Feasibility of Reducing Prescription Drug Cost Through Generic Alternatives

Baixue Yao, Evgeniya Lagoda, Julia Lynn, Lisa Song, Yunting Yin

Problem

Prescription drugs are expensive for consumers and the U.S. government. Approximately **66% of Americans** use at least **one prescription drug daily**, increasing to almost **90% for Americans** who are **over the age of 65**.

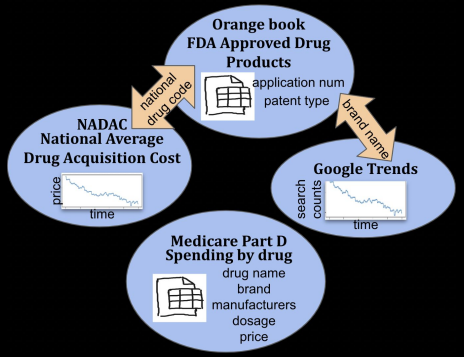
The National Health Interview Survey (NHIS) data shows an estimated **5.3 million Medicare beneficiaries** struggled to afford medications in 2019.

In 2021, the **purchase of prescription drugs** made up almost **11% of the total healthcare spending** in the U.S.

Approach

Generic drugs offer **affordable alternatives** to brand-name medications. We investigated the **market dynamics** of **generic** vs. **brand-name** prescription drugs from the following perspectives:

- **Contribution of branded drugs** in Medicare spending
- **Correlation** between **competition** and **price** for generic drugs
- **Price trends** of generic drugs from 2016-2022



69% of branded drugs hold a monopoly and account for 81% of total Medicare Part D spending

Market Share	Number of Drugs	Spending in 2021 (Billion $)
<= 99%	1096	41
>99%	2470	175

Figure 1. Branded drugs are classified based on the criterion of whether the **proportion of dosage units** attributed to the branded drug, in relation to both the branded and corresponding generic drugs combined, **exceeds a threshold of 99%**.

Google search counts rise after generic drugs being approved by FDA

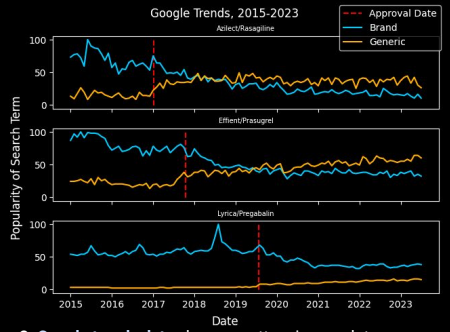
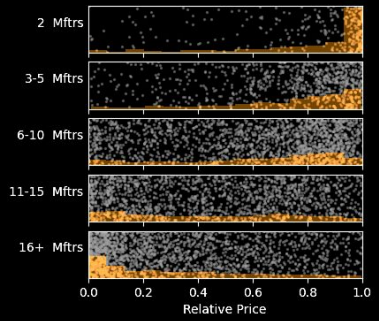


Figure 2. Google trends data shows a pattern in search terms across a number of drugs where **searches for the generic name** of a drug **increase over time**, and experience **a significant bump** when the **first generic version** of the drug is **approved by the FDA**. More data is needed to confirm the generalizability of this trend.



Increased competition reduces the price of generic drugs, especially when the number of competitors is larger than 10

Figure 3. Scatter plot of **relative price** and **number of manufacturers** for **generic drugs**. **Relative price** is defined as the **ratio** between the **generic drug** and the corresponding **branded drug**. The **Spearman rank-order correlation coefficient** between **number of manufacturers** and **relative price** is **-0.5**, indicating **moderate negative correlation**.

The price trend of generic drugs form two clusters, with 73% of drugs showing monotonically decreasing price over time

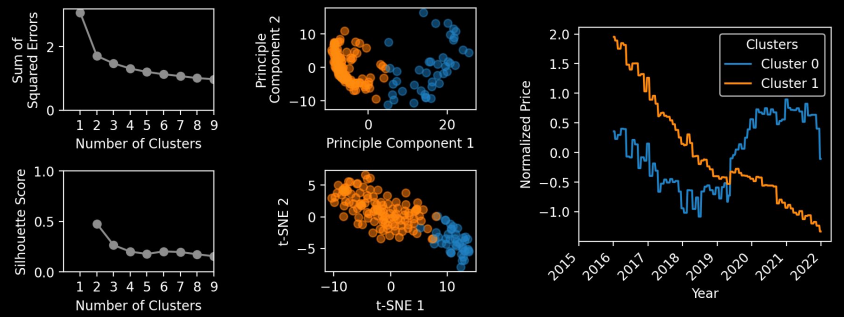


Figure 4. Results of **k means clustering** on **normalized weekly NADAC data** for **generic drugs** from **2016** to **2022**. Dimension reduction using **PCA** and **t-SNE** is also consistent with the hypothesis that **price trends form two clusters**. A brief analysis suggests the **price spike in cluster 0** is due to **supply chain issues** surrounding the **COVID-19 pandemic**; more research is needed to confirm this hypothesis.

The introduction of generic competitors into the market vastly and rapidly decreases the prices of prescription drugs. Short-term exclusivity patents for generic alternatives can encourage the development of these drugs and reduce prices in the long term.