Two Studies of Overdraft Alerts

Sending out an SMS:
The impact of automatically enrolling consumers into overdraft alerts

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Time to act:
A field experiment on overdraft alerts

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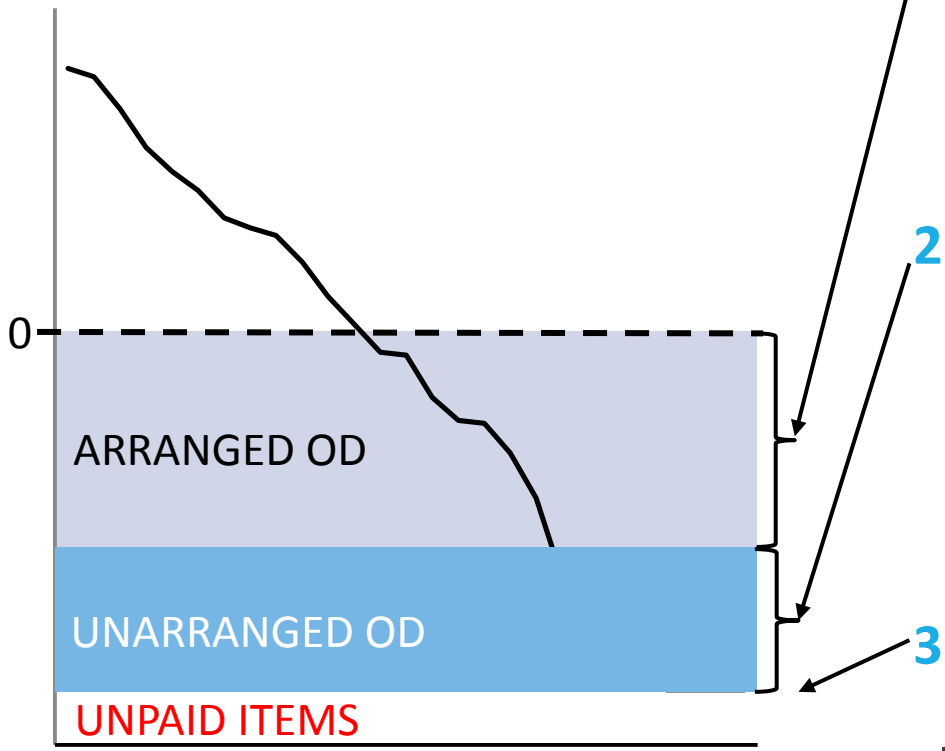
October 2018

Setting

Overdraft Charges in U.K. Personal Current Account (PCA) Market

97% of U.K. individuals have a PCA.



1. **Arranged (Authorized) Overdraft Credit**:
   - pre-agreed line of credit (56% of accounts)
   - Typical Charges: £3/day or £6/month + interest.
2. **Unarranged (Unauthorized) Overdraft**:
   - Most accounts have this facility, but not typically discussed with customer upon signing up.
   - Typical Charges: Some Combination of £5- £10/day + interest + paid item fees.
3. **Transactions Denied:** Unpaid Item fees (£6- £15).

UK: £2.9 billion (£39 per account) in 2014.

Overdraft Charges in U.K. Personal Current Account (PCA) Market

	Total Fees 2014	2016 Incidence	
Arranged Overdraft (AOD)	£1.7 billion (20% Net Rev)	37% charged	
Unarranged Overdraft (UOD)	£1.2 billion (14% Net Rev)	14% Charged	3% Pay 76% of charges
Unpaid Items (UI)		10% Charged	3% Pay 71% of charges

Inattention and Overdraft Behavior

Overdrafts may result from demand for credit.
But prior research suggests some occur as a result of inattention.

- Stango and Zinman (2014):
  - Surveying US individuals about overdraft charges reduces charges.
  - Over 50% of overdraft charges were avoidable by using alternative accounts with available liquidity
  - 60% of overdraft users did so because they 'thought there was enough money in [their] account'.
- UK Competition and Markets Authority (CMA) report (2016): matched survey: half of overdraft users were unaware they had recently used their overdraft facility.
- Liu, Montgomery and Srinivasan (2016): Light overdrafters are more likely to overdraw the less they check their bank balance.
- Alan, Cemalcilar, Karlan, and Zinman (2018): Advertising overdraft discounts reduces usage

Recent UK Regulatory Intervention

- 2012: Banks to provide annual summaries of charges
  - Hunt, Kelly, & Garavito (2015) find no effect on charges
- 2013: Banks to offer opt-in SMS alerts
  - Only 3 to 8% of individuals opt-in (CMA, 2016; similar opt-in rates in our dataset)
  - Hunt, Kelly, & Garavito (2015) find overdraft charges fall following opt-in
- 2018: By CMA order, Banks auto-enroll customers into unpaid item and unarranged overdraft SMS alerts by Feb 2018.
- Future: FCA Proposes more alerts, more transparency, and consideration of more radical options (e.g. banning fixed fees)

Research Questions

1. Effect of auto-enrolment on enrolment?
2. Effect of auto-enrolment on charges?
3. How do individual's respond to alerts?
4. What types of individual's benefit most from auto-enrollment?

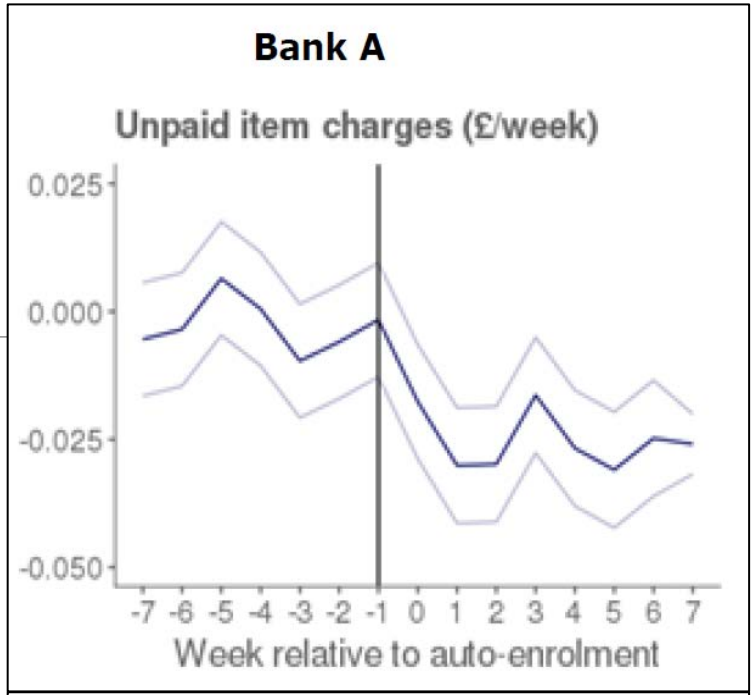
Data & Empirical Approach

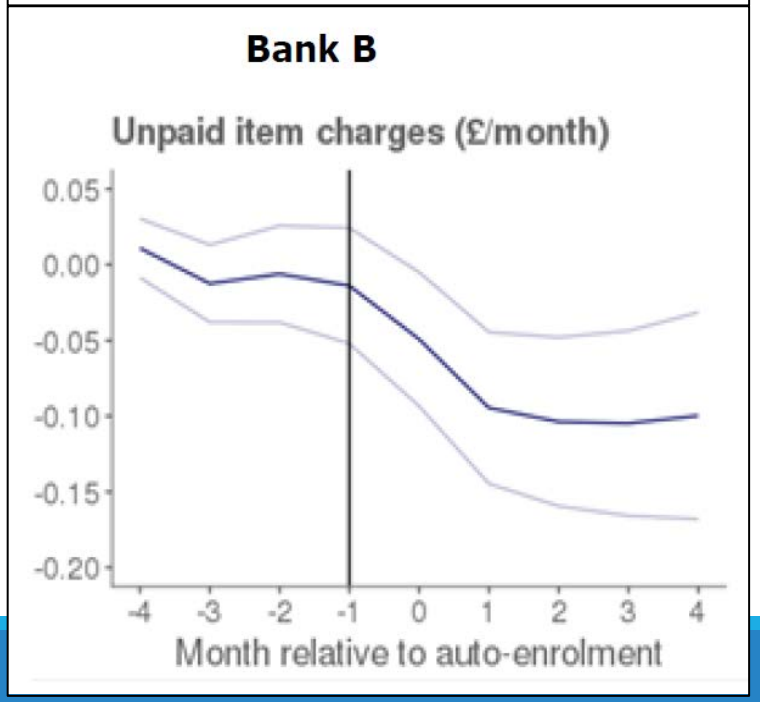
Data: Detailed panel of customer accounts & transactions

- Includes:
  - Account transactions; self-service banking (phone, internet and mobile) log-ins; bank communications (SMS alerts & other); customer demographics; overdraft arrangements
- Observational Data: (1.5 million customers, 0.9-1.4m after exclusions)
  - 2-year panel (Jan. 15 - Dec. 16) of 250,000 customers for each of 6 largest U.K. banks (~90% of the PCA market).
  - Natural Experiments: Two banks auto-enrolled customers in CMA alerts during this period.
- Experimental Data: (1.3 million customers)
  - 11 month panel for 2 of the largest U.K. banks.
  - 4 trials (5 control groups and 11 treatment groups)

Empirical Approach

- Natural Experiments (Banks A and B)
  - Staggered rollout of CMA alerts
  - Diff-in-Diff specification: 3-way FE (customer, month, tenure)
  - Common trends assumption
- RCTs (Banks 1 and 2)
  - Random sampling of relevant customers (stratification at bank 1)
  - Standard ANCOVA specification (post-treatment data and controls for average pre-period outcome & month FE.)



