A comparative evaluation of Sraffa’s
‘The laws of returns under competitive conditions’ and its Italian precursor

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1. Introduction

In his classic paper ‘The laws of returns under competitive conditions’, Piero Sraffa (1926, p. 535) noted that ‘the opening pages of this article contain a summary of the conclusions’ of a paper which he wrote in Italian with the title ‘Sulle relazioni fra costo e quantità prodotta’ (Sraffa, 1925). It is my purpose here to compare the relative contributions found in these two papers, the first of which, to the best of my knowledge, has not appeared in English translation.¹ Sraffa’s thesis that the Marshallian partial equilibrium analysis of prices and quantities is inadequate in the case of industries subject to variable costs acquires added stature from the clear and detailed exposition it received in his 1925 paper, which also contains a critique of the analyses of variable returns of Turgot, J. S. Mill, Cairnes, Edgeworth, Wicksteed, Pigou, Pantaleoni, Barone, J. N. Keynes and particularly Marshall, among others.

It is worthy of note that one of the major students and popularisers of Sraffa’s work, A. Roncaglia, holds the view that ‘the 1925 article is today of greater interest for it concentrates on criticism of Marshallian theory, as well as providing diverse hints of great interest (such as the analysis of “spurious margins” to which Sraffa refers in the preface to Production of Commodities (by Means of Commodities) . . . )’ (Roncaglia, 1978, p. 19).² Roncaglia adds that ‘the [1925] article greatly impressed the ageing Edgeworth who as a co-editor decided to invite Sraffa to write a second article in the same vein for the

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¹ In private correspondence, A. Roncaglia has informed me that the publication of a translation of the 1925 paper prepared by J. Eatwell and himself was delayed at Sraffa’s own suggestion, apparently in the hope that he would subsequently be able to reconsider the arguments expounded in that paper.

² Schumpeter held a similar view of the relative worth of Sraffa’s two papers. The 1925 paper ‘shows Sraffa’s striking points and the nature of his brilliantly original performance much better than does the English article’ (Schumpeter, 1934, p. 10970).
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Economic Journal. When Edgeworth died [J. M.] Keynes, as the other co-editor, made the request to Sraffa (ibid.). In accepting Keynes’s invitation, Sraffa wrote a letter to him which is now conserved among the Keynes Papers in the Marshall Library in Cambridge. Roncaglia quotes three passages from this letter (1978, pp. 11–13) in which Sraffa outlined both the gist of the 1925 paper and anticipated the novel aspects of the 1926 paper dealing with what became known subsequently as the theory of monopolistic (or imperfect) competition. Harcourt (1972, pp. 14–15) notes J. Robinson’s indebtedness to the latter part of Sraffa’s 1926 paper in developing her analysis in The Economics of Imperfect Competition (1933).¹

In comparing the 1925 and 1926 papers, the first thing which strikes the reader is their relative length: the Italian paper is 52 pages long, whereas only the first seven pages of the Economic Journal paper cover similar ground. The discussion of the laws of returns in the Italian version is therefore much more detailed than the analogous discussion in the English version. Secondly, in addition to the wealth of references to the work of his predecessors (many of which are amplified in the sometimes lengthy 90 footnotes), the Italian paper is at times considerably more technical than the English one, some of the analysis being based on two diagrams which are omitted in the 1926 paper.

After laying out his basic position in Section 1 of his 1925 article, Sraffa devotes its longest section (Section 2, numbering 21 pages) to a discussion of increasing costs, followed in Section 3 by an analysis of decreasing costs (14 pages) and, in Section 4, of constant costs (three pages). The article concludes in Section 5 with Sraffa’s fundamental critique of supply curves which are characterised by variable returns and, together with demand curves, determine commodity prices in a partial equilibrium setting. It is my intention in this paper to follow this general format by focusing successively on increasing, decreasing and constant costs, and summarising Sraffa’s exegesis of his predecessors’ views in each case and his own views on the conditions which are likely to give rise to them. Finally, I compare the 1925 paper to the analysis of the laws of returns found in the 1926 paper and to Sraffa’s subsequent book Production of Commodity by Means of Commodity (Sraffa, 1960), in which he took markets to be competitive but, by postulating no variation in industry outputs, dispensed with any assumption regarding the nature of returns to scale.

