Dynamic Competition when Consumers Have Inertia: Evidence from Medicare Part D

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Motivation
Dynamic Competition with Consumer Inertia

- *Inertia* has been documented in several markets, e.g. banking, telecommunications, beverages, insurance and health care.
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- With consumer inertia, firms could implement *dynamic pricing*:
  - **Investment phase**: first, low prices to build a large market share
  - **Harvesting phase**: then, increasing prices to exploit consumers

Equilibrium welfare implications of dynamic pricing regulations are not well understood:
- Prices might go down (positive for consumers)
- Entry might go down too (harming consumers)
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- Part D is a federal government program that subsidizes prescription drug insurance premiums for Medicare beneficiaries
  - Economically relevant: 37 million individuals and $50 billion
  - Example of decentralized solutions for healthcare markets
  - Medicare Part D offers a particularly good setting
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  - Economically relevant: 37 million individuals and $50 billion
  - Example of decentralized solutions for healthcare markets
  - Medicare Part D offers a particularly good setting
- Recent literature has found evidence consistent with plans exploiting inertia in Medicare Part D
  - discussion about price regulations
  - mostly focused on the static effects of inertia
  - little about dynamic equilibrium effects
Motivation

Dynamic Competition

- Concerns about these strategies in health care markets arise also in public media:

The New York Times

PUBLIC HEALTH

Updated: Why Shopping Is So Important in Health Enrollment

Many people who bought the most popular health insurance plans in 2014 will pay substantially higher monthly premiums next year if they renew. But cheaper plans are available in most areas for those willing to shop.
Paper in a Nutshell

- **Research Question:** How would policies that limit dynamic pricing affect entry, exit and welfare in Medicare Part D?

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**Contribution:** I document the presence and analyze the welfare impacts of dynamic competition in Medicare Part D allowing for endogenous entry and exit.

**Approach:** I develop a dynamic model of demand and supply.

- **Demand:** Myopic and heterogeneous consumers with inertia
- **Supply:** Endogenous entry and exit with dynamic pricing decisions

**Results:** Counterfactuals where I assess entry, exit and welfare when dynamic pricing is not allowed (fixed markups), finding:

- Overall, policy would be welfare increasing (3.1% increase)
- Result of two opposing mechanisms: lower premiums but less entry
- Results very sensitive to size of inertia (gains would be 9.4% without inertia)
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Contribution to Literature

- Dynamic competition with consumer inertia:
  - “Investing-then-harvesting” (Klemperer, 1987, 1995; Farrell and Klemperer, 2007)
  - Size of the switching costs (Dubé et al., 2006; Arie and Greco, 2014; Ruiz, 2016) and entry and exit (Fabra and García, 2015)
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- Choice frictions are well-documented in health care markets and Medicare Part D:
  - Inconsistency and learning (Abaluck and Gruber, 2011, 2013; Ketcham et al., 2012; Heiss et al., 2013)
  - Inertia, inattention and lock-in (Nosal, 2012; Handel, 2013; Polyakova, 2015; Ho et al., 2015; Fleitas, 2016)
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  - Inertia, inattention and lock-in (Nosal, 2012; Handel, 2013; Polyakova, 2015; Ho et al., 2015; Fleitas, 2016)

- Supply-side of Medicare and Part D:
  - Subsidy design (Decarolis, 2015; Decarolis et al., 2015)
  - Responses to inertia (Ericson, 2014; Ho et al., 2015)
  - Dynamic pricing with exogenous entry (Miller, 2014; Wu, 2016)
Medicare Part D
Enrollees, Plan Design and Subsidies

- **Enrollees**
  - Two types of private insurance plans: Prescription Drug Plans (PDP) and Medicare Advantage plans (MA-PD)
  - Two types of beneficiaries: “regular” and LIS beneficiaries.
Medicare Part D
Enrollees, Plan Design and Subsidies

