Project: Medicare Drug Utilization

Introduction

Medicare, the federal health insurance program for 55 million people ages 65 and over and people with permanent disabilities, helps to pay for hospital and physician visits, prescription drugs, and other acute and post-acute services. In 2014, spending on Medicare accounted for 14% of the federal budget at $597 billion. Of that, 11% was for outpatient prescription drugs [ref: http://kff.org/medicare/fact-sheet/medicare-spending-and-financing-fact-sheet/]. Outpatient drug coverage by Medicare comprises a significant amount of the federal budget.

Motivation

We're expected to face the health care financing challenges posed by the aging population. Understanding the spending trend and characteristic will provide an insight into the Medicare program's future spending levels. It is an ongoing debate between funding augmentation and efficient federal budgeting. The detailed analysis will further assist in updating the legislative measures according to the population need so that the resource is allocated efficiently and effectively.

Data

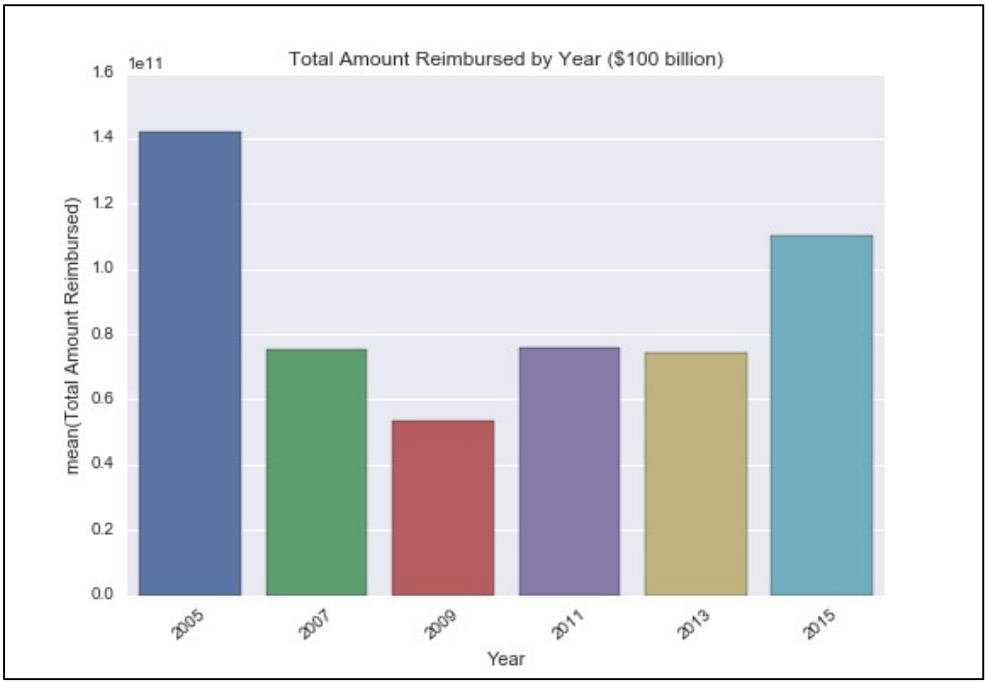
Drug utilization data by states are reported for covered outpatient drugs that are paid for by state Medicaid agencies, since the start of the Medicaid Drug Rebate Program. The data includes state, drug name, number of prescriptions, and dollars reimbursed.

Datasets by year are being published by U.S. Department of Health & Human Services' Centers for Medicare & Medical Services and are available on data.gov health data catalog in various formats. The link to 2015 dataset is https://catalog.data.gov/dataset/state-drug-utilization-data-2015, for example.

Datasets from every other year between 2005 and 2015 were evaluated in this preliminary analysis.

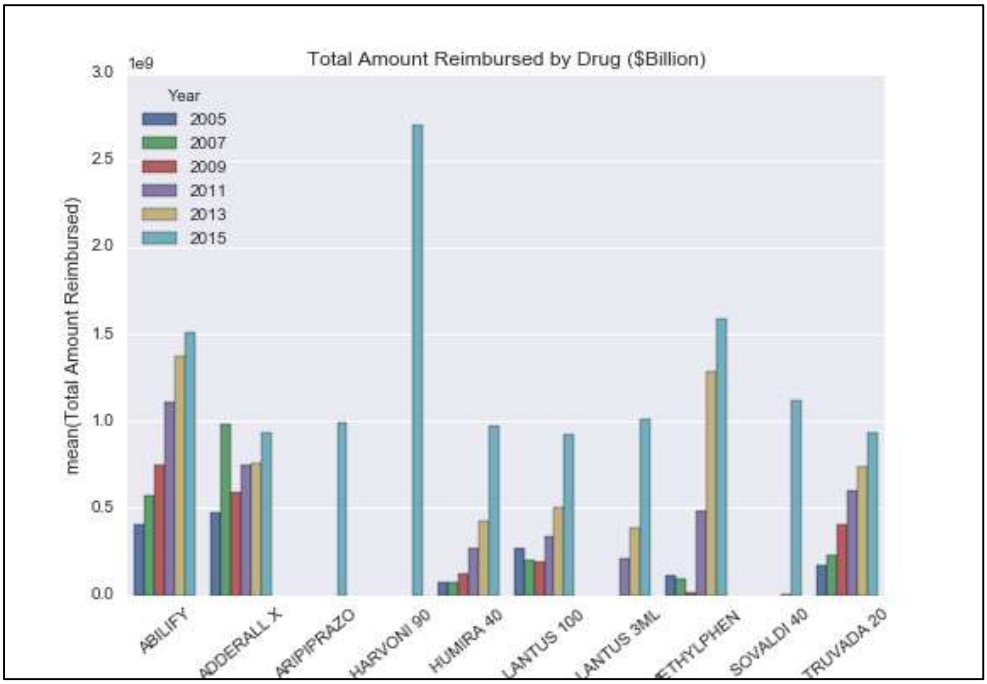
Analysis

Data was obtained for the years: 2005, 2007, 2009, 2011, 2013, and 2015. 2005 showed the highest total reimbursement at ~$140 billion. The total reimbursement was reduced to below $100 billion between 2007 and 2013, and exceeding $100 billion in 2015. The trend is not consistent. Data was analyzed further to investigate the cause of the fluctuation.



