Reducing Medicare Costs by Accounting for Selection

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Jan 6, 2025

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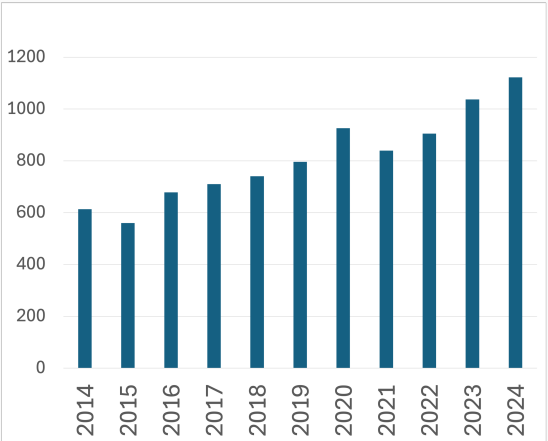
Motivation

Motivation

- Medicare spending increased by 82.9% ($500 billion) over past decade
- CBO projects Medicare spending to double over next ten years
- Yet many older Americans struggle to afford necessary care and medications
- Serious problem

Private Insurers to the Rescue?

Medicare Spending Over Time

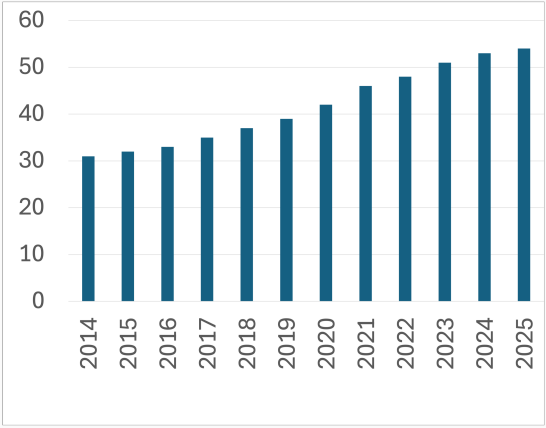


Source: CMS / Statista

Cost-Saving Channel

- Traditional Medicare (TM)
- Medicare Advantage (MA)
  - Private Insurers to harness competition and managed care tools
  - Better coverage to patients
  - Cost-Saving Channel-Reimbursement designed to share cost saving with government

Share of Enrollees in Medicare Advantage



Source: CMS / Statista

Selection Channel

$27 Billion (12%) overpayment to Medicare Advantage!

(Medicare Payment Advisory Commission (MedPAC) 2025 Status Report)

- Advantageous selection of beneficiaries into Medicare Advantage
- Reimbursement to Medicare Advantage plans is a fixed amount per person adjusted for health using a variable called risk-score
- Evidence for selection conditional on risk-score (Aizawa and Kim (2018))

This Paper

- Uses survey data along with administrative claims data-Capture selection channel
- Develops structural model of demand, supply and government expenditure -Capture equilibrium price changes and consumer sorting

Three key questions:

1. Which effect dominates with presence of Medicare Advantage:cost-saving channel or selection channel?
2. What are welfare effects of reforming Medicare Advantage payments to account for selection?
3. What are decompositional effects of government expenditure on those who sort between TM and MA?

This Paper

- Uses survey data along with administrative claims data
- Develops structural model of demand, supply and government expenditure

Three key questions:

1. Which effect dominates with presence of Medicare Advantage:cost-saving channel or selection channel?

   Selection effect outweighs cost saving channel-Total Medicare costs will go down by $20.8 billion dollars if MA were to be shut down

This Paper

- Uses survey data along with administrative claims data
- Develops structural model of demand, supply and government expenditure

Three key questions:

2. What are welfare effects of reforming Medicare Advantage payments to account for selection?

   Reinstates managed-care cost-saving intent of Medicare Advantage, generating $7.56 billion in savings at the cost of a $0.585 billion reduction in consumer and producer surplus

This Paper

- Uses survey data along with administrative claims data from Centers for Medicare and Medicaid Services
- Develops structural model of demand, supply and government expenditure

