The Last Mile of Monetary Policy: Consumer Inattention, Disclosures, and the Refinancing Channel

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The Refinancing Channel of Monetary Policy Transmission

- Immediate MP pass-through for adjustable-rate mortgages
- For fixed rate mortgages, need to refinance to take advantage of rate cut
- Unconventional MP transmission through refinancing (Di Maggio Kermani Palmer, 2020)
- Conventional MP transmission through refinancing (Cloyne et al., 2020)

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Implies refinancing frictions inhibit monetary policy transmission:

1. Need to qualify for refinancing mortgage (DeFusco and Mondragon, 2020)
2. Need to have positive equity (Beraja et al., 2020)
3. Need to be in segment with credit-market access (Di Maggio et al., 2020)
4. Need to be paying attention (Andersen et al., 2020)

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$\Rightarrow$ Addressing refinancing frictions could strengthen refinancing channel

Could direct communication overcome inattention to refinancing?

- Maybe not?
  - Fed publications college reading level (Haldane and McMahon, 2018)
  - 2/3 consumers unaware FOMC announcements (Lamla and Vinogradov, 2019)
  - HHs inattentive to disclosures (Adams Hunt Palmer Zaliauskas, 2021)
  - Overestimate time to reoptimize (Adams et al., 2021; CBI, 2017)

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- Maybe?
  - New multi-faceted direct communication efforts (Blinder et al., 2022)
    "some promise... many challenges" (music videos!)
  - Forward Guidance can be powerful (McKay et al., 2016)
  - Optimize disclosures? (Wang and Burke, 2022)
  - Send reminders? (Adams et al., 2015; Karlan et al., 2016)
- If so, potentially useful tool, especially at zero lower bound

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→ This paper: test for communication effects with RCT of optimized disclosures

Outline

Structure of Irish Mortgages

Three flavors of residential mortgages in Ireland, 25-30 year terms

1. Fixed rate mortgages (28% market share)
   - ~UK fixed rate, ~US ARM. Fixed for 1-5 years
   - Convert to variable rate after the fixed-rate period
   - Prepayment penalty of ~2% of balance (but mortgages portable)
2. Tracker mortgages (37% market share)
   - ECB rate + ~100 bp
   - Stopped offering in 2008.
3. Variable-rate mortgages (35% market share)
   - Not indexed; 100% discretionary
   - Internal refinances without increasing term easy, basically no fee

Variable Rate Policy Statement

Bank of Ireland

WARNING: We may change the interest rate on this loan. This means the cost of your monthly repayments may increase or decrease.

What do we consider when setting our variable interest rates?

i. We may change the standard variable rate at any time. Here is a list of the factors that may result in our changing our standard variable rates:

- To reflect any change in our cost of funds (i.e. the cost of borrowing the money we use in our residential mortgage business in the Republic of Ireland), for example, caused by any change in market interest rates or by other factors outside of our control;
- To reflect any change in the variable rates which mortgage lenders other than us charge on loans secured on residential property in the Republic of Ireland;
- To ensure we are competitive;
- To encourage or promote fixed rates;
- To enable us to increase the rate we pay to customers with deposit accounts in the Republic of Ireland to the level needed to retain their money;
- To ensure that the amount we receive from borrowers

i. We may change a standard variable rate because one or more of the factors we have listed has occurred or we know the factors will occur or are likely to occur.

How do we make decisions when setting variable interest rates?

We review our variable interest rates on a regular basis and any changes require approval by the Chief Executive of Retail Ireland and the Chief Executive of Bank of Ireland Group.

Why do we have different variable interest rates?

