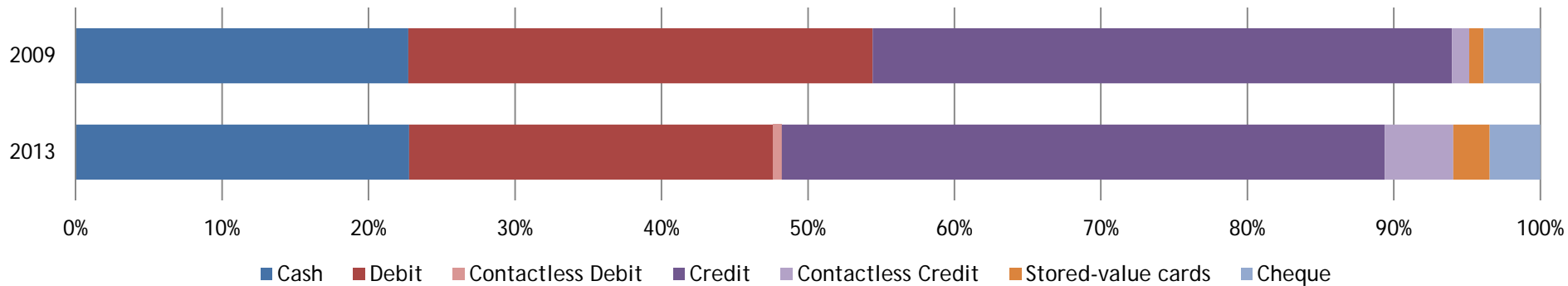


# Innovations are replacing cash (2009/2013 Method-of-Payment Surveys in Canada)

## Volume



## Value



- Fung et al (2015) “The Impact of Retail Payment Innovations on Cash Usage” find that innovations reduce cash use

## Few innovations were able to achieve the network effect in a two-sided market

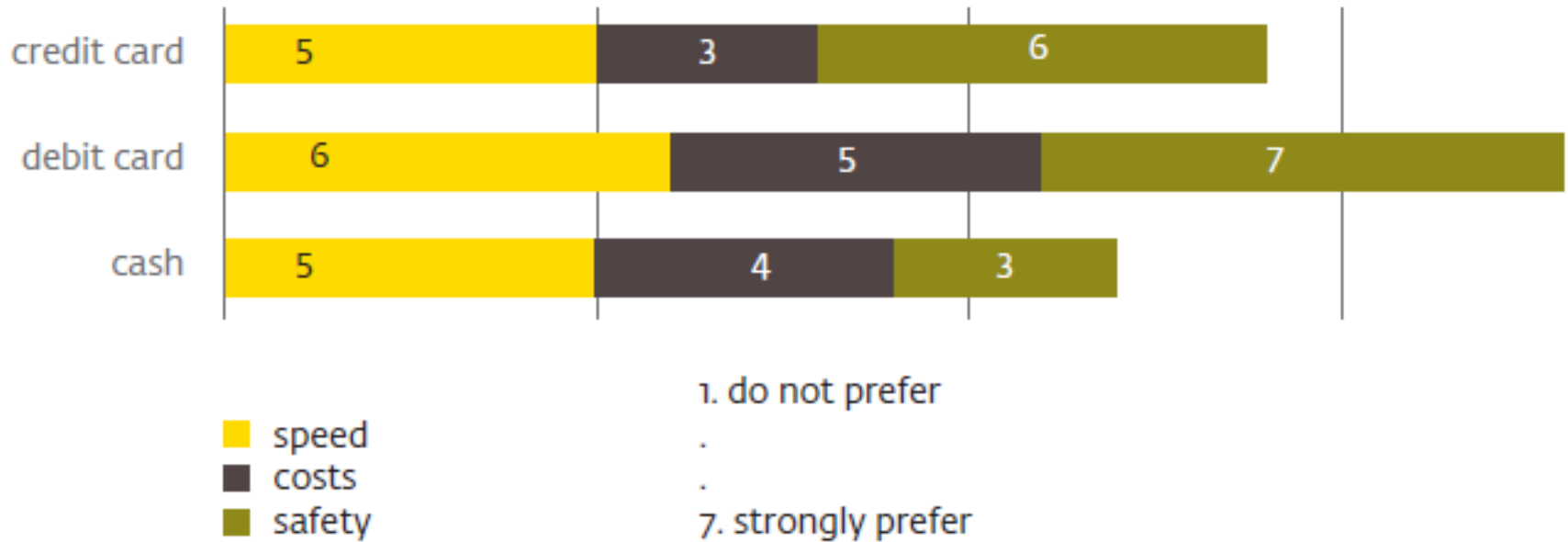
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- Successful examples
  - Debit cards – it is the ATM card
  - Credit cards – consumer likes interest-free and rewards
  - Octopus cards in Hong Kong – almost everybody takes public transportation and owns an Octopus card already
  - M-PESA in Kenya – more people have mobile phones than bank accounts
- Not so successful examples
  - Mondex, Facebook Credit, Google Wallet, PayPal at the POS
- Among all the latest innovations in retail payments around the world, how many of them will be broadly adopted and accepted (Bitcoin/Ripple, Apple Pay, ...)?

