Medicare Analysis Report

MGSC310
December 9th, 2018
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Problem:

For our project we studied a major government medical program, Medicare[1]. Healthcare initiatives and programs have been the center of political and social discussion for years and will likely continue to be so, as the safety and care of citizens is of the utmost importance. However, many questions arise from the treatment of citizens and how much the scope of government healthcare should cover. This brought us to the idea of analyzing the relationship between Total Payment and Average Covered Charge to determine the amount of Medicare coverage (in dollars) patients are receiving in regards to their treatment (operation).

Motivation:

When taking into consideration the varying financial climates people have it is apparent that many do not have the ability to afford healthcare and are reliant on the government to provide it. This dependence means the government cannot afford to not be distributing the best healthcare coverage possible for the financial sake of its citizens. That being said this report

[1] *Medicare government health insurance is offered assuming people fulfill one of the following requirements: 65 years or older, disability benefits, Lou Gehrig's disease, or end-stage renal disease. There are 4 different parts to Medicare: A) hospital insurance, B) medical insurance, C) Medicare Advantage, D) prescription drug coverage. While not all people contract all parts of Medicare as of 2015 over 55 million people were beneficiaries. *In all parts of Medicare beneficiaries are responsible for at least part of a share in the cost (often around particular percentages). In terms of financial coverage, there are some flat charges and percentages depending on operations, for example, in Medicare Part A after 60 days in a hospital there would be flat charges incurred.*

helps indicate how much monetary help the government gives in terms of paying for medical services. Our motivation in selecting this topic was the consideration that one's health is of paramount importance and no one should ever risk their health because of financial reasons.

Revision of Medicare Study

Originally our group took an undertaking much more complex than what we delivered. We had a heavy interest in understanding the allocation of where most medical payments go in terms of what particular of medical operations experience the highest costs and coverages. In other words, what is the distribution of Medicare coverage by field. Unfortunately, we encountered several obstacles too complicated for our own skills. First and foremost, this dataset was originally selected because of the vast amounts of "DRG.Definition" data. With this variable we hoped to scrub it into our own category of specific medical fields. Because they were categorical variables we thought it would be simpler to export them into Excel and then with conditional formatting and replacing we began switching them to particular medical fields such as neurology, pulmonology, gastroenterology. This became increasingly complex as we realized that hospitals had hundreds of procedures and they were assigned numbers in no particular pattern. In other words an operation like "EXTRACRANIAL PROCEDURE" may have the "DRG.Definition 0.39", but another neurology procedure may easily be a number like 925. Also another important point to mention is that many hospitals have different standards of healthcare and as a result have different rates of charged which would impact Medicare directly.

Dataset Explained:

Our data covers Medicare part A, as we chose to take a closer look into Medicare within hospital operations. The data we used includes hospital-specific charges from more than 3,000 United States hospitals that receive Medicare Inpatient Prospective Payment System (IPPS) payments for the top 100 frequently-billed discharges, paid under Medicare based on a rate per discharge using the Medicare Severity Diagnosis Related Group (MS-DRG) for Fiscal Year (FY) 2011. For these DRGs, average charges, average total payments, and average Medicare payments are calculated at the individual hospital level. With this data, we are able to make comparisons between the amount charged by individual hospitals within local markets, and nationwide, for services that might be furnished in connection with a particular inpatient stay.

The variables our group focused on were Covered Charges, Average Total Payments, Total Discharges and Average Medicare payments. Covered Charges are the provider's average charge for services covered by Medicare for all discharges in the MS-DRG(Medicare Severity Diagnosis Related Group.) Average Total Payments to all providers for the MS-DRG, teaching, capital, disproportionate share and outlier payments. Included in the average total payments are copayments and deductible amounts. Total Discharges is the number of discharges billed for inpatient hospital services. Lastly, Average Medicare payments are the average amount that Medicare pay to the provider for Medicare share of the MS-DRG. The Average Medicare payment amounts include the teaching, capital, disproportionate share and outlier payments as well.