Three key questions:

3. What are decompositional effects of government expenditure on those who sort between TM and MA?

   Leads to relatively unhealthy individuals to switch from Medicare Advantage to Traditional Medicare at the margin

Outline

1. Motivation
2. Literature
3. Setting
4. Data
5. Descriptive Evidence
6. Structural Model
7. Results and Counterfactual

Literature

Positioning in the Literature

- **Subsidy Design in Medicare Advantage**

  Miller et al. (2023); Curto et al. (2021); Zahn (2025)

  Contribution: Incorporates selection beyond risks-score using survey data

- **Selection Channel in Medicare Advantage**

  Aizawa and Kim (2018)

  Contribution:

  1. Quantifies the selection-cost saving tradeoff
  2. Study the effect of selection on government expenditure

Setting

Setting: Traditional Medicare vs Medicare Advantage

	Beneficiary's Tradeoff	Govt Reimbursement
Traditional Medicare(TM)	Broad provider network	Fee-for-service reimbursement
Medicare Advantage(MA)	Lower cost sharing (copay, deductible, out of pocket maximum)	Fixed payment per enrollee based on an benchmark rate

- Benchmark is supposed to approximate cost of insuring MA beneficiary had they instead chosen TM
- Thus benchmark is based on average spending per beneficiary in TM

Medicare Advantage Reimbursement

- After benchmarks are published, insurers submit 'bids' reflecting the cost of covering an average-risk beneficiary under TM

Payment to MA plan j

$$\text{Base}_j = \begin{cases} B_m, & \text{if } b_j \geq B_m \\ b_j + \underbrace{\lambda_j(B_m - b_j)}_{\textit{rebate}}, & \text{if } b_j < B_m \end{cases} \qquad \text{Payment}_{ij} = \text{Base}_j \times \text{Risk}_i$$

B_m: benchmark b_j: plan bid λ_j: rebate rate Risk_i: risk score i-individual

Government captures a share of managed-care cost savings $= (1 - \lambda_j)(B_m - b_j)$

Data

Data

CMS Administrative data for 2019 (Research Identifiable File):

1. **Plan characteristics (administrative+publicly available)**
   - Markets, market size (Medicare eligible), and plan shares.
   - Premium, copay, deductible, out of pocket max, quality rating, plan average risk score.
2. **Beneficiary characteristics (MBSF, 5% sample of Medicare)**
   - Demographics: age, gender, race.
   - risk score (2014).

▸ riskscore

Data

3. **Encounter ('claims') data for Medicare Advantage** (5% sample)
   - Inpatient data
   - Individual $\rightarrow$ *Hospital* $\rightarrow$ *Diagnosis*

4. **Survey data (MCBS)** (separate smaller sample)
   - Questions on health conditions and self-reported health to derive a poor health indicator
   - Used to capture selection conditional on risk score.

Survey Health Variable

Survey Data Used:

Medicare Current Beneficiary Survey (MCBS) is a nationally representative, longitudinal survey conducted by CMS

Survey Variable Created:

Poor health=1 if

- Vision/Hearing problem
- Physical/Cognitive decline-Difficulty using the telephone, shopping, paying bills, memory loss, trouble concentrating, or problems making decisions

Descriptive Evidence

Advantageous Selection

Outcome: MA Enrollment	Coef.	SE
1{Poor health}**	-0.084	0.033
Risk score***	0.051	0.019
Age	0.001	0.001
Male*	-0.040	0.022
White***	-0.109	0.029
Constant***	0.443	0.062
Observations	4,032	

Notes: Linear probability model. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Takeaway: Conditional on risk score healthier individuals choose MA plans

Traditional Medicare Cost Predictors

CF2

Outcome: TM Cost	Coef.	SE
Risk score***	5442.05	678.73
1{Poor health} **	2859.57	1227.40
Age**	-67.63	29.63
Male	-177.56	843.09
White	961.27	1104.02
Constant***	7393.84	2335.38
Observations	1,966	

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.

