

# Controversy and Empirical Evidence About the Giffen Paradox Case: Egg Consumption in Mexico

Ph.D. Julio César Cenicerros Angulo

Professor, Department of Economic Sciences, Universidad De Occidente, Culiacán, México.

**Abstract:** *The purpose of this research is to show empirical evidence on the existence of a Giffen good: white egg consumption in Mexico. Also an important part of the review of the literature is presented, showing part of the controversy on this issue. The period from 2000 to 2014 analyzes, which shows that if the price of a kilogram of egg white increases by one percentage point, the amount consumed will grow by 0.03%. While this is a good with inelastic demand, one can not conclude from the information available that it is a Giffen good.*

**Keywords:** Giffen paradox, price elasticity of demand, ANOVA.

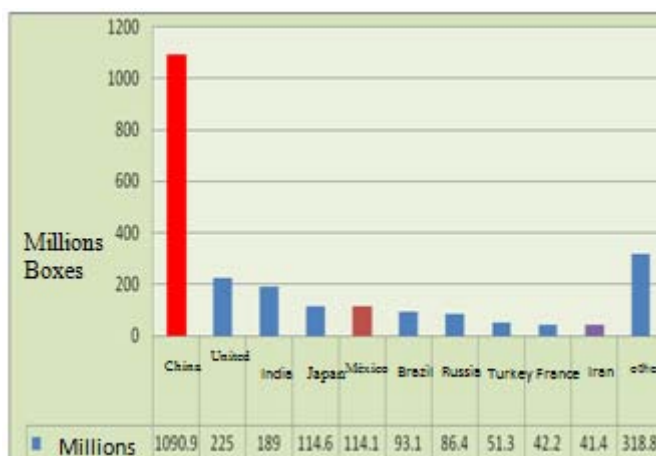
**JEL:** D12, D19

## 1. Introduction

The study of products which apparently recorded a Giffen goods type behavior continues to draw attention. In this sense, from the year 2012 Mexico is presented in an acute shortage of egg and, the invariable price increase consequence of the effect on production by the call avian flu, presents the opportunity to register and analyze information in search of evidence about the paradoxical curve of demand for this product. The second significant event was recorded in March 2015, with significant increases in the price of the product; whose causes were attributed to a seasonally adjusted according to the Mexican Secretary of Agriculture, Livestock, Rural Development, Fisheries and Food, Enrique Martínez y Martínez. Economist Newspaper (2015).

It should be mentioned that the importance of this product in Mexico is reflected by the fact that, the egg is one of products of widely consumed whose domestic production is sufficient to meet national demand.

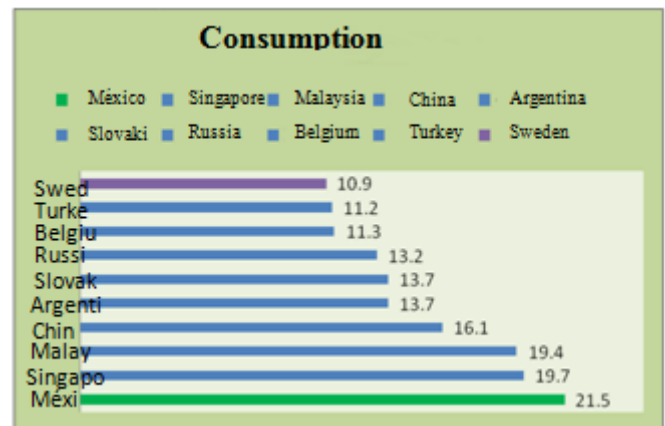
The Figure 1, shows the positioning of Mexico in 2013 at the international level in relation to the production of whole egg.



**Figure 1.** Major Whole Egg Producers in 2013

Source: Authors. Based on information from the National Union of Poultry Farmers (N.U.P.F).

Likewise, it stands to México as the main consumer country of this product. For more detail, see Figure 2.