Our data file is solely informative on Medicare Part A fee-for-service coverage, which is the hospital-based part of Medicare. Our data limitations are numerous as there are many privacy issues that would be breached if we were provided more information on Inpatient PUF (Public Use File). For example, our dataset does not possess any data on patients that are not covered by Medicare. Additionally, there is no data on patients who may be covered by both Medicare and private insurances. Furthermore, there was vasts amounts of data that was removed from the dataset in order to keep anonymity. Specifically if a hospital did a medical procedure with fewer than 10 or less patients the profiles were eliminated as it would be able to be backtracked to the identity of patients. Another significant limitation was that we do not have access to patients backgrounds, and profiles that could tell us how much Medicare they have previously received. Patient profiles are huge determinants of how Medicare is distributed. For example, if an individual has a history of cardiac issues they would have a much higher variance in amount of Medicare coverage offered and most likely receive less than someone who does not have a poor medical history.

Data Analysis:

In the graph (Fig. 1), we used K-means numeric data representing Average Total Payments against the Average Covered Charge. The graph shows that while the Averaged Cover Charge does increase as Average Total Payments rises indicating that there is a relationship between a rise of Medicare coverage and when Total Payment for operations rise.

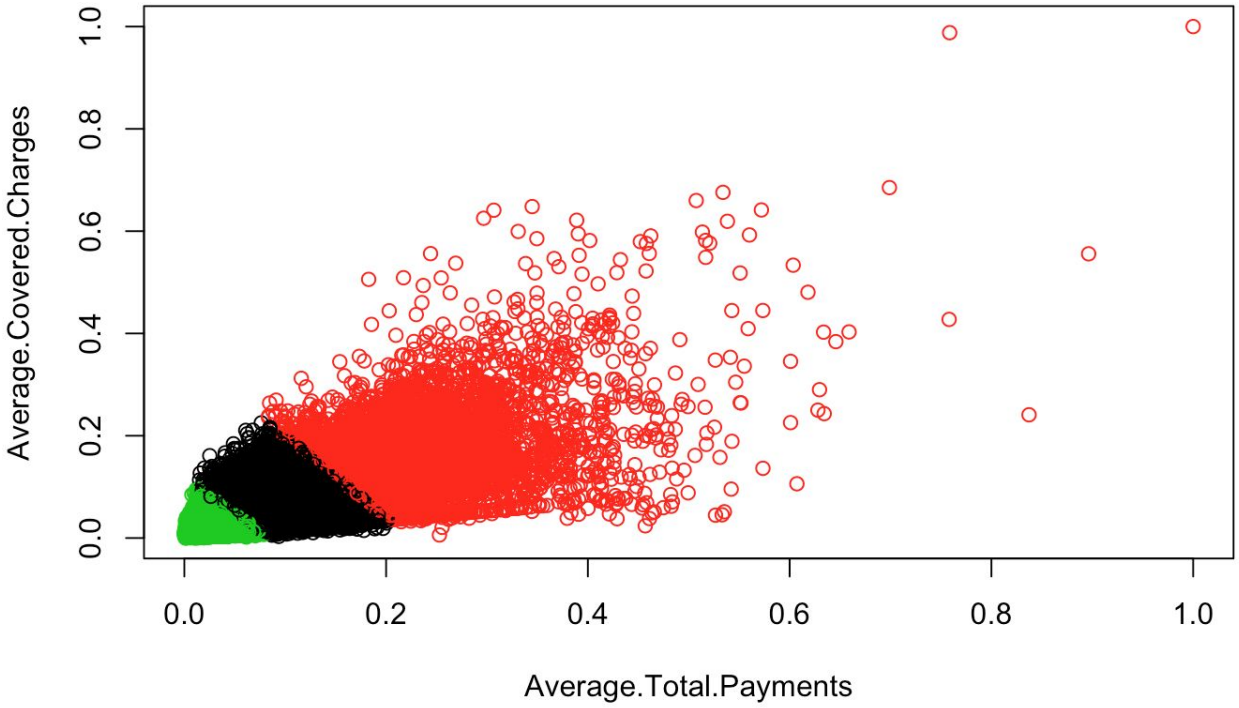

Figure 1

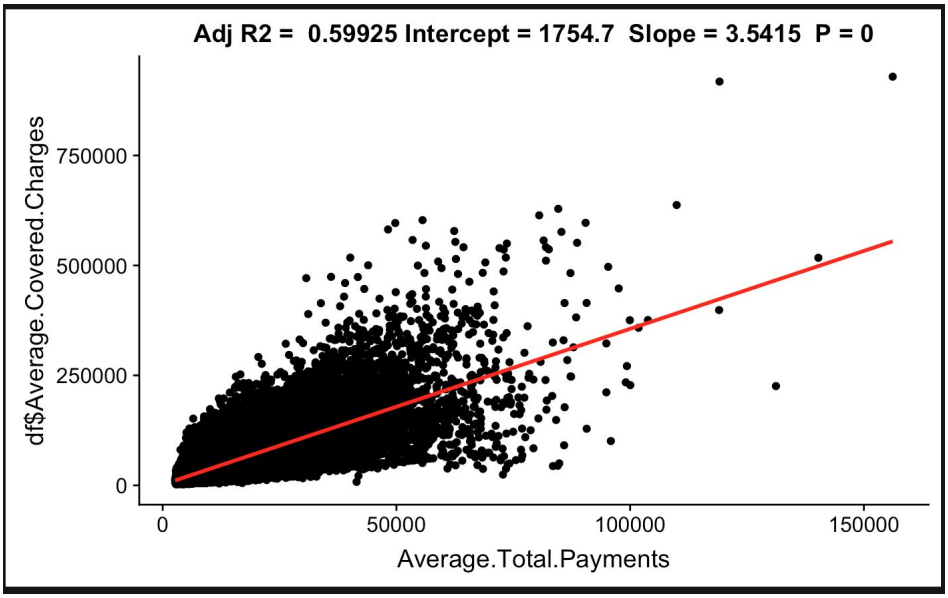

Figure 2

This next graph (Fig. 2) shown above is a linear regression model showing a relatively

mediocre R-squared but it still seems to strengthen our hypothesis that a higher total payments would mean higher cover charges. Also to be noted is that there several outliers in the data sets that we endlessly tried to remove but to no avail. We explored the idea of using the middle 80% of values within both Average Total Payments and Average Covered Charges.

In Figure 3 below, we compare Average Total Payments against Total Discharges. The ggplot we ran was geom_cohl, which is a horizontal bar graph. We felt that this version of the graph best illustrated the increase of average total payments as the number of discharges goes up. The average total payments goes up at what looks to be a exponential increase, which logically makes sense.

