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Introduction to Econometrics

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A Statistical Analysis of Starbucks Annual US Income in Comparison with Dunkin

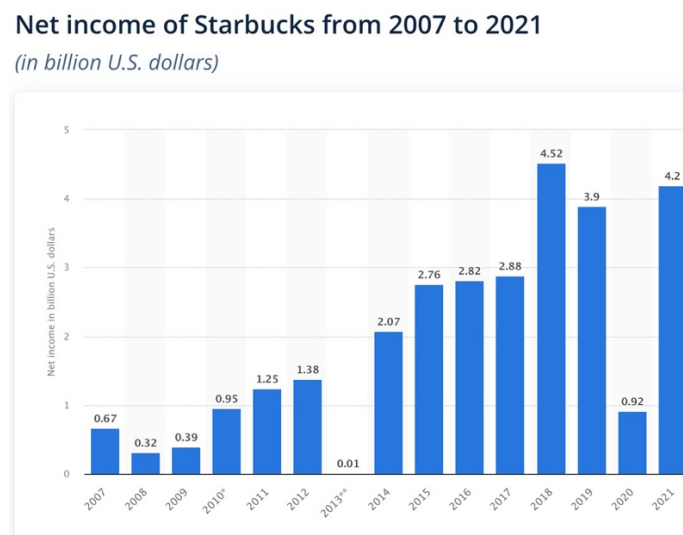
When the word “coffee” is said, chances are the conversation is about Starbucks.

Starbucks is the largest coffee-chain in the world, earning billions of dollars each year from over 30,000 stores worldwide (Statista.com). There are many different places to get coffee, whether that’s a grocery store, a restaurant, or a local coffee shop. However, one of the most successful companies worldwide is Starbucks. Starbucks’ success led to competition for other coffee retailers, most notably Dunkin. Dunkin used to be named “Dunkin Donuts”, but they changed their name to “reflect its increasing emphasis on coffee and other drinks as well as sandwiches” (cbsnews.com). Essentially, the company wanted to increase their coffee sales and be a competitor with other high-end successful businesses, such as Starbucks. Knowing this information, which coffee company has had more success in their overall sales?

Starbucks is known for serving more expensive coffee products, including individual drinks, bags of whole beans, and reusable cups. The company also has a higher quality coffee service reputation, including the café style design, like the “variety and ambiance” of their stores (friedcoffee.com). Starbucks “offers a comfortable and quiet environment with free wireless internet access, encouraging customers to stay to socialize, work, study, browse media, or listen to music while consuming their Starbucks products” (investopedia.com). However, Dunkin has lower prices with a lower quality bean for their products and is more associated with “often resembling fast food stores in furnishings and décor” (Investopedia.com). Does quality and

reputation change the revenue the company receives? Also, how does advertising spending relate to the amount of revenue made for each company? These are important questions to ask when comparing the two companies and their success. There is no doubt that these two fast-food corporations are successful as they are both multibillion dollar companies, but which one has had more success from their customers? It is also important to examine how both companies had impacted the overall food and beverage income of the United States as well. First, start by looking at the data for Starbucks sales in the United States.

Figure 1. Bar Chart of Net Income of Starbucks from 2007 to 2021 in the United States (Billions USD).



Source 1. Statista – Net Income of Starbucks from 2007 – 2021.

Figure 1 above from Statista looks at the income of Starbucks in the United States from 2007 to 2021 in billions of dollars. Starbucks had a major suffrage in 2013, where the company nearly went out of business after only making about \$10,000,000 the entire year. However, after that year, the company was able to avoid bankruptcy and their sales had increased significantly, even before the drop. A similar occurrence happened in the year 2020, where the company once

again had a significant decrease in revenue. However, this was due to the coronavirus pandemic, in which significantly many other businesses had similar drops.

