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AN ESSAY
ON SRAFFA'S CONTRIBUTIONS TO ECONOMICS
INTRODUCTION

Economic theory, it is said, tries to solve three basic economic problems. First, what must be produced and how much, so that the human needs can be satisfied. Second, how things can be produced, and, third, who is to consume these products; in other words, how products are to be distributed among the factors of production. Economic theory tries to find the fundamental principles which will help us to understand and solve these problems. A good many doctrines, from ancient times to the present, have tried to answer the above questions. Modern economic theory continues to advance principles relevant to them.

Sometimes, however, there is a striking divergence between economic theory and concrete economic reality, this divergence becoming wider every day 1 as new situations and new social groups and classes arise (the managerial class, for example). Economics may then try to come to grips with new circumstances. After the first World War, for example, 'uncertainty' was introduced into economic theory. Otherwise economic theory remained strangely untouched by the cataclysm, its doctrines remaining much as they had been for some time. Then, the relation of these doctrines to the world of reality, to the pressing problems of the day, began to be called into question. Refinements of the theoretical structure were made, but the gap between it and the daily preoccupations of the public, of statesmen, and even of an increasing number of economists, became ominously wide.

The thirties gave a fresh impetus to theoretical change. There was a fresh consolidation of academic economic thought, including an internationalization of its doctrines. During this period a large number of writers tried to give new solutions to the old economic problems, and new solutions to new problems, in an attempt to bridge the gap between economic theory and concrete economic reality. One of these writers was professor Piero Sraffa.


The purpose of the present study is to throw light upon the work of Professor Piero Sraffa and to examine his contributions to economics. In the first chapter we will analyze his article, ‘The Laws of Returns under Competitive Conditions’. Then, in chapter two we will examine his contribution to economics in the publication of D. Ricardo’s Works. Next, in chapter three, we will analyze his famous book, Production of Commodities by Means of Commodities. Finally, based on these, we will arrive at our conclusions.
CHAPTER I

THE LAWS OF RETURNS UNDER COMPETITIVE CONDITIONS: AN EVIDENCE OF SRAFFA'S CONTRIBUTION TO ECONOMICS

In 1922 Sir John Clapham, in an article published in The Economic Journal, asked economists whether their various abstract 'boxes' labelled 'Diminishing Returns', 'Increasing Returns' and so on, had any relevance to problems of the real world. The discussion was not, however, continued. It was four years before, a further powerful stimulus came from an article by Piero Sraffa which remains to this day the best statement of the problem of economies of scale. This article was the foundation on which E. H. Chamberlin (The Theory of Monopolistic Competition) and J. Robinson (The Economics of Imperfect Competition) built an imposing structure of new theory. The theoretical structure which these economists developed quickly became integrated with doctrines of the Marshallian type and with research in the field of economics.

Before we begin to analyze Sraffa's first work we will say, as an introduction, that among the other problems which make the solution of the problem of production more complicated is the problem of the relationship between input and output, between the quantities of the factors of production used in productive operations and the amount of the resulting product.

Quite early, economists began to consider expanding output on the basis of a fixed supply of one of the productive agents, of land, in particular. Turgot, Petty, Quesnay, Young, Adam Smith, West, Senior, Malthus, and Ricardo, all considered phenomena of diminishing and of increasing returns. All sought to discover the 'laws of returns' while assuming that the conditions which existed in the market were either conditions of pure competition or of pure monopoly. Cournot, however, soon

4. J. Robinson, op. cit., p. V.
made a beginning in studying the economics of the area between the two. Edgeworth, also, examined some aspects of imperfect competition as well as of monopoly. But the most significant work on the subject of imperfect competition was Sraffa’s, 'The Laws of Returns under Competitive Conditions'. Hicks says that with this article there began the controversy on the 'laws of returns'. We will give a brief summary of Sraffa’s argument in order to see the setting in which the modern discussion begins and to see, therefore, his contribution to the development of economic thought in this area of study.

At the beginning of this article Sraffa presents the place which, historically, the 'laws of returns' have occupied in the theory of value. First, he presents the classical view and the way in which it considered diminishing and increasing returns. Sraffa then presented the modern Marshallian modification of the classical position. Marshall, as is known, generalized the two laws of returns (diminishing and increasing) and made them a part of his theory of Value. Both Marshall and modern economists provided the basis of the theory of supply modification. Diminishing returns were generalized to cover all factors with fixed supply, while increasing returns were made to consist of what Marshall called 'external economies'. This later restriction was thought necessary, because internal economies of scale were found to be incompatible with a stable competitive equilibrium.

Now in the ordinary competitive theory of value the demand and supply curves represent two equations relating price to quantity supplied and price to quantity demanded. In these equations utility and cost figures respectively as independent variables. In this scheme a determinate equilibrium is provided, a single solution which assumes the conditions necessary for each of the various possible magnitudes to be assigned to

5. 'Of course, when we are supplied with theories in respect to the two extreme cases of monopoly and competition as part of the equipment required in order to undertake the study of the actual conditions in the different industries, we are warned that these generally do not fit exactly one or other of the categories, but will be found scattered along the intermediate zone, and that the nature of an industry will approximate more closely to the monopolist or the competitive system according to its particular circumstances, such as whether the number of autonomous undertakings in it is larger or smaller, or whether or not they are bound together by partial agreements, etc.' P. Sraffa, op. cit., p. 542.


