

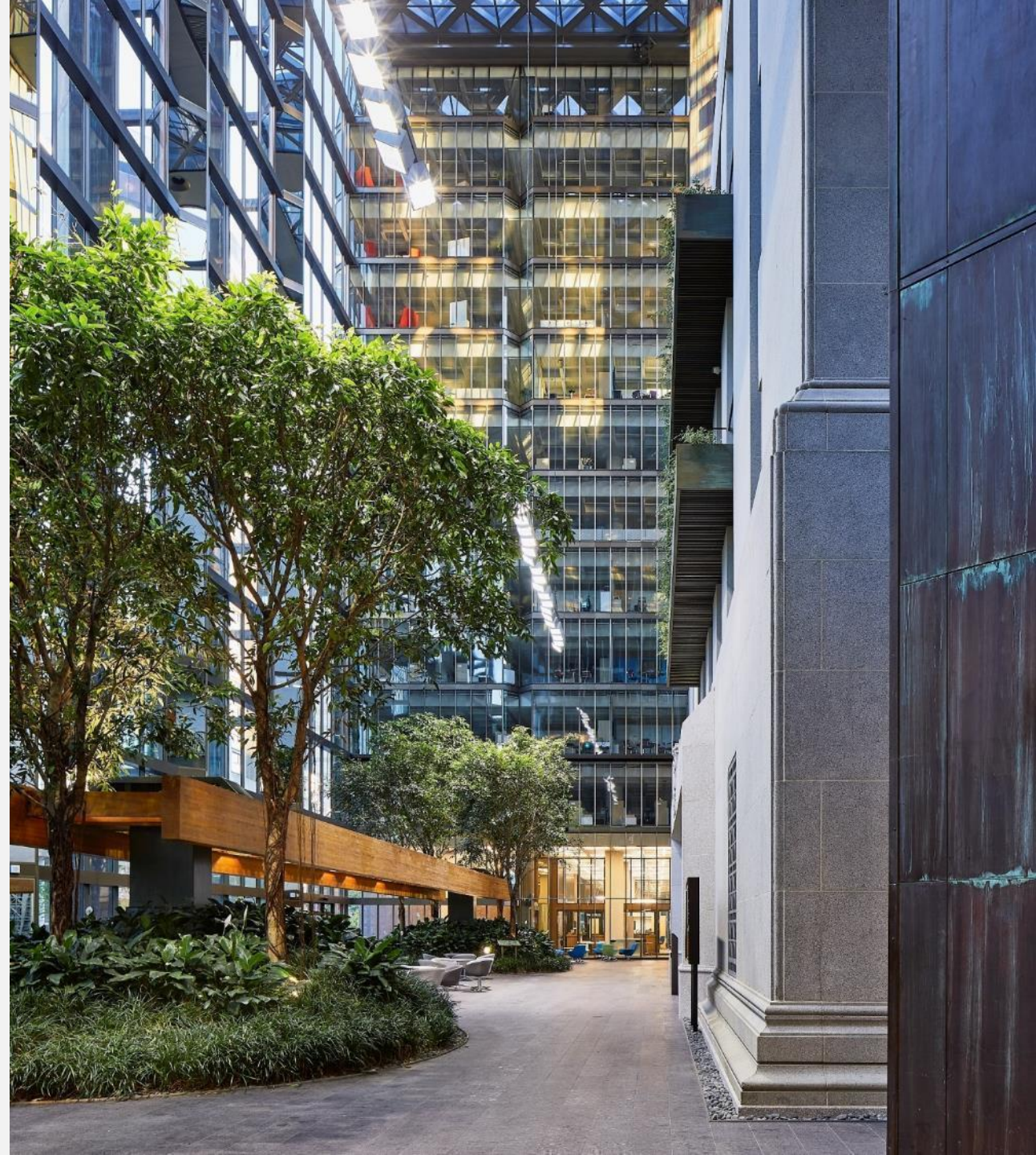
Untapped Potential: Mobile Device Ownership and Mobile Payments in Canada

Marie-Hélène Felt and Angelika Welte

Currency Department, Bank of Canada

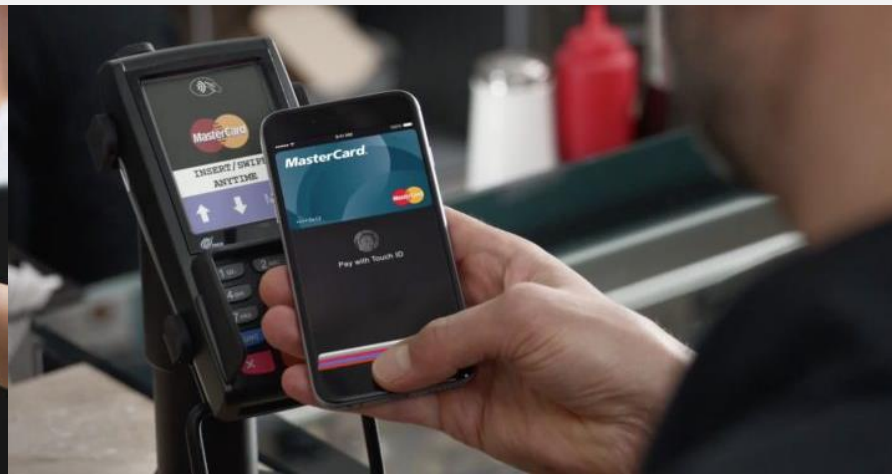
2025 CANADIAN STATA CONFERENCE
OCTOBER 3, 2025

THE VIEWS EXPRESSED IN THIS PRESENTATION ARE SOLELY THOSE OF THE AUTHORS AND MAY DIFFER FROM OFFICIAL BANK OF CANADA VIEWS. NO RESPONSIBILITY FOR THEM SHOULD BE ATTRIBUTED TO THE BANK.