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- **Plan design**
  - The program creates incentives to reduce adverse selection:
    - financially favorable for most seniors (McFadden et al., 2006)
    - fee for delay in enrollment and risk correction
  - Standard Defined Benefit (SDB) plans and “enhanced” plans
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- **Subsidies**
  - For regular beneficiaries all insurers submit bids for each plan they are offering covering an average risk beneficiary.
    - Subsidy: 75% of bid plus adjustments for the risk scores of enrollees
    - Premium: 25% of bid plus enhanced benefits (if offered)
Data

Data and Summary Statistics

- Detailed data at the plan level for the 34 geographic markets defined in Medicare Part D (PDPs segment).
  - Plan characteristics and enrollment by “regular” and LIS enrollees.
  - Crosswalk files to link the plans across years (exit by mergers or other causes).
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  - Plan characteristics and enrollment by “regular” and LIS enrollees.
  - Crosswalk files to link the plans across years (exit by mergers or other causes)
- Summary Statistics:
  - about 40 firms with 30 plans competing in each market
  - stability of premiums for SDB plans over time
  - firms specialized in one plan per market
  - stable product differentiation over time
Descriptive Statistics
Entry, Exit and Number of Plans

Figure: Demography of Plans by Year

(a) Number of Plans by Year
(b) Entry and Exit of Plans by Year

- Other entry patterns:
  - plans enter or exit the market one at a time
Descriptive Statistics

Competition and Firms

Figure: Variation in Market Share by Firm and Market

(a) Premiums and Number of Firms (2009)  (b) Market Share by Firm/Market (2009)

Takeaways:

- Large effect of firm-level competition on premiums
- Observed variation in market share at firm level
## Reduced-Form Evidence

### Premiums, Lagged Market Shares and New Plans

**Table:** Reduced-form evidence of bidding behavior

<table>
<thead>
<tr>
<th></th>
<th>(1) Bids</th>
<th>(2) Bids</th>
<th>(3) Bids</th>
<th>(4) Bids</th>
</tr>
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<tbody>
<tr>
<td>Lagged Firm Market Share</td>
<td>146.36**</td>
<td>258.25***</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(61.83)</td>
<td>(70.78)</td>
<td></td>
<td></td>
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<tr>
<td>New Plan in the Market</td>
<td></td>
<td></td>
<td>-62.68***</td>
<td>-42.22***</td>
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<td></td>
<td></td>
<td></td>
<td>(3.53)</td>
<td>(3.46)</td>
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<td>Yes</td>
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<td>Plan FE</td>
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<td>No</td>
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<td>Yes</td>
<td>No</td>
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<td>Yes</td>
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<tr>
<td>Region FE</td>
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<td>Observations</td>
<td>8866</td>
<td>8866</td>
<td>8866</td>
<td>8866</td>
</tr>
</tbody>
</table>

- **Takeaways:**
  - Lagged market share increases bids (and premiums)
  - New plans have lower bids (and premiums)
Reduced-Form Evidence

Entry Behavior

**Figure**: Bidding behavior over time for entrants

- **Takeaway**: New plans increase bids (and premiums) over time
Model
Timing and State Variables

- Timing of the model:
  - Plans are endowed with characteristics and simultaneously:
    - Incumbent plans: stay or leave (draw of scrap value) and prices if they stay (draw of marginal cost).
    - Potential entrant plans: enter or not (draw of entry cost) and price if they enter (draw of marginal cost).
  - Consumers choose among available plans using demand function
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  - Consumers choose among available plans using demand function
- Incumbent plans decide each period which action to take based on the state variables vector ($\tilde{S}_t$):
  - lagged firm market share, lagged number of firms in the market, lagged number of plans by firm, and market size ($s_{jt-1}, N_{t-1}, D_{t-1}, M_t$)
Model

Model Assumptions

- Non-price characteristics change exogenously.
- Consumers face switching costs but they are myopic.
- Plans know the demand function and use it to form expectations about transitions between state variables.
- Plans do not game the LIS (Decarolis, 2015).
Model

Demand Side: “Regular” and LIS enrollees

- One period flow utility:
  \[
  f_{ijmt} = \begin{cases} 
  X_{jmt} \Pi + \alpha_i p_{jmt} + \xi_{jmt} + \mu_{ijmt}, & \text{if } j \neq 0 \\
  \mu_{i0mt}, & \text{if } j = 0 
  \end{cases}
  \]