2. Increasing costs

Sraffa criticises Palgrave’s Dictionary of Political Economy (1894, etc.) for assuming that the same circumstances can give rise to either decreasing or increasing returns. Sraffa links decreasing returns to changes in the proportions with which factors of production are used in a given industry, and argues that changes in the size of an industry instead bring about increasing returns.² The latter can arise from changes in factor proportions only when the term ‘constant factor’ is interpreted too literally as one which can neither

¹ In his eulogistic account of Sraffa’s role in the reformulation of value theory in the ‘years of high theory’ (1926–1939), Shackle (1967, p. 12) states that “the period opens with the Sraffian Manifesto of 1926, demanding the revision of value theory”. According to Shackle (p. 20), in a chapter entitled ‘Sraffa and the State of Value Theory, 1926’, “in a single paragraph the whole basis and necessity of the modern theory of imperfect competition is set out with an ease and economy that have never been improved on”. Shackle nowhere mentions Sraffa (1925), possibly because of its unavailability in English. Had it been taken into account in his splendid book, the ‘years of high theory’ might have been extended by one year.

² Unlike Marshall, who at times blurred the distinction between ‘returns to scale’ and the ‘law of variable proportions’ (see Levine, 1980), Sraffa is perfectly explicit in separating out the influences of scale effects from the effects on output of incremental additions of a single factor.
be augmented nor reduced. In fact, a 'constant factor' such as land can always be left partially idle, and this will occur if a farmer is to obtain the highest product per unit of his doses of capital-and-labour. Sraffa cites Turgot (1844, p. 421; the original source dates from 1767) as giving the first, and very precise, formulation of a tendency toward increasing returns of variable factors applied to land, followed by diminishing returns until output reaches its maximum. However, the initial stretch of increasing return would be observed only if the farmer ignored the best way to utilise his land, since he could maximise the productivity of his variable factors by leaving some of the land idle.

To prove his point Sraffa introduces Fig. 1, reproduced above, in which the x-axis measures doses of capital-and-labour applied to a given piece of land, the curve OAE measures the marginal product of these doses and the dashed curve OPD their average product. Given homogeneous land—and, although Sraffa does not mention it, constant returns to scale—there exists a similar pair of curves displaced to the right or to the left in proportion to the size of the plot of land available to the farmer. If the latter decided to employ the amount of variable factors OS, it would behove him to leave the fraction SM/OM of his land fallow and achieve the highest average product PM (= US), and hence the highest total product, from his variable factors. Allowing for optimal use of the fixed factor thus results in an average product curve given by EPD rather than OPD. Sraffa points out that the initial stretch of increasing returns to the variable factor corresponds to a negative marginal product of the fixed factor. He adds the qualification that if a minimum amount of the fixed factor must be used, then an initial region of increasing returns to the variable factor will be observed.

Sraffa quotes Marshall's statement in his 'Note on the Law of Diminishing Return' (Marshall, 1920, p. 141) that 'the tendencies of diminishing utility and of diminishing return have their roots, the one in qualities of human nature, the other in the technical conditions of industry'. Is it not rather strange, Sraffa asks, that two elements as heterogeneous as human nature and industrial technique should have such similar implications? Also, he notes that many different reasons are adduced for diminishing marginal productivity in different industries. Is it not more likely that there should be a single common cause for this diminishing productivity? He finds it more plausible and simpler to suppose that this similarity is due to their only common element, their relation to human nature.

Sraffa quotes statements by J. S. Mill, Cairnes, J. N. Keynes and Pantaleoni to the effect that the law of diminishing returns is borrowed from the physical sciences, and is

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1 One can only wonder why Sraffa chooses to make the average and marginal product curves pass through the origin, since this would imply that the total product curve has a zero slope at the origin. A diagram with the same underlying assumption is found in Wicksteed (1910, Book II, Chapter 8). I am indebted to my colleague Fred Westfield for pointing this out to me.
therefore a technological rather than an economic law. He makes the telling point that if there were indeed a technically prescribed ordering of productive combinations, there would be no reason to expect these to follow in order of decreasing productivity. It is also too complicated to postulate that a different technical reason for diminishing product exists for each industry. Far more plausible is the assumption that each productive agent consciously uses additional units of a factor of production in descending order of productivity.

According to Sraffa, Ricardo preferred to emphasise the decline in productivity arising from the utilisation of less fertile lands (now usually referred to as the 'extensive' margin of cultivation) rather than from the application of successive doses of capital and labour to the same plot of land (the 'intensive' margin). Whereas the productivity of a plot of land is independent of whether another plot is cultivated or not, the productivity of a dose of capital and labour is much less independent of whether another such dose has been applied to the same plot. The certainty and generality of the law of diminishing returns is much greater when different types of land are being considered.

