Module 3: Medicare Advantage Quality and Regression Discontinuity

Part 1: MA Data and Quality Measurement

Ian McCarthy | Emory University
Econ 470 & HLTH 470

What is Medicare Advantage

- Private provision of health insurance for Medicare beneficiaries
- Medicare "replacement" plans
- It's just private insurance for those eligible for Medicare

Medicare Advantage History

- Existed since 1980s, formalized in the 1990s, expanded in 2000s
- Medicare+Choice as part of Balanced Budget Act in 1997
- Largest expansion: Medicare Modernization Act in 2003 (also brought Medicare Part D)

Medicare Advantage Details

In its current form...

- Insurers submit plan details and a price needed to cover traditional Medicare ("bid")
- If approved, Medicare pays risk-adjusted bid *or* benchmark
- Bid $<$ benchmark, insurer gets a rebate
- Bid $>$ benchmark, insurer charges premium
- Seperate bidding for Part D

Medicare Advantage in Real Life

Let's take a look at the Medicare Advantage plan options...

Medicare Plan Finder

Medicare Advantage Quality Ratings

- Initial MA Star Ratings (2007)
- Overall rating introduced in 2009
- Complicated formula...

- **key point:** ratings from several domains are averaged and then rounded
- More details available here

Role of Quality Ratings

- Potentially affect plan choice
- Quality bonus program in 2012
  - Demonstration program at first (2012 through 2015)
  - ACA quality bonus payments begin 2015

Details of QBP

Eligible plans may receive two bonuses:

1. Benchmark bonus: Increased benchmark payment of up to 5\%
2. Rebate bonus: Share of bid-benchmark differential going back to insurer (from 50% up to 70%)

- Applied to plans with 3-stars and above from 2012-2015 (demonstration period)
- Applied to plans with 4-stars and above beginning 2015

Some good primers

- KFF Bonus Payment Illustration
- 2021 Star Ratings and Bonus Payments

Medicare Advantage Data

- Recall the Medicare Advantage repository, Medicare Advantage GitHub repository

- Now we need to work with the **final** dataset

Final MA Data

```r
ma.data ← read_rds(here("data/final_ma_data.rds"))
```

Summary stats

Focus on enrollments and star ratings:

```
stargazer(as.data.frame(ma.data %>% select(avg_enrollment, avg_eligibles, Star_Rating)), type="html")
```

Statistic	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
planid	895,495	35.849	69.789	1	4	41	999
avg_enrollment	204,173	397.404	1,578.641	11.000	31.250	231.667	63,234.080
avg_eligibles	749,267	42,587.920	98,741.840	11.571	3,798.000	37,116.570	1,355,734.000
Star_Rating	448,793	3.307	0.783	1.500	2.500	4.000	5.000

Clean the data

Limit to plans with:

