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Analyzing Medicare Advantage Plan Quality with Respect to Market Concentration

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## ABSTRACT

Medicare Advantage (MA), sometimes referred to as Medicare Part C, provides Medicare benefits through private providers. The private providers are paid by Medicare to give care to patients. During initial enrollment in Medicare or during a certain enrollment period each year, policyholders can choose to sign up for a Medicare Advantage plan instead of traditional Medicare. Since 2009, Medicare Advantage markets have become highly concentrated. In 2019, the top 10 MA organizations held about 75% of enrolled Medicare Advantage members. Additionally, since 2009 Medicare Advantage enrollment grew from 10.2 million to 18.5 million beneficiaries without much public policy debate. The trend continues as studies show a projected increase in the share of beneficiaries enrolled in MA plans, creating impetus to study how this market could change both the quality and cost of care. This research studies the effect of Medicare Advantage market concentration on the quality of MA plans quantified by the Star Rating System. This metric ranges from 1 to 5 and considers plan performance in several categories including quality of care and customer service. Medicare Advantage plans are funded differently by the government than traditional plans. The thesis discusses the results of this study through the lens of possible public policy changes that MA markets might require and critics' qualms with the Star Rating System for Medicare Advantage plans.

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## **Chapter 1**

### **Introduction**

Originating in 1997 with the name Medicare + Choice (M+C), Medicare Advantage was signed into law by President Bill Clinton. In 2003 the name changed and Medicare enrollees have had the opportunity to opt into MA plans ever since. Also referred to as Part C coverage, these plans cover Part A and Part B benefits traditionally provided by Medicare. Any member enrolled in Medicare Part A and Part B is able to apply for a MA plan, the only exception being members with kidney failure. Otherwise, all MA applicants must be accepted regardless of health needs. In addition to Part A and B coverage, most MA plans incorporate extra benefits such as Part D prescription drug coverage, dental, or vision. Some plans even provide coverage for fitness memberships, over-the-counter drug costs, or transportation to doctor visits. Plans can also provide specific coverage towards certain chronic illnesses to target enrollees who need those services. Aside from the additional coverage, the main difference of MA plans is that they are provided by private companies that Medicare approves.

Insurance companies offer six different types of MA plans to enrollees, however not all of them are available in all geographical areas. These six plans are HMO, PPO, HMOPOS, PFFS (Private Fee-for-Service), MSA (Medical Savings Account) and SNP (Special Needs Plan) (Medicare Advantage). Unlike traditional Medicare, MA plans may require policyholders to operate within a limited geographical area of medical providers. This may constrain MA enrollees to a limited provider network. Because of this constraint, Medicare enrollees who require specific services might benefit more by enrolling in Original Medicare plus supplemental

coverage. Each MA plan can have different rules about how coverage must be obtained. For example, certain MA plans may require a referral in order to see a specialist. With an HMO Medicare Advantage plan, enrollees are only allowed to see providers within the network. These restrictions can be harmful to Medicare enrollees who travel or live in different geographical locations throughout the year.

MA plans give enrollees the opportunity to receive care through private plans that Medicare approves and pays. Rather than charging fee-for-service (FFS) payment that is used by traditional Medicare, MA plans are paid a predetermined rate, risk-adjusted per enrollee. The intended benefit of this payment method is to incentivize private plan providers to innovate and improve care-management techniques in order to improve efficiency. This incentive is not present to providers in the FFS method. The Medicare Payment Advisory Commission (MedPAC) has recommended more equitable spending in payments between MA and traditional FFS Medicare plans. Previously, the payments to MA plans have been higher due to subsidies and quality bonus rules. Legislation has reduced the payment inequity so that MA plan payments have fallen relative to FFS plan spending. The payments and overall spending by Medicare on the two types of plans becomes crucial when reviewing the results of the plans' efficiency and quality of care (MedPAC).

For the Medicare enrollee, costs between Original Medicare and Medicare Advantage also differ. Under Original Medicare, the premiums for Part A and Part B coverage are set by the federal government. Part D prescription drug coverage can vary by plan, but the government sets a maximum deductible for this coverage. Many Original Medicare enrollees purchase supplemental coverage, Medigap, in addition to this coverage. There is no annual cap on out-of-pocket costs. This makes MA plans enticing due to the cap on out-of-pocket expenses. In 2021



the cap is set at \$7,750, which is a large increase from the previous decade's cap of \$6,700. A large caveat to this out-of-pocket expense cap is that it only applies to services otherwise covered under traditional Medicare, Part A and Part B coverage. This means that Part D expenses for MA plans are not capped even though many MA plans have Part D coverage. Enrollees must still pay the Part B premium, but MA plans can have a \$0 monthly premium. There are a few MA plans that offer "giveback" rebates, which reduces an enrollee's Part B Social Security premium to offset the Medicare Part B premium costs. When available, this reduction can save enrollees \$30 to \$70 per month. With growing availability in almost every state, a total of 160 MA plans offer this giveback rebate (Medicare Resources).

Aside from these specified rules, the amount that an enrollee pays for MA plans can vary widely. Out-of-pocket costs for MA plans can depend on deductibles, premiums, copayments, and doctor networks. The type of health care needs of an enrollee can drastically change the out-of-pocket expenses for these plans. Due to the volatility of MA plan costs, it is important to note that Medigap cannot apply to MA plans so there is no additional way to attain coverage for these out-of-pocket costs.

Since the creation of Medicare Advantage plans, the share of Medicare enrollees who opt into MA plans continues to increase. In spite of the narrower networks, increased out-of-pocket spending limits, and sometimes fewer benefits, the MA market reaches higher enrollment each year. In 2019, a record high of 34% of Medicare enrollees were enrolled in MA plans, bringing the total beneficiary number to 24 million Advantage enrollees (MedPAC). This number has continued to grow each year for the past decade. In 2021, the number of available MA plans in the country increased to 3,550. The average enrollee has the opportunity to pick from 33 different plans (Freed). A majority of enrollees also still have a zero-premium plan available in

that selection. The growth of the MA market creates a need to analyze the impact of the growing MA market on the effectiveness and cost of care, especially in areas of high and low market concentration.