- If consumer and old plan are still in the market (\(\Gamma(j_{it-1}) = 1\)):
  \[
  V(j_{it-1}, \mu_{ijt}|\Gamma(j_{it-1}) = 1) = \max \left\{ f_{ij_{it-1}t}, \max_{j \in J_t, j \neq j_{it-1}} \left\{ -\eta + f_{ijt} \right\} \right\}
  \]

- Plan exited, outside option last period or new consumer (\(\Gamma(j_{it-1}) = 0\)):
  \[
  V(j_{it-1}, \mu_{ijt}|\Gamma(j_{it-1}) = 0) = \left\{ \max_{j \in J_t, j \neq j_{it-1}} \left\{ f_{ijt} \right\} \right\}
  \]
Model

Supply Side

- Per-period profits of plans:

\[
\Pi_{jt}(b_{jt}, b_{-jt}, \vec{a}_t, \theta, \vec{\epsilon}_t) = (b_{jt} - c_{jt})s_{jt}(\vec{b}_t, \vec{a}_t)M_t + \Lambda(a_{jt}, \kappa_{jt}, \phi_{jt})
\]

\[
\Lambda(a_{jt}, \kappa_{jt}, \phi_{jt}) = \begin{cases} 
-\kappa_{jt}, & \text{if the plan is a new entrant} \\
\phi_{jt}, & \text{if the plan exits the market}
\end{cases}
\]

- Value function for incumbent plans

\[
W(s_{jt-1}, N_{t-1}, D_{t-1}, M_t, \vec{\epsilon}_t) = \max \left\{ \phi_{jt}, \max_{b_{jt}} \left\{ E[(b_{jt} - c_{jt})s_{jt}M_t + \beta E[W(\vec{S}_{jt}, \vec{\epsilon}_{t+1} | \vec{S}_{jt-1})]] \right\} \right\}
\]

- Value function for entrant plans

\[
W^e(N_{t-1}, D_{t-1}, M_t, \vec{\epsilon}_t) = \max \left\{ \kappa_{jt}, \max_{b_{jt}} \left\{ E[(b_{jt} - c_{jt})s_{jt}M_t + \beta E[W(\vec{S}_{jt}, \vec{\epsilon}_{t+1} | \vec{S}_{jt-1})]] \right\} \right\}
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Estimation

- Estimation of Demand and Supply models
  - Demand model estimated using GMM (BLP, 1995)
  - Supply model estimated in a two-step procedure (BBL, 2007):
    * Step One: Estimate the parameters of the policy functions.
    * Step Two: Recover the structural parameters (cost, entry and exit) simulating value functions and imposing MPNE condition.
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Estimation

Second Step Supply Model: Estimation

- Under the assumption of same MPNE played in each market:
  - Minimize squared difference between value function (VF) at optimal policy ($\sigma_j^*$) and VF under fake policies ($\tilde{\sigma}_j^k$) when they have larger values.

$$
\min_\theta Q_{kr}(\theta) = \frac{1}{K} \frac{1}{R} \{ g_{kr}(\tilde{\sigma}_j^k, \theta) > 0 \} g_{kr}(\tilde{\sigma}_j^k, \theta)^2
$$

where

$$
g_{kr}(\tilde{\sigma}_j^k, \theta) = [Z(\tilde{S}_r, \tilde{\sigma}_j^k, \sigma_{-j}) - Z(\tilde{S}_r, \tilde{\sigma}_j^*, \sigma_{-j})] \left( \frac{1}{\theta} \right)
$$
Identification

- Identification of Demand and Supply models
  - Identification of demand model:
    - Characteristics: variation after FE for firm, time and region.
    - Endogeneity of premiums: Instruments (BLP and Hausman-Type)
    - Switching costs: exit of plans and new consumers.
  - Identification of supply-side policy functions:
    - Observed characteristics and fixed effects by market
    - Unobserved quality estimated from the demand side
  - Identification of supply-side structural parameters:
    - Marginal Costs: pricing decisions under different market structures
    - Entry and Exit costs: entry and exit decisions and duration.
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## Results: Demand for Regular Beneficiaries