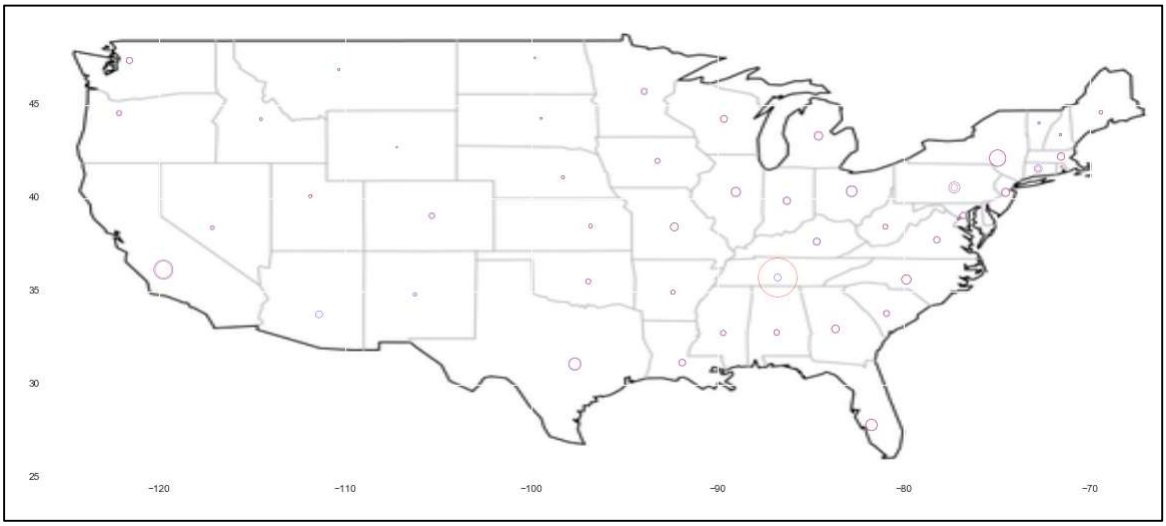
Plot 1 below shows the total reimbursement amount for 10 drugs which showed the most expenditure in 2015. It shows that spending on most drugs increased more gradually over time. However, 3 drugs showed the lack of usage prior to 2015. Harvoni 90, in particular, showed sudden usage surge in 2015. Harvoni 90 is used to treat chronic hepatitis C in adults, which came on the market in October 2014.

The Washington Post reported of the sudden surge in Medicare drug expenditure for hepatitis C treatment. Sovaldi, another hepatitis C drug created by the same company as Harvoni, costs particularly high at “$84,000 for a 12-week course of treatment, accounted for more than $3 billion of the spending.” [ref: https://www.washingtonpost.com/national/health-science/medicare-spent-45-billion-on-new-hepatitis-c-drugs-last-year-data-shows/2015/03/29/66952dde-d32a-11e4-a62f-ee745911a4ff_story.html] Sovaldi is one of the drugs shown in the graph below which also showed a sudden surge in 2015. It seems that the lawmakers and the manufacturers are aware of the occurrence.



Plot 1: Total amount reimbursed by drug (top 10 from 2015)

Plot 2 shows the map of the total amount reimbursed in 2015 and 2005 by states. The size of the bubbles indicates the amount. Blue circles are 2015 spending and red circles are from 2005. The striking observation is that the reimbursement in Tennessee in 2005 was unusually high. This may have contributed to high nationwide reimbursement amount in 2005. This will be investigated further below. Other states maintained the total reimbursement from 2005 to 2015. Future work may be to add the population information to obtain information on per capita spending, as the reimbursement may be directly correlated to the sheer size of the state population.



Plot 2: Map of the total amount reimbursed in 2015 and 2005 by state

Top 10 highest reimbursement entries in 2005 are shown in the table below. All of them were from Tennessee. In fact, it was determined that ~250 highest entries belong to the state of Tennessee. These entries do not appear to be mistakes. They are for distinct drugs with a high number of prescriptions. Further investigation is needed to identify the reason for the high spending and what was done to mitigate it.

State	Product Name	Number of Prescriptions	Total Amount Reimbursed
TN	METOPROLOL	940002	99800000.20
TN	LEVOTHYROX	210001	99100000.18
TN	VERAPAMIL	980000	99100000.15
TN	TRAZODONE	430004	98700000.27
TN	HYDROCODON	510018	98400002.16
TN	ERYTH ST 5	40000	98400000.08
TN	SEROQUEL 1	40001	98300002.62
TN	HYDROCHLOR	400010	98300000.46
TN	KRISTALOSE	40000	97000000.52
TN	RANITIDINE	540007	96700000.68

Future work

A possible future work would be to add population/demography info to model the Medicare spending and usage on drugs. From the population projection, the model will predict the fiscal impact outlook, drug usage, and state-by-state trend. Furthermore, data from other years will be included in the comprehensive analysis.