## **Chapter 2**

### **Medicare Advantage Market**

The Medicare Advantage system and its ability to help increase efficiency in health care is dependent upon a few market elements, one of them being market competition between private plans (The Commonwealth Fund). The success of this “managed competition” created by federal subsidy to the Medicare Advantage plans is formulated by a certain level of market competition. In recent years, policymakers and health care analysts questioned the level of competition that exists within the MA market. Experts believe that competition in this market leads to lower premiums and increased benefits for enrollees (The Commonwealth Fund).

### **Measure of Market Concentration**

In the healthcare market, the Federal Trade Commission (FTC) and the US Department of Justice (DOJ) work to determine the measure of market concentration of insurance firms, especially when determining the viability of different mergers within the industry. The measure used by the FTC and DOJ to determine concentration is known as the Herfindahl-Hirschman Index (HHI). The HHI is calculated by summing the squared market shares of all individual firms within that market. The HHI can range from close to 0, indicating nearly perfect competition, up to 10,000, indicating a monopoly. The higher the HHI measure, the higher the market concentration. This measure adds weight to firms with higher market share by squaring those numbers to demonstrate market concentration.

## Herfindahl-Hirschman Index

$$HHI = \sum_{i=1}^n (MS_i)^2$$

**Figure 1: Herfindahl Hirschman Index Formula**

The DOJ uses three ranges of HHI figures to analyze the concentration of markets. An HHI of 1,500 or less indicates a competitive market. This means that market concentration is low and there are enough firms operating in that location to maintain competition. An HHI that falls between 1,500 and 2,500 indicates a moderately concentrated market. If the HHI is higher than 2,500, the DOJ considers that market to be highly concentrated. This means there are few competitors in the market and the market share falls between a small number of firms.

The benefit of using the HHI is the simplicity of the calculation. Additionally, little data is needed in order to calculate the market concentration. On the other hand, in certain situations the measure can be too simplistic. In cases of complex market situations this measure might not consider all of the important details necessary to identify a monopoly in a market or properly examine a market's concentration.

The DOJ and FTC use HHI measures to assess possible mergers in order to determine whether or not the merger will be healthy for market competition. The HHI index is used in this study to identify markets of high and low concentration within Medicare Advantage. The study is not affected by the simplicity of this calculation because it is only being used to determine concentration relativity within the MA market.

## Medicare Advantage Market Concentration

Since 2009, the MA market has become increasingly more concentrated, particularly after 2011. In 2007, the top four MA insurer organizations held 45% of total enrollees and the top 10 insurer organizations held 61% of enrollment. These numbers held relatively steady throughout health care changes due to the Affordable Care Act in 2010. In 2018, the top four MA organizations held 59% of enrollment and the top 10 organizations had 74% (MedPAC). There are different trends found between metropolitan and nonmetropolitan areas, however.

### *Metropolitan Areas*

### *Nonmetropolitan Areas*

Parent Organization	Share of total MA enrollment in counties	Parent Organization	Share of total MA enrollment in counties
UnitedHealth Group Inc.	26%	UnitedHealth Group Inc.	29%
Humana Inc.	17%	Humana Inc.	26%
CVS Health Corporation	10%	CVS Health Corporation	10%
Kaiser Foundation Health Plan Inc.	8%	Anthem Inc.	4%
Anthem Inc.	5%	Blue Cross Blue Shield of Michigan	3%
WellCare Health Plans Inc.	2%	WellCare Health Plans Inc.	2%
Blue Cross Blue Shield of Michigan	2%	Blue Cross Blue Shield of Tennessee	2%
CIGNA	2%	Geisinger Health	1%
InnovaCare Inc.	1%	CIGNA	1%
Centene Corporation	1%	UPMC Health System	1%
<b>Total, top 10 organizations</b>	<b>76%</b>	<b>Total, top 10 organizations</b>	<b>80%</b>

**Table 1: Share of Medicare Advantage Enrollment by Parent Organization, October 2019**

In 2019, there was higher MA market concentration in nonmetropolitan areas compared to metropolitan areas. With 19.3 million MA enrollees living in metropolitan areas, the top two insurers had 43% of enrollment. In nonmetropolitan areas, the top two insurers held 55% of market share. It is important to note that although the MA market is somewhat concentrated, most MA beneficiaries reside in areas where there are multiple insurers offering plans. In 2019, 97% of MA enrollees resided in areas where at least three insurer organizations offered MA plans (MedPAC).

There is an important distinction to be made between actual and potential competition in the Medicare Advantage market. Some literature about consumer choices within Medicare Advantage can be misleading to those trying to pick their health care plans. This is because many health insurers included in these markets offer multiple products in the form of health insurance plans within the same market (The Commonwealth Fund).

The topic of market concentration within the Medicare Advantage market has taken center stage in recent years through the eyes of the DOJ. In 2015, there was an attempt at the largest health merger in history when Aetna proposed to buy Humana for \$37 billion. A similar and even more ground-breaking proposal came about in the same summer when Anthem proposed to buy Cigna for \$54 billion. Both of these proposed mergers were scrutinized by federal judges through the lens of antitrust laws (Wattles).

The DOJ challenged both of these mergers on antitrust grounds. A focus of the argument was the effect the mergers would have on the MA market. The fast-growing MA market was gaining a large share of Medicare enrollees. One of the important decisions to be determined by federal judges was whether or not Traditional Medicare was a competitor with Medicare

Advantage plans. When it was determined that MA plans competed in their own distinct market, the rulings blocked both proposed mergers (The Commonwealth Fund).

There are certain drivers of this market concentration that explain the lower competition in MA markets across the country. Typically, consumers are the ones driving the changes in a market; their choices, preferences, and desire for lower costs drive change. Usually, consumers naturally make choices that lead to increased competition. In traditional markets, consumers benefit from competition in the form of lower premiums and increased benefits.