7. P. Sraffa, op. cit., p. 536.
utility and cost. The theory requires an important assumption: the assumption of the independence of the supply and demand curves. Equilibrium is then established when the two quantities are equal at the margin for all lines of production.

In the theory of distribution an attempt is made to carry over the same method of analysis by applying it to prices of factors of production. Again, the assumption of the independence of the demand and supply curves is required. By 'independence' in this context is meant that a change in one of them, through its effect on the price of labor or the price of other commodity, does not thereby produce a change in the other. Sraffa restricted this assumption of independence to those cases in which the production of an individual commodity absorbed the whole supply of a scarce factor and to those uses in which there are economies which are internal to a whole industry but external to the individual firm within that industry.

Sraffa pointed out that this assumption of independence might not hold in the case of a specific commodity. He wrote: 'If in the production of a particular commodity a considerable part of a factor is employed, the total amount of which is fixed or can be increased only at a more than proportional cost, a small increase in the production of the commodity will necessitate a more intense utilization of that factor, and this will affect in the same manner the cost of the commodities question and the cost of the other commodities into the production of which that factor enters; and since commodities into the production of which a common special factor enters are frequently, to a certain extent, substitutes for one another (for example, various kinds of agricultural produce), the modification in their price will not be without appreciable effects upon demand in the industry concerned.' Thus we reach what is called Sraffa's dilemma.

Professor Joan Robinson named this 'Sraffa's famous dilemma'. She explained the dilemma by saying that, 'If we are interested in an industry which is sufficiently small to use only a small proportion of the specialized lump of the factor, the factor will not be scarce. And if the industry is sufficiently large for the factor to be scarce our tools will break in our

9. J. Robinson gives a good example on this case in her book Economics of Imperfect Competition, p. 117.
11. J. Robinson, loc. cit., p. 117.
hands. Professor Sraffa thus proposed to abandon the assumptions of competition, and to apply instead, in view of the extent of large industry in the modern economy, the well tried methods of monopoly analysis.

Of this proposal Mr. D. Robertson said, 'Mr. Sraffa has argued (The Economic Journal, 1926, pp. 335-350) that the theory of competition is unequal to dealing with the problem, and that though monopoly in the ordinary sense does not prevail, recourse must be had to the theory of monopoly, which will yield a determinate result (loc. cit., p. 548)'. Professor J. Becker remarks that Sraffa is one among the excellent monopoly theorists who rejected the 'theory' of perfect competition and sought to escape the alternative labor theory of value. Under actual conditions of large scale industry we think that Sraffa was correct in his conclusion. His economic reasoning is precisely applicable to a situation in which the individual firm finds the market rather than its own conditions of production, the limit factor. As Joan Robinson says, 'We can bind up the wound in the demand curve if we have sufficient knowledge of the conditions of the problem'.

Another important point in Sraffa's article has to do with constant costs and its relationship with the industry and with its internal and external economies. This subject is closely related to the former.

Every economic text book even today says that production in nearly all industries is subject either to 'increasing returns' or 'diminishing returns' as output increases (and sometimes to the former at lower levels of output, and to the latter, at higher levels of output). By implication the condition of 'constant returns', where cost is independent of output (and hence demand), is a special case. This is the case where opposing tendencies happen to cancel out, or all factors of production, including capital equipment, are supplied in relatively small divisible units.

On this whole subject there was a good deal of recondite discussion in the late 'twenties and early' thirties. The conclusion was that a condition of 'constant costs' in the relevant sense was probably the general rule, rather than the exception, in many-firm industries under com-

12. Ibid., p. 117.
petitive conditions. This conclusion was that of Sraffa's in the article which started the discussion. He stated, 'In normal cases the cost of production of commodities produced competitively must be regarded as constant in respect of small variations in the quantity produced. And so, as a simple way of approaching the problem of competitive value, the old and now obsolete theory which makes it dependent on the cost of production alone, appears to hold its own as the best available' 16.

Professor Pigou agrees with Professor Sraffa on this. He, too, connects the problem of costs with the level of output. Professor Pigou gives a good interpretation of what Sraffa's article wants to say on this subject; so we quote him:

"Since, ex hypothesi, an increase in the scale of output involves no change in the relative value of the several factors of production, there is nothing to prevent producers from meeting an enlarged demand by increasing the quantities of all the factors employed (including, of course, managing ability) in exactly equal proportions. But it is impossible to conceive of any way in which an addition of 10 per cent. to output could require an addition of more than 10 per cent. in the quantity of all the factors at work. Unless, however, other arrangements of factors involve less real cost than is involved in a 10 per cent. increase in each of them, the 10 per cent. increase of each of them will be the method which it pays producers to adopt. Hence, with this class of commodity, it is impossible for production anywhere to take place under conditions of increasing costs. In this matter my conclusion agrees with that reached by Professor Sraffa in his recent article" 17.

