silly b) rude to Dennis c) badly written. I didn't mean it to be any of these things, but good intentions will not help me' (letter kept in Keynes Papers, EJ/1/2).

25 Wolfe considered himself strongly influenced by Robertson on the representative firm, as appears in two letters he wrote to the English economist on 1 September 1954 and 25 October 1957 (letters kept in Robertson Papers, Trinity College, Cambridge).

26 It seems that this article was influenced by Sraffa's (see Gregory 1929). Also Charles Blitch maintained that 'Young's paper was written in partial reply' to the idea that 'in order to deal with increasing returns it was necessary to turn to monopoly theory' (unpublished letter to Nerio Naldi of the 28 May 1997; see also Blitch 1983b; I thank Nerio Naldi for his permission to quote this letter).

4 Sraffa and Cambridge economics, 1928–1931

Maria Cristina Marcuzzo

Foreword

In the introduction to the first volume of her Collected Economic Papers, published in 1951, Joan Robinson in an illuminating line described Sraffa's teaching as 'penetrating our insularity' (Robinson 1951: vii). This sentence could have been a title for this chapter, which is mainly concerned with Sraffa's impact on Cambridge economics in the late 1920s and early 1930s. The assessment has been facilitated by the new catalogues of Keynes, Kahn and Joan Robinson papers, the recently granted access to Sraffa's papers, and the availability of Austin Robinson's papers, the cataloguing of which is under way.  

In looking into this material and reviewing the new evidence, I hope to contribute to a better understanding of the issues involved and to trace out the development of new ideas more accurately. The scope of this chapter is, however, rather limited. I shall examine two episodes which are extensively discussed in the literature and for which I have found new evidence: (a) the developments in value theory, which went under the name of the imperfect competition revolution; (b) the 'arguing' about the Treatise, which paved the way to the Keynesian revolution.

The time span under consideration is also very short: from the autumn of 1928 (when Sraffa gave his first set of lectures) to the autumn of 1931 – when, as result of many discussions (chiefly in the 'Circus'), Keynes decided that he had to postpone his own lectures, feeling that a 'theoretical clean up' was needed before he could 're-lecture stuff which is available in print'. In the same year Sraffa resigned from his lecturership as from 30 September 1931.

Sraffa's Lecture Notes

Sraffa's lectures on Advanced Theory of Value – after being postponed for a year at Sraffa's request – were listed in the Cambridge Reporter for the Michaelmas and Lent Terms of the academic year 1928–9, on Tuesdays and Thursdays, at 12 noon at King's. These lectures were given again, with
very few excisions and additions to the material covered, in the Michaelmas and Lent Terms of the academic year 1929-30, and in the Lent Term 1931 (Sraffa was on leave of absence in the Michaelmas Term 1930). Among Sraffa’s papers there is a set of Lecture Notes on Advanced Theory of Value, consisting of about 220 handwritten pages, of which roughly two thirds correspond to material covered in the Michaelmas Terms on theories of production and distribution, the remaining third - covered in Lent Terms - dealing with the theory of demand and forms of competition. In his Lecture Notes Sraffa drew on his previously published articles in the Annali di Economia (Sraffa 1925a) and the Economic Journal (Sraffa 1926a), leaving indications of the pages of the relevant passages.

In the Lecture Notes the focus on the theory of value historically considered is meant to show how the notion of cost of production was transformed from the classical school to the marginal school, leading - as the result mainly of Marshall’s work - to unification with utility and the statement of a symmetry between cost and utility. For such a unification to be possible - Sraffa argues - the notion of cost of production had to undergo a series of changes which made it unrecognisable in terms of the meaning given to it by the classics, but comparable with utility. ‘It is only when cost is conceived as a quantity of utility’ - Sraffa wrote - ‘that is to say of negative utility, that it can be brought together with marginal utility in a single theory of value’ (SP D 2/4 3(18)).