Takeaway: Both risk score and poor health indicator are significant predictors of cost

Model

Demand-Random Coefficients Logit

Individual utility from plan j: (outside option = TM)

$$u_{ij} = \alpha(\boldsymbol{z}_i, N_{ij})1 + \beta(\boldsymbol{z}_i, N_{ij})\,\text{price}_j + \gamma \boldsymbol{x}_j + \xi_j + \varepsilon_{ij}$$

Endogenous variable

- price_j : out of pocket maxima_j

Plan characteristics

- $\boldsymbol{x}_j$: deductibles, copay, premium, star rating

▸ Network utility construction

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Individual utility from plan j: (outside option = TM)

$$u_{ij} = \alpha(\boldsymbol{z}_i, N_{ij})1 + \beta(\boldsymbol{z}_i, N_{ij})\,\text{price}_j + \gamma \boldsymbol{x}_j + \xi_j + \varepsilon_{ij}$$

Preference heterogeneity

$$\alpha(\boldsymbol{z}_i, N_{ij}) = \alpha_0 + \alpha_{1z}\boldsymbol{z}_i + \alpha_2 N_{ij} + \sigma_\alpha \nu_i, \qquad \nu_i \sim \mathcal{N}(0,1)$$

Endogenous variable

- price_j : out of pocket maxima$_j$

Plan characteristics

- $\boldsymbol{x}_j$: deductibles, copay, premium, star rating

▸ Network utility construction

Individual characteristics

- $\boldsymbol{z}_i$: age, gender, race, risk score, poor health indicator

Network utility

- N_{ij}: value of plan j's hospital network

Instrument 1

1. Leave one out benchmark for plan j in county m (Zahn (2025))

$$B_{j \setminus m} = \sum_{k \in A_j \setminus m} \omega_{jk} B_m$$

where A_j denotes the set of counties where plan j entered and ω_{jk} are weights based on the number of people enrolled in the plan.

- ***Relevance***: Higher benchmarks $\rightarrow$ higher reimbursements $\rightarrow$ lower cost sharing
- ***Exogeneity***: Demand shocks assumed to be uncorrelated across markets

Instrument 2

2. Average number of insurance contracts offered by the same insurer in other markets (Decarolis et al. 2020)

- ***Relevance***: More contracts offered in different market $\rightarrow$ larger customer base or more aggressive pricing strategies $\rightarrow$ affect price in the market of interest.
- ***Exogeneity***: Demand shocks assumed to be uncorrelated across markets

▸ Estimation and Identification ▸ Demand Results

Supply – Bertrand Price Setting

Plan j's profit in market m:

$$\Pi_j = N_m \int_{z_i} \Big[\underbrace{p_j}_{\text{Premium}} + \underbrace{sub_j(B_m.Risk_i, b_j)}_{\text{Subsidy}} - \underbrace{c(\boldsymbol{z_i}, \text{cost sharing}_{\boldsymbol{j}})}_{\text{Marginal cost}} \Big] \cdot s_j(\boldsymbol{z_i})\, dF_m(\boldsymbol{z_i})$$

N_m – market size $\quad b_j$ – plan bid $\quad B_m$ – benchmark $\quad \boldsymbol{z_i}$ – demographics

- Insurers choose price (out of pocket max) to maximize profit
- FOC depend on health composition, risk adjusted benchmark, plan characteristics and demand elasticity
- ***Counterfactual***: subsidy changes → equilibrium price changes

▸ Supply Details

Government Expenditure

Total Government Expenditure in Market m

$$\text{GE}(B_j) = \underbrace{\sum_{j \in J_m} s_j \ \text{sub}_j(.) \ N_m}_{\text{MA subsidy}} + \underbrace{\left(1 - \sum_{j \in J_m} s_j\right) N_m \, \overline{\text{TM}}(z_i)}_{\text{TM cost}}.$$

- $\text{sub}_j(.) = \overline{Risk}_j .\ min\{B_m, bid + rebate\}$
- $\text{sub}_j(.) = \overline{Risk}.B_m - rebate\_savings_j$
- Functional form assumption for rebate savings

