LÉON WALRAS
AND
THE CONCEPT OF ECONOMIC EQUILIBRIUM

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The leader of the Mathematical School,[1] was Léon Walras who maintained its structure on the economic equilibrium of prices, as these are formed within the various markets and are dominated by the laws of the equilibrium of the whole.

Léon Walras was born in Evreux in 1834. He was taught his first classical studies first at the college of Coen and later at Douai. His father Auguste Walras wanted to see him become an engineer, however, the young Walras sought something more likable in this field. Moreover, he was prompted to this by the book of A. Cournot, *Les principes mathématiques de la théorie des richesses* (1838) and certainly by his father's theory concerning value in *De la Nature de la Richesse et de l' origine de la Valeur* (1811)[2]. Under the influence of those works Walras began to give his full attention to economics, and endowed with mathematical knowledge he

1. R. Murray : *Leçons d'Économie Politique d'après la definition de l'Ecole de Lausanne*, Paris, 1920. G. Pirou : *Les Théories de l'Equilibre Économique*, Paris, 1945. F. Oulés : *Les insuffisances Théoriques Fontamentales de la Doctrine Économique de la Premiére Ecole de Lausanne*, in «Metroeconomica», 1950 and by the same author : *La Veritable Portée du Marginalisme*, Paris, 1938 and G. Palomba : *Saggi Critici*, Roma, 1976, p. 48ff. J. Schumpeter : Ten Great Economists, London, 1966. L. Houmanidis : The subjective theory of value (doctorate thesis) (in Greek), Athens 1954. W. Jaffé : Walras theory of tâtonnement : a critique of recent intepretations «journal of Politicdi Economy» 75, 1967.

2. L. Walras : *Éléments d'Économie Politique Pure*, p. 159.

began to introduce it into the study of economic science. In 1859 he published his work, *Économie Politique et Justice* in which he proceeds with a criticism of Proudhon. In 1860 the Council of the State of the Canton of Vaud in Switzerland announced an examination relative to the question of tax. In this examination Walras only managed to secure fourth place, the first going to Proudhon. The committee gave fourth place to Walras because it was judjed that his work was completly revolutionary. In 1861 he published *Théorie critique de l'impôt* in the prologue of which he set forth anew his ideas related to tax calling for the nationalization of the land to get rid of land rent. The trade union question also held a fascination for him, particularly the country cooperatives. His ideas relative to their position and future evolution he first developed in *Le Travail* and in a series of lectures which were published in 1868 under the title, *Recherche de l'Idéal Social* where a plan for social reforms is set forth. In 1870 the University of Lausanne founded the chair of Political Economy and Léon Walras was called to take it. In 1874 he published, *Élémenss d'Économie Politique Pure* and in his memorandum to the French Academy published in «Journal des Êconomistes» under the title, *Principes d'une Théorie Économique de l'Echange* he particularly developed his ideas concerning prices. In 1883 and 1886 Léon Walras published *Théorie Mathématiques de la Richesse Sociale* and *Théorie de la Monnaie* and in 1892 he retired from teaching but maintained his connection with the University as Honorer professor. He continued to work and gave himself to writing *Études d' Économique Social* and *Études d' Économie Politique Appliquée,* which were published in 1896 and 1898 respectively. He died in 1910 in Clarens, Switzerland.

According to Léon Walras the balance between effective supply and effective demand of each product or service, which gives the current price, is conmprised of an equilibrium of exchanges (Equilibre des Echanges). This equilibrium tends to restore itself within free competition. Supply and demand influence each other in every economic factor endeavoring to achieve from the smallest cost the greatest reward. Each product has one and only one price and the same happens with services (labor, land and capital).

