Buying Data from Consumers

The Impact of Monitoring in U.S. Auto Insurance

Yizhou Jin and Shoshana Vasserman
University of Toronto and Stanford University

Journal of Political Economy, 2026



Firms now buy data directly from consumers

IT + privacy standards → direct transactions of consumer data

- Firms directly incentivize consumers to reveal information voluntarily
- Firms own the collected data as proprietary

Firms now buy data directly from consumers

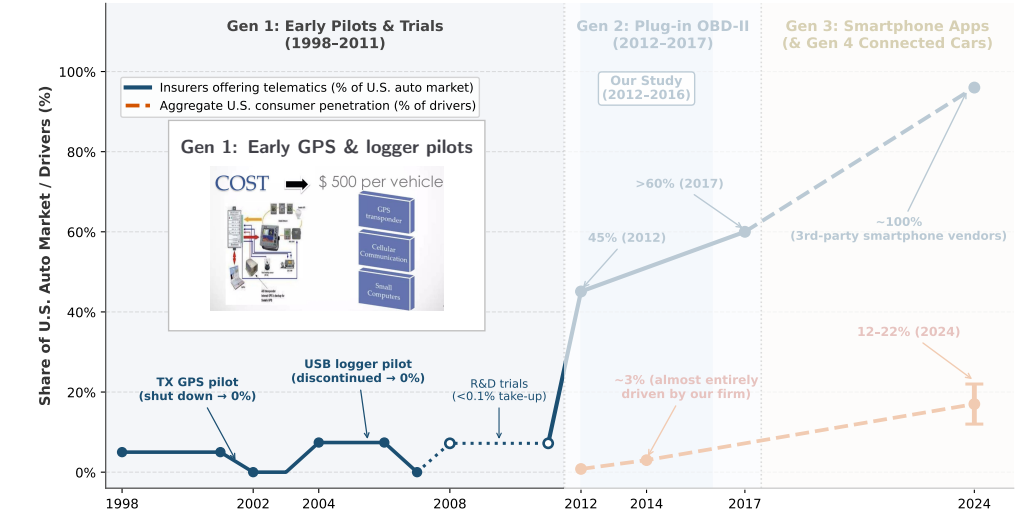
IT + privacy standards → direct transactions of consumer data

- Firms directly incentivize consumers to reveal information voluntarily
- Firms own the collected data as proprietary

Economic impact on total surplus and its division?

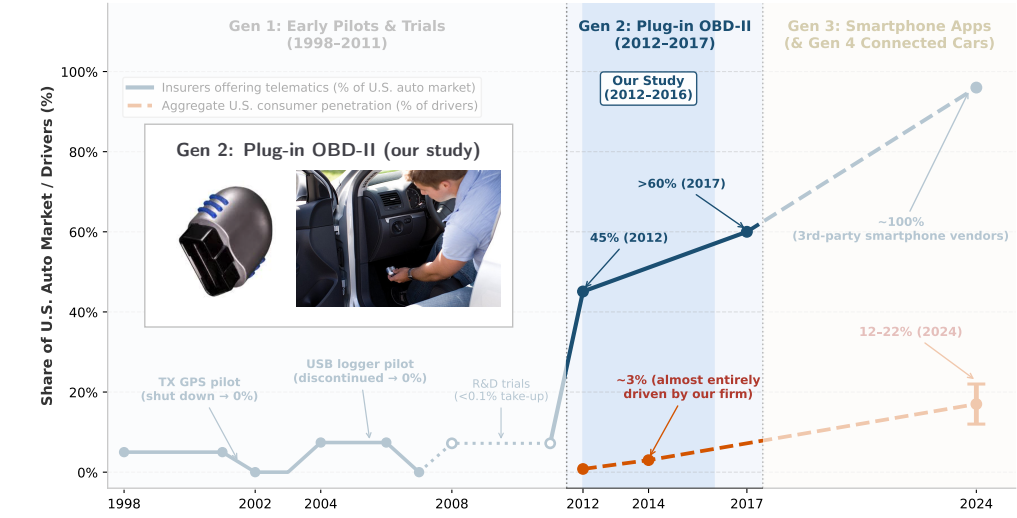
- More info can mitigate information asymmetry
- Consumers may not opt in even if compensated
  - Preferences (reclassification risk...) and choice frictions
- Proprietary data can facilitate higher markups

Telematics evolution: widespread insurer adoption, gradual take-up



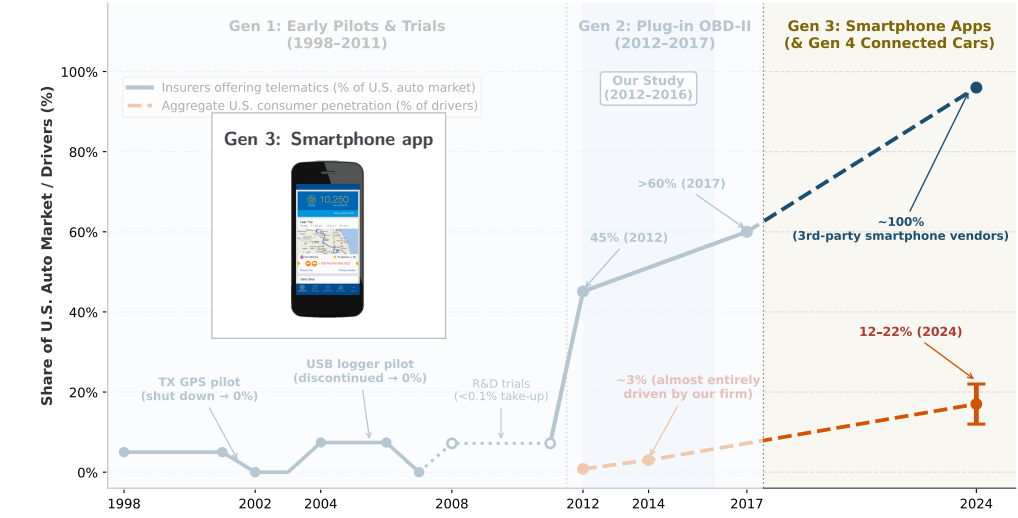
A0: adoption sources & quotes

Telematics evolution: widespread insurer adoption, gradual take-up



A0: adoption sources & quotes

Telematics evolution: widespread insurer adoption, gradual take-up



A0: adoption sources & quotes

Question: what does monitoring do to profit and welfare?

How does monitoring affect profit and welfare? Why was opt-in rate so low? Should we mandate data portability or set pricing caps?

- Proprietary panel from a major U.S. auto insurer ("the firm")
  - Panel covering 1M+ new customers from 2012–2016 across 23 states (Gen-2 monitoring)
  - Claims, prices, coverage and attrition choices, and monitoring scores

A1: sum stats

Question: what does monitoring do to profit and welfare?

How does monitoring affect profit and welfare? Why was opt-in rate so low? Should we mandate data portability or set pricing caps?

- Proprietary panel from a major U.S. auto insurer ("the firm")
  - Panel covering 1M+ new customers from 2012–2016 across 23 states (Gen-2 monitoring)
  - Claims, prices, coverage and attrition choices, and monitoring scores
- Matched to competitors' price menus based on regulatory filings
  - Top-5 competitors' quotes for each consumer, matched on characteristics and purchase date
  - 7.5 million quotes (the firm and its top-5 competitors) for 55,302 consumers in one Midwestern state: the structural sample

A1: sum stats

Roadmap

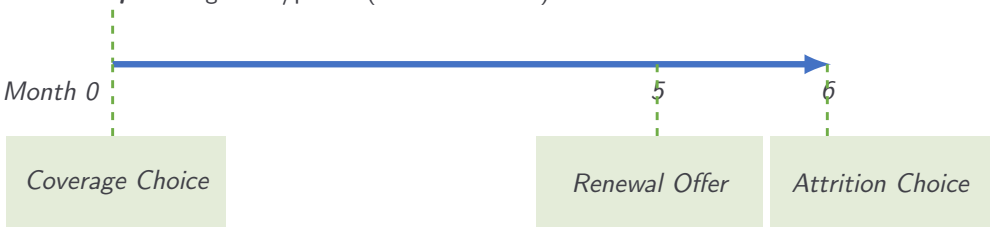
Background and Evidence of Efficiency Benefits

Demand Model and Estimation: Selection and Choice Frictions

Pricing and Equilibrium: Invest-and-Harvest Dynamics and Data Portability

Auto insurance: six-month liability contracts, repriced at renewal

- ***Observable characteristics:*** 1-driver-1-vehicle, 23 states, 2012–16
- ***Quotes:*** liability limits ($25K–$500K, discrete choice)
- ***Competitor quotes:*** top 5 competitors in focal state
- ***Coverage choice:*** avg. $113K, and 43% in mandatory min
- ***Premium paid:*** avg. $658/period ($578 focal state)

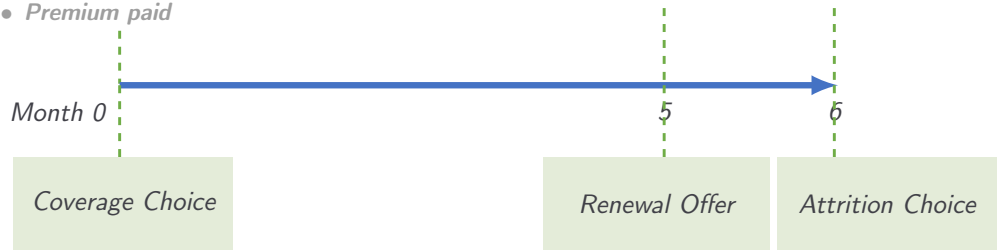


A1: sum stats
A10: full pricing model

Auto insurance: six-month liability contracts, repriced at renewal

- *Observable characteristics*
- *Quotes*
- *Competitor quotes*
- *Coverage choice*
- *Premium paid*