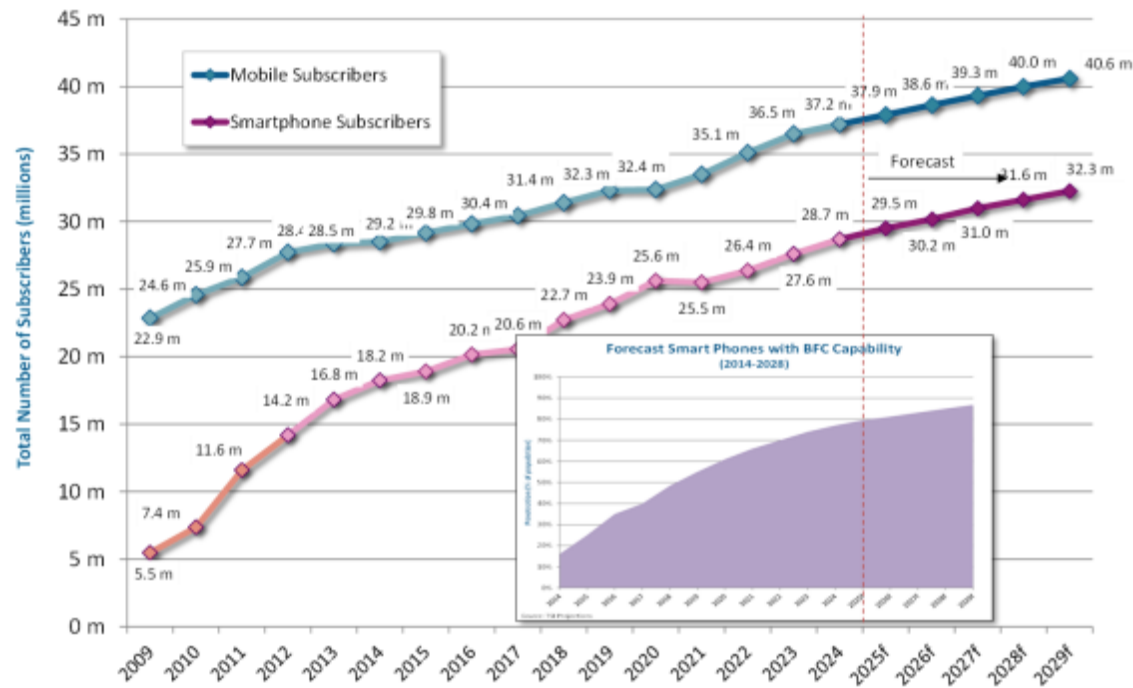
Motivation

- Mobile payments are digital payments made from a mobile device, such as smartphone or smartwatch
 - › Digital wallet apps, mobile banking apps, store-branded card apps
- New way of paying both online and **in-store**
- Shift from physical to **digital wallet**?
- **Accessibility** considerations: are there barriers and why do we care?



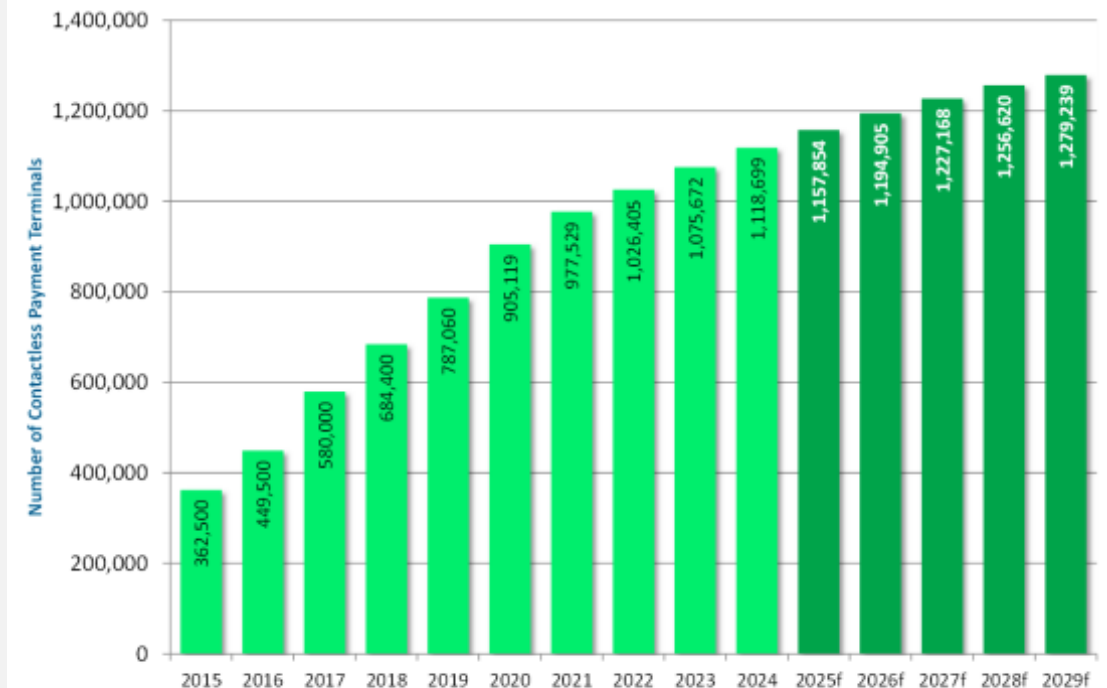
Favourable context: massive smartphone adoption and high contactless acceptance

Forecast Number of Mobile Subscribers in Canada (2024 - 2029)



Source: TSI Projections

Forecast Installed Base of Contactless Payment Terminals (2024 - 2029)



Source: TSI estimates

(Technology Strategies International, *Canada Payments Forecast*, 2025)

Digital Wallet and Payment Trends (DWPT)

- Syndicated survey by Ipsos
- 4 waves per year; N= ~3,000 Canadian adults per wave
- We use 2021Q1-2023Q1 data **with our own sample weights.**
- **Stata command:** we construct raked weights using *ipfraking*
 - › Kolenikov, S. 2014. "Calibrating Survey Data Using Iterative Proportional Fitting (Raking)." Stata Journal 14 (1), 22–59.
 - › Kolenikov, S. 2019. "Updates to the Ipfraking Ecosystem." Stata Journal 19 (1), 143–184.



Roadmap of the presentation



How Canadians use their mobile devices to pay.



Who uses mobile payments?



A two-stage model of mobile phone and mobile payment adoption.

1. How Canadians use their mobile devices to pay

- Online transactions made in a browser on a smartphone;
- In-app payments;
- E-transfers via a mobile banking app;
- **In-store contactless payments using mobile wallet apps** (Apple Pay, Google Pay, Samsung Pay);
- **In-store QR code payments** using a mobile wallet app, a store-branded app, the PayPal app, etc.

