



OESTERREICHISCHE NATIONALBANK
EUROSYSTEM

The Convenience of Electronic Payments and Consumer Cash Demand – Causal Evidence from the Staggered Introduction of Contactless Debit Cards

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Economics of Payments X

20. October 2021

Disclaimer: The findings, interpretations and conclusions presented in this article are entirely those of the authors and should not be attributed in any manner to the Oesterreichische Nationalbank or the Eurosystem.

Does the introduction of contactless debit cards causally affect payment choice & cash demand?

Mobile payments [+ Add to myFT](#)

Rise of contactless payment means cash is no longer king

UK spending on debit cards overtook hard currency for the first time in 2017



Contactless payments have almost doubled over the past year © Bloomberg

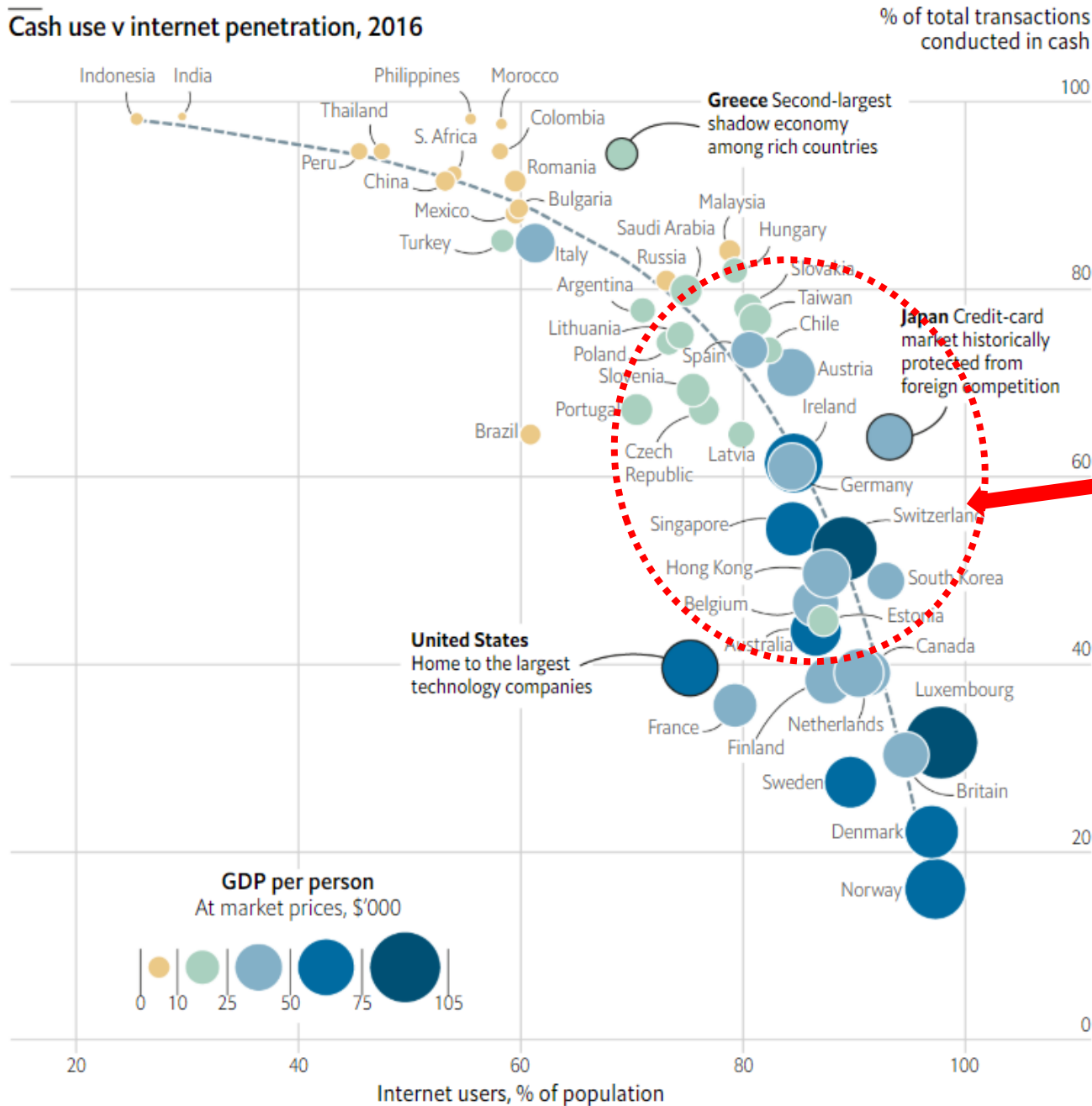
Nicholas Megaw, Retail Banking Correspondent JUNE 18 2018



