Comparison of Mobiles Prices Between Flipkart And Snapdeal

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Abstract: *The present study is analytical in nature where an effort is made to find out if there is a price difference between Flipkart and Snapdeal. Based on sample obtained on 16 Dec 2020 through a web scrapping method, a two-sample t-test is used to test the nullity of the price difference and a Kolmogorov-Smirnov test is used to compare the sample to a reference probability distribution.*

Keywords: **Flipkart, Snapdeal, Mobiles, Price Differences, Distribution**

1. Introduction

Business war is a very significant concept which is very distinctively seen in the e-commerce industry these days with the presence of the COVID-19. The e-tailing websites try to outrun their competitors by adopting new strategies of price every time and thus gain better consideration in the market which will ultimately increase their web traffic. Online shopping is a type of commerce that allows users to purchase goods and services from the seller by using the Internet. In today's digital age, customers are more likely to migrate to online retail stores than to physical stores. Hence, online business is increases rapidly. Online shopping is easy for anyone who purchases products and services on the internet. Today, there are more than 100 popular e-commerce sites that offer various online services all over the world e.g., Amazon, eBay, … Hence, customers have a variety of options when purchasing a product or service. Indeed, there is such competition between two leading e-commerce companies namely Flipkart and Snapdeal in India. Flipkart is a leading e-commerce company in the fast-growing Indian market and was founded in 2007 by Sachin Bansal and Binny Bansal. The company focuses on products such as electronics, books, music, and movies. Meanwhile, Snapdeal was founded in February 2010 by Kunal Bahl and Rohit Bansal proposing over 30 million products in over 800 different categories. The purpose of this study is to compare the mobile products price between two giant e-commerce firms in India: Flipkart and Snapdeal; and derive a reference distribution from the difference.

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2. Literature Review

In their study, [1] Burdett & Judd (1983) model a market with rational and identical buyers, each willing to buy at lower price. It resulted that when the market reached an equilibrium it exists obviously a price dispersion. More, [3] Passyn et al. (2013) did conduct a research where two ShopBots were used to find out the price dispersion over time. The dispersion was declining at some time. They have also made a survey on about thousands of Americans who use ShopBots, and it was found that knowing the existence of that price dispersion will certainly lead the consumer to buy products with lowest prices. [5] Vijayasarathy & Jones (2001) had previously conducted an experiment to examine the perception of online shopping between two batches of Internet purchases: one with the help of online shopping aid and one without. They have found that digital aids reduce radically search time and costs. In the same vein, knowing the price difference can have the same output as using shopping aids.

Based on a questionnaire made by [4] Veena & Nayana (2019) on Indians, the preferred website for online shopping is Flipkart, as it was the only online shopping website in the country for many years after other websites appeared and the market contracted. Next is Snapdeal's website, which consumers prefer after Flipkart. In terms of price range, up to 35% of consumers responded to Flipkart because it offers a higher level of discount and a lower price if only customers can give preference to these sites. Next is Snapdeal where 27% of consumers prefer this website.

3. Research Methodology

This research is an attempt to study the mobile products price difference between two giant e-commerce firms in India: Flipkart and Snapdeal. The study hovers around one major objective which is the comparison of mobile prices between Flipkart and Amazon India in other term to see if there is a difference between the prices. Our secondary objective is to find the distribution that best fit the price difference between the products. The scope of the study extends to the mobile category of two giants of the e-commerce industry of India: Flipkart and Snapdeal. The purview of the study can be extended to all the categories.

Our data collection was done by creating two scrappers and bypassing all the hurdles to gather data on thousands of mobiles on Flipkart and Snapdeal into a CSV (Comma-Separated Values). The final form of the data has been obtained by joining the two CSV files by common mobiles names. A new column named *difference in price* has been added by subtracting the Snapdeal price from the Flipkart price. We ended up with an acceptable sample of 180 mobiles scrapped on October 6th, 2020 at 15:31 IST. The result was purely found with R, where some libraries (in-built and not) have been used. The statistical tools which are going to be used in this paper are as follows:

3.1. Wilcoxon-test

The Wilcoxon Signed Rank Test is a nonparametric statistical hypothesis test used to compare two relevant samples, matched samples, or repeated measures on a single sample to

assess whether the mean scores of their populations differ. When it cannot be assumed that the distribution of the differences between the means of two samples is normally distributed, it can be used as an alternative to the paired Student's t test.