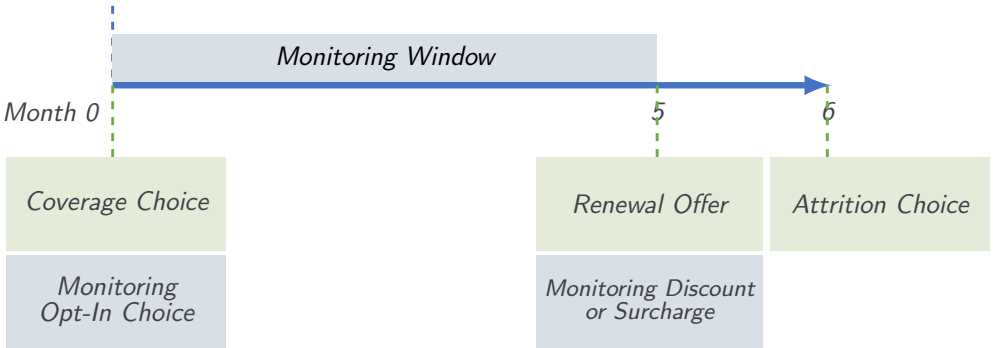
- ***Claim realization:*** avg. 1 per 11 yrs ($3.6K/claim; public record)
- ***Renewal quote change:*** +13% avg. at 1st renewal
- ***Attrition choice:*** 15% after 1st period, stable around 5–10% after



A1: sum stats | A10: full pricing model

Monitoring: a one-time, five-month audition for new customers

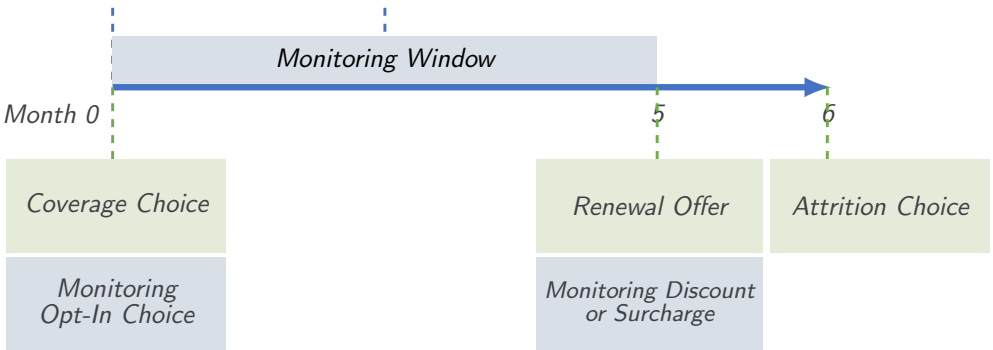
- ***Monitored behavior:*** mileage, hard brakes, speed, late night driving
- ***Duration:*** First period only (100–150 days, before renewal offer)
- ***Opt-in discount:*** First period only (0–10%, 4% avg.)
- ***Monitoring discount:*** Lasts forever after first period



Monitoring: a one-time, five-month audition for new customers

- *Monitored behavior*
- *Duration*
- *Opt-in discount*
- *Monitoring discount*

- ***Real-time feedback***

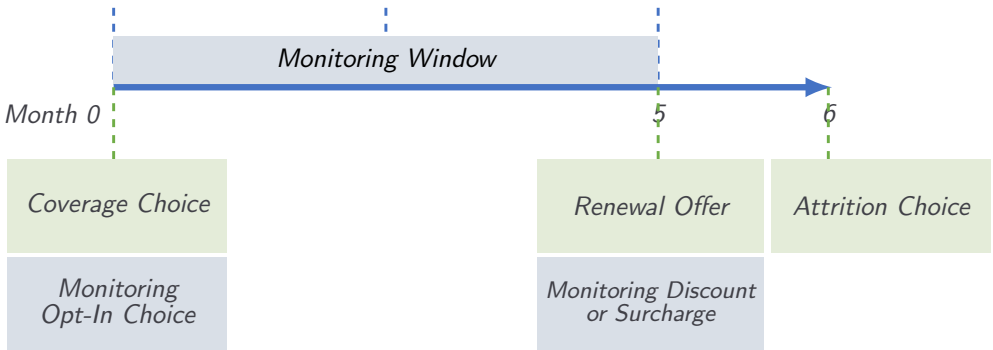


Monitoring: a one-time, five-month audition for new customers

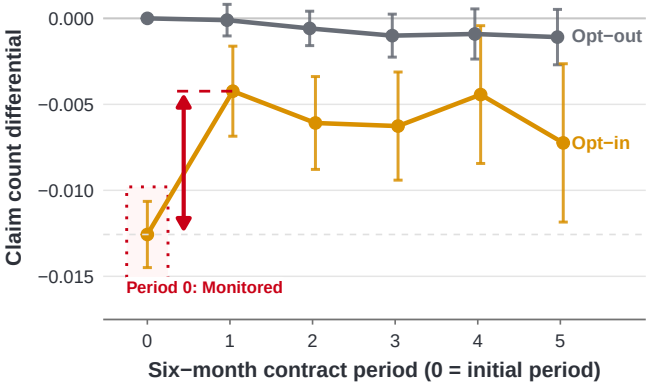
- *Monitored behavior*
- *Duration*
- *Opt-in discount*
- *Monitoring discount*

- *Real-time feedback*

- ***Score & discount:***
  - ▷ 1 s.d. worse score → +29% future claims
  - ▷ Discount range: 30% to −10% (7% avg.)



Monitoring is useful in two ways: safer driving and better risk rating

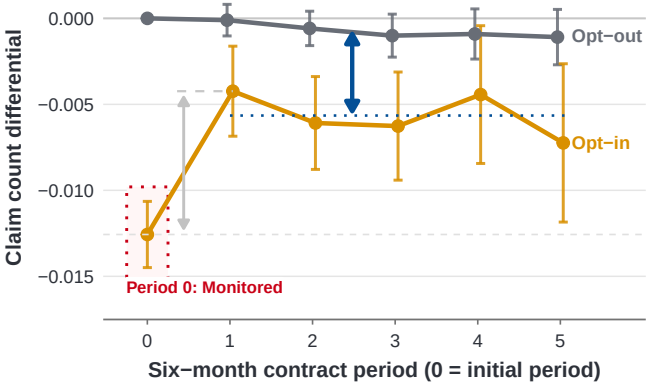


Claim counts vs. opt-out in period 0 (driver, vehicle, state & coverage controls; unbalanced panel, 95% CIs).

1. (Reverse) moral hazard effect

- +30% claims once monitoring ends (22% without adjusting for monitoring duration)
- Robust to driver FEs, duration/intensity, balanced panels & placebos

Monitoring is useful in two ways: safer driving and better risk rating



Claim counts vs. opt-out in period 0 (driver, vehicle, state & coverage controls; unbalanced panel, 95% CIs).

1. (Reverse) moral hazard effect

- +30% claims once monitoring ends (22% without adjusting for monitoring duration)
- Robust to driver FEs, duration/intensity, balanced panels & placebos

2. Advantageous selection

- -11% to -15% safer across $t = 1..5$
- Explains 39% of the Period-0 gap

A4: DiD | A5: selection | A6: learning & het. MH | A7: score & claims

Roadmap

Background and Evidence of Efficiency Benefits

Demand Model and Estimation: Selection and Choice Frictions

Pricing and Equilibrium: Invest-and-Harvest Dynamics and Data Portability

Model: cost, noisy monitoring score, and monitoring discount

- **Cost (accident arrival & severity):** driver i in period t

$$\log \lambda_{it}(m,z) = \underbrace{\hat{\lambda}(x_{it})}_{\text{public base rate}} + \underbrace{\left(m\,\theta_0^{mh} + z\,\theta_1^{mh}\right)1_{t=0}}_{\text{moral hazard effect}} + \underbrace{\epsilon_i^{\lambda}}_{\text{private type}}$$

x_{it}: rating observables; m: opt-in; z: monitoring duration share; minor vs. major claim severity modeled separately

- **Monitoring score:** noisy signal of private risk ϵ_i^{λ}

$$s_i = \theta_0^s + \theta_1^s\,\epsilon_i^{\lambda} + \theta_2^s\,\hat{\lambda}_{i0} + \epsilon_i^s, \qquad \epsilon_i^s \sim N(0,\sigma_s^2)$$

Score noise ϵ_i^s creates **reclassification risk** when mapped into renewal prices

A9: why a model | A9a: severity | A9b: ϵ_i^{λ} shrinkage | A10: full pricing model | A13a: score by regime

Model: cost, noisy monitoring score, and monitoring discount

- **Cost (accident arrival & severity):** driver i in period t

$$\log \lambda_{it}(m,z) = \underbrace{\hat{\lambda}(x_{it})}_{\text{public base rate}} + \underbrace{\left(m\,\theta_0^{mh} + z\,\theta_1^{mh}\right)1_{t=0}}_{\text{moral hazard effect}} + \underbrace{\epsilon_i^{\lambda}}_{\text{private type}}$$

  x_{it}: rating observables; m: opt-in; z: monitoring duration share; minor vs. major claim severity modeled separately

- **Monitoring score:** noisy signal of private risk ϵ_i^{λ}

$$s_i = \theta_0^s + \theta_1^s\,\epsilon_i^{\lambda} + \theta_2^s\,\hat{\lambda}_{i0} + \epsilon_i^s, \qquad \epsilon_i^s \sim N(0,\sigma_s^2)$$

  Score noise ϵ_i^s creates **reclassification risk** when mapped into renewal prices

- **Monitoring discount:** first-renewal factor for monitored drivers

$$r_{i0}(m=1) = \theta_0^{r1} + \theta_1^{r1}\,RC_{i0} + \theta_2^{r1}\,s_i + \sigma^{r1}\,\nu_{i0}, \qquad \nu_{i0} \sim N(0,1)$$

  Multiplicative factor on 1st-renewal price ($p_{i\mathbf{1}} \propto p_{i\mathbf{0}} \cdot r_{i\mathbf{0}}$) that persists in $t \geq 1$; $RC_{i\mathbf{0}}$: baseline risk class

A9: why a model | A9a: severity | A9b: ϵ_i^{λ} shrinkage | A10: full pricing model | A13a: score by regime

Choice model: key demand parameters and assumptions

$$\max_{d=(f_d,y_d,m_d)} \mathbb{E}\Big[u\big(\underbrace{-p_{it}(d)-\tau_{it}(d)-e_{it}(d)}_{\text{premium, friction, OOP}}\big)\Big] + \underbrace{\delta\,\mathbb{E}\big[V_{i,t+1}(d)\big]}_{\text{next two periods}} + \epsilon_{idt}, \quad u(h) = (w_i + h) - \tfrac{\gamma_i}{2}(w_i + h)^2$$