Our contribution

- Financial innovation and consumer behavior
 - Jack & Suri (AER 2016), Bachas et al. (JF 2020), Agarwal et al. (2020), ...
 - Financial innovation and money demand
 - Attanasio et al. (JPE 2002), Alvarez & Lippi (Ectra 2009), ...
 - Consumer payment choice
 - Klee (JME 2008), Wang & Wolman (JME 2016), Borzekowski & Kiser (IJIO 2008), ...
-
- Effect of financial innovation on payment choice & cash demand
 - «natural experiment» to estimate causal effects
 - we measure consumer choice using detailed administrative data

Cash use v internet penetration, 2016



August 3, 2019

like Switzerland,
many other advanced
economies
are cash intensive ..

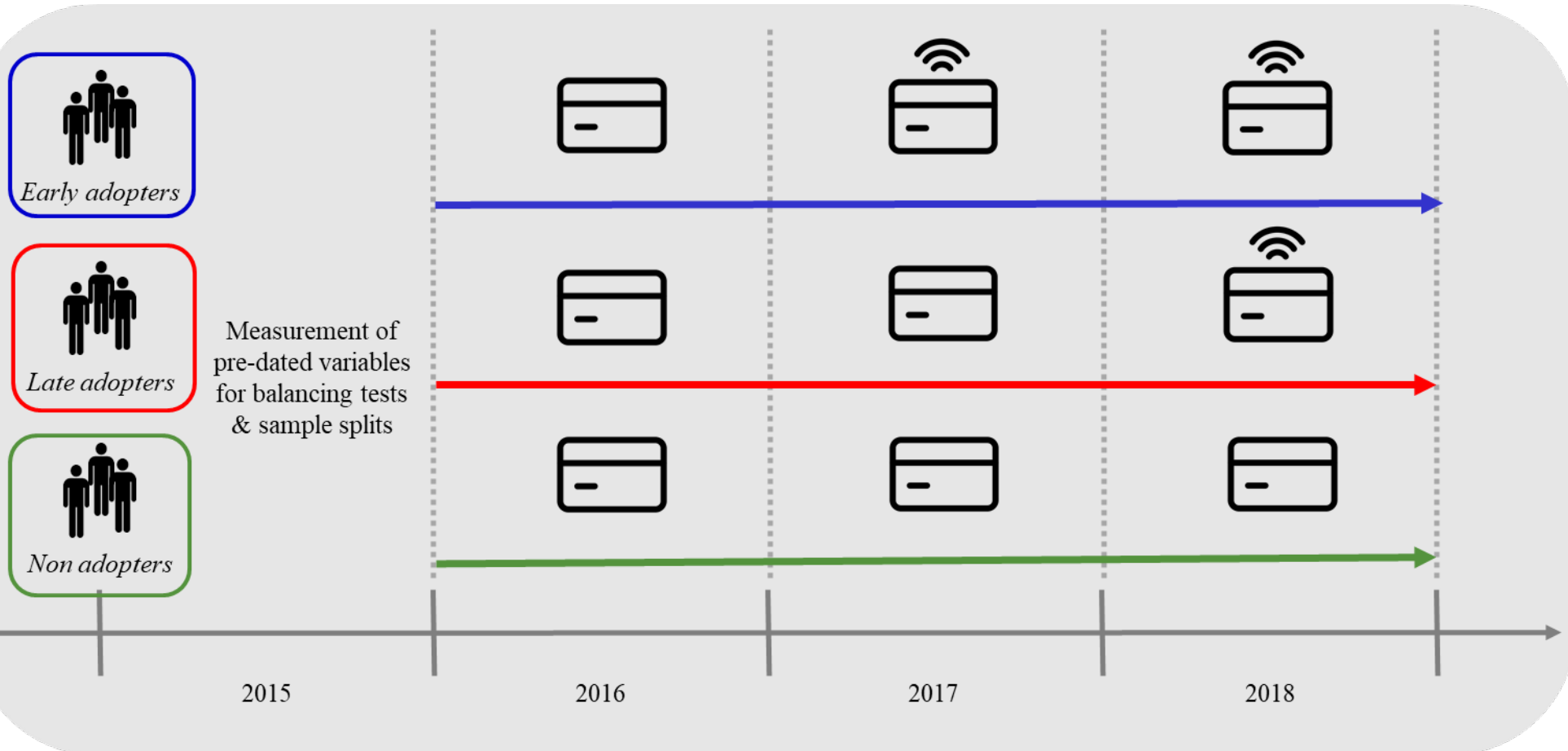
Research Design (I)