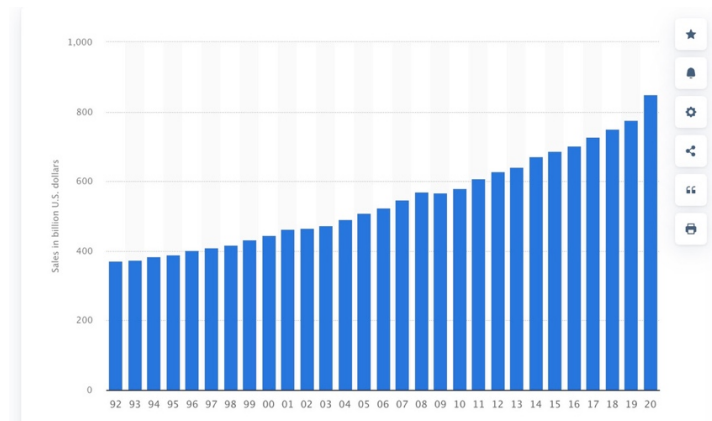
Figure 2. Table of Net Income of Dunkin from 2011 to 2020 in the United States (Billions USD).

Year	Revenue	Change
2020 (TTM)	\$1.25 B	-4.85%
2019	\$1.31 B	3.64%
2018	\$1.27 B	57.37%
2017	\$0.80 B	3.93%
2016	\$0.77 B	2.73%
2015	\$0.75 B	5.32%
2014	\$0.71 B	4.54%
2013	\$0.68 B	8.52%
2012	\$0.63 B	0.82%
2011	\$0.62 B	

Source 2. Companies Market Cap – Revenue history for Dunkin Brands from 2011 to 2020.

Figure 2 above from Companies Market Cap lists the United States net income of Dunkin from 2011 until 2020. Instead of graphic display, this table gives the percent change in revenue between the years. From 2011 until 2019, Dunkin was increasing their profit each year, but by 2020 the company had a 4.85% decrease. Like Starbucks, this was due to the coronavirus pandemic. One thing to notice is that overall, the revenue for most years is lower than Starbucks revenue. For example. In 2011, Dunkin made \$0.62 billion in the United States, meanwhile Starbucks made \$1.25 billion.

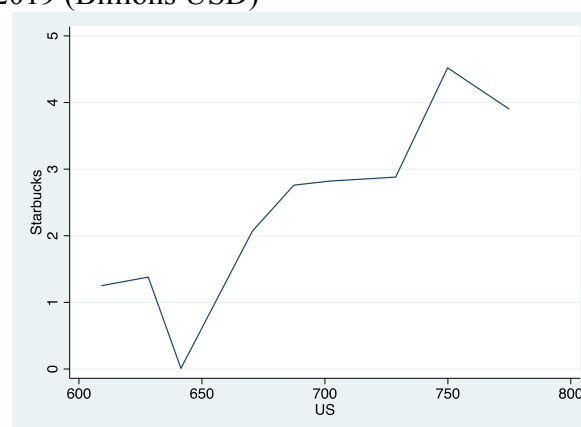
Figure 3. Bar Chart of Annual Sales of Retail Food and Beverage Stores in the United States from 1992 to 2020 (Billions USD).



Source 3. Statista - Annual Sales of Retail Food and Beverage Stores in the United States from 1992 to 2020.

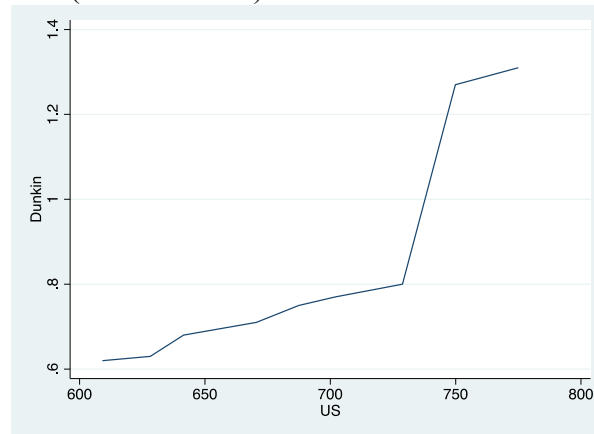
Figure 3 above from Statista shows yearly revenue of food and beverages amongst all retail stores, including Starbucks and Dunkin'. This graphic display shows a trend of having increase in sales amongst all retail food and beverage stores, including Starbucks and Dunkin'. Because the data is conducted over time, we can observe a time series for each company to help show the change in annual income over the years of 2011 – 2019.

