

IS MARSHALL'S UTILITY A FORM OF WEALTH?

Economics is all about wealth. I pray that the study of Economics should confine to wealth and wealth alone. I think that wealth must be studied in the manner and on the lines that Chemistry studies matter. Understanding wealth should start from defining wealth and should proceed with studying properties of wealth and classification of wealth. Laws that apply to all forms of wealth in general should be studied on priority. With these objectives in mind discussion is presented here.

Matter, energy and wealth have two important properties in common. Law of Conservation is a proven Law when it is studied with reference to matter and energy. This Law states that when matter/energy is transformed from one form to another, the mass/ quantity of energy of transferee form equals mass/ quantity of energy of transferor form. It is further stated that matter/energy can neither be created nor be destroyed but can be changed from one form to the other. Law of Conservation of Wealth is, unfortunately untold hitherto, mother of all economic laws and principles. Similarly, when wealth is transformed from one form to the other the value of transferee form of wealth equals value of wealth of transferor form and that wealth can neither be created nor be destroyed but can be changed from one form to the other. This Law forms the sum and substance of Double Entry Method of Bookkeeping. In Accountancy, debits should match credits, assets should match liabilities and source of funds should match application of funds. All economic theories/laws/principles are based on the concept of Conservation of Wealth. In a perfect market, equilibrium price is arrived at by plotting demand and supply curves. The point of intersection of these curves is the equilibrium price. At this point, Value in demand in money terms=Value of supply in money terms AND Value of demand in commodity terms=Value of supply in commodity terms This is based on Law of Conservation. We say, $\text{Income} = \text{expenditure} + \text{savings}$. This also proves Law of Conservation. This Law can be proved mathematically also.

When one studies basics of algebra, $2a$ can be added to $3a$ and the answer would be $5a$. $4a$ can be subtracted from $7a$ and the answer would be $3a$. One cannot add $2a$ and $3b$. Similarly, one cannot subtract $5b$ from $10a$. One can add 5 meters to 7 meters and the result is 12 meters. One can subtract 5 meters from 8 meters and the answer is 3 meters. Can we add 5 hours and 2 kilograms? No. Only like terms can be added or subtracted. In simple words **WEALTH ONLY CAN BE ADDED TO OR SUBTRACTED FROM WEALTH** proving that **WEALTH CAN NEITHER BE CREATED NOR BE DESTROYED BUT CAN BE CHANGED FROM ONE FORM TO THE OTHER**. Thus, the conclusion is, wealth can neither be created nor be destroyed but can be changed from one form to the other.

Economists say that wealth should have "Value in use" and "Value in exchange". I find that somewhere we are losing. Let us go by the assumption of a layman that all that are shown in balance sheet and other financial statements are forms of wealth. We find some items in the financial statements like loss, depreciation and goodwill that may or may not have "Value in Exchange". Are they not forms of wealth? As a layman I am confused as to know who is right- Accountant or Economist. We know that loss is subtracted from assets to arrive at net worth. Depreciation is subtracted to machinery/fixed assets account (a form of wealth). Goodwill is added to total assets of a firm. All these are expressed in units of money

and money is form of wealth. As discussed earlier, only wealth should be expressed in units of wealth and further that only wealth can be added/subtracted to/from wealth, these items should be treated as forms of wealth.

Now let us assume that crop worth Rs.5million is lost due to floods. Here loss is expressed in units of money and money is a form of wealth. If loss is not a form of wealth then why is it expressed in units of wealth? If loss is a form of wealth even though it does not have “Value in Exchange” what is sanctity of using words Value in Exchange? Economists also say that wealth should be scarce. Are oxygen and water scarce? Are they not wealth?