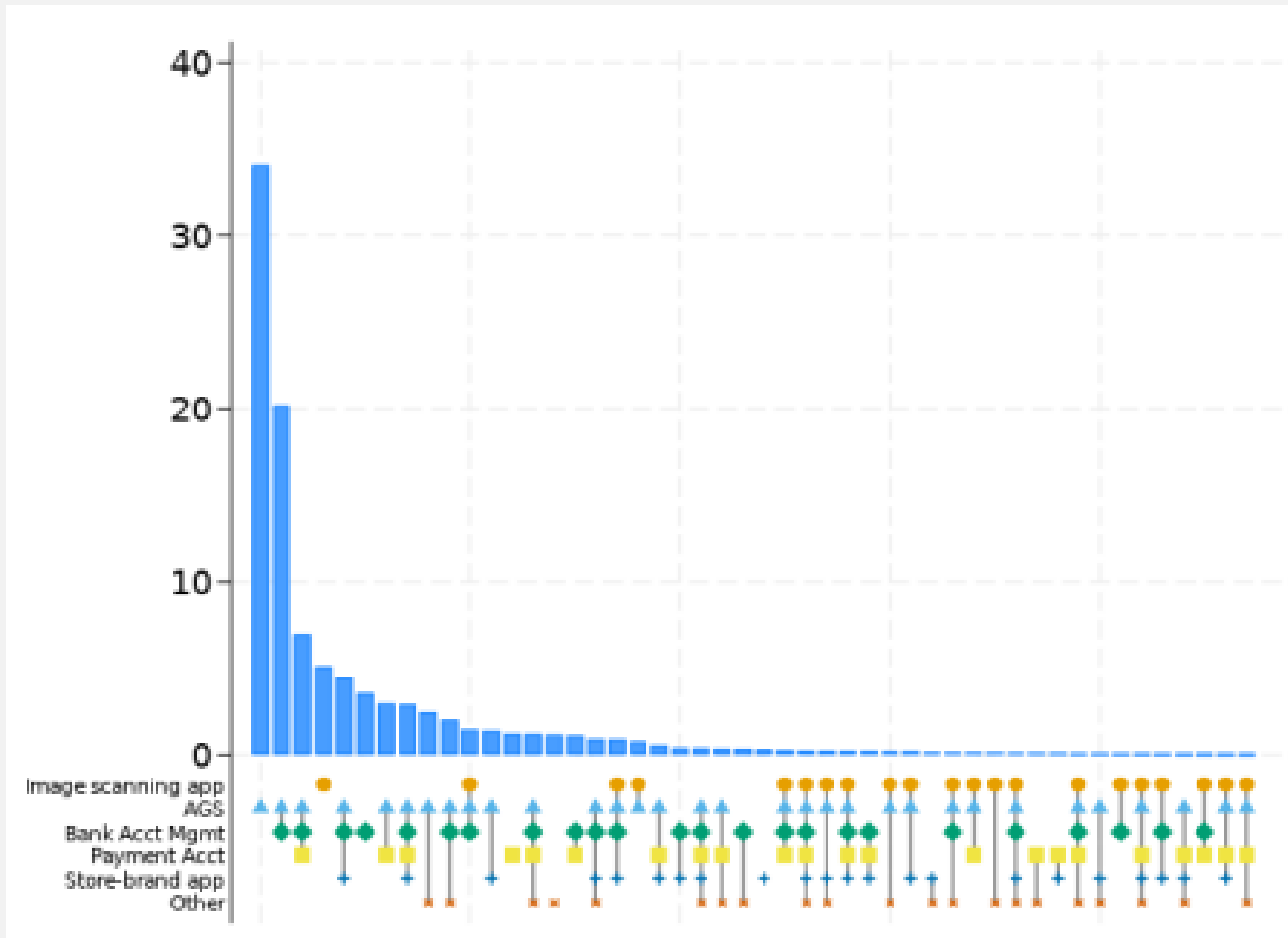


Digital wallets and bank account apps are most popular

	% of mobile payers
Mobile payment apps	94
Image scanning payments	12
	% of mobile payment <u>app</u> users
► Payment apps used:	
Apple/Google/Samsung Pay (AGS)	89
Bank Account Management	51
Payment Account	20
Store-branded prepaid	15
Other	10
► Linked cards:	87
Only Credit card	46
Only Debit card	20
Credit and Debit Card	21

Mobile payers often use more than one type of mobile payment

Adoption patterns among mobile payers



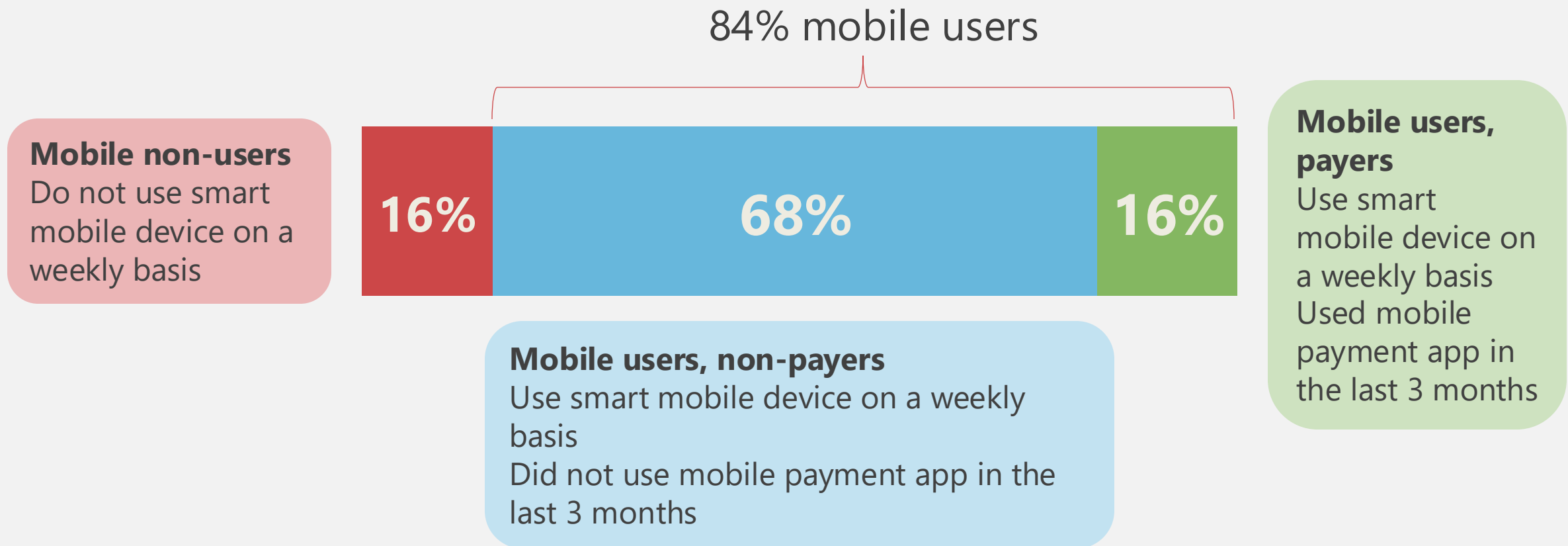
Stata command:

