

Introduction

“Experimental Confirmation of the Existence of a Giffen Good” by Battalio, Kagel and Kogut (hereafter ECEGG) is concerned with the laboratory confirmation of Giffen behavior. In order to understand the motivation of the authors, I will start out by presenting the concept of a Giffen good. The Giffen phenomenon is not an inherent feature of the good as, for example, luxury in luxury goods. Giffen goods are always associated with a certain behavioral reaction to a price change. In order to have the chance to observe an increase (decrease) in price associated with an increase (decrease) in demand, we necessarily need an inferior good. Inferiority therefore is the only feature inherent to Giffen goods.

Income and substitution effects are used to explain the standard downward sloping demand, but this theory can also be used to explain the Giffen phenomena. A perverse case, from the perspective of the law of demand, may arise for an inferior good, in which consumers spend less when their income rises. Inferiority is a necessary but not a sufficient condition for observing the Giffen behavior. When the potato price greatly increased during the 1845 Irish famine, poor families whose diet was composed of some meat and a lot of potatoes the year before saw their real income fall due to the sharp rise in potato prices. As a result, they consumed more rather than fewer of the high priced potatoes. Because of the sharp increase in prices for potatoes and the lack of substitutes, the poor families had to spend so much on potatoes¹, the necessity of life, as to make it quite impossible to afford any meat at all. They were forced to become even more dependent on potatoes because, analytically put, the substitution effect was outweighed by the income effect applicable to an inferior good such as the potato, whose

^{*} Critical summary of: Experimental Confirmation of the Existence of a Giffen Good by Battalio, R. C., Kagel J. H. and Kogut, C. A., in: American Economic Review, 1991, p.961-970

Literature used: Economics, 13th edition by Samuelson, P. A., Nordhaus, W. D., Mc Graw Hill

¹ This qualification is necessary because inferior goods on which little money is spend, do not have an income effect that outweighs the substitution effect and therefore do not produce the Giffen case.

consumption tends to decrease in the poor person's budget when income rises.

In order to analyze the observed consumer choices, either the Slutsky or the Hicks decomposition can be chosen. The authors of ECEGG used the Slutsky decomposition because this method does not require knowledge of the underlying utility functions.

To give some intuition on why the Giffen paradox is almost nonexistent on an aggregate level, the example presented in class by Professor Williams seems better suited. As opposed to the historical example provided above, we now have the case of falling prices and falling demand. The example applies to a poor family that lives in an old house in a cold region. Due to insufficient insulation and a rough climate, the family has to spend a great proportion of its income on heating. With decreasing heating prices, standard theory would suggest that demand increases *ceteris paribus*. However, this might not happen in this specific case. In particular, demand might actually decline, creating the Giffen effect, because now, with low heating costs, the family suddenly can afford a vacation in a warmer region. During this vacation, individual demand goes down. Since prices, however, indicate relative shortages and induce a multitude of adjustment and substitution processes in the economy, this effect will probably not be observed on the aggregate level.

Due to the difficulty of observing Giffen behavior in the field, the authors decided to analyze the phenomenon in a laboratory environment. Budget constraints as well as legal and ethical considerations given, the authors used rats as individuals to confirm the existence of Giffen behavior “under appropriate, even if rare, initial conditions.” Based on significant parallels between human and animal behavior as well as the consistency of rat (and pigeon) behavior with the Slutsky-Hicks theory of preference, this choice seems justified.

Experimental Setting

To investigate the Giffen paradox, initial conditions guaranteeing a strongly inferior good had to be created. The experimenters (probably after a painstaking process of experimentation with various

liquids) settled on rats choosing between root beer and a quinine solution. Genetically similar rats were placed in boxes in which they had free excess to solid food. The amount of liquid food, however, was restricted. In keeping the price of quinine lower than the price of root beer, rats would be induced to trade off the good-tasting root beer for more fluid in the form of bitter-tasting quinine. Quinine was to serve as a Giffen good. Rats could obtain either one of the two liquids by pressing either one of the two levers mounted in the cage. Below each lever was a dipper cup that was filled each time the lever was pressed. Income was controlled by restricting the number of lever presses available for obtaining liquid food. Prices were changed by varying the amount of liquid obtained with each lever press.

The experiments had four phases. The first phase consisted of a search for an income range over which reliable observations of strong inferiority of the quinine solution could be established. Second, using the income level determined in phase 1, prices were changed (the amount of quinine received per lever press was increased) in order to demonstrate the existence of Giffen behavior. The third phase consisted of testing for negative substitution effects for the rats that exhibited Giffen behavior. Then, in a final stage, income was increased and additional income-constant price changes for the Giffen-good rats were induced in order to determine if behavior was still Giffen even at higher income levels. Variations in income or prices were maintained for a minimum of ten days depending on the rats' choices. Prices and/or income were not changed until the rats' choices remained within some equilibrium band established during the previous ten days. This was important to eliminate noise in the choices and assure stability of the preferences for a particular consumption bundle.

Results

The results obtained by this experiment have two major implications for rival theories developed in animal psychology. First, the existence of Giffen goods represents a serious anomaly to the "law of effect". An increasing reward or positive reinforcement for an activity does not increase the probability of engaging in that activity. Thus Giffen behavior is inconsistent with simple strengthening

mechanisms which would predict animal responses only to relative price changes and not to the income effect. Second, the existence of Giffen good behavior also contradicts “melioration theory” and its implication, the “matching law” developed by Herrnstein. Under the matching law, average rather than marginal rates of reward/punishment guide behavior, which is assumed to be unaffected by the overall rate of reinforcement. As a result pure income changes, which do not affect average reward/punishment rates should play no role in consumption behavior.

As a result the series of experiments is supportive of the conventional preference-map model of individual choice and demand. The analytical decomposition of changes in behavior into an income and substitution effect seem to be an efficient tool in predicting behavior.

Finally, the authors add another reason why a Giffen response is unlikely to be observed at the aggregate market demand level. Individual consumption patterns, even of almost genetically identical rats raised in the same environment, are not homogeneous and have the tendency to “equal out”. The data also emphasizes that the Giffen phenomenon is a property of the preference map of the individual at a point in the choice space rather than a property of the good. Economists therefore might not really observe Giffen goods but rather Giffen behavior while analyzing inferior goods.