First, general consolidation within the health insurance industry may have influenced the concentration of the MA market. A study by Leemore Dafny, a professor at Northwestern University, showed this effect of consolidation on the MA market. It indicated the increased concentration ratios that resulted from the health insurance market changes.

The concentration of provider markets has also played a role in the consolidation of the MA market. When provider markets become more concentrated, price negotiations become more difficult for insurers. MA insurers, especially small companies, have a more difficult time making deals with different providers in their plan networks when there is lower competition among doctors, pharmacies, and hospitals (Scheffler).

Finally, in contrast to the private insurance market, the MA market is also affected by and reliant upon Medicare policy changes. Policy changes can have an effective influence on market concentration within MA. For example, Medicare made a policy change in 2011 that required all MA plans to create a provider network. This change increased provider concentration and MA insurers were then required to make changes to their available plans in each market based on price negotiations and market concentration of providers. Evidence in the *Journal of Health Economics* revealed that insurers who already had greater market power were more likely to stay

and create provider networks while those MA insurers with smaller market share were more likely to exit (Pelech). This effect grew stronger in nonmetropolitan areas, which adds to the already heightened concentration in those areas.

These market drivers worked together over the past decade to increase the concentration within Medicare Advantage.



## Chapter 3

### Star Rating System

The Centers for Medicare and Medicaid Services (CMS) created the 5-star rating program for MA plans in 2008. The rating program was designed to assist consumers with plan selection and provide information about the quality of different MA plans. The scores are set at the contract level so all plans under the same contract receive the same score (O’Neil). The calculated 5-star rating score is an average of different categories that have to do with quality of patient care.

### Star Rating Categories

CMS uses five different categories or “domains” to assess Part C MA contract performance and quality. A star rating score is calculated for each of these five domains and the resulting scores are averaged to create a summary score. Each of the following five domains are equally weighted to create the summary score.

1. Staying Healthy (HD1): Use of screenings, tests, and vaccines

This domain is rated on the patient’s access to preventative care. Some of the examples of the measures that fall into this category are breast cancer screenings, monitoring physical activity, annual flu vaccine administration, and maintaining mental health (17). These types of services are typically managed by a patient’s primary physician. If these preventative services are performed at a higher rate, the star rating in this category increases.

2. Managing Chronic Conditions (HD2): Care given for long-term illnesses

Measures in this domain provide information on the plan coordination and quality of long-term condition management of the contract. Special Needs Plan (SNP) management, pain assessment, diabetes care, rheumatoid arthritis management, and reducing fall risk are all measures that fall into this domain. Similar to HD1, the star rating for this category is higher if these measures are managed by the patient's doctors.

3. Member Experience (HD3): Rating overall member satisfaction with plans

In addition to measurable health outcomes and administration of treatments, member satisfaction with the care they receive is considered when calculating star ratings. Some of the measures included in this domain are timeliness of appointment scheduling, customer service, care quality, and plan coordination. While HD1 and HD2 data are collected from plan reporting, HD3 uses different sources. Enrollee plan surveys are used to gather the data for HD3 measure calculations. Patients who are members of different contracts answer a series of survey questions to determine the member experience metrics.

4. Member Complaints and Changes in Health Plan's Performance (HD4)

Similar to the member experience measures, HD4 focuses on the responses and behaviors of the contract members. The plans are rated on how frequently members left the plan or filed complaints about the plan. It notes instances where members struggled to acquire the care they needed. Another measure used is the improvement from year to year of the plan based on the previous year's summary star ratings.

5. Health Plan Customer Service (HD5): Quality of call center services and processing

Processing appeals and acquiring information about plans from call center representatives are integral parts of the health care process. One of the important measures of this domain is the timeliness of appeals processing because of the necessity to correctly charge and manage the payments of the member. Another included measure is the availability of translators at call centers so that members always have accessibility to information about their plans. Prospective enrollees are also included in this measure of call center availability.

These domains culminate to create a summary star rating score for Part C MA plan contracts (CMS). It is important to note that for Part D stand-alone plans and MA plans that include drug coverage, additional measures are used to calculate the summary star rating. The domains and measures are similar to the Part C contract domains. They include the following:

1. Drug Plan Customer Service
2. Member Complaints and Changes in the Drug Plan's Performance
3. Member Experience with the Drug Plan
4. Drug Safety and Accuracy of Drug Pricing

With the exception of the last domain, many of the measures and categories are very similar to those used for the Part C ratings. The Part D domain regarding drug safety and pricing information allows these plans to be accountable for the additional risks associated with prescription drug care. The drug safety measures represent the percentage of members who were given a risky drug or one with many side effects when there was a safer one available to them. It also considers the safety of the prescription plans that are administered to patients with underlying medical conditions. The drug pricing measures have little to do with the actual prices

that the members pay for the drugs. These measures account for the accuracy of the plan's communication about the pricing. Information regarding the pricing is usually listed on the Part D Prescription Drug Plan and MA Prescription Drug Plan websites. If this information is not as accurate and up-to-date as it should be, the plan receives a lower rating for this measure of drug pricing (Sprague).

### Star Rating Implications

Beyond data collection and feedback, star ratings have other implications on the functions and details of MA plans, especially for the provider. Medicare payments toward MA plans are in the form of a plan bid. The bidding partially determines the amount that the plan contract receives from the government. Consisting of the plan's administrative costs as well as profit, the plan bid is based off of a standard beneficiary in the plan. CMS then uses the plan bid as well as the benchmark in order to determine the payment. MA benchmarks are an important part of the payment process because of their variability from plan to plan.

Star Rating	Benchmark Rate Bonus*	Rebates %** (% of Savings)
3.0 or lower	0%	50%
3.5	0%	65%
4.0	5%	65%
4.5 or higher	5%	70%
New/Low Enrollment	3.5%	65%

\*The bonus is double the percentage shown in this table for qualifying counties.