$d = (f_d, y_d, m_d)$: firm, coverage limit, monitoring opt-in ($t = 0$ only); γ_i: risk aversion; ϵ_{idt}: Type-I EV taste shock

Key demand parameters

- **Risk aversion (γ_i):** coverage share gradient + mandatory min. change
- **Default plan ($\psi_{\mathbf{mm}}$):** bunching at mandatory minimum
- **Firm-switching inertia (η^f):** renewal attrition vs. rival quotes (min- & median-price rivals)
- **Monitoring disutility (ξ):** opt-in wedge beyond financial gains
- All parameters vary with X_{it}

A2a: what customers see | A10: full pricing model | A10b: plan switch & RE | A11: horizons

Choice model: key demand parameters and assumptions

$$\max_{d=(f_d,y_d,m_d)} \mathbb{E}\Big[u\big(\underbrace{-p_{it}(d)-\tau_{it}(d)-e_{it}(d)}_{\text{premium, friction, OOP}}\big)\Big] + \underbrace{\delta\,\mathbb{E}\big[V_{i,t+1}(d)\big]}_{\text{next two periods}} + \epsilon_{idt}, \quad u(h) = (w_i + h) - \tfrac{\gamma_i}{2}(w_i + h)^2$$

$d = (f_d, y_d, m_d)$: firm, coverage limit, monitoring opt-in ($t = 0$ only); γ_i: risk aversion; ϵ_{idt}: Type-I EV taste shock

Key demand parameters

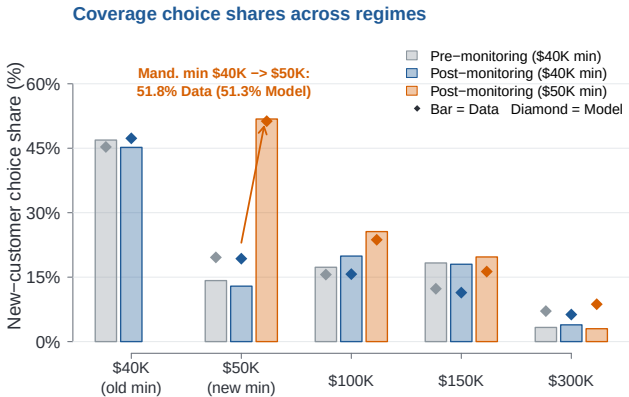
- **Risk aversion (γ_i):** coverage share gradient + mandatory min. change
- **Default plan (ψ_{mm}):** bunching at mandatory minimum
- **Firm-switching inertia (η^f):** renewal attrition vs. rival quotes (min- & median-price rivals)
- **Monitoring disutility (ξ):** opt-in wedge beyond financial gains
- All parameters vary with X_{it}

Key model assumptions

- **Rational expectations:** drivers know private risk ϵ_i^{λ}, moral hazard, and score/price rules
- **3-period horizon:** matches 2.98-period mean tenure (tested at 2 & 4 periods)
- **Active switching:** triggered by a "push" factor—1st-renewal price change (44% of switches) or a claim (Hortaçsu et al. 2017)

A2a: what customers see | A10: full pricing model | A10b: plan switch & RE | A11: horizons

Model fit: baseline coverage shifts, monitoring take-up, and selection

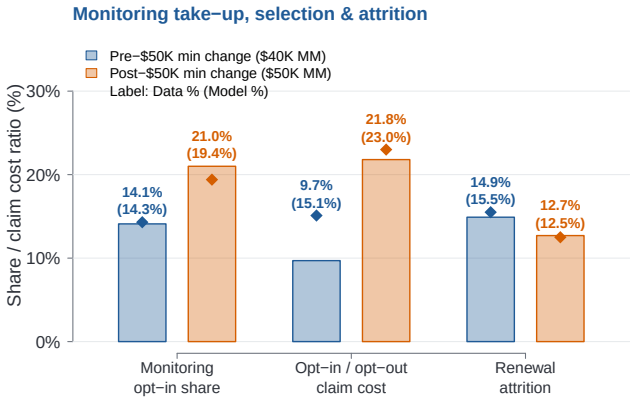


Baseline coverage shifts

- $40K → $50K hike shifts $50K share: 12.9% → 51.8% (model: 51.3%)
- $100K–$300K share shifts 19.9% → 25.6%, separating γ from ψ_{mm}

A13: Tables 4–5 fit numbers

Model fit: baseline coverage shifts, monitoring take-up, and selection

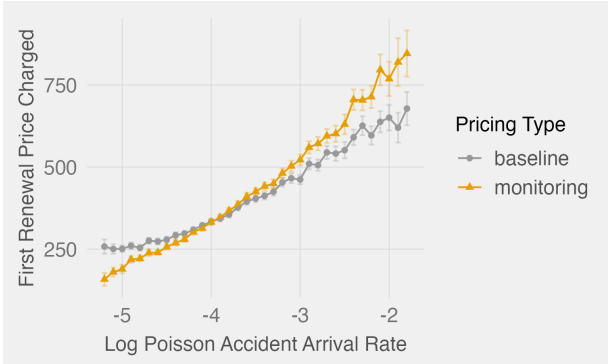


Monitoring take-up & selection

- Opt-in rise across regimes: 14.1% $\rightarrow$ 21.0% (model: 14.3% $\rightarrow$ 19.4%)
- Opt-in/opt-out claim ratio: 9.7% $\rightarrow$ 21.8% data vs. 15.1% $\rightarrow$ 23.0% model (excl. $t = 0$ MH)

A13: Tables 4–5 fit numbers

Renewal pricing fit, steeper risk rating, and advantageous selection



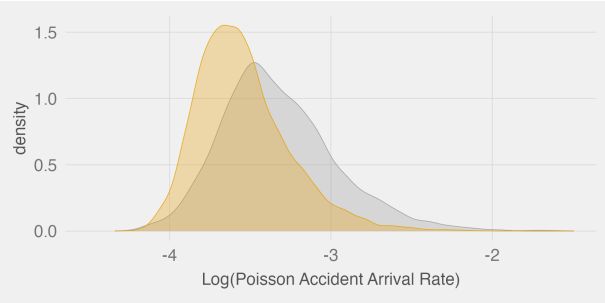
First-renewal price ($50K plan) vs. estimated log accident risk (Regime 3).

Renewal pricing & risk rating

- Steeper, more accurate risk pricing than baseline renewal pricing
- 1 of 3 monitoring regimes on top of many baseline pricing changes

A13a: regime schedules | A13b: score fit | A13c: price–risk by regime | A16: OLS vs. IV

Renewal pricing fit, steeper risk rating, and advantageous selection



Estimated risk distribution: gold = monitored, grey = unmonitored.

Private risk & selection

- Multi-period claims + score–risk covariance pin down ϵ_i^{λ}
- Monitored pool's risk distribution shifts left

A13a: regime schedules | A13b: score fit | A13c: price–risk by regime | A16: OLS vs. IV

Drivers are mildly risk averse but face large choice frictions

Parameter (Table 6)	Mean	% of prem.	Interquartile range
Risk aversion γ ($\times 10^{-5}$)	1.43	–	0.86 – 1.83
Default-plan preference ψ_{mm} (\$ / period)	36	6%	-12 – 86
Firm-switching inertia η^f (\$ / period)	333	58%	297 – 361
Monitoring disutility ξ (\$ / period)	113	20%	76 – 143

Average 6-month premium: \$578/period (§5.3). Plan-switching inertia (η^y = \$543) & random-effects specs in A10b.

A2a: opt-in UI | A12: Table 6 | A11: 2p/4p | A10b: RE & switch | A9b: shrinkage | A6: learning

Drivers are mildly risk averse but face large choice frictions

Parameter (Table 6)	Mean	% of prem.	Interquartile range
Risk aversion γ ($\times 10^{-5}$)	1.43	–	0.86 – 1.83
Default-plan preference ψ_{mm} (\$ / period)	36	6%	−12 – 86
Firm-switching inertia η^f (\$ / period)	333	58%	297 – 361
Monitoring disutility ξ (\$ / period)	113	20%	76 – 143

Average 6-month premium: \$578/period (§5.3). Plan-switching inertia (η^y = \$543) & random-effects specs in A10b.

- **Mild risk aversion:** \$7.17 for a 50-50 bet of ±\$1,000 (Cohen and Einav 2007)
- **Large adoption friction:** \$113/period required to opt in
  - Privately safer drivers suffer slightly higher monitoring disutility ($\rho = -0.22$)
- **High firm-switching inertia:** \$333/period enables ex-post information rent from proprietary data

A2a: opt-in UI | A12: Table 6 | A11: 2p/4p | A10b: RE & switch | A9b: shrinkage | A6: learning

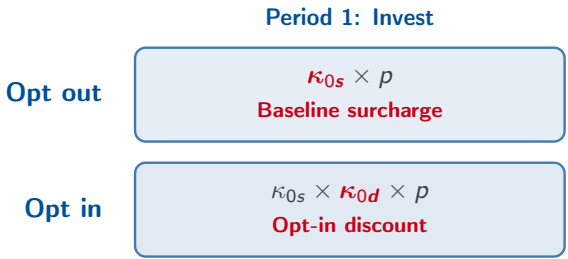
Roadmap

Background and Evidence of Efficiency Benefits

Demand Model and Estimation: Selection and Choice Frictions

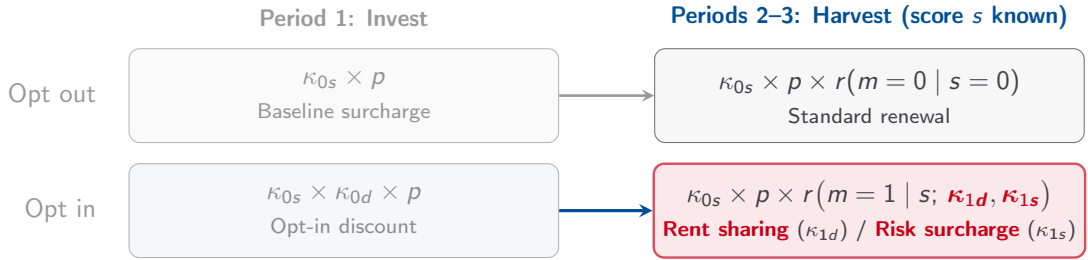
Pricing and Equilibrium: Invest-and-Harvest Dynamics and Data Portability