We can apply different standard variable interest to different groups of personal consumers depending on, for example:

- Whether you have borrowed your mortgage loan for a house for yourself or your relatives or whether you have borrowed to buy a house to rent it out;
- How you got your mortgage loan from us - we have different lending channels or ways in which we sell mortgages now or in future. The different channels

Failure to Refinance

- Failure to refinance documented in many countries (US, Italy, Denmark, UK, Australia...)
  - (Campbell, 2006; Keys et al., 2016; ACCC, 2018; Bajo & Barbi, 2018; Johnson et al., 2019; FCA, 2019; Andersen et al., 2020)
- Refinancing in Ireland is similarly infrequent.
- Low pass-through of ECB policy rate to Irish variable-rate mortgages
- 2% of Irish mortgages switched provider from 2011-2016 (close to EU average)
- In our sample, 9% refinance internally
- Yet 60% Irish mortgages could save €1,000 in year #1 (Byrne et al., 2020)

Attempt to address low pass-through with disclosure regulation

Provision 6.5(g) of the Ireland Consumer Protection Code 2012 Amended 2016

At least annually, must provide variable rate mortgage holders with statement disclosing:

1. **summary of bank's other products that could save the consumer € at that time**
2. how the personal consumer can obtain further information on these mortgage products
3. statement that the consumer should review other options that could provide savings
4. link to CCPC website on switching lenders or changing mortgage type
5. reminder that the bank's Provision 4.28a summary statement is online
6. whether and how consumer can qualify for lower rate if appraisal finds lower LTV
7. if not, notification that consumer can switch to other provider using new appraisal

Field Trial Details

- Partner with large Irish bank to vary design of their mandatory disclosure letters
- Test whether optimized disclosures support refinancing
- Estimate a model of inattention to refinancing

		Control	
Treatment Group	1	Simplification + Personalized €	+ Reminder
	2	+ Color	+ Reminder
	3	+ Headline	+ Reminder
	4	+ Headline + Gain-frame	+ Reminder
	5	+ Headline + Loss-frame	+ Reminder
	6	+ Headline + Loss-frame + Process	+ Reminder

- Representative sample, N ~ 12,000. 12 treatment groups + control
- Letter mailed February 2020, reminder 4-6 weeks later, track refinancing June + Dec

Control Group Letter

Mortgage Account Number: 1234567

You may be able to save money on your mortgage

Dear John,

This letter supplements the information we sent with your annual mortgage loan statement in the leaflet called "Information about your mortgage (You may be able to save money on your mortgage)".

The standard variable interest rate we currently charge you on your mortgage loan is 4.34%. However, we want to make sure you are getting the best deal and we may have a lower interest rate for your mortgage.

What rates are available?

The lowest interest rate currently available to you is a one or two-year fixed rate of 2.9%. We also offer fixed rates for periods of three, five and ten years. The ten-year rate varies depending on your Loan to Value (LTV). We explain Loan to Value at the end of this letter.

Explaining the tables below

These tables show you the interest rates along with the Annual Percentage Rate of Charge (APRC). We explain APRC at the end of this letter.

Fixed interest rates

Fixed interest rate options	Loan to Value Up to 60%	Loan to Value 61-80%	Loan to Value over 80%
1-year	2.9% (3.9% APRC)	2.9% (4.2% APRC)	2.9% (4.4% APRC)
2-year	2.9% (3.8% APRC)	2.9% (4.0% APRC)	2.9% (4.3% APRC)
3-year	3% (3.7% APRC)	3% (3.9% APRC)	3% (4.1% APRC)
5-year	3.2% (3.7% APRC)	3.2% (3.8% APRC)	3.2% (4.0% APRC)
10-year	3.5% (3.7% APRC)	3.5% (3.8% APRC)	3.7% (4.0% APRC)

Treatment Group #2 Letter

Mortgage Account Number: 1234567

You may be able to save money on your mortgage

Dear John,

Your current mortgage interest rate is a standard variable rate of 4.34%. We want to make sure you are getting the best deal and we may have a lower interest rate for your mortgage.

Current monthly repayment at 4.34%:	€700
Potential monthly repayment at 2.9% fixed:	€670
Estimated difference in monthly repayments	-€30
Potential difference over the year:	-€360

- We have a range of interest rates that could save you money.
- Our lowest rate is a fixed rate of 2.9%, which could result in an immediate monthly saving to you of about €30. Over the course of a full year, that's approximately €360 in savings.
- Below, we outline the full range of interest rate options currently available, along with the next steps to take if you wish to choose one of these alternative options.