Sraffa discusses at this point Wicksteed’s distinction between ‘descriptive’ and ‘functional’ productivity curves, corresponding respectively to ‘economic’ and ‘physical’ laws of diminishing returns (Wicksteed, 1914). According to the first, all factor units are heterogeneous and of different productivity, and can be ranked in order of diminishing productivity. According to the second, all factor units are identical, and their marginal productivity (unlike in the first case) depends functionally on the total number of such units employed. Wicksteed rejects the first type of productivity curve, the associated marginal concept and the Ricardian theory of rent based upon it. He accepts the second type of curve as a basis for a theory of distribution, with the proviso that it should be applied uniformly to all factors.

Sraffa finds Wicksteed’s distinction and rejection of descriptive productivity curves to be unacceptable, believing instead that any decreasing productivity curve is inherently descriptive in nature. Even if the ‘doses’ of capital and labour are identical, the uses to which they are put must be different. The productivity of the marginal dose does not depend directly on the total number of doses, but only in that, the most productive uses of the factor having already been exploited, only the least productive employment remains available for the marginal dose. The relationship between the number of doses and their marginal productivity is the same for either descriptive or functional curves, their ‘arbitrary’ arrangement (criticised by Wicksteed) shifting from the doses themselves to their utilisation. The arbiter, in either case, is the productive agent himself, who is rationally motivated. The same holds for decreasing utility and the demand curves derived from it, which are not based on any psycho-physical law but on the tendency to use the first doses of a commodity to satisfy the most urgent needs.

Sraffa next examines another objection to the ranking of land plots in order of decreasing fertility, namely that this ranking may be affected by the intensity of cultivation. This objection potentially extends to the more general law of diminishing productivity based on the different uses to which a variable factor may be put. Marshall himself denied the possibility of devising an absolute measure of fertility of the soil (Marshall, 1920, p. 131). Sraffa points out that the possibility of a consistent ranking depends on the definition of fertility adopted, and he rejects those advanced by Marshall, Malthus and J. S. Mill. He argues instead that the most fertile piece of land is that which yields the highest average product, corresponding to the ordinate PM in Fig. 1. The

1 See also Rocaglia’s illuminating discussion of these two types of curve (Rocaglia, 1978, Chapter 6).
resulting ranking is then independent of the greater or lesser degree of cultivation of each plot of land.

In the remainder of this section, Sraffa takes Barone to task for incorrectly applying the law of diminishing returns to the supply curve of an industry under perfect competition (Barone, 1913). Barone ranks firms in order of increasing cost and argues that they will enter the market in that order when the price of the commodity increases. The implied analogy is with the utilisation of lands of decreasing fertility when the price of agricultural commodities increases. This analogy, according to Sraffa, is a false one, since the last firm to enter an industry is not necessarily the least efficient one. Unlike marginal land, it may have operated in another industry. Similarly, the first firms to enter an industry, instead of being the most efficient, might be first because of a greater mobility of factors, similar input requirements, etc. The proper analogy, instead, is with the production of a single agricultural commodity. Individual farmers producing that commodity can purchase larger quantities of a ‘fixed’ factor without necessarily affecting its price; indeed, thanks to scale economies, an individual farmer or firm may enjoy a range of falling costs. However, it is not possible to construct an industry supply curve by adding horizontally a number of firm supply curves without violating the ceteris paribus assumption underlying them. For all firms taken together the supply of a fixed factor is given instead, and the industry thus finds itself in a similar position to that of all farmers for whom the supply of land is also fixed.

3. Decreasing costs

In his 1925 paper, Sraffa gives two reasons why costs may decrease within a firm: the first is economies of scale (‘internal economies’) which are a function of the overall amount of the factors employed rather than the proportion between them; the second consists of overheads (‘general expenses’) whose average cost declines with total output. While in the first case it is a decline in marginal cost which brings about a decline in average cost, in the second case the fall in average cost occurs directly, since average fixed cost declines with no effect on marginal cost. The first reason for decreasing costs, as Marshall has pointed out, is inconsistent with perfect competition, though writers of the calibre of Cournot and (at least initially) Edgeworth did not appreciate this fact.

Marshall’s role in the development of the theory of decreasing costs is so paramount that Sraffa feels justified in limiting himself in this section to a discussion of the evolution of Marshall’s thought. In his Economics of Industry (1919), Marshall attributes decreasing costs first to a greater division of labour, without realising that this is inconsistent with perfect competition (an error he was later to criticise in others) and, second, to the location of a large number of firms in the same district. This second rationale was not fully satisfactory since there is no reason to expect that an increase in a firm’s output is necessarily associated with a greater ‘density’ of firms, and vice versa. When Marshall realised that a decline in costs arising from an expansion in the size of firms and a greater division of labour was inconsistent with perfect competition, he abandoned this point of view and developed the theory of external economies to such an extent as to make this the sole cause of decreasing costs under competitive conditions.