Comparison between the notion of cost in Petty and in the Physiocrats, on the one hand, and in Marshall, on the other, shows that, while for the former authors cost is mainly food for the worker, for the latter it is the sum of ‘efforts and sacrifices’, in abstention or waiting and in labour required. These two notions of cost reflect different conceptions of what economics is about (classical economists were mainly concerned with measures, marginalist authors were mainly concerned with motives) and gave rise to two theories of distribution. Thus, Sraffa wrote:

> For Marshall, wages, interest and profits, are simply shares in the product; they are co-ordinate quantities, that can be regarded as acting upon the value of the product in the same way. Both, are the inducement required to call forth certain sacrifices, which are equally necessary for production, and they are also the reward of those sacrifices. . . . It is not necessary for the actual goods which compose real wages and profits to be in existence at the beginning of the process of production - the hope, or the promise of these goods is equally effective as an inducement. They operate on production only by being expected, but that comes into existence only when production is finished, as shares in the product.

> Petty and all the classics, on the contrary, take the opposite view. They don’t regard at all wages as an inducement; they regard them as a necessary means of enabling the worker to perform his work.

(SP D 2/4 3(22-23))
dence between the units under consideration: i.e., which compose the variable factor, or between the units which compose the constant factor, or between the methods by which the two factors can be combined (that is to say, the ways in which the variable factors can be utilised).

(SP D 2/4 3(103))

Sraffa then gives examples of diminishing returns in agriculture and discusses Wicksteed's distinction between two types of ordering of marginal units of a factor, one based on what is said to be 'an arbitrary arrangement of units of factors in a descending order of effectiveness' and the other on a 'causal connection between the number of units and the effectiveness of the marginal unit' (SP D 2/4 3(109)). Sraffa argues that there is no such difference, 'that, in fact, one is quite arbitrary as the other, because in both cases the decrease in the marginal product is due to the action of the producer, directed to obtain in each case the maximum product' (SP D 2/4 3(112)).

Sraffa then goes on to discuss the role of diminishing returns in the construction of the supply curve for the industry. He shows that, since they arise from a factor which is constant for the industry, but not for the individual firm, the supply curve should be made up not of the whole of the curve of the individual firm, but only of the quantity and cost that correspond to the optimum size of the firm.

Turning now to increasing returns, Sraffa explains why - at the individual firm level - they are incompatible with perfect competition, since they would lead to monopoly. Therefore, increasing returns for an industry can arise only because there are supposed to be external economies: 'the result being that, if a single firm expands its output, its costs rise; but if all the firms expand at the same time, the costs for each of them fall' (SP D 2/4 3(130)). It follows that while it is assumed that a close interdependence between the costs of any firm and the quantity produced by other firms in the same industry exists, it is also assumed that there is independence between these costs and the quantity produced by firms in other industries. Sraffa argues that this type of external economy is very hard to find. What is more likely to occur - as classical economists would have it - is that, as a result of general improvements, all industries will be affected. It follows that external economies cannot be considered in the supply curve of a commodity because prices of products of other industries are affected, therefore altering the demand curve for that commodity, and thus violating the condition of independence of supply and demand for a commodity in any given industry. Thus - Sraffa concludes - constant costs are the general rule. This topic brings to a close the lectures to be given in the Michaelmas Terms.

In the introductory remarks to the set of lectures to be given during the Lent Terms, Sraffa declares that he will not follow a 'logical scheme', but simply deal with miscellaneous topics: the assumptions underlying demand

curves, the theory of general equilibrium, and 'special' cases of value, such as monopoly and international trade.

After reviewing the substance of the arguments presented in the Michaelmas Terms, Sraffa first discusses imperfect competition and monopoly, arguing that monopoly should be regarded 'not as the opposite extreme of competition, which either is or is not: but as "a quantity", a substance as it were, which may be present to a greater or smaller extent' (SP D 2/4 13(3)). However, the degree of monopoly is definite only if demand is a constant elasticity curve, but in general elasticity is defined at a point and it is different at different points. Sraffa then comments:

In these cases I am doubtful as to which is the characteristic point (where the two curves cross, as in competition, or where monopolist fixes prices, or an intermediate: the second must have elasticity less than unity, in general, if there are costs, much less). Probably, the best definition of the strength of a monopolist, is the elasticity of a constant elasticity curve which can be superimposed upon the demand curve (in the 'relevant' part) and most nearly fits it.