### Table: Parameter Estimates for the Demand System for Regular Enrollees

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<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OLS</td>
<td>2SLS w/ vintage variable</td>
<td>2SLS w/ random coeff. and swit. costs</td>
<td>GMM</td>
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<td>Annual Premium</td>
<td>-0.0026***</td>
<td>-0.0037***</td>
<td>-0.0036***</td>
<td>-0.0106***</td>
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<td>(0.0001)</td>
<td>(0.0004)</td>
<td>(0.0004)</td>
<td>(0.0002)</td>
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<td>Years the plan is on the market</td>
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<td>0.3098***</td>
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<td>(0.0246)</td>
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<td>Switching Costs ($\eta$)</td>
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<td>7.8724***</td>
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<td>Standard Deviation of Premium ($\sigma_{premium}$)</td>
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<td>Plan Characteristics</td>
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<td>F-Test First Stage</td>
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<td>8866</td>
<td>8866</td>
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*Notes: Robust std. err. (clustered by market). + p<0.1, ** p<0.05, *** p<0.01.*

- Price elasticity (-5.24) similar to Lucarelli, 2012 and Decarolis et al., 2015.
- Std. dev. of random coefficient small but significant
- Inertia ($743) in the range of literature (Miller and Yeo, 2012; Abaluck and Gruber, 2013; Polyakova, 2015)
Results: Demand for LIS Beneficiaries

Results Demand Estimation

Table: Parameter Estimates for the Demand System for LIS Enrollees

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<tr>
<td>Annual Premium with LIS</td>
<td>-0.0023***</td>
<td>-0.0026***</td>
<td>-0.0025***</td>
<td>-0.0081***</td>
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<td></td>
<td>(0.0001)</td>
<td>(0.0004)</td>
<td>(0.0004)</td>
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<td>0.4129***</td>
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<td>4.9241**</td>
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<td>0.0009</td>
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Notes: Robust standard errors (clustered by market) in parentheses. + p<0.1, ** p<0.05, *** p<0.01.

- LIS choosers are more inelastic consumers (Elasticity: -4.12)
- have less inertia ($608)
- and are less heterogeneous (Std. Dev. of random coefficient not significant)
## Results: Supply-Side First Stage

**Policy Functions: Bidding Behavior**

### Table: Bidding Decisions for Incumbents and New Plans

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
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<tbody>
<tr>
<td><strong>Bid Amount ($)</strong></td>
<td></td>
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<tr>
<td>Lagged Firm Market Share</td>
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<td>150.0126***</td>
<td>122.3674***</td>
<td>91.1387**</td>
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<td></td>
<td>(40.3318)</td>
<td>(40.4659)</td>
<td>(39.3519)</td>
<td>(39.4766)</td>
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<td>Demand-side Unobserved Quality</td>
<td>10.9417***</td>
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<td>10.6959***</td>
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<td>-13.1103***</td>
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<td>(0.8328)</td>
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<td>(0.8304)</td>
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<tr>
<td>Market Size (in 1000)</td>
<td>0.4185***</td>
<td></td>
<td>0.4139***</td>
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<tr>
<td></td>
<td>(0.0308)</td>
<td></td>
<td>(0.0308)</td>
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<tr>
<td>Lagged Number of Plans by Firm</td>
<td>0.3481</td>
<td></td>
<td>0.3860</td>
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<tr>
<td></td>
<td>(0.8604)</td>
<td></td>
<td>(0.8579)</td>
<td></td>
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<tr>
<td><strong>Characteristics</strong></td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Region FE</strong></td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td><strong>R-Squared</strong></td>
<td>0.92</td>
<td>0.92</td>
<td>0.93</td>
<td>0.93</td>
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<tr>
<td><strong>Adjusted R-Squared</strong></td>
<td>0.92</td>
<td>0.92</td>
<td>0.93</td>
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<td><strong>F-test State Variables</strong></td>
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<td>14</td>
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<td>128</td>
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<tr>
<td><strong>Obs.</strong></td>
<td>8866</td>
<td>8866</td>
<td>8866</td>
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</table>