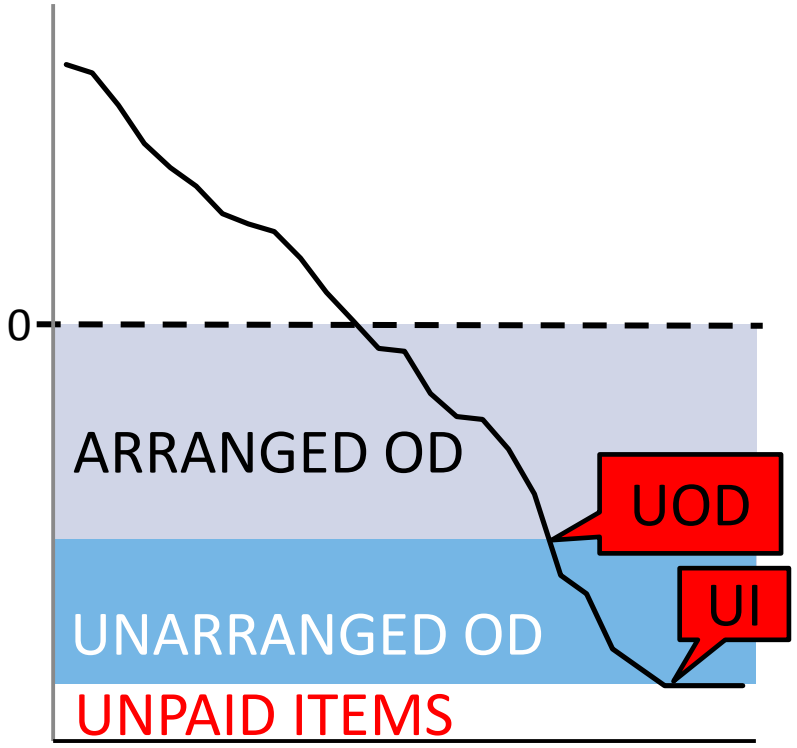


SMS Alerts

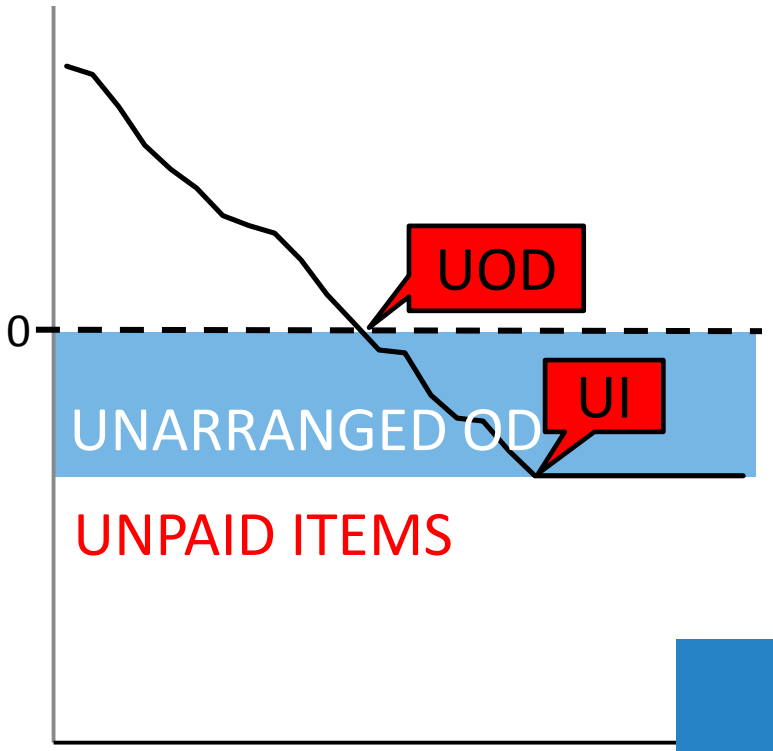
CMA Mandated UI & UOD Alerts

Just-In-Time Alerts
(act within hours to avoid fees)

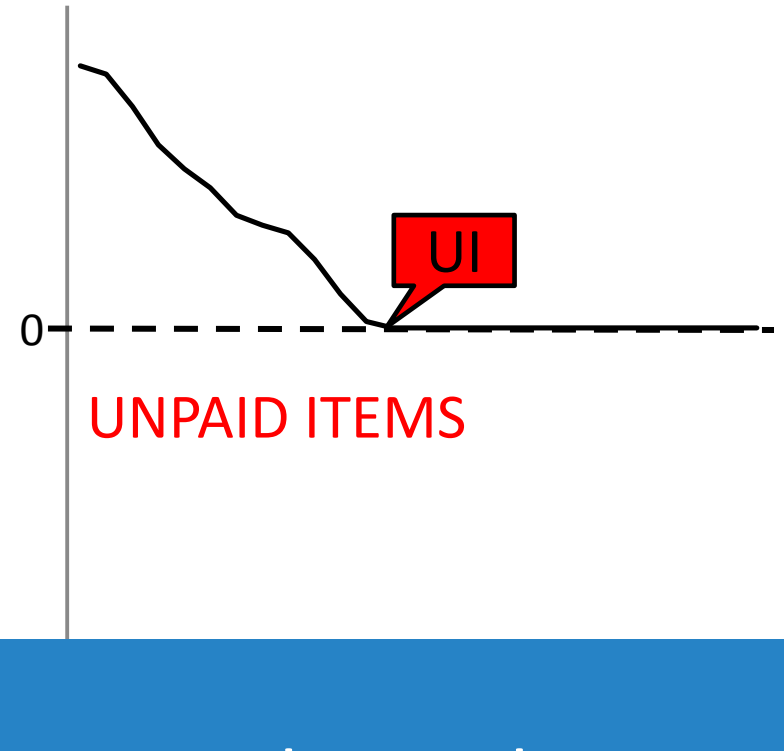
1) Consumers with AOD and UOD



2) Consumers with UOD



3) Consumers with no overdraft



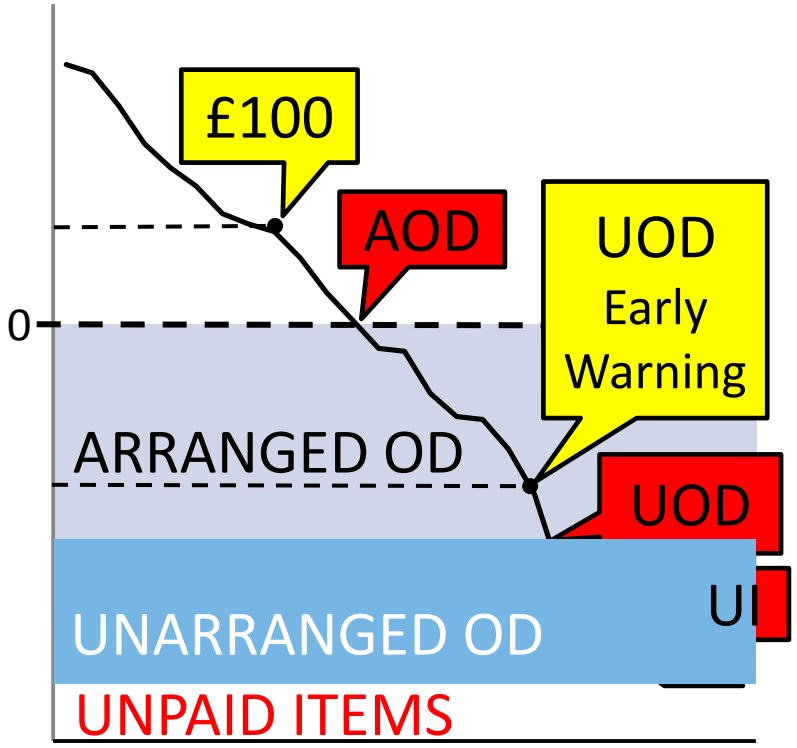
Control: No Alerts

Additional Alerts

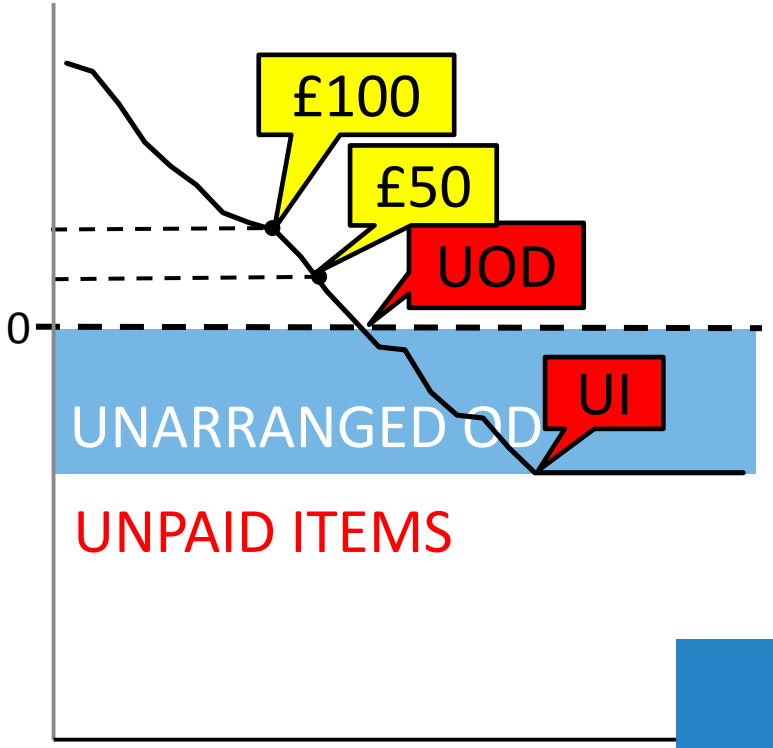
Early-Warning Alerts

Just-In-Time Alerts
(act within hours to avoid fees)

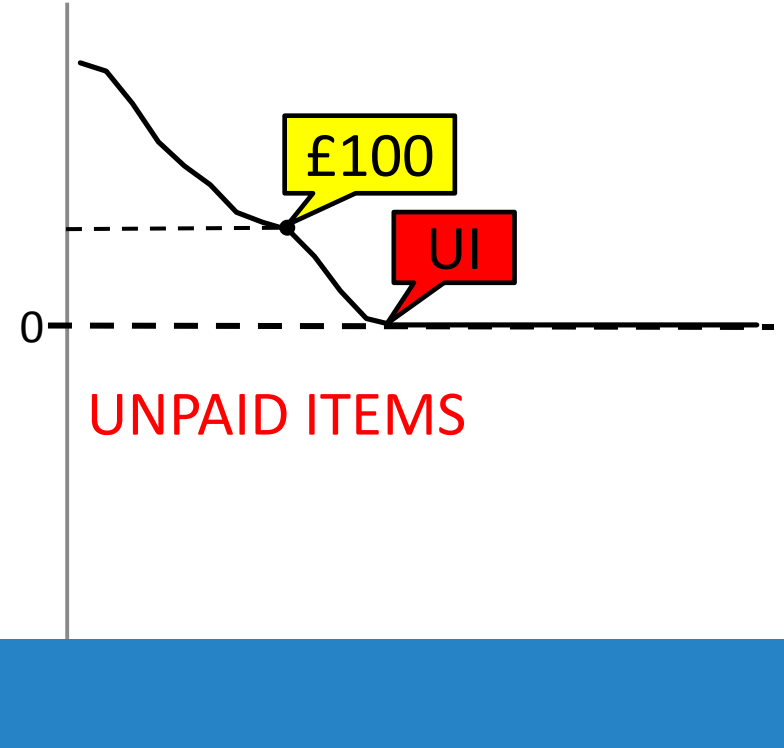
1) Consumers with AOD and UOD



2) Consumers with UOD



3) Consumers with no overdraft



Control: CMA Alerts

Results 1: Effect On Enrollment

Auto-enrollment dramatically increases enrollment

- 2013: Major banks offer opt-in SMS alerts
- As of 2015: only 3-8% actively opted-in.
- Field Experiment
  - Bank 2—allows opt-out online—less than 2% opt-out.
  - Bank 1—allows opt-out by SMS reply—less than 10% opt-out