These services are shaped into products by the entrepreneurs who do not profit but do not lose either because of the fact that the aggregate income from the sale of consumption goods. And here is the simple mechanism of cost and scarcity. The sellers of their services come into conflict, through the offering of services, with the businessmen demanding them. The arena of conflict of this opposing interests is called the service market (marché

des services) and is directed by scarcity. The current price balances these two counterpoised forces. The product market (marché des produits) shows the latter in conflict with the former. The entrepreneurs supply and the bearers of services are the demanders. When the supply exceeds the demand the prices fall and vice versa. The current price is the balance of the effective supply and the effective demand. The first as well as the second market constitutes the General Equilibrium of Exchange, which tends to be realized by itself. Within this general equilibrium there is one and only one exchange value in relationship to all the others of the market[1] while the central lever of this, the entrepreneur, receives his reward through the direction of this business and a perecentage of interest through the capital disposed by him himself, but not more than that because in economic equilibrium there is no profit. Only in real life is there profit. This is the perfect mechanism of theoretical economic equilibrium differs from that of real economic equilibrium.

This was the ideal design of the abstract conception of the School of Economic Equilibrium. It is an automatic and temporary view of economic equilibrium within a system of perfect competition, which the classics first tried to conceptulize, with the only difference being that now the changes in prices are examined as changes in utility.

Léon Walras also accepted that the conception of abstract reasoning of the flow within the economy of things would have douptful value, if the conclusions of pure political economy could not be applied in deed. Also, according to Walras, with the theoretical elaboration we draw continually nearer to reality when the abstract structure (formation abstraite) is replaced by a more realistic one (formation appliquée). For the achievement of this end he believes it would be more beneficial if the position of the entrepreneur were undertaken by the State, when the various services would be placed in a just relationship of value to scarcity. This is

1. In a collectivist state, he says, «the worker would achieve a just wage while at the same time there would be a condition of freedom...» . «The system that I am proposing would differ from communism...». «In the system of applied rational economy (économie rationelle sociale) the most useful products would be produced, and the wages of labor would be high, because it would have been placed in the just relationship of value to scarcity.» (L. Walras : *Études d' Économie Politique Appliquée* p. 237). Despite this Bousquet maintains that there is no Mathematical School, in the way we speak of the Liberal or Socialistic School, «because the use of mathematical methods is never accompanied by an empirical science and the School of Lausanne completely refuses to confront practical problems». (G.H. Bousquet: *Essai sur l'Evolution de la Pensée Économique*, p.225).However, we are not in agreement with this viewpoint of Bousquet since Walras as well as Pareto attempted to give explanation of economic equilibrium in what they considered the most suitable economic system. Walras in this instance tried

the theoretical model of Walras which he realized mechanically, outside of any social element.

According to Walras follower Pareto, if it is a question of establishing the relationship of economic phenomena we must study the society from outside. This conception of Pareto, however, is completely abstract finally ending in a complete break with reality. Economists are not able to observe the world of economics from the «outside» and uncover its laws, so that later with the aid of science they can impose a rational order. This manner of thought of course led Pareto to the creation of autoritarian political models far removed from individual freedom and democracy.

The writers belonging to the Mathematical School wavered between positive economics and psychological economics but with the appearance of Manuale d' Economia Politica (1906) by Vilfredo Pareto they were led to the completely objective view of economic equilibrium.

Anyway, the mathematical method took account only the factors that can be measured, exclusding the others, so that they succeeded in the construction of a mathematical theorem the solution of which was completely mathematical. Thus, despite their use of mathematics in the interpretation of economic phenomena, as if it were a question of souless mumbers, behind the mathematical symbols they used were their reactions to living individuals in a society. But we will return to this later.

In addition, the followers of the Mathematical School, not taking into account the element of time, immobilized the economic forces and created a static hypothetical structure. However, economic phenomena evolve within space and time and present a continuing development within time a continual becoming «before» and «after».

The method of mathematical proof was adopted by Léon Walras, the leader of the Lausanne School. He declared : theoretically all the unknows of the economic problems are dependent on all the equations of the economic equilibrium[1].

Walras identified marginal utility with the concept of scarcity (rareté).

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to reconcile liberalism which, according to him, advanced production, with socialism, which sought the establishing of justice. Nevertheless, Jevons while being a follower himself of free competition supported for the sake of the whole the legal supervision of society so that he was called a moderate follower. (T. S. Hutchinson : *Economists and Economic Policy in Britain after 1870*, in «History of Political Economy», No. 1, 1967, pp. 231 - 235).