\*\*The rebate percentage is the portion of the difference between the benchmark rate and bid retained by the MAO.

**Figure 2: Benchmark and Rebate Rates by Star Rating from Milliman**

MA benchmarks serve as targets for the plan bids. They are based on different factors of the plan including risk score, benchmark rate, rebates, premiums, and MSP factors (Backes). The benchmark rate is where the star ratings are incorporated. The summary star rating of a contract can increase its benchmark rate by enabling it to enter the Quality Bonus Payment (QBP) program. If contracts are given a higher score, they can receive higher bonus payments from CMS.

In addition to the QBP, the star rating also allows for higher rebate percentages as shown in Figure 2. The rebate percentages for MA plan bids are defined as the portion of the difference between the benchmark rate and the bid retained by the MA contract (Backes). For contracts with higher star ratings, the rebate percentages are higher. If that plan bids below the benchmark, the plan will receive the specified rebate. The funds received from rebates are required to be rolled back to enrollees. Rebate funds can be given back to enrollees in the form of premium cuts or additional benefits (MedPAC).

### **Problems with QBP**

Since the introduction of the QBP Demonstration in 2012, many studies have reported results of improved quality in MA plans. Improved star ratings across counties and contracts were recorded. By 2014, 95% of counties in the country had accessibility to at least one 4-star plan. Additionally, by 2015 over half of Medicare Advantage enrollees were enrolled in a 4-star or higher plan (L&M). Rating improved significantly between 2012-2015 for for-profit MA plans.

More recently, however, MedPAC began to criticize the details of the QBP and how it was affecting the functionality of MA plans. In a 2019 report, MedPAC argued that the QBP program was inconsistent with the previously defined principles of quality measurement made by the CMS. MedPAC outlines three qualms it has with the QBP program.

First, MedPAC points out that there are too many quality measurements used in the QBP program. With almost 50 different measures, the program strays away from patient outcomes and results. Instead, it is too focused on administrative and process quality measurements. The report points out the importance of using a small set of measurements based on population data (MedPAC).

Second, the QBP program makes bonus payments based on the performance of an entire contract. This stretches beyond just one local area, and sometimes includes noncontiguous states. Contract-level ratings are not the best way to accurately portray the performance of local plans. Large amounts of variation could exist between two plans in the same contract if they are located in different states or regions of the country.

Finally, the contract comparisons used to determine where to distribute the QBP bonuses are done through a “tournament-style” scoring plan (MedPAC). Plan performance is rated based on how other plans perform, as opposed to comparing plan performance to pre-set targets specific to each plan. Under this method, performance targets are not known in advance by the different plan owners, which makes it difficult to improve their ratings.

Another issue with the QBP is presented by its funding. Originally, the program was supposed to be budget-neutral, meaning that the payment funding would not affect the overall program budget. However, the QBP is funded with additional dollars. CMS works to provide a financially neutral group of options for Medicare enrollees. This includes both MA plans and

traditional Medicare plans. Through the QBP program funding, this principle is violated and creates a financial imbalance to the Medicare playing field (MedPAC).

## **Chapter 4**

### **Data Study Background**

The goal of the thesis data study is to identify and analyze the relationship between Medicare Advantage plan concentration by county and plan quality measure through the Star Rating System. All raw data files are sourced from the Centers for Medicare and Medicaid Services. Using the most recent data available, this study uses MA enrollment data from the 2020 plan year. The enrollment numbers by county and the star rating summary for each plan are from the October 2020 data release from CMS. These two raw data files are key players in the study performed in this thesis.

The enrollment data is separated by State/County/Contract. Using the abridged version that excludes any contracts with less than 10 enrollees, the data file lists each Contract ID across the United States with details on its county and state origins. The enrollment numbers for each contract ID are listed as well. Over 33,000 Contract ID's are entered into this raw data file. To begin analyzing the data using concentration of MA plans, Pivot Tables in Excel are used to consolidate the enrollment data by county. Around 3,000 counties exist in the United States and each is included in this MA plan study.

### **HHI Calculations**

As briefly discussed in Chapter 2, the Herfindahl-Hirschman Index is used to measure market concentration in most economic analyses. It is also the main measure used by the DOJ when determining how competitive or monopolistic a market is. The HHI is used in this study as



the only measure of market concentration for MA markets across the country. The first part of the data study works to calculate those index measure for each county across the country.

Using the HHI formula discussed earlier in the thesis, the data study performs market share calculations for each contract in every country. The HHI is calculated by then summing the squared market share for each county. Below is an example of how this calculation was done for Centre County, Pennsylvania:

<b>Contract ID</b>	<b>Enrolled</b>	<b>Market Share (% rounded)</b>	<b>Squared Market Share (% rounded)</b>
<b>H2001</b>	300	2.323	5.397
<b>H2915</b>	33	0.256	0.065
<b>H3907</b>	51	0.395	0.156
<b>H3916</b>	5369	41.575	1728.484
<b>H3923</b>	129	0.999	0.998
<b>H3924</b>	610	4.724	22.312
<b>H3954</b>	3320	25.709	660.929
<b>H3959</b>	542	4.197	17.615
<b>H3962</b>	170	1.316	1.733
<b>H4279</b>	11	0.085	0.007
<b>H4909</b>	11	0.085	0.007
<b>H5216</b>	143	1.107	1.226
<b>H5521</b>	1228	9.509	90.422
<b>H5522</b>	541	4.189	17.550

<b>H5525</b>	269	2.083	4.339
<b>H8145</b>	131	1.014	1.029
<b>H9408</b>	33	0.256	0.065
<b>H9572</b>	11	0.085	0.007
<b>R0923</b>	12	0.093	0.009
<b>TOTAL</b>	<b>12194</b>	<b>100</b>	<b>2552.349</b>

**Table 2: Centre County, PA HHI Calculation**

Each Contract ID that exists in Centre County, Pennsylvania is listed on the far-left column. The enrolled column is extracted from the raw enrollment data file downloaded from CMS. The market share column takes each contract's enrollment number and divides it by the total Centre County enrollment, which is 12,194. The market share numbers are multiplied by 100 to fit the format of the HHI formula. The squared market share column squares each term in the market share column. Finally, the total of the squared market share column, 2552.349, is the HHI of Centre County, PA.