→ 82-95% follow default

Results 2: Effect On Charges

Effect on Targeted Charges/month

Alert Type	Consumer Population				
Just-In-Time	AOD+UOD		UOD only		No OD
AOD	RCT_1	RCT_2	N/A		N/A
	-0.44*** -7.6% [£5.80]	-0.31*** -3.9% [£7.93]			
UOD+UI	RCT_2	SR_B	RCT_2	SR_B	N/A
	-0.36*** -15% [£2.38]	0.35*** -27.1% [£1.30]	-0.46*** -18% [£2.54]	-0.24* -18.3% [£1.33]	
UI only	SR_A		Not tested		SR_A
	-0.27*** -25.4% [£1.05]				-0.21*** -17.2% [£1.19]

Notes * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Effect on Targeted Charges/month

Alert Type	Consumer Population				
Early-Warning	AOD+UOD		UOD only		No OD
AOD	**RCT_1**	**RCT_2**	N/A		N/A
	-0.03 -0.49% [£5.80]	-0.20*** -2.5% [£7.93]			
UOD	**$RCT_{2,\ £50}$**		**RCT_1**	**RCT_2**	**$RCT_{2,\ £50}$**	N/A
	-0.06 -0.8% [£7.93]		-0.20*** -4.6% [£4.23]	-0.01 -0.4% [£2.43]	-0.06 -2.3% [£2.43]	
UI only	Not tested		Not tested			**RCT_1**
						-0.00 -0.2% [£0.98]

Notes * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

Results 3: Mechanism?

Account behavior *must* change for just-in-time alerts to reduce charges: **How?**

- Just-in-time alerts reduced targeted charges
  - No spill-over to other charge categories
- Little change in monthly account measures
  - Average monthly balance, # transactions, online engagement
- >15% UOD spells resolved within 1 hour of
  - Receiving alert or
  - Grace period deadline

Account behavior *must* change for just-in-time alerts to reduce charges: **How?**

	UOD / AOD+UOD SR_B	UOD RCT_2	AOD+UOD RCT_2
UOD Spells ≥ 2 days	-0.004** -20% [0.02]	-0.006*** -8% [0.075]	-0.006*** -8% [0.075]

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

- More UOD spells resolved within grace-period, avoiding charges.
- Suggests an important part of the reduction in charges is due to consumers transferring money to their account during the grace or retry periods.
- Suggests alerts main effect is on timeliness of response.

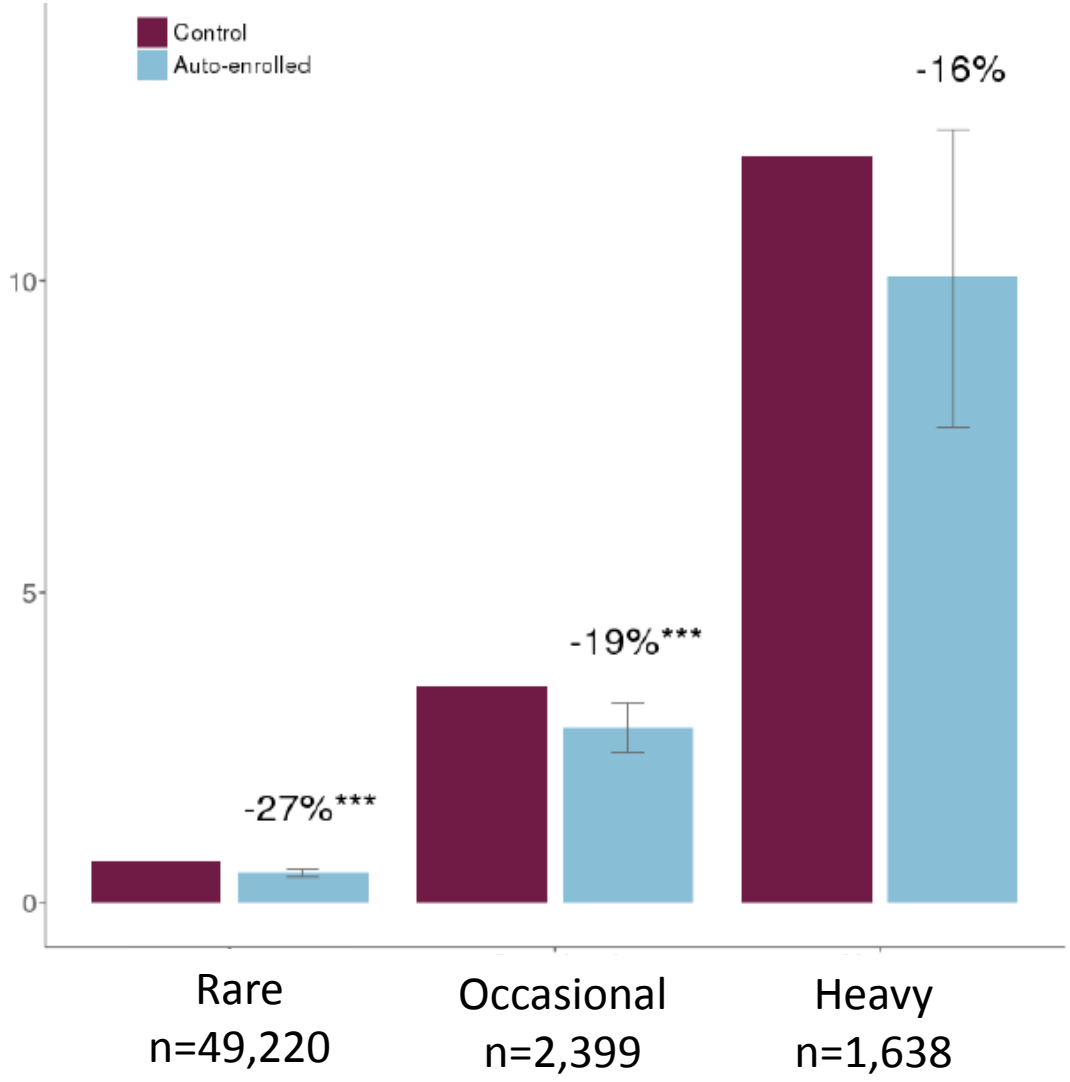
Results 4: Heterogeneous Effects (Focus CMA Alerts)

Heterogeneity

Alert effectiveness appears to increase less than proportionally with baseline.

- Relative Effects are strongest among individuals who rarely overdraft (up to 90% of the population).
- Point estimates of Absolute Effects often strongest among heavy overdrafters, even if not significant (smaller n).

Natural Experiment, UI Charges Bank A, UI alerts



Conclusion and Next Steps

- Just-in-time alerts consistently effective
  - CMA alerts reduce UI+UOD charges 15-27%
  - AOD use alerts reduce AOD charges 4-8% (similar amount in absolute terms)
- Early warning alerts are less effective and inconsistent.
- Survey: Most customers found alerts helpful (84-90%) and most report transferring money from savings after an alert (51-61%).
- Next steps: can we say
  - anything more about the behavioral mechanisms?
  - anything about remaining overage charges?

Backup Slides

CMA Unarranged Overdraft & Unpaid Item Retry Alerts

1. **Unpaid item (UI) retry alert**: scheduled payment will be rejected (and unpaid item fee applied) unless funds transferred by cutoff time (retry period). Alert usually sent early in the morning.

2. **Unarranged overdraft (UOD) alert**: triggered by negative account balance, informs consumers they must transfer funds by a cutoff time (grace period) to avoid fees.

Grace/Retry periods → Just-in-time alerts

Natural Experiments (CMA Alerts)

Auto-Enrolment Natural Experiment—Staggered rollout at two banks

- **Bank A**: enrolled 26% of customers into **unpaid item** alerts over a 12-month period.
- **Bank B**: enrolled 49% of customers into **unpaid item and unarranged overdraft** alerts over a 6-month period.
  - We observe date when individuals are enrolled.
  - Customers were **not** notified of auto-enrolment.
  - Could opt-out using bank's website (**not** mobile app).
  - Exclude customers with < 2 months pre-treatment data.

Remaining 51% - 74% of Customers?