*Notes: Robust standard errors (clustered by market). + p<0.1, ** p<0.05, *** p<0.01.*

- 10 percentage point increase in lagged market share increases bids by 1% of average bid
## Results: Supply-Side First Stage

**Policy Functions: Exit Behavior**

**Table: Probability of Exit for Incumbent Plans**

<table>
<thead>
<tr>
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<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
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<tr>
<td><strong>Panel A</strong></td>
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<tr>
<td>Probability of Exit:</td>
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<td></td>
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<td>Coefficients</td>
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<tr>
<td></td>
<td>(1.3389)</td>
<td>(1.3443)</td>
<td>(1.3416)</td>
<td>(1.3448)</td>
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<td>Demand-side Unobserved Quality</td>
<td>-0.0682**</td>
<td>-0.0700***</td>
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<tr>
<td></td>
<td>(0.0270)</td>
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<td></td>
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<tr>
<td>Lagged Number of Firms by Market</td>
<td>0.0414**</td>
<td>0.0450**</td>
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<td></td>
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<tr>
<td></td>
<td>(0.0182)</td>
<td>(0.0184)</td>
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<td>Lagged Number of Plans by Firm</td>
<td>0.0038</td>
<td>0.0034</td>
<td></td>
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<tr>
<td></td>
<td>(0.0153)</td>
<td>(0.0153)</td>
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<td></td>
</tr>
<tr>
<td>Market Size (in 1000)</td>
<td>-0.0013**</td>
<td>-0.0013†</td>
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<tr>
<td></td>
<td>(0.0007)</td>
<td>(0.0007)</td>
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</tr>
<tr>
<td>Characteristics</td>
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<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Region FE</td>
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<td>No</td>
<td>Yes</td>
<td>Yes</td>
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<td>Observations</td>
<td>7830</td>
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</table>

**Notes:** Robust standard errors (clustered by market). + p < 0.1, ** p < 0.05, *** p < 0.01.

- 10 percentage point increase in lagged market share reduces probability of exit by 2.3%
Results: Supply-Side First Stage
Policy Functions: Entry Behavior

Table: Probability of Entry

<table>
<thead>
<tr>
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<th>(1)</th>
<th>(2)</th>
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</thead>
<tbody>
<tr>
<td>Lagged Number of Firms by Market</td>
<td>-0.1287***</td>
<td>-0.1270**</td>
<td>-0.1302**</td>
<td>-0.1276**</td>
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<tr>
<td></td>
<td>(0.0494)</td>
<td>(0.0495)</td>
<td>(0.0509)</td>
<td>(0.0510)</td>
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<td>Demand-side Unobserved Quality</td>
<td>-0.0296</td>
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<td>-0.0290</td>
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<tr>
<td></td>
<td>(0.0367)</td>
<td></td>
<td>(0.0369)</td>
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<tr>
<td>Market Size (in 1000)</td>
<td>-0.0016</td>
<td></td>
<td>-0.0015</td>
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</tr>
<tr>
<td></td>
<td>(0.0011)</td>
<td></td>
<td>(0.0011)</td>
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<tr>
<td>Lagged Number of Plans by Firm</td>
<td>0.0142</td>
<td>0.0156</td>
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<tr>
<td></td>
<td>(0.0225)</td>
<td>(0.0226)</td>
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<tr>
<td>Mean Characteristics</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Region FE</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>Observations</td>
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</tbody>
</table>

Notes: Robust standard errors (clustered by market). + p<0.1, ** p<0.05, *** p<0.01.