# Merchants: What payment methods do they prefer?

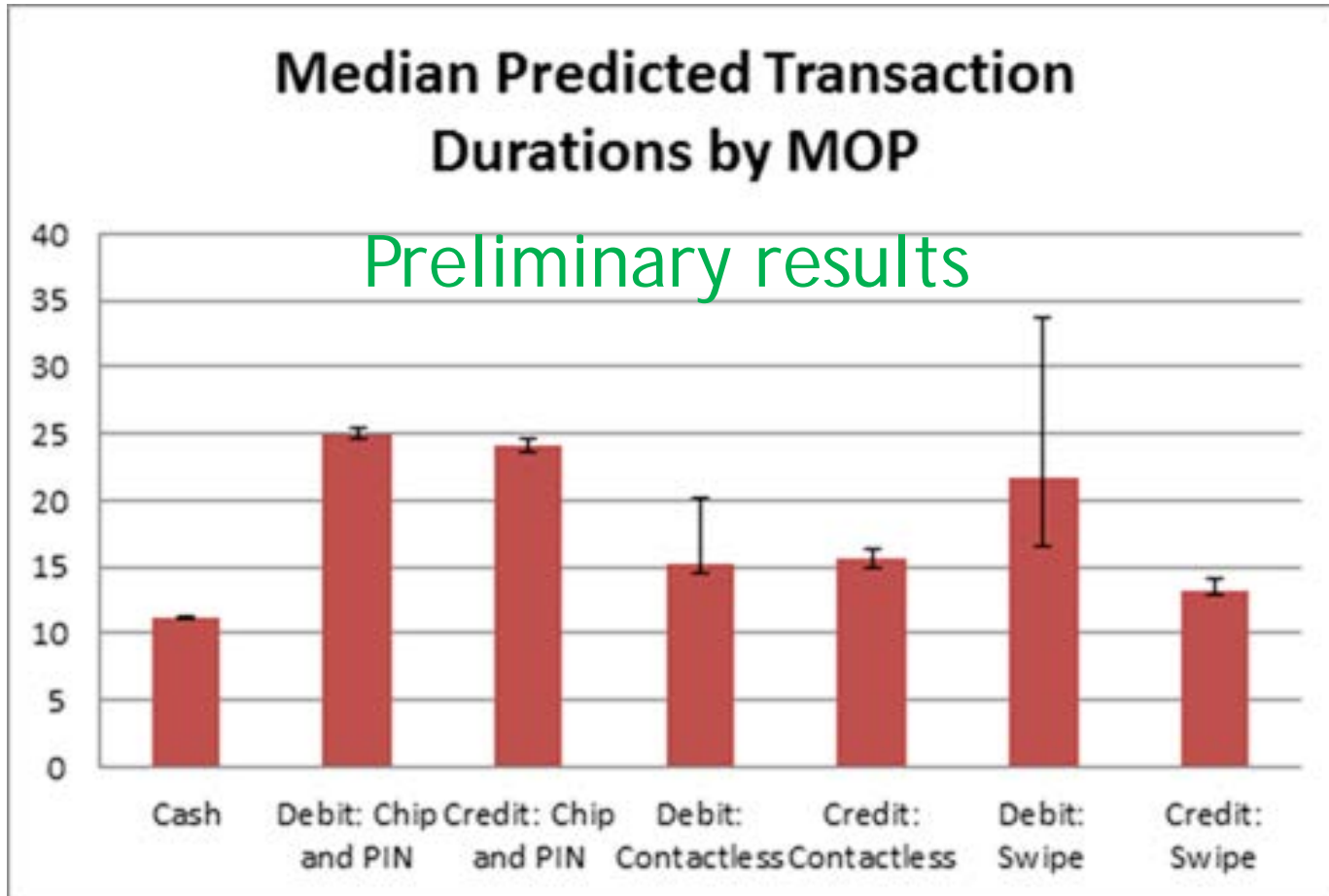
- Merchants

Figure 2: Preferred payment instruments



- DNB: “Cash – retailer’s behaviour and perception”. Based on survey of 1,340 retailers

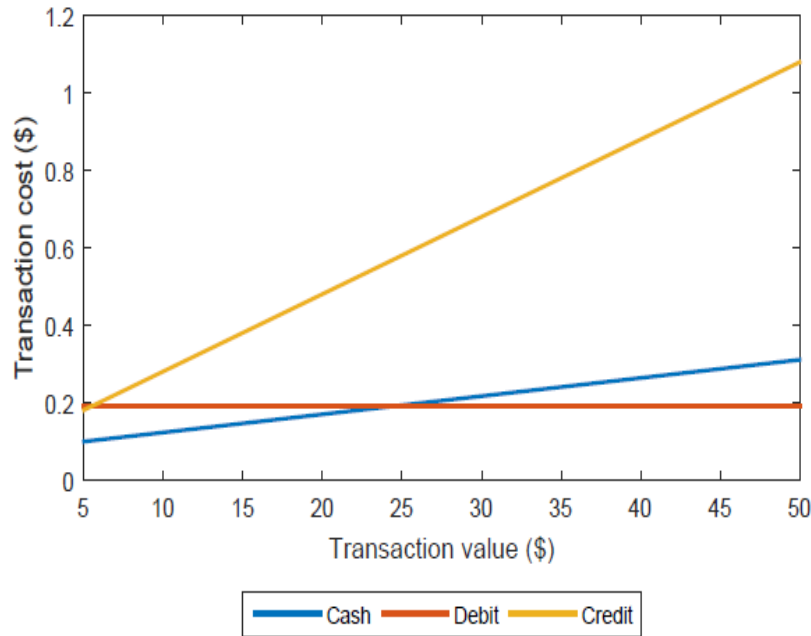
# Merchants: Making a cash payment is actually quite fast