- ~25% no mobile number on file.
- ~3-8% previously self enrolled
- ~20-40% auto-enrolled prior to sample window

Difference-in-Differences Regression Specifications

- Linear 3 way (customer, month, tenure) fixed effects model.

$$X_{i,t} = AutoEnrolled_{i,t}\beta_1 + EnrolmentMonth_{i,t}\beta_2 + EnrolmentMonthLag_{i,t}\beta_3 + \delta_{t-s\_i} + \theta_i + \mu_t + \varepsilon_{it}$$

Common Trends Assumption

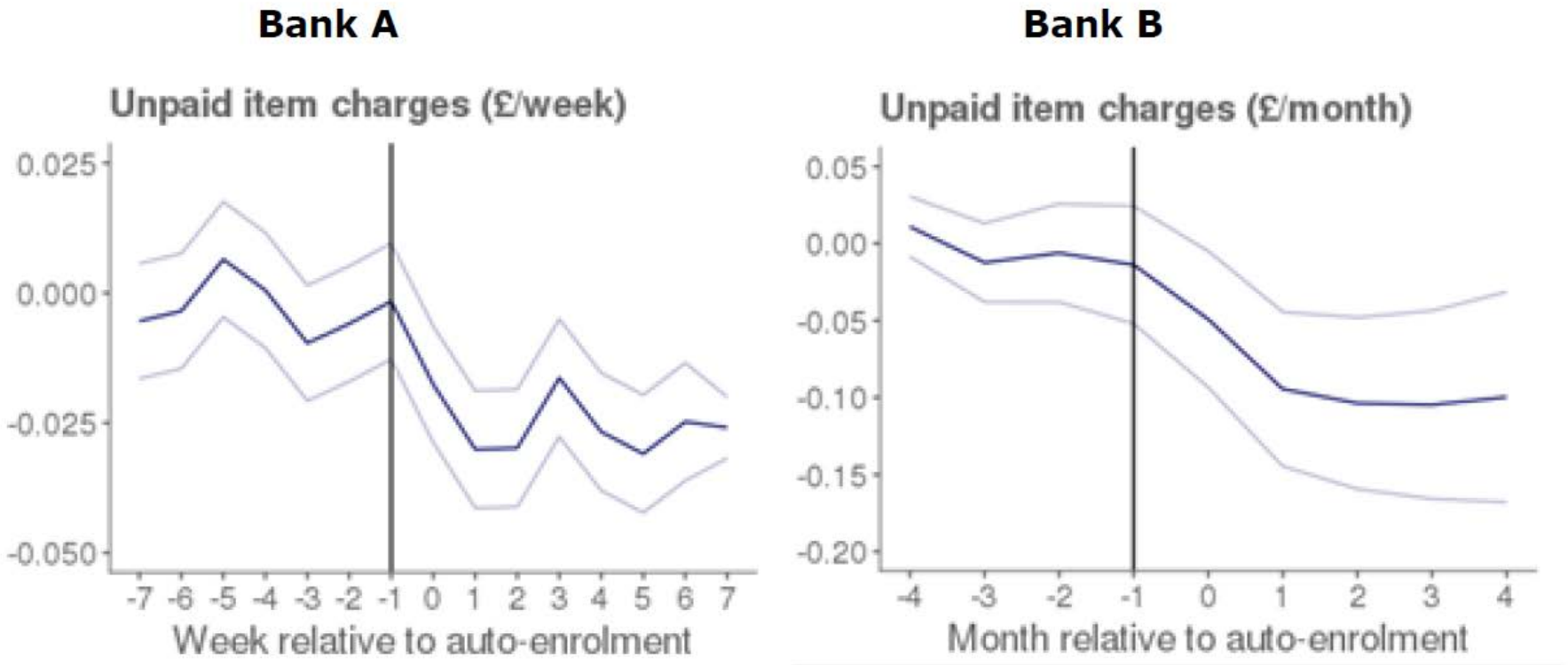
- Individuals were enrolled based on an identifier that is correlated with account tenure, but appears random conditional on tenure.
- To verify we perform placebo tests with the following regressions.
- Bank A:

$$X_{i,t} = \sum_{l=-7}^{6} WeekstoAutoEnrol_{i,t,l}\,\beta_l + 7WeeksSinceAutoEnrol_{i,t}\,\beta_7 + \theta_i + \mu_t + \delta_{t-s\_i} + \varepsilon_{it}$$

- Bank B:

$$X_{i,t} = \sum_{l=-4}^{4} MonthstoEnrol_{i,t,l}\,\beta_l + 4MonthsSinceEnrol_{i,t}\,\beta_5 + \delta_{t-s\_i} + \theta_i + \mu_t + \varepsilon_{it}$$

Pre- and Post- Treatment Unpaid Item Charges



Note: light blue lines indicate 95% confidence intervals.

Field Experiment: (All Alerts)

Field Experiment Sampling

- Sampling unit = customer
- Exclusions
  - Dormant accounts; Ineligible accounts (e.g. no mobile on file); accounts w/o relevant fees (student accounts); accounts with balances above 1,000 6 months preceding trial.
- Bank 1: stratified on important pre-treatment variables
- Bank 2: random sampling
- Compared to all PCA customers, sampled customers are
  - Are younger with lower tenure; Have higher mobile logins
  - Have lower average balances and higher arranged overdraft charges
  - Have similar unarranged overdraft charges + unpaid item charges

Field Experiment Details

- Duration
  - Trial A: 8 months, CMA alerts
  - Trials B, C, and D: 11 months, Additional Alerts
- Notification
  - Auto-enrolled customers notified by SMS
- Opt-out
  - Both banks allow opt-out online
  - Bank 1 also allowed customers to opt-out by replying to SMS notification of auto-enrollment within a 2-days.

Field Experiment Regression Specifications

- Standard ANCOVA specification
  - Includes only post-treatment observations
  - Controls for average pre-period outcome variable & post-period month FE

$$Y_{i,t} = Treatment_{i,t}\,\beta_1 + \overline{Y}_{i,t<0}\,\beta_2 + \theta_t + \varepsilon_{it}$$

Effect on Total Charges/month

Alert Type	Consumer Population				
Just-In-Time	AOD+UOD		UOD only		No OD
AOD	**RCT_1**	**RCT_2**	N/A		N/A
	-0.45*** -7.3% [£6.13]	-0.28*** -2.7% [£10.20]			
UOD+UI	**RCT_2**	**SR_B**	**RCT_2**	**SR_B**	N/A
	-0.39*** -3.7% [£10.30]	-0.49* -6.5% [£7.52]	-0.46*** -18% [£2.54]	-0.24* -18.3% [£1.33]	
UI only	**SR_A**		Not tested		**SR_A**
	-0.12 -1.5% [£7.87]				-0.21*** -17.2% [£1.19]

Notes * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

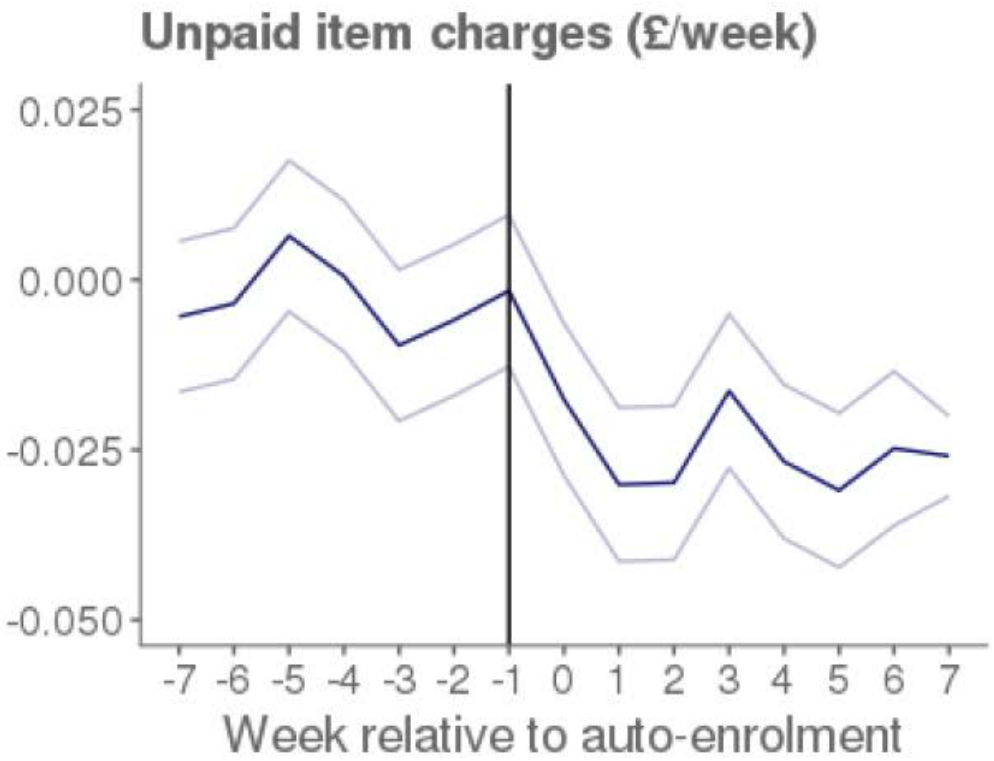
Effect on Total Charges/month

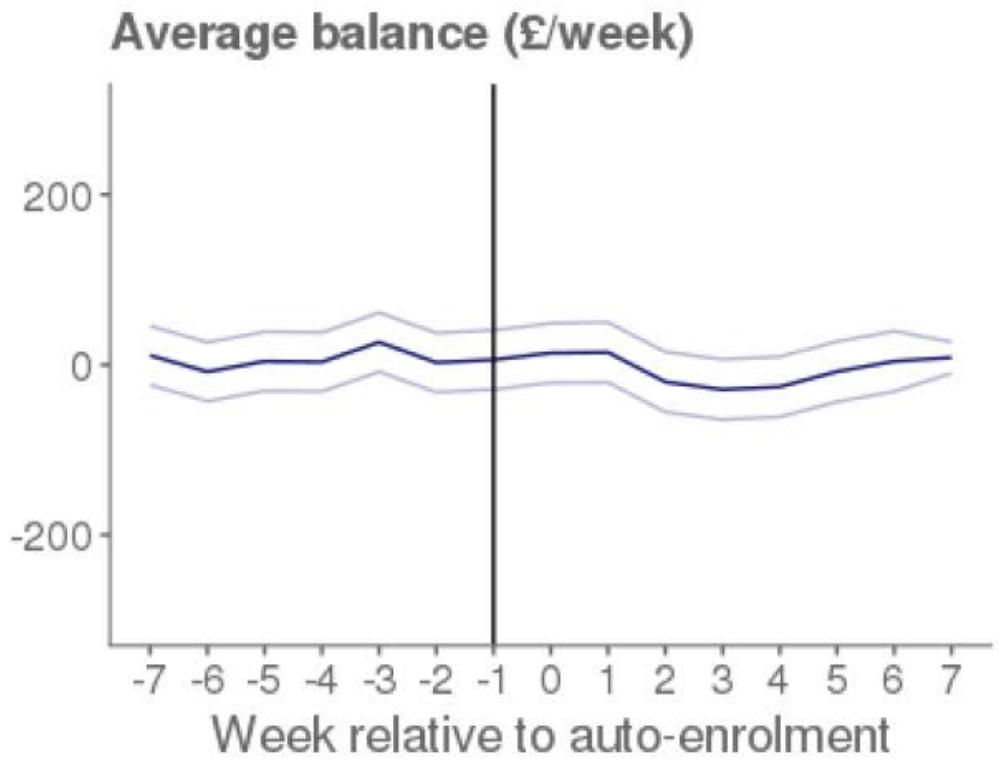
Alert Type	Consumer Population					
Early-Warning	AOD+UOD		UOD only			No OD
AOD	**RCT_1**	**RCT_2**	N/A			N/A
	-0.02 -0.34% [£6.13]	-0.21*** -2.0% [£10.20]				
UOD+UI	**$RCT_{2,\ £50}$**		**RCT_1**	**RCT_2**	**$RCT_{2,\ £50}$**	N/A
	-0.08 -0.8% [£10.20]		-0.20*** -4.6% [£4.23]	-0.01 -0.4% [£2.43]	-0.06 -2.3% [£2.43]	
UI only	Not tested		Not tested			**RCT_1**
						-0.00 -0.2% [£0.98]