- Debit cards are regularly replaced every 3rd year at end-year
- Staggered introduction of contactless debit cards by a Swiss retail bank in 2016:Q4, 2017:Q4, 2018:Q4
- Timing of receipt of contactless debit card depends only on expiry date of existing card



disclaimer:
not card of
the «Bank»

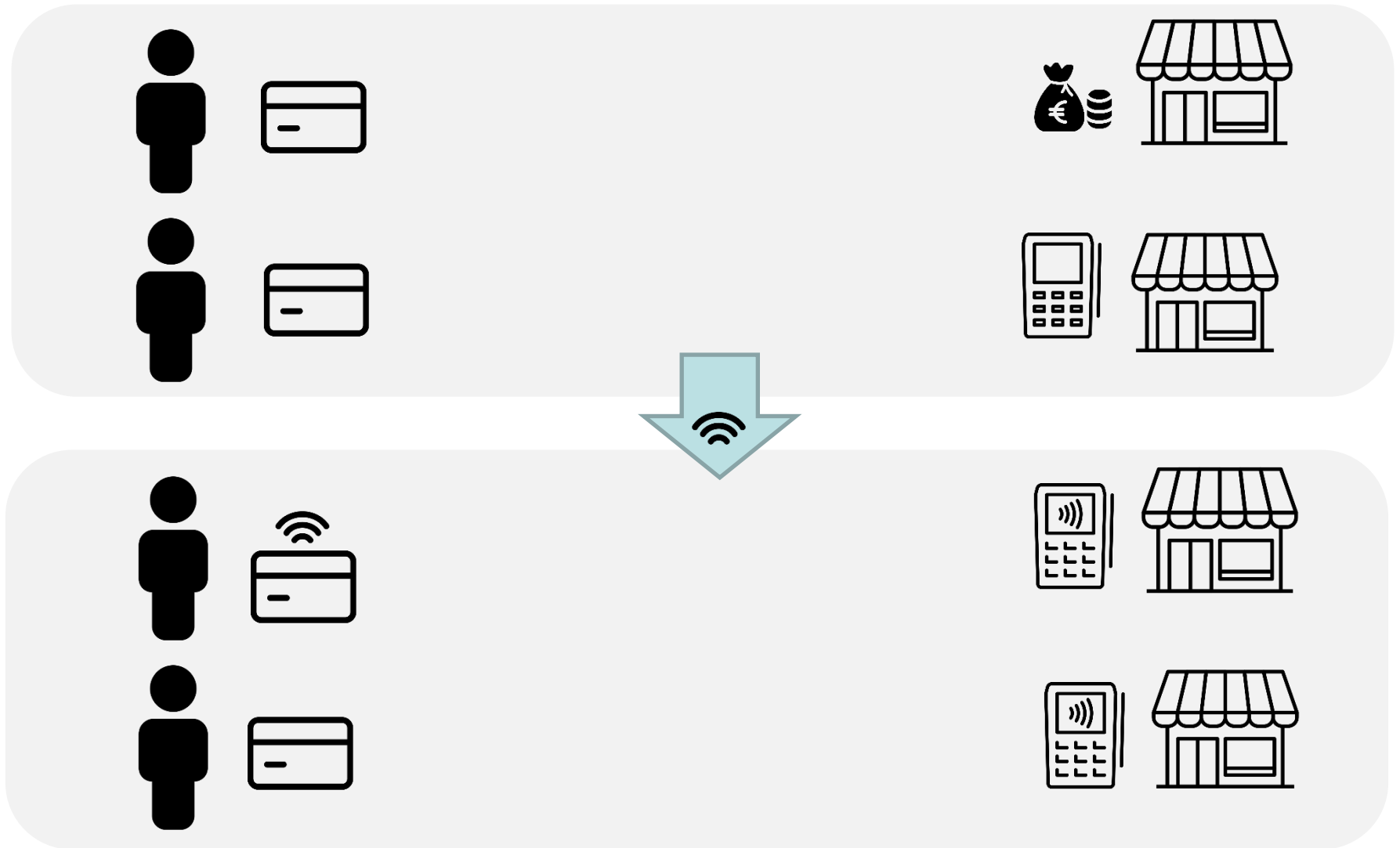
Research Design (II)