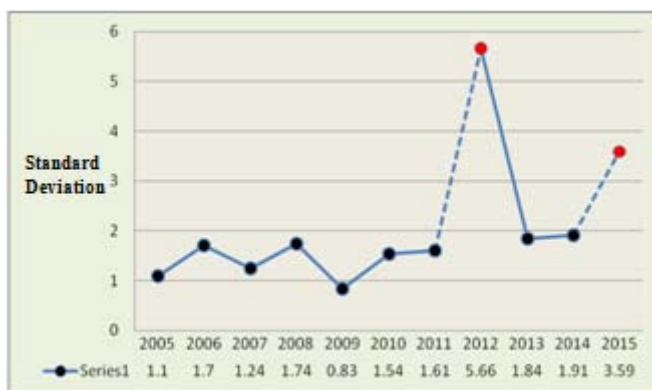
**Figure 2.** Principal whole egg consuming countries in 2013.

Source: Authors. Based on data of the (N.U.P.F).

Regarding egg merchandising for human consumption, in three ways it is performed: 80% is sold in bulk in traditional markets and supply centers, 14% in supermarkets in closed containers and the remaining 6% goes to industrial use. National Union of Poultry Farmers (2015). During June 2012 and March 2015, it presents the events described in Mexico that influenced the production of this white egg and sustained increases in the price of the product. Vid. Figure 3 and 4.



**Figure 3.** Annual average prices per kilogram of egg white.



**Figure 4.** Standard deviation of retail egg prices

Source: Authors. Based on data of the N.S.I.I.M (2015)

It is important to note as the standard deviation of prices have two major peaks; precisely for 2012 and the first months (until May) 2015. It analyzed after excluding those facts, is there empirical evidence and theoretical basis to suggest that this product has been typically behaving like a Giffen goods product based on the period from 2000-2014? Thus, the goal is to present initial evidence to suggest that this product has been typically behaving like a Giffen and then try to prove it. Given the information that there are first, it is estimated coefficient of price elasticity of demand and it is analyzed by the time series of prices and egg consumption. If the results are consistent, then it seeks to estimate the coefficient elasticity of demand income.

As for the hypothesis;  $H_0$ : "The time series incorporated in the analysis of information, as well as the econometric estimation for classifying good they have no consistent evidence to suggest that good (egg white) has a typical or characteristic behavior Giffen goods".

Similarly, it is not only important from the practical perspective but also theoretical, document and test whether there is enough evidence to show whether this product performs as well Giffen goods given the limited information including at international level such cases.

## 2. Review of the Literature

Weber (1997), reported that an article published in 1994, Uriel Spiegel presented an interesting and demonstrative review of the literature about inferior goods and Giffen phenomenon. It analyzed in particular way a utility function that produces an inferior good, with a demand curve upward sloping responding to certain price levels and income.

In addition, Weber (1997) clearly states a review of utility functions that have as corollary an inferior good: so, from Liebafsky (1969), Vandermeulen (1972), and Spiegel (1994), it appears that is Liebafsky (1969) the first to develop a utility function that produces an inferior good, but it was Vandermeulen (1972) who managed to develop a utility function that produces a Giffen good.

Meanwhile, Cespa (2005) explains the role of information in the presence of Giffen goods. Thus, the phenomenon in his opinion is due to substitution effect caused by the prices in an economy with asymmetric information.

According to Dougan (1982) states that, assuming that the Giffen goods case has always been considered a paradox only because it is largely at odds with our experience. However if you look, for example, as an increase in consumption of goods that have increased their cost of production in a certain amount, therefore Giffen goods then surely would not seem so strange.

Moffatt and Moffatt (2014), work about the conditions that predict the behavior Giffen goods, these being: (a) that the function is defined in closed form and is twice differentiable especially in the positive quadrant, (b) monotonous growth in both arguments and globally quasi-concave, and (c) are Marshallian demand functions that are expressible in closed form as explicit functions of price variables.

Shachmurove & Szyrmer (2011), analyze data relating to food consumption in Russia once you start the process of economic conversion to capitalist forms since 1990. Attributed to income inequality and impoverishment of much of the population as a cause of the presence of such products Giffen. In this research they were interviewed many people, but mainly pensioners and unemployed who strengthened their consumption of basic foods (potatoes and bread) and slowly looked away from foods such as meat, dairy products, fish, among others. This take place once relative prices of food increased significantly.