Notes * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$

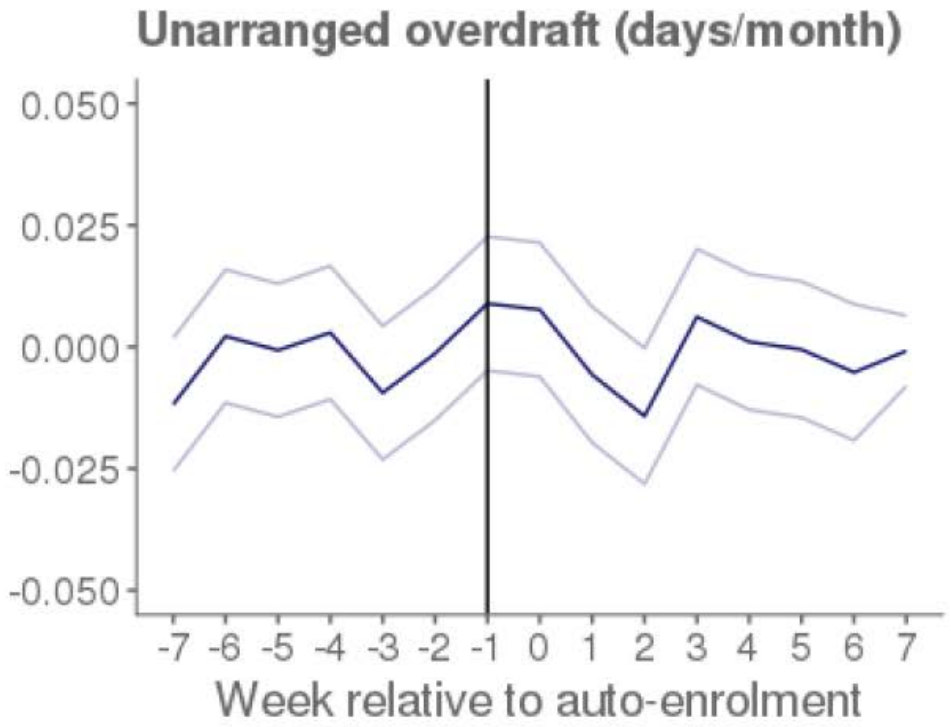
More Backup Slides

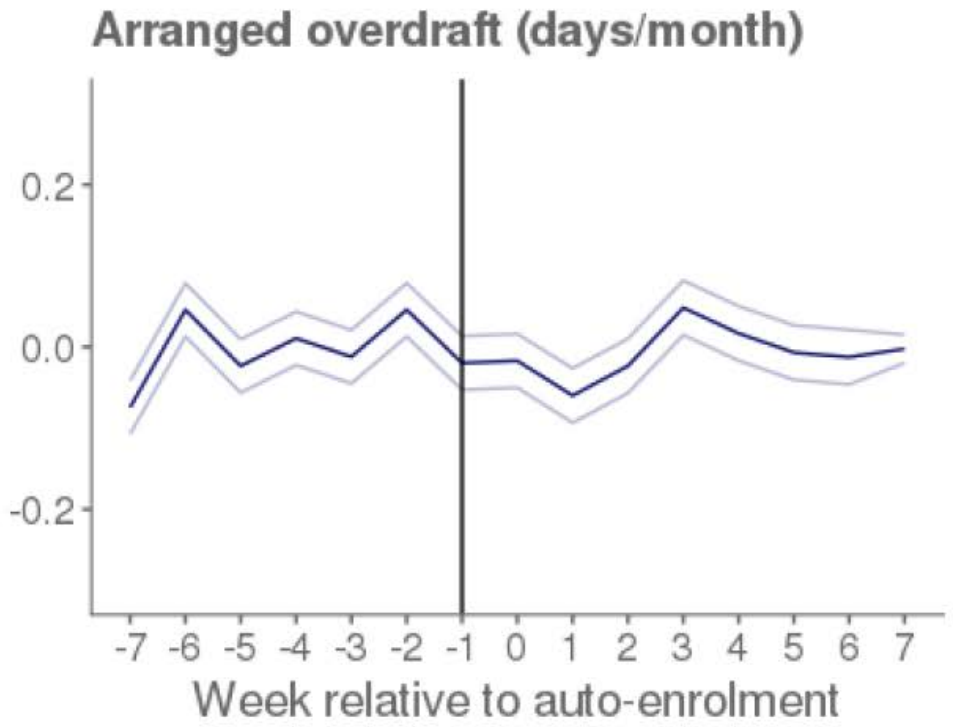
Bank A Parallel Trends: Secondary



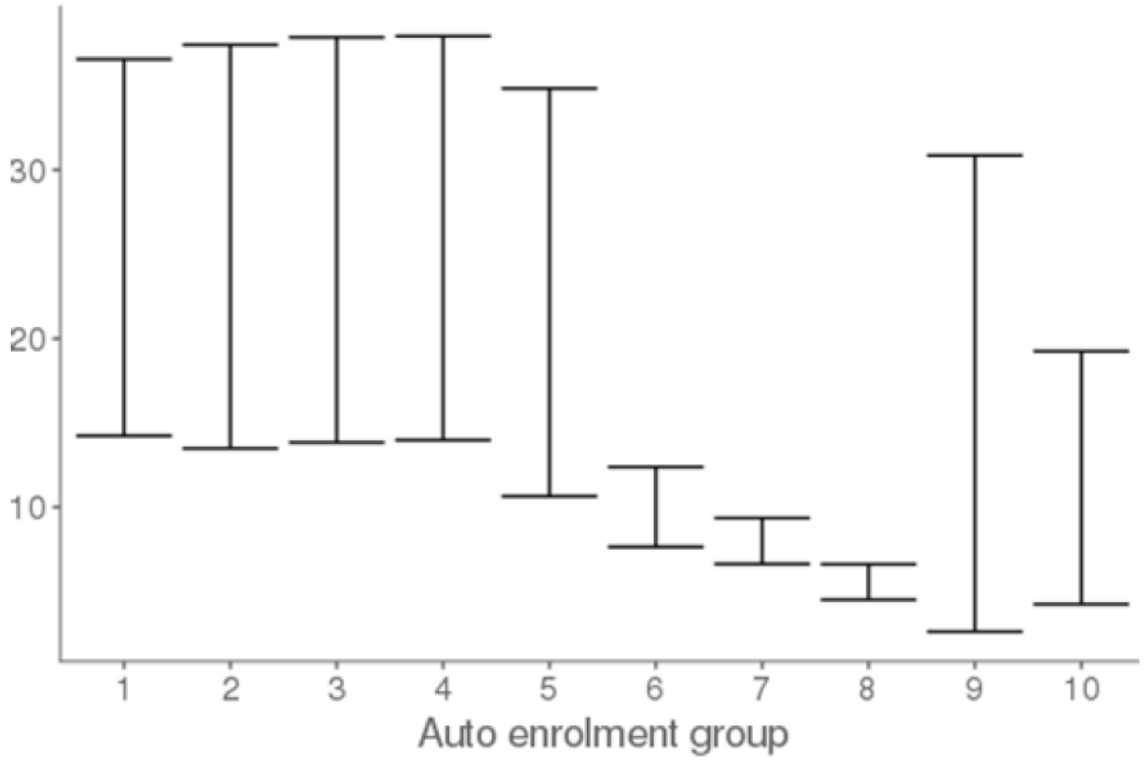


Bank A Parallel Trends: Secondary

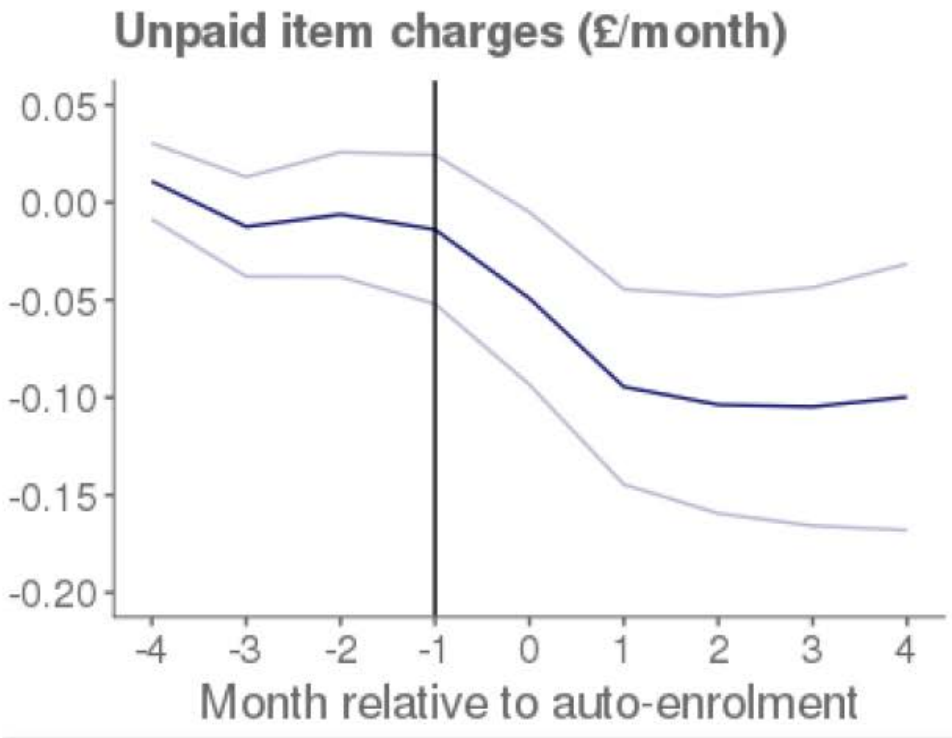


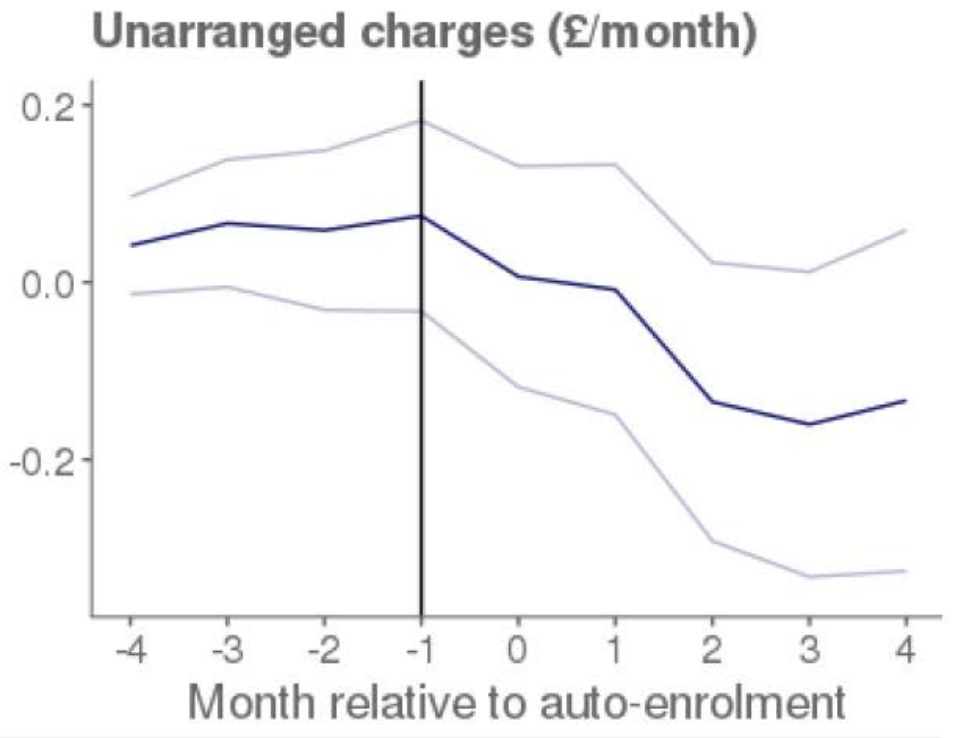


Bank B: 1st and 9th decile of tenure for enrolment groups

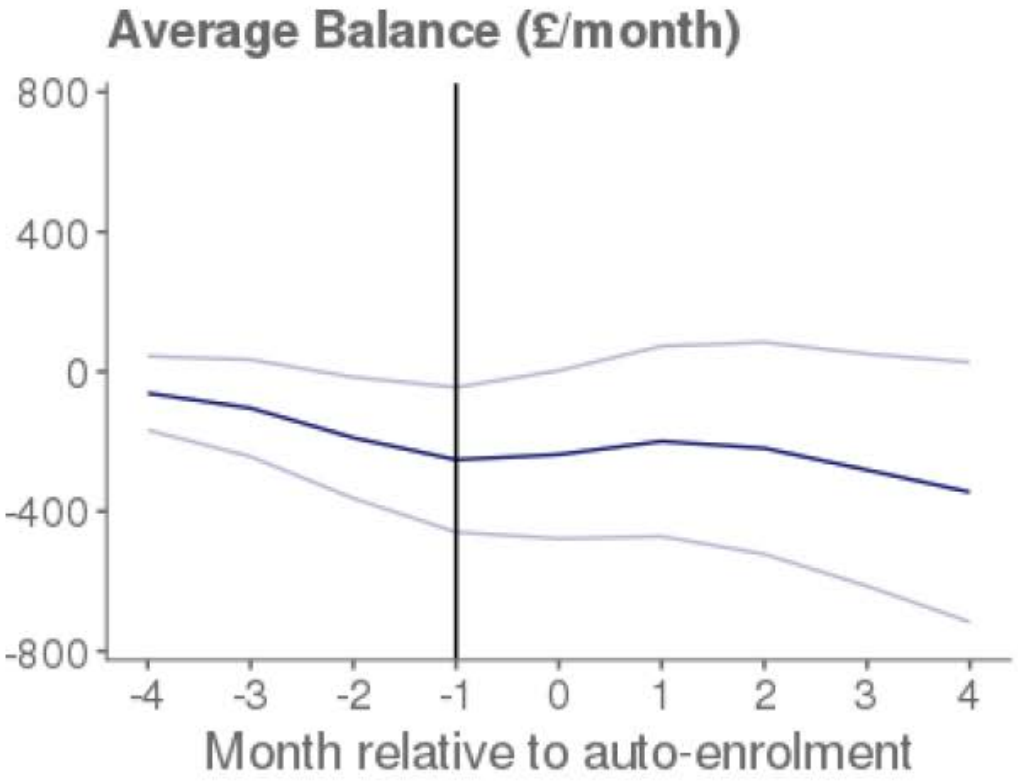


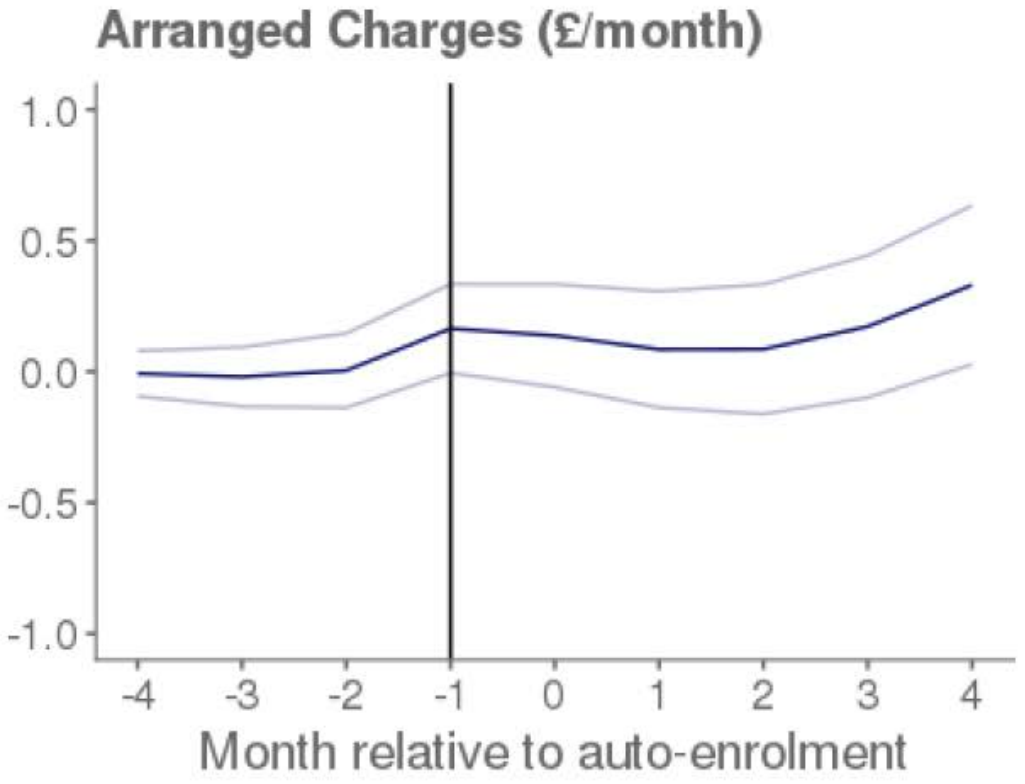
Bank B Parallel Trends: Secondary





Bank B Parallel Trends: Secondary





Field Experiment – Trial A
CMA Alerts at Bank 2

- 2 month trial (Limited by regulatory deadline)