It is worth at this point quoting in full one of Sraffa’s paragraphs:

It is only in the Principles of Economics that the theory has appeared in its definitive form. The radical change which this work produced in the substance of the laws of the variations in cost has gone almost unobserved, while the theory of value based on the ‘fundamental symmetry’ of the
forces of demand and those of supply, of which those laws were necessary premises, remains unchanged. In effect, the foundations have been replaced without the building above them receiving any jolts, and it was Marshall’s masterful skill to make this transformation go unobserved. If he had given the originality of this new concept the emphasis it deserved, perhaps it would not have been received without opposition; presenting it as something very well known and devoid of novelty, almost as a commonplace, he was able to have it accepted as a tacit compromise between the necessity of the theory of competition, which is incompatible with a decline in firm cost, and the need not to stray too far from reality, which (being far from perfect competition) presents numerous cases of decreasing costs of that type. It is then frequently forgotten that the ‘external economies’ particular to an industry, which make possible the desired reconciliation between scientific abstraction and reality, are themselves a purely hypothetical and unreal construct (Sraffa, 1925, pp. 306–307; my translation).

The implication of Marshall’s new theory is that the cost of production of each firm is a function not only of its own output, but also of that of the entire industry. Each firm is considered so small that it is unable, by varying its own output, to affect the market price. Similarly, changes in the amounts of factors of production employed by a firm are assumed not to affect their remuneration. At this point Sraffa introduces the second (and last) of his diagrams, Fig. 2 (not reproduced here), consisting of a firm’s U-shaped average and marginal cost curves, together with a horizontal demand curve (no downward-sloping demand curves here!) tangent to the average cost curve at its lowest point, characterised by Sraffa as the point of ‘maximum economy’. The U-shape of the average cost curve is due to the fact that it would be impossible for this curve to be either upward-sloping or downward-sloping throughout its length.

Now, the location of the average cost curve depends on total industry output, z. As the latter expands in the presence of external economies, the average and marginal cost curves shift and the minimum average cost of the firm should decline. Sraffa invites his readers to consider another axis Oz in Fig. 2 perpendicular to the plane of the paper and measuring the total industry output z. Finding the minimum average cost corresponding to each value of z will yield a three-dimensional locus of points of maximum efficiency. Consistency requires that the sum of the optimal firm outputs must add to the industry output z. The plane curve relating z to each price is the ‘collective’ or industry-wide supply curve. Because of the external economies, the industry marginal cost will be smaller than the average (and marginal) cost of each firm, so that social and private costs diverge and the output level attainable under perfect competition (as pointed out earlier by Marshall and Pigou) will be less than socially optimal.

Sraffa returned to the issue of firms operating under decreasing costs in his contributions to the Symposium on ‘Increasing Returns and Representative Firm’ (Sraffa, 1930) published in the Economic Journal of March 1930 at the behest of Keynes, who labelled them ‘some negative and destructive criticisms by Piero Sraffa’ (p. 79). The latter were directed at a paper by D. H. Robertson (1930), who sought to save the Marshallian concept of the representative firm from Lionel Robbins’ devastating critique, and to justify Marshall’s alleged ‘suggestion’ that increasing returns not arising from external economies could after all be reconciled with perfect competition. Sraffa denies the latter assertion and demolishes Robertson’s specious reasoning in its support. He notes that

1 In this section of his paper, Sraffa anticipated several of the points made by Viner (1931) in the section on ‘the external economies of large production’ contained in his celebrated paper ‘Cost Curves and Supply Curves.’ Viner’s Chart V and the accompanying analysis practically duplicate Sraffa’s arguments, with the difference that Viner’s diagram shows a firm producing the same least-cost output at a lower cost when the industry’s output expands, whereas Sraffa allows the more general case of its output being either higher or lower than the original one.
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[Marshall’s] theory cannot be interpreted in a way which makes it logically self-consistent and, at the same time, reconciles it with the facts it sets out to explain. Mr Robertson’s remedy is to discard mathematics, and he suggests that my remedy is to discard the facts; perhaps I ought to have explained that, in the circumstances, I think it is Marshall’s theory that should be discarded (Sraffa, 1930, p. 93).