Therefore it is necessary to redefine wealth. In my opinion it would be conclusive if a substance has Value in Use for qualifying to be a form of wealth. Wealth in the form of “value in use” and wealth in the form of “value in exchange” are interchangeable in nature. Let me cite examples. Oxygen, carbon dioxide, chlorophyll, sunlight, soil moisture and essential plant nutrients present in the soil combine through a process called “photosynthesis” and manufacture food, a commodity that has “value in exchange”. According to doctrine of mathematics, only wealth can be added to wealth and hence it is proved that sunlight, carbon dioxide, soil moisture, essential plant nutrients and sunlight are all forms of wealth. Here wealth in the form of value in use is converted into wealth in the form of value in exchange. Similarly this food, a commodity that has value in exchange gets digested in the body and through the process of respiration releases energy, a form of wealth that has value in use.

The second important property of wealth is that wealth, like matter and energy, always moves from higher concentration to lower concentration. Let us understand this concept in detail. When I say that concentration of sugar solution is 5%, I mean that 5grams of sugar (solute) dissolved in 100grams of water (solvent). We observe that there are two distinct forms of matter here. One is sugar and the other is water. Similarly when we express concentration of wealth two forms are necessary. Price, cost/unit of production, rent per house, rate of interest, returns/capital are some such examples involving two forms of wealth. Let us study and confirm whether wealth moves from higher concentration to lower concentration.

Example1: In two neighboring markets, let us assume, the price of potato as follows:

| | |
|--------------------------------|--------------------------------|
| Rs.6.00 | Rs.5.00 |
| Kilogram of potato MARKET A | Kilogram of potato MARKET B |

We notice that concentration of wealth in the form of money is more in Market A than in Market B because $Rs.6 > Rs.5$. Conversely, Wealth in the form of commodity (potato) is more in Market B because $1/5 > 1/6$. Remember always that concentration of one form of wealth is reciprocal of concentration of other form of wealth. We observe in the above example that wealth in the form of money (buyers) move from Market A to Market B i.e. from higher concentration to lower concentration. Wealth in the form of potato moves from Market B to Market A i.e. from higher concentration to lower concentration.

Example2: Let us assume that in the two neighboring banks the rate of interest offered on deposits are as follows:

| Rs.10 interest | Rs.8 interest |
|--|--|
| Rs.100 investment or deposit BANK A | Rs.100 investment or deposit BANK B |

Before proceeding further, I want to explain a biological process called “Osmosis”. When a semi permeable membrane separates two solutions of different concentration, a membrane that allows only solvent particles to pass through, solvent moves from higher concentration to lower concentration. In this example wealth in the form of interest does not move from bank to bank. Only wealth in the form of investment moves. I have termed such movement of wealth where only one form of wealth moves as “Osmotic movement of wealth”. Depositors or investment moves from Bank B to Bank A because investment is more concentrated in Bank B than in Bank A ($100/8 > 100/10$).

Example3: Imagine that you are credit appraiser of a Bank. You have received a proposal for financing a project whose IRR is 12%. The opportunity cost of capital is 10%. Will you for economic feasibility of the project? Yes. Because, in opportunity cost of capital, investment is more concentrated than that in the project and that wealth in the form of investment should move from opportunity cost to the project.

When wealth moves from higher concentration to lower concentration, we receive any or all of the following benefits-A) Increased income: B) increased savings: C) decreased costs: D) increased satisfaction.

Now, after summarizing above, one may state the properties of wealth as follows. 1) Wealth should be expressed in units. 2) Wealth cannot be destroyed or created. 3) Wealth can be changed from one form to the other. 4) Wealth should move from higher concentration to lower concentration till concentrations in both systems equalize.

Is Marshall’s Utility a form of wealth? Does it satisfy the requirements? Marshall used numbers without any specific units. Can this utility be expressed in units of wealth? Yes. Marshall, while formulating his Theory, did not imagine that utility is a form of wealth. What is this utility? Is it mere satisfaction that one derives by possessing or consuming a commodity (or service)? Or is it the USEFULNESS or NEED of the commodity or service? I opine that latter would be appropriate. When a man is hungry and that he needs five apples to satisfy his hunger, utility can be expressed, in this case, in units of apples and it would be appropriate to say- utility = 5apples. Utility can be expressed in units of any form of wealth.