Source: Bank of Canada Time Duration Study - preliminary results

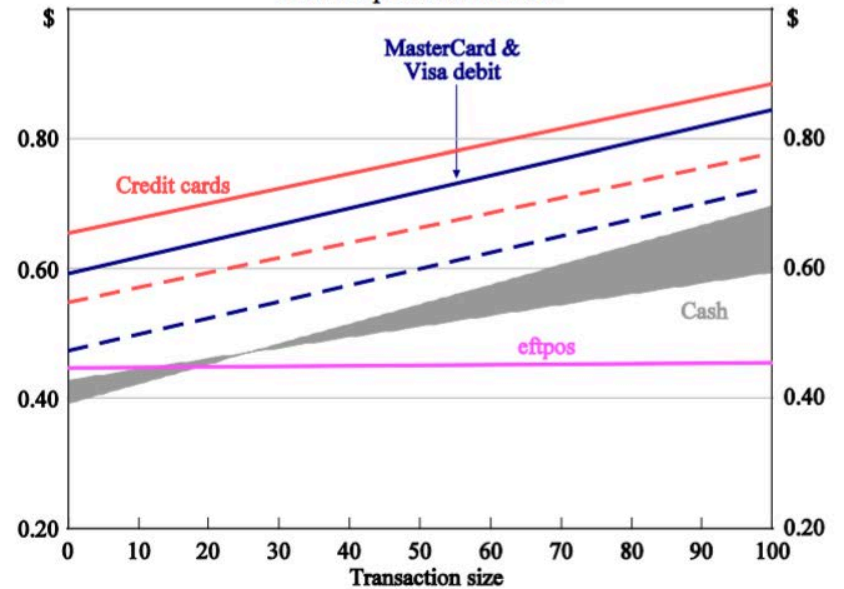
# Merchants: Cash is the cheapest for low value transactions

Merchant Costs for Cash, Debit, and Credit Cards (2006)



Source: Arango and Taylor (BoC Review, 2008)

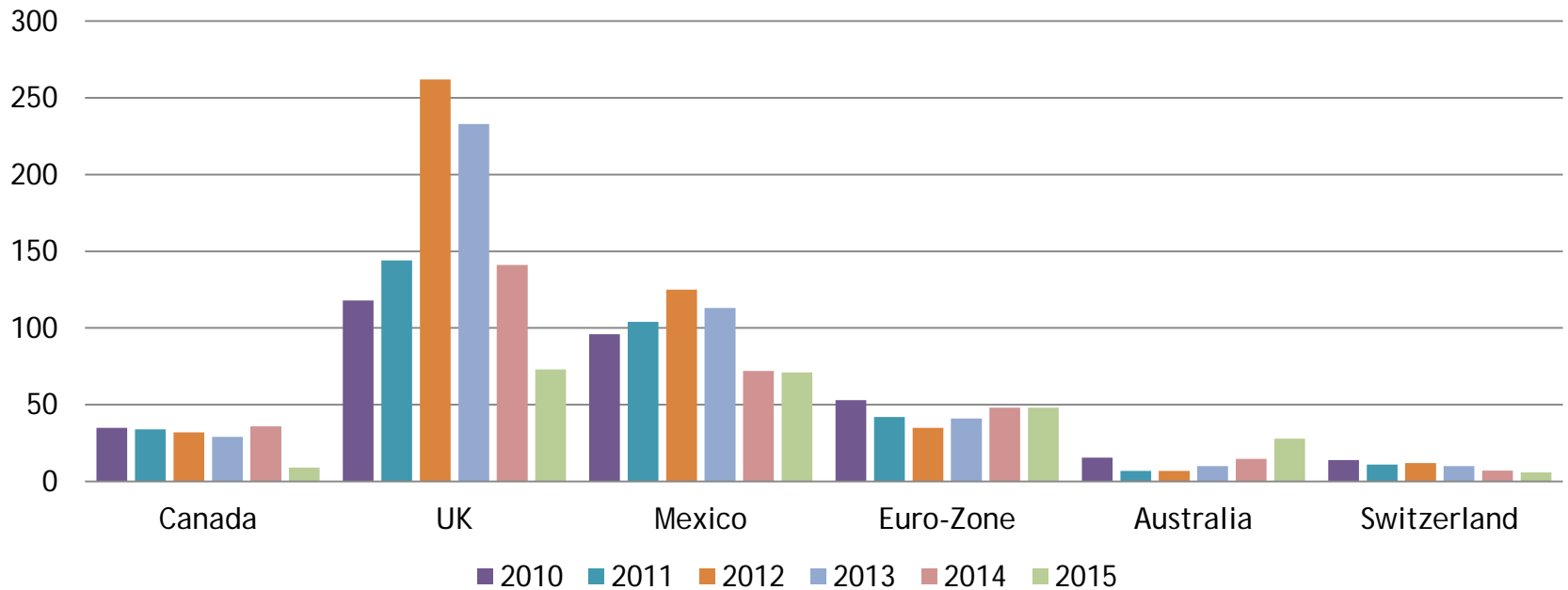
Figure 7: Resource Costs by Transaction Value  
Dollars per transaction