3.2. Maximum Likelihood Estimation (MLE)

Maximum likelihood estimation is a method that determines the values of the parameters of a model. It has been found that the values of the parameters maximize the probability that the process defined by the model produces the observed data.

3.3. Kolmogorov-Smirnov Test (KS test)

The Kolmogorov-Smirnov test is a nonparametric test for the equality of continuous or discontinuous one-dimensional probability distributions that can be used to compare a sample with the reference probability of distribution. (one-sample K-S test) or to compare two samples (two-sample K-S test).

At first, through descriptive statistics, histogram and density plots, the data will be explored and understood. The next step will be to perform a Wilcoxon test to test the hypothesis. Further, a Cullen and Frey graph will be appropriate to choose a theoretical distribution which is closed to the sample observation in terms of kurtosis and skewness. From that, the MLE method is called to find estimates accord to the previous results. And last, we will compare the new reference probability and the sample observation to test the equality using the KS test.

4. Result and Discussion

4.1. Dataset

Table 1. Descriptive Statistics of Flipkart/Snapdeal Prices

	Flipkart.Price	**Snapdeal.Price**
min	5777	6199
max	29990	26490
range	24213	20291
sum	2413476	2461603
median	13319	13999
mean	13408.20	13675.57
var	15514063.25	15664270.96
std.dev	3938.79	3957.81
skewness	0.69	0.47
kurtosis	1.11	-0.07

Table 1 indicates the descriptive statistics of our data. At first glance, if one individual is willing to buy all these products in only one market (either Flipkart or Snapdeal), he/she will spend 2413476 in Flipkart which is less than for the case of Snapdeal which is 2461603. In fact, it will be a difference of 48127 even though the price range of Flipkart is considerably larger than the one of Snapdeal. Indeed, both price distributions are positively skewed with different levels of flatness.