Pigou continues:

'Professor Sraffa also maintains, however, that under competitive conditions it is impossible, or at least extremely unlikely, that production will anywhere take place under conditions of decreasing costs. He argues that decreasing costs can only result from the development, in consequence of an enlarged scale of output, of either internal or external economies. He admits that, where monopoly prevails, as, for example, in the provision of

a railway service, internal economies may operate with sufficient force to evoke them. Under competitive conditions, however internal economies cannot occur in a relevant manner, because if they did, the equilibrium necessary to competitive conditions would disappear and monopoly would supervene. Hence there only remain external economies. These are admissible in point of logic; Professor Sraffa argues, as a matter of fact, the external economies of real life are almost wholly general in character, arising out of industrial progress as a whole, and not out of expansion in the scale of particular industries. It is, he asserts, highly improbable that a small increase in the scale of output of a single industry will lead to a growth of external economies sufficient appreciably to affect costs in that industry. This point of view is clearly important and calls for careful study" 18.

Joan Robinson adds something very important on this subject. She says:

"Mr. Sraffa, no doubt, is perfectly content to await the verdict of the statisticians. For he was not concerned to defend a particular view about the real world. His purpose was quite a different one. He was concerned to show that economists who make use of the competitive analysis of value have a strong unconscious bias in favour of rising and falling supply price, simply because, if supply price is always constant, their analysis has nothing interesting to say. The monopoly analysis of value, inaugurated by Mr. Sraffa himself, has no axe to grind in the matter. If the statisticians assure Mr. Sraffa that he is right, and that almost every industry works under conditions of constant costs, the task of the monopoly analysis will be much simplified. But it will lose none of its validity, and will gain considerably in charm" 19.

We conclude that Sraffa makes a most successful beginning with his reformulation of the theory of market equilibrium. His conclusion has become an established and internal part of modern economic thought. His starting point for market behavior is the position of the individual seller. As Marshall pointed out, when "we are considering an individual

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producer we must couple his supply curve, not with the general demand curve for his commodity in a wide market, but with the particular demand curve of his own special market.” 20. In these cases then the individual demand curve is downward sloping. This, of course, breaks down a basic assumption of perfect competition, namely, the indifference of the buyers as to the seller from whom they purchase. H. Hoteling writes: “The asymmetry between supply and demand, between buyer and seller, which professor Sraffa emphasizes is due to the condition that the seller sets the price and the buyers the quantities they will buy” 21. If the buyer’s preferences do exist, the single market of competition becomes subdivided into a number of special markets for the products of each firm, separated from one another by more or less strong and more or less stable insulating walls of special buyer’s preferences. As M. Dobb says: “Since most markets for the products of industry were in fact broken up into more or less separate “private markets” for each firm, the situation was properly to be treated in terms of the theory of monopoly rather than of the classical theory of competition” 22. In that situation, as Sraffa pointed out, each firm has to consider the demand of two kinds of marginal buyers; those who are marginal in its own special market, and those who are marginal to all the related “monopolistically competitive” markets. Theoretically, the firm’s policy may be one either of price reduction to attract buyers away from the competitors, or one of buttressing its monopoloid position by maintaining the thickness of the insulating wall between it and the others through the continued expenditure of sales costs.

The upshot of Sraffa’s analysis is that in many cases where there is a large number of sellers, and where internal economies are present but not excessively large, the second policy of monopoly will be chosen. This means that a determinate equilibrium — a monopolistic one — is possible 23 in spite of the existence of conditions which make the apparatus of


23. Mr. G. Shove in order to explain or to give an answer to this conclusion says that “whether a given situation is to be called competitive or monopolistic is, of course, a question of words. True, there may be a real issue behind it—the question, namely, whether in the given situation value approximates to cost of production or
competitive equilibrium analysis inappropriate. It will not necessarily be an equilibrium with a single price, although that may be the case where the internal economies and the degrees of buyer's preference have become slight and where the individual firms are fairly similarly placed. In such a case, the resulting price will tend to the level which would obtain under a single monopoly; and the competition of the individual firms will have as its object the securing and holding of as large a share of the total market as possible. As Dobb says, "This prevalence of monopolistic restriction, as a general and not merely an exceptional feature of capitalistic industry, even where apparent competition prevailed, was a factor which accounted for a failure by industry to take full advantages of large-scale economies, or of "increasing returns", and for a chronic under-utilization of productive resources" 24.

In conclusion, we can say that Sraffa's article provided something important to the development of economic thought. He showed that in most cases, in economic reality, whatever market equilibrium there may be is reached under conditions of imperfect competition or monopoly and not under conditions of pure competition. In this way he tried to bridge the gap between economic theory and the real world. Then, on the foundation he provided, professors Chamberlin and Robinson built an imposing structure of a new theory: the theory of imperfect competition, the theory which supplants the traditional analysis of competitive equilibrium 25.

25. Ibid., p. 196.
CHAPTER II

THE WORKS AND CORRESPONDENCE OF DAVID RICARDO: A FURTHER EVIDENCE ON THE NATURE OF SRAFFA'S CONTRIBUTION TO ECONOMICS

In 1951 the Royal Economic Society issued the first volumes of the "Sraffa edition" of the works of David Ricardo, a project first agreed upon in principle by the Council of the Society in 1925, and, on Keynes' suggestion, actually commenced in 1930 by Professor P. Sraffa with M. Dobb's collaboration.