Panel data with staggered adoption (Athey & Imbens, 2018)

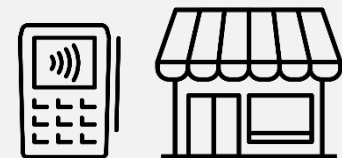
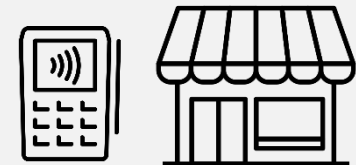
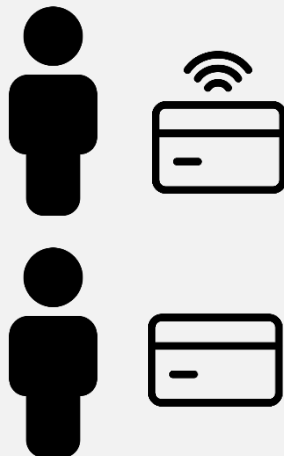
$$Y_{i,t,r} = \beta_i + \beta_{t*r} + \tau \cdot \text{Contactless}_{i,t} + \varepsilon_{i,t}$$

Payment innovation: Consumers & merchants



Payment innovation: Consumers & merchants

- We control for (changes in) local payment infrastructure 
- > we are not measuring the overall impact of the contactless technology on payment choice and money demand in the economy !
- > we are measuring the effect of being able to “tap and go” (rather than insert a PIN) for small debit card transactions → increased convenience



Data

- Anonymized, random sample of retail clients from 1 bank
- Transaction data: 2015 – 2018
 - Cash withdrawals (ATM, branch) – number and amount
 - Amount spent with debit card, credit card
 - Number of PoS debit card transactions by transaction size

precise measures of the use of cash and cards and of cash demand by the same consumers over a long period of time

- Socioeconomic / account information as per 2015:12
 - Age, Location, Gender, Nationality, other bank services (savings, custody, retirement, mortgage), etc.

Outcome variables

Summary Statistics 2016, 2017 and 2018

	mean
<i>Main Outcome Variables</i>	
Cash ratio (%) - value share of cash in cash/card transactions	68.2
Cash withdrawal frequency (per month)	3.7
Cash withdrawal amount (CHF, per withdrawal)	614
<i>Auxiliary Outcome Variables</i>	
Debit PoS transactions (per month)	6.5