1. L. Walras : *Elémen ts d'Economie Politique Pure*, p. 289.

«It is certain», he said, «that scarcity is the cause of exchange value»[1]. Scarcity is the conbination of two concepts : a) the one of utility and b) the one of the limitation of quantity.[2] The increase of the decrease of utility has as result the increase or the decrease of scarcity and the increase or the decrease of the quantity results in the increase or the decrease of scarciry.

For the classicists, the element of scarcity was not excluded, but it was considered to be a secondary importance. Léon Walras on the contrary accepted that for a good to have value, it must be scarce, there must be a limited quantity of it and it must be an object desired for the satisfaction of needs. Scarcity is the relationship of utility (a qualitative property of things) to quantity (a quantitative concept of a host of units of this good).

Scarcity is accompanied by:[3]

1. Ownership (propriété)
2. Exchange (échange)
3. The business works (industrie)

1. Only the rare things become objects of ownership, because as they are in small quantity they are in demand. No one is interested in objects which are abundant (air, an inexhaustible reserve of a certain good, etc.). Léon Walras observing the two elements, utility and scarcity creeping into value, said that only the rare things become property and are saved. The possession of these rare goods by their possessor gives him on the one hand the satisfaction of their use and on the other the exchange of them for other products also rare.

2. Only the rare useful things can have value and be exchanged, because there can only be a demand for useful products, which are found in limited quantity. Everyone endeavors to acquire things that he can exchange for others. The endeavor of each individual is instituted to ashieve the exchange of a less rare thing for one of greater scarcity, this so that in a future exchange he will achievre this proportion until it is bound to be to his advantage.

3. An enterprise is never to employ itself with the production or useless things. Anything involved, he says, in the elaboration of the various

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1. L. Walras : p. 102. And in *Études d'Économie Politique Appliquée* pp. 26 - 27.
2. L. Walras : p. 21 ff.
3. Walras : *Eléments d' Économie Politique Pure.* p. 43ff.

utilities aims at the further quantititive improvement of them, so that a scarcity of a given utility is created. Thus entrepreneurial activity is turned to the production and the fashioning of those useful things which are found in limited quantity and which are in demand. Finally, Léon Walras observes that the entrepreneurial works are turned in two directions in the beginning to the multiplication of the existing useful goods which are found in limited quantity and then the transformation of indirect utility to direct. Indirect utility he considers as raw materials, direct as the ready made products which can satisfy human needs without further fashioning.

In addition, Walras distinguishes utility in extensive (utilité extensive) in which at a price of zero demand is infinite and intensive utility (utilité intensive) which is the satisfaction desired by us and the acquisition of which requires sacrifice, while the intensity of the last need satisfied or the in other words scarcity is what determine determines value.[1]

Based on the above Walras proceeded to the equilibrium in the exchange observing that the maximum of utility is achieved when the relationship of the intensity of the last need satisfied or the relationship of scarcity between the two goods is equal to the prece.[2]

Speaking about prices Walras[3] had in mind the market without forces of wear (frottements) and perfect competition, in which the price is estabilized at a level of equilibrium of buyers and sellers and vice versa. In the case where the demand is creater than the supply, the prices rise and a climate of increases of supply is created so that the price will fall. If the supply is greater than the demand will increase untill the equilibyrium between supply and demand is restored.

«Given» he says, «two commodities so that there is an equilibrium of supply and demand, where the stable price of the one is expressed through the other, the prices of the effective demand of each of the commodities will be equal to the price of its effective supply. If this does not occur, then the price of the commodity whose effective demand is greater than the price must increase and the price of the commodity whose effective supply is greater than its effective demand must fall.» [4] And if this balance is not

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1, 2. L. Walras: *Eléments* p. 95 ff and p. 104. And Jevons also maintained that, saying in relation to the economic problem the most general one is that one which refers to the magnification of utility and that the consumer normally tends to be supplied with a quantity of goods of which the relationships of the final degree of utility is equal to the relatonships of their prices. (S. Jevons: Theory of Political Economy ed. 1970 p. 130).