- Entry is affected negatively by number of firms in market (4.2% lower probability)
Results: Supply Side Second Stage
Structural Parameters

Table: Estimates from Structural Model

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Point</td>
<td>Standard</td>
</tr>
<tr>
<td>Marginal Cost</td>
<td>Estimate</td>
<td>Error</td>
</tr>
<tr>
<td>Mean</td>
<td>1,079***</td>
<td>141</td>
</tr>
<tr>
<td>Std.Dev</td>
<td>367**</td>
<td>178</td>
</tr>
<tr>
<td>Exit Cost</td>
<td>Mean</td>
<td></td>
</tr>
<tr>
<td></td>
<td>987,765†</td>
<td>548,766</td>
</tr>
<tr>
<td>Std.Dev</td>
<td>381,987</td>
<td>302,844</td>
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<tr>
<td>Entry Cost</td>
<td>Mean</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2,426,733***</td>
<td>376,673</td>
</tr>
<tr>
<td>Std.Dev</td>
<td>843,536**</td>
<td>409,287</td>
</tr>
</tbody>
</table>

Notes: Standard errors (clustered by market). + p<0.1, ** p<0.05, *** p<0.01.

- Markup rate of 13% and average total cost of $1079.
- Plans pay a cost of 2.5M for entry to a market.
- Imprecise estimates for scrap values.
Counterfactuals

Counterfactuals Strategy

- I compute counterfactuals where dynamic pricing is not allowed
  - I have to solve for the new MPNE
  - I assume a maximum of 5 single-product firms
  - State space with inertia: market share divided in ten grid points interacted with indicators of activity of firms ($10^5 \times 2^5$)
Counterfactuals

Counterfactuals Strategy

- I compute counterfactuals where dynamic pricing is not allowed
  - I have to solve for the new MPNE
  - I assume a maximum of 5 single-product firms
  - State space with inertia: market share divided in ten grid points interacted with indicators of activity of firms ($10^5 \times 2^5$)

- I use estimated parameters to evaluate counterfactuals
  - I use the FE for these firms, average shares and the switching cost parameter estimated in the demand model.
Counterfactuals

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- I compute counterfactuals where dynamic pricing is not allowed
  - I have to solve for the new MPNE
  - I assume a maximum of 5 single-product firms
  - State space with inertia: market share divided in ten grid points interacted with indicators of activity of firms \((10^5 \times 2^5)\)
- I use estimated parameters to evaluate counterfactuals
  - I use the FE for these firms, average shares and the switching cost parameter estimated in the demand model.
- I estimate welfare, entry and exit patterns using actual policy functions.
  - Two counterfactuals with fixed markups: with and without inertia in demand.
## Counterfactuals

### Simulated Counterfactuals: Welfare and Entry Results

<table>
<thead>
<tr>
<th></th>
<th>Current Policy</th>
<th>Fixed Markup with Inertia</th>
<th>Fixed Markup without Inertia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average Premiums</td>
<td>404</td>
<td>378</td>
<td>378</td>
</tr>
<tr>
<td>% Change</td>
<td></td>
<td>-7%</td>
<td>-7%</td>
</tr>
<tr>
<td>% Periods with Entry</td>
<td>52</td>
<td>38</td>
<td>61</td>
</tr>
<tr>
<td>% Periods with Exit</td>
<td>40</td>
<td>31</td>
<td>42</td>
</tr>
<tr>
<td>Consumer Welfare</td>
<td>$360</td>
<td>$372</td>
<td>$394</td>
</tr>
<tr>
<td>% Change</td>
<td></td>
<td>3.1%</td>
<td>9.4%</td>
</tr>
</tbody>
</table>

- Three main takeaways from the counterfactuals:
  - Overall, fixed markups increase consumer welfare by 3.1%
  - Only modest welfare gains because of two opposite effects:
    - 7% reduction in premiums
    - Reduction of periods with entry (from 52% to 38%)
  - Importance of entry effects (size of inertia)
    - Fixed markups without inertia would result in larger welfare gains.
    - 9.4% increase in consumer welfare (non-welfare relevant inertia)
Conclusions

- I study the dynamic equilibrium effects of dynamic pricing responses to inertia
- I analyze counterfactuals where dynamic pricing is not allowed
  - Overall, regulation that fixes markups has a positive effect
  - Two opposite effects: lower premiums but less entry
  - Amount of inertia is relevant
- Effects of other counterfactual policies in progress:
  - Endogenous premium determination with caps
  - Longer contract lengths (first best and benchmark)
Appendix
# Data