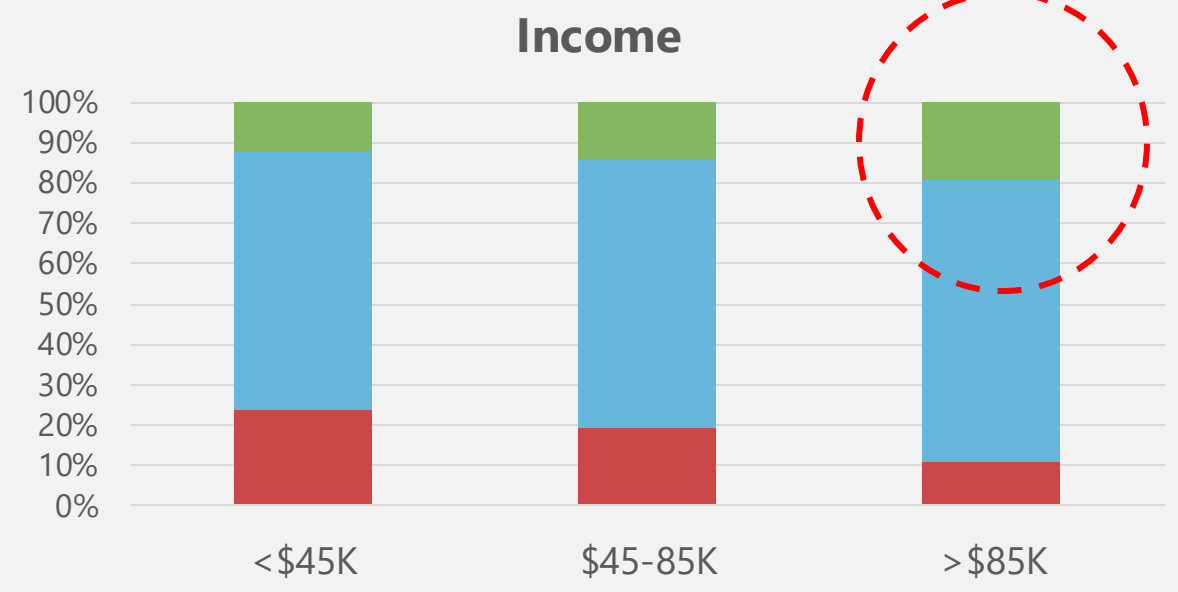
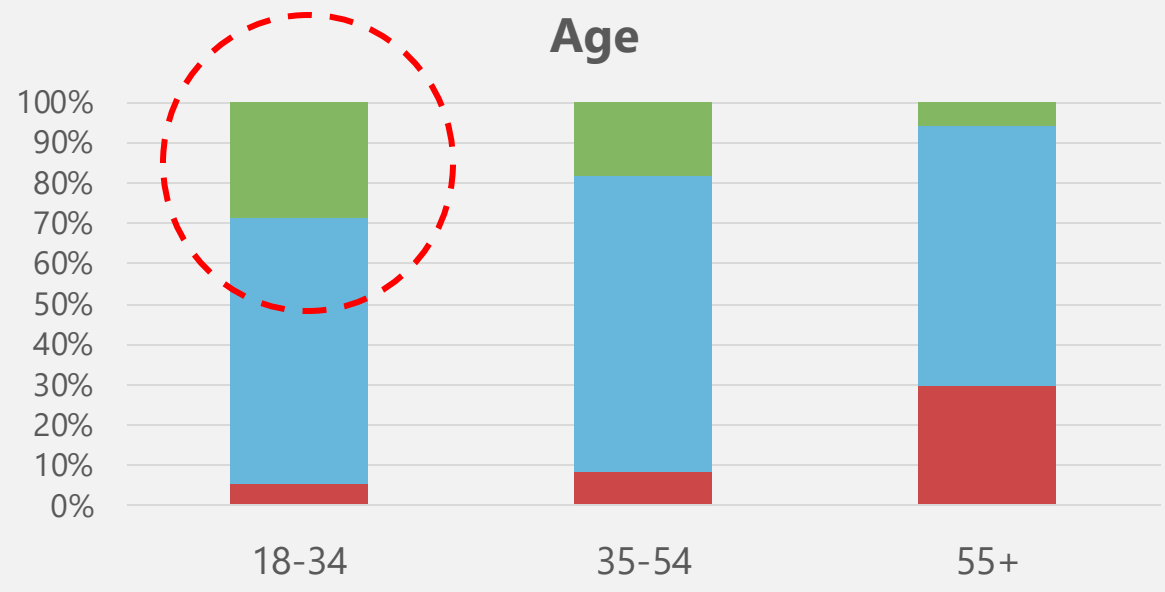
Tim Morris & Nicholas J. Cox, 2023.

"**UPSETPLOT: Stata module to show Euler or Venn diagrams mapped to bar charts, upsetplot style**," [Statistical Software Components S459161](#), Boston College Department of Economics, revised 03 Dec 2023.

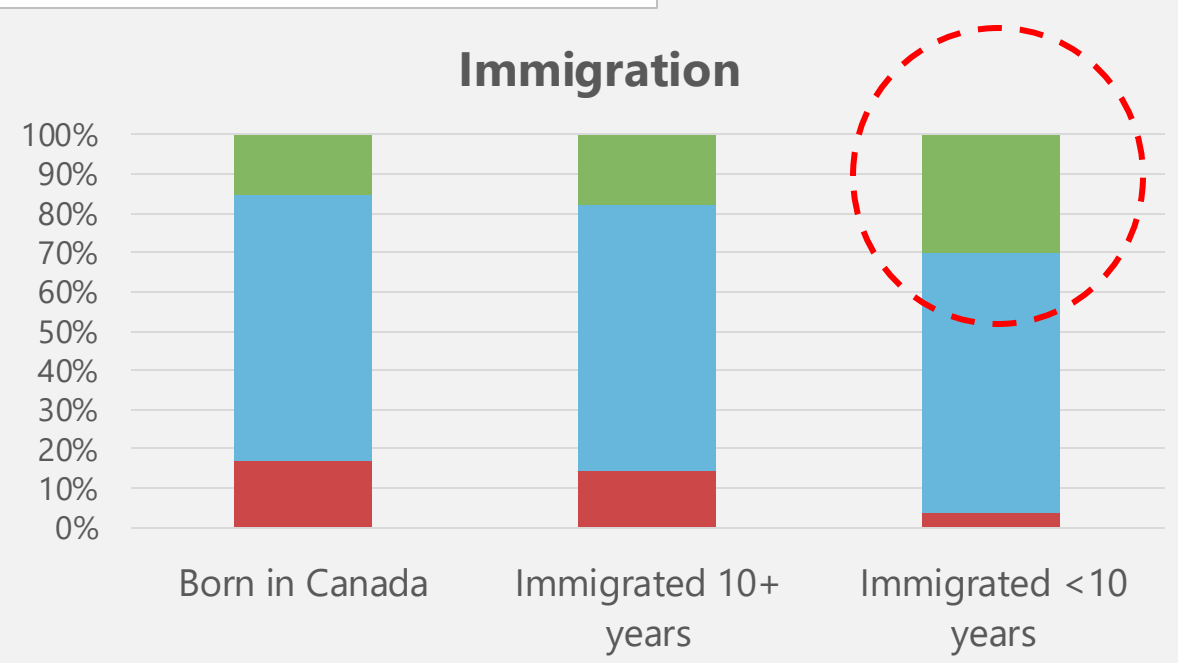
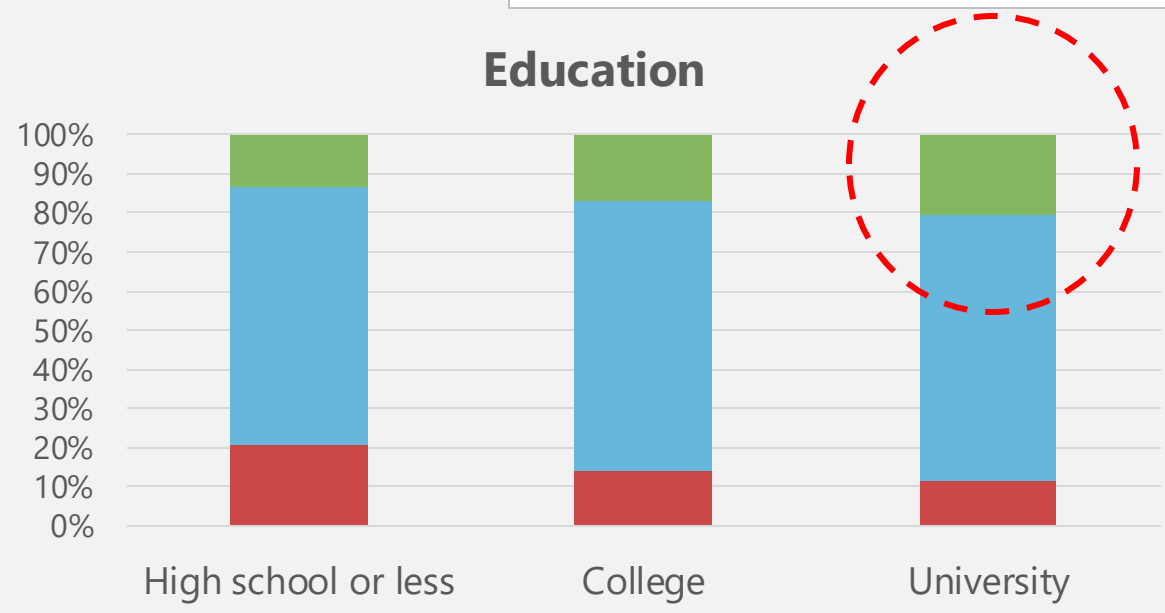
2. Who uses mobile payments?