3. L. Walras: p. 74 ff.

4. L. Walras p. 86.

achieved, the traders interest is to sell that commodity which has a smaller scarcity than the sum price of the scarcity of the other one, in order to buy from that commodity which has a greater scarcity than the sum price of the scarcity of the other one. This is the mostperfect point of achievement of the greatest utility during the exchange which is the ideal point of equilibrium. This equilibrium, however, is changed ; as the rest of the elements remain unchanged, the quantity of the utility of one of the two goods is changed. The money entering into the exchange simply reflects, and only this, the value of the exchanged goods. Walras procceding on to the general equilibrium where there are the exchanges of a number of goods on the part of a number of exchangerd, observes : «Given more commodities, even if the utility or the quantity of one of these commodities is changed by one or more of the exchangers, in a manner in which their relationship of scarcity is not changed, the price will not change. If the utility or the quantity of all the commodities of one or more of the exchangers were to be changed but again in a manner in which their relationships of scarcity were not changed, their price would not be changed». In the case of the general equilibrium in the maket where the act of exchange occurs through money, the rest of the terms remaining unchanged, he emphasizes : «given a majority of commodities, if the utility of one of them is increased or decreased though one of the exchangers, the price of this commodity in money will rise or lower. Again if the quantity of one of these commodities is increased or decreased by one of the possessors of this commodity, the price will lower or rise.» [1]

According the above mentioned we observe that Walras started from Cournot, who with the demand curve representing the amount, demanded as a function of price applicable only to the exchange of two goods he passed to a figure of tuo curves (supply and demand) of these goods pointing the intersection of the two curves as the equilibrium price. Then, he refers to the total amounts of the goods on the market in order to arrive to his main theory of scarcity work in the marginal ability concept. In this equilibrium conceived and connected trough the enterpreneur without any loss or profit by him all sales are equal with all receipts (general equilibrium) which means the intersection of cost and utility and price in the magaximazation of very person engaged in exchange[2] while don't exist cost of

1. L. Walras : pp. 161 - 162.
2. J. Schumpeter : Ten Great Economists p. 77 - 78.

dependence when credit money interferes disequilibrium it appears accompagnied by dynamic profits in order to emerge the cost of dependence.[1] This is the ideal conception of the naturalisme of convenience (naturalismo di convenienza), as it was called by Professor Amintore Fanfani [2].

In the case of monopoly, the price in the market is not single, as occurs in the market of free competition, because under a monopoly the price is directed according to the various categories of buyers and their buying capability, so that the monopolist can sell this commodity simultaneously at different prices.

The general Equilibrium as it was formulated by Léon Walras contributed a minimum amount to economic development because the dynamic elements with which the changes of economic volumes in time is missing from its view of the economy.

Concerning to the theory of Walras the variable quantity varies according to the price which is the independent variable of this. However, the dependent variable which is the quantity includes also as a variable the prices of all the remaining commodities. The consumer will not decide to buy until he knows all the prices of the remaining goods and if we have a reserve of goods (u) the aggregate demand for each one of them is determined by their aggregate price. And Walras goes from the equilibrium of individual psychology to the equilibrium of the market.

The aggregate demand for each commodity can be represented as D_1 $D_2 \ldots . D_n$ and the prices P_1, $P_2 \ldots \ldots P_n$ while an equilibrium can be formulated for each commodity showing that the price for this is a function of the other prices.

So we have :

$$D_1 = F_1 \ (P_1, \ P_2 \ldots ., \ P_n)$$
$$D_2 = F_2 \ (P_1, \ P_2 \ \ldots \ldots \ P_n)$$
$$D_3 = F_3 \ (P_1, \ P_2 \ \ldots ., \ P_n)$$
$$\ldots \quad \ldots \quad \ldots \quad \ldots \quad \ldots$$
$$D_n = F_n \ (P_1, \ P_2, \ \ldots . \ P_n)$$

In the situation of equilibrium the demand of each commodity will be balanced with its supply.

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1. L, Houmanidis : The Theory of Wages from Classicists until to day, (in Greek) Preface by A. Fanfani, Athens 1957 2nd ed. 1965.

2. A. Fanfani : Economia, Brescia 1953 p. 64.

So we have : $S_1 = F_1, P_1, P_2 \ldots, P_n)$

$S_2 = F_2 (P_1, P_2 \ldots . P_n)$

$S_3 = F_3 (P_1, P_2 \ldots, P_n)$

. . . . . .

