Pay-As-You-Go Insurance

Experimental Evidence on Consumer Demand and Behavior

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Disclosures

- I gratefully acknowledge support from J-PAL North America for a pilot version of the experiment and from HBS for data purchases.
- I have no financial interests or conflicts to disclose.

Motivation

- Despite universal mandate, 17% of drivers in California are uninsured
  - → Participation in many insurance markets is suboptimally low (Cole et al., 2013)
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Q: What are the effects the introduction of a pay-as-you-go contract on insurance demand?

This Project

- Setting: California auto insurance market
- Partner: Insurtech “Hugo” introducing novel pay-as-you-go auto insurance contract
  - → Buy days of coverage at a time
  - → Pause insurance on days you don’t drive

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Randomize:

1. Traditional or pay-as-you-go contract $\Longrightarrow$ pay-as-you-go on take-up and coverage
2. Price of pay-as-you-go insurance (conditional on risk) $\Longrightarrow$ demand wrt price
3. Incentives to buy larger number of days at a time $\Longrightarrow$ bound WTP for smaller quantities

Contributions to the Literature

1. Optimal contracts and underinsurance in auto insurance markets
   (Vickrey, 1968; Edlin, 1999; Bordoff and Noel, 2008; Jin and Vasserman, 2021; Sun and Yannelis, 2016)
   + Characterize uninsured and speak to potential solutions

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   + Estimate effects of breaking connection between financing and insurance
3. Consumer demand for smaller quantities/pay-as-you-go contracts (Jack and G. Smith, 2015; Aker and Mbiti, 2010; Kalba, 2008; Baker, Johnson, and Kueng, 2020; Attanasio and Pastorino, 2020)
   + Pay-as-you-go contracts for insurance, in US, and enrich understanding of demand
   + Implications for other fin/insur-tech products (e.g., buy-now-pay-later, earned wage access)

Roadmap

Background

Experiment

Data & Experiment Sample

Results

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The Uninsured Driver Problem

- Despite a universal insurance mandate, 13% of drivers uninsured nationally
  - → 17% in California (Insurance Research Council, 2021)
- Uninsured drivers are exposed to large financial risks in event of accident
  - → Penalties for driving uninsured include fines and impounded vehicle
  - → Ineligible for compensation in event of accident (“no-pay-no-play”)
- Uninsured impose large externalities on other drivers
  - → Premium externalities of $27B/year, $6B in CA alone (Sun and Yannelis, 2016)
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Three features of the auto insurance market may contribute

Market Features Contributing to Uninsurance

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3. Nonstandard market pools drivers shopping for minimum coverage & high-risk drivers
   - Volatile, transaction-heavy, and features high fees (13% of net earned premiums)
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Pay-as-you-go (1) reduces upfront payments, (2) eliminates fees, (3) only bills days driven

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- Drivers can purchase 3, 7, 14, or 30 days at a time by SMS or website
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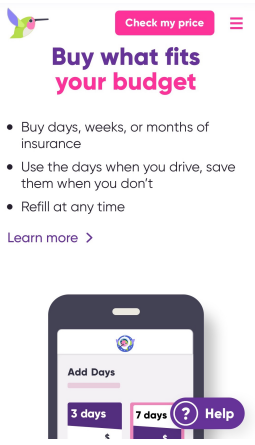
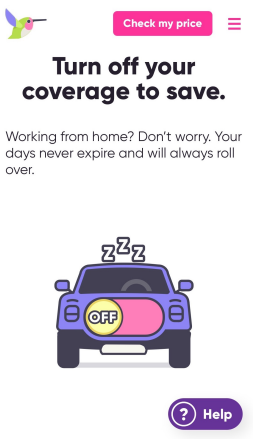
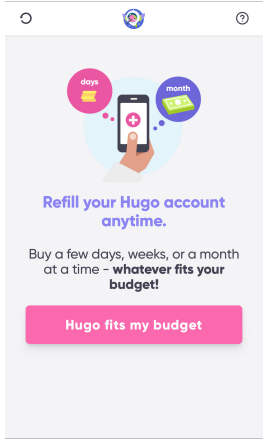
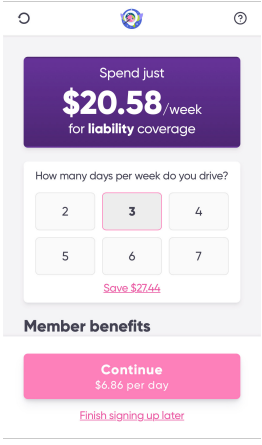
- Regulations require 10 days coverage *after* lapsation
  - → 10 days charged upfront as “lifetime membership fee”
  - → Drivers borrow against these days as “grace period” when account is exhausted
  - → Pay back days “borrowed” when they top up account and add additional days on top