▸ Supply Details

Counterfactual 1: Shut-down Medicare Advantage

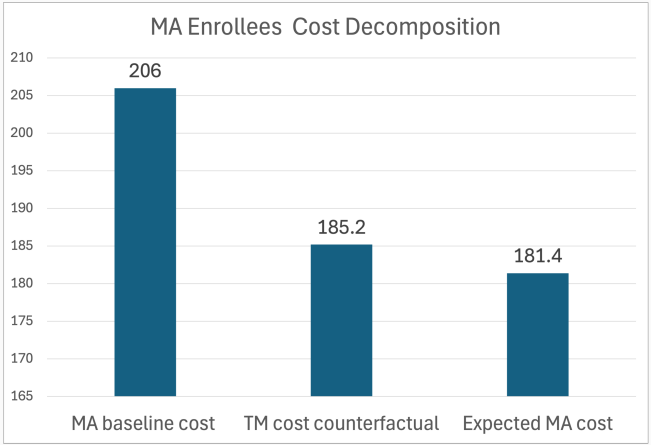
Total Government Expenditure in Market m

$$\text{GE}(B_j) = \sum_{j \in J_m} s_j \Big[\underbrace{\overline{Risk}_j}_{\text{Selection channel}} \cdot B_j \underbrace{- f(cost\_sharing_j)}_{\text{Cost saving channel}} \Big] N_m + \Big(1 - \sum_{j \in J_m} s_j\Big) N_m \, \overline{\text{TM}}(z_i).$$

- TM cost counterfactual $\uparrow$: Cost Saving $>$ Selection
- TM cost counterfactual $\downarrow$: Selection $>$ Cost Saving

Results

Counterfactual 1: MA Shut Down



TM cost counterfactual

- Gross savings from MA shut down=$20.8 billion (4%)
- Selection>Cost Saving

Expected MA cost

- Intended cost if no selection
- Net loss from selection is $24.6 billion

CBO prediction=$27 billion

Note: All values are in billions of dollars

Counterfactual 2: Selection-Corrected Benchmark

Total Government Expenditure in Market m

$$\mathrm{GE}(B_j) = \sum_{j \in J_m} s_j \Big[\underbrace{\overline{Risk}_j}_{\text{Selection channel}} \cdot B_j \underbrace{- f(cost\_sharing_j)}_{\text{Cost saving channel}} \Big] N_m + \Big(1 - \sum_{j \in J_m} s_j\Big) N_m \, \overline{\mathrm{TM}}(z_i).$$

- Replace $\overline{Risk}_j . B_m \rightarrow \overline{\mathrm{TM}}(z_i)$ ▸ TM(z_i)
- Payment adjusted for both the risk score and poor health indicator
- Lowers payments to most plans, raises it for some

Counterfactual 2: Selection-Corrected Benchmark

payment $\downarrow \longrightarrow$ **cost** $\uparrow \longrightarrow$ **profits** $\downarrow \longrightarrow$ **equilibrium price** $\uparrow \longrightarrow$ **CS**$\downarrow$ **, GE** $\downarrow$

	Baseline	Counterfactual 2	Difference
Consumer Surplus	3.488	3.035	–0.453
Profits	10.177	10.045	–0.132
Government Expenditure	672.8	655.83	–16.9
MA cost saving		7.5	

All values are in billions of dollars

Takeaway:

Selection-corrected benchmark reinstates the cost-saving intent of Medicare Advantage

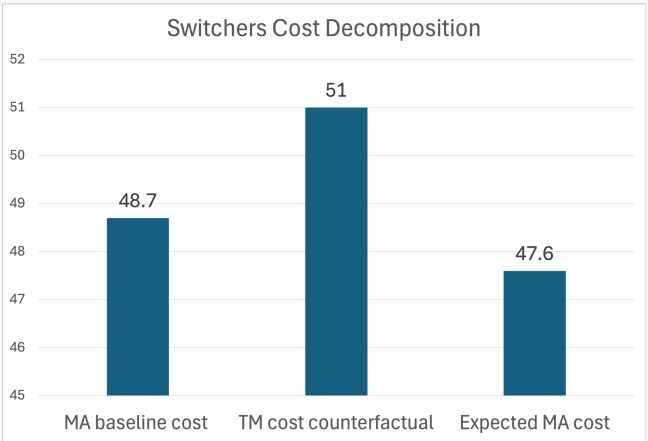
Counterfactual 3: Capped Selection-Corrected Benchmark