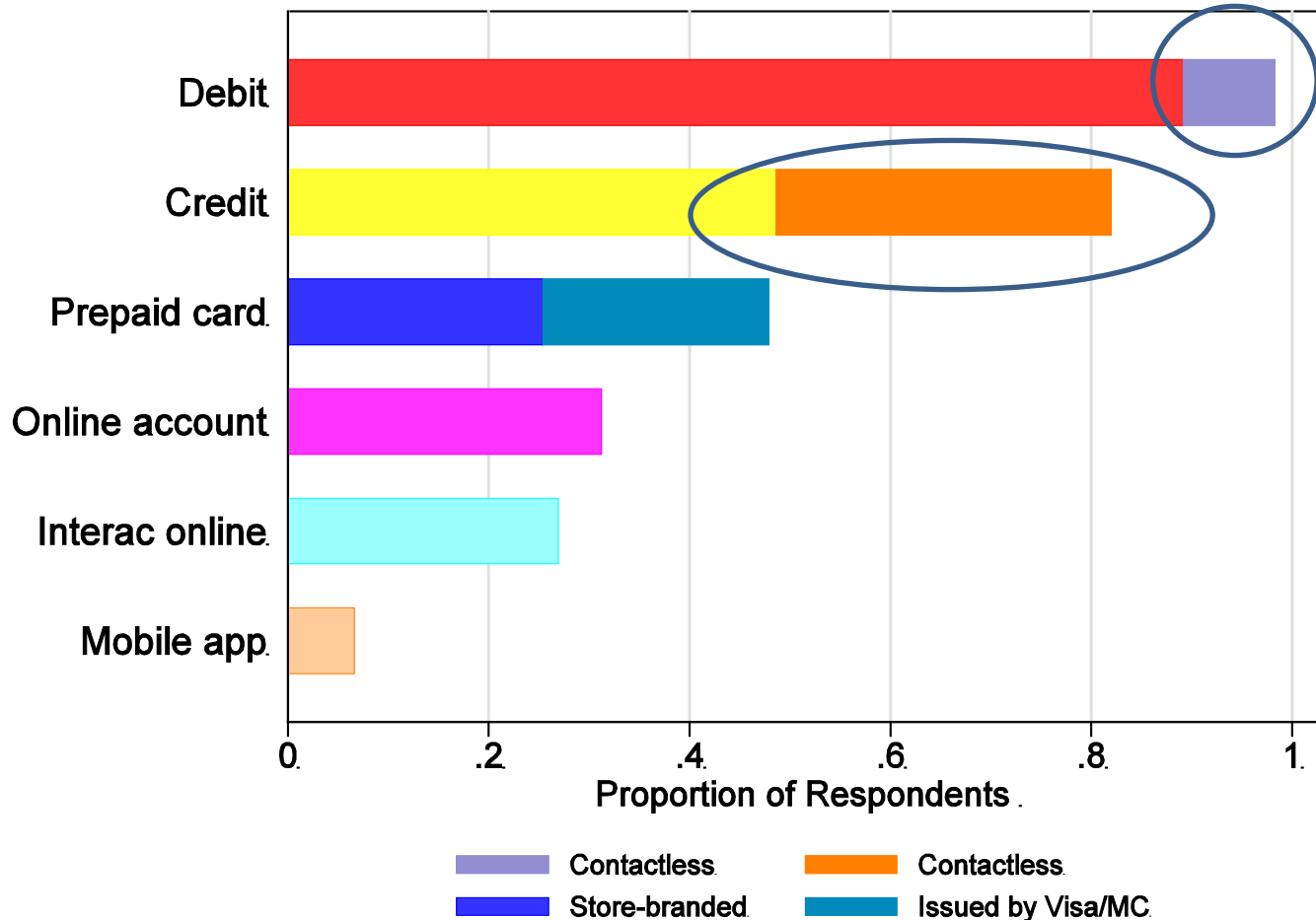
Source: Stewart et al (RBA Research Discussion Paper 2014)

# Merchants: Cash is quite safe as counterfeiting of bank notes remain low

Counterfeit bank notes passed for each one million genuine notes in circulation (PPM) in selected countries