Supply: "invest" up front to buy data, "harvest" at renewal



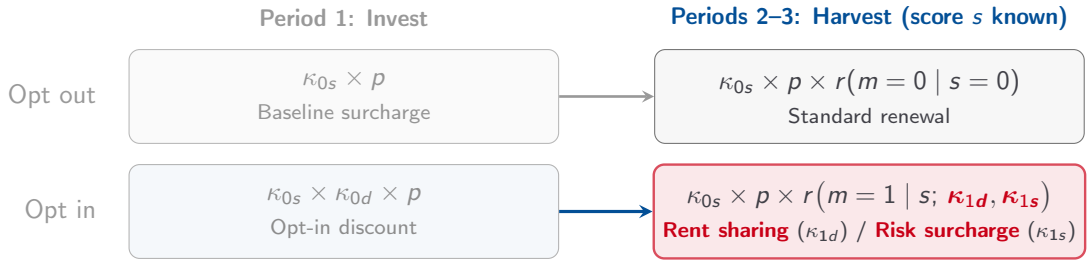
- **Firm levers:** multiplicative factors on baseline menu p and renewal schedule $r(m = 1 \mid s)$ ($1\times$ = status quo)

Supply: "invest" up front to buy data, "harvest" at renewal



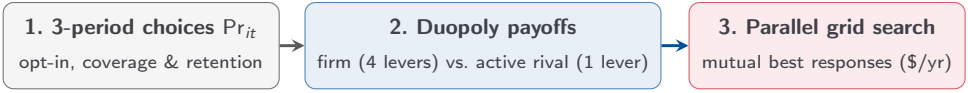
- **Firm levers:** multiplicative factors on baseline menu p and renewal schedule $r(m = 1 \mid s)$ ($1\times$ = status quo)

Supply: "invest" up front to buy data, "harvest" at renewal



- **Firm levers:** multiplicative factors on baseline menu p and renewal schedule $r(m = 1 \mid s)$ ($1\times$ = status quo): $\boldsymbol{\kappa} = \{\boldsymbol{\kappa_{0s}}, \boldsymbol{\kappa_{0d}}, \boldsymbol{\kappa_{1d}}, \boldsymbol{\kappa_{1s}}\}$
- **Competitor response:** active rival scales baseline price via $\kappa^c_{0s} \times p^c$, plus renewal levers $(\kappa^c_{1d}, \kappa^c_{1s})$ under data portability

Simulating equilibrium: duopoly game, non-concavity, and parallel grid search

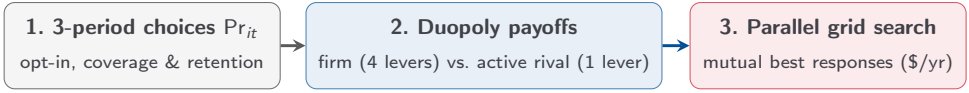


1. From 3-period choices to the duopoly game

- Aggregate 3-period choices into annualized consumer welfare and firm profit ($/yr)
- Differentiated Bertrand duopoly: firm (11.8%) vs. lowest-price rival (22.2%) + passive outside option (66.0%, brand FEs calibrated to state shares)

A11: horizons | A14: calibration & rival | A14b: algorithm & bootstrap

Simulating equilibrium: duopoly game, non-concavity, and parallel grid search



1. From 3-period choices to the duopoly game

- Aggregate 3-period choices into annualized consumer welfare and firm profit ($/yr)
- Differentiated Bertrand duopoly: firm (11.8%) vs. lowest-price rival (22.2%) + passive outside option (66.0%, brand FEs calibrated to state shares)

2. Solving the equilibrium: non-concavity & tractability

- **Why grid search:** endogenous selection makes firm profit non-concave
- **Model simplifications:** analytical shocks + compression to 1 active rival (5D/7D grid)
- **Computational:** coarse-to-fine C++ grid and parallelization

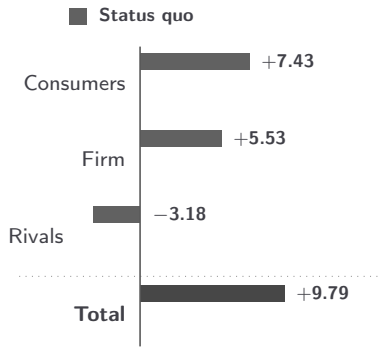
A11: horizons | A14: calibration & rival | A14b: algorithm & bootstrap

Optimal pricing doubles take-up and reshapes surplus division

Pricing levers & take-up

	SQ
Monitored share	**2.59%**
Opt-in discount	3%
Baseline price	1.00×
Rent / surcharge	1 / 1×
Rival price	1.00×

Surplus division (Δ$ / person / yr)



Status quo: tiny upfront discount + full rent sharing recruits via **advantageous selection**.

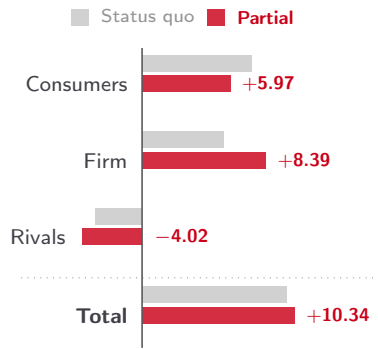
A15: launch RD | A16: renewal IV | A17: Table 7

Optimal pricing doubles take-up and reshapes surplus division

Pricing levers & take-up

	SQ	Partial
Monitored share	2.59%	**6.91%**
Opt-in discount	3%	**77%**
Baseline price	1.00×	1.09×
Rent / surcharge	1 / 1×	**0.05 / 0.58×**
Rival price	1.00×	1.00×

Surplus division (Δ$ / person / yr)



Partial (selection → data production): broad upfront subsidy, ≈0 rent sharing, <1× surcharge.

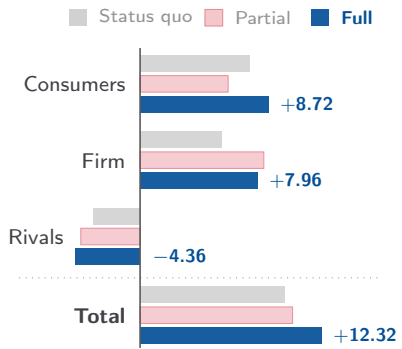
A15: launch RD | A16: renewal IV | A17: Table 7

Optimal pricing doubles take-up and reshapes surplus division

Pricing levers & take-up

	SQ	Partial	**Full**
Monitored share	2.59%	6.91%	**6.78%**
Opt-in discount	3%	77%	**76%**
Baseline price	1.00×	1.09×	1.08×
Rent / surcharge	1 / 1×	0.05 / 0.58×	**0 / 0.59×**
Rival price	1.00×	1.00×	**0.99×**

Surplus division (Δ$ / person / yr)



Full equilibrium: little competitive response (−1% rival price), leaving levers & take-up unchanged.

A15: launch RD | A16: renewal IV | A17: Table 7

Policy 1: mandated data portability

1. Mandated data portability

EU plans law to give car services groups access to vehicle data

Reuters, March 5, 2025

"Users of connected products may choose to share this data with third parties."

European Commission, EU Data Act (in force Sept. 2025)

Fixed-data benchmark (Cosconati, Xin, Wu and Jin 2026): sharing *existing* Italian insurer signals cuts premiums 21.6% (CS +15.7%)—here, data must be **bought up front**.

2. Surcharge bans / discount floors

Maryland insurance commissioner backs insurer-opposed telematics regulation bill

Repairer Driven News, March 7, 2025

"would only allow telematics data to be used by insurers if it decreases rates . . . "

SB 984 amendment; discount-only rules already apply in New York and Ontario

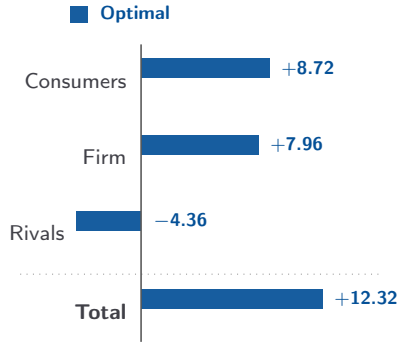
D1: ReStud benchmark

Data portability raises reclassification risk, lowering take-up and surplus

Pricing levers & take-up

	Optimal
Monitored share	**6.78%**
Firm opt-in disc.	**76%**
Firm baseline	1.08×
Firm rent / surcharge	**0 / 0.59**×
Rival rent / surcharge	–

Surplus division (Δ$ / person / yr)



Proprietary benchmark: exclusive scores + switching inertia let the firm recoup upfront data subsidies at renewal.

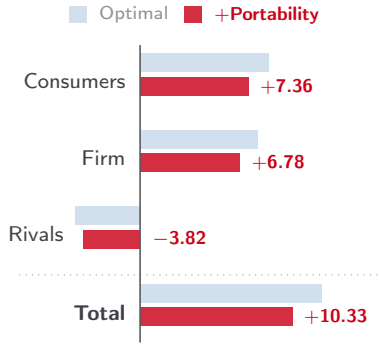
A17: Table 7 A18: robustness

Data portability raises reclassification risk, lowering take-up and surplus

Pricing levers & take-up

	Optimal	+Portability
Monitored share	6.78%	**6.09%**
Firm opt-in disc.	76%	77%
Firm baseline	1.08×	1.08×
Firm rent / surcharge	0 / 0.59×	0 / 0.57×
Rival rent / surcharge	–	**0 / 1×**

Surplus division (Δ$ / person / yr)



Unique equilibrium: Period-1 levers counter any interior poaching $\Longrightarrow$ harm runs via **reclassification risk**, not competition.

A17: Table 7 A18: robustness

Policy 2: limits on telematics surcharges and discount floors

1. Mandated data portability

EU plans law to give car services groups access to vehicle data

Reuters, March 5, 2025

"Users of connected products may choose to share this data with third parties."

European Commission, EU Data Act (in force Sept. 2025)

Fixed-data benchmark (Cosconati, Xin, Wu and Jin 2026): sharing *existing* Italian insurer signals cuts premiums 21.6% (CS +15.7%)—here, data must be bought up front.