Total Government Expenditure in Market m

$$\mathrm{GE}(B_j) = \sum_{j \in J_m} s_j \Big[\underbrace{\overline{Risk}_j}_{\text{Selection channel}} \cdot B_j \underbrace{- f(cost\_sharing_j)}_{\text{Cost saving channel}} \Big] N_m + \Big(1 - \sum_{j \in J_m} s_j\Big) N_m \, \overline{\mathrm{TM}}(z_i).$$

- Replace $\overline{Risk}_j . B_m \rightarrow \min\{\text{Current benchmark}, \text{ Selection-corrected benchmark}\}$
- Payments to all plans only decrease mechanically
- Sorting only from MA to TM
- To cleanly decompose intensive and extensive margins

Counterfactual 3: Switchers



Note: All values are in billions of dollars

4.15 million (30%) switch from MA to TM

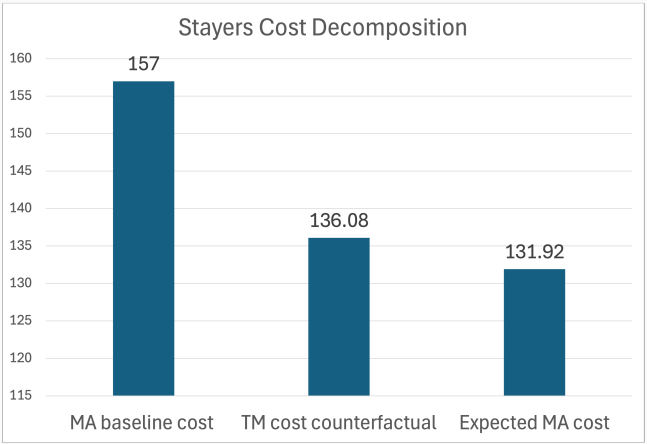
TM cost counterfactual

- MA still cost saving in absolute
- *Reason: unhealthy people switching out*

Expected MA cost

- Net loss from selection is $1.1 billion

Counterfactual 3: Stayers



Note: All values are in billions of dollars

10.3 million (70%) stay in MA

- *Most of savings in GE from stayers*

Conclusion

Policy Motivation

CBO(2022) notes overpayment to MA although difficult to measure equilibrium effects

This Paper

Quantifies the welfare and equilibrium effects of advantageous selection into MA

Policy Suggestion

Incorporate survey-based health measures into MA payment design to restore its cost-saving intent

Thank you

I welcome your questions and comments

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Network Utility

1. Estimate hospital choice model (patient i, diagnosis d, hospital h)

$$U_{idh} = \eta_h + \gamma X_h Z_i + \delta Dist_{i,h} + \epsilon_{idh}$$

- where η_h-hospital fixed effect, X_h-hospital characteristics, Z_i-individual characteristics, $Dist_{i,h}$-distance to the hospital, ϵ_{idh}-type I error
- MLE with fixed effects using inpatient encounter data.
- Hospital network backed out at the individual-plan level.

Go Back

Network Utility

2. Calculate expected utility from the above model

$$\begin{aligned} HospEU_{i,d,j}(N_j) &\equiv Emax_h\{\hat{u}_{i,d,h}(N_j) + \epsilon_{i,d,h}\} \\ &= log\Big[\sum_h exp(\hat{u}_{i,d,h}(N_j))\Big] \end{aligned} \tag{1}$$

3. Network Utility=Illness probability (based on age/sex)*Hospital Expected Utility

$$NV_{i,j} = \sum_d \hat{p}_{i,d}.HospEU_{i,d}(N_j)$$

Go Back

Network Value

- Estimate a Poisson regression of the number of hospitalizations in the data (for a given d) on age-sex and income groups.
- The predicted values from the regression is used as the probability weights to calculate the network utility.