Hugo Insurance: Explaining the Product









Setting & Intervention

Setting:

- Uninsured drivers shopping for minimum liability insurance coverage in CA
- Recruit using lead aggregators and online ads between March and August 2019
- Contracts offer minimum liability coverage and run for 3 months

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Intervention: Randomize along three dimensions:

1. Type of contract: Traditional (1/7) vs. Pay-as-you-go (6/7)

Within pay-as-you-go contract, randomize 3 prices x discount/no discount (1/6 each)

2. Price of insurance: Randomly vary price (base, up 20%, or down 20%)

Waiver from CA DOI allowing us to randomize price conditional on risk

3. Bundle discounts: Randomly vary discount of 2 (6) days if they purchase 14 (30) days

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Data

- Insurance application information
  - → Demographics (age, gender, years experience) and quoted traditional premium
  - → Vehicle make, model, and year (+ resale value collected via MTurk)
- Insurance administration data
  - → Take-up, purchases, utilization
  - → Data on take-up from any insurer (covering >90% of market)
  - → Stripe payment processing data which includes “insufficient funds” bounces
- Credit report data from Experian
  - → Credit score, debts in collection, access to credit, etc.

Applicant Characteristics

	Mean	SD	Median
3-Month Premium	232	94.5	209
Daily Premium	4.27	1.83	3.83
Vehicle Resale Value	1,877	3,293	551
Age	37.8	10.4	36.6
Income Insight Score*	37,452	15,625	34,000
Vantage Credit Score*	515	127	532
Total Inquiries*	5.5	6.82	3
Credit Card Limit*	497	2,969	0
Is Credit Constrained*	80.8	39.4	100
N (N*)	1,537	(1,309)	

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Q1: Does pay-as-you-go increase coverage?

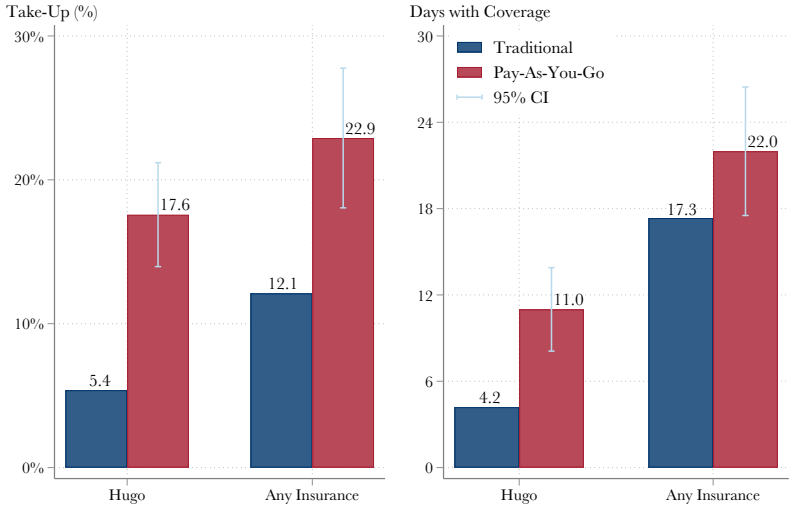
Define two measures of insurance coverage, y_i, separately for coverage through the experiment and from any insurer:

1. Take-up
2. Days with coverage

Run ITT regression:

$$y_i = \alpha + \beta \mathbb{1}\{PAYG_i\} + \epsilon_i$$

ITT: Take-up and Coverage Effects of Daily Contract



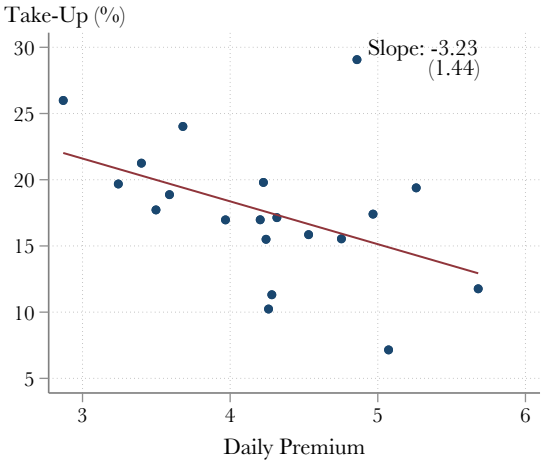
Q2: How sensitive is demand to price?

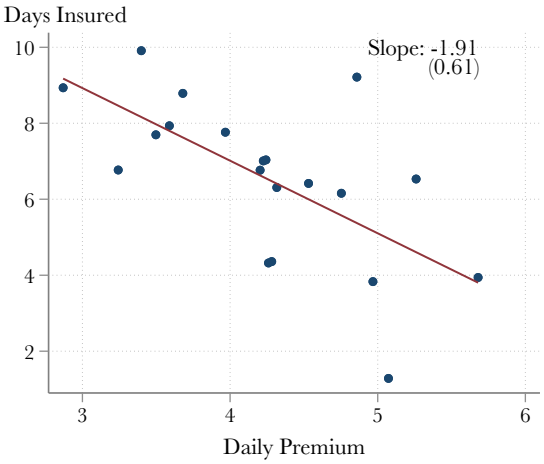
- Isolate randomly induced variation:

$$y_i = \beta_0 + \underbrace{\beta_1 p_{induced_i}}_{\text{Isolates induced price variation}} + \underbrace{\beta_2 p_{base_i}}_{\text{Controls for risk premium}} + \varepsilon_i$$

- Estimate elasticity of demand with same logic
- In both cases, limit these regressions to those offered pay-as-you-go contract

Q2. Demand is Relatively Price Inelastic





Q2. Demand is Relatively Price Inelastic

- Elasticity of demand for days of coverage = **-0.63**
  - → Higher for days purchased conditional on enrollment: **-0.72**
  - → 10% increase in price reduces take-up by **-1.3pp** (7% of 17.6% take-up rate)

- Estimates are less elastic than other estimates of demand for auto insurance
  - → e.g., (Barone and Bella, 2004): Average ε_D across market segments = -1.1
  - → Could reflect the inaccessibility of alternative insurance contracts

Q3: Is there demand for smaller quantities at higher prices?

- Forgoing the bundle discount to buy fewer days reveals an implied cost of borrowing
  - → Size of discounts were designed so refusing implies an APR ≈ payday loan

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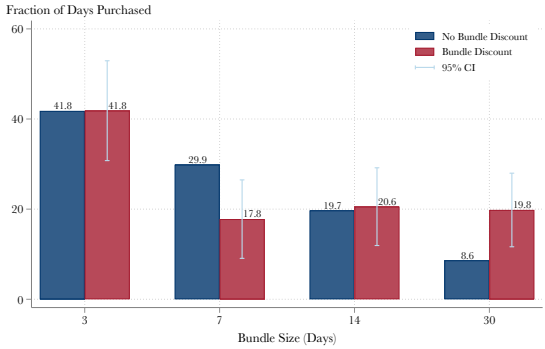
	Days Purchased			
	3	7	14	30
APR Implied by Forgoing 14-Day Bundle (%)	498	1,409	0	0
APR Implied by Forgoing 30-Day Bundle (%)	261	378	514	0

Example

Q3: Demand for Smaller Quantities at Higher Prices

- Without discount, 72% of days are purchased in small quantities
  - → Days purchased via bundle increase by 12pp (43%) when offered discount
- Even with discount, 51% of drivers always opt for small quantities at higher prices and 77% do so at least once



Why is there demand for smaller quantities at higher prices?