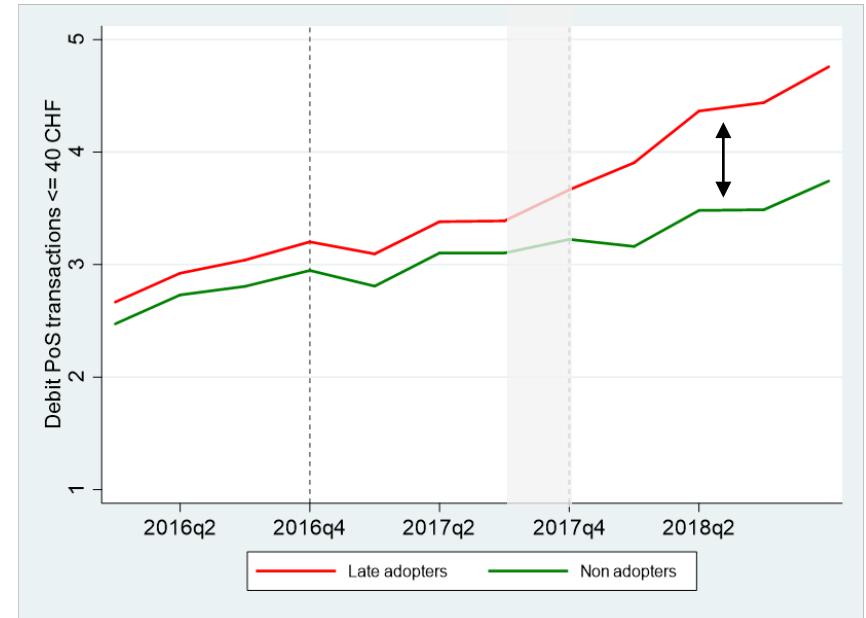
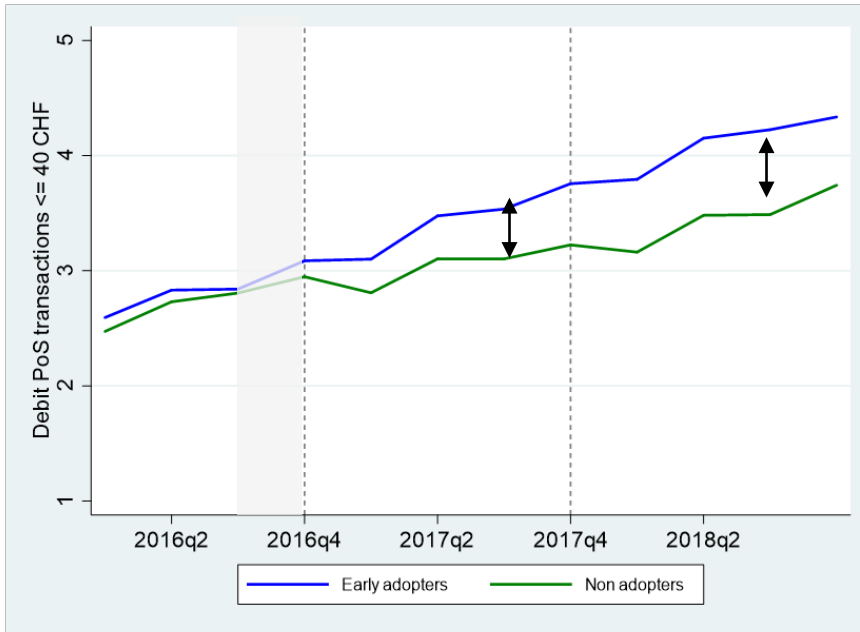
$$\text{Cash ratio (\%)} = \frac{\text{Cash Withdrawals}}{\text{Cash withdrawals} + \text{Debit PoS payments} + \text{Credit card payments}} \cdot 100$$