# Consumers: Electronic payment methods are broadly available in Canada (2013)



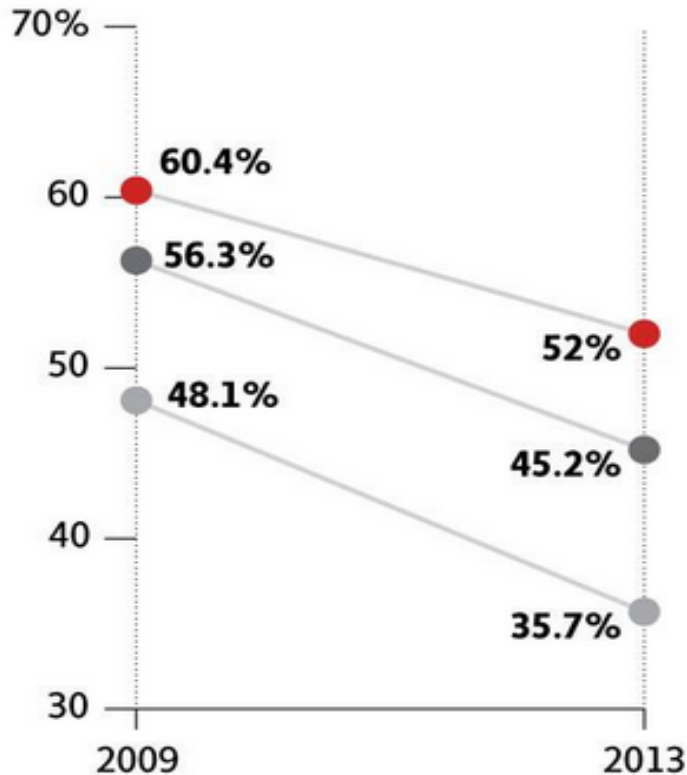


# Cash use tends to vary across demographic groupings but they all use less cash

## Cash use by demographic groups

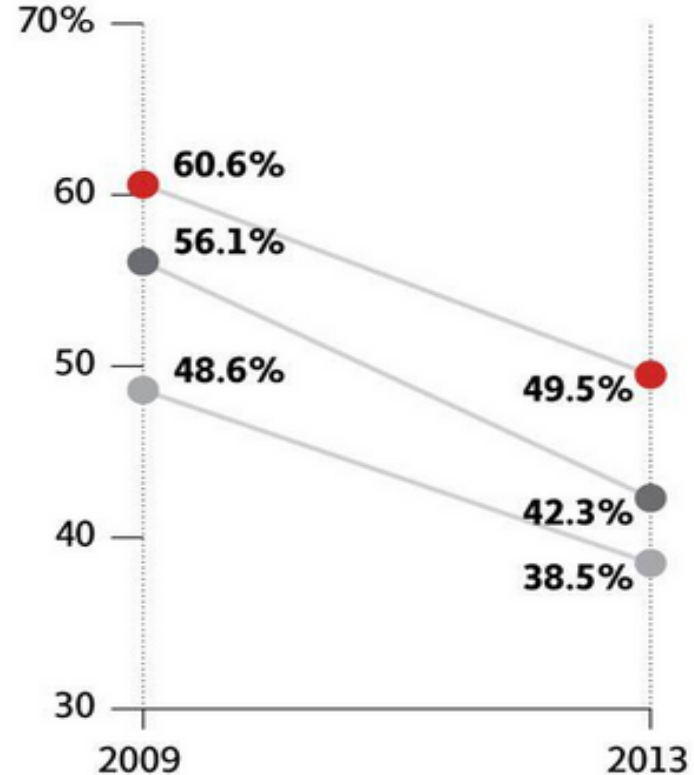
Percent of volume, by income level

- Low income
- High income
- Medium income



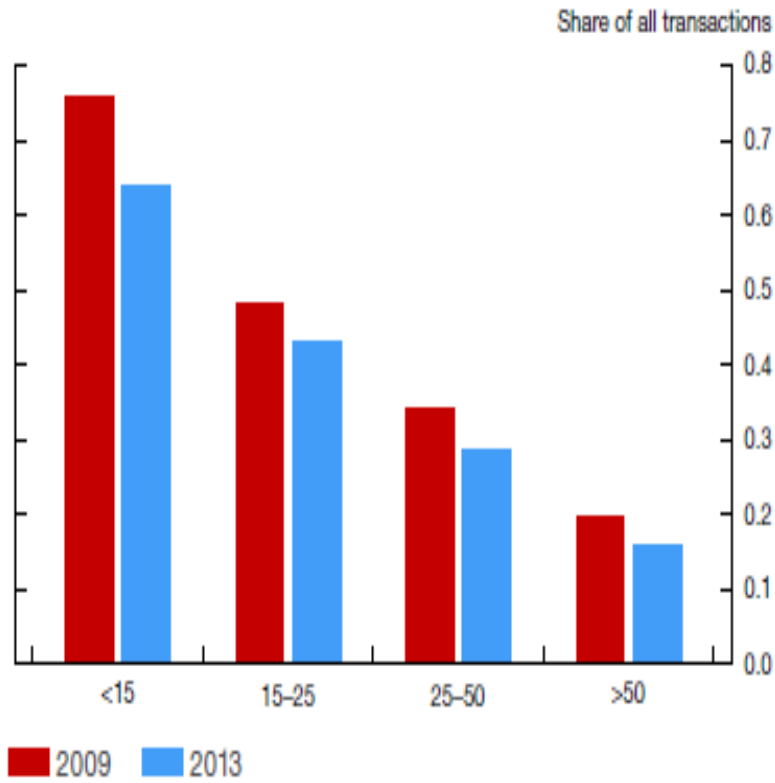
... by education level

- High school
- University
- Technical/community college

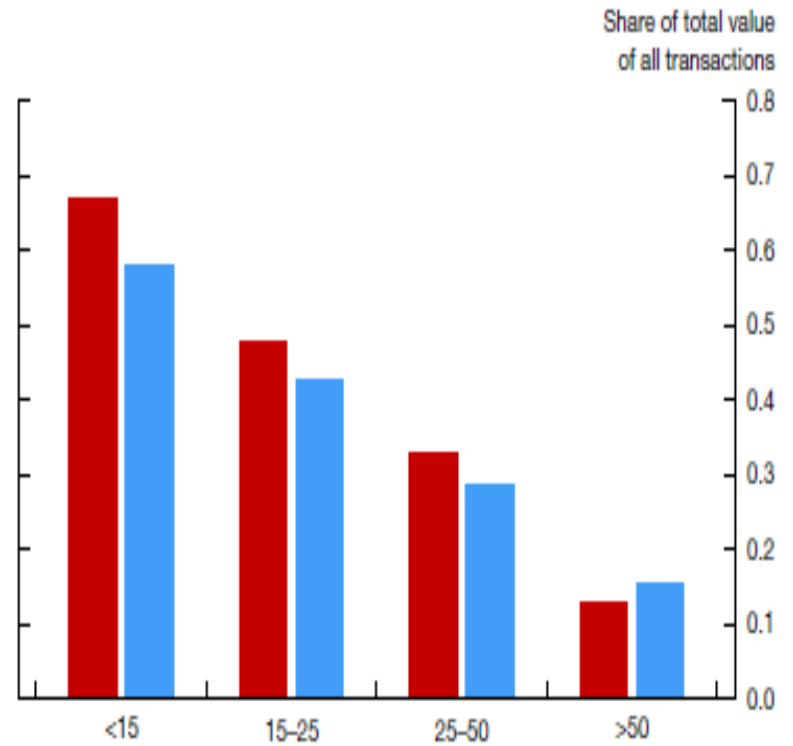


# Consumers use cash mainly for small value transactions

a. Volume

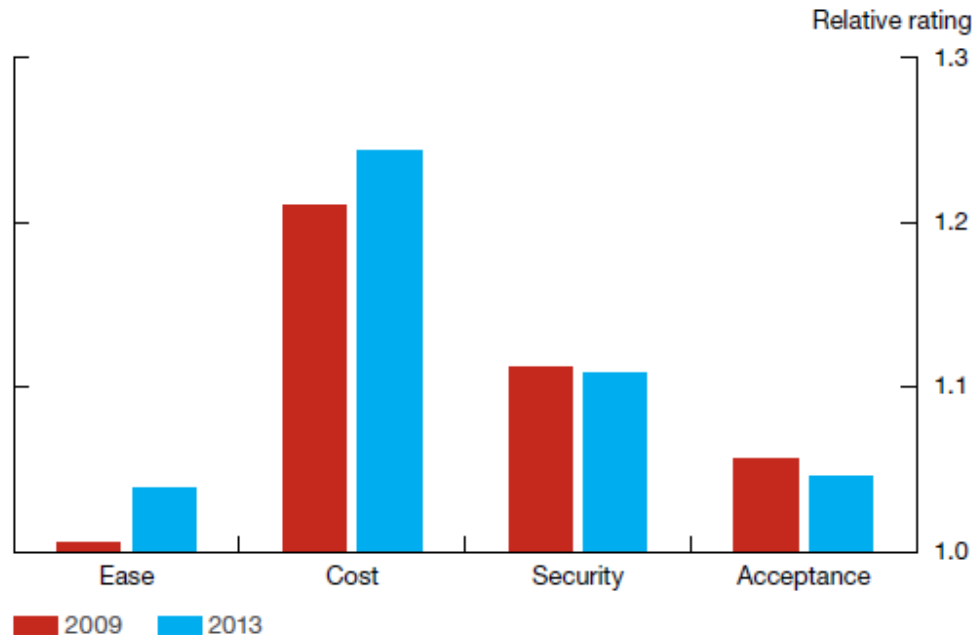


b. Value