$S_n = F_n (P_1, P_2 \ldots, P_n)$

As the supply is given and stable with (n) reserve of goods we have (n) prices, i.e. (n) unknows so that there will be a separate corresponding equation for each good, and with the knowledge of the corresponding price of each commodity the aggregate demand can be calculated. The picture, however, that this analysis gives us which depicts the general equilibrium by the aggregate price influecting the demand for each commodity is deceptive, because various factors enter into the formulation of their demand within the continually changing condition of formulated prices [1]. We must alao discuss the money theory of Léon Walras so wiqhont to offer a further anaylis.

Léon Walras also contributed concerning the value of money and opened the road of the School of Cambridge by his idea of the means of payments desired cash (encaisse désirée) ln his book titled : *(Théorie de la Monnaie),* 1878).

According to Walras[2] the value of money is formed either by the in crease of its supply or by its decrease in relation to the desired cash; if the level of prices P_α are represent by the chosen good - money (numéraire) Q_α is the amount of the circulating value and H the desired cash then $Q_\alpha P_\alpha = H$. If we take into consideration also the credit money (F) then $(Q_\alpha + F)\ P_\alpha = H$ and in this case the economic equilibrium will be disturbed because the money circuit may not correspond to the circuit of goods and services, while with the numéraire we succeed in having a steady equilibrium exception the output of gold out of the country [3], when

1. Criticizing Walras' theory of economic equilibrium, Stigler says : «The peculiarity of this theory, the desctription of the nature of general equilibrium was essential; this idea appeared after arduous research preceeded it. It was the great contribution of Walras one of the few cases in the history of post-Smithian economics, in which a fundamentally new idea appeared». (J. Stigler : *Production and Distribution Theories* p. 265).

2. L. Walras : Elements d'Économie Politique Pure, Lausanne 1874 ed. 1926, p. 352.

3. L. Walras : pp. 311, 352. Marx coincides with those view of Walras, according to professor Rugina, when we have simple production i.e. the circuit starts with the sale of the commodity and ends with purchase of Same (C-M-C-) (we have commodity-money numéraire). In the case however of the developed production money interferes as capital (M—C—M-M′) we

an equilibrium is established in case $Q_\alpha P_\alpha = H$ money may be comted as a numéraire and the rate of interest should be such as to equalize desired cost ((holding of cash) and the total quantity of money.

From all that we have developed up till now concerning the economic equilibrium concept of Walras, we come to the conclusion that the entire conception of economic equilibrium tends to bring economic theory into the framework of one whole of internally dependent markets, which are continually led to a condition of equilibrium within free competition. This equilibrium preceeding from micro-static equilibrium and proceeding to the macro-static conception is ideal and abstract, because it is not based on reality but consists simply of a tendency. This equilibrium is insured through the mechanism of prices which through their increase and decrease create the conditions for the absorption of the liquid productive factors within the production procedure.

Walras accepts that the schematization of the prices of the various goods does not contain space singly for each of these and this is because the demand for each good depends on the price of the remaining goods and the buying capability of the consumer. Again the price of each good contributes, even if infinitesimally, to the determination of all the remaining prices, where the aggregate demand for the goods is a function of the prices of these goods. The economic equilibrium arises from the opposition which occur between the needs (goûts) of individuals and the cost which the satisfaction of these demands runs up against. The existence of the entire economic problem springs from the fact that we have man, who emdeavors to achieve.. the satisfaction of his needs while there are also the obstacles which blook this satisfaction. A host of things exist for the treatment of the needs of man and a host of alternatives occur on his part. The difficulty of the whole problem lies in our placement of man in one of these alternatives. The formulation of the relationships of the various volumes (quantitative relationships)[1] among themselves and the changes of these in every change of

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have credit money-antinumeraire and so we shall have disequilibrium (A. Rugina : A monetary dialogue with Marx in «East European Quarterly» Vol. III No. 3, 1975).