2. Surcharge bans / discount floors

Maryland insurance commissioner backs insurer-opposed telematics regulation bill

Repairer Driven News, March 7, 2025

"would only allow telematics data to be used by insurers if it decreases rates . . . "

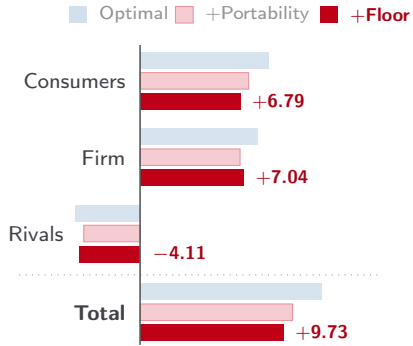
SB 984 amendment; discount-only rules already apply in New York and Ontario

Adding a discount floor cuts upfront subsidies and hurts consumers

Pricing levers & take-up

	Optimal	+Port.	**+Floor**
Monitored share	6.78%	6.09%	**6.36%**
Firm opt-in disc.	76%	77%	**70%**
Firm baseline	1.08×	1.08×	1.09×
Firm rent / surcharge	0 / 0.59×	0 / 0.57×	**1** / 0.50×
Rival rent / surcharge	–	0 / 1×	**1** / 1×

Surplus division (Δ$ / person / yr)



Mandated rent sharing: forcing ex-post discounts compels rival poaching, eroding renewal rents and choking off upfront data investment.

A17: Table 7 | A18: robustness

Conclusion: what drives the economics of monitoring?

1. **Allocative gains from risk rating are small—mostly transfers**
   - ▷ Ex-post score pricing mainly redistributes surplus across drivers
   - ▷ Frictions, reclassification risk & competition keep opt-in low (2.6%–6.8%)
2. **The 30% moral hazard reduction drives the welfare gains**
   - ▷ Social efficiency comes from accident prevention while monitored

Conclusion: what drives the economics of monitoring?

1. **Allocative gains from risk rating are small—mostly transfers**
   - ▷ Ex-post score pricing mainly redistributes surplus across drivers
   - ▷ Frictions, reclassification risk & competition keep opt-in low (2.6%–6.8%)
2. **The 30% moral hazard reduction drives the welfare gains**
   - ▷ Social efficiency comes from accident prevention while monitored

Property rights over data drive effort to elicit information

- **Upfront data investment:** exclusive renewal rights fund the 76% upfront opt-in subsidy that overcomes the $113 adoption friction (Posner 1978; Hermalin and Katz 2006)
- **Why policy rules bite:** data portability mandates and discount floors erode renewal rents and choke off upfront subsidies, lowering monitoring and consumer welfare

Appendix A0: telematics adoption sources and quotes

- **Gen 1 pilots & pre-commercial R&D trials (1998–2011; discontinuations → 0% in 2002 & 2007):**
  - **1998–2002 TX GPS pilot** (5.0% U.S. share in 2000; Wells & Danskin 2014, HBS 9-715-427, Ex. 7): *"In 1998, the company launched a pilot program in Texas... [and] shut the program down in 2002 because of privacy concerns and the high cost of GPS technology."* (p. 2; $500/car cost, Reimers & Shiller 2019, p. 6).
  - **2004–2007 USB-logger pilot** (7.4% U.S. share in 2004; Ex. 7): *"In 2004, [the firm] launched [its 2nd pilot]... without GPS"* (p. 3); discontinued in 2007.
  - **2008–2011 R&D beta trials (< 0.1% take-up):** *"[T]he program we analyze is shown [in Reimers & Shiller 2019] to have been introduced up to four years before what our proprietary data suggests... due to the various trials and R&D efforts."* (Jin & Vasserman 2026, §2.2 fn. 9; Fig. B.1a).
- **Gen 2 commercial OBD-II rollout (2012–2017):**
  - **2012–2017 insurer commercialization (**45.1% → >60% **U.S. share):** *"The program we analyze is the first to achieve large-scale commercialization in the U.S."* (§2.2 p. 8). Top 5 insurers = 45.1% U.S. share in 2012 (Reimers & Shiller 2019, Fig. I; Wells & Danskin 2014, Ex. 3); *"In 2017, insurers serving over 60% of the $267B U.S. auto insurance industry offered monitoring."* (§1 p. 2 & fn. 1, NAIC 2017).
  - **2012–2016 consumer take-up (starts 2012; < 4% U.S. in 2014; our firm** 14.6–21.1% **vs. rivals** < 1–6%**):** *"[T]he highest opt-in rate achieved by a competing program was* < 1% *in 2012 and* < 6% *in 2016. In contrast, the finish rate... was already around 15% for our monitoring program in 2012"* (§2.2 fn. 8, Table 5); U.S. market share *"under 4% in 2014"* (Ptolemus 2016; §2.2 p. 8).
- **Gen 3 smartphone apps (late 2010s–2024):**
  - **2024 insurer offering (→** 100% **via 3rd-party vendors) vs. driver enrollment (**12–22%**):** *"Most major insurers have since adopted continuous [smartphone] monitoring models"* enabled by turnkey third-party telematics vendors (§2.2 p. 9); *"As of 2024, industry estimates suggest that 12–22% of U.S. drivers are enrolled in a telematics program (J.D. Power, 2025; AutoInsurance.com, 2024; Ben-Shahar, 2023)."* (§7 p. 31, fn. 28).

Appendix A1: data and summary statistics

All 23 states, per six-month period

	Mean
Total premium ($)	658
Liability premium ($)	398
Risk class: fair premium ($)	270
Liability claims per period	0.04
Liability coverage limit ($000)	113
At mandatory minimum (%)	43

About one liability claim per eleven years.

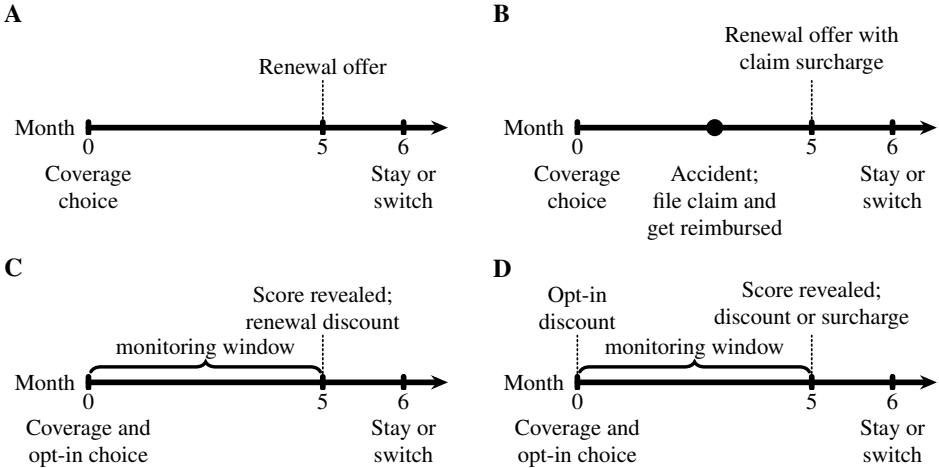
Focal state: average quote, $50K plan

	Quote ($)
Monitoring firm	327
Competitor 1 (median price)	351
Competitor 2 (lowest price)	281

55,302 consumers; 7.5 million quotes. Competitors 1–2 are the outside options in the model.

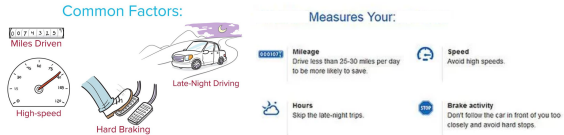
↩ Back

Appendix A2: monitoring regimes, with and without surcharges



A: contract. B: accident. C: monitoring regimes 1–2 (renewal discount only). D: regime 3 (opt-in discount; renewal discount or surcharge).

Appendix A2a: what customers see at opt-in and disclosed factors



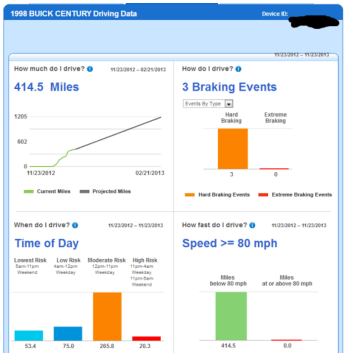
What we use to calculate your monitoring result

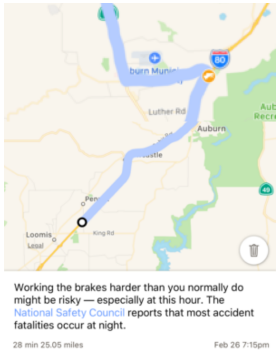
- Hard braking—Hard brakes are decreases in speed of seven mph per second or greater. Minimize hard braking to work toward a discount.
- Amount of time driven—The number of minutes that your engine is running during a trip. To earn a discount, try to minimize your time behind the wheel by combining trips, carpooling or using public transportation.
- Time and day—The number of minutes you spend driving during higher risk hours—the highest risk are between midnight and 4 a.m. on the weekends.
- Fast starts— Fast starts are increases in speed of nine mph per second or greater. Also known as "jackrabbit starts" or just "putting the pedal to the metal." Use a lighter foot on the gas pedal to work toward a discount.