Can utility be changed to other forms of wealth? Yes. When a hungry man buys food, wealth in the form of money is changed to utility expressed in units of food. Thus utility can be changed to other forms of wealth. Does utility move from higher concentration to lower concentration? In a hypothetical example, let us assume that utility expressed in units of money be Rs.100/- i.e. one unit of utility=Rs.100/-. A person has utility of goods as under:

| | |
|------------------|------------------|
| One utility | one utility |
| 2 units of goods | 3 units of goods |

GOODS A

GOODS B

Utility is concentrated in Goods A than in Goods B. Hence utility should move from Goods A to Goods B. Men tend to buy cheaper goods. Hence, movement of wealth in the form of utility takes place from Goods A to Goods B. In other words, the person prefers to buy commodity B.

Having studied the properties of utility and after having confirmed that utility is a form of wealth, it is easier to make an in depth study of this form of wealth. As one has already understood, chemistry and economics share similar concepts. We have in chemistry, a concept of solubility. We call water as Universal Solvent. Many substances dissolve in water. The substances that do not dissolve in water do not undergo reaction. Utility, in economics, is one such form of wealth that can take the place of Universal Solvent. All forms of wealth dissolve in this form of wealth called utility. The forms of wealth that lose their solubility in utility do not undergo economic reaction. A discussion here is presented on ECONOMIC REACTIONS.

In a chemical reaction, matter changes from one/more form/s to one/more forms. Chemical reactions are broadly classified into: 1.Reversible chemical reactions and 2.Irreversible reactions. In reversible chemical reactions products turn into reactants and reactants turn into products. In irreversible reactions, say burning of wood, only reactants get converted into products and products do not enter into reaction. Similarly, a concept called economic reaction is introduced here. Economic reaction can be defined as reaction where wealth changes from one form to the other. All economic reactions are reversible in nature and this is the reason why Double Entry Bookkeeping Method of Accountancy is successful. I name a few economic reactions here:

1.Money → Goods

←

2.Liquidity → Investments

←

3.House ⇔ Rent

4.

One Law of Chemistry called Law of Mass Action, which is stated “in a reversible chemical reaction rate of chemical reaction is directly proportional to the product of the concentration of reacting substances expressed in moles/liter” is applicable to every Economic Reaction. A chemical reaction is one where matter changes from one form to another. I have termed a reaction where wealth changes from one form to another as Economic Reaction. In reversible chemical reaction, reactants change into products and products get changed into reactants. All Economic reactions are reversible where as only a few chemical reactions are reversible. Reversible chemical reactions and economic reactions have some properties in common. Law of Mass Action is one such Law.

Let $A+B=C+D$ is a reversible chemical reaction. Increase in the concentration of reactants, i.e. A and B, results in increased rate of forward reaction. In simple words more units of reactants get changed into products. The equilibrium constant, denoted by K, is arrived at by the following equation.

$$K = \frac{[A][B]}{[C][D]}$$

[A], [B], [C] and [D] are concentrations of A, B, C, and D respectively. Let us apply this to economic reactions. Let us consider following economic reactions.

1. Goods-----> Money K= money/goods or price
- 2.Houses-----> Rent K=rent/house
- 3.Labor-----> Wages K=wages/labor
- 4.Rupee-----> US\$ K=US\$/Re
- 5.Face value (or deposit or investment)---> Maturity value K=maturity value/face value which is called compounding factor by bankers.
- 6.Capital---> Returns K= returns/capital

If wealth in the form of goods increases, K, the equilibrium constant, or price falls. More units of goods get changed for lesser money. Remember Quantity Theory of Money.

In the second example, if houses increase in number, rent per house (K) decreases. In the third example, if number of laborers increase, wages/labor decreases. In the fourth example, if rupee is in excess of demand, US\$/Re decreases or US\$ becomes costlier in Rupee terms. If deposits start pouring in, Maturity value/Face value, in other words the compounding factor, as Bankers call it, decreases. Compounding factor is a function of rate of interest and thus rate of interest also decreases with increase in deposits. In the last example, if capital increases, returns/capital decreases-remember Law of Diminishing Marginal Returns here. In all the above examples, you may add a few more to the list, you notice that when one form of wealth increases, its relative value in terms of other form of wealth decreases. But K is equilibrium constant and it soon attains equilibrium by movement of wealth from higher concentration to lower concentration (not by invisible hands or self adjusting forces).