4. Constant costs

After his lengthy discussions of the cases of increasing and decreasing costs, it is at first a little surprising to find that Sraffa devotes only just over two pages to a discussion of constant costs. Sraffa grants in this section that it is conceivable for increasing and decreasing costs to operate simultaneously in a given industry, and that if the strengths of these forces happened to match each other exactly, the industry would appear to operate according to constant costs. It is again worth quoting Sraffa at this point:

In fact, much more simply, it can be assumed that the case of constant costs arises not from the offsetting of these two opposite tendencies, but from the absence of both: if all the factors of production employed by an industry are used in many others and if the conditions of production of the individual firms are independent of each other, the industry shows constant costs. None of these assumptions is unlikely; and, on the other hand, the small probability of the assumptions which give rise to either one or the other of the tendencies to variable cost seems to indicate that the absence of both should be considered to be much more general—given the partial equilibrium conditions—than the presence of one of them and that therefore one should, if at all, regard as normal the case of constant costs, rather than that of increasing or decreasing costs (Sraffa, 1925, p. 316; my translation).

The acceptance of this viewpoint serves to cast considerable doubt on a theory of value based on the symmetry between demand and supply, which requires that the variation of cost with output should have the same degree of generality as the variation of demand with price. The more important is the case of constant cost, the more this symmetry is disturbed. To defend the theory underlying this symmetry, it is then not surprising to find writers such as Sidgwick, Palgrave and Marshall himself concluding that constant costs can arise only from the exact balancing of two opposing forces. For this very reason, there are those (Bullock among them) who contend that constant costs are hardly ever likely to be observed.

5. Conclusions of the 1925 paper

The last ten pages of Sraffa’s 1925 paper constitute a section entitled ‘Coordination and critique of the three tendencies’ in which he brings together all the separate threads of the preceding sections. Not surprisingly, it is this concluding section which bears the greatest similarity to the initial pages of the 1926 Economic Journal paper. Sraffa examines the difficulties associated with combining the three laws of decreasing, constant and increasing costs into a single ‘law of non-proportional costs’ leading to a general supply curve symmetrical with the industry demand curve. He sees several difficulties with this procedure.

First, the assumptions on which the three laws are based had very different origins and purposes. The diminishing productivity assumption, connected with the Ricardian theory of rent, was used for the purpose of determining the distribution of income.

1This quotation aptly illustrates one of the achievements of Sraffa’s 1925 and 1926 papers, namely to point out the contradictory aspects of a theory (the Marshallian one) which claimed to be logically self-consistent and at the same time adequately to reflect the facts of the economic world. Talano (1976) has argued that, faced with the impossibility of satisfying both these requirements, economists subsequently split into two camps, those (following Robbins and Viner) who developed a theory which became increasingly abstract and divorced from the real world, and those (headed by J. Robinson and Chamberlin) who developed theories (e.g. that of imperfect competition) addressed to particular aspects of economic reality.
Modern economists, interested in the analysis of prices and quantities of individual commodities, formulated the increasing productivity assumption which takes factor prices as given. The first assumption focuses on factors of production available in fixed amounts and on their price variability, the second on price determination for a large number of industries, given factor prices.

Whether an industry is classified as being of the increasing or the decreasing cost type depends on the characteristics chosen for defining it. If an industry is defined as one utilising a given factor of production, fixed in amount, the presumption is that it is an increasing cost industry. If instead an industry is defined as the sole producer of a given commodity and every industry employs only a small fraction of each factor of production, it is more likely to be a decreasing or constant cost industry. The time element further muddies the issue of industry classification, since the same industry can belong to one or the other type depending on the length of time allowed for adjustment; over the short run, increasing cost conditions can be expected to prevail, while in the longer run decreasing cost conditions tend to assert themselves.

The most serious flaw of the theory in question relates to the nature of the laws themselves, even considered in isolation. Two conditions must be satisfied by any supply curve: first, it must be independent of the supply curve of all other commodities as well as of the demand curve for that industry; secondly, it is valid only for small changes in the quantity produced. These conditions reduce to a minimum the field of application of the increasing cost hypothesis since, for the latter to be valid, the industry would have to employ the entire amount of a given factor. If a small number of industries use the common factor, the second condition would be violated since a more intensive utilisation of the fixed factor by a given industry would also raise the cost of that factor to the other industries. If a large number of industries use the fixed factor, the second condition would be violated, since a large change in the quantity produced by a given industry would be needed in order to raise costs for all the industries using the factor. It follows either that all industries are subject to variable costs, which requires the analysis to be conducted in a general equilibrium framework, or that small changes in output result in essentially constant cost production.