As we know, one of the great economists, one of Smith's successors in the so-called British Classical School, was David Ricardo (1772-1823). The theory of comparative advantage, the theory of rent and the theory of value — the latter theory which through Marx had great influence on socialist thought — all of Ricardo's contributions to these theories reveal the importance of his contribution to economic theory in general.

With Mr. M. Dobb's collaboration Sraffa undertook the difficult task of collecting and publishing Ricardo's Works and Correspondence, a real treasure of economic thought. Nothing but praise can be accorded to the editors of this monumental undertaking for the care they bestowed on it. Of course there were previous publications of Ricardo's Works, but Sraffa's edition is one of scrupulous scholarship. To substantiate this it is enough to note that of the 555 letters that appear in the four volumes well over half are published for the first time. These previously unpublished letters include the correspondence between Ricardo and James Mill and the letters of Malthus and Ricardo. We will give a short summary of this edition hoping that as a result, the reader will see more clearly Sraffa's contribution to the History of modern Thought.

In the two first volumes, in the Principles of Political Economy and Taxation, we have for the first time a variorum edition. In the case of the "Notes on Malthus' Principles of Political Economy", Sraffa closes the gap contained in all previous editions, and especially the Hollander's — Gregory's edition of the "Notes". He says, "When Ricardo's 'Letters
to Trower' were published in 1899 (the last of three similar collections) the editors of that volume remarked in their Introduction: Two appreciable 'desiderata' still remain — literary evidence of his long and close intimacy with James Mill, and the important 'Notes on Malthus'". They (Hollander - Gregory) concluded that further knowledge of Ricardo would have to wait 'until some fortunate accident or more successful search' brought these to light. The 'Notes on Malthus'" have since been found and published; and the last big gap is now filled by the discovery of both sides of the extensive correspondence between Ricardo and James Mill which is here published for the first time" 26. Even this provision proves the quality of his editing. But Sraffa and his collaborator went further than this. To each volume there is an admirable introduction which makes use of material that appears in subsequent volumes to clarify the form and origin of the earlier texts. Thus, the introduction to the Principles provides a fully documented account of the part played by James Mill in encouraging Ricardo, as clarified by the newly discovered correspondence between the two. This fact is a new evidence of Sraffa's contribution to economics, especially to the history of economic thought. He and Dobb prove that the book was written not as a statement of opinions, as Dunbar suggested, made for Ricardo's own purposes, but as a work for the public eye.

Sraffa's and Dobb's introduction to the Principles also provides an admirable guide to the main changes made in the successive editions of the work. The editors not merely reveal a fact previously unknown, but they provide material which illuminates the stages by which Ricardo was led to record his changes of view. One of the points established is that some of the changes in successive editions of the Principles, which commentators such as Hollander and Cannan interpreted as indicating that Ricardo "steadily retreated under pressure of his critics" are not capable of bearing this interpretation. The conclusion, therefore, is not that these two volumes in themselves provide material for a significant reinterpretation of Ricardo; it is that the editors have lifted enough of the curtain covering the contents of the later volumes to show that familiarity with those contents will be a necessary part of the equipment of anyone who undertakes either to confirm or to refute a generally accepted interpretation of Ricardo.

Volumes III and IV constitute two more magnificent specimens in the series. The bulk of the material had been published previously. However, published here for the first time is a fragment on Torrens and one by Torrens on Ricardo, both found among the Mill - Ricardo papers. The two Volumes contain Ricardo's shorter writings, most of which are concerned with the monetary question and public finance. With inclusion of the speeches and of evidence to Parliamentary Committees (Vol. V), they cover almost everything Ricardo had to say on these matters, excepting the more systematic discussion of taxation in the *Principles*. As in reading the first two volumes, every reader will be delighted with the work that has gone into their preparation. The reader is pampered with interesting notes, cross-references and the printing of the passages from the authors upon which Ricardo is commenting. *Volume V* is not very important theoretical point of view, but it provides one more evidence of Sraffa's effort to clear up everything related with Ricardo's *Works*.

Volumes VI, VII, VIII, and IX contain the letters from 1810 until 1823. As mentioned before, more than two hundred letters of the total of 555 had not been previously published. Sraffa and Dobb sought to bridge this gap by spending years of systematic enquiry among Mill's numerous descendants and their executors and friends in all parts of the world. *Volume X*, the last one, contains Biographical Miscellany. In conclusion we can say that Sraffa's contribution to source material in the history of economic thought by the publication of Ricardo's *Works* along with that of Dobb, was great. One of the ends served by this research was, doubtless, clarification of Sraffa's own thinking on the important subject of "the production of commodities by means of commodities".

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CHAPTER III

PRODUCTION OF COMMODITIES BY MEANS OF COMMODITIES: SRADF-FA'S MAIN CONTRIBUTION TO THE DEVELOPMENT OF MODERN ECONOMIC THOUGHT

Capital theory is notorious for the controversies with which it is associated. They arise from two sources, ideology and difficulty, so that both passions and understanding are involved. As Mr. P. Garegnani says, “The notion of capital as a ‘factor of production’ on which the theories of production and distribution dominant since the latter part of the last century ultimately rely, has been the object of considerable discussion in recent years” 30.

