

# Risk Adjustment, Self-Selection and Plan Design in Medicare Advantage

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## Background

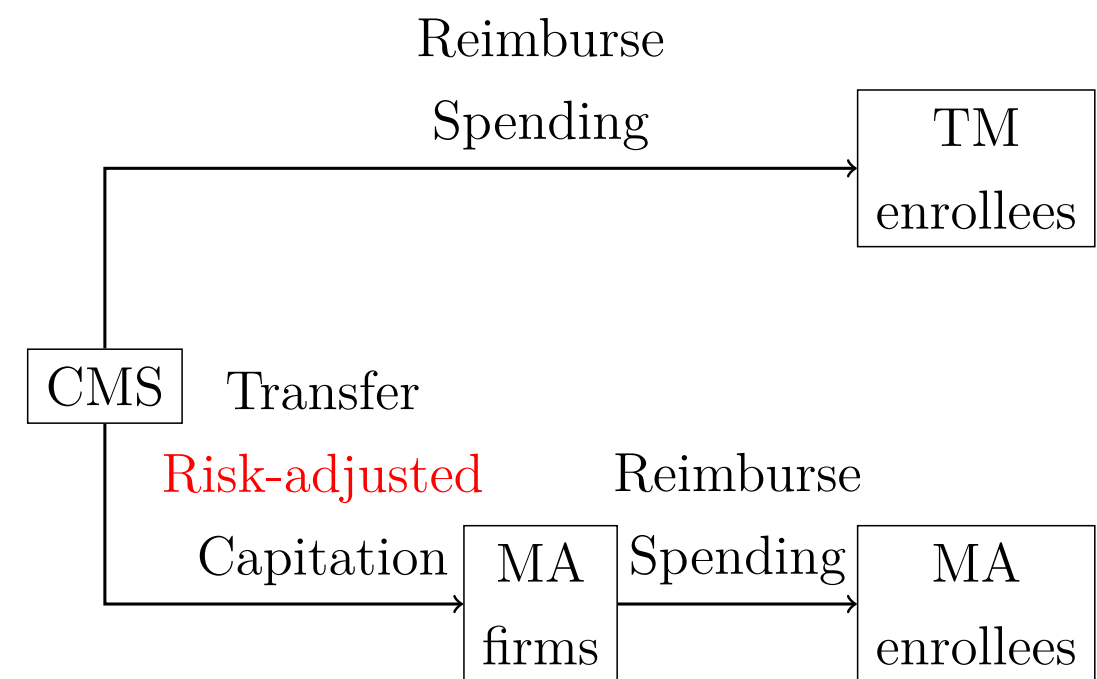


Figure: Medicare Market Illustration

Medicare is a U.S. federal health insurance program mainly for individuals aged 65 and older, comprising two main components:

- **Traditional Medicare (TM):** A fee-for-service (FFS) system, typically paired with Medigap plans.
- **Medicare Advantage (MA):** A managed competition framework where private insurers, subsidized by the government, often offer plans with **lower premiums and reduced generosity** compared to Traditional Medicare (TM).
- **Managed Competition:** The government provides fixed and predetermined subsidies to private insurance firms, which in turn offer insurance plans to beneficiaries.
- **Cream Skimming:** Firms strategically target healthier beneficiaries to maximize profits.
- **Risk Adjustment:** The government adjusts subsidy payments to insurers based on beneficiaries’ observable characteristics.

## Motivation

- **Self-Selection:** Beneficiaries make enrollment decisions based on their private information.
- Due to private information, beneficiaries sharing the same risk-adjusted subsidy payment may have different unobserved health perceptions. For example, healthier beneficiaries prefer to enroll in plans with lower premiums and reduced generosity, while less healthy beneficiaries opt for plans with higher premiums and greater generosity.
- The current risk adjustment mechanism implicitly assumes that beneficiaries with identical observable characteristics possess the same unobserved health perceptions, which may not be accurate in practice.
- Consequently, it fails to account for self-selection effects, leading to “cream-skimming” incentives for MA firms to target healthier beneficiaries by strategically designing plans with lower premiums and reduced generosity.
- Although much of the literature has focused on competition and selection within Medicare Advantage, attention to self-selection under the current risk adjustment mechanism remains limited.

## Goals

- **Theoretical:** Developed a managed competition model incorporating endogenous plan design and self-selection under private information.
- **Empirical:** Applied the model to Medicare Advantage data, evaluating the welfare implications of self-selection effects.
- **Policy:** Provided insights for enhancing risk adjustment payment policies to mitigate market distortions.

## Method

- Develop a structural model of demand and supply that incorporates self-selection and endogenous plan design.
- Estimate the model using Medicare Advantage data.
- Conduct counterfactual simulations to analyze scenarios where self-selection effects are neutralized.