Explaining the tables below

These tables show you the interest rates along with the Annual Percentage Rate of Charge (APRC). We explain APRC at the end of this letter. The rates may vary by Loan to Value (LTV) ratio. We also explain LTV at the end of this letter.

Fixed interest rates

Fixed interest rate options	Loan to Value Up to 60%	Loan to Value 61-80%	Loan to Value over 80%	Difference in monthly repayments	Difference over the year
1-year	2.9% (3.9% APRC)	2.9% (4.2% APRC)	2.9% (4.4% APRC)	-€30	-€360
2-year	2.9% (3.8% APRC)	2.9% (4.0% APRC)	2.9% (4.3% APRC)	-€30	-€360
3-year	3% (3.7% APRC)	3% (3.9% APRC)	3% (4.1% APRC)	-€25	-€300
5-year	3.2% (3.7% APRC)	3.2% (3.8% APRC)	3.2% (4.0% APRC)	-€20	-€240
10-year	3.5% (3.7% APRC)	3.5% (3.8% APRC)		-€15	-€180
10-year			3.7% (4.0% APRC)	-€12	-€144

Reminder letters sent 4-6 weeks later to 1/2 treatment group

Mortgage Account Number: 1234567

REMINDER: You may be able to save money on your mortgage

Dear X,

We recently wrote to you about the availability of lower mortgage interest rate options and the potential for savings on your monthly mortgage repayments.

This is a reminder to take action to avail of one of these options.

If you wish to take up a lower interest rate for which you are eligible, you can go online at websiteaddress.com/mortgages, call us on 01 XXX XXXX, or visit a branch.