# Consumers prefer cash to cards: cost and security

**Chart 4: Perception ratings of cash relative to debit and credit cards**



Notes: The columns indicate the perceptions of cash relative to payment cards (debit and credit cards) with respect to different attributes. The attributes for which respondents had a positive perception of the use of cash have a rating greater than 1.

Source: Bank of Canada calculations based on the 2009 and 2013 MOP diaries

Last observation: December 2013

Naoki and Welte (2016) "Why Do Shoppers Use Cash? Evidence from Shopping Diary Data": Some consumers still prefer to use cash even if cards are accepted everywhere

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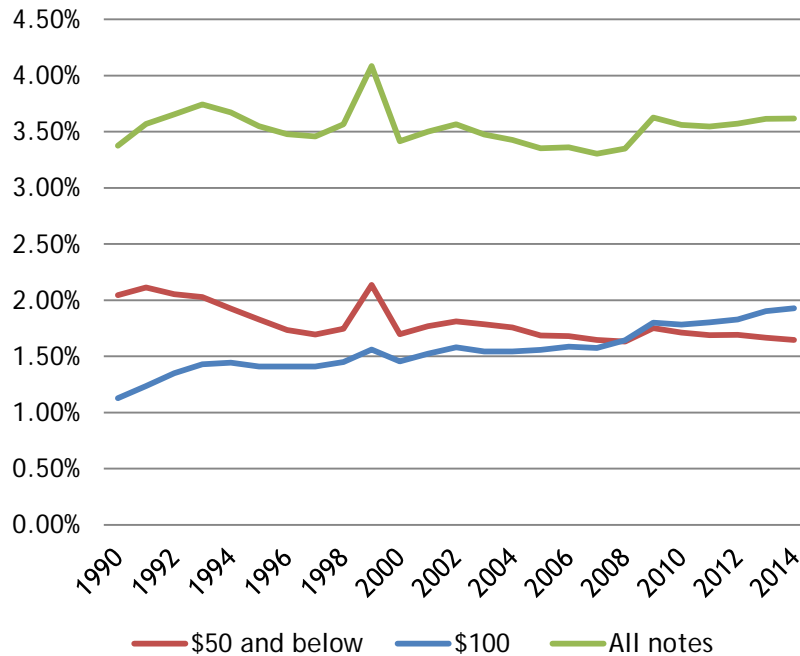
Final thoughts (there is still so much that we don't understand)