## Model & Estimation

### Demand

- The model incorporates self-selection effects, where beneficiaries have varying unobserved health perceptions, leading to heterogeneous preferences for plan design.
- Health perceptions are assumed to follow a distribution with a mean equal to the predicted health status from the risk adjustment model and a standard deviation of  $\sigma_\tau$ .

Table: Estimation Results of Consumer Preference Heterogeneity

Variable	Parameter	Estimate	Std Error
<b>Generosity Preference</b>			
Health Perception	$\gamma$	0.115	(0.052)
<b>Premium Preference</b>			
High Income Level	$\rho^{inc}$	-0.473	(0.248)
<b>MA Type Preference</b>			
High Education Level	$\rho^{edu}$	-0.275	(0.203)
White Race	$\rho^{white}$	-0.173	(0.280)
Medicaid Coverage	$\rho^{Med}$	0.039	(0.244)
ESI Coverage	$\rho^{ESI}$	-2.543	(0.404)
<b>Private Information Distribution</b>			
SD of Health Perception	$\sigma_\tau$	3.983	(2.733)

Note: ESI stands for employer-sponsored insurance.

- Private health perceptions significantly influence beneficiaries’ plan choices.
- Among beneficiaries with identical risk-adjusted subsidy payments, private health perceptions can vary widely, resulting in different plan selections. This aligns with the self-selection effects.

### Supply

- The model incorporates endogenous plan design, where firms strategically design plans to maximize profits.
- The cost structure of plans allows the self-selection effects.

Table: Estimation of Plan Marginal Cost

Variable	I		II	
	Estimate	Std Error	Estimate	Std Error
<b>Coverage</b>				
Generosity	1.353	(0.171)	1.367	(0.174)
Generosity <sup>2</sup>	0.160	(0.020)	0.140	(0.021)
<b>Network</b>				
Rating (per star)	0.150	(0.019)	0.157	(0.020)
HMO	0.237	(0.022)	0.247	(0.023)
<b>Additional Benefits</b>				
Dental	0.170	(0.023)	0.158	(0.025)
Vision	0.039	(0.055)	0.045	(0.055)
Hearing	0.095	(0.026)	0.118	(0.027)
<b>Firm Fixed Effect</b>				
Aetna	-	-	-0.017	(0.033)
Anthem	-	-	-0.181	(0.049)
UHG	-	-	-0.079	(0.030)

- Plan generosity is the most significant factor influencing its cost.
- Marginal costs increase non-linearly with plan generosity, indicating self-selection effects.
- Generosity impacts the marginal cost of a plan in two ways:
  - **Direct Effect:** Generosity directly raises plan costs by providing more comprehensive coverage.
  - **Indirect Effect:** Generosity indirectly increases plan costs by attracting sicker beneficiaries.

## Counterfactual Simulation

### Equal-Profit Risk Adjustment

- **Goal:** Align subsidies so firms earn the same profit from healthy and sick enrollees, removing cream-skimming incentives.
- **Approach:** Adjust plan subsidy payments so expected profits are uniform across all beneficiaries.
- **Impact:** Firms no longer have incentives to favor healthier individuals.

Table: Welfare Comparison Between Current and Equal-Profit Risk Adjustment

	Metrics	Current	Equal-Profit	% Change
Total MA share (%)		30.58	33.25	8.72%
Total Consumer Surplus		22.08	24.51	11.01%
Total Producer Surplus		14.45	19.45	34.60%
Gov Spending on TM		370.26	357.46	-3.46%
Gov Spending on MA		163.51	176.31	7.82%
Subsidy Adjustment		-	0.95	-
Total Gov Spending		533.77	534.72	0.18%

Note: The monetary values are in billion dollars. The subsidy adjustment is the change in the total capitation payment from the government to MA firms, compared to the current policy. The total government spending is the sum of government spending on TM and MA.

### Welfare Analysis

- **Firm Response:** Firms optimize their plan designs to maximize profits under the new risk adjustment mechanism. Consequently, the updated plan designs are generally more generous and feature higher premiums.
- **Consumer Surplus:** Total consumer surplus increases by 11.01% with the new risk adjustment-based plan designs.
- **Producer Surplus:** Medicare Advantage plans become more attractive, resulting in a 34.60% increase in total producer surplus under the new risk adjustment mechanism.

## Takeaways

- Conventional risk adjustment mechanisms do not fully eliminate cream-skimming incentives, leading to market distortions and welfare losses.
- The proposed equal-profit risk adjustment mechanism can further mitigate cream-skimming incentives by accounting for self-selection effects, leading to improved market outcomes and welfare gains.

## References

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