

Executive Summary Income Effect Study

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The main goal of my presentation is to see the effects of Income or propensity to spend on the quantity or the proportions of food categories and nutrients. This includes trying to identify some inferior and normal goods in the data. Normal goods are those where demand increases when income increases and inferior goods are those where demand decreases when income increases Krugman and Wells (2018). I utilized the data provided by Aiello et al. (2020) in order to show that both the types of nutrients and food categories are seasonal in their quantities purchased. The data provided by Aiello et al. (2020) consists of breaking down an average purchase of a customer. Therefore, each data entry consists of an area identifier, some variables to describe the purchase including the weight, volume, calories and caloric density of the average product, and some general demographic variables. The variables that describe the purchase can be further subdivided into the type of nutrients including proteins, fats and carbohydrates and their further subdivisions and different product categories such as wine and ready-made meals and the like. Furthermore, for nutrient types, we have variables to describe the weight and proportion and their diversities by weight and calories, while for food categories, we have variables to describe their proportions and the diversity of their proportions by both weights and number.

For the Tesco data, the main goal was to find that both nutrient types and categories show signs of seasonality. If there are signs of seasonality, this might also show that Income might have an effect on both the types of nutrients bought and food categories bought, because the propensity to spend somewhat mirrors an income effect Scott (1995). First of all, I found that the average total calories in the average purchase was different from month to month with peaks during the Christmas and Easter holidays while in the summer months the average total calories purchased seemed to be at its lowest. In addition, I found that the weight of fats, carbs and proteins are seasonal as well; mirroring the pattern found in total calories. In order to confirm my analysis, I conducted an ANOVA test on each of the three nutrient types and found that the mean of at least one month was different to the rest of the months. In contrast, I found that the proportion of calories from nutrient types experiences a different seasonal effect. During the Christmas and Easter holiday months, the proportion of calories purchased coming from fat increases while the proportion of calories purchased from carbs and proteins actually decreases, I also ran ANOVA tests to confirm that at least one of the months for each of the proportions of calories from nutrient types is different. Moreover, I found that there is some seasonality in some of the food types. I chose to look at wine as a potential normal good and ready made meals as a potential inferior good. For wine, the scatter plot that I generated showed that the proportion of wine per purchase went up during the Easter and Christmas holidays as well, I also ran an ANOVA to confirm that at least one month was different from the rest in terms of proportions. In contrast, even though the scatter plot of proportion of ready made meals by month showed signs that they were purchased less during holiday months, the p-value of the month factor in the ANOVA test did not meet my confidence level of 95 percent. I then ran a t-test between the months of November and December to similar results, which lead me to look at the effect size which was also small. Therefore, the evidence suggest that there is not much seasonality when it comes to ready made meals and there fore they might not be inferior goods either.

For my income data, I chose to work with median weekly income by Borough from ONS (2022). I found very strong linear trends when coming the proportion of calories from a nutrient type per purchase, I also ran a simple regression analysis to validate claims. According to Xu et al. (2020), it was found that lower income families heavily relied on getting their caloric needs from carbohydrates indicating that carbohydrates might be inferior goods while protein and fats might be normal goods. As median weekly income increases, the proportion of calories purchased from carbohydrates decreases; results from the regression show that the adjusted r-squared value is 0.477 and the p-value of the coefficient for income is zero. As median weekly income increases, the proportion of calories purchased from fats increases; results from the regression show that the adjusted r-squared value is 0.310 and the p-value of the coefficient for income is 0.001. As median weekly income increases, the proportion of calories purchased from protein increases; results from the regression show that the adjusted r-squared value is 0.395 and the p-value of the coefficient for income is zero. Therefore, we have evidence to suggest that both proteins and fats can be considered normal goods while carbohydrates might be considered an inferior good. Furthermore, as it relates to wine and ready made meals, I found very strong evidence to suggest that wine is a normal good while there is no evidence to suggest that the proportion of purchases of ready made meals is affected by income level at all. For wine, I found a positive linear trend with an adjusted r-squared value of 0.607 and coefficient p-value of 0. Whereas we could not find any trend between income and ready made meals. Therefore, Income does have an effect on the types of food we purchase.

References

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