This process is performed for each county in the country and the final output is a list of all counties with the corresponding HHI. The next step in the study includes the star ratings for each MA plan.

### **Average Star Rating Calculations**

The CMS provides data on the star ratings updated each plan year for all MA plans in the system. The most recent set of star rating data comes from October 2020. To analyze star ratings by market concentration, the plan star ratings had to be analyzed on the same level as the HHI

calculations. The HHI measure performs its calculations on the county level, so the same was done with star ratings. CMS provides a list of star ratings by individual Contract ID's, similar to the enrollment files. To analyze star ratings on the county level, this data study uses average star ratings of all plans in each county. The final result provides average star ratings of all MA plans for each county in the US with enough data.

One stipulation of the final data set used in the analysis of the study is that star rating data from the CMS is not complete. Not all Contract ID's come with a star rating. There are two main reasons for this lack of data for certain plans. One of the reasons the CMS gives for absence of star ratings is that some plans are too new to be measured. When plans are first implemented, the plan must be up and running for a certain minimum period of time before star rating categories can be fulfilled. If a full year has not yet passed, certain procedures, preventative screenings, and vaccines may not have had a chance to be administered yet. Therefore, a standard minimum of plan existence is required before star rating data can be provided. The other reason for the lack of data for certain contracts is that there is not enough data available. The CMS does not give an explicit description of why there is not enough data available. It is possible that certain contracts do not receive the optimal amount of monitoring to get accurate results of the quality of the plans.

To adjust the data set for these missing measures, the average star rating calculations ignores any Contract ID's that do not have enough data or are too new to be measured. In the average calculations performed in the study, Pivot Tables in Excel are used to ignore these values so they do not skew averages based on how many plans in the county have missing data.

### Final Data Set

The completed data set that is used throughout the remainder of the thesis is comprised of the HHI measures and average star ratings by county. Certain counties that did not have any star rating data to create an average are removed from the final data set. 2,823 counties are included in this data set, part of which is displayed below:

County, State	HHI	Average Star Rating
Abbeville, SC	1523.396811	3.9375
Acadia, LA	1668.053622	4
Accomack, VA	2045.27697	3.583333333
Ada, ID	1998.718742	4
Shawano, WI	2500.957829	3.95
Adair, KY	1945.354643	3.8
Jasper, SC	2502.001769	4.1875
Black Hawk, IA	2505.651301	3.857142857
Smith, TN	2505.760504	3.6
Chattooga, GA	2506.588795	3.928571429
Jersey, IL	2506.884886	3.8
Louisa, IA	2510.228571	3.928571429
Adams, IN	2125.296456	4
Yadkin, NC	2511.860633	3.785714286
Aransas, TX	2512.43229	3.916666667
Adams, NE	1613.554172	4
Adams, OH	1696.173909	4.055555556
Adams, PA	1691.528609	3.911764706
Pawnee, NE	2517.146776	4

**Table 3: Excerpt from Final Data Set**

After completing the final data set, the next chapter examines and analyzes the relationship between MA market concentration and average star rating by county.

## Chapter 5

### Data Study Analysis

The final data set consisting of all counties in the United States with MA plan star ratings and market concentration measures is analyzed in this data study. Beginning with the entire data set, descriptive statistics of the star ratings of all counties are displayed.

☐ COUNTIES W STAR RATINGS

#### Descriptive Statistics: Average Star Rating

##### Statistics

Variable	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3
Average Star Rating	2823	0	3.9111	0.00423	0.2246	3.2500	3.7778	3.8800	4.0000

Figure 3: Descriptive Statistics of All Counties

To determine the effect of market concentration on star ratings of Medicare Advantage plans, counties are split into categories. Using the scale defined by the HHI, counties are separated into competitive markets, moderately concentrated markets, and highly concentrated markets. Descriptive statistics are displayed for the competitive markets and highly concentrated markets to show an initial difference in sample means.

☐ NOT CONCENTRATED

#### Descriptive Statistics: Average Star Rating

##### Statistics

Variable	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3
Average Star Rating	355	0	3.8527	0.00727	0.1370	3.4286	3.7692	3.8529	3.9375

Figure 4: Descriptive Statistics of Competitive Markets

HIGHLY CONCENTRATED

## Descriptive Statistics: Average Star Rating

### Statistics

Variable	N	N*	Mean	SE Mean	StDev	Minimum	Q1	Median	Q3
Average Star Rating	1490	0	3.9570	0.00694	0.2680	3.2500	3.8000	3.9500	4.1000

Variable	Maximum
Average Star Rating	5.0000

Figure 5: Descriptive Statistics of Concentrated Markets

### Test Assumptions

To initially analyze the difference in population means of average star ratings for different market concentration groups, a two-sample t-test was run in Minitab. Assumptions for a two-sample t-test include independent populations, normality of data, and equal variances. The populations of competitive markets and highly concentrated markets are independent from one another. The average star rating of a county in New York City does not affect the star rating of MA plans of a county in California. The normality assumption of the data is also satisfied. Using a histogram, a probability plot, and an Anderson Darling test of normality, there is evidence that the data follow a relatively normal distribution.