Yours sincerely,

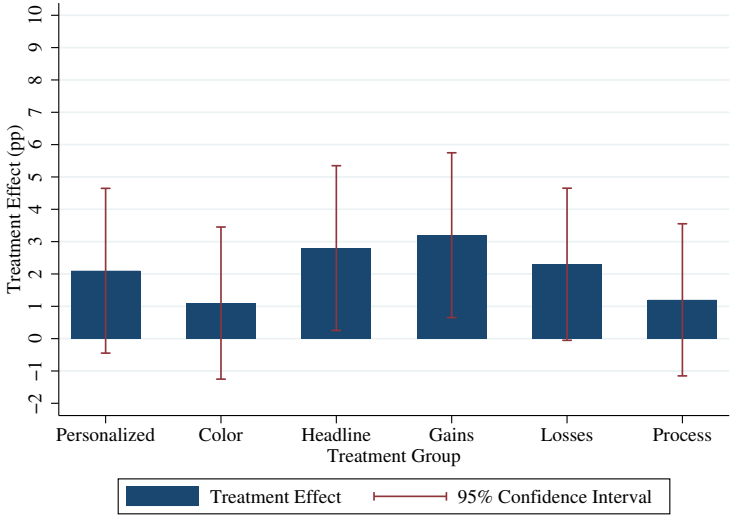
Firstname Secondname
Head of Mortgages

Experiment balanced on observables

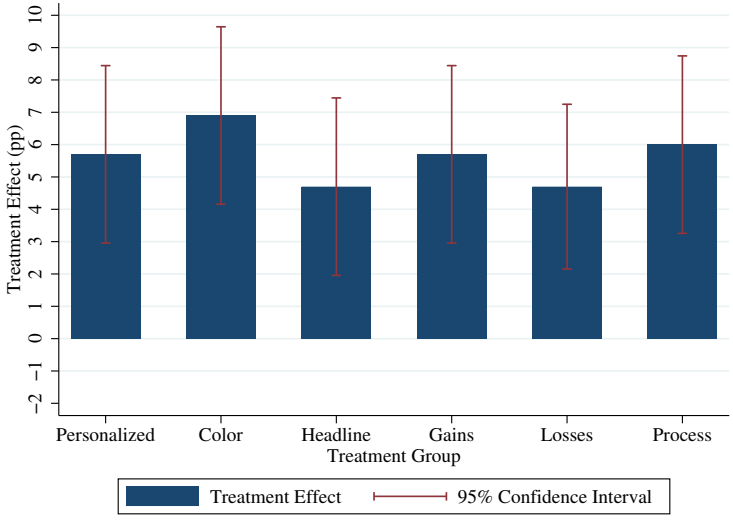
Treatment Group	Control	Treatment No Reminder	Treatment Reminder	Market (Variable Rate)
Dublin indicator	0.20	0.19	0.20	0.27
	(0.40)	(0.39)	(0.40)	(0.44)
Borrower age	49.8	50.2	50.0	49.1
	(9.2)	(9.4)	(9.3)	(9.9)
First-time buyer	0.40	0.41	0.39	0.39
	(0.49)	(0.49)	(0.49)	(0.49)
Mortgage balance (€)	84,212	82,185	83,587	104,224
	(84,141)	(89,348)	(93,700)	(96,368)
Interest rate	0.042	0.042	0.042	0.037
	(0.003)	(0.002)	(0.002)	(0.007)
Years to maturity	13.8	13.2	13.3	14.7
	(8.5)	(8.5)	(8.5)	(8.8)
1-year savings (€)	1,056.7	1,043.9	1,053.7	1,033.5
	(1,013.9)	(1,144.2)	(1,126.4)	(1,176.8)
Covid forbearance	0.09	0.08	0.08	0.12
	(0.28)	(0.27)	(0.28)	(0.32)
Observations	1,659	4,931	4,942	220,299

Outline

Treatment Effects Without Reminder, equality $p = 0.58$



Treatment Effects With Reminder, equality $p = 0.79$



Pooled Treatment Effect Estimates

Parameter	(1)	(2)	(3)	(4)
Disclosure Redesign Treatment	0.035***	0.039***	0.018**	0.021***
	(0.008)	(0.008)	(0.008)	(0.008)
Disclosure Treatment × Reminder			0.035***	0.035***
			(0.007)	(0.006)
Constant	0.087***	-0.282***	0.087***	-0.284***
	(0.007)	(0.035)	(0.007)	(0.035)
Borrower Controls		✓		✓
R-squared	0.001	0.037	0.004	0.039
Observations	11,532	11,532	11,532	11,532

Treatment Effects Summary

- Best treatment+reminder had a +80% (6.9 p.p.) effect on refinancing
- Average redesign w/o reminder had a 2 p.p. effect $\Rightarrow$ reminder effect 2.5x more

- No effects on external refinancing, little treatment effect heterogeneity, same 6 mo later
- Suggests reminders were effective at getting through to borrowers
- Simple, unexpected, reinforce procrastinated task
- No heterogeneity by Covid forbearance more

- What does this imply for effect on Pr(attention)?

Outline

How *should* people exercise refinance option?

- Agarwal Driscoll Laibson (2013) solve optimal exercise of refinancing option in closed form under simplifying assumptions
- Threshold to refinance: minimum decrease in interest rates O_{it}

$$
\begin{aligned}
O_{it} &= \frac{1}{\psi_{it}}\left[\phi_{it} + W(-\exp(-\phi_{it}))\right] \\
\psi_{it} &= \frac{\sqrt{2(\rho+\lambda_{it})}}{\sigma} \\
\phi_{it} &= 1 + \psi_{it}(\rho+\lambda_{it})\frac{\kappa(m_{it})}{m_{it}(1-\tau)}
\end{aligned}
$$

- ρ discount rate, σ volatility of r, τ is marginal tax rate, m is mortgage balance, $\kappa(m)$ is refinancing costs, λ is expected rate of decline in real principal
- Implies incentive to refinance $Incentive_{it} = (r_{it}^{old} - r_{it}^{new}) - O_{it}$

Andersen et al. (2020) mixture model of inattentive refinancing

- Inattentive households never refi. Attentive households refinance if

$$e^{\beta} Incentive_i + \epsilon_i > 0$$

  β measures households' responsiveness to incentive

- Assume $\epsilon_i \sim T1EV \Rightarrow$

$$\begin{aligned} \Pr(refinancing_i = 1 | attentive_i = 1) &= \Pr\left(e^{\beta} Incentive_i + \epsilon_i > 0\right) \\ &= \Lambda(e^{\beta} Incentive_i) \end{aligned}$$

  where $\Lambda(x) = e^x/(1+e^x)$

- Extend ADL to allow for observables to shift cost of refinancing

$$\kappa^*(x_i, m_i) = \kappa(m_i) + \exp(x_i'\gamma)$$

- Usual role for inattention: very high fixed-cost estimates γ_0 imply inattention