Go Back

Risk Score

- Predicted **relative** cost of beneficiary based on demographics (age, sex, Medicaid/ESRD/disability status) and past year diagnoses
- **Assumption**: The relative health of individuals have not changed from 2014
- **Robustness**: Calculate risk score from 2019 claims data

Go Back

Summary Statistics-Selection on health

	TM	MA	p-value*
Risk Score - full sample	0.78	0.83	0.0000
Risk Score - survey sample	0.77	0.85	0.0025
Poor health - survey sample	14.24%	11.61%	0.0410

Table 1: * One-sided p-value for difference test.

Individuals who choose MA have higher risk score but better health wrt vision, hearing or cognitive abilities. (Correlation coefficient between risk score and poor health is 0.1887)

Demand Estimation and Identification

	Estimation	Identification
Hospital Choice Model	• Individual-level MLE • **Data:** Inpatient claims	• Individual choice variation • Distance to hospitals • Hospital characteristics
Plan Choice Model	• BLP-style GMM • Market-level shares • **Data:** Plan + individual characteristics	• Plan choice sets across markets • Demographic distribution • Plan characteristics

Go Back

Supply

$$sub = min\{\underbrace{b_j}_{bid} Risk_i + \underbrace{\lambda(B_m - b_j)Risk_i}_{rebate}, B_m.r_i\}$$

- A plan that receives a rebate must "return" the rebate to its enrollees in the form of supplemental benefits or lower premiums.
- Following **Miller, Petrin (2023)**, I assume that this rule is binding and that the rebate equals the cost of proving additional benefits over providing a 'base' TM equivalent plan.

$$Cinc_j = \lambda(B_m - b_j)Risk_i \tag{2}$$

Supply

Substituting, profit for firm f:

$$\Pi_f = N_c \sum_{j \in L_{fc}} \int_{z_i} [p_j + Risk_i.B_m - \frac{1-\lambda}{\lambda} Cinc_j - c_j(\boldsymbol{z_i}), \text{cost sharing}_j].s_j(\boldsymbol{z_i}) dF_c(\boldsymbol{z_i})$$

Functional form assumptions for cost:

- $c_j(\boldsymbol{z_i}) = \gamma_{TM}.\overline{TM}(\boldsymbol{z_i}) - \gamma_x.cost\_sharing_j + \delta_f + \eta_j$
- IV for $TM_c(\boldsymbol{z_i})$ is $TMavg_c$
- $Cinc_j = -\gamma_x.cost\_sharing_j$

Go Back

Supply Results

Characteristic	Estimate	SE
$\overline{TM}_c(h_i)$	0.70	(0.53)
Copay (Primary, min)	-118.26	(80.14)
Deductible*	77.08	(37.43)
Constant*	-17853.47	(8664.08)

Number of observations = 7,516; Firm FE included.

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

When the TM cost goes up by \$1, the marginal cost in MA goes up by \$0.70 dollar. MA plans have a 30% cost saving as compared to TM.

Demand Results

Table 2: Preference heterogeneity

	Constant		Price	
Variable	Coef.	SE	Coef.	SE
Age	0.411***	(0.048)	-0.211***	(0.032)
Sex	0.027***	(0.007)	0.355***	(0.004)
White	-0.100*	(0.047)	0.079	(0.237)
Risk score	-0.090**	(0.032)	0.892***	(0.027)
Poor health	-0.483***	(0.026)	0.039	(0.134)
Network utility	0.464***	(0.038)	0.123*	(0.058)

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Demand Results

Table 3: Mean Utility

Variable	Coefficient	SE
Constant***	-0.286	(0.011)
Prices (oop max)***	-1.518	(0.025)
Copay (Primary)***	0.258	(0.068)
Quality rating**	0.362	(0.129)
Deductible	-0.018	(0.011)
Premium***	-1.323	(0.106)

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Elasticity=-2.48 : Comparable to elasticity for premium in literature Go Back