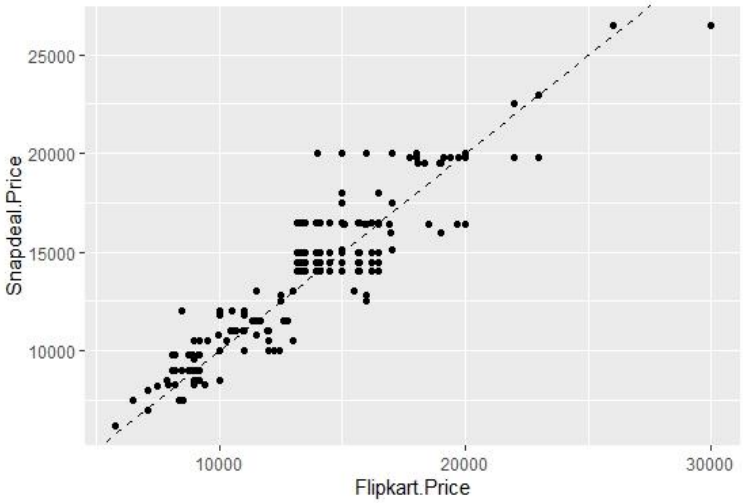

Figure 1. Flipkart price vs Snapdeal price

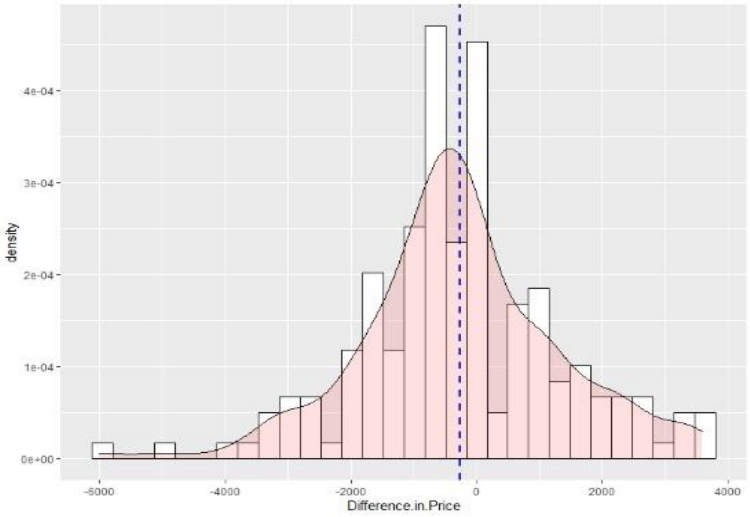

Figure 2. Histogram/Density Plot of Price Difference

Error! Reference source not found. shows a scatter plot of Flipkart price and Snapdeal price where a dotted line is a line indicating that both prices are equal. We note that from price ranging from 0 to 13000, points are closed to the dotted line. In other words, the difference is low compared to the price range of 13000 to 17000. Somehow can say that the price range is a

predictor for price difference or let us say price dispersion. Figure 2 shows a combination of histogram and density plot for price difference. The data is a unimodal bell-shaped curve which is positively skewed, and the mean denoted by the dotted blue line is greater than the mode.

4.2. Hypothesis Testing

We test our hypothesis using the Wilcoxon test and the p-value which is 0.3664. If the p-value is greater than 0.05 then fail to reject the null hypothesis at 95% confidence interval otherwise accept it. In other terms, we do not have enough evidence to say that there is a difference in mobiles prices between Flipkart and Snapdeal.

4.3 Distribution of price difference

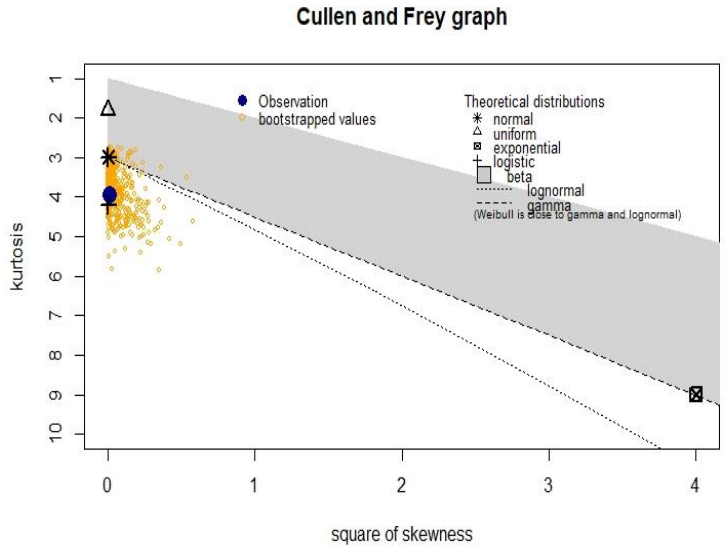

Figure 3. Cullen And Frey Graph of Difference in Prices

We notice in Figure 3 that in terms of square of skewness and kurtosis, our observation is very closed to the logistic distribution, we will focus our quest only on the logistic distribution and the normal distribution even if the logistic is more predictable as our observation is very close to the latter in terms of square of skewness and kurtosis.

Using the method of Maximum Likelihood Estimators (MLE) for a logistic distribution, the estimates obtained respectively for location and scale are -285.8174 and 863.8023. Nevertheless, being focus on parameters like skewness and kurtosis is not fully reliable. Therefore, a Kolmogorov-Smirnov test is used to compare our observation to a logistic distribution with the found MLE parameters. It results a D-statistic of 0.077619 and a p-value of 0.3433 (>0.05). The logistic distribution with the given parameters is a good fit of our dataset. We state at 95% confidence that our data follows a logistic distribution with location = -285.8174 and scale = 863.8023.