Corroborating evidence for liquidity constraints:

- **81%** of applicants have $0 of available credit on their credit report
- **19%** of drivers have $\geq$1 attempted purchase rejected for insufficient funds
  - → 26% drop insurance coverage after an attempted purchase is rejected
  - → 5% of all attrition occurs after insufficient funds bounce
- Drivers 43% more likely to make a purchase on a Friday

Q4: Do coverage increases persist (within-experiment)?

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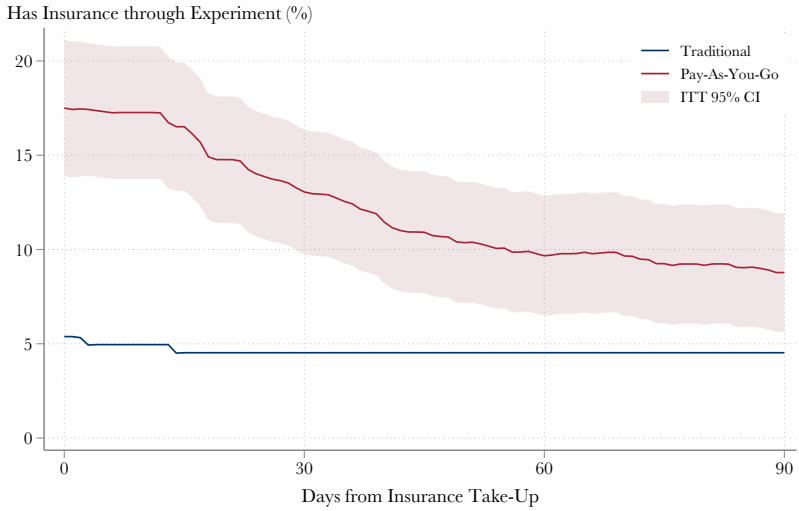
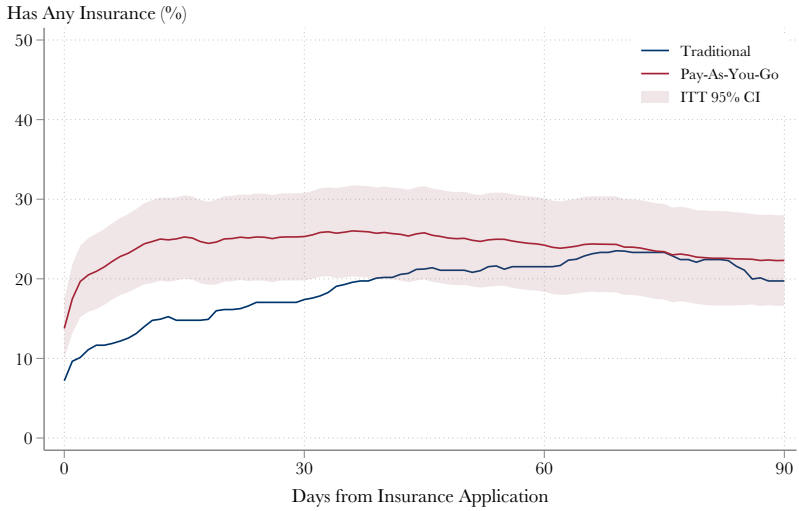


Q4: Do coverage increases persist (any insurer)?



Contextualizing Attrition

- RCT may understate the potential of “pay-as-you-go” for several reasons
  - → Product was early stage (SMS, website) and clunky (now there’s an app)
  - → Prices were high (max mark-up is now 20%, down from 67%)
  - → Product bundled “pause” and financing features, expensive for frequent drivers
  - → Some drivers may “graduate” to full coverage (1 in 3 report this as reason)

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  - → Product bundled “pause” and financing features, expensive for frequent drivers
  - → Some drivers may “graduate” to full coverage (1 in 3 report this as reason)
- Widespread attrition in traditional plans
  - → One Exec: “Nonstandard customers typically lapse on their policy within the first three months and re-enroll within 30 days” (Walls, 2015)
  - → Of 3,723 minimum liability insurance plans originated in 2021, 35% churned within 65 days