In 1953 Professor Joan Robinson published the famous article “The Production Function and the Theory of Capital” 31, which was the reason for an outburst between Cambridge, England and Cambridge, Massachusetts.

Mr. Dobb rightly disputes the identification of the so-called ‘neoclassical’ theory of production 32 as a macroeconomic theory and the theory of distribution — as represented for instance by the writings of Samuelson and Solow and their British epigones — with the ‘classical’ economic thought 33. J. Robinson calls it “neo-neoclassical” to stress the remoteness of the connection with both the classical thought of Ricardo and Marx and the “neoclassic” mainly microeconomic tradition of Marshall and Wicksell 34. The context of the capital debates is the reawakened interest

32. Following Marx, we could label the so-called “neo-classical theory” as a species of “vulgar economy”.
in the post-war period in problems of economic growth and income distribution over time, coupled with the clash of rival ideologies as to how these problems are best tackled in both developing and developed economies. Capital theory became relevant once more when the problem of the choice of technique arises, and when argument develops over the explanation of distributive shares and of productivity changes over time.

The opening rounds of the debate were concerned with an old problem, the search for a unit in which to measure (aggregate) social capital. The desired unit had to be independent of distribution and relative prices, so that it could be used, "without arguing in a circle", in an explanation of production and distributive shares and prices set within the context of the neoclassical theoretical fiction of a stationary state. Sraffa participates in the discussions on these subjects in his book, The Production of Commodities by Means of Commodities, published in 1960. Its central propositions were established in the mid-twenties. On the other hand, R. Harrod writes in his Review of Sraffa's book that, "The publication of this book is a notable event". Professor M. Reder characterized it as a "terse book", a "lucid book".

Sraffa's book can be regarded as an implicit attack on modern marginal analysis. In his preface he expresses the hope that someone will eventually attempt the job of basing a critique of the marginal analysis on his foundations. He writes, "It is, however, a peculiar feature of the set of propositions now published that, although they do not enter into any discussion of the marginal theory of value and distribution, they have nevertheless been designed to serve as the basis for a critique of that theory. If the foundation holds, the critique may be attempted later...

35. This was one of the main objections by Professor R. E. Quandt, against Sraffa's book. In his review in the Journal of Political Economy, Vol. 69, 1961, p. 500, he says, "The author remarks in the preface that the opening propositions in the slim volume were worked out in the 1920's, while most of the remainder was completed in the 1930's and 1940's. It might be inappropriate to judge this book from the point of view of current thought on the theory of production. It should perhaps be taken as the belated expression of ideas which, in their time, might have been considered to point toward some new approaches in economic theory." And he closes his review by saying, "Although this is a quite remarkable work for the 1920's, it comes thirty five years too late".


either by the writer, or by someone younger and better equipped for the task” 38. The sub-title “Prelude to a Critique of Economic Theory”, does not allow doubts to be raised as to Sraffa’s objectives. Joan Robinson says, “The sub-title gives a hint of the purpose for which it has been established—Prelude to a Critique of Economic Theory” 39. And Mr. Dobb remarks on the sub-title, “It may be remembered that the sub-title of Sraffa’s book is “Prelude to a Critique of Economic Theory” 40.

This work has contributed much to criticism including the promotion of some of it. What is at stake here is the logical tenability of the whole line of theoretical doctrine dating back to Jevonian Revolution against the classical school and against Ricardo and Marx in particular. This old conflict has usually been in terms of a difference between two rival theories of Value, one emphasizing conditions of production (in particular, expenditures of labor) and the other conditions of demand as represented by utility to consumers. The title of Sraffa’s book is “Production of Commodities by Means of Commodities. “This title, as Quandt also, says, “denotes the essential role played by intermediate goods in Sraffa’s system of production” 41. Quandt regards Sraffa’s system as similar to that of Leontief. Again Joan Robinson regards the title as the central theme of the study of the relation between wages and profits 42.

Undoubtedly Sraffa is dealing with a lot of subjects in his book. As Harrod remarks, “Mr. Sraffa’s volume makes a new approach to certain central parts of economic theory 43. Some of the subjects with which Sraffa is dealing are: the concept of “standard commodity”, the concept of “joint production”, the concept of “switching of techniques”, the problem of measuring the value of the “factor capital”, the meaning of the “factor price frontier”, the concepts “wage” and “profit” and the relationship between them, and the meaning of “basic” and “non basic” commodities. He tries to determine the existing relationships among these, the interdependencies on each other. Of course, all are related to the main problem of production and to the problem of measuring value

which, as we saw in the Introduction, are two of the three most important problems to which economic theory seeks solutions.

Now we will give some of Sraffa’s renditions of those problems. We will try to present and analyse as briefly as possible his system, its assumptions and implications. Then we will give some proofs of the relationship between Sraffa’s system and Ricardo’s. Then, we will present our conclusions concerning Sraffa’s last work. Finally, we will present our general conclusions with respect to Sraffa’s contributions to economics.