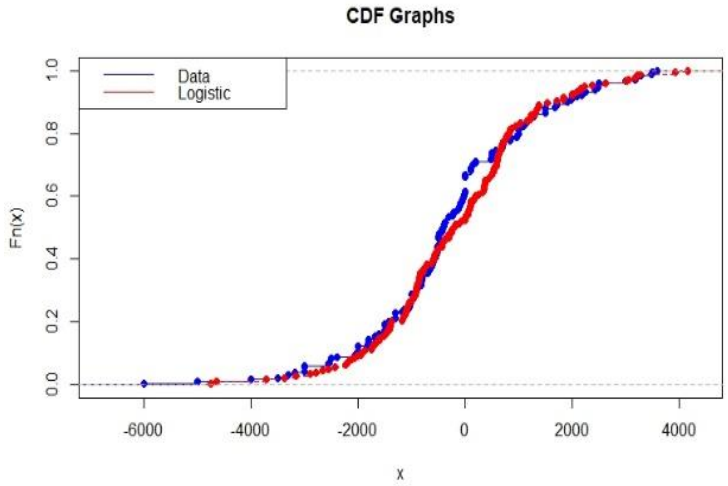

Figure 4. CDF Graphs Comparison

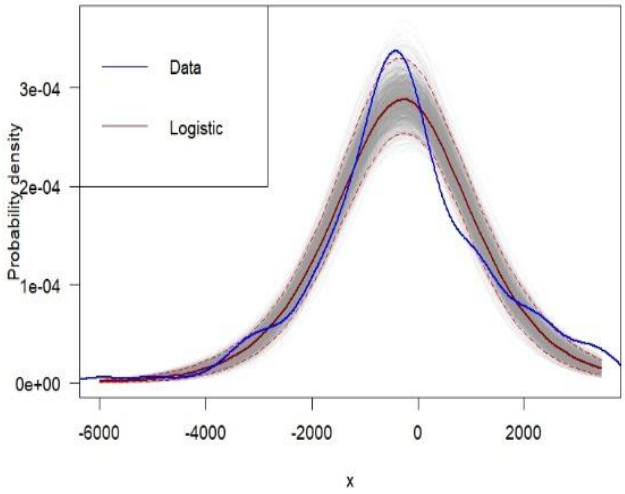

Figure 5. PDF Graphs Comparison

From the Figure 4, one can easily see how close the two curves are even if there exist a deviation at some small intervals around 0. Nevertheless, we notice from the probability density curves in the Figure 5 that at some point the two curves are not very closed. This is since the logistic distribution is not skewed but our data is (positive skewness) and the existence of large outliers in our data. However, we can use this graph to make some predictions in the sense that it offers a fitted logistic distribution for our data and a 95% confidence interval.

Without any further calculation, we have noticed from our collected data that most of the cheaper products are from Flipkart. There is not enough evidence to say that there is a price difference between Flipkart and Snapdeal in terms of mobiles. The logistic distribution with location and scale is the distribution that best fits the mobile prices difference. Its predictions would be very accurate for value under the location and doubtful for the other side.

5. Conclusion

The main concern of this report is to see whether there exists a price difference of mobile products between Flipkart and Snapdeal for a sample of 180 products collected using the web scraping method. At a very first level, we were able to see that among the observations in our sample, Flipkart prices were in number less than Snapdeal prices. Nevertheless, after performing a Wilcoxon test, we have found that we cannot state that a price difference exists. But it is important to know that difference in price can have a huge consequence on consumers. In fact, [2] Jung, Cho, & Lee (2014) enriches this statement in their work where they stipulated that price difference has an influence on how they see the price reference in each shop. Although, our research has allowed us to find that the logistic distribution fits our data, talking about mobile price differences. Nevertheless, it is found that it does not correctly fit in some tiny certain intervals. Indeed, this research can be useful for customers who want to have an overview of price difference between these two markets.

Acknowledgement

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