“No Other Name Under Which We Shall Be Saved” – Brand Name Versus Generic Drug Diffusion in the U.S.

School of Public and Environmental Affairs Undergraduate Honors Thesis

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Abstract

There have been increased lobbying efforts to diminish generic competition in the pharmaceutical industry (Frommer, 2007). Allowing generic entry almost immediately loosens the brand name’s hold on the market and thus on its profits. With generics costing consumers on average about 30 percent to 80 percent less than the brand name, many people prefer the generic option (FDA, 2005). Yet, there are others who adamantly oppose generics, insisting that the generic components must be chemically compromised, thereby making it inferior to its brand name counterpart. Further solidifying this idea are multi-million dollar advertisements by brand name manufacturers aimed directly at consumers. This helps explain why consumers have the prevailing idea that they cannot be “saved” with a generic drug. This paper will examine trends in new generic entry in the pharmaceutical industry following brand name patent expiration by using data from a large and nationally representative pharmacy claims dataset. Research will focus on the blockbuster drug, Lipitor. The paper will examine whether there is a relatively larger increase in generic use within counties that have greater proportions of low income, vulnerable populations. Results will thus identify the communities that benefit the most from a drug’s patent expiration. In analyzing the profit driven world of pharmaceuticals, to whom does a drug’s name matter most?

Introduction

November 30, 2011 was a seemingly normal day in the United States. The Occupy Wall Street movement continued to captivate the public’s attention, Republican presidential candidates Mitt Romney and Newt Gingrich rivaled for the Republican nomination, and President Obama worked on expanding his electoral map. But for pharmaceutical giant, Pfizer, this date represented mere mortality for one of the company’s “blockbuster” drugs – Lipitor.
Pfizer would be forced to acquiesce to the generic market after maintaining 14 years of patent exclusivity for Lipitor.

After a patent has expired for a branded drug, the innovator company faces competition from firms that plan to manufacture and sell generic drugs. Generics are chemically identical to the brand name drug yet consumers have been bombarded with messages that generic quality and effectiveness are substandard and chemically compromised (Treacy). In a national survey on patient perceptions of generic medications, researchers found that Americans strongly agreed with the statement “Branded drugs are more effective than generics.” (Shrank et al, 2009). Researchers also found that an overwhelming number of respondents believed that drug costs were too high and appreciated the value of generics yet far fewer were eager to actually use generics (Shrank et al, 2009). Researchers attribute this finding to the fact the word “generic” connotes lesser quality or the belief that more expensive products must be more effective than cheaper products (Waber et al, 2008). Making this notion more concrete are multi-million dollar advertisements aimed directly at consumers. Advertising for pharmaceuticals has proven to be one of the most effective mechanisms used to influence consumer decisions (Greider, 2003). Advertising is so effective that spending on consumer advertising skyrocketed from $266 million in 1994 to $2.6 billion in 2001 (Greider, 2003). The National Institute for Healthcare Management reported that the 50 most heavily advertised drugs increased 32% between 1999 and 2000, while expenditures for all other drugs increased by less than half at 14%. Most of this expenditure increase results from increased utilization (that is, an increase in prescriptions filled), not from price increases. Among the 50 most heavily advertised drugs, the number of prescriptions dispensed rose 25 percent between 1999 and 2000, compared to a 4 percent
increase for other drugs. With this information, it is clear that advertising is one primary advantage that the innovator company has over its generic competitor.

In an effort to deter other generic firms from entering the market, the first generic firm uses competitive pricing as its tool thus creating an oligopoly. In contrast, the innovator company does not utilize the same strategy to deter generic entry; instead, the innovator usually increases the price for the drug. This move appears to be a blunder as one would assume that increasing the drug’s price would result in losing a significant portion of market share (Sloan and Hsieh, 2012).

When confronted with patent expiration, other leading pharmaceutical companies (often collectively referred to as “Big Pharma”) allow for its generic rivals to rapidly access the market while Big Pharma diverts its attention to other endeavors. With no new blockbusters in Pfizer’s arsenal, the company used unprecedented alternatives to extend their products’ exclusive market. Pfizer devised tactics that made Lipitor as cheap, or even cheaper than its generic counterpart. Some of Pfizer’s efforts included offering insured patients a discount card to get Lipitor at $4 a month. This was far below the $25 average copayment for a preferred brand-name drug, and below the $10 average copay for a generic drug. From Pfizer’s perspective, lowering the copay is better than lowering the price of the drug altogether. Pfizer promoted heavily via advertisements, information distributed at doctors' offices, and its www.LipitorForYou.com website. The day before Lipitor’s patent expired, Pfizer announced that sign-ups exceeded its goals (Johnson). Another tactic involved Pfizer’s marketing strategy. There is usually a two-thirds drop in marketing a drug in its final year under patent (Johnson). Pfizer chose to keep its marketing spending nearly level with the United States’ up until the drug’s final days. From July through September 2011, Pfizer spent approximately $90 million on doctor sales calls and free samples,
about the same as a year earlier, according to Cegedim Strategic Data. Ads targeting patients fell about 60% to $19 million. This would eventually taper off in 2012 (Johnson).