Instead, Battalion & Kagel (1991), they documented as Giffen goods have been during long time in a special place in the theory of consumer choice. However, economists have so far have been able to find unambiguous evidence of this frequently cited "exception" to the simple law of demand (Stigler, 1947, 1948; Prest, 1948; Dwyer and Lindsay, 1984).

In the same line of ideas, Barzel & Wing (1992), emphasize the reasons why the Giffen goods are hard to find in everyday life. First, when the proportion of expenditure on a good on total spending is small, the magnitude of the income effect is likely to be small (eg, Hicks, 1946). Second, at the aggregate level, the income effect of a change in price is approximately zero (eg Friedman, 1949; Heiner, 1974). And finally, with a

demand curve slopes upward, a decrease in supply would result in a lower price, which is inconsistent and contrary to the facts (eg Dougan, 1982; Dwyer and Lindsay, 1984). Thus, the empirical results has not produced a solid case of a demand curve upward sloping (eg Stigler, 1947).

### 3. Materials and Methods

As for the method of analysis of the objectives posed in the research are guided by the descriptive analysis and econometric traditional methodology. With the aim of measuring price elasticity of demand and obtain reliable information to test the null hypothesis that the product does not behave as a Giffen goods.

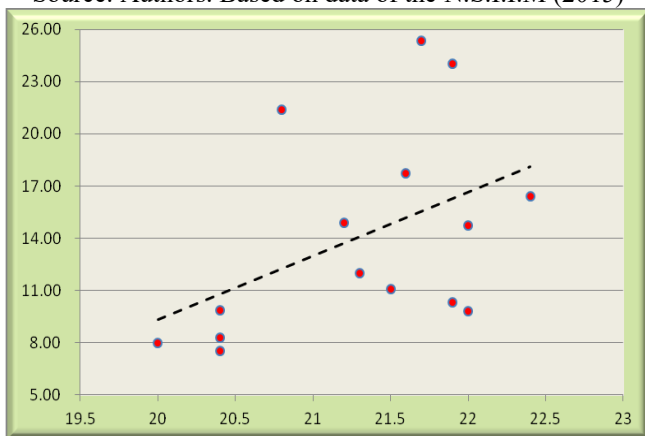
Information is collected (time series: 2000 to 2014.) about price and consumption. Start, is selected the prices registered in the Central de Abasto in Iztapalapa D.F. The basic sources in the data collection part of the National System of Information and Integration of Markets (N.S.I.I.M) and National Union of Poultry Farmers (N.U.P.F).

This protocol corresponds to a quantitative research design: no experimental descriptive and correlational. It is used in the analysis of data the econometric methodology in its concluding part. For processing and analyzing of the information using the SPSS. V.20 software and Excell.V.2010.

### 4. Results



**Figure 5.** Historical performance: consumption and prices.  
 Source: Authors. Based on data of the N.S.I.I.M (2015)



**Figure 6:** Scatterplot: Prices - consumption.  
 Source: Authors. Based on data of the N.S.I.I.M (2015)

**Table 1:** Summary of regression statistics

Multiple correlation coefficient	0.46
Coefficient of determination R <sup>2</sup>	0.22
Standard error	0.68
Observations	15

**Table 2:** Information ANOVA.

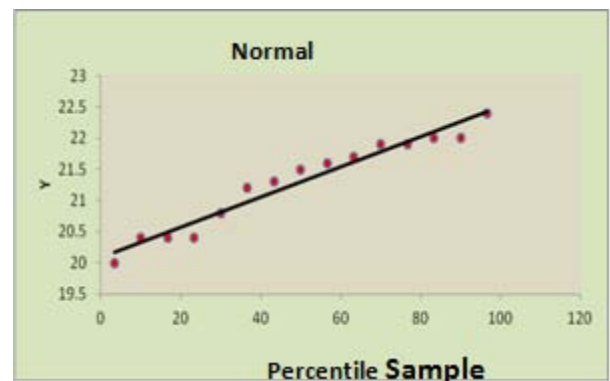
	Degrees of freedom	Sum of squares	Average of squares	F	Value critic F
Regression	1	1.63	1.63	3.56	0.08
Residual Error	13	5.95	0.46		
Total	14	7.58			