Taking Stock

1. Pay-as-you-go increases coverage relative to traditional contract

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1. Pay-as-you-go increases coverage relative to traditional contract
2. Demand for pay-as-you-go insurance is relatively price inelastic ($\epsilon_D = -0.6$)
3. Drivers prefer small quantities, even at higher prices (in part due to liquidity constraints)

Concluding implications for pay-as-you-go

- Pay-as-you-go successfully alleviates binding constraints by breaking connection between financing and insurance (Rampini and Viswanathan, 2022)
  - → More beneficial for drivers without prior coverage history Heterogeneity

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  - → More beneficial for drivers without prior coverage history Heterogeneity
- Retiming purchases from today to the future $\Longrightarrow$ continued coverage is contingent on avoiding income/expense shocks (similar to Dobbie and Song, 2020)
  - → Coverage increases erode if auto insurance falls below other consumption priorities
  - → Drivers could nevertheless be better off with option to attrit and re-enroll without high fees

Concluding implications for the “uninsured driver problem”

- Uninsured driving is difficult problem to solve
  - → Policymakers have imperfect tools (lowering minimum coverage limits, steeper penalties)
    - WTP for Medicaid $<$ cost of coverage, so we subsidize (Finkelstein, Hendren, and Shepard, 2019), which is more effective than mandating (Frean, Gruber, and Sommers, 2017)
  - → From insurer’s perspective, providing minimum coverage is expensive
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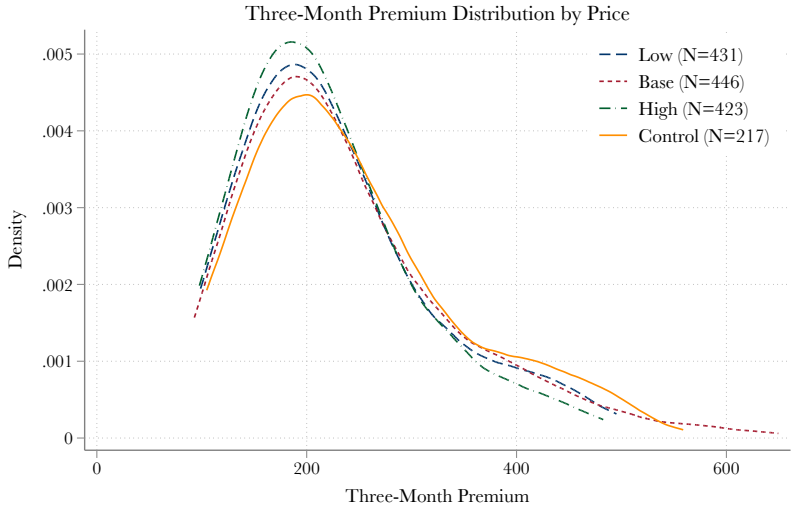
  - → From insurer’s perspective, providing minimum coverage is expensive
    - Cost of acquiring a customer is high, attrition is high
- Technology has exciting potential to automate processes and reduce admin costs!
- Pay-as-you-go contracts can help – particularly liquidity constrained, infrequent drivers
  - → Encourage financial product innovation in markets where consumption is below optimal levels to harness the “liquidity flypaper effect” (Di Maggio, Katz, and Williams, 2022)

Thanks!