Sraffa begins with a very simple model of a subsistence economy. Each of the commodities serves as a necessary input in the production of both commodities. The total amount produced must be used as productive inputs to perpetuate the same level of production. Neither utility nor any type of marginalism enters the calculation. Stress is laid on the use of commodities to produce commodities as stated in the title. Basic assumptions are that there are only two commodities produced, and all industries operate with supply curves of infinite elasticity — no variations in physical returns to scale, no factors scarce to the industry.

Then Sraffa introduces the terms “basic” and “non basic commodity”. Professor M. Reder gives the interpretation of Sraffa’s terms, “basic” and “non basic commodity”. He writes, “Basic commodities are those which enter into the production of all commodities (including themselves) either directly, or as means of production or other commodities — perhaps at several removes. Non-basics are all other commodities” 44. Sraffa’s model of a subsistence economy deals with a two-commodity world. It assumes that the whole net income is taken out in one good. That may seem sensible, as consumers do not presumably desire the other good as such. The conclusion is that the total amount of each of these commodities going into the productive process each year, is precisely the same as the total amount coming out. It means that we have a self-maintaining system. Labor coming in under the head of the commodities required for its subsistence, in a short of Marxist fashion. In a later chapter, entitled “Reduction to Date Quantities of Labour”, Sraffa shows us how the analysis can be shifted from commodities as the only inputs to labor as the only input. The rate of exchange between the goods is determined, quite simply, by the ratio of the excess production of the one commodity. If we proceed to a greater number of industries and commodities we will have a system of simultaneous equations in which the

44. M. W. Reder, op. cit., p. 689.
exchange values of the commodities in terms of one another are determined by the same principle. In other words the values of output can be measured in terms of any commodity, or linear combination of commodities where the weight of each commodity is its fraction of the national income. All prices are independent of relative quantities. And "this is", as Professor R. F. Harrod says, "perhaps the most remarkable feature of the book, that while the determination of prices is one of its central topics, no reference is made to the scale of elasticity of the demand for end-products. (The word "demand" does not occur in the index)". And he remarks, "It is surprising that one can get a system of price determination without reference to final demand. It might be thought that this was simply a reversion to early classical tradition, such as might come naturally from so profound a student of Ricardo". Professor M. Reder also writes, "The main purpose is to show how one can construct a standard of value which is independent of the vagaries of demand and, ultimately, of tastes".

Sraffa next considers an economy in which a surplus above subsistence produced. The labor can have more than a subsistence wage. The wage may in fact include not only the ever-present element of subsistence (which is constant), but also a "share of the surplus product" which is variable. This implies that Sraffa is defining the "surplus product" of a system as the difference between gross output and what Ricardo called "the absolutely necessary expenses of production. Professor M. Reder says, "He envisions a 'cycle' of production beginning with a stock of commodities which is used up in the productive process from which emerges its replacement, and (possibly) a surplus, depending upon the productivity of the system". And he continues, "The amount of the surplus per period depends solely upon the technological characteristics of the system and not upon how it is divided between the two shares, wages and profits". Professor Harcourt gives a shorter interpretation of Sraffa's concept of "surplus".

Sraffa examines what happens to relative prices and profits as the wage rate moves from a point where labor receives none of the surplus to a

47. M. Reder, op. cit., p. 691.
48. He says, "The excess of the total output of any commodity over that part of it which is equal to its use as a means of production is a component of the net product of the system". G. Harcourt, "Notes and Memoranda: A Note on Mr. Sraffa's Sub-systems", The Economic Journal, Vol. 74 (Sept. 1964), p. 715.
point where labor receives all of the surplus. He writes the relationship between wage and profits as $r = R (1 - w)$ where $R$ is the ratio of net product to the means of production, $w$ is the wage share in net product, and $r$ is the rate of profits. The system has one degree of freedom; wage $w$ may vary from zero to the whole of the net product with profits varying inversely. The wage share may be represented by any real number between zero and one, and the profit share by one minus the wage share.

In order to determine wages Sraffa requires a measure of value which is called a “standard commodity”. This is according to Sraffa, a composite commodity which would be produced by a “Standard System” in which “the various commodities are produced in the same proportions as they enter the aggregate means of production” 49. As Quandt says, “Since one could never know whether changes in relative prices were due to the peculiarities of one commodity or another, Sraffa constructs the “standard commodity”, a weighted composite of commodities in the system, with the property that the system producing the standard commodity uses commodities as inputs in the same proportion as it produces them” 50. The standard commodity rests on the assumption that $w$ is zero. As we said before the standard commodity is used to measure net income — the surplus of commodities over what is required for their own reproduction. So we come to the very important problem of measuring the value, that will be invariant to changes in the profit-wage ratio. In other words, to find a measure of commodity magnitudes and of relations between them that is independent of distribution and of relative prices. As professor Harcourt says, “J. Robinson provided a measure of capital in terms of labour time which attempted to make sense of capital goods viewed as aids to production. It was not, however, and this was intended, independent of distribution and prices” 51. Champernowne, as the same author informs us, “accepted the logic of J. Robinson’s measure of capital. However, he objected to some of its implications for the analysis of distribution and accumulation” 52. Sraffa, the third economist who with the two former leaded the attack against the neo-neoclassical school or economists (Cambridge, Mass.), knocks over once and for all the possibility of measuring capital in a unit which is independent of