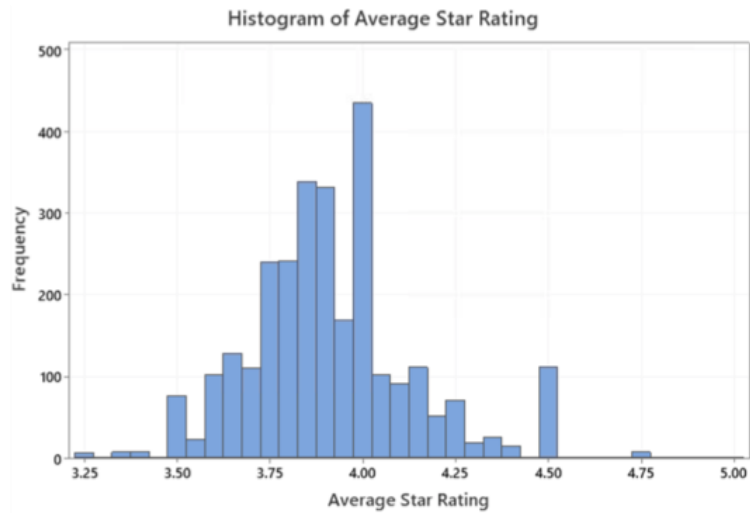


Figure 6: Histogram of Average Star Ratings of All Counties

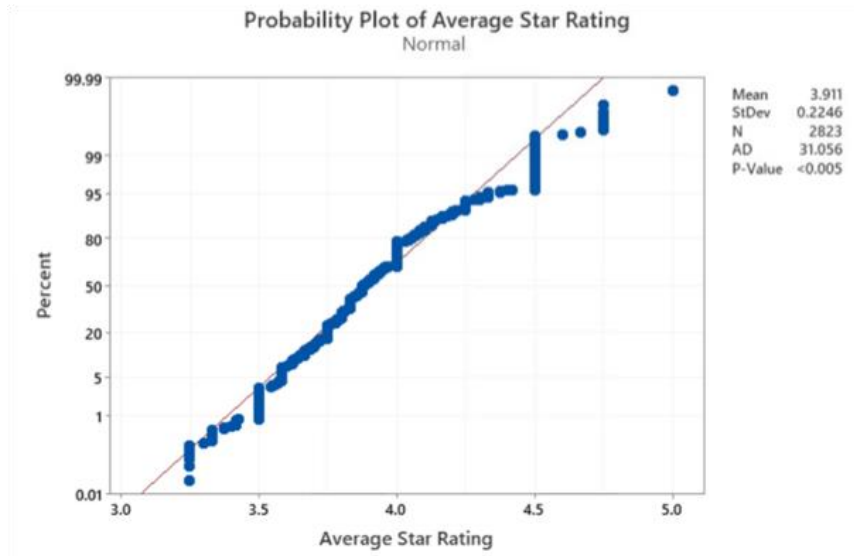


Figure 7: Probability Plot & AD Normality Test

Although the histogram does not show the clearest evidence that the data follow a normal distribution, t-tests are fairly robust to the normality assumption. When analyzing the normality of the data set, it is important to note that the two-sample t-test is fairly forgiving when it comes to normality testing. Even so, after running an Anderson Darling test of normality, there is evidence to suggest the data do not follow a normal distribution using the Anderson Darling test outlined in Figure 7 and below.

*$H_0$ : The data follow a normal distribution*

*$H_a$ : The data do not follow a normal distribution*

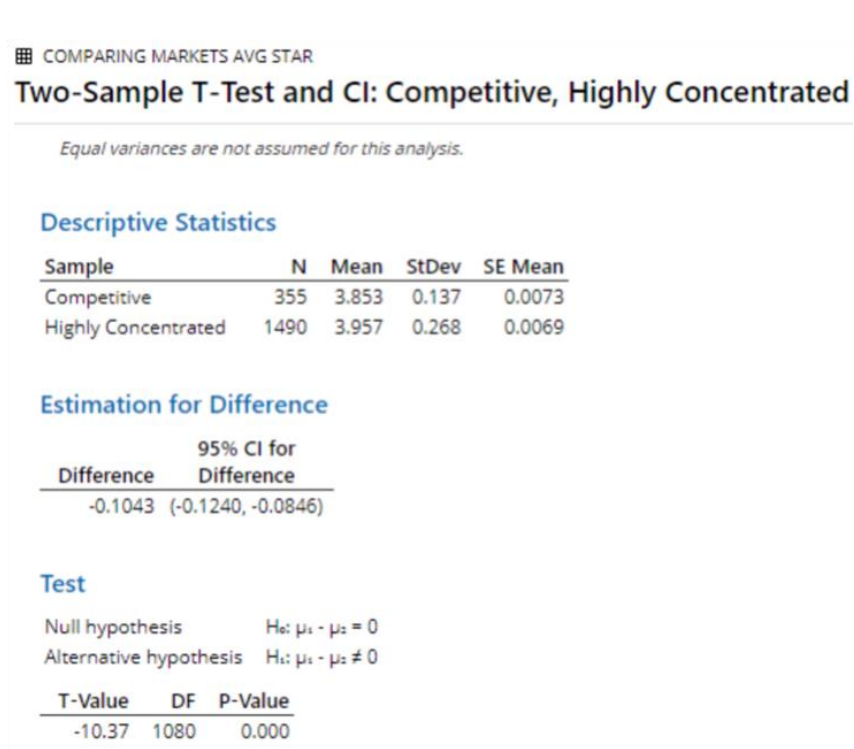
With an Anderson Darling test statistic of 31.056 and a P-value less than 0.005, at an alpha level of 0.05 there is evidence to reject the null hypothesis and conclude that the data do not follow a normal distribution. However, the histogram suggests that the data is relatively normal as it is fairly symmetrical and unimodal. Relying on the robust nature of the two-sample t-test, the AD test results do not prove the t-test to be ineffective.

Finally, the variances assumption must be evaluated. Although the data assumption outlines the need for equal variances, there can be t-tests performed on samples with unequal variances. Minitab uses a different calculation for standard error when variances are unequal. In this case, the sample variances as outlined in the descriptive statistics for the two market comparisons are different enough to assume unequal variances.



## T-Test Results

After checking the t-test assumptions, a two-sample t-test was run on the data samples of competitive market average star ratings and highly concentrated market average star ratings. The results of the two-sample t-test are shown and analyzed further in this section.