The two conditions mentioned above have similarly damaging implications for the existence of decreasing cost supply curves, which require that scale economies should be external to single firms but internal from the viewpoint of the industry. There are very few external economies fulfilling these conditions. The most important external economies benefit all the industries located in the region where they occur. Marshall himself, who placed so much stress on external economies particular to a given industry in his Principles, recognised in Industry and Trade (1919, p. 188) that external economies 'can seldom be allocated exactly to any one industry: they are in great measure attached to groups, often large groups, of correlated industries'. Moreover, it is unlikely that external economies could be introduced without a sizable increase in output of the industry in question, which would again violate the second condition given above.

The basic difficulty with the Marshallian analysis is that its implied ceteris paribus assumption cannot be expected to hold when an industry’s costs are variable, since the changes in other industries’ costs can be expected to be of the same order of magnitude as that of the industry whose output changes. As Sraffa expresses this point in the final paragraph of his paper:

There are then cogent reasons, of which we have tried to emphasise the most salient, why, in a static system of free competition, it is only in exceptional cases that non-proportional cost curves
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can be involved in the determination of the partial equilibria of single commodities, without introducing hypotheses which contradict the nature of the system. An essential condition is to isolate perfectly the industry which produces the commodity in question from all other industries. Now, in the case of increasing costs one must take into account the whole group of industries employing a given factor of production; in the decreasing cost case, one must consider the whole group of industries which benefit from certain ‘external economies’. These causes of cost variation, very important from the viewpoint of general economic equilibrium, must necessarily be considered negligible in the study of the partial equilibrium of an industry. From this point of view, which constitutes only a first approximation to reality, one should therefore assume that commodities are in general produced under conditions of constant cost (Sraffa, 1925, p. 328; my translation).1

6. Conclusions

A comparison of Sraffa’s 1925 and 1926 articles shows that the aspects of variable returns which Sraffa chose to emphasise in his 1926 article are mostly to be found in the last section of the 1925 one. Insofar as diminishing returns are concerned, Sraffa concluded that ‘very little remains: the imposing structure of diminishing returns is available only for the study of that minute class of commodities in the production of which the whole of a factor of production is employed’ (Sraffa, 1926). Difficulties are also shown to arise in the case of increasing returns:

Those economies which are external from the point of view of the individual firm, but internal as regards the industry in its aggregate, constitute precisely the class which is most seldom to be met with. ... Thus it appears that supply curves showing decreasing costs are not to be found more frequently than their opposite (Sraffa, 1926, p. 540).

It follows that

in normal cases the cost of production of commodities produced competitively—as we are not entitled to take into consideration the causes which may make it rise or fall—must be regarded as constant in respect of small variations in the quantity produced (ibid., pp. 540–541).

It is interesting to speculate on the relationship between Sraffa’s 1925 and 1926 papers and his book Production of Commodities by Means of Commodity whose ‘... central propositions had taken shape in the late 1920’s ...’ (Sraffa, 1960, p. vi), even though it was published much later. In the Preface to this book, Sraffa mentions the possible interpretation that ‘... the argument rests on a tacit assumption of constant returns in all industries’ in the very first sentence, while adding immediately that ‘[i]f such a supposition is found helpful, there is no harm in the reader’s adopting it as a temporary working hypothesis. In fact, however, no such assumption is made’ (Sraffa, 1960, p. v).

On the following page, Sraffa comes back to the issue of constant returns and refers to his 1925 paper when he states: ‘The temptation to presuppose constant returns is not entirely fanciful. It was experienced by the author himself when he started on these studies many years ago—and it led him in 1925 into an attempt to argue that only the case of constant returns was generally consistent with the premises of economic theory’ (Sraffa, 1960, p. vi). It should, however, be noted that in 1925 Sraffa was considering the pricing of single commodities in a partial equilibrium framework. In Production of Commodity, on the other hand, the price of every commodity depends on those of all the (basic) commodities in the system, as well as on the wage (or profit) rate, so that the

1The methodological problems surrounding Marshallian (and, by extension, neoclassical) theory analysed in Sraffa’s 1925 and 1926 papers are discussed in considerable detail by Bhadraajit (1978), who provides an interesting account of the paradigm shift in economic theory from classical political economy to neoclassical demand and supply analysis. The author states in the Acknowledgements to her R. C. Dutt Lectures that she has ‘drawn liberally upon the writings of Piero Sraffa and on the innumerable and stimulating discussions we have had over a long period’.
model shares some of the characteristics of a general equilibrium one even if it is not couched in terms of supply and demand relationships. Sraffa's model has in fact been interpreted and reformulated by some authors in terms of constant returns to scale, though this was not Sraffa's intention.  