- **Upfront offer at quote time:** one-time **opt-in discount** (0–10%, avg. 4%) in Period 0
- **Disclosed scoring inputs:** mileage, hard braking (> 7 mph/s), speed, and peak-risk hours (midnight–4am)
- **Terms & conditions:** device mailed after purchase; 100–150 days of tracking determines the persistent **monitoring discount** (30% discount to -10% surcharge in Regime 3)
- **Demand friction ($\xi = \$113$):** captures privacy cost, installation hassle, and anxiety beyond expected financial return

↩ Timeline ↩ Choice ↩ Estimates

Appendix A2b: real-time feedback dashboard and mobile trip summary

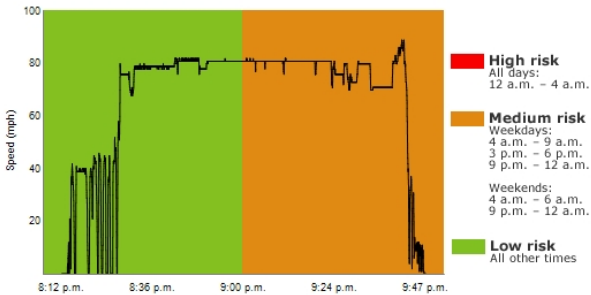




- **Audible in-car beeps:** device beeps immediately upon hard braking (> 7 mph/s)
- **Online & mobile dashboard:** trip-by-trip summaries of miles, hard brakes, high-risk hours, and projected renewal discount
- **Salience during Period 0:** continuous feedback keeps the financial incentive salient while monitored, driving the **30% moral hazard reduction**

⟵ Back

Appendix A2c: OBD-II sensor data and behavioral event construction



- **Second-by-second OBD-II speed trace:** records vehicle speed, timestamp, and ignition on/off (no GPS location)
- **Constructed risk events:**
  - **Hard brake:** deceleration ≥ 7 mph/sec
  - **High speed:** time spent > 80 mph
  - **Night driving:** medium/high-risk late-night hours (12am–4am)
  - **Mileage:** integrated speed over trip duration

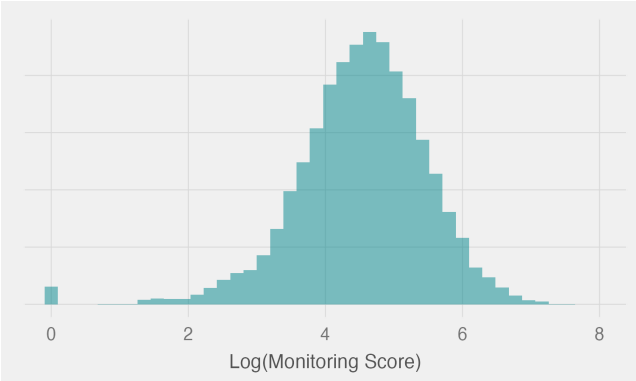
↩ Back

Appendix A2d: monitoring eligibility, take-up, and completion

- **Eligibility (**85.4% **of sample):** requires arrival after state monitoring launch and all insured vehicles model year $\geq$ 1995 (OBD-II standard mandate)
- **Starter rate (**17%**):** share of eligible new customers who opt into monitoring at Month 0
- **Completion rate (**73% **of starters;** 12% **overall):** finish the 100–150 day window and receive a monitoring score; the 27% non-finishers lose the opt-in discount and are treated as unmonitored ($m = 0$) in main specifications (with continuous duration $z_i \in [0, 1]$ in Table 2 Col. 7 and the structural cost model)

↩ Back

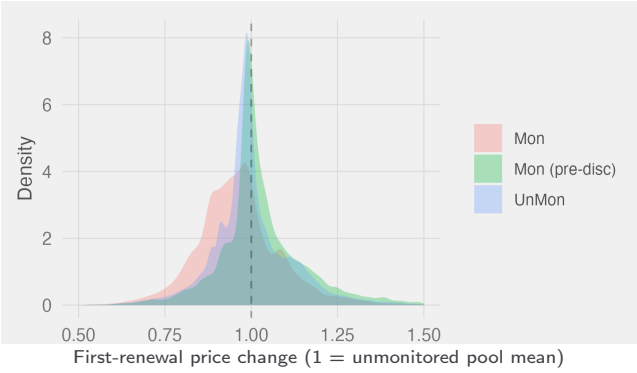
Appendix A3: monitored drivers get an extra 7% discount at renewal



- Log monitoring score among finishers; lower is better

Back

Appendix A3: monitored drivers get an extra 7% discount at renewal



- Log monitoring score among finishers; lower is better
- First-renewal price change relative to the unmonitored average: monitored drivers (Mon) get an extra 7% discount on average

↩ Back

Appendix A4: moral hazard effect, difference-in-differences

$$C_{it} = \alpha + \tau m_i + \omega 1_{post,t} + \theta_{mh}\, m_i \cdot 1_{post,t} + \mathrm{x}'_{it}\beta + \mathrm{y}'_{it}\psi + \epsilon_{it}$$

C: claim count; m: finished monitoring (col. 7: any monitoring, with intensity z); x: pricing observables; y: coverage fixed effects. Balanced panel over the first three periods (Figure 4 on the main slide uses the full unbalanced panel).

	(3) main	(4) driver FE	(7) duration	(9) placebo: later periods	(10)	(11)
$1_{post} \times m$	0.007***	0.008***	−0.004**	−0.000	0.000	−0.000
	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)
$1_{post} \times z$			0.015***			
			(0.002)			
Implied effect	29.97%		33.08%	−1.68%	1.90%	−1.46%
Periods compared	0 / 1–2	0 / 1–2	0 / 1–2	1 / 2	2 / 3	3 / 4

Final Table 2. Col. (3) adjusts the 21.93% raw increase for the 131-day average monitoring duration. Col. (7): all monitored drivers; z = share of days monitored in period 0 minus the share in later periods; 33.08% sets $z = 1$ and adds the two interactions.

↩ Back

Appendix A5: the risk gap is larger than the moral hazard effect

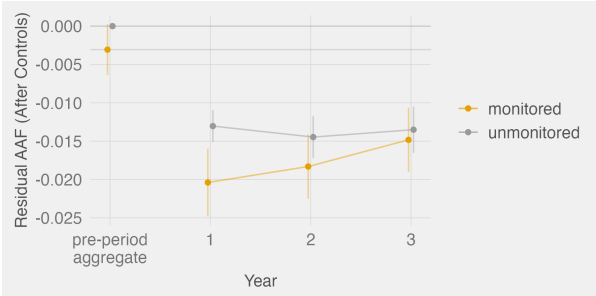
First-period claim count	(1)	(2)	(3)
Monitoring indicator (m)	-0.016^{***}	-0.013^{***}	-0.012^{***}
	(0.001)	(0.001)	(0.001)
Gap relative to mean	-36.03%	-29.58%	-27.16%
Pricing observables	No	Yes	Yes
Coverage fixed effects	No	No	Yes

Final Table 3; $N = 898{,}925$; monitoring finishers vs. others.

- The moral hazard effect accounts for only **61%** of this first-period gap
- The rest is private information about risk: **advantageous selection** into monitoring

↩ Back

Appendix A6: testing for learning via public violation records



Public-record at-fault accidents (LexisNexis) across monitoring groups (Figure C.4).

1. Learning check (LexisNexis records)

- **Pre-period (−8.7%):** monitored drivers already have 8.7% fewer at-fault accidents before joining $\Longrightarrow$ **advantageous selection**
- **During & after monitoring:** gap widens to −38.8% in Year 1 (moral hazard), then fades to −21.9% (Year 2) and −7.4% (Year 3, back to pre-period gap) $\Longrightarrow$ **negligible persistent learning**

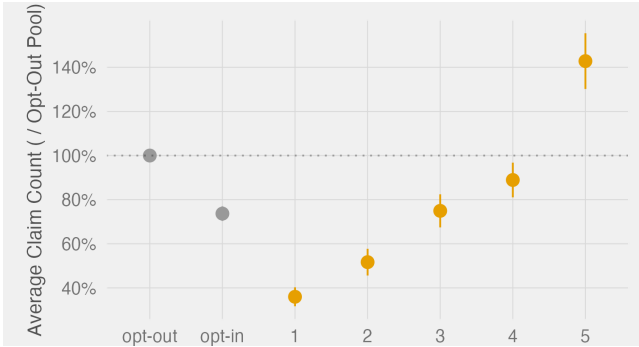
2. Moral hazard heterogeneity

- Little heterogeneity across age, income, or tenure; slightly larger in higher risk classes (Figures C.2–C.3)

Online Appendix C.2–C.3 (Figures C.2–C.4). Pre-period aggregates 1–5 years of prior LexisNexis records; Years 1–3 track policy periods 1, 3, and 5.

↩ Claims ↩ Estimates

Appendix A7: monitoring scores strongly predict future claims

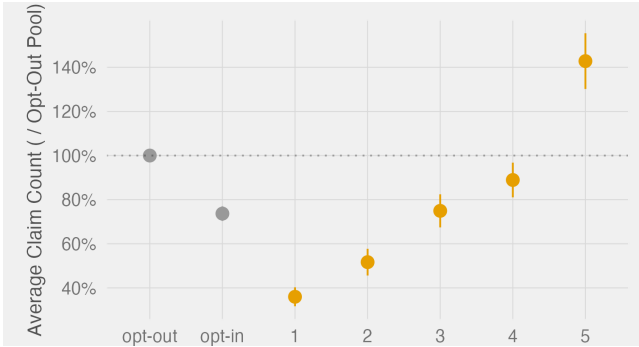


Claims in the period after monitoring ends, relative to the opt-out pool (=100%); groups 1–5 are score quintiles; 95% CIs.

- Drivers who finish monitoring: **26% fewer claims** after it ends
- Best to worst score quintile: 36% to 143% of the opt-out claim rate

A8: persistence ⟷ Back

Appendix A7: monitoring scores strongly predict future claims

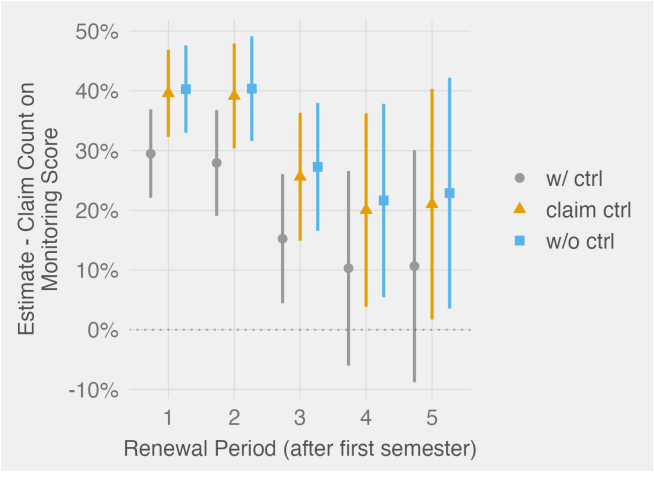


Claims in the period after monitoring ends, relative to the opt-out pool (=100%); groups 1–5 are score quintiles; 95% CIs.