Majority of Canadians have a phone but don't use it to pay.

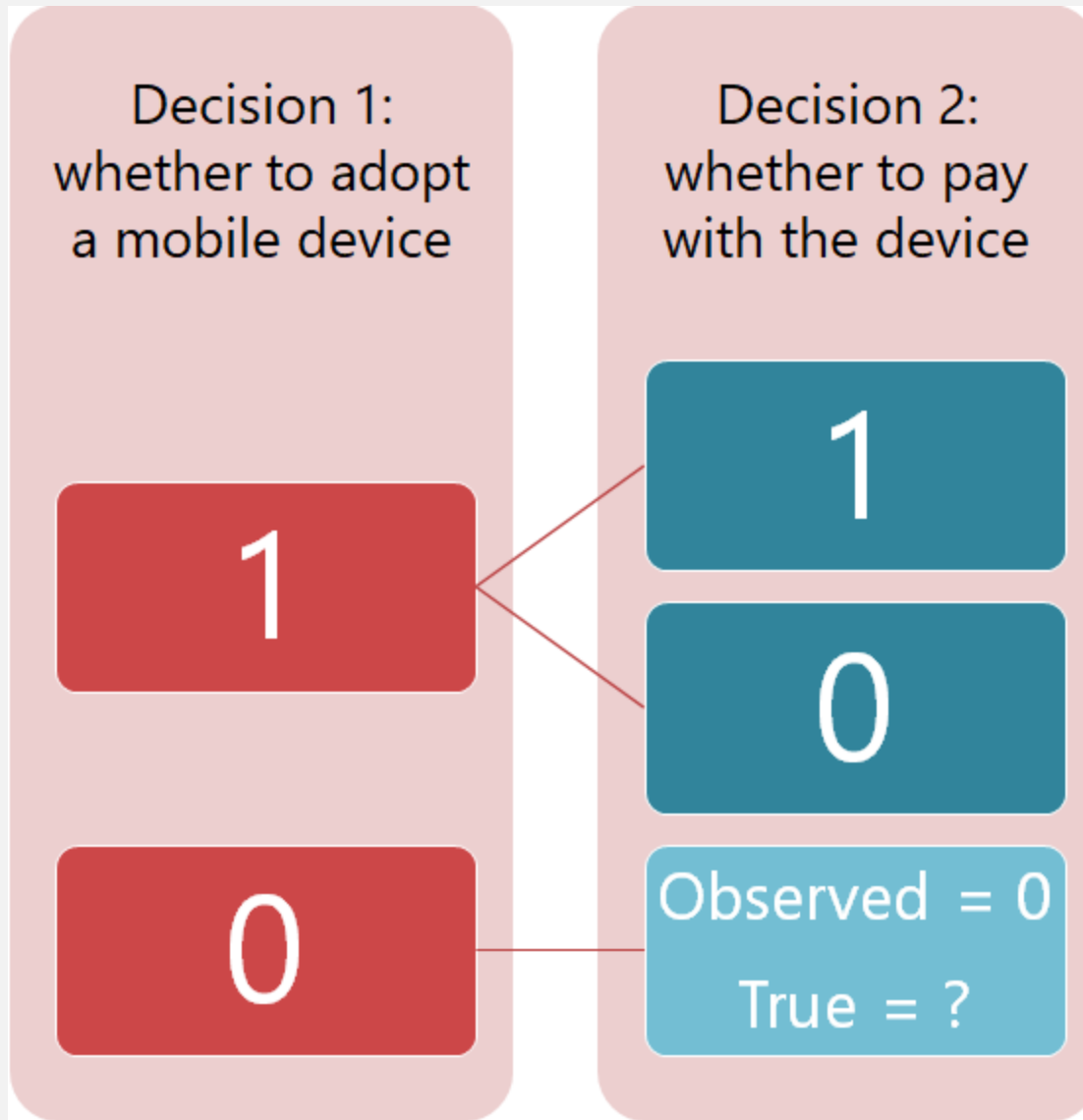




■ Mobile non-users ■ Mobile users, non-payers ■ Mobile payers



3. Mobile payment adoption happens in two steps



- Mobile payment adoption is observed only for mobile device users (**sample selection**).
- But focusing on mobile device users is problematic if the 2 decisions are not independent (**selection bias**).
- Stata command: *svy: heckprobit*
predict ..., pmargin
predict ..., pcond
predict ..., psel