49. R. Harrod, op. cit., p. 784.
52. Ibid., p. 5.
distribution and prices. He shows, by means of the concept “dated labour”, that the relative prices of two commodities will change when \( r \) and \( w \) change even though there has been no change in their technical methods of production. “The reversals in the direction of the movement of relative prices in the face of unchanged methods of production, cannot be reconciled with any notion of capital as a measurable quantity independent of distribution and prices”\(^{53}\). Mr. Bharadwaj says, “The most interesting use of the standard commodity (and the wage-profit relation) arises in connection with the measurement of capital. Economists have long ceased to be complacent about the average period of production as a measure of capital. Sraffa’s demonstration regarding the impossibility of measuring capital independently of distribution and prices is powerful and convincing”\(^{54}\).

Sraffa’s view of the nature of the problem of measurement has had a great impact upon Robinson and Harrod. Professor Harcourt writes, “Rymes shows that J. Robinson and Harrod’s measure of neutral technical progress — also Read’s (1968) — reflect Sraffa’s view, whereas the neoclassical measures do not”\(^{55}\). The problem of measuring is closely related to the problem of “Switching of techniques”. Sraffa also deals in his book with the “switching of techniques”, “production to dated quantities of labor”, and “factor price frontier”. All are very closely related to the problem of value. “Double switching” is the possibility that the same technique may be the most profitable of all possible techniques at two or more separate values of the rate of profits even though other techniques have been the most profitable at rates of profits in between. The phenomena of double — (or re-) switching and capital — reversing were first noticed in the literature by J. Robinson (1953-4, 1950), Champernowne (1953-4) and Sraffa (1960)\(^{56}\). Capital - reversing is the value of capital moving in the same direction, when alternative rates of interest are considered, so that a technique with a lower degree of mechanization, as measured, for example, by its level of output per head and value of capital per head, is associated with a lower - rate of profits. Professor Sraffa discusses both in chapter XII. He also used with J. Robinson, this uneven distribution of labor through “horizontal” or “instant”

\[^{53}\text{P. Sraffa, op. cit., p. 38.}\]
\[^{55}\text{G. Harcourt, op. cit., p. 86.}\]
\[^{56}\text{G. Harcourt, op. cit., p. 124.}\]
time to describe the possibilities of double-switching and capital reversing.

In the chapter entitled “Reduction to Dated Quantities of Labour”, Sraffa shows us how the analysis can be shifted from commodities as the only inputs to labor as the only input. He gives the definition of the concept, "Reduction to Dated Quantities of Labour" in page 34. He says, “we shall call 'reduction to dated quantities of labour' (or 'reduction' for short) an operation by which in the equation of a commodity the different means of production used are replaced with a series of quantities of labour, each with its appropriate ‘date’” 57. Professor Harrod remarks, “Having proceeded so far, Mr. Sraffa adopts an alternative approach to price formation, namely by the method of ‘reducing’ the commodities engaged in the production of other commodities to ‘dated labour’: he resolves each commodity into the labour and other commodities required to produce it, working back through time until the commodities themselves constitute but a negligible residual. Prices are thus formed by adding together all the dated labour, the value of each segment being increased through time at compound interest. ...The reader surely requires a little more help than the author gives him about how this conventional labour cost approach can give the same result as the commodity approach supplied in the earlier chapters” 58.

The concept “Factor Price Frontier” is a tool, the use of which runs through the literature, which is related to the “switching of techniques”, and which had been used by professor Sraffa and Champenowne before Samuelson named it 59. Harcourt explains in his book why the neo-neoclassicals do not use the term “Factor-Price-Frontier” but rather the equivalent terms “wage-rate, rate of profits, trade-off” or “wage-interest frontier” 60.

Finally Sraffa deals with the concept of “Joint Production”. Here he recognizes the familiar point that in the case of joint production one cannot readily determine the quantity of labor required for each of the

57. P. Sraffa, op. cit., p. 34.
58. R. Harrod, op. cit., p. 785.
60. He says: “It should be noted, though, that the neo-Keynesian critics of the neo-neoclassicals do not regard ‘capital’ as a ‘factor of production’ on the same footing as labour (and land). They intentionally use the terms “wage-rate, rate-of-profits, trade-off” or ‘wage-interest frontier’ rather than factor-price frontier”. G. Harcourt, op. cit., p. 4.
joint products. He meets this problem by considering that there may be more than one method of production. Sraffa assesses the amount of labor required for the production of a particular commodity by taking the same quantities of commodities to be used in two processes of production, and by assessing how much extra labor would be required to increase the product by one unit by altering the proportion in which the two processes are used.

There are some similarities between Sraffa's model and Ricardian theory. This may be why Sraffa is called "neo-Ricardian" by many authors. Lebowitz identifies Sraffa's view as a neo-Ricardian view. The same author says later that, "The key of the 'Sraffian surplus' is to be found in his interpretation of Ricardo in his introduction to that writer's collected works." And he continues in the next paragraph: "This Ricardian model is generalized by Sraffa. ... Sraffa's 'standard' or composite basic commodity performs the same function as corn in Ricardo's model, permitting a direct comparison between inputs and outputs."  