- Drivers who finish monitoring: **26% fewer claims** after it ends
- Best to worst score quintile: 36% to 143% of the opt-out claim rate
- A score 1 s.d. above the mean: **29% more claims** next period, holding observables fixed

A8: persistence ⟷ Back

Appendix A8: the score keeps predicting claims for several periods



Final online Figure A.6: effect of a 1 s.d. higher score on claims in renewal periods 1–5, as % of monitored drivers' mean; three control sets; 95% CIs.

↩ Back

Appendix A9: why a structural model

1. Monitoring affects welfare through interacting channels: lower risk, more coverage, and **reclassification risk**; weighing them needs risk preferences

2. Consumers make three linked choices (coverage, opt-in, renewal), correlated with risk; together they set the degree of asymmetric information

3. Monitoring prices are dynamic, multidimensional, and regulated; counterfactuals need the firm's pricing levers

↩ Back

Appendix A9a: major vs. minor claims and severity estimation

$$A_{g,it} \sim \text{Poisson}(\lambda_{g,it}),\ g \in \{1\ (\text{minor}\ <\$30\text{K}), 2\ (\text{major}\ \geq\$30\text{K})\},\quad \ell_{1,it} \sim \text{LogNormal}(\mu_{\ell,it}, \sigma_\ell),\ \ell_2 \sim \text{Pareto}(\ell_0, \alpha_\ell)$$

Separate arrival & severity specification

- **Why split minor vs. major at \$30K:** out-of-pocket exposure $e_{it}(d) = \max\{\ell - y_d, 0\}$ only binds on major claims exceeding the \$40K–\$300K coverage limits
- **Shared private risk ϵ_i^λ:** enters both minor and major log arrival rates $(\log \lambda_{g,it} = \hat{\lambda}_{g,it} + (m\theta_0^{mh} + z\theta_1^{mh})1_{t=0} + \epsilon_i^\lambda)$, where $\hat{\lambda}_{g,it}$ is a GLM on 28 covariates X_{it}

Step-1 severity & arrival fit (Table 4 / App. B.4)

Moment	Data	Model
Total claims per period (mean)	0.039	0.039
Major claims $\geq$ \$30K (mean)	0.004	0.004
Pareto tail index α_ℓ (major)	–	2.41
Expected insurer cost (\$/period)	205.2	205.2

Analytical 2nd-order Taylor expansion integrates over Pareto tail risk for each limit y_d in closed form.

↩ Back

Appendix A9b: guarding against overfitting private risk ϵ_i^λ

Core econometric challenge: Claims are rare ($\bar{C} = 0.039$/period, $\sim$ 1 per 11 years), so estimating unconstrained individual fixed effects ϵ_i^λ would severely overfit realizations and exaggerate private information.

1. **Empirical Bayes hierarchical shrinkage prior:** model $\epsilon_i^\lambda \sim N(\mu_\lambda, \sigma_\lambda^2)$ as a single random effect with common variance $\sigma_\lambda \approx 0.25$ across drivers (`ll_choice_panel.stan`), shrinking noisy individual claim histories toward 0

2. **Two-step estimation + 28-covariate GLM base rate $\hat{\lambda}(X_{it})$:** Step 1 pins down public risk $\hat{\lambda}_{g,it}(X_{it})$, moral hazard $(\theta_0^{mh}, \theta_1^{mh})$, and severity on the full panel ($N = 55{,}302 \times T_i$) before Step 2 estimates $(\sigma_\lambda, \theta^s)$ jointly with choices

3. **Joint signal extraction from multi-period claims *and* continuous score s_i:** ϵ_i^λ must jointly rationalize $t = 0..T_i$ claims, continuous score s_i, coverage choice, and opt-in integrated via 6-node Gauss-Hermite quadrature

4. **Penalized MLE + out-of-sample cross-validation:** regularize variance parameters and verify that likelihood and choice/claim moments hold out-of-sample on holdout samples

↩ Model ↩ Estimates

Appendix A10: full renewal pricing model

1. Renewal price menu evolution (§4, Eq. 2): at monitoring firm f^0 vs. competitors $f_d \neq f^0$

$$p_{t+1}(d \mid \tilde{x}_t, A_t, s, \nu_t) = \begin{cases} p_t(f^0, y_d \mid \tilde{x}) \cdot \underbrace{(1+r_c)^{1\{A_t>0\}}}_{\text{public claim surcharge}} \cdot \underbrace{r_t(m_d \mid \tilde{x}, s, \nu_t)}_{\text{renewal factor}} & \text{if } f_d = f^0 \\ p_0(f_d, y_d \mid \tilde{x}) \cdot (1+r_c)^{1\{A_t>0\}} & \text{if } f_d \neq f^0 \end{cases}$$

2. Renewal factor specification (§4.1, Eq. 8): $\nu_{it} \sim N(0,1)$

$$r_t(m \mid x_{it}, s_i, \nu_{it}) = \begin{cases} \theta_0^{r0} + \theta_1^{r0}\, RC_{it} + \sigma^{r0}\, \nu_{it} & \text{if } t=0,\ m=0 \text{ (1st renewal, unmonitored)} \\ \theta_0^{r1} + \theta_1^{r1}\, RC_{it} + \theta_2^{r1}\, s_i + \sigma^{r1}\, \nu_{it} & \text{if } t=0,\ m=1 \text{ (1st renewal, monitored)} \\ \theta_0^{r} + \theta_1^{r}\, RC_{it} + \sigma^{r}\, \nu_{it} & \text{if } t>0 \text{ (subsequent renewals)} \end{cases}$$

- RC_{it}: actuarial risk-class fair premium (data); s_i: monitoring score; $(1+r_c)$: public LexisNexis claim surcharge
- Multiplicative structure carries the $t=0$ monitoring discount/surcharge forward into $t \geq 1$
- Estimated by OLS on realized menus: 30 parameters across 3 baseline pricing × 3 monitoring regimes

↩ Model ↩ Choice

Appendix A10b: plan-switching inertia (η^y) and random-effects specs

Plan-switching inertia η^y ($543 / period; IQR $528–$557)

- **Where it enters:** paid when a continuing customer changes coverage limit $y_{it} \neq y_{i,t-1}$ at renewal ($t \geq 1$)
- **Identification:** pinned down by extreme persistence of coverage limits at renewal ($> 97\%$ stay in their chosen tier) even when relative limit prices shift across pricing regimes
- **Mandate hike exception:** customers forced out of the eliminated $40K tier when the statutory minimum rises to $50K do not pay η^y to move to the new $50K minimum

Observable heterogeneity X_{it} & random effects

- **All preferences & frictions vary with X_{it}:** $\gamma_{it}, \psi_{\text{mm},it}, \eta^f_{it}, \eta^y_{it}, \xi_{it}$ are functions of 28 driver/vehicle observables X_{it} (producing ex-post correlations with risk in Table 6)
- **Unobserved random effects:** persistent unobserved individual heterogeneity enters via ϵ^λ_i; adding driver random effects to γ_{it} or frictions risks overfitting persistent plan choices and adds out-of-sample noise

Final Table 6 and Online Appendix Table A.5 (full covariate loadings).

↩ Choice ↩ Estimates

Appendix A11: estimates and counterfactuals under each planning horizon

Planning horizon (periods)	2	**3 (baseline)**	4
Parameter means, $ per period unless noted			
Risk aversion ($\times 10^{-5}$)	4.46	**1.43**	8.52
Default-plan preference	65	**36**	20
Plan-switching inertia	716	**543**	546
Firm-switching inertia	568	**333**	329
Monitoring disutility	84	**113**	215
Optimal equilibrium pricing & consumer welfare ($\Delta$$ / capita / yr vs. no monitoring)			
Opt-in discount, optimal (%)	10	**76**	100
Monitored share, optimal (%)	3.77	**6.78**	7.07
Optimal pricing (full)	+5.56	**+8.72**	+7.53
+ data portability	+5.51	**+7.36**	−0.69
+ discount floor	+5.32	**+6.79**	−1.80

- Longer horizon $\Longrightarrow$ more renewals to harvest, raising optimal upfront subsidies (10% $\rightarrow$ 76% $\rightarrow$ 100%) and take-up
- Under every horizon, portability and the floor reduce consumer welfare relative to optimal pricing

Final Tables 6–7 and Online Appendix Tables A.7–A.8, A.11–A.12.

↩ Choice ↩ Supply

Appendix A12: parameter distributions

	Mean	Q25	Q50	Q75	Q95	Corr. with private risk
Claim rate ($\times 10^{-2}$)	3.94	1.34	2.38	4.52	11.30	0.45
Private risk component	0.08	−0.19	0.10	0.41	0.98	1.00
Expected cost to insurer ($)	205.23	69.71	125.02	236.87	595.48	0.45
Risk aversion ($\times 10^{-5}$)	1.43	0.86	1.28	1.83	3.02	−0.10
Default-plan preference ($)	36.11	−12.25	27.38	85.86	136.12	0.02
Plan-switching inertia ($)	542.77	527.57	541.65	556.58	582.23	−0.07
Firm-switching inertia ($)	332.83	296.98	325.79	361.39	430.40	0.10
Monitoring disutility ($)	112.56	76.06	106.68	142.76	208.76	−0.22

Final Table 6. Per six-month period. Bootstrap standard errors in the paper.