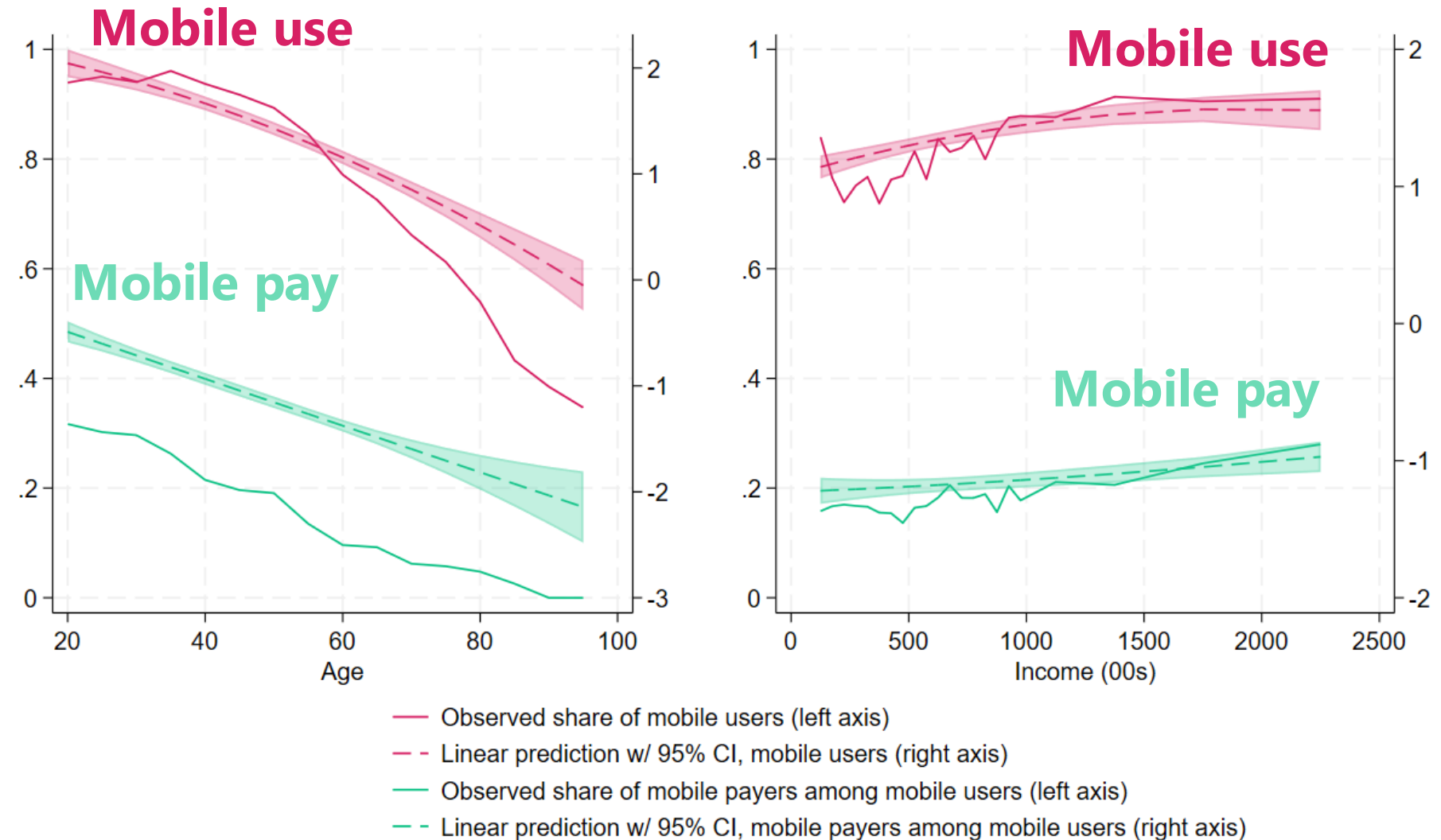
Non-linearity in age and income provides identification

■ Exclusion restrictions:

- › **Age squared** and **income squared**

See Dong (2010), Escanciano, Jacho-Chávez and Lewbel (2016), Lewbel (2019), Balutel, Henry, Vásquez and Voia (2022).

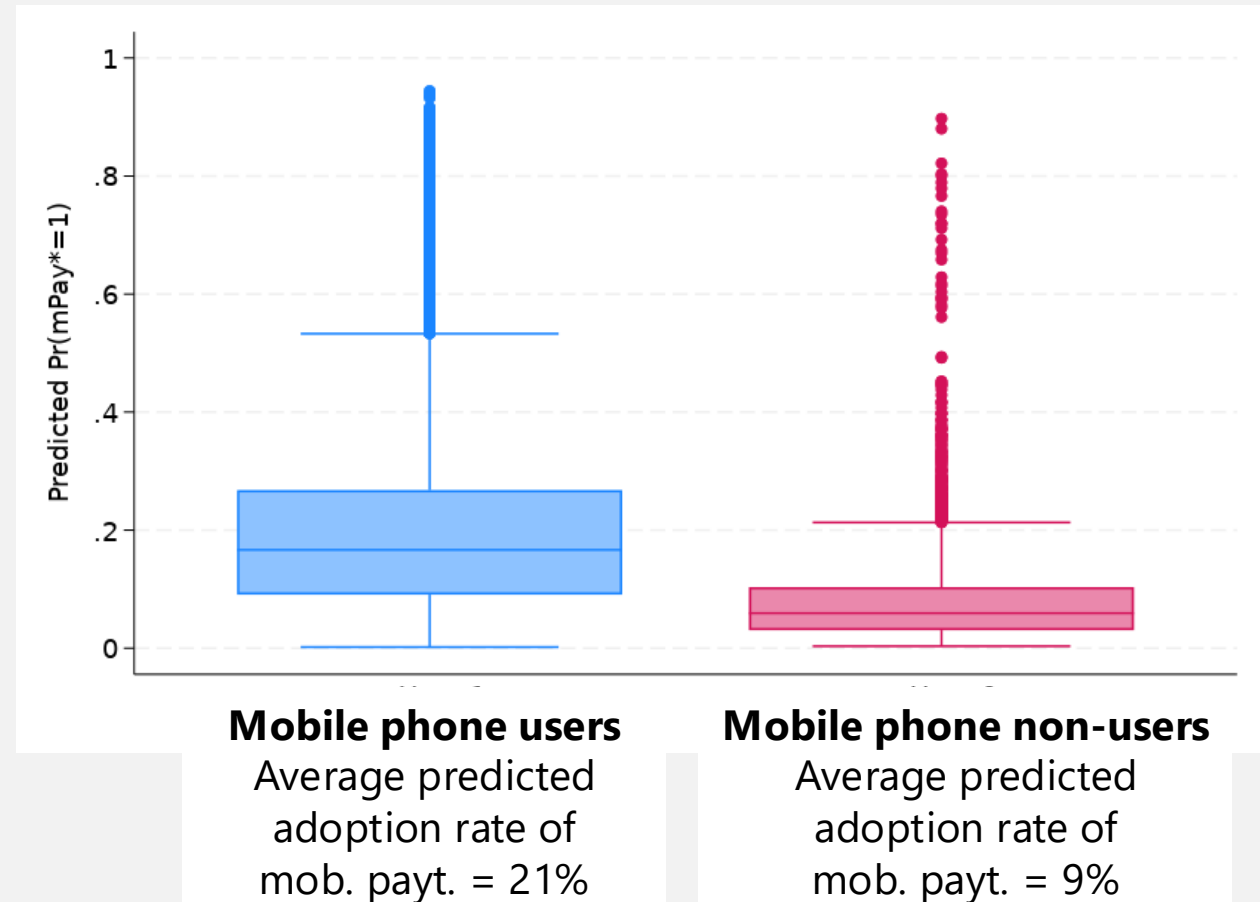
- › Province-by-time FEs



Our estimation results indicate positive selection on observables...