Figure 4. A Time Series of Starbucks Annual Income for the United States Food and Beverage Income between 2011 – 2019 (Billions USD)



Source 4. Stata Program Was Used to Create the Above Time Series of Starbucks Annual Income for the US Food and Beverage Income Between the Years of 2011 – 2019

Figure 5. A Time Series of Dunkin Annual Income for the United States Food and Beverage Income between 2011 – 2019 (Billions USD)



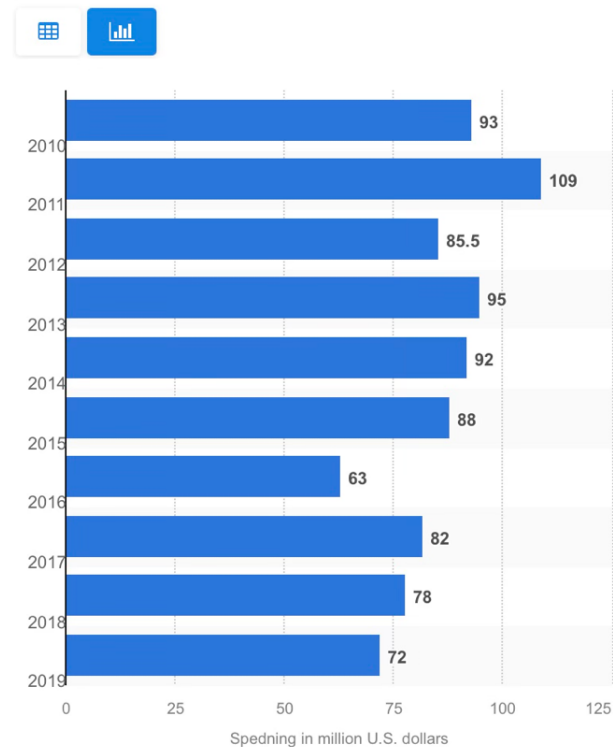
Source 5. Stata Program Was Used to Create the Above Time Series of Dunkin Annual Income for the US Food and Beverage income Between the Years of 2011 – 2019.

One important question to ask is how did Starbucks and Dunkin contribute to the annual income for the United States food and beverage sales? One way to examine this is to look at advertising.

Figure 6. Annual Spending for Advertisement from Starbucks from 2010-2019 (Millions USD).

Advertising spending of Starbucks in the United States from 2010 to 2019

(in million U.S. dollars)



Source 6. Statista – Advertising spending of Starbucks in the United States from 2010 – 2019.

Figure 6 above from Statista shows the amount of money Starbucks spent on advertising for each year in millions of US dollars. From Figure 4, 2011 was the year where Starbucks spent the most on advertising. However, 2019 was the second lowest amount spent on advertising at 72 million dollars, right behind 2016 with 63 million dollars. By looking at 2013, this was the second highest amount spent, but shown from Figure 1, it was also the lowest amount of annual income for the United States. This proposes the question of does advertising spending have a relationship with annual income? To see if this is true, we can conduct a linear regression. For the following, only the years 2011 until 2019 were calculated to exclude the 2020 data, as the coronavirus pandemic had an impact on the company.

Figure 7. A Linear Regression Analysis Between Starbucks Advertisement Cost and Starbucks Revenue for 2011 - 2019.

. regress Starbucks SBAds						
Source	SS	df	MS	Number of obs	=	9
Model	6.68072836	1	6.68072836	F(1, 7)	=	5.32
Residual	8.78396084	7	1.25485155	Prob > F	=	0.0544
				R-squared	=	0.4320
				Adj R-squared	=	0.3509
Total	15.4646892	8	1.93308615	Root MSE	=	1.1202

Starbucks	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
SBAds	-67.98993	29.46652	-2.31	0.054	-137.6672	1.68732
_cons	8.174256	2.530716	3.23	0.014	2.190063	14.15845