- Bank 2 only

Treatment	Alert Example Content	No Arranged OD facility (Trial A2)	Arranged OD facility (Trial A1)
Control	NA	n = 156,618	n = 201,356
Treatment	• UOD: You are now using your unarranged overdraft. Transfer funds before cut-off to avoid charges. • UPT: You will incur an unpaid item today. Transfer funds before cut-off to avoid charges.	n = 34,989	n = 33,605

Distribution of Unpaid Items Charges (2016)

Monthly average (£)	Share of consumers	Share of charges
15+	1%	35%
10-15	1%	14%
5-10	1%	22%
0-5	7%	29%
Zero	90%	0%

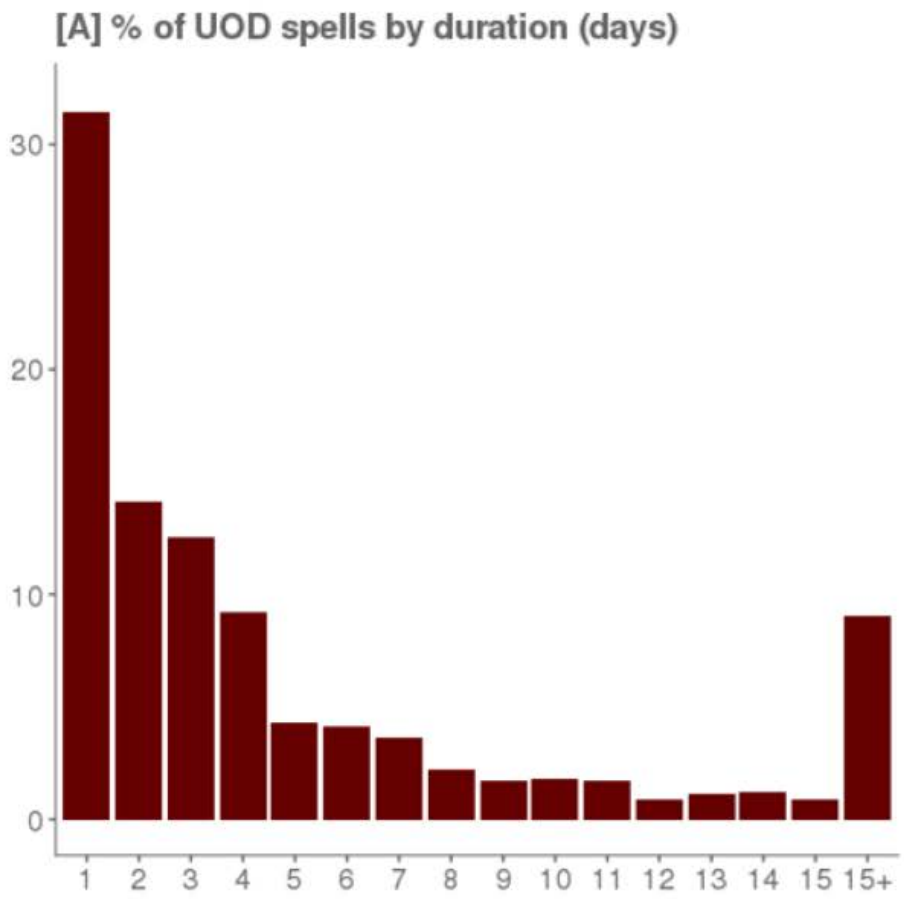
Notes: Based on 925,027 customers across six banks. (Excludes dormant accounts & customers without a primary account)