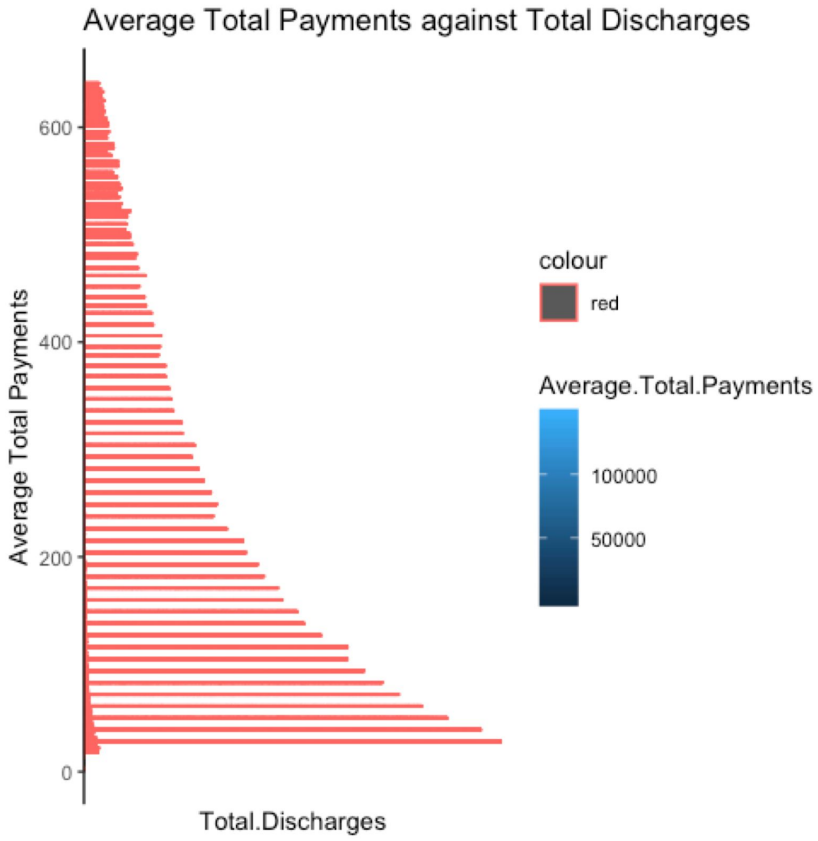

Figure 3

In Figure 4, we compared Average Covered Charges against Average Total Payments. This ggplot we used for this graph was a geom_spline , and felt that this graph shows the range between the variables. The graph show a moderate increase of Average Total Payments as the Average covered charges increases, but most notable the graph shows high increases and low drops, demonstrating there is no set percentage of fixed rate for procedures. This graph shows the inconsistency of the covered charges when compared to average total payments.

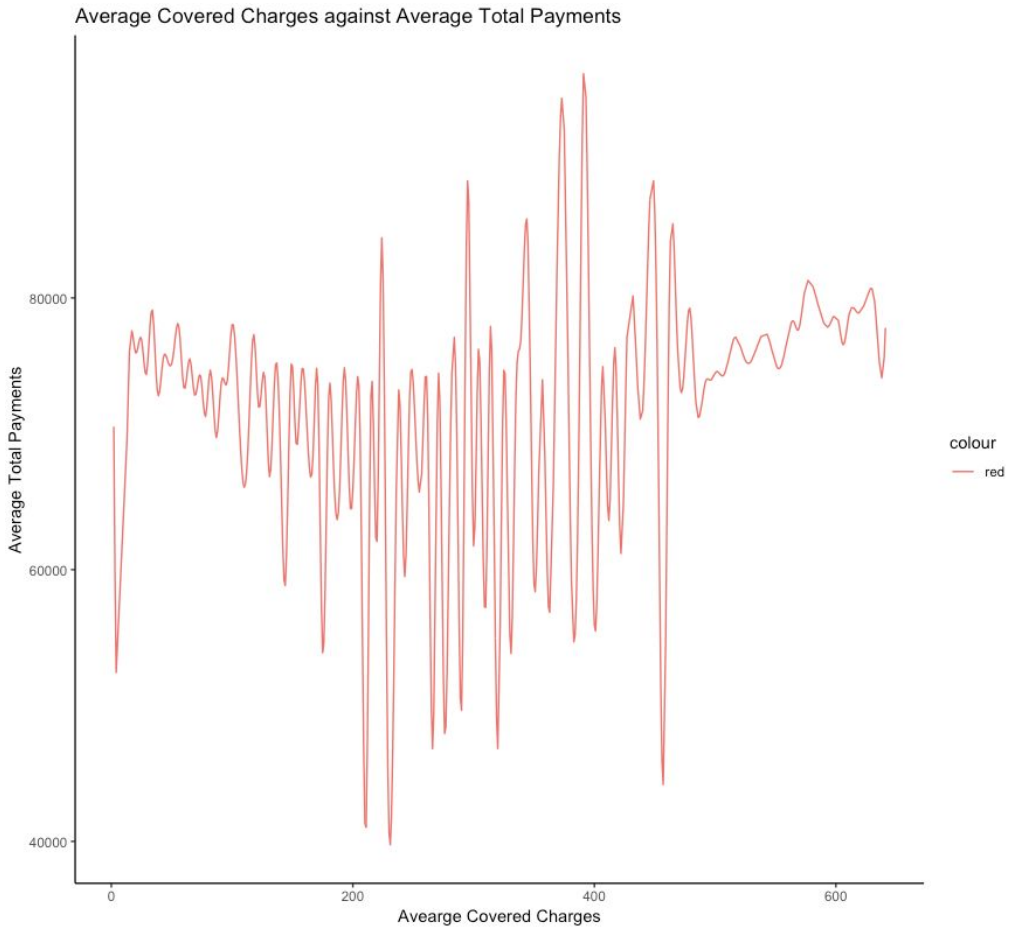

Figure 4

In our last figure, Figure 5, we compare the Average Covered Charges against total discharges. Compared to Figure 3, which demonstrated a steady exponential increase of Average Total payments, Average Covered Charges shows the inconsistency of the average covered charges compared to the total discharges. The graph shows lots of local minimums and local maximums, but the graph itself goes from high to low to high, making a "U" shape, even though the local max and mins don't show a perfect "U" within the graph.