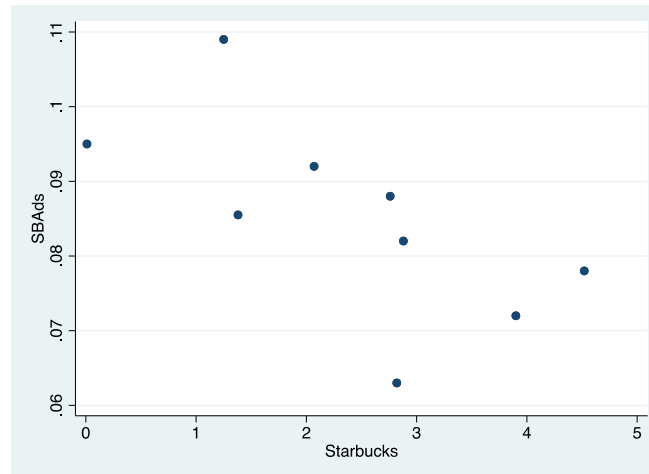
Source 7. Stata Program Was Used to Calculate the Linear Regression Analysis Between Starbucks Advertisement Cost and Starbucks Annual Income for 2011 – 2019.

From Figure 7, a linear regression was performed in Stata to help see the relationship between the cost of advertisement and the revenue generated for Starbucks. From this linear regression, the slope is -67.98993, and we can generate the equation

$$\hat{Sales} = 8.174256 - 67.98993x,$$

where x would be the amount Starbucks spent in advertisements. To clarify, since x is the amount Starbucks is losing, x is a negative value, meaning the amount in sales would be positive. If a scatterplot is made to show the relationship, we have Figure 8 below. The scatterplot shows a moderately negative correlation, which also explains the slope. Since the slope is negative, the correlation is negative. This helps show that as Starbucks income increases, the cost of Starbucks advertisements decreases.

Figure 8. A Scatterplot of Starbucks Income Vs. Starbucks Advertisement Cost for 2011 – 2019.



Source 8. Stata Program Was Used to Create Scatterplot Using Starbucks Income Data and Starbucks Advertising Cost Data.

Figure 9. A Two-Sample T-Test Comparing Starbucks Advertisement Cost and Starbucks Income for 2011 – 2019.

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. ttest Starbucks == SBAds, unpaired unequal
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Two-sample t test with unequal variances

Variable	Obs	Mean	Std. err.	Std. dev.	[95% conf. interval]	
Starbucks	9	2.398889	.4634516	1.390355	1.330168	3.46761
SBAds	9	.0849444	.0044802	.0134407	.074613	.0952759
Combined	18	1.241917	.3595597	1.525483	.4833119	2.000521
diff		2.313944	.4634732		1.245208	3.382681

diff = mean(Starbucks) - mean(SBAds) t = **4.9926**
H0: diff = 0 Satterthwaite's degrees of freedom = **8.0015**

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr(T < t) = **0.9995** Pr(|T| > |t|) = **0.0011** Pr(T > t) = **0.0005**

Source 9. Stata Program Was Used to Calculate This T-Test Between Starbucks Advertising Cost and Annual Income of Starbucks for 2011 – 2019.

From Figure 9 above, a two-sample t-test was conducted to explain the significance of the relationship between Starbucks advertisements and Starbucks annual income. A t-test measures the means of two variables to see if they could be correlated. Here, the t-value is 4.9926 which is high. This is because of the conversion from millions of dollars to billions of

variables. Given this information, between the years of 2011 and 2019, Starbucks, on average generated more annual income in sales over the course of the 9 years than Dunkin.

While Starbucks has earned more than Dunkin, that does not mean Dunkin isn't a successful company. Dunkin has grown a reputation surrounding their donuts, partially because it was implemented into the company name. In terms of competition, what this means for the future of the company is that Dunkin and Starbucks will always be competitors. However, Starbucks will be on top in terms of coffee sales. The data collected from over the years have been mostly consistent with Starbucks being the company with the most revenue, except some economic obstacles like near bankruptcy in 2013 and the 2020 coronavirus pandemic. However, even while selling more expensive products than Dunkin during economic struggles, Starbucks has managed to bounce back from these obstacles to remain the top coffee retail distributor worldwide.

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