- Observed enrollments, > 10
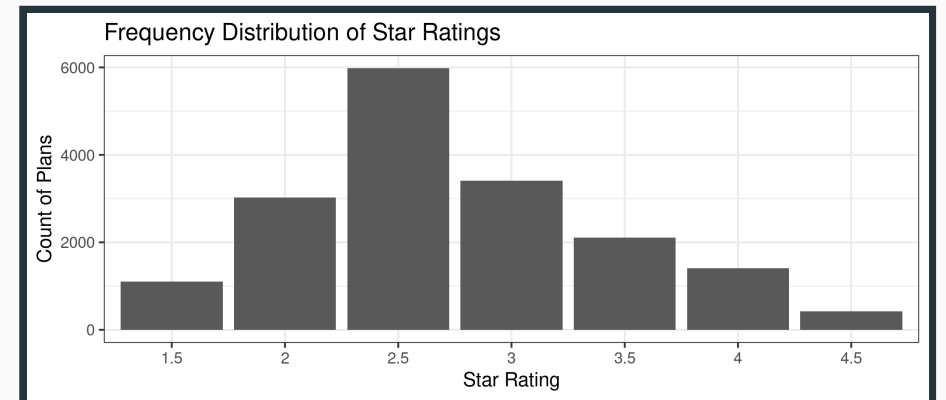- First year of star rating (2009)
- Observed star rating

```
ma.data.clean ← ma.data %>%
  filter(!is.na(avg_enrollment) & year==2009 & !is.na(partc_score))
```
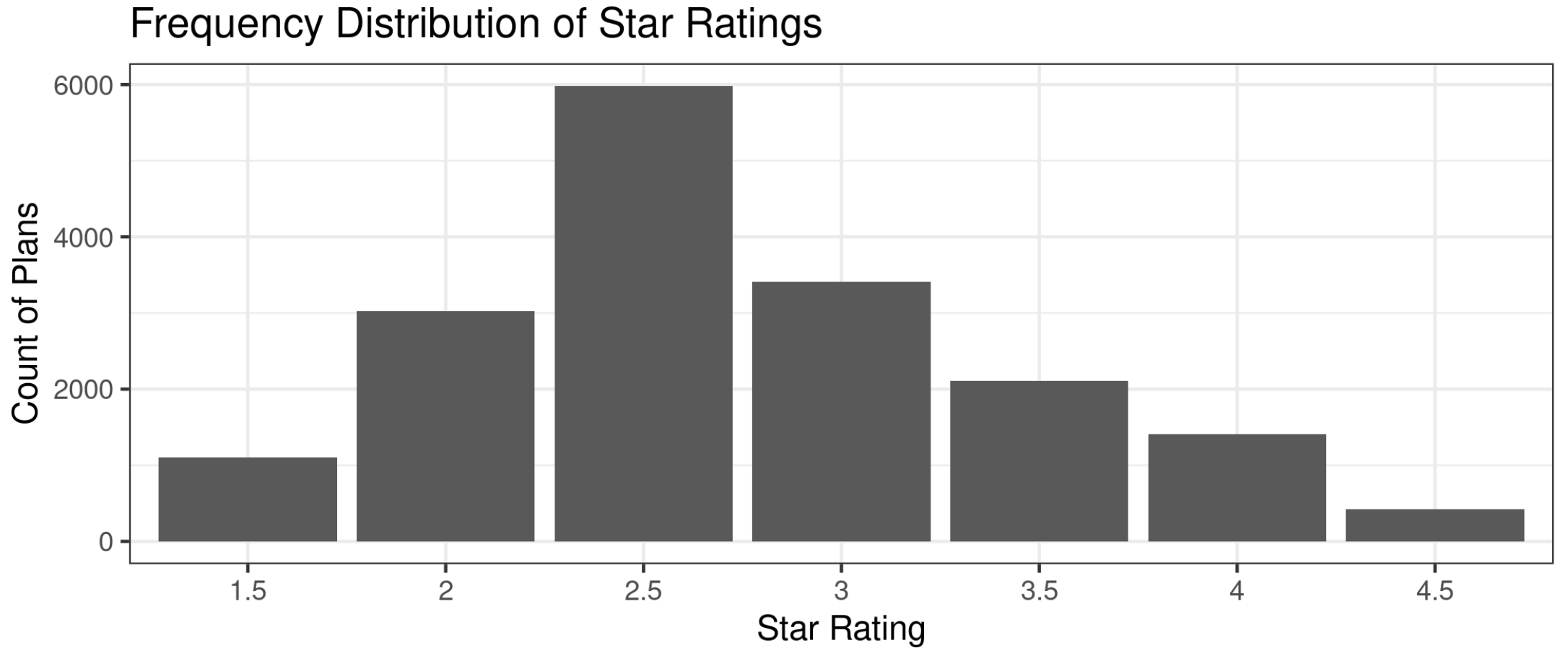
Calculate raw average rating

```r
ma.data.clean ← ma.data.clean %>%
  mutate(raw_rating=rowMeans(
    cbind(breastcancer_screen,rectalcancer_screen,cv_cholscreen,diabetes_cholscreen,
          glaucoma_test,monitoring,flu_vaccine,pn_vaccine,physical_health,
          mental_health,osteo_test,physical_monitor,primaryaccess,
          hospital_followup,depression_followup,nodelays,carequickly,
          overallrating_care,overallrating_plan,calltime,
          doctor_communicate,customer_service,osteo_manage,
          diabetes_eye,diabetes_kidney,diabetes_bloodsugar,
          diabetes_chol,antidepressant,bloodpressure,ra_manage,
          copd_test,betablocker,bladder,falling,appeals_timely,
          appeals_review),
    na.rm=T)) %>%
  select(contractid, planid, fips, avg_enrollment, first_enrollment,
         last_enrollment, state, county, raw_rating, partc_score,
         avg_eligibles, avg_enrolled, premium_partc, risk_ab, Star_Rating,
         bid, avg_ffscost, ma_rate)
```

Distribution of star ratings

```
ma.data.clean %>%
  ggplot(aes(x=as.factor(Star_Rating))) +
  geom_bar() +
  labs(
    x="Star Rating",
    y="Count of Plans",
    title="Frequency Distribution of Star Ratings"
  ) + theme_bw()
```

Distribution of star ratings

Frequency Distribution of Star Ratings

Enrollments and star ratings

```
##
## Call:
## lm(formula = avg_enrollment ~ factor(Star_Rating), data = ma.data.clean)
##
## Residuals:
##     Min     1Q Median     3Q    Max
##    -627   -388   -214    -51  41908
##
## Coefficients:
##                           Estimate Std. Error t value Pr(>|t|)
## (Intercept)                  87.31      43.32   2.016  0.04387 *
## factor(Star_Rating)2         32.75      50.62   0.647  0.51758
## factor(Star_Rating)2.5      194.65      47.15   4.128 3.67e-05 ***
## factor(Star_Rating)3        433.95      49.84   8.707  < 2e-16 ***
## factor(Star_Rating)3.5      470.91      53.47   8.808  < 2e-16 ***
## factor(Star_Rating)4        552.30      57.91   9.538  < 2e-16 ***
## factor(Star_Rating)4.5      272.36      82.68   3.294  0.00099 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1440 on 17451 degrees of freedom
## Multiple R-squared:  0.01559,    Adjusted R-squared:  0.01526
## F-statistic: 46.07 on 6 and 17451 DF,  p-value: < 2.2e-16
```