I propose the name “LAW OF WEALTH ACTION” for this law to suit economic reactions. Now, after having come to know that matter, wealth and energy have some important properties in common it is evident that Economics is pure MATERIAL SCIENCE. There are several other concepts in chemistry that are applicable to Economics. I would say that economics and chemistry are mirror images.

With this in back ground let us study afresh Law of Diminishing Marginal Utility of Marshall. Let us imagine that a man is hungry. To fill his hunger he needs 5 apples or in simple words his utility, expressed in apples, is 5. Let us apply Law of Wealth Action.

1 utility \Leftrightarrow 5 apples.

$$K \text{ (equilibrium constant)} = \frac{5}{1}$$

By eating one apple he derives the satisfaction of eating 5 apples. Here the marginal utility is 5. At this point of time he is unaware that he would receive a few more apples. When he has consumed one apple, his utility is reduced by one apple and this is scaled down to 4apples. Now his utility, expressed in apples, is 4. If he is offered a second apple, according to Law of Mass Action,

1 utility \Leftrightarrow 4 apples.

$$K (\text{equilibrium constant}) = \frac{\text{---}}{1}$$

Thus, the marginal utility for second apple is 4 (for marginal utility no units are there as this is a ratio, i.e., apple/apple and the apple gets cancelled.). Similarly successive additions of apple results in reduced marginal utility. If the person consuming apples is aware of availability of some more apples, this will not be case. If the person is given two apples at a time, the marginal utility changes.

Law of Mass Action is a proven Law in chemistry. This law is based on Law of Conservation and Law of Equilibrium. This law has justified the correctness of Marshall's Law of Diminishing Marginal Returns. Only fault is that Marshall did not assign units to utility and he did not present utility as a form of wealth.

Continuing the discussion- Utility, a universal solvent, an observation may be made here that all forms of wealth dissolve in this form of wealth called utility. A study of properties of water, a universal solvent for matter, would give us more insight. Water is a form of matter and dissolves other forms of matter. Similarly, utility is form of wealth and dissolves other forms of wealth. Water, chemically denoted as H₂O, remains as H⁺ and OH⁻. The H and OH are equal in quantity/concentration. If acids are dissolved in water the concentration of H⁺ increases. If bases are dissolved in water, the concentration of OH⁻ increases. In pure water, the concentration of H and OH are equal and the pH (a measure of H⁺ concentration) is 7 which is called neutral. Because of this character, water has acquired the status of universal solvent. Similarly, utility has two components. One is the money or money related forms of wealth like deposits in banks, investments in shares and debentures that are readily convertible in to cash, etc., which are called "MEANS" in economics. The other component of utility comprises of goods and services which are otherwise called "WANTS" in economics. Any unit of economy or rather one may call an economic system e.g., an individual, a family, a country, a firm, an organization etc., has a utility complex comprising of these two components. In simple words, the components of utility of the economic system or unit tend to be in equilibrium. If there is increase/decrease in any one component, there will be non-equilibrium. The equilibrium will be restored by decrease or increase in the other component of utility. Let us study with an example.

A man has salary of Rs.8000/-p.m. The money component of utility is Rs.8000/- His goods and services component of utility is, at current prices, Rs.8000/-. Both components of utility are in equilibrium (In reality such cases are few and true equilibrium is a myth. This is discussed later in the paper as to why true equilibrium cannot be achieved.). In a particular month, if his goods and services component increases by Rs.2000/-, the state of equilibrium is disturbed. He resorts to loans and advances to make good the shortfall. He will be borrowing from his future resources. On the other hand, if his money component is more than goods and services component, he will be depositing excess money for future use. Thus the future acts as a balancing tool to bring about equilibrium. In case of nations, deficit budget is a measure to meet the current requirements. By deficit budget, both the components of utility are balanced. By deficit budget, we are not creating wealth. We are also not creating wealth by loans and advances (or by extending credit). We may assume

charge such as positive and negative charges to the components of wealth. When the charges (components of utility) are equal, we may call this as **neutral state**.