Debit PoS transactions

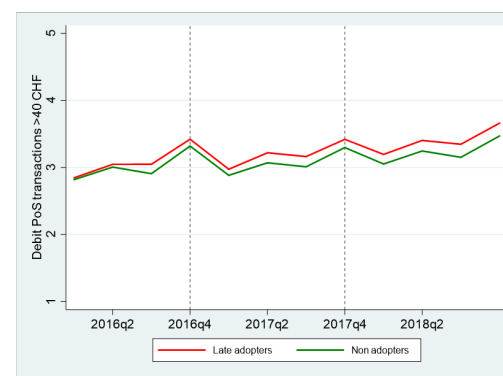
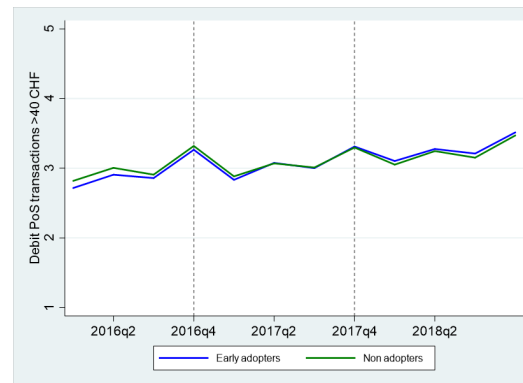


Ø transactions per month: 6.5

Transactions ≤ 40 CHF



Transactions > 40 CHF



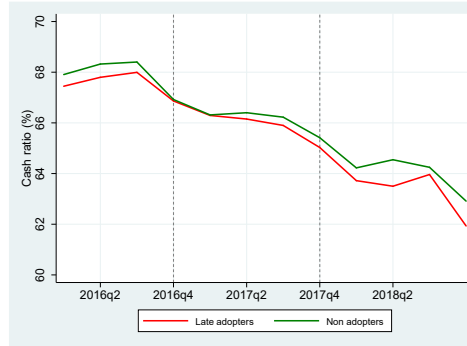
Debit card PoS transactions

- All transactions
 - ATE of contactless card: +0.5*** transactions
 - Trend change 2016-2018: +0.6*** transactions
 - Average 2016-2018: 6.5 transactions per month

Bulk of the increase comes from transactions below 40 CHF



Cash ratio (%)



- Cash Ratio

- ATE of contactless card:
- Trend change:
- Average 2016-2018:

-0.3 pp per year

-1.8*** pp per year

68 %

Heterogenous treatment effects

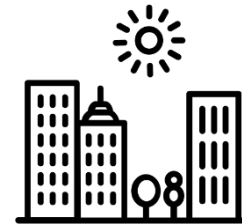
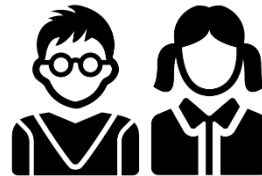
- Extensive vs. Intensive Margin

- Cash-only clients do not react



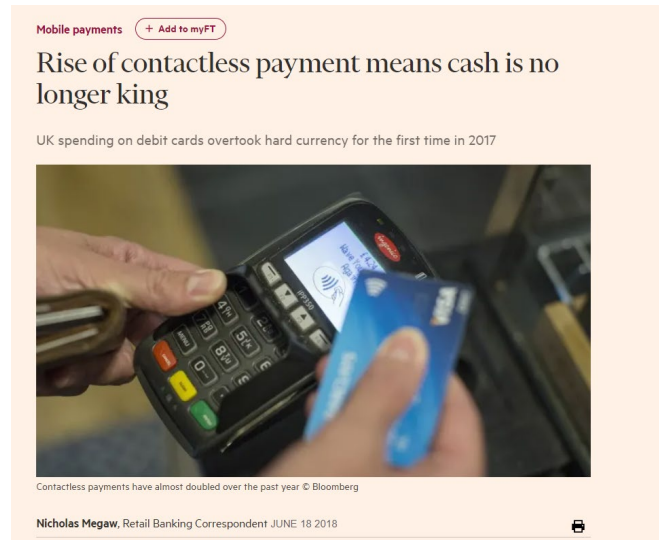
- Age & Location

- Strong effects for young*urban clients only



Conclusion

- Contactless cards do cause a substantial change of directly related payment behavior ... but have little impact on cash demand



- Contactless cards do cause a divergence in payment behavior across consumers

XTRA slides

Pre-registered analysis plan



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The Causal Effect of Financial Innovation on Payment Choice and Cash Demand - Evidence from the Staggered Introduction of Contactless Debit Cards.

OSF Preregistration

[Brown](#), [Stix](#), [Mettler](#), and 1 more

We identify the causal impact of financial innovation on consumer payment choice, i.e. the ...