Appreciate any/all feedback: rkluender@hbs.edu

Visualizing Treatments: Price



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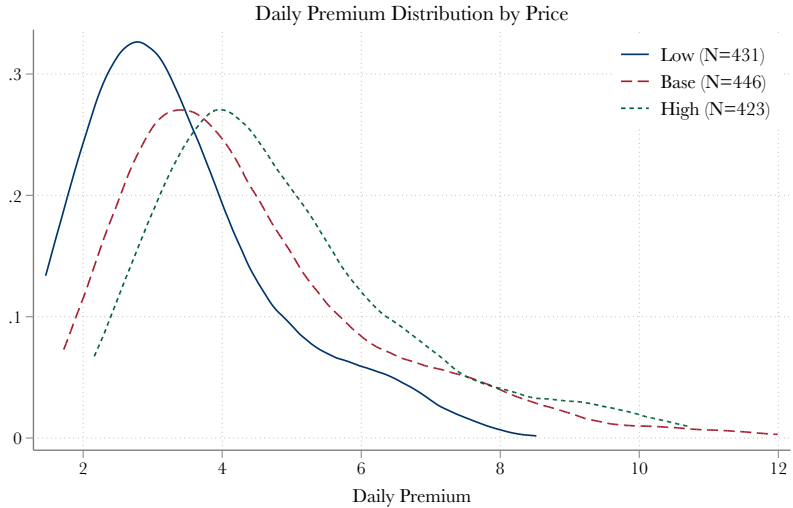
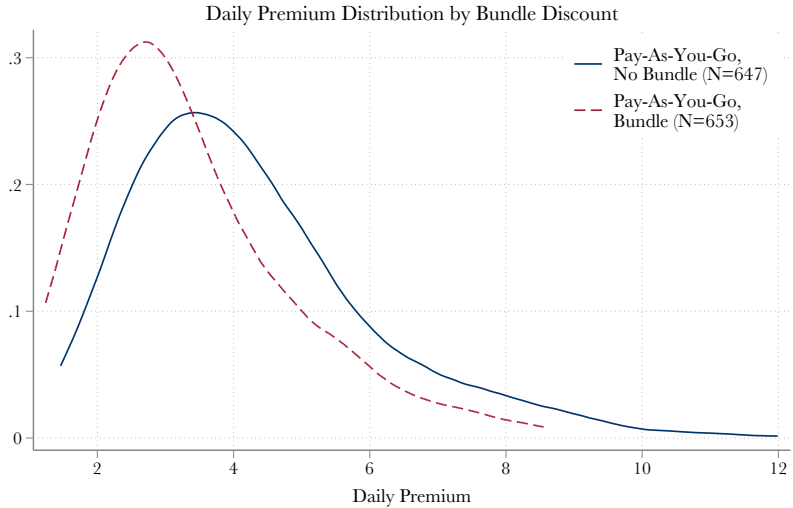


Visualizing Treatments: Quantity Discounts



Inferring Lower Bound on Cost of Credit

$$\text{Implied APR} = \frac{\text{Forgone discount (“interest”)}}{\text{Borrowing required to access bundle (“principal”)}} * (\frac{365}{T})$$

- Ex: Assume $5/day, purchase 30 days for $120 ($4/day) or 7 days for $35 ($5/day)
  - → Spend $150 instead of $120 to avoid borrowing $85 ($120 - $35)
  - → Duration of “loan” is days to reach 23 insured days (23 days / utilization rate)
  - → Drivers use their insurance on 67.5% of days $\implies$ T = 34 days

$$\text{Implied APR} = \frac{\$30}{\$85} * (\frac{365}{34}) = 378.3\%$$

Back

Interaction with No Regular Policy History

	Take-Up	Days with Coverage	Days Insured	Insured End of Study
	(1)	(2)	(3)	(4)
Pay-As-You-Go=1	6.43	3.15	-2.17	-2.59
	(4.20)	(5.42)	(3.33)	(4.71)
	[0.125]	[0.562]	[0.514]	[0.581]
No Regular Policy	-7.24	-12.56	-6.08	-11.19
History=1	(4.00)	(5.44)	(3.42)	(4.93)
	[0.070]	[0.021]	[0.076]	[0.023]
Pay-As-You-Go=1 ×	**8.24**	**10.95**	**6.47**	**10.35**
No Regular Policy	(4.60)	(6.02)	(3.58)	(5.33)
History=1	[0.074]	[0.069]	[0.071]	[0.052]
Constant	10.45	20.90	8.45	25.17
	(3.74)	(4.97)	(3.21)	(4.39)
	[0.005]	[0.000]	[0.009]	[0.000]
N	1,537			
No Regular Policy History	70.2			

Back