Extend to allow for treatment effects on attention

- Attention depends on observables and attention shock $\eta_i \sim T1EV$
- Inattentive if

$$\delta_0 + \delta_1 Treatment_i + \delta_2 Reminder_i + \eta_i > 0$$

$$\Pr(inattentive_i|\delta) = \Lambda(\delta_0 + \delta_1 Treatment_i + \delta_2 Reminder_i)$$

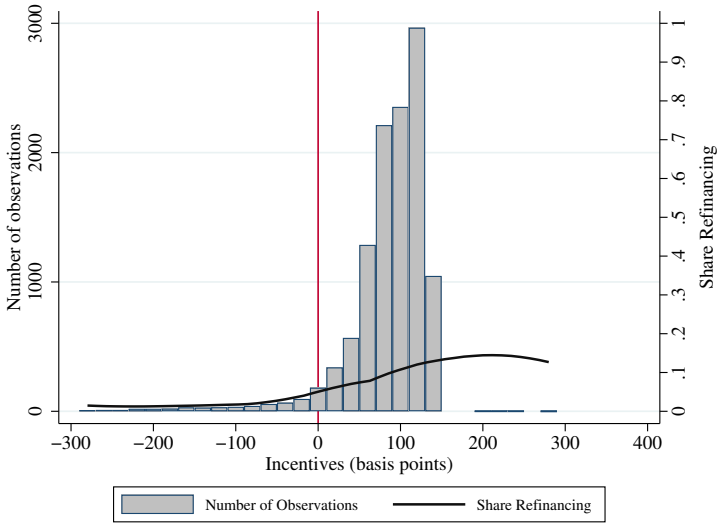
$$\Pr(refinancing_i = 1|x_i, \beta, \gamma, \delta) = \Pr(attentive_i|\delta) \Pr(refinancing_i = 1|attentive_i, \beta, \gamma)$$

$\rightarrow$ Estimated parameters quantify attention effects, allow counterfactuals

Model Parameters

Parameter	Name	Value	Source
Inflation	π	0.02	Average IE inflation
Real discount rate	ρ	0.05	Standard
Nominal interest rate volatility	σ	0.002	CBI monthly interest rate series
Marginal tax rate for interest deduction	τ	0	Eliminated in Ireland in 2019
Exogenous Pr(termination)	μ	0.11	Microdata from partner bank
Perceived fixed costs of refinancing (€)	κ	100	Usual cost is zero

Refinancing Increasing in ADL Incentive



Estimation

Maximum likelihood

$$\mathcal{L}(\beta, \delta, \gamma | x, refi) = \left(\prod_{refi_i=1} (1 - w_i(x_i, \delta)) \Lambda(e^{\beta} Incentive(x_i, \gamma)) \right) \times \left(\prod_{refi_i=0} w_i(x_i, \delta) + (1 - w_i(x_i, \delta)) \Lambda(-e^{\beta} Incentive(x_i, \gamma)) \right)$$

where w_i is the probability i is inattentive

$$w_i \equiv \Pr(inattentive_i | x_i, Treatment_i, Reminder_i, \delta) = \Lambda(\delta_0 + \delta_1 Treatment_i + \delta_2 Reminder_i)$$

Maximum Likelihood Mixture Model Estimates

Parameter	(1)	(2)	(3)	(4)	(5)
Incentive Sensitivity (β)	-125.48***	-1.61***	-0.23	-1.58***	-1.65***
	(1.12)	(0.01)	(0.51)	(0.05)	(0.05)
Fixed Cost of Refinancing (γ_0)		13.15***	6.43***	8.71***	8.71***
		(0.70)	(0.49)	(0.03)	(0.20)
Inattention Constant (δ_0)			1.28***	1.13***	1.02***
			(0.19)	(0.11)	(0.12)
Treatment on Inattention (δ_1)				-0.31**	-0.33**
				(0.12)	(0.13)
Reminder on Inattention (δ_2)				-0.43***	-0.44***
				(0.08)	(0.09)
Borrower Controls					✓
Observations	11,200	11,200	11,200	11,200	11,200