A careful reading of Sraffa's 1925 paper shows that Sraffa did not believe that constant returns to scale are an empirically more plausible assumption than either increasing or decreasing returns. Rather, Sraffa makes conditional statements to the effect that if returns to scale are variable, then a partial equilibrium analysis of a particular industry under perfect competition is inappropriate; if, on the other hand, returns to scale are constant, then such a partial equilibrium analysis is appropriate, but then the Marshallian symmetry between demand and supply is destroyed, and one is left with a classical theory of prices being determined by costs of production. Moreover, in the second half of his 1926 paper in which he introduced the concept of monopolistic competition, Sraffa discusses the fact that downward sloping demand curves serve to limit the market for firms whose cost curves are downward sloping, a condition which Sraffa clearly thought to be quite common. This alternative to the perfectly competitive model would have been unnecessary if Sraffa had thought constant costs to be prevalent. Finally, we have Sraffa's own interpretation of the thrust of his 1925 paper. In the letter to Keynes mentioned in Section 1, in which he summarised the substance of the latter and described the modifications he would introduce in the 1926 'sequel' to it, Sraffa stated:

This conclusion has been misunderstood and taken to imply that in actual life constant returns prevail; although I believe that Ricardo's assumption is the best available for a simple theory of competition (viz. a first approximation), of course in reality the connection between cost and quantity produced is obvious. It simply cannot be considered by means of the system of particular equilibria for single commodities in a regime of competition devised by Marshall (quoted in Roncaglia, 1978, p. 12).

As pointed out by Roncaglia (1978), Sraffa had three choices in constructing a price theory to replace the rejected Marshallian one: assume generalised constant returns to scale; extend the field of investigation so as to examine the conditions of simultaneous equilibrium in numerous industries, a well-known conception, whose complexity, however, prevents it from bearing fruit...’ (Sraffa, 1926, p. 187); or reject the assumption of perfect competition in favour of that of imperfect competition. Possibly under Keynes's

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1 See Pasinetti (1977, Chapter 5) for a reformulation of Sraffa's system using constant returns to scale assumptions, as well as the exchanges between Levine (1975, 1977), Barzel (1975, 1977) and Eatwell (1977) regarding the relevance of the constancy of returns to scale in Sraffa's analysis. Roncaglia (1978, Chapters 1, 2, 6) discusses the issue of returns to scale in detail, and shows that constant returns to scale have no place in Sraffa's model since at a given moment in time the economy's output levels and technology are exogenously given. The same point is forcefully made by Eatwell (1977) in the context of his comparison of the different sets of data implicit in classical and neoclassical theories.

2 This is also implied by Harcourt's statement that ‘... Sraffa's work led him in 1925 and 1926 to argue that partial equilibrium analysis only applied to constant costs, i.e., to do otherwise was to be inconsistent with the method used (though not necessarily with the “real world” facts which he also discusses). His criticism is a logical and methodological one, that is to say, a search for the set of conditions which allow the method logically to be applied’ (Harcourt, 1983, p. 120). His paper traces the development of Sraffa's thought from the 1925 and 1926 articles to Production of Commodities, and argues that it is necessary to view the latter against the background of the former.

3 See, for example, the quotation in Section 3 above where Sraffa states that ‘... reality... (being far from perfect competition) presents numerous cases of decreasing costs of that type’. The quotations in Sections 4 and 5, which may appear to make a case for the existence of constant returns to scale, in fact only imply that such an assumption is necessary for logical consistency in a partial equilibrium setting under perfect competition.
Sraffa's 'The laws of returns'

influence, Sraffa introduced the demand side in the form of downward-sloping demand curves at the firm level, and unwittingly gave birth in 1926 to the theory of monopolistic competition, thus choosing the third of these avenues. However, he subsequently abandoned it in favour of an approach which is closest in spirit to the second one, i.e. based on each industry's economic interdependence with all other industries, though bereft of any demand influences on commodity prices. There is in fact no trace of monopolistic competition in Production of Commodities, which can instead be regarded as a lineal descendant of Sraffa's 1925 paper, in the sense that it is both consistent with its critique of Marshallian methodology and fulfills the 'positive' part of this critique by providing an alternative framework of analysis. In Production of Commodities the unit of analysis is the industry rather than the firm, which not only allows Sraffa to dispense with any notion of imperfect competition but also makes redundant any discussion of the horizontal summation of firm supply curves in order to arrive at an industry-wide one.