Analysts argued that Pfizer’s approach was cunning and could become “the new norm in the pharmaceutical industry” (Johnson). With such unconventional approaches, Pfizer expected to realize a 2% increase in earnings per share in the following year. Why would Pfizer – after spending millions of dollars on marketing – essentially pay its consumers to continue using its blockbuster cholesterol medicine after patent expiration? Which stakeholders benefit most from a blockbuster drug going off patent? Do the groups of individuals affected by patent expiration vary by geographic region?

It is said that American consumers “benefit from having access to the safest and most advanced pharmaceutical system in the world” (FDA, 2012). This paper, in addition to answering the questions posed above, will focus on the premise that once pharmaceuticals go off patent, generics emerge, which should in theory, allow increased access to consumers. By examining various counties use of generic drugs after patent expiry, an analysis will be conducted to determine if there is an increase in use within counties that have greater proportions of low-income, vulnerable populations.

**Background**

There are two key stages in pharmaceutical research and development (R&D), discovery and development. In the discovery phase, basic “upstream” science research is conducted in order to find a new compound or chemical structure that will be used to develop the drug (Sloan and Hsieh, 2012). The development stage is the “downstream” research stage that focuses on market related R&D. In this phase, preclinical and clinical trials are conducted to test the drug’s
safety and efficacy for the new compound discovered in the discovery process. Safety is
determined on the basis of whether or not the drug produced a minimum threshold for an adverse
health effect. Efficacy means that the drug produced the desired outcome that the manufacturer
hypothesized. The validity of clinical trials and pharmaceutical regulations has been disputed but
generally, this is the blueprint for pharmaceutical R&D. Many drugs, about 60 percent to be
exact, progress to the first phase of testing; ultimately, only 8 percent of drugs receive FDA
approval for marketing (Sloan and Hsieh, 2012).

In order to sell brand name pharmaceuticals at optimal and profitable prices, drug
manufacturers must first prevent consumers from attaining access to other alternatives available
in foreign and domestic markets. Companies must also ensure that alternatives aren’t available at
lower costs because the presence of a lower cost option yields less profit for the manufacturer.
Pharmaceutical patents are the most essential device used in combating such situations from
arising.

As a “reward” for investing in years of research and development for a drug, the Food
and Drug Administration (FDA) gives exclusive right to a brand-name drug company in the form
of a patent. Technically, this patent allows for the company to sell the new product for 20 years
but there are several factors that can change this allotted time period. On one hand, original
patents are usually issued before the drug actually reaches the market and so the effective life of
the patent is shorter than 20 years (Greider, 2003). On the other hand, as was the case with
Pfizer, drug manufacturers “avail themselves of various methods to extend patent life or to
protect an exclusive market beyond the expiration of the primary patents” (Greider, 2003). Brand
name drugs and patents have been huge concerns for the public. The problem is that patents are
needed in order to encourage investment in creating new drugs, but patents also enable drug
companies to be monopolistic and thus charge higher prices, which means that the masses aren’t able to access the drug.

The Drug Price Competition and Patent Term Restoration Act of 1984, dubbed the “Hatch-Waxman Act”, is responsible for the establishment of the modern system of generic drug manufacturing and marketing. This act amended the Federal Food, Drug, and Cosmetic Act of 1938 by allowing generic manufacturers to file Abbreviated New Drug Applications (ANDAs) in an effort to obtain FDA approval for the generic version of a “mother drug”. Provisions of the act are in favor for both the pioneer company and its generic competitors. The act grants terms of exclusivity for pharmaceuticals and prohibits the FDA from requesting more studies from the generic manufacturer other than bioavailability studies. Essentially, Hatch-Waxman protected “the intellectual property rights of innovator companies, while also encouraging the development of generic drugs” (FDA, 2011) As a result of this piece of legislation, generic companies are able to market their drugs at lower prices because they won’t incur the same development costs that the pioneer company did; nor do the generics manufacturers have to recreate the costly clinical trials. Simply proving that their drug is bioequivalent (i.e. its active ingredient enters the bloodstream in the same way, in the same amount of time) to the brand name drug is sufficient evidence for the FDA generic approval process. The FDA asserts that roughly two decades ago, generics made up only 12 percent of all prescriptions. As of 2011, generics represented over 50 percent of all prescriptions filled in the United States, according to the Generic Pharmaceutical Association (FDA 2011).