Interpreting Marginal Effects

- Once allowing for unobservable fixed costs, $\exp(\hat{\beta})$ implies a 50 bp response in Pr(refinancing | awake) for 10 bp decrease in rates

- Fixed costs estimates implausibly high (~€514k) w/o allowing for inattention
- Still high (~€6k) even allowing for inattention, consistent w/ pessimistic process beliefs (Adams Hunt Palmer Zaliauskas, 2021)

- Estimates imply 76% probability of being inattentive
- Treatment + reminder reduces inattentive probability by 16 pp to 60%

Counterfactuals: Relative Strength of Reminders

Use estimated model to horse-race reminders and rate cuts

$$\Pr(\textit{refinancing}_i = 1 | x_i, \hat{\beta}, \hat{\gamma}, \hat{\delta}) = \Pr(\textit{attentive}_i | \hat{\delta}) \Lambda(e^{\hat{\beta}} \textit{Incentive}_i(x_i, \hat{\gamma}))$$

- If average incentive to refinance $\sim$ 100 bp, reminders increase refinancing by 12 pp

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- Would need to get *mortgage* fixed interest rates to fall by 200 bp to achieve same refis
- (tough given ZLB + limited pass through of ECB policy rate to IE variable interest rates)

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Caveats

1. Treatment likely more effective when status-quo disclosure worse (undoes obfuscation)
2. Reminders more effective when rates have fallen (complementary)
3. Repeated reminders more/less effective (dynamic selection, lose salience, peer effects)
4. Communication may depend on trust in the discloser (send letters from gov't?)
5. More attention to refinancing could lower variable rates (competition hardening)

Conclusion

- Inattention is a significant source of refinancing inertia, weakens refinancing channel
- Targeted communication can reduce inattention, stimulate refinancing

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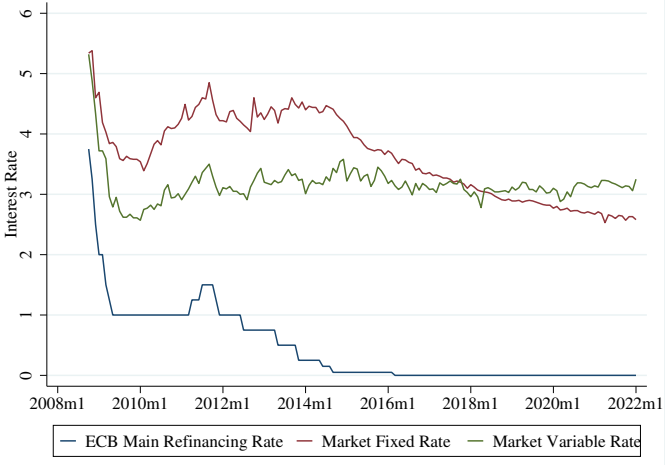
- Mean year 1 savings by average refinancer: €1,217
  - MPC out of US mortgage interest savings (Di Maggio et al., 2017) $\sim 0.75 \Rightarrow \overline{C}_{refi} \uparrow$ €913
- Cost effectiveness: if average letter costs €0.5 to send and generates
  €913 $\times$ 7% = €64 in additional consumption
  $\Rightarrow$ multiplier is €128 per €1 of spending

- Direct communication has potential to help solve last mile problem in monetary policy
- Complementary and possibly more effective than monetary policy for household sector

Pass-through to variable rates less than to fixed rates



Role of Covid?

- Might reminder effectiveness simply be Covid?
- Letters sent Feb 2020, reminders March/April 2020, follow ups June/Dec 2020

→ All the more reason to have a RCT!

→ Not much heterogeneity by most-affected group: Covid forbearance

→ If Covid ⇒ abnormally high attention, why didn't treatment have an effect?
...seems something special about reminders

→ 2020-1 external refinancing no higher than 2019

back