⟷ Back

Appendix A13: full model fit—risk, scores, pricing, and choices

Table 4: Risk, score & renewal pricing

Moment	Data	Model
Claims & monitoring score		
Poisson claims (mean)	0.039	0.039
Major claims (mean)	0.004	0.004
Monitoring score (mean)	4.301	4.322
Score–risk covariance	0.154	0.142
Renewal pricing factors		
1st renewal (mean)	1.129	1.126
1st renewal–risk cov.	0.044	0.041
Later renewals (mean)	0.999	1.002
Later renewal–risk cov.	0.034	0.036

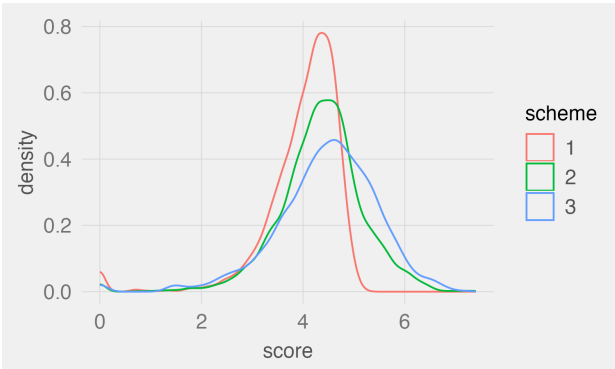
Table 5: Choice shares & selection (%)

	Pre-Mtr		Post-Mtr		+$50K Min	
	Data	Pred	Data	Pred	Data	Pred
$40K share	46.9	45.3	45.2	47.3	–	–
$50K share	14.2	19.6	12.9	19.3	51.8	51.3
$100K share	17.3	15.6	19.9	15.7	25.6	23.7
$150K share	18.3	12.3	18.0	11.4	19.7	16.3
$300K share	3.3	7.1	3.9	6.3	3.0	8.7
Opt-in share	–	–	14.1	14.3	21.0	19.4
Opt-in selection	–	–	9.7	15.1	21.8	23.0
Renewal attr.	–	–	14.9	15.5	12.7	12.5

Final Tables 4–5 (focal state; $N = 55{,}302$ consumers). Renewal attrition cols. compare pre- vs. post-$50K mandatory minimum increase.

⟵ Back

Appendix A13a: score distributions and renewal schedules by regime

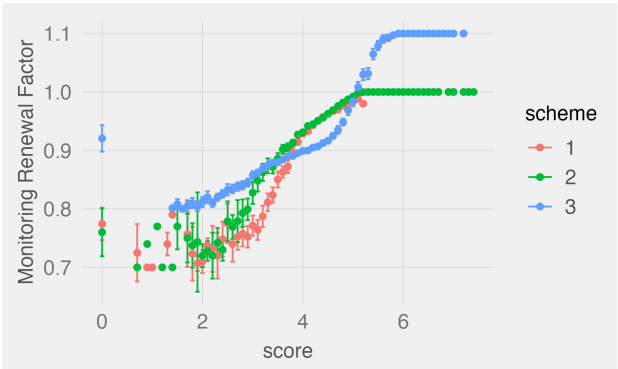


- **Score distributions** across monitoring Regimes 1–3 (lower score = safer driving)

Online Appendix Figure B.2: empirical monitoring score density (click 1) and first-renewal factor schedule (click 2) across Regimes 1–3.

↩ Model ↩ Regimes

Appendix A13a: score distributions and renewal schedules by regime



- **Score distributions** across monitoring Regimes 1–3 (lower score = safer driving)
- **Renewal pricing factor vs. score:** Regimes 1–2 cap factors at 1.0 (discount-only), whereas Regime 3 surcharges high-risk scores up to 1.10×

Online Appendix Figure B.2: empirical monitoring score density (click 1) and first-renewal factor schedule (click 2) across Regimes 1–3.

↩ Model ↩ Regimes

Appendix A13b: monitoring score vs. risk fit across regimes



Online Appendix Figure B.3: actual data (left) vs. model-predicted (right) monitoring score against log accident risk across Monitoring Regimes 1–3.

⟷ Back

Appendix A13c: renewal price vs. risk across regimes



Online Appendix Figure B.4: first-renewal price ($50K plan) vs. log accident risk across Baseline Pricing Regimes 1–3 × Monitoring Regimes 1–3 (bottom-right = Figure 6a).

⟷ Back

Appendix A14: calibration, focal state, and rival monitoring

Calibration & equilibrium

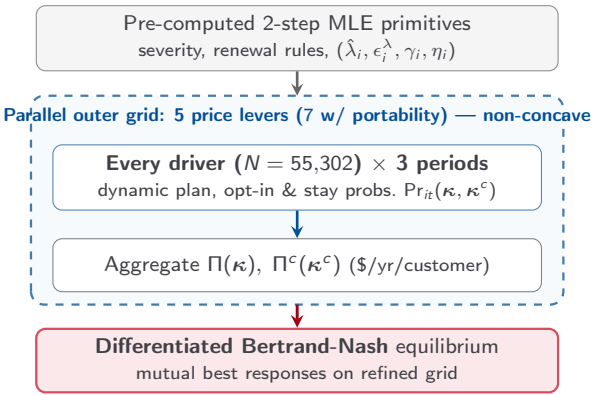
- **Three-firm market:** monitoring firm (11.8%), lowest-price rival (22.2%), passive residual rival (66.0%, median-price menu)
- **Brand effects:** \$0, \$118, \$640, matching aggregate market shares
- **Loading costs:** \$84, \$25, \$209 / period (baseline prices = mutual best responses without monitoring); \$35 monitoring cost
- **Equilibrium & welfare:** 3-period grid search (firm-profit-maximizing selection); certainty-equivalent $\Delta\$$ / capita / yr

Focal state & competing monitoring

- **Why one Midwestern focal state:** (i) keeps 3-period equilibrium grid search tractable (55,302 drivers), (ii) mid-window \$40K $\rightarrow$ \$50K mandatory minimum increase, (iii) best rate-filing price match
- **Why lowest-price rival is active:** closest to our firm in channel composition (22.2% vs. 11.8%) and \$50K quote (\$281 vs. \$327), and first rival to launch monitoring at window's end
- **Rival pilots (2012–2016):** mainly agency-driven insurers; $< 1\%$ opt-in in 2012, $< 6\%$ in 2016; U.S. telematics share $< 4\%$ in 2014 (Ptolemus 2016)

⟵ Back

Appendix A14b: computation algorithm, parallelization, and inference

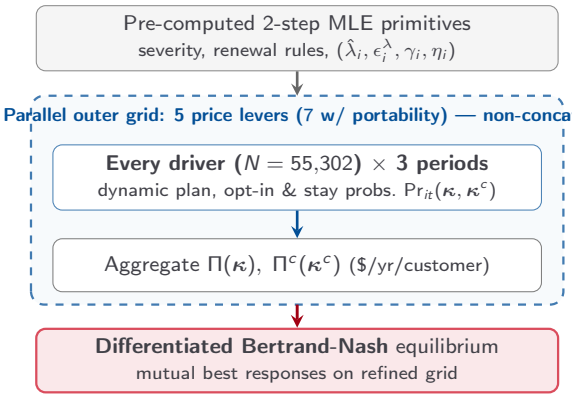


Curse of dimensionality

- Evaluate 55,302 forward-looking drivers over 3 periods at *every* 5D (7D) price vector
- Endogenous selection makes firm payoffs **non-concave** $\Longrightarrow$ requires grid search

↩ Back

Appendix A14b: computation algorithm, parallelization, and inference



Curse of dimensionality

- Evaluate 55,302 forward-looking drivers over 3 periods at *every* 5D (7D) price vector
- Endogenous selection makes firm payoffs **non-concave** $\Longrightarrow$ requires grid search

What keeps it tractable

- **Model simplifications:** analytical shocks (2nd-order Taylor utility + closed-form renewal moments) and compression to **1 active rival** (5D/7D grid)
- **Computational: coarse-to-fine C++ grid** (Δ: $0.05 \rightarrow 0.01$) and **parallelization** across candidate price vectors
- **Inference:** 100-draw joint Bayesian bootstrap (Dirichlet weights across full 2-step pipeline)

↩ Back

Appendix A15: baseline prices did not rise when monitoring launched



Final online Figure B.1(b): change in trend of unmonitored drivers' first-period premium and claims after launch (regression discontinuity in arrival quarter, staggered by state); 95% CIs.

Back

Appendix A16: safe monitored drivers are less price sensitive at renewal



- Drivers who earned a discount are **less** price sensitive than unmonitored drivers; those without one are **more** $\Longrightarrow$ informational rent extraction
- OLS (algorithmic pricing conditional on rich rating observables) matches 30-day rate-revision event-study IV, avoiding noisy/weak price IVs

Final Figure 5: IV uses arrival just after a state rate revision within 30-day windows.

Appendix A17: all counterfactual scenarios

	No monitoring	Status quo	Counterfactual equilibria			
			Partial	Full	+Data port.	+Disc. floor
Consumer welfare (Δ$)	–	+7.43	+5.97	+8.72	+7.36	+6.79
Firm profit ($)	30.04	35.57	38.43	38.00	36.82	37.08
Competitor profit ($)	71.66	68.48	67.64	67.30	67.84	67.55
Total surplus (Δ$)	–	+9.79	+10.34	+12.32	+10.33	+9.73
Coverage ($000)	108.53	108.62	108.66	108.88	108.70	108.67
Firm share, first period (%)	10.24	11.85	12.84	12.85	12.39	12.36
Monitoring share (%)	0.00	2.59	6.91	6.78	6.09	6.36
Baseline factor $\kappa_{\mathbf{0}s}$	1.00	1.00	1.09	1.08	1.08	1.09
Opt-in factor $\kappa_{\mathbf{0}d}$	–	0.97	0.23	0.24	0.23	0.30
Risk surcharge $\kappa_{\mathbf{1}s}$	–	1.00	0.58	0.59	0.57	0.50
Rent sharing $\kappa_{\mathbf{1}d}$	–	1.00	0.05	0.00	0.00	1.00
Rival baseline $\kappa^c_{\mathbf{0}s}$	1.00	1.00	1.00	0.99	0.99	0.99
Rival surcharge $\kappa^c_{\mathbf{1}s}$	–	–	–	–	1.00	1.00
Rival rent sharing $\kappa^c_{\mathbf{1}d}$	–	–	–	–	0.00	1.00

Final Table 7. Per capita per year; Δ relative to no monitoring. Portability: both firms see the score; surcharge ≤ 1.00 and rent sharing ≥ 0. Discount floor: portability plus rent sharing ≥ 1.00.

↩ Back

Appendix A18: counterfactual results are robust

- **Monitoring cost** 50% higher or lower than \$35: qualitatively similar
- **Horizon** of 2 or 4 periods: same conclusions; smaller consumer gains in both
- **Looser price limits** ($\pm$200%): very stable; the rival still does not poach under portability
- **Market structure**: firm vs. lowest- and median-price rivals only (27% share): same pattern, larger effects
- **Dominant rival** (66% share) as the focal competitor: less up-front discount, more rent sharing, lower opt-in

Final s6.4 and online appendix robustness tables.

⟵ Back