(SP D 2/4 13(4))

What is meant by the strength of a monopolist is not the magnitude of his gains, but his power as a seller. Monopoly is so defined as to include the cases in which, although there are many producers of a commodity, due to the lack of indifference of the consumers as to the firm from which they are going to buy, the conditions of competition break down' (SP D 2/4 13(5)). Sraffa then explains that the difference between the usual case of monopoly and the ones considered by him lies chiefly in the nature of the substitutes, or rival commodities - i.e. whether the money which is not spent when price raised goes to many different commodities or to one substitute.

When we are considering an individual producer this does not matter: it is indifferent to him what they do with their money, since they do not buy his goods.

But when we want to consider the industry as a whole the two cases are very different. (It is obvious that to do this we cannot compound several demand curves - they refer to different things.)

(ibid.)

There is, therefore, great interdependence between producers, because when one increases his price, the demand schedule of the others goes up and they also increase their prices. Consequently, the first producer will increase prices again and so on; the limit to this series of price increases is the loss of customers to other firms in the same industry or to firms in other industries. Under these conditions the market price cannot be determined,
since there will not be one single market price, but a series according to individual circumstances of firms. However, Sraffa argues:

if we assume (and preferences can be expressed as proportion of price) that the private markets are very similar, we can see what the market price will be (I assume entry of new firms is forbidden).

When individual firms raise price part of the customers are sent from one to the other – part are lost to industry. But no more are lost than if it were a single monopolist: it is these that set the limit to general rise. Consequently, the price will be fixed as by a monopolistic association, however small the lack of indifferece.

Of course this is only true for short periods and for longer, only insofar as expenses of establishing trade connections and build up a private market make it unprofitable [sic] for newcomers.

(36.P.D. 2/4 13(8))

Should individual increasing returns prevail, however, when the demand schedule is raised following an increase in price by other firms, it may pay that individual producer to reduce his price, and this will probably lead to the establishment of a single monopoly. In so far as this happens equilibrium is indeterminate.

The foregoing analysis shows the dependence of the shape of the demand curve upon the prices of other commodities, and the necessary condition for its validity, that is that prices of substitutes remain fixed.

The final set of lectures deals with the general method of approach of the general equilibrium theory in comparison to the partial equilibrium approach. Its main conclusion is stated as follows:

As regards the equations of general equilibrium, their chief importance is as an attempt to prove that no vicious circle is involved in determining prices by supply and demand, a sufficient number of conditions may be found to determine all the prices and quantity exchanged simultaneously.

(36.P.D. 2/4 28)

Although in the Lecture Notes there are many references both to the 1925 and 1926 articles, their scope is much wider. This is clearly the result of the extensive work in which Sraffa has been engaged since the summer of 1927, on what would eventually become the core of Production of Commodities by Means of Commodities grew. The development and transformation of the notion of cost of production from the classical school to the marginal school is the new element in the evolution of Sraffa's thought. The novelty appears to be the discovery that there are two notions of cost – one concerned with necessaries and the other concerned with motives – which gave rise to two theories of distribution and two conceptions of wages and profits, one as surplus of the product over necessaries and the other as shares in the product. As a consequence, the whole attribution to the classical economists of the assumption of constant costs was discarded. In the 1925 article the idea is still attributed to Ricardo and Mill (Sraffa 1925a: 316n), but the point is not reiterated in the 1926 article. However, in the 1926 article it is still maintained that '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' (Sraffa 1926a: 540–1). In the Lecture Notes the argument is reiterated. The assumption about constant costs, however, turned out to be a crucial point in the difficulty encountered by Sraffa in presenting his own research project, since we are told in the Preface to Production of Commodities by Means of Commodities that when, in 1928, 'Keynes read a draft of [its] opening propositions . . . he recommended that, if constant returns were not to be assumed, an emphatic warning to that effect should be given' (Sraffa 1960a: vi). Now a further piece of evidence is provided by a letter from Pigou of January 1928, in which he wrote to Sraffa: 'Your equations seem to me capable of being subsumed as a special case of the general analysis. You in effect are simply supposing that each of the three (or n) commodities is being produced under conditions of constant returns' (SP C239 1).

The theory of imperfect markets

The excitement aroused by Sraffa's lectures is well described by Austin Robinson:

When Joan Robinson and I came back from India and settled down again in Cambridge at the beginning of 1929, the most vigorous arguments of our younger friends were primarily concerned with Piero Sraffa's lectures and derived more remotely from his Economic Journal article in 1926.

(