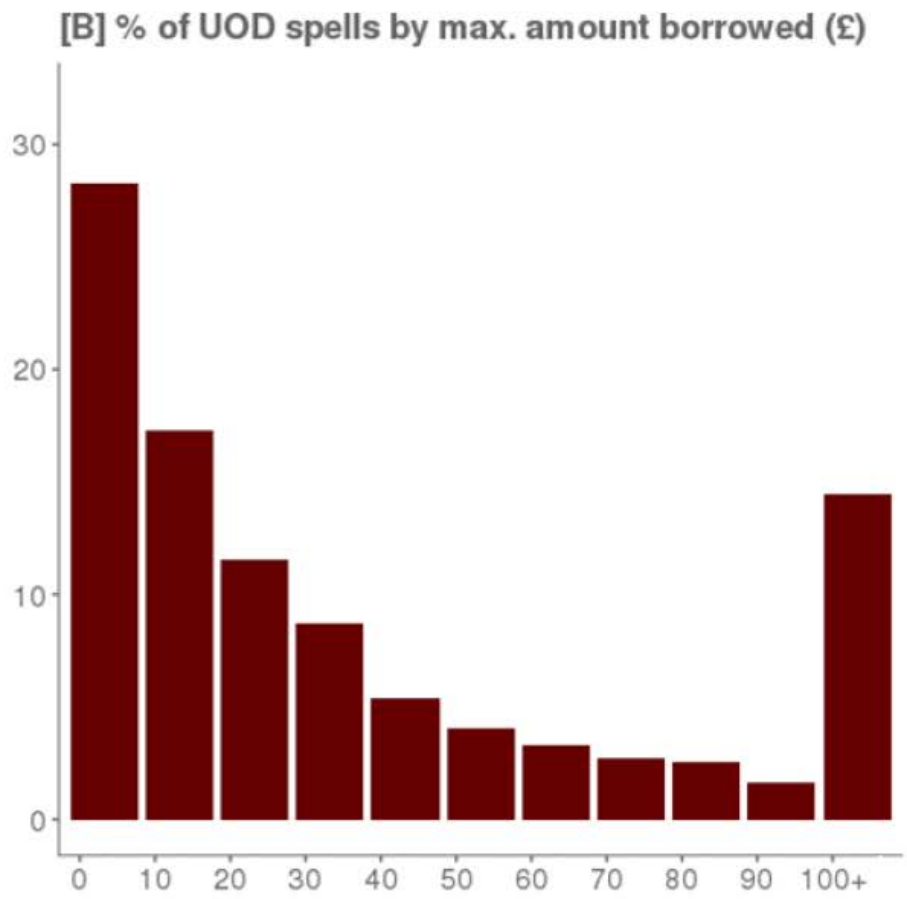
Distribution of Unarranged Overdraft Charges (2016)

Monthly average (£)	Share of consumers	Share of charges
15+	2%	64%
10-15	1%	12%
5-10	2%	12%
0-5	8%	12%
Zero	86%	0%

Notes: Based on 925,027 customers across six banks. (Excludes dormant accounts & customers without a primary account)

Distribution of Unarranged Overdraft Episodes by Duration and Amount Borrowed



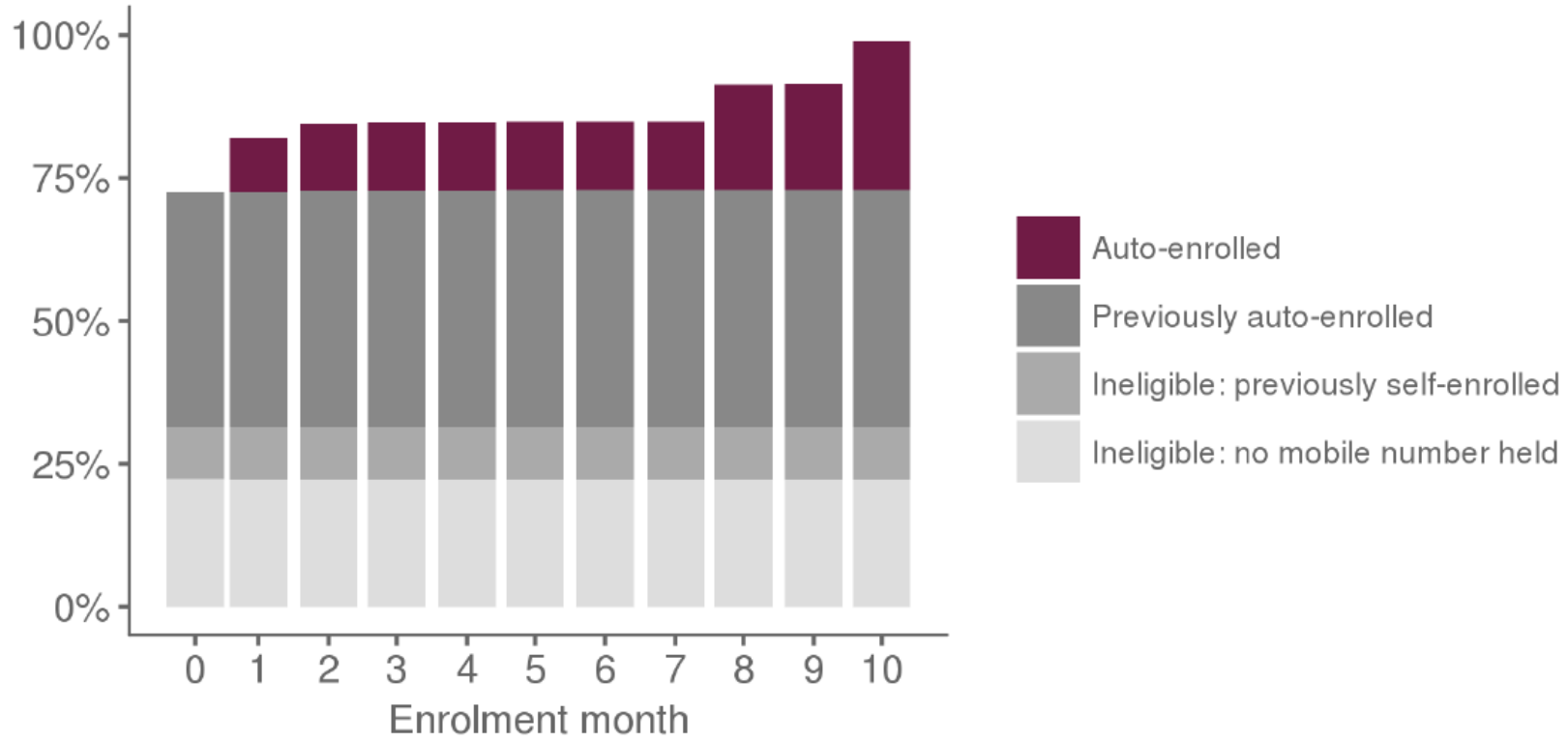


Observational Data Descriptive Statistics

	Mean	Q5	Q25	Median	Q75	Q95
Age (years)	47.11	21	32	46	61	80
Tenure (years)	15.10	1	5	11	21	50
Gender (=1 if Female)	0.50					
Arranged OD facility	0.56					
Mobile banking registration	0.41					
Online banking registration	0.67					

Notes: Based on 1,366,355 customers across 6 banks. (Excludes dormant accounts)

Bank A: Proportion Enrolled into Alerts



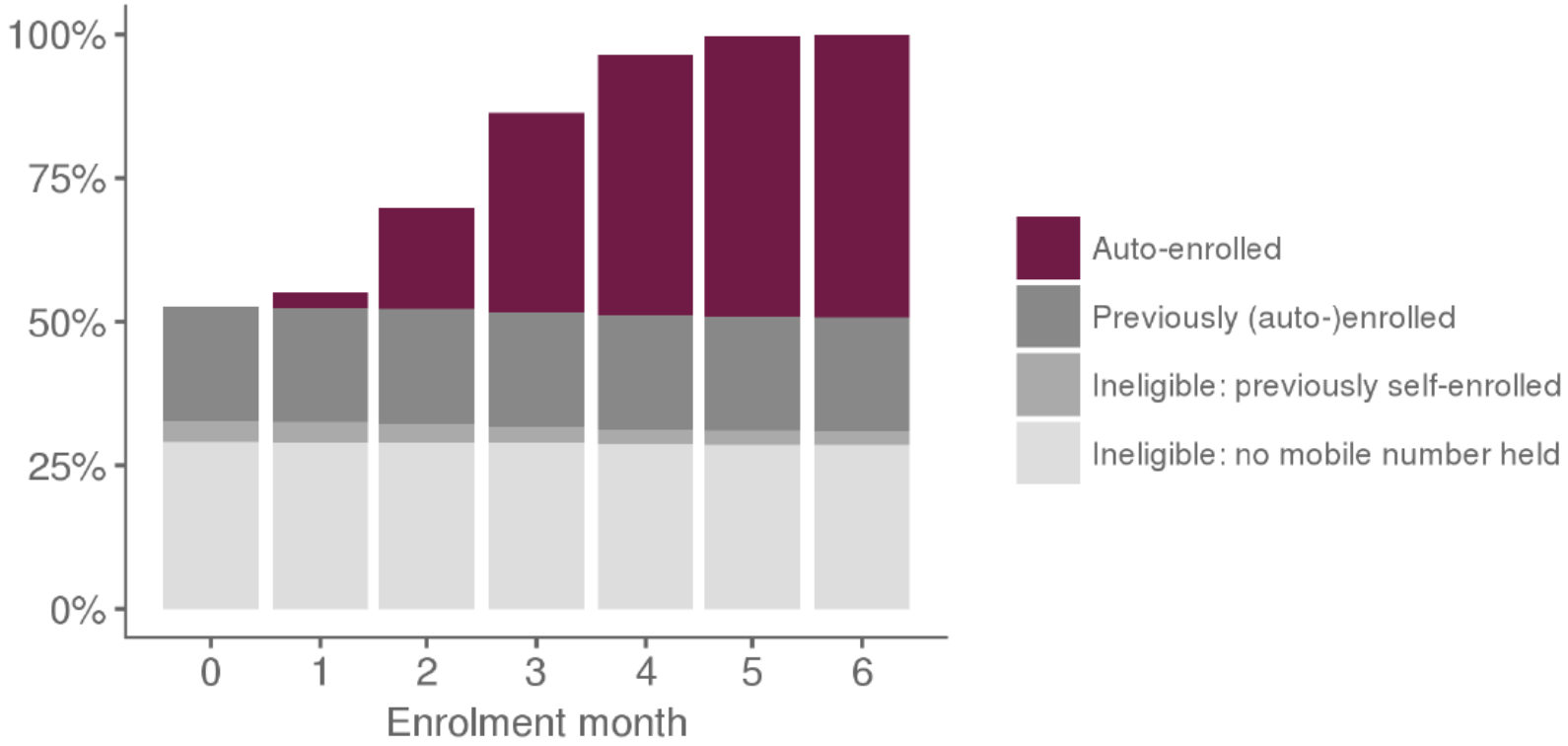
Notes: Based on sample of existing Bank A customers as of January 1st, 2015 (n=201,078) after exclusions.