To briefly set the stage for Lipitor’s debut: in 1997, Lipitor entered the statin market joining four other blockbusters. This was the same year that that FDA allowed direct-to-consumer advertising (DTCA). Pfizer spent over $3 billion per year on advertising (Murphee). Results of a
1996 study showed that Lipitor dramatically reduced cholesterol compared to other statins. Lipitor was more effective and outperformed other drugs in its class. Showing physicians these results, Lipitor skyrocketed to the top selling statin bringing in more than $125 billion in sales over 14.5 years. It provided Pfizer with 20 to 25% of its revenue. Lipitor’s patent expired and the number of Lipitor prescriptions filled in the first full week after generics arrived fell by half. After patent expiry, Atorvastatin rapidly captured over 60% of prescriptions for the molecule (IMS Institute for Healthcare Informatics). Dispensed prescriptions for lipid regulators exceeded 260 million in 2011, with 63% filled with a generic; this was expected to rise to over 75% following Lipitor’s patent expiry (IMS Institute for Healthcare Informatics).

Literature Review

American consumers have always relied heavily on the primacy of the physician-patient relationship (Greider, 2003). As such, physicians are the key actors in choosing which drugs to prescribe to their patients. Consistently using brand name terminology can play a huge role in the dispensing of brand-name products; this in turn perpetuates the consumer perception that brand names are a far superior option. Even when a generic alternative is available, brand names are still dispensed which results in an estimated $8.8 billion in excess expenditures per year in the United States (Haas et al 2005). Similarly, the name written on a prescription can impact whether a drug is dispensed in brand-name or generic form even when the physician would accept the generic version, and the pharmacy is empowered to provide it (Steinman, Chren, Landefeld 2007).

Data was obtained from the 2003 National Ambulatory Medical Care Survey, a nationally representative survey of 25,288 community-based outpatient visits and 1,342 physicians in the United States. After each visit, patient medications were recorded by the
treating physician on a survey encounter or were transcribed from office notes. In order to appropriately measure the outcomes, surveyors analyzed the frequency with which medications (using the brand name or generic name) were recorded on the encounter.

Steinman, Chren, and Landefeld identified how often physicians prescribe or refer to medications using the brand-name or its generic equivalent. Researchers concluded that: for 20 commonly used drugs, the median frequency of brand name use was 98%. Among 12 medications with no generic competition at the time of the survey, the median frequency of brand name use was, as expected, 100%. Among 8 medications with generic competition at the time of the survey (“multisource” drugs), the median frequency of brand name use was 79% (range 0–98%; P<.001 for difference between drugs with and without generic competition). Authors concluded that physicians refer to most medications by their brand names, including drugs with generic formulations. Steinman, Chren, and Landefeld’s findings remained consistent with those of similar studies in that prescriptions are predominantly written using brand names. Researchers further suggest that reasons for increased brand name prescriptions is due in part by brand names being more memorable and evocative than the generic and are easier to pronounce (Steinman, Chren, Landefeld, 2007). Their research also indicates that physicians may only know the brand name or in some cases, are unaware that a generic counterpart even exists. The economic ramifications of this are noteworthy. Consistent prescribing of brand names has the potential to lead to higher health care costs by promoting the use of brand-name products even when generic alternatives are available.

Morton analyzed generic manufacturers’ entry decisions after patent expiration. More specifically, Morton examined the role of pre-expiration brand advertising to see if it deterred generic entry. To research this, Morton utilized revenue and quantity data from IMS America’s
Drugstore and Hospital Audits. The researcher observed and recorded data from 2 years before patent expiry to 1 year after expiration for drugs that lost its patent between 1986 and 1991.

Advertising data was also collected from 3 years before and 1 year following patent expiration. Morton then used “The most important variable in predicting entry will clearly be the proxy for market size since this is likely to be correlated with profits”(Morton 1095).

Research concluded that previous forms of literature assumed that advertising before patent expiration is exogenous with respect to generic entry. Morton estimates that the coefficient on advertising is relatively small and its sign varies with respect to the type of advertising. Advertising may affect generic entry if it creates a barrier; advertising could also be a reflection on the market conditions (i.e. good, stable markets are worth advertising in and not poor ones). Morton concludes that brand advertising is not a barrier to generic entry in the U.S. pharmaceutical market because the coefficient on advertising is not significantly different from zero.

The rising costs of prescription drugs have always been an area of concern for American consumers. To defray some of these costs, the generic option exists, usually costing about 60% less than its brand name equivalent. On a larger scale, generic substitution can help curtail national prescription expenditures. Haas et al. establish means to estimate the potential savings associated with generic substitution by designing a cross-sectional, nationally represented survey of non-institutionalized adults included in the Medical Expenditure Panel Survey Household Component from 1997-2000. Researchers estimated that substitution for a generic when available would save the average adult below age 65 a total of $46 per year and $78 per year for older adults. To accurately and efficiently measure the use of generic formulations, researchers measured use of a multisource drug (that is, a drug available in a brand-name and >1 generic
formulation) or a generic drug and the potential cost savings associated with broad generic substitution for all multisource products (Haas et al. 2005).