**Figure 8: Two-sample t-test Results**

As shown in the Minitab output, the two-sample t-test uses the following null and alternative hypotheses:

$$H_0: \mu_1 - \mu_2 = 0$$

$$H_a: \mu_1 - \mu_2 \neq 0$$

Using an alpha level of 0.05, the test statistic of -10.37 gives a P-value of approximately 0. The null hypothesis is rejected and there is evidence to conclude that the population means are unequal. From this t-test conclusion it is demonstrated that the average star ratings of Medicare

Advantage plans in highly concentrated counties is different than that of competitive markets. Furthermore, based on the sample means for the two categories it seems as though the average star ratings for highly concentrated counties is higher than the averages of the counties with low market concentration.

After analyzing these results, it is clear that there is some significant difference between the quality of Medicare Advantage plans depending on the concentration of the market they operate in. However, the estimation for this difference performed in the two-sample t-test was considerable small. While the star ratings range from 0 to 5 on a 0.5 step scale, the 95% confidence interval estimates that the difference in population means of average star ratings for the two markets is (-0.124, -0.085).

To continue exploring the effect that market concentration has on Medicare Advantage plan quality, the study analyzes a different dataset using the same testing method.

### **Data Tail Analysis**

While the results of the two-sample t-test analysis on the original data set are significant, the difference between the two hypothesized population means are quite small. To further analyze the effects that market concentration has on the average star ratings of MA plans, the two-sample t-test is run on a new dataset that focuses on the tail ends of the data.

In the previous testing, the competitive markets category includes all counties with HHI measures below 1500 and the highly concentrated markets includes all counties with HHI measures greater than 2500. To test the extreme cases of market concentration, the dataset is edited to include only the top and bottom 10% of counties in terms of their HHI metric.

The same testing assumptions are used for the tail analysis. However, a one-sided t-test is used instead of a two-sided t-test. After analyzing the results of the descriptive statistics and t-test for the entire dataset, the population mean of average star ratings is lower for competitive markets than in highly concentrated markets. To test the validity of this conclusion, a one-sided t-test is implemented. The difference in the null and alternative hypotheses for this type of test allow for a more concrete conclusion of the specific effect market concentration has on these ratings.

$$H_0: \mu_1 - \mu_2 = 0$$

$$H_a: \mu_1 - \mu_2 < 0$$

Rejecting the null hypothesis in this one-sided two-sample t-test allows for the conclusion that the population means for the two market types are not only different, but that one is greater or less than the other. In this test, the alternative hypothesis postulates that the population mean of average star ratings in the most competitive markets is less than that of the most highly concentrated markets. The purpose of this test is to reach this conclusion about which group has better quality MA plans as well as analyze the extreme cases of market concentration on both sides of the spectrum.

LOWEST AND HIGHEST 10%

## Two-Sample T-Test and CI: Lowest 10%, Highest 10%

### Method

$\mu_1$ : population mean of Lowest 10%

$\mu_2$ : population mean of Highest 10%

Difference:  $\mu_1 - \mu_2$

*Equal variances are not assumed for this analysis.*

### Descriptive Statistics

Sample	N	Mean	StDev	SE Mean
Lowest 10%	282	3.847	0.138	0.0082
Highest 10%	282	4.134	0.350	0.021

Figure 9: Descriptive Statistics of Tail Data

After viewing the descriptive statistics, it seems that the difference in sample means support running the two-sample t-test. The larger difference in the tail data sample means suggest the possibility of market concentration having a larger effect on star ratings in the more extreme cases.

### Estimation for Difference

Difference	95% Upper Bound for Difference
-0.2866	-0.2497

### Test

Null hypothesis  $H_0: \mu_1 - \mu_2 = 0$

Alternative hypothesis  $H_1: \mu_1 - \mu_2 < 0$

T-Value	DF	P-Value
-12.81	365	0.000

Figure 10: One-sided t-test of Tail Data

The results of the two-sample one-sided t-test calculate a t-value of -12.81 with a p-value of approximately 0. At an alpha level of 0.05, there is evidence to reject the null hypothesis and infer that the population mean of average star ratings for the top 10% of competitive markets is less than that of the top 10% of highly concentrated markets.

It is also important to note that the estimated difference between the population means is a much larger gap than indicated in the entire dataset. The estimation for the difference in population means in the tail data study is almost triple that of the study including all counties in the category. This result is significant because it exhibits the powerful impact of extreme concentration or extreme competition on the MA plan quality in those counties.

From the data study completed in this thesis, the test results show evidence that Medicare Advantage market concentration has an effect on plan quality as rated by the star system. The average star ratings for counties with increased market concentration are significantly greater. Additionally, the more extreme the market concentration or market competition, the larger the impact it has on the average plan quality. After this discovery, the next steps are to analyze reasons for this difference in plan quality across counties and understand the impact this trend might have on the Medicare Advantage market as a whole.

## Chapter 6

### Data Study Analysis

#### Study Limitations

Though the results of the study show a significant difference in plan quality for contracts operating in markets with different levels of competition, there are limitations to its implications. Star rating data is the most glaring limitation of the study performed. While the metric provides an outline of patient health outcomes and health care accessibility, it is unclear whether this measurement fully captures the quality of care patients receive. Critics of the star rating system denote it as an incomplete measure of health plan quality. A major concern from MedPAC is that the star rating system evaluates plan quality on the contract level rather than on a local geographic level. This makes it hard to evaluate the quality of care in a patient's local area and capture the differing qualities of care for patients in certain subgroups of the Medicare population (MedPAC). To gather more accurate data on patient health outcomes, MedPAC also recommends that ratings only include claims-based metrics, which are considered MA encounter data. Currently, the star rating metric relies on sampling of medical records as well. Ratings are very sensitive to the influence of outliers, either high or low performers in the market (MedPAC).

The concerns with the star rating system put limitations on the outcomes of this study. However, the results found through the data are significant and provide reason for consideration of market concentration when adjusting or creating policy in the Medicare Advantage space.