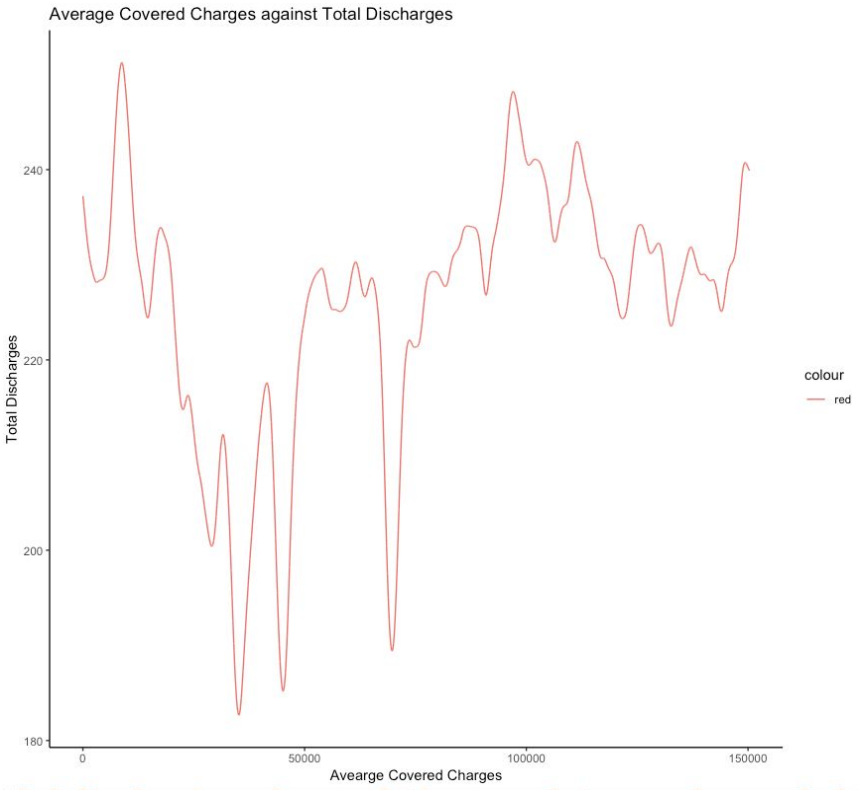

Figure 5

Figure 5 shows the Average Covered Charges against Total Discharges would actually

was surprising to see that mid-level costs of operations were not generally covered. Meaning that surgical operations covered were frequently on the lower-tier of cost and higher-tier, and not so much in the middle. This is unlikely coincidental as vasts amounts of data have been collected from all across the country.

Conclusion and Implementation:

Healthcare is a centripetal pillar to the machine that is the United States. So many lives are dependent on the efficiency and distribution of medical coverage the government provides. Our motivation for this project was to understand the allocation and distribution of Medicare coverage by field, but instead we learned more regarding just how much Medicare covers for Total Average Payments. These data models can be implemented and benefit society in numerous ways. First and foremost, health is unarguably understood as one of the most important factors in everyday lives. People would without a doubt spend as much as they can for the best possible medical care so by understanding how much Medicare coverage people are receiving we would have a clearer understanding on the economic status of citizens. Since they are required to pay the difference in total payment. This also can be used to show other statistics like what kind of operations are happening most frequently, which could lead to more government funding in particular fields. Overall our hypothesis that higher medical payments would lead to higher coverage charges was accurate however from an unbiased standpoint it is clear that there are too many known, let alone, unknown factors that would impact how much Medicare coverage one would receive (age, sex, illness history).