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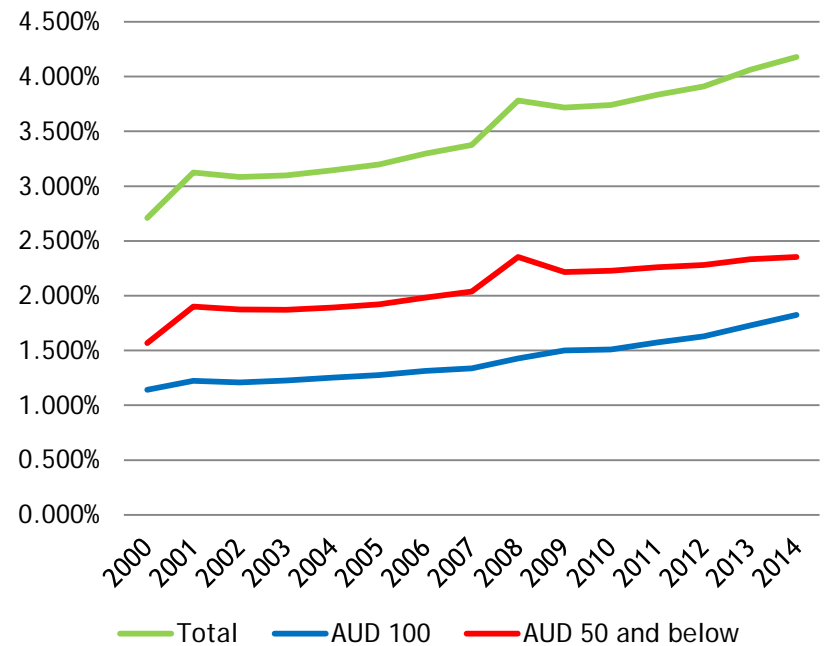
Conclusions