Bank A: Sample Descriptive Statistics

	Estimation sample (n=53,257)				**PCA dataset** (n=1,366,355)			
	Mean	Q25	Median	Q75	Mean	Q25	Median	Q75
Age (years)	46.97	35	47	59	47.11	32	46	61
Tenure (years)	18.48	5	13	24	15.10	5	11	21
Gender (=1 if Female)	0.54				0.50			
Arranged OD facility	0.51				0.56			
Mobile banking registration	0.19				0.41			
Online banking registration	0.50				0.67			

Notes: All statistics calculated at the consumer level for the 1st of January 2015. PCA dataset figures are taken from Table 1. Tenure is based on the opening date of a customer's first account with the bank.

Bank B: Proportion Enrolled into Alerts



Notes: Based on sample of existing Bank B customers as of January 1st, 2015 (n=208,971) after exclusions.

Bank B: Sample Descriptive Statistics

	Estimation sample (n=96,015)				**PCA dataset** (n=1,366,355)			
	Mean	Q25	Median	Q75	Mean	Q25	Median	Q75
Age (years)	43.35	30	42	55	47.11	32	46	61
Tenure (years since customer opened their account)	15.93	7	14	23	15.10	5	11	21
Gender (=1 if Female)	0.51				0.50			
Arranged OD facility	0.70				0.56			
Mobile banking registration	0.41				0.41			
Online banking registration	0.81				0.67			

Notes: All statistics calculated at the consumer level for the 1st of January 2015. PCA dataset figures are taken from Table 1.

Account behavior *must* change for CMA alerts to reduce charges 15-25%: **How?**

- UPT alerts reduce UPT charges
- UOD alerts reduce UOD charges
- No spill over to other charge categories

Account behavior *must* change for CMA alerts to reduce charges 15-25%: **How?**

Little change in many monthly account measures:

How do monthly balances change? **Not much**

- Do balances rise as alerts encourage consumers to transfer money into their PCA?
- Do balances fall, as consumers feel less need for a large buffer?
- → Nat Exp, Banks A & B → no effect on average monthly balances or minimum monthly balances

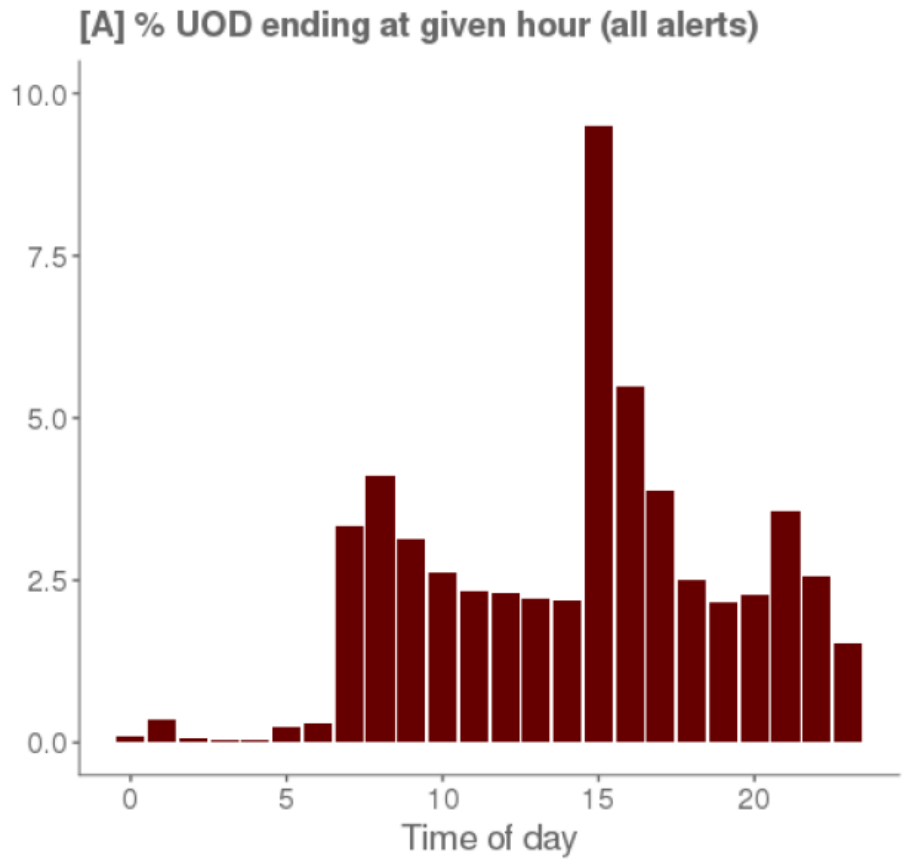
Does monthly account engagement increase? **No**

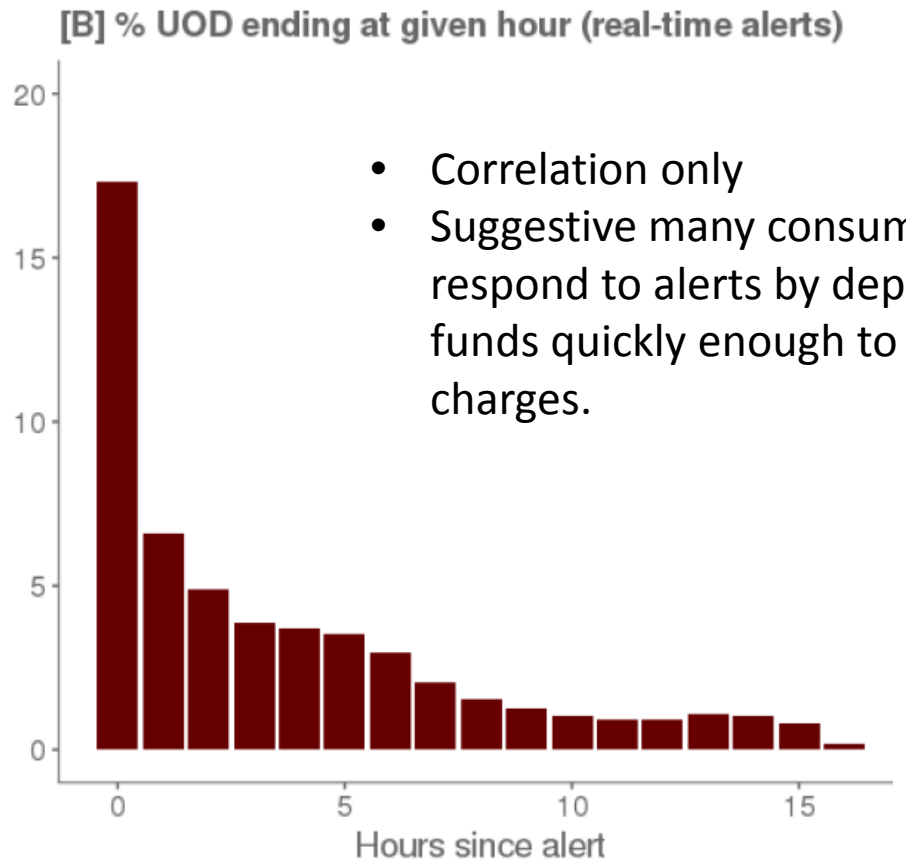
- Insignificant change in Natural experiments (measured by monthly mobile-logins at Banks A & B)
- Insignificant change in Field experiments (measured by monthly mobile-logins & online-logins at Bank 2)

Does monthly account activity increase? **Mostly No**

- Only significant effect found at Bank B—natural experiment increased # scheduled monthly transactions 3% (baseline 8 per month)

Correlation of UOD spell resolution with SMS Alerts on First Day of Unarranged Overdraft





- Correlation only
- Suggestive many consumers respond to alerts by depositing funds quickly enough to avoid charges.

Notes: Based on data for all of 2016 from two banks.

Effects by Other Consumer Types

Consumer group	Key insight on impact of alerts
Age	• largest effects found for 40-50 year olds, we find a consistent 30% decrease in charges across banks and types of charges • fewer effects for 18-30 year olds, the only effect we find is a 22.5% decrease in unpaid item charges at Bank B • We find no effects for 60+ year olds
Estimated Income	• effects are broadly similar in size across estimated income groups, though high income customers experience larger effects • these results could be driven by age or other factors
With arranged overdraft	• largest effects tend to be for those with an arranged overdraft but differences are not statistically significant • results are mixed and could be driven by age (i.e. older people are more likely to have an arranged overdraft)

Effects by Other Consumer Types

Consumer group	Key insight on impact of alerts
Registered for mobile banking	• results are mixed: at Bank B we only find an effect on unpaid items for those who are registered for mobile banking. Other differences, for unpaid items at Bank A and unarranged overdrafts at Bank B, are not statistically significant.
Having available savings in easy access savings account at bank	• results are mixed: having available savings with the same bank does not appear to be a key condition for usefulness of alerts • for Bank A we only find an effect for customers with no savings • for Bank B we find higher relative effects for those with savings

- Has at least 100 pounds savings in another account at the same institution