Researchers found that for adults younger than age 65 years, the median annual per person savings associated with generic substitution was $45.89 (interquartile range, $10.35 to 158.06). These savings would be realized by the individual and his/her health plan. Savings per person savings increased with age (adults at least 65 years of age saved $78.05) and number of chronic conditions, and men saved more than women. Low-income individuals saved more and varied by insurance status. The estimated national savings associated with widespread generic substitution in 2000 was $5.9 billion (95% CI, $5.5 billion to $6.2 billion) per year for adults younger than 65 years of age (11.1% of all drug expenditures) and $2.9 billion (CI, $2.6 billion to $3.1 billion) per year among those at least 65 years of age (10.7% of drug expenditures). From a national perspective, the potential annual savings associated with generic substitution among adults younger than 65 years of age was $4.1 billion for those with employer-sponsored insurance and $388 million for those with Medicaid or public coverage. For adults at least 65 years of age who were dually eligible for Medicare and Medicaid, the potential savings was $1.7 billion per year.

The study implies that per person savings of generic substitution are small, but national savings would be substantial with about $6 billion for adults younger than age 65 years and about $3 billion for older adults. Generic substitution could save the same $8.8 billion (approximately 11% of drug expenditures for adults surveyed) in expenditures that Steinman, Chren, and Landefeld discussed.
Data

The literature gathered focused on physician prescribing patterns, the effects of advertising on a generic manufacturer’s decisions to enter the market, and per capita and national cost savings associated with generics. Steinman, Chren, and Landefeld affirm that the physician plays a pivotal role in brand name and generic use with his/her prescriptions. Constantly referring to and prescribing a brand name, even when a generic is available, adds huge costs to the U.S. healthcare sector. Morton theorizes that advertising has an insignificant effect on a generic manufacturer’s decision to enter the market. This decision can be based upon present market conditions and other factors. Haas et al. researched how much is saved on a per capita and national level when generics are used. Their research provided a wealth of information related to the age variable and generics. My research will further investigate and build upon the race and per capita income variables in conjunction with Lipitor and Atorvastatin use.

In order to appropriately collect relevant data, I used an Area Resource File (ARF) and Symphony Health Solution’s pharmaceutical database. The ARF is produced by the Health Research and Services Administration (HRSA) and is a publically accessible health resource information database with over 6,000 variables for each county within the U.S. These variables range from county information related to population characteristics such as age, sex, and household income. For my research, I used race and per capita income variables. I chose the racial majority population, White, and compared it to the top two minority populations, Hispanic and Black. According to the U.S. Department of Health and Human Services’ Office of Minority Health, individuals within these minority groups are more likely to develop heart disease and stroke as a result of high cholesterol. Comparing all three groups in conjunction with Lipitor and Atorvastatin prescriptions will assist in answering which group benefits from patent expiry.
Similarly, by attaining the nation’s median per capita income and comparing it with Lipitor and Atorvastatin prescriptions, I will make conclusions regarding whether or not lower income individuals truly benefit from a drug’s patent expiration.

The Symphony Health Solution pharmaceutical database is a national leader in providing robust pharmacy data that is aggregated daily from approximately 80 percent of pharmacies across the nation. This database allowed me to gather data related to prescription trends for Antihyperlipidemics\(^1\), Lipitor, and Atorvastatin prescription counts from years 2007-2012.

**Methods**

The two datasets group regions of the U.S. in two different ways. The ARF groups its variables with Federal Information Processing Standards (FIPS) codes and the Symphony database uses Core Based Statistical Areas (CBSAs). In order to appropriately merge and compare the two datasets, I used a FIPS to CBSA county crosswalk. The crosswalk essentially allows users to easily compare two or more datasets by leveling geographical regions. The crosswalk separated regions in Metropolitan Statistical Area (MSA) format. MSAs are defined by the U.S. Office of Management and Budget and are typically comprised of geographic areas that contain a substantial population nucleus that has influence over the area (United States Census Bureau).

To begin analyzing the variables, I used a statistical software program that provided basic descriptive statistics about the nation’s MSAs. I retrieved the median percentile (50%) for Whites, Hispanics, and Blacks and the median percentile for per capita income (Table 1).

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\(^1\) Antihyperlipidemic is an umbrella term that encompasses all cholesterol reducers and lipotropics aimed at reducing lipid levels in the blood.
Table 1: Median Percentile for Race and Per Capita Income

<table>
<thead>
<tr>
<th>Race</th>
<th>Median</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>82.85</td>
</tr>
<tr>
<td>Hispanic</td>
<td>4.8</td>
</tr>
<tr>
<td>Black</td>
<td>5.16</td>
</tr>
<tr>
<td>Per Capita Income</td>
<td>$33,522</td>
</tr>
</tbody>
</table>

I also used descriptive statistics to retrieve the mean prescription and pill counts for Lipitor and Atorvastatin counts by quarter for years 2007-2011. Because Lipitor went off patent in November 2011, Atorvastatin counts don’t begin until Quarter 4 of 2011.