**Table 3:** Coefficients for the construction of the model.

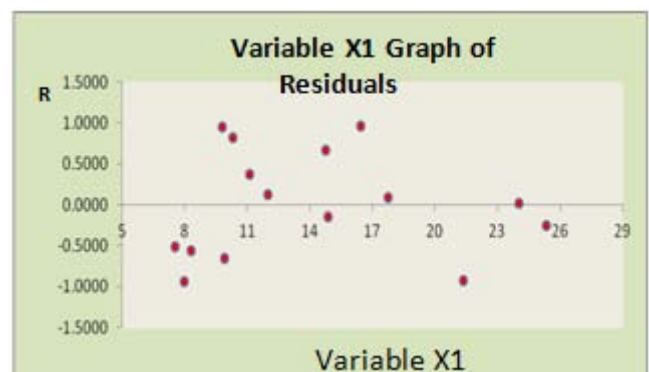
	Coefficients	Standard error	Statistical t
Intercept	20.47	0.47	43.49
Variable X <sub>1</sub>	0.058	0.03	1.88

**Table 4:** Forecasts and remainder not standardized

Observation	Forecast Y	Remainder
1	20.9420	-0.9420
2	20.9607	-0.5607
3	20.9151	-0.5151
4	21.0538	-0.6538
5	21.1246	0.3754
6	21.0485	0.9515
7	21.0784	0.8216
8	21.1773	0.1227
9	21.3458	-0.1458
10	21.5138	0.0862
11	21.3382	0.6618
12	21.4366	0.9634
13	21.7257	-0.9257
14	21.9581	-0.2581
15	21.8814	0.0186



**Figure 7:** Graph normal probability.



**Figure 8:** Remainder graphs

Therefore, regression model obtained is:

$$\hat{Y} = 20.47 + 0.058(X1) + \varepsilon_i \quad (1)$$

Then:

$$\varepsilon_{px} = \left(\frac{\partial y}{\partial x}\right) \left(\frac{x}{y}\right) = \beta_1 \left(\frac{x}{y}\right) \quad (2)$$

In consequence:

$\varepsilon_{px} = 0.03$ . Therefore, if the price of kilogram of white egg is increased by one percentage point the egg amount will increase by 03%. Thus, we can say that this product is inelastic.

## 5. Discussion

The results of this investigation show that, although the time series used shows a slight improvement in egg consumption on average in the presence of increases in the price of the same, when the data processing is formalized shown that:

The value F experimental of ANOVA proof, can not reject the null hypothesis, therefore there is no robust evidence to state categorically that, as a first condition is predictive model ( $0.08 > 0.05$ ) and therefore, is reliable generalize the results to the population.

Similarly, the value (t) in the statistical test of significance associated with the explanatory variable in the model (X1), is similarly irrelevant. With regard to the sign that accompanies the explanatory variable shows that is presented according to the theory of Giffen goods. However, the coefficient is very low, tending to almost zero. Regarding the level of association between the analyzed variables have a correlation coefficient (0.46) weak.

While it is true that the coefficient price elasticity of demand ( $\varepsilon_{px}$ )  $< 1$ , and therefore can be classified as an inelastic good; this is not conclusive to affirm the existence of Giffen goods, missing from the theoretical point of view corroborate the existence of an inferior product.

Therefore, we can predicate that given the length and level of disaggregation of data and the results of formal tests analyzed, there is no robust evidence to affirm that we are in the presence of a Giffen goods, difficulties have documented in the literature Battalio & Kagel (1991), Barzel & Wing (1992), Stigler (1947, among other economists).

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## Author Profile



**Julio César Cenicerros** is economist, M.Sc. in international trade and Ph.D. in administration Sciences by the Universidad Autonoma de Durango in Mexico. Professor in the area of Economic-Administrative Sciences of the Universidad de Occidente and in the Faculty of Accounting and Administration at the Universidad Autonoma de Sinaloa. Consultant in the area of marketing research, which in turn is his line of investigation.