

**Economics is a Mathematical Science.**

Economics comes from the Greek word “oikos” meaning house, so “Economics” literally means the study of household management. Prior to the 14<sup>th</sup> Century, social formations were embedded in social and political institutions. This was the time of private enterprise. As people subjected social and political forces and institutions to economic thought, the economy became universal; politics and society became dependent variables. This brings us to the social formation of capitalism, which differs from every other social formation because human actions under capitalism take on the appearance of natural phenomena. Because human actions take on the appearance of natural phenomena, capitalism lends itself to mathematical modeling. WS Jevons, in his book *The Theory of Political Economy*, proves, through his analysis and counterarguments against the problems with economics, the belief that Economics is mathematical science and that the only way to understand the economy is to model it.

The first problem Jevons sees in economic theory is that most believe “labour rather than utility [is] the origin of value”. This notion that labor creates value is completely false. Labor only determines value indirectly; it is not *the* determinant of value. Labor varies the degree of utility of a good through the increase or decrease of the supply of that good. If there is more labor then there is more of that good, and thus less utility. As Jevons states it “the degree of utility varies with the quantity of the commodity, and ultimately decreases as that quantity increases”. Value does not stem from how long it took or how much labor went into a product. In other words, value does not mean I worked for  $x$  hours on this so it should be worth  $y$  amount. It comes down to the amount of the good that determines the utility of the good and thus the value.

Now that this problem is taken care of, let's move to the BIG problem in economic theory. In *The Theory of Political Economy*, Jevons states, "figuring out how to maximize pleasure is the problem of economics" (37). With this statement he brings forth the idea that human beings want to satisfy our needs with the least amount of effort required. This comes down to pleasure versus pain. According to Jevons, "pleasure and pain are undoubtedly the ultimate objects of calculus of Economics". Human beings want commodities and goods, but do not want to put in any extra work. The definition of a commodity is to ward off pain or to afford pleasure, so whether or not a good is purchased depends on the increase in pleasure or decrease in pain that a person gets from buying it.

Economics rests upon the laws of human enjoyment because consumption is based on satisfaction. This is the key to the meaning and theory of value. Value is derived solely from utility and "utility is no inherent quality" because it is based on the circumstances of man's needs, whether or not the purchase will satisfy him. For example, water is indispensable up to a certain quantity. It is a necessity and the value is very high when there is not much to go around, think of our water bills in this drought. The utility of water begins to decrease as more becomes available, and thus its value (and price) declines as well. The utility will eventually sink to zero when there is abundance. This example also shows the relationship between the supply of a good and its utility and value. As the supply increases the utility and value decrease because the need for the good is less. Later we will see how this fact makes it possible for the mathematical modeling of the economy.

To understand the solutions to these problems Jevons' is addressing in *The Theory of Political Economy*, we must examine the positions he is arguing against. Jevons' argues against the idea that Economics can be explained only using qualitative methods. He believes that

Economics is a quantitative science and that “a student of Economics has no hope of ever being clear and correct in his ideas of the science if he thinks of value as at all a thing or an object, or even as anything which lies in a thing or an object”. Value cannot be based off of a thing or an object because value is based off of utility, which changes when the needs of the population change. For example, just because gold is sparkly does not make it valuable. The fact that it is sparkly makes people want it, giving it utility. Gold that has yet to be discovered has no value. It is important to remember that anything desired has utility. Once again, utility comes from the value it gives to a person, not the labor behind it; “the mere fact that many things, such as rare books, coins, antiques, etc., which have high values and which are absolutely incapable of production now, disperses the notion that value depends on labour”. This also brings us to the fact that value is an abstract concept. Value is a relative term, “the value of a thing means the quantity of some other thing... which it exchanges for”. This is the Theory of Exchange. Value is decided by the circumstance of its exchanging in a certain ratio for some other substance, usually money.

Since the economic system is made up of “wealth, utility, value, demand, supply, capital, interest, and labor”, all quantities, Economics must be quantitative and it must be modeled mathematically. In the beginning of *The Theory of Political Economy*, Jevons states “my theory of economics... is purely mathematical in nature”, but, it is not until we understand the meaning of value and its relationship to utility that the reader can see how Economics can be modeled with calculus. Economics “must be mathematical simply because it deals with quantities”. To go into more depth we use math because “the degrees of utility of commodities exchanged will be in the inverse proportion of the magnitudes of the increments exchanged”. This means that the utility of a good decreases as the amount of the good increase, a point that we now know by

heart. This inverse proportion is easily graphed and modeled using calculus. Some do believe that Economics is too imperfect to be mathematically modeled. Other sciences, physics for example, are not perfect yet we do not fight whether they are mathematical. Economics is, also, not too imperfect simply because the individual does not matter; the market has the freedom. The choice of an individual has no influence in the aggregate market place. In the end, everything will be aggregated together and the market will choose the price and the quantity of the good.

Jevons' *The Theory of Political Economy* proves to the reader three things: value is based on utility, utility comes from the supply and demand of a good which is based on pleasure, and, most importantly, that Economics can and must be modeled with math. There is, however, one thing that Jevons' theory leaves out. While he does state that the individual does not matter in Economics because in the end the aggregate market will average his or her decisions, Jevons does not give any regard to politics. How will the economy be influenced if there is a major political event or outcry? Jevons believes that these events will not affect the market as a whole. If there is a political disaster, like a war for example, the economy will indeed be affected. War could lead to a smaller labor force, a shortage of goods, etc all which lead to a change in the economy. In summation, Jevons makes a great case for modeling economics mathematically and shows the reader how to think of utility and value and where they come from, even if he does not take political events into account.

SOURCE:

WS Jevons, *The Theory of Political Economy*