When an economic unit (individual/family/state/nation/firm/industry or any such entity) suffers from short/excess of any one component of utility, we may call it as charged entity. Such entities are economically active. The entities that have equal charges are economically inactive. In chemistry, elements with perfect electronic configuration do not participate in chemical reactions and they are rightly called inert gases. Those elements that have electronic configuration nearer to that of an inert gas (e.g. mono-valents like sodium, chlorine, etc.) are chemically highly active. The elements that have electronic configurations distantly placed from that of inert gases (e.g. gold), are less active. This applies to economics as well. This commonness shows that all sciences-chemistry, human psychology and economics are inter-related. This can be understood by a simple story.

A youth was, on a hot summer afternoon, sleeping under a tree in a public garden. A middle aged man passing by, saw the youth and was annoyed of the laziness of the youth. Like all middle aged people do, he started preaching the youth, the importance of hard work. The youth asked the old what he would get if he works hard. The aged starts narrating the benefits: “You would get money and this would help you acquire every thing you desire. You can have a car, a house, servants at your beck and call and you can relax and rest any time you so desire”. The youth said “What I am doing now? I am relaxing and sleeping at will. For this small thing why should I work? The story ends here. But had the young boy acted upon the advice of the old the story might not have found any end. Let us imagine that a man is working as clerk in a government office. He aspires for promotions, which, in his view, would enable him to earn more and thereby meet his wants. In simple words he wants to attain equilibrium between wants and means and aspires to lead a peaceful lazy life. By getting promotions he becomes more active. The equilibrium state eludes him. As one approaches equilibrium he tends to become more active. The thinner the membrane (separating one and the equilibrium), the more active one gets. The richest man in the globe is perhaps the most active man in the world. Similarly, the advanced countries, which are nearer to equilibrium state, are very active countries. Imagine gold. It has electronic configuration far from that of any inert gas. Hence it is least active chemically. Similarly, a government employee, say, a primary school teacher, has no aspirations to attain equilibrium. He is not economically active at all. One must remember that true equilibrium state is a rare phenomenon. For any developmental activity to progress in-equilibrium is a prerequisite. That is the reason I advocate deficit budget to promote economic activity. By resorting to deficit budget, the state or nation approaches equilibrium state and it becomes more active economically.

Now, a discussion on solubility of various forms of wealth in UTILITY is presented here. There are two important concepts in chemistry:

1.Common ion effect: according to this concept, when two substances of different solubility are dissolved and that they contain common ions, the solubility of the substance with less solubility gets reduced. Suppose sodium chloride and calcium chloride are dissolved in water, solubility of calcium chloride being less than that of sodium chloride and further that both contain a common ion called chloride, results in

precipitation of calcium chloride. Once a substance precipitates it will participate in a chemical reaction. Similar thing happens in economics as well. When two forms of wealth, say, cars in mid segment (both have same utility and catering to same class of people) are introduced in the market, the cars with less utility(in terms of technology or cost or style) loses its solubility in utility. Once a form of wealth loses its solubility in utility it precipitates from the market or in other words do not undergo economic reaction called “sale”. It remains to be a form of wealth but loses its solubility in the utility.

2. Diverse ion effect: When two substances are dissolved in water with diverse ions the solubility of both the substances increase. Suppose calcium sulfate and sodium chloride are dissolved in water, the solubility of both the substances increase. Similarly, when two substances like washing machine and television are introduced in the market, one product enhances the solubility of other product in utility and the sale of both forms of wealth increase.

Similarly two other concepts of chemistry, dilution effect and concentration effect on adsorption of charged substances (ions) have relevance in this study but needs further research. It is clear from the discussions above that human behavior, economics and chemistry are built on same principles and are inseparable.

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