## Summary Statistics

<table>
<thead>
<tr>
<th>Plans</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
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<tbody>
<tr>
<td>Number of Plans</td>
<td>1866</td>
<td>1824</td>
<td>1687</td>
<td>1564</td>
<td>1109</td>
<td>1039</td>
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<tr>
<td>Average Number of PDP plans per market</td>
<td>55</td>
<td>54</td>
<td>50</td>
<td>46</td>
<td>33</td>
<td>31</td>
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<table>
<thead>
<tr>
<th>Firms</th>
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<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td>Total Number of Firms</td>
<td>68</td>
<td>61</td>
<td>53</td>
<td>52</td>
<td>43</td>
<td>40</td>
</tr>
<tr>
<td>Average Nr. of Firms per Market</td>
<td>21</td>
<td>19</td>
<td>16</td>
<td>16</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td>Average Nr. of PDP per firm and market</td>
<td>2.7</td>
<td>2.8</td>
<td>3.2</td>
<td>3</td>
<td>2.4</td>
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</table>

<table>
<thead>
<tr>
<th>Premiums</th>
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<tbody>
<tr>
<td>Average Premiums of SDB plans</td>
<td>336</td>
<td>348</td>
<td>420</td>
<td>396</td>
<td>432</td>
<td>408</td>
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<tr>
<td>Unweighted avg. annual PDP Premium</td>
<td>442</td>
<td>480</td>
<td>546</td>
<td>560</td>
<td>664</td>
<td>648</td>
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<table>
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<tbody>
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<td>CMS national average bid (annual)</td>
<td>965</td>
<td>966</td>
<td>1012</td>
<td>1060</td>
<td>1045</td>
<td>1014</td>
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<tr>
<td>CMS base consumer premium (annual)</td>
<td>328</td>
<td>335</td>
<td>364</td>
<td>383</td>
<td>386</td>
<td>373</td>
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<tr>
<td>Low income (LIS) benchmark threshold</td>
<td>341</td>
<td>332</td>
<td>353</td>
<td>387</td>
<td>400</td>
<td>390</td>
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</tbody>
</table>

*Notes:* All columns show descriptive statistics of Medicare Part D over different years. The sample includes all PDP Plans in Medicare Part D during 2007-2012.
Results: Demand Side

- Demand for “regular” enrollees
  - Price elasticity (-5.24) similar to Lucarelli (2012), Decarolis et al. (2015)
  - Std. dev. of random coefficient small but significant
  - Inertia ($743) in the range of literature (Miller and Yeo, 2012; Abaluck and Gruber, 2013; Polyakova, 2015)

- Demand for LIS enrollees
  - LIS choosers are more inelastic consumers (Elasticity: -4.12)
  - have less inertia ($608)
  - and are less heterogeneous (Std. Dev. of random coefficient not significant)
Results: Demand Side

- **Demand for “regular” enrollees**
  - Price elasticity (-5.24) similar to Lucarelli (2012), Decarolis et al. (2015)
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  - have less inertia ($608)
  - and are less heterogeneous (Std. Dev. of random coefficient not significant)
Results: Supply-Side First Stage

- First Stage Supply Side (policy functions)
  - 10 percentage point increase in lagged market share increases bids by 1% of average bid
  - 10 percentage point increase in lagged market share reduces probability of exit by 2.3%
  - Entry is affected negatively by number of firms in market (4.2% lower probability)
Counterfactuals

Counterfactuals Results

Three main takeaways from the counterfactuals:

▶ Overall, fixed markups increase consumer welfare by 3.1%
▶ Only modest welfare gains because of two opposite effects:
  ★ 7% reduction in premiums
  ★ reduction of periods with entry (from to 52% to 38%)
▶ Results very sensitive to size of inertia
  ★ Fixed markups without inertia would result in larger welfare gains.
  ★ 9.4% increase in consumer welfare (non-welfare relevant inertia)