Mr. E. Nell says, "The best example of a modern Ricardian model is Sraffa (1960)". Professor Reder adds, "As Sraffa notes in Appendix D (p. 93), this view of the productive process is essentially Ricardian." J. Robinson writes in her book, An Introduction to Modern Economics, that "All the same, Ricardo's idea of using an 'average commodity' as a standard of value later bore fruit. Sraffa demonstrated how such a commodity might be formed as a composite commodity which can be used to analyse the distributive relations holding at a particular time in an economy of produced commodities." Professor Meek remarks, "This implies that Sraffa is defining the 'surplus product' of a system as the difference between gross output and what Ricardo called 'the absolutely necessary expenses of production'". The same author writes in the same article, page 146: "Sraffa's explanation of

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62. Ibid., p. 391.
63. Ibid., p. 391.
65. M. Reder, loc. cit., p. 691.
the basic reason for the emergence of the 'modifications' is substantially the same as that of Ricardo and Marx". He also writes in the same page, "Now Smith, Ricardo and Marx having established this proposition, went on to argue that in a capitalist society, where the net product was shared between wages and profits, prices no longer followed the simple rule. The 'Law of Value' which originally operated in this direct and simple way was now subject, as Ricardo put it, to important 'modifications'. Sraffa, like his classical predecessors, now goes on to consider the nature and causes of these 'modifications'". Harrod says of Sraffa, "It might be thought that this was simply a reversion to early classical tradition, such as might come naturally from so profound a student of Ricardo". Finnaly, Harcourt says, "Sraffa himself has suggested that the rate of profits may be related to the money rate of interest, or, sometimes, following Ricardo, he introduces the real wage which, however, reflects labour".

We think that Sraffa's Introduction to Ricardo's Works and Correspondence, together with all the opinions cited above, are evidence enough of the relationship between Sraffa's and Ricardo's system. There is, of course, the model itself.

And now we come to the conclusion of this very important work. The most remarkable feature of this book is that, while the determination of prices is one of its central topics, no reference is made to the scale or elasticity of the demand for end products. The section in which he examines the relation between relative prices and profits as the wage rate moves from a point where labor receives none of the surplus to a point where labor receives all of the surplus, is the crucial section of his book. This is his new version of the labor theory of value because here he confronts the nemesis of the labor theory—the effects of differing ratios of labor to the means of production. Only Marshall's version of utility theory is consistent with Sraffa's theory because it does not contain two very important theoretical and ideological tenets which totally vitiate most traditional and most modern versions of utility theory.

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68. L. Meek, op. cit., p. 146.
69. R. Harrod, loc. cit., p. 783.
70. G. Harcourt, op. cit., p. 175.
71. First, Marshall recognized that utility was simply a kind of abstract proxy for people's desires, and, as such, had no necessary implications for social welfare. The second point on which Marshallian utility theory differs from the more orthodox neoclassical tradition is that it does not contain the neoclassical marginal productiv-
We want to close this chapter with professor Meek's remarks: "The book can be looked at from various points of view. It can be regarded, if one pleases, simply as an unorthodox theoretical model of a particular type of economy designed to solve the traditional problem of value in a new way — in which case it will be judged purely on its own merits. Or it can be regarded as an implicit attack on modern marginal analysis. Or finally, the book can be regarded as a sort of magnificent rehabilitation of the classical approach to certain crucial problems relating to value and distribution" 72.

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72. R. Meek, op. cit., p. 139.
CONCLUSION

As we already saw in our *Introduction*, economic theory tries to solve three important problems, (the problem of what must be produced, the problem of how can it be produced, and the problem of distribution of the product of production among the factors of production. There are many other problems which are related to these. The existing difference between economic theory and economic reality makes the solution of these problems complex and difficult than ever before.

Among economists who try to help the economic theory bridge the gap between itself and existing economic reality is Sraffa. His work all testifies to the great effort he has made to help economic theory to bridge the gap. In the course of trying to achieve this goal he contributes much to the reconstruction of economic thought. With his first work in English he opens new horizons with a reformulation of the theory of Market equilibrium. This now has become an established part of current economic thought.

Sraffa's main work comes with his revival of Ricardo. He helps us to know and understand better the great economist. Finally, his *Production of Commodities by Means of Commodities*, providing the basis for a correct solution to the transformation problem, shows that the general Marshallian case (in which costs increase, decrease or remain constant) is consistent with this transformation of values into prices, and provides the basis for a totally devastating critique of the reactionary Clarkian—neoclassical theory of distribution. His theory of relative prices, which belongs to that group of value theories in which the horizontal division between classes receives major emphasis, provides the most elegant framework for a theory of profits and wages. His system is a fundamental analytical structure whose variables are subject to measurement as economic magnitudes.

Concluding, we say that, for the historian of economic thought, one of the most interesting features of Sraffa's extensions of his basic analysis is the number of old friends who are met with. For example, in the chap-
ter of fixed capital Sraffa makes interesting use of the old classical device, first used by Torrens, of treating what is left of fixed capital at the end of the year as a kind of joint product of the industry in which it is used. We can say, however, that Sraffa has given much to contemporary economics, and the quality of his contribution is not negligible.
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