Positive selection on observables:

- The **observable** characteristics of **mobile users** tend to make their adoption rates of mobile payments **high**.
- The **observable** characteristics of **mobile non-users** tend to make their *potential* adoption rates of mobile payments **low**.

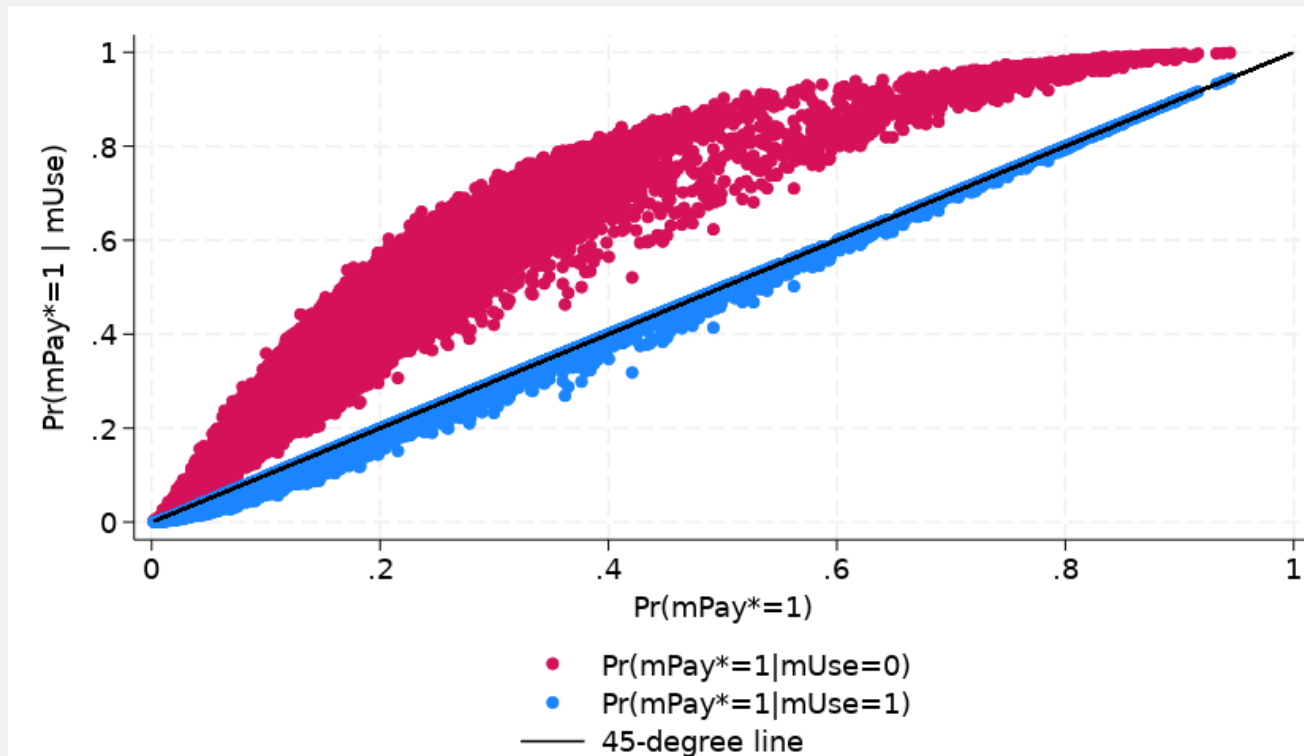


Our estimation results indicate negative selection on unobservables

Negative selection on unobservables:

- Negative correlation between the **unobserved** error terms that affect mobile phone usage and mobile payment.
- **Mobile device non-users** have a propensity to adopt mobile payments higher than **mobile users**, all else equal.

- $\hat{\rho} = -0.32$
- P-value=0.09



Without selection, we understate mobile payment adoption among mobile non-users

	Among mobile users			Among mobile non-users		In the population		
	Observed	Predicted without sample selection	Predicted with sample selection	Predicted without sample selection	Predicted with sample selection	Observed	Predicted without sample selection	Predicted with sample selection
Overall	19.47	19.21	19.23	6.55	14.73	16.36	17.61	18.79

High predicted adoption rates are for some segments of mobile non-users

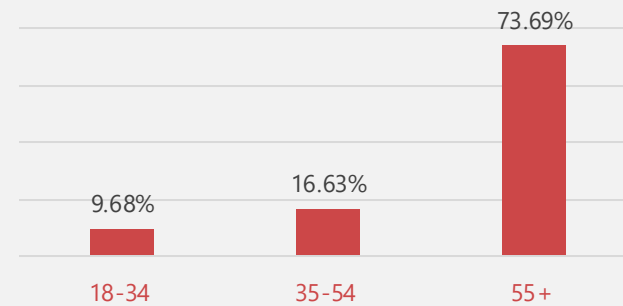
Category/Catégorie: Non-Sensitive/Non-Délicat

	Among mobile users			Among mobile non-users		In the population		
	Observed	Predicted without sample selection	Predicted with sample selection	Predicted without sample selection	Predicted with sample selection	Observed	Predicted without sample selection	Predicted with sample selection
Overall	19.47	19.21	19.23	6.55	14.73	16.36	17.61	18.79
Age								
18-34	30.18	30.89	30.71	23.64	44.62	28.51	29.93	30.71
35-54	20.05	20.74	20.93	10.01	23.06	18.40	19.37	20.26
55+	8.62	8.46	8.45	4.29	10.32	6.05	7.39	9.10
Immigration								
Born in Can.	18.49	18.31	18.32	6.36	14.30	15.35	16.62	17.84
10+ years	20.65	20.72	20.72	6.98	16.03	17.67	18.92	20.06
<10 years	31.42	31.57	31.55	22.53	46.62	30.31	31.22	31.77
Ethnic origin								
North Am.	17.49	17.51	17.53	6.49	14.42	14.53	15.69	16.99
Europe	17.87	17.68	17.69	5.65	13.15	14.52	15.64	17.01
Africa, Latin Am.	28.08	28.48	28.49	10.90	24.86	26.49	27.15	27.90
Asia-Oceania	26.13	26.16	26.16	15.91	32.13	24.43	25.51	26.49

What's missing? Unobserved mechanisms that might explain negative selection

→ *Who are mobile non-users and why would they want to mobile pay?*

Age of mobile non-users



Payment cards ownership

No DC

DC but no CC

DC+CC

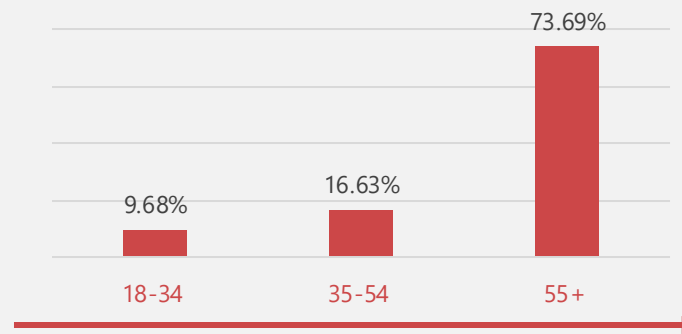
Financial situation less favourable
↘ Access to mobile devices
↗ Interest in online payments

Low trust
Low digital literacy
↘ Preference for mobile devices
↗ Interest in contactless payments

What's missing? Unobserved mechanisms that might explain negative selection

→ *Who are mobile non-users and why would they want to mobile pay?*

Age of mobile non-users



Payment cards ownership

No DC

DC but no CC

DC+CC

Financial situation less favourable
 ↘ Access to mobile devices
 ↗ Interest in online payments

→ Higher cash dependence
 → **Unmet needs** in a cashless environment (Henry et al., 2023)

Low trust
 Low digital literacy
 ↘ Preference for mobile devices
 ↗ Interest in contactless payments

Key Takeaways



Mobile devices are widely used, but mobile payments are still marginal.