Finally, I combined any population characteristic variable (race or per capita income) with Lipitor or Atorvastatin prescriptions and ran a command to determine which populations used each drug. For example, this command: “Collapse (mean) Lipitor_Cnt_High_Income=Lipitor_Cnt if PCIncome >33522, by(Qtr)” yields the number of Lipitor prescriptions if per capita income is greater than $33,522. Lipitor data collected above/below the mean was labeled “Lipitor High/Low variable name” and Atorvastatin data collected above/below the mean was labeled “Atorva High/Low variable name”. “Cnt” signifies the prescription count and “Qty” signifies the quantity of pills dispensed. I continued this process until I ran commands for each population characteristic variable with Lipitor and Atorvastatin prescription counts. Lastly, I compared the population groups with others in its category (i.e. White versus Hispanic versus Black and High Income versus Low Income). Unfortunately the timeframe allotted for my research did not allow me to combine race and per capita income.
variables and compare them with Lipitor and Atorvastatin use. I plan to investigate this relationship in the future.

Results

The Office of Minority Health states that minority populations are more susceptible to heart disease, diabetes, and stroke as a result of high cholesterol. Armed with this statistic, one would expect to see an increase in statin among these populations compared to the White population. Figure 1 confirms this hypothesis. The graph shows the number of Lipitor prescriptions filled quarterly from 2007 to 2012. The graph uses median White, Black, and Hispanic percentiles of 82.85, 5.16, and 4.8 respectively. All races reach its peak in Quarter 1 of 2007 and maintain a steady decrease from 2008 until 2012. Since Lipitor’s patent expired in Quarter 4 of 2011, forecasters projected that its sales would fall dramatically, the graph also confirms this.

*Figure 1: Lipitor Prescriptions by Race by Quarter by Year*
Since Black and Hispanic prescription counts were higher than those for Whites, one would expect to see the same trend for Atorvastatin prescriptions. Figure 2 displays the number of Atorvastatin prescriptions by race. To accurately compare Figure 1 and Figure 2, it is important to remember to compare Lipitor and Atorvastatin data only for Quarter 4 of 2011 and all of 2012. Using the same median percentiles identified in Figure 1, the graph shows the number of Atorvastatin prescriptions was higher than Whites and Hispanics yet Hispanic prescription counts were less than Whites. This contrasts the data outlined in Figure 1 where Hispanic Lipitor counts were higher than Whites and Blacks. Further research might be able to identify reasons for this. One reason for the increased numbers for Whites and Blacks may be attributed to the fact that generics are often marketed to households with incomes that couldn’t support the brand name drug and now that a generic is available, the drug has come within the income bracket of these lower income households and is deemed economically viable despite being a nonessential medication.

*Figure 2: Atorvastatin Prescriptions by Race by Quarter by Year*

Note:
Median Race: White: >82.85; Black: >5.16; Hispanic: > 4.8
Figure 3 shows the number of Lipitor prescriptions by income. Using a median income of $33,522 this graph splits prescription tracking with incomes higher and lower than the median. One would expect low income individuals to use Lipitor in smaller quantities when compared to high income individuals. The graph confirms this assumption. High income and low income individuals maintain an equal rate of decrease until Quarter 2 of 2011 where there is a significant drop in number of prescriptions filled. There is a perceived drop in Quarter 3 of 2011 due to generic availability. During this time, Pfizer kept Lipitor’s marketing stable. This, in addition to Pfizer’s other aforementioned tactics, proved to be of no avail.

*Figure 3: Lipitor Prescriptions by Income by Quarter by Year*

Note:
Median Income: $33,522
Figure 4 shows the number of Atorvastatin prescriptions by income. Using the same median income of $33,522, this graph splits the number of Atorvastatin prescriptions with incomes higher and lower than the median. Because Atorvastatin is the generic, one would expect to see low income individuals to have a greater number of prescriptions. However this data shows that low income individuals used Atorvastatin in smaller quantities than high income individuals. High income and low income individuals follow the same trend and maintain an equal rate of increase.

*Figure 4: Atorvastatin Prescription by Income by Quarter by Year*

![Atorvastatin Prescriptions by Income](image)

Note:  
Median Income: $33,522

**Discussion and Conclusion**

According to IMS, when a drug loses patent protection, more than 80% of its prescription sales are replaced by generics in the first six months (Zamosky, 2012). Results of my research confirm IMS findings that after Lipitor’s patent expiration, Atorvastatin captured 60% of prescriptions filled for the molecule. Atorvastatin prescriptions were filled nearly four times as much (Figure 7). With the exception of Hispanics and their Atorvastatin use, Lipitor and Atorvastatin prescriptions for minorities were higher than those for Whites (Figure 1).
Individuals with higher income used more Lipitor and Atorvastatin when available compared to low income population. Similarly, Shrank et al. found that wealthier patients (those with incomes greater than $100,000 a year) were more likely than poorer patients to prefer generic medications. This may indicate a change in perceptions about the efficacy of generic drugs and the improvements that modern medicine has made. While most people generally have positive perceptions about prescription drugs, data indicates that the major stakeholders who benefit from patent expiry are usually over age 65, minorities, and the wealthy. Numerous patent expirations, favorable regulatory environments, and generic biotechnology firms produce an even brighter outlook for generics and the patients who take them.