## MA Consumer Pricing

While plan quality is a very crucial component of consumer choices in selecting a MA plan, there is another large factor to be considered. An important examination that falls beyond the scope of this data study is the relationship between MA market concentration and the premium levels that consumers pay for plans in those markets. Since the reimbursement system used by Medicare to pay insurers in the MA system relies on competition to pass savings onto consumers, there is concern that policyholders might overpay in areas of high market concentration. An issue brief from The Commonwealth Fund suggests that the development of high market concentration in the MA space could cause both taxpayers and consumers to overpay for these plans. The report notes that the competition between insurers selling MA plans encourages premiums to stay close to insurers' actual costs (The Commonwealth Fund). The concerns addressed by The Commonwealth Fund are based on economic theory of competition and prices, and the authors expressed the need for more empirical evidence.

A research article from the Journal of Health Research Services analyzes this relationship with concrete data. Results of the 2019 study suggest that mean premiums of plans operating in more concentrated markets are higher than those operating in more competitive markets. In extreme cases, the mean premiums of plans in highly concentrated markets were almost double the premiums of plans in extremely competitive markets. Plans in markets with an HHI of 100 or less had an average premium of \$31.25, whereas the adjusted mean premium of plans operating in markets with an HHI over 7500 was \$65.54 (Adrian). The staggering difference in plan premiums, especially for extreme cases, indicates the need to take both plan quality and price into consideration in the discussion of policy relating to MA market concentration.

A limitation of the conclusions drawn in this study is the lack of consideration of consumer preferences. Medicare Advantage premiums are based on the quality and amount of services that are offered by a plan. The insurance provider has the flexibility to create a bundle of services and healthcare offerings to include in the MA plan and set the premium for the consumer. It is possible that a portion of the higher premium costs in more concentrated markets is due to the consumer preference for a larger bundle of healthcare services to be included in the MA plan. The study reviewed above does not take this difference in consumer preferences into account when analyzing the study results of premium differences. Regardless of the reason for these premium differences, the study results have a place in policy discussion of the regulation of MA plans.

### **Policy Implications**

After concluding the study on the relationship between market concentration and plan quality for Medicare Advantage, it is important to try to understand why the data behaves this way. In most economic theory, competition leads to positive outcomes for the consumer. Competitive markets create fair prices and better quality and choice of products for the buyer. In health care, the economic behavior of Medicare Advantage plans might vary from this theory. The results show that the quality of MA plans is higher in areas with less competition. While this result deviates from the competition theory of neoclassical economics, there may be reasons to explain this relationship.

Insurers that create MA plans tend to create narrow networks for their policyholders. Insurers pay different providers to be a part of their network at a contracted rate. To create the



best network of doctors and healthcare providers, an insurer must use their resources and negotiation leverage to get the best doctors at the best price. As seen in the data study, insurers with greater market share operating in more concentrated markets have better health outcomes as reflected by the star ratings. These larger insurers are able to get higher health outcomes by using their elevated negotiation and bargaining power with providers in highly concentrated markets (Scheffler). A study on insurer market share and bargaining power from 2017 found evidence of this hypothesis. The study finds that with physician services, insurers with market shares of 15% or higher negotiated prices for doctor visits that were 21% lower than prices negotiated by insurers with less than 5% market share (Roberts). The ability of large insurers operating in concentrated markets to create networks at lower costs could possibly explain the higher average plan quality for these contracts.

In addition to the leverage these large insurers have with negotiation of networks, there are also more systematic ways that insurers are able to acquire better health outcomes. As discussed earlier, the Quality Bonus Program (QBP) rewards MA insurers for high star ratings. Plan contracts with above a 4-star rating are eligible for quality bonuses. Larger insurers with the negotiation power to create narrow networks that result in higher health outcomes are likely to receive these bonus payments. Upon its implementation, the bonus payments were a revenue incentive for insurers to create the best networks possible and give their policyholders the opportunity to receive the best health care at the best price. However, it is possible now that the bonuses create a cycle that stalls improvement from insurer contracts with lower market share and star ratings. The large insurers with the plentiful resources to create networks that they know will result in high health outcomes are getting rewarded with even more revenue to use as they please. Smaller insurers may get stuck in a cycle of low star ratings without any boost from CMS

to help them improve their networks. This cycle of high star ratings and high bonus payments could be contributing to the results found in the study relating high market concentration to higher health outcomes.

The research performed in this study as well as the conclusions drawn on the explanation of the behavior of the data have implications for policy creation in the future of Medicare Advantage. Typically, in the health insurance space, there are two ways that the government can control the market: regulate competition or regulate prices. The DOJ currently deals with most of the market competition regulation in terms of rejecting or accepting mergers and acquisitions of health insurers. After studying the results of the tests on the relationship between market concentration and star ratings it seems that regulation on market competition may not be as robust a solution as it appears in terms of economic theory and popular policy discussion. However, the results of the study combined with the research on consumer prices for plans operating in highly concentrated markets suggest that price regulation could be helpful for MA contracts.

The MA market could benefit from a policy process that requires MA insurers to pass a certain portion of the quality bonuses they receive onto the consumer in the form of premium reductions. While these insurers are providing networks that give policyholders the best care in terms of health outcomes, the consumer may be overpaying. Policy action on the state and federal level can be taken to ensure that consumers are paying the right price. In addition to this change, CMS can continue to enhance its plan quality metrics so that the star rating system becomes an accurate measure of health outcomes for MA plans on the local level.

With the improvement of accuracy in measuring MA plan quality and the implementation of a policy to pass insurer savings onto the consumer, MA plans can continue to grow not only in enrollment size but also in value to the current healthcare system.

## Appendix

Full data set and data splits can be downloaded [here](#).

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**Marsh & McLennan** **Virtual**  
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- Trained virtually with Marsh & McLennan employees through Zoom video sessions in an 8-week learning experience to meet actuarial professionals and understand the role of a Mercer wealth consulting actuary
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**LEADERSHIP & INVOLVEMENT**

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