Of course, it is undeniable that Sraffa's thinking evolved considerably in the course of writing his book. An indication of this is his substitution of the term 'price of production' for his earlier, classically derived 'cost of production', since the production of commodities by means of commodities implies that the price of any one commodity depends on the prices of all other commodity inputs, including that of the commodity itself. While Sraffa in 1925 and 1926 insisted that general equilibrium effects should be allowed for, he avoids the terms 'general equilibrium' or even 'equilibrium' in his book. While he allows for variable returns to scale under well-specified conditions in his 1925 and 1926 articles, Sraffa rules out any scale changes in 1960.

At the same time most of the aspects of Sraffa's critique of Marshallian methodology in 1925 are fully, and constructively, reflected in Production of Commodities. This is clear from (i) the fact that the interdependence among economic sectors emphasised in this book makes any type of partial equilibrium analysis both unnecessary and indeed infeasible, (ii) the absence of demand as a determinant of price, (iii) the lack of any need to classify industries into increasing, decreasing and constant cost ones, achieved by the simple (and possibly unique) expedient of making returns to scale irrelevant, (iv) the absence of demand as a determinant of price, (iii) the lack of any need to classify industries into increasing, decreasing and constant cost ones, achieved by the simple (and possibly unique) expedient of making returns to scale irrelevant, (iv) the ability of Sraffa's framework to allow for land or other factors in fixed supply (see Sraffa, 1960, Chapter 11), while eschewing any functional Wicksteed-type curves of diminishing marginal product, and (v) the possibility of incorporating technical progress in the form of the reduction of one or more coefficients of production, with possible repercussions on...

1 According to Harcourt (1972, p. 15), '[t]he passages on monopoly, which gave rise to the "imperfect competition" saga, evidently were added to placate an English audience accustomed to pragmatic judgments about the real world'. As Roncaglia has stated in his recent evaluation of Sraffa's contributions, '[t]he whole analysis of imperfect competition seems to us a detour which engages Sraffa for only a few months after the publication of his article in Italian' (Roncaglia, 1983, p. 344). Similarly, it has been argued that while Sraffa's 1926 paper was meant to formalise a feature of the market economy (monopolistic competition) which had already been alluded to in Marshall's writings, with a view to injecting greater realism into economic theory as demanded by the spirit of the times, this in fact turned out to be a 'blind alley', since imperfect competition implied 'the loss of a great unifying principle such as the idea of a competitive equilibrium' (Talamo, 1976, p. 63).

2 Many commentators have discussed whether Production of Commodities is a special case of a Walrasian general equilibrium model or is even consistent with the latter. Roncaglia (1978) and Talamo (1976) have argued that the special features of Sraffa's model, such as the absence of demand relationships and hence of market equilibrium defined in terms of equality between demand and supply, put it in a class of its own to which the term 'general equilibrium' should not be applied.

3 The points of similarity between Sraffa's 1925 article (and the first part of the 1926 one) and Production of Commodities are spelled out by Talamo (1976), who makes a persuasive case that the main features of Sraffa's book had indeed taken shape in the 1920s (as asserted by Sraffa himself) and can be traced to the 1925 article in particular.
all sectors of the economy, which obviates the need to assume industry-specific external economies.

Bibliography

Barone, E. 1913. Principi di Economia Politica, Rome
Burmeister, E. 1975. A comment on 'This age of Leontief . . . and who?', Journal of Economic Literature, June
Burmeister, E. 1977. The irrelevance of Sraffa's analysis without constant returns to scale, Journal of Economic Literature, March
Eatwell, J. 1977. The irrelevance of returns to scale in Sraffa's analysis, Journal of Economic Literature, March
Levine, A. L. 1975. 'This age of Leontief . . . and who?' A reply, Journal of Economic Literature, June
Levine, A. L. 1977. The irrelevance of returns to scale in Sraffa's analysis: A comment, Journal of Economic Literature, March
Levine, A. L. 1980. Increasing returns, the competitive model and the enigma that was Alfred Marshall, Scottish Journal of Political Economy, November
Robinson, J. 1933. The Economics of Imperfect Competition, London, Macmillan
Roncaglia, A. 1983. Piero Sraffa and the reconstruction of political economy, Banca Nazionale del Lavoro Quarterly Review, December
Sraffa, P. 1925. Sulle relazioni fra costo e quantità prodotta, Annali di Economia II
Sraffa, P. 1926. The laws of returns under competitive conditions, Economic Journal, December
Turgot, A. R. J. 1844. Observations sur le mémoire de M. de Saint-Péray en faveur de l'impôt indirect, Oeuvres de Turgot, Paris (originally written in 1767)