Unobserved preferences and/or characteristics work against having a mobile phone and towards mobile paying.



Unmet needs for mobile-type payments among mobile non-users?



Thank you! Merci!

Sources of illustrations

- <https://www.forbes.com/advisor/credit-cards/contactless-credit-cards/>
- <https://streetfightmag.com/2020/08/06/who-benefits-from-the-surging-interest-in-contactless-payments/>
- <https://weartotrack.com/smartwatches-nfc-payment/>
- <https://sheepblackish.medium.com/google-pay-vs-in-app-billing-b224b2e4fbab>
- <https://medium.com/@neerajkumar6801/make-in-app-payments-a-breeze-with-google-pay-and-apple-pay-3042472560da>
- [BMO iPhone App Update Improves Interac e-Transfer History • iPhone in Canada Blog](#)
- [Home | ANB Bank](#)
- <https://www.nerdwallet.com/ca/banking/what-is-contactless-payment>
- [Tim Horton's launches mobile payment option | CTV News](#)

References

Dong, Y. 2010. "Endogenous regressor binary choice models without instruments, with an application to migration." *Economics Letters* 107: 33-35. <https://doi.org/10.1016/j.econlet.2009.12.017>

Heckman, J. 2019. "Sample selection bias as a specification error." *Econometrica* 47: 153–161.

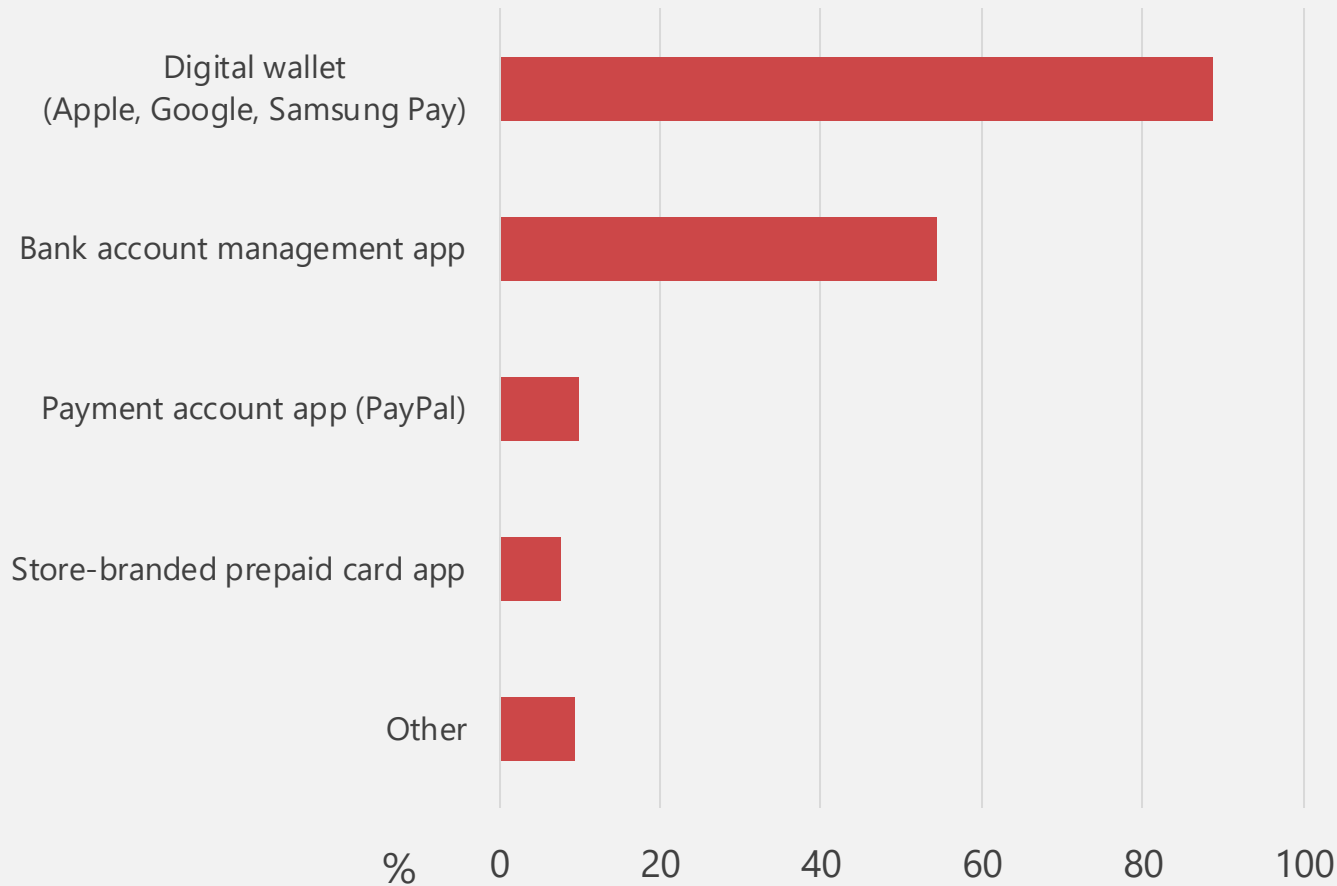
Kongaut, C. & Bohlin, E. 2016 "Investigating mobile broadband adoption and usage: A case of smartphones in Sweden." *Telematics and Informatics* 33: 742-752. <https://doi.org/10.1016/j.tele.2015.12.002>

Lee, E.J., Eastwood, D.B. & Lee, J. 2004. "A Sample Selection Model of Consumer Adoption of Computer Banking." *Journal of Financial Services Research* 26: 263–275.
<https://doi.org/10.1023/B:FINA.0000040052.74854.bd>

Van de Ven, W. P. M. M., and B. M. S. Van Pragg. 1981. "The demand for deductibles in private health insurance: A probit model with sample selection." *Journal of Econometrics* 17: 229–252.

Mobile payments: linked and in-person

Mobile payment apps used in past 3 months



Payment cards saved to mobile for in-person contactless payments