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- Frank Vilardo, Associate Professor Emeritus
- Barton Willage, Master of Public Affairs Candidate and Pharmaceutical Database Instructor
Appendix

Figure 5: Spending on Lipid Regulators

![Lipid Regulators Spending by Area](image)

Source: IMS Health, National Sales Perspectives, Dec 2011

Figure 6: Antihyperlipidemic Prescriptions by Quarter

![Antihyperlipidemic Prescriptions by Quarter](image)

Note:
Antihyperlipidemic drugs encompass all cholesterol reducers and lipotropics aimed at reducing lipid levels in the blood.
Figure 7: Lipitor vs. Atorvastatin Prescriptions by Quarter

Lipitor Prescriptions

Atorvastatin Prescriptions
Stata Notations (DO File)

#delimit ; * tell Stata that we will use “;” to mark the end of a command.;
clear all; * removes everything from memory, ensuring that we start with a completely clean slate.;
set more 1; * tell Stata not to pause or display the --more-- message;
capture log close; * close any open logs ;
cd "E:\Users\watsonar\Data";
* Save a log file. ;
log using E:/Users/watsonar/program/Lip_v_Atrova_Data.log, replace;
* Load the data. ;
use "E:\Users\watsonar\Data\merged_data_ariana.dta";
*naming labels;
rename f0453710 White;
rename f0453810 Black;
rename f0454110 Other;
rename f0454210 Hispanic;
rename f0978108 PCIncome;
* Obtain basic information about the data;
describe;
* Obtain descriptive statistics ;
sum;
sum PCIncome, d;
sum White, d;
sum Black, d;
sum Hispanic, d;
save drug_info, replace;

*MSA Trends;
*collapse TRx by quarter;
collapse (mean) Atorva_Cnt, by(Qtr);
list;
sort Qtr;
save avg_atorva_cnt_by_qtr, replace;
*obtain means for Atorva_Qty;
use drug_info;
collapse (mean) Atorva_Qty, by(Qtr);
list;
sort Qtr;
save avg_Atorva_qty_by_qtr, replace;
*obtain means for Lipitor_Cnt;
use drug_info;
collapse (mean) Lipitor_Cnt, by(Qtr);
list;
sort Qtr;
save avg_Lipitor_cnt_by_qtr, replace;
*obtain means for Lipitor_Qty;
use drug_info;
collapse (mean) Lipitor_Qty, by(Qtr);
list;
sort Qtr;
save avg_Lipitor_qty_by_qtr, replace;

*High MSA Trends Income;
collapse TRx by quarter;
use drug_info;
collapse (mean) Atorva_Cnt_HighPCIncome=Atorva_Cnt if PCIncome >33522, by(Qtr);
list;
sort Qtr;
save avg_atorva_cnt_by_qtr_high_income, replace;
*obtain means for Atorva_Qty;
use drug_info;
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list;
sort Qtr;
save avg_Atorva_qty_by_qtr_high_income, replace;
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*obtain means for Lipitor_Qty;
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list;
sort Qtr;
save avg_Lipitor_qty_by_qtr_high_income, replace;

*High MSA Trends White;
collapse TRx by quarter;
use drug_info;
collapse (mean) Atorva_Cnt_High_White=Atorva_Cnt if White >82.85, by(Qtr);
list;
sort Qtr;
save avg_atorva_cnt_by_qtr_High_White, replace;
*obtain means for Atorva_Qty;
use drug_info;
collapse (mean) Atorva_Qty_High_White=Atorva_Qty if White >82.85, by(Qtr);
list;
sort Qtr;
save avg_Atorva_qty_by_qtr_High_White, replace;
sort Qtr;
save avg_Atorva_qty_by_qtr_High_White, replace;
*obtain means for Lipitor_Cnt;
use drug_info;
collapse (mean) Lipitor_Cnt_High_White=Lipitor_Cnt if White >82.85, by(Qtr);
list;
sort Qtr;
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list;
sort Qtr;
save avg_Lipitor_qty_by_qtr_High_White, replace;