# Why does the demand for large denomination notes continue to grow strongly in some countries, e.g. CA, AU?

Value of notes over GDP in Canada

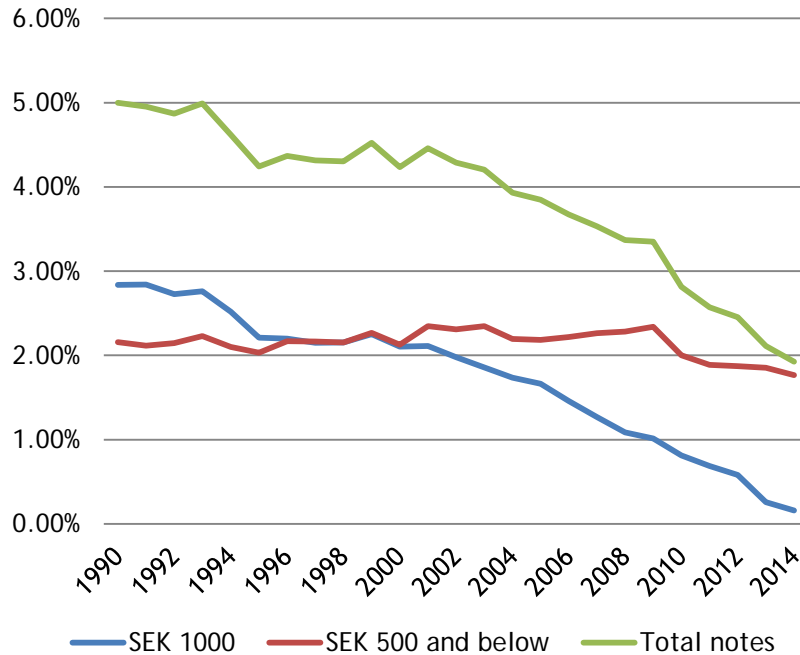


Value of notes over GDP in Australia

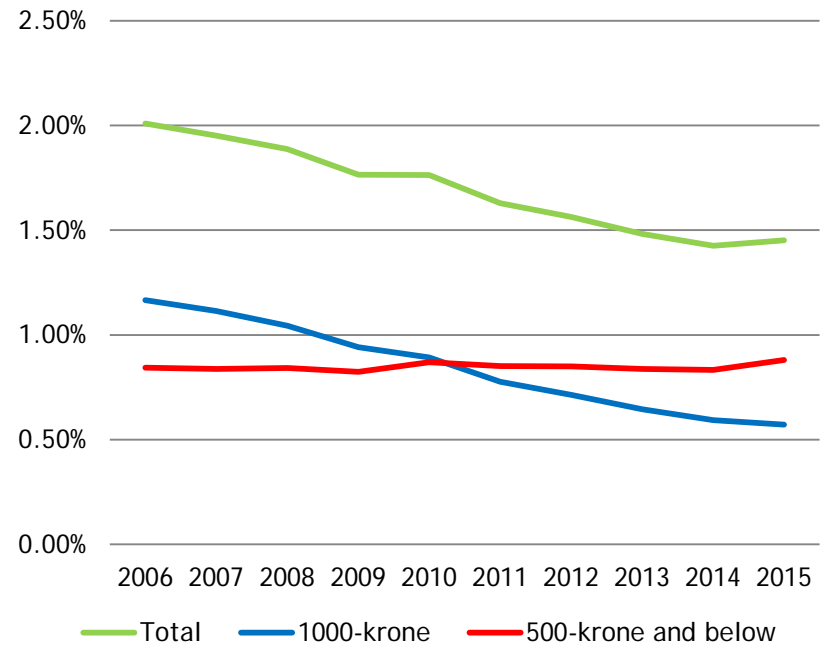


# Why not in Sweden and Norway?

## Value of notes over GDP in Sweden



## Value of notes over GDP in Norway



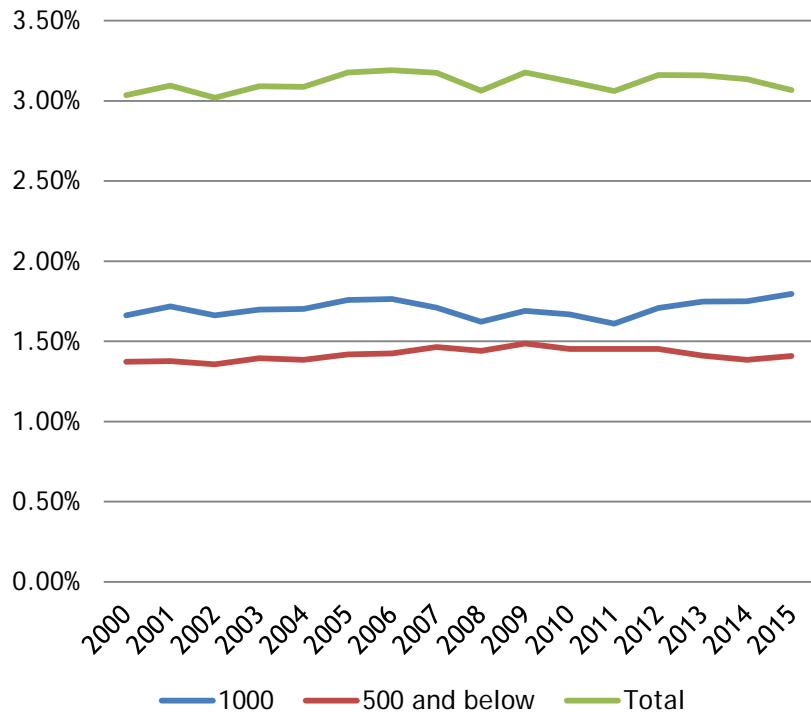
# Possible explanations

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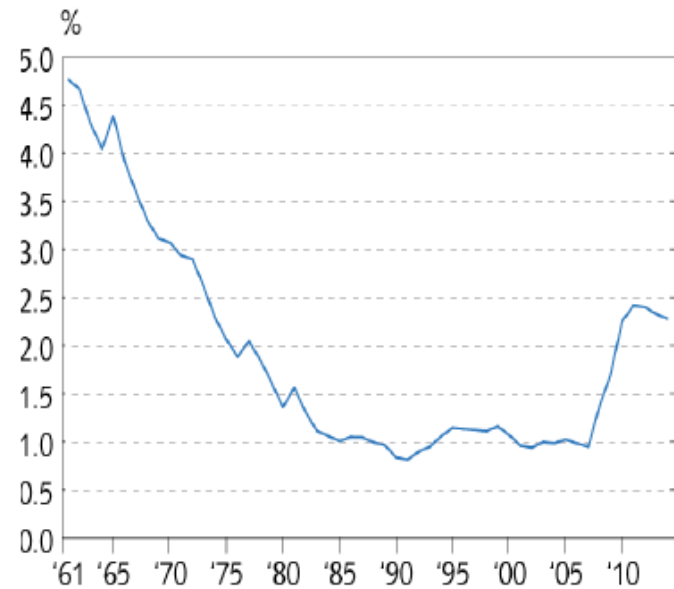
- The underground economy and illegal transactions
- Foreign demand for banknotes
- Currency substitution: Euro in Sweden and Norway, US\$ in Canada
- Hoarding of notes for saving or precautionary motive (given uncertainty in financial markets and low interest rates, financial crisis)
- Supply of bank notes by banks (banking structure)

# What about Denmark and Iceland?

Value of notes over GDP in Denmark



Notes and coin in circulation % of GDP  
1961-2014



Source: Central Bank of Iceland.



# Notes of largest denomination in selected countries

	Share of total notes in circulation			Share of total notes in circulation	
	2000	2014		2000	2014
JPY 10,000	90%	92%	AUD 100	42%	44%
USD 100	67%	78%	NOK 1,000	58%	40%
KRW 50,000	28% (2009)	72%	EUR 500	23% (2002)	30%
CHF 1,000	53%	60%	NZD 100	7%	11%
DKK 1,000	55%	56%	SEK 1,000	50%	8%
CAD 100	43%	53%	GBP 50	5%	7%

# Where are the notes?

## -Notes in circulation and notes in consumers' wallets

Denomination	2009 NIC volume (millions)	2009 MOP Notes in consumers' wallets		2013 NIC volume (millions)	2013 MOP Notes in consumers' wallets	
\$100	275	3	1%	350	4	1%
\$50	155	6	4%	215	9	4%
\$20	823	80	10%	861	84	10%
\$10	113	21	19%	126	26	20%
\$5	211	37	18%	221	42	19%

# Ongoing research on understanding cash

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- Cost of payment study and method of payment survey
- Jiang and Shao (2014) “Understanding the cash demand puzzle”
  - Cash use goes down and yet cash demand remains strong, because the velocity of cash falls as credit expands
- Dunbar and Jones (2016), “The (un)demand for cash”
  - Study the economic factors affecting banknote deposit (\$1000, \$100, \$50) and the stock of notes circulating in each region in Canada
- Bejanov and Dunbar (2016) “The social network of money”
  - Use data that track notes by serial number to study the circulation pattern of \$100 and \$50
- Is cash being used a lot in criminal activities?
  - RCMP data

# Some final thoughts

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- People always want to make a trade
- Hard to find double coincidence of wants; so will need a medium of exchange
- The medium will evolve over time as needs and technology change
- One size generally does not fit all: so continuing demand for and use of cash

# Conclusions

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- Cash remains broadly accepted and accessible
- The use of cash continues to decline relative to other payment methods and to the size of household spending
- The demand for cash in most countries, however, is growing steadily.
- Ultimately consumers make the decision to use the payment method that meets their needs and serves them the best, while merchants decide what payment methods they accept
- Bank notes are unlikely to disappear in the near future and they appear to be more than just another payment instrument.
- Central banks should continue to monitor developments in retail payments and conduct research on the holding and use of cash

For more information about Bank of Canada research on cash and payment innovations, visit:  
<http://www.bankofcanada.ca/e-money>