1. The following paragraph of Léon Walras on this method in characteristic : «La mathématique seule peut nous apprendre pourquoi et comment non dans l'échange mais dans la production, la capitulation et la circulation on arrive à des prix courants d'équilibre en faisant à hause de prix des services des produits et des capitaux neufs dont la demande excede l'offre et en faisant la baisse du prix de ceux dont l'offre excede la demande» (L. Walras : *Elément s d'Économie Politique Pure*, p. 16).

one of them, is the work of mathematics. Every change occuring in an element of economics (supply, demand, factors of production etc.) has a direct or indirect influence on the rest of them. The functions of these elements is presented through algebraic representations and geometric diagrams. [1]

Schumpeter discussing the theory of economic equilibrium according Walras says : «The theory of economic equilibriumis Walras' claim to immortality that great theory whose crystal-clear train of thought has illuminated the structure of purely economic relationships with the light of one fundamental principle the momment with which the University of Lausanne has honored him hightly has no other inscription than : é q u i l i b r e é c o n o m i q u e [21] ..... « the whole of pure economics ress with Walras on the two conditions that every economic unit wants to maximize utility and that demand for every good equals supply. All this theories follow from these two aquisitions. Edgeworh, Barone, and other many have supplemented his work ; Pareto and others many have gone beyond it in individual points : The significance of his work is not thereby touched».[2]

Everything concerning the economic equilibrium was established by the classicists, as well as the other economic phenomena, but it was formulated by the Walras and Mathematical School, until it constituted the foundation of a new investigation. According to Dupriez, «the concept of this equilibrium is itself the basis of the interpretation of economic movement».[3] But the method of mathematical proof adopted by the mathe matical School also underwent criticism.

Nevertheless, Jevons issued a severe announcement to economists that «economists must to be mathematicians, otherwise they are not really economists[4] to which serious objections were formulated about the utility of the excessive use of mathematics and the confronting of economics problems as mathematical ones.

Already Cournot had observed that «mathematics must be used with

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1. J. Schumpeter : Ten Great Economists, London 1966, p. 76.

2. J. Schumpter : p. 79.

3. L. Dupriez : *Les mouvements économiques généraux*, Louvain, Vol. I, p. 43. From as early as the 17th century Pascal's mathematics went beyond static equilibrium and reached the conception of dynamic equilibrium.

4. S. Jevons : op. cit. p. 16.

great caution or must be abandoned when its conclusions are in opposition to common experience.»[1]

Alfred Marshall announced : «The basic use of pure mathematics in economic subjects is to aid in the quick, concise and precise writing of a person's thoughts for his personal use.»[2] Painlevé also in his prologue to the work of Jevons in French said, «Mathematical calculation is useful to us as a helpful and temporary instrument, so that we can deduce quantitative conclusions from qualitative presuppositions. We temporarily dress with quantitative conclusions from qualitative presuppositions. We temporarily dress with quantitative clothes qualitative givens. It is a question of a loan of dress, which we take off as soon as we reach our conclusions.» [3]

Precisely because of this, the psychological and sociological research of economic phenomena started being sufficiently pursued resulting in the halting of the excessive mathematicization of economics. Because the abuse of mathematics drew the science of economics away from its real field and made it in many ways fruitless and also «strange» among the social sciences. It is a fact that mathematics is indispensible to economics but the mathematician must not make use of mechanistic caclculation but must conceive living examples from the point of view of their application offering thus a useful technique for life. As for the tendency to mathematicize economic science we would like to repear together with Tarde, «the tendency to mathematicize economic science in the tendency to psychologize it far from being mutually exclusive can offer to our eyes a mutual support». (A. Tarde : *Psychologie Èconomique*, Paris. 1902, (Vol. I-II) Vol. I, p. 141). Nicholas Georgescu-Roegen (Analytical Economics, Issues and Problems, 1966; *The Entropy Law and Economic Process*, 1971 and *Mathematic Dogma and Economics* in «Methodology and Science», 1974) makes also an acute criticism against mechanistic concepts on economic theories and mathematics.

The mathematical method occupied also and the thought of the Marxists Process. Kantorovitch introduced linear programming in order to find a possible solution, while other Soviet writers followed him as Novojilov, Trapeznikov and Libermann.

1. A. Cournot : op. cit. p. 519.

2. A. Marshall : *Principles of Economics* London, 8th edit., Preface. p.x.

3. S. Jevons : op. cit. Preface, p. xvi.