*Low MSA Trends White;
*collapse TRx by quarter;
use drug_info;
collapse (mean) Atorva_Cnt_Low_White=Atorva_Cnt if White <=82.85, by(Qtr);
list;
sort Qtr;
save avg_atorva_cnt_by_qtr_low_White, replace;
*obtain means for Atorva_Qty;
use drug_info;
collapse (mean) Atorva_Qty_Low_White=Atorva_Qty if White <=82.85, by(Qtr);
list;
sort Qtr;
save avg_Atorva_qty_by_qtr_low_White, replace;
*obtain means for Lipitor_Cnt;
use drug_info;
collapse (mean) Lipitor_Cnt_Low_White=Lipitor_Cnt if White <=82.85, by(Qtr);
list;
sort Qtr;
save avg_Lipitor_cnt_by_qtr_low_White, replace;
*obtain means for Lipitor_Qty;
use drug_info;
collapse (mean) Lipitor_Qty_Low_White=Lipitor_Qty if White <=82.85, by(Qtr);
list;
sort Qtr;
save avg_Lipitor_qty_by_qtr_low_White, replace;

*High MSA Trends Black;
*collapse TRx by quarter;
use drug_info;
collapse (mean) Atorva_Cnt_High_Black=Atorva_Cnt if Black >5.157143, by(Qtr);
list;
sort Qtr;
save avg_atorva_cnt_by_qtr_High_Black, replace;
*obtain means for Atorva_Qty;
use drug_info;
collapse (mean) Atorva_Qty_High_Black=Atorva_Qty if Black >5.157143, by(Qtr);
list;
sort Qtr;
save avg_Atorva_qty_by_qtr_High_Black, replace;
*obtain means for Lipitor_Cnt;
use drug_info;
collapse (mean) Lipitor_Cnt_High_Black=Lipitor_Cnt if Black >5.157143, by(Qtr);
list;
sort Qtr;
save avg_Lipitor_cnt_by_qtr_High_Black, replace;
*obtain means for Lipitor_Qty;
use drug_info;
collapse (mean) Lipitor_Qty_High_Black=Lipitor_Qty if Black >5.157143, by(Qtr);
list;
sort Qtr;
save avg_Lipitor_qty_by_qtr_High_Black, replace;

*Low MSA Trends Black;
*collapse TRx by quarter;
use drug_info;
collapse (mean) Atorva_Cnt_Low_Black=Atorva_Cnt if Black <=5.157143, by(Qtr);
list;
sort Qtr;
save avg_atorva_cnt_by_qtr_low_Black, replace;
*obtain means for Atorva_Qty;
use drug_info;
collapse (mean) Atorva_Qty_Low_Black=Atorva_Qty if Black <=5.157143, by(Qtr);
list;
sort Qtr;
save avg_Atorva_qty_by_qtr_low_Black, replace;
*obtain means for Lipitor_Cnt;
use drug_info;
collapse (mean) Lipitor_Cnt_Low_Black=Lipitor_Cnt if Black <=5.157143, by(Qtr);
list;
sort Qtr;
save avg_Lipitor_cnt_by_qtr_low_Black, replace;
*obtain means for Lipitor_Qty;
use drug_info;
collapse (mean) Lipitor_Qty_Low_Black=Lipitor_Qty if Black <=5.157143, by(Qtr);
list;
sort Qtr;
save avg_Lipitor_qty_by_qtr_low_Black, replace;
*High MSA Trends Hispanic;
collapse TRx by quarter;
use drug_info;
collapse (mean) Atorva_Cnt_High_Hispanic=Atorva_Cnt if Hispanic > 4.8, by(Qtr);
list;
sort Qtr;
save avg_atorva_cnt_by_qtr_High_Hispanic, replace;
obtain means for Atorva_Qty;
use drug_info;
collapse (mean) Atorva_Qty_High_Hispanic=Atorva_Qty if Hispanic > 4.8, by(Qtr);
list;
sort Qtr;
save avg_Atorva_qty_by_qtr_High_Hispanic, replace;
obtain means for Lipitor_Cnt;
use drug_info;
collapse (mean) Lipitor_Cnt_High_Hispanic=Lipitor_Cnt if Hispanic > 4.8, by(Qtr);
list;
sort Qtr;
save avg_Lipitor_cnt_by_qtr_High_Hispanic, replace;
obtain means for Lipitor_Qty;
use drug_info;
collapse (mean) Lipitor_Qty_High_Hispanic=Lipitor_Qty if Hispanic > 4.8, by(Qtr);
list;
sort Qtr;
save avg_Lipitor_qty_by_qtr_High_Hispanic, replace;

*Low MSA Trends Hispanic;
collapse TRx by quarter;
use drug_info;
collapse (mean) Atorva_Cnt_Low_Hispanic=Atorva_Cnt if Hispanic <= 4.8, by(Qtr);
list;
sort Qtr;
save avg_atorva_cnt_by_qtr_low_Hispanic, replace;
obtain means for Atorva_Qty;
use drug_info;
collapse (mean) Atorva_Qty_Low_Hispanic=Atorva_Qty if Hispanic <= 4.8, by(Qtr);
list;
sort Qtr;
save avg_Atorva_qty_by_qtr_low_Hispanic, replace;
obtain means for Lipitor_Cnt;
use drug_info;
collapse (mean) Lipitor_Cnt_Low_Hispanic=Lipitor_Cnt if Hispanic <= 4.8, by(Qtr);
list;
sort Qtr;
save avg_Lipitor_cnt_by_qtr_low_Hispanic, replace;
obtain means for Lipitor_Qty;
use drug_info;
collapse (mean) Lipitor_Qty_Low_Hispanic=Lipitor_Qty if Hispanic <= 4.8, by(Qtr);
list;
sort Qtr;
save avg_Lipitor_cnt_by_qtr_low_Hispanic, replace;
*obtain means for Lipitor_Qty;
use drug_info;
collapse (mean) Lipitor_Qty_Low_Hispanic=Lipitor_Qty if Hispanic <=4.8, by(Qtr);
list;
sort Qtr;
save avg_Lipitor_qty_by_qtr_low_Hispanic, replace;

use avg_Lipitor_qty_by_qtr;
merge Qtr using avg_atorva_cnt_by_qtr;
list;
sort Qtr;
drop _merge;
merge Qtr using avg_Atorva_qty_by_qtr;
sort Qtr;
drop _merge;
merge Qtr using avg_Lipitor_cnt_by_qtr;
sort Qtr;
drop _merge;
merge Qtr using avg_atorva_cnt_by_qtr_high_income;
sort Qtr;
drop _merge;
merge Qtr using avg_Atorva_qty_by_qtr_high_income;
sort Qtr;
drop _merge;
merge Qtr using avg_Lipitor_cnt_by_qtr_high_income;
sort Qtr;
drop _merge;
merge Qtr using avg_atorva_cnt_by_qtr_low_income;
sort Qtr;
drop _merge;
merge Qtr using avg_Atorva_qty_by_qtr_low_income;
sort Qtr;
drop _merge;
merge Qtr using avg_Lipitor_cnt_by_qtr_low_income;
sort Qtr;
drop _merge;
merge Qtr using avg_atorva_cnt_by_qtr_high_White;
sort Qtr;
drop _merge;
merge Qtr using avg_Atorva_qty_by_qtr_high_White;
sort Qtr;
drop _merge;
merge Qtr using avg_Lipitor_cnt_by_qtr_high_White;
sort Qtr;
drop _merge;
merge Qtr using avg_Lipitor_qty_by_qtr_high_White;
sort Qtr;
drop _merge;
merge Qtr using avg_Atorva_cnt_by_qtr_low_White;
sort Qtr;
drop _merge;
merge Qtr using avg_Atorva_qty_by_qtr_low_White;
sort Qtr;
drop _merge;
merge Qtr using avg_Lipitor_cnt_by_qtr_low_White;
sort Qtr;
drop _merge;
merge Qtr using avg_Lipitor_qty_by_qtr_low_White;
sort Qtr;
drop _merge;
merge Qtr using avg_atorva_cnt_by_qtr_high_Black;
sort Qtr;
drop _merge;
merge Qtr using avg_Atorva_qty_by_qtr_high_Black;
sort Qtr;
drop _merge;
merge Qtr using avg_Lipitor_cnt_by_qtr_high_Black;
sort Qtr;
drop _merge;
merge Qtr using avg_Lipitor_qty_by_qtr_high_Black;
sort Qtr;
drop _merge;
merge Qtr using avg_atorva_cnt_by_qtr_low_Black;
sort Qtr;
drop _merge;
merge Qtr using avg_Atorva_qty_by_qtr_low_Black;
sort Qtr;
drop _merge;
merge Qtr using avg_Lipitor_cnt_by_qtr_low_Black;
sort Qtr;
drop _merge;
merge Qtr using avg_Lipitor_qty_by_qtr_low_Black;
sort Qtr;
drop _merge;

merge Qtr using avg_Atorva_qty_by_qtr_high_Hispanic; sort Qtr; drop _merge;
merge Qtr using avg_Lipitor_cnt_by_qtr_high_Hispanic; sort Qtr; drop _merge;
merge Qtr using avg_Lipitor_qty_by_qtr_high_Hispanic; sort Qtr; drop _merge;
merge Qtr using avg_Atorva_cnt_by_qtr_low_Hispanic; sort Qtr; drop _merge;
merge Qtr using avg_Atorva_qty_by_qtr_low_Hispanic; sort Qtr; drop _merge;
merge Qtr using avg_Lipitor_cnt_by_qtr_low_Hispanic; sort Qtr; drop _merge;
merge Qtr using avg_Lipitor_qty_by_qtr_low_Hispanic; sort Qtr; drop _merge;

list;
save lip_v_atrova_data, replace;
clear;
* stop logging;
log close;
exit;
References


Morton, F. (1998). Barriers to entry, brand advertising, and generic entry in the US
pharmaceutical industry. *International Journal of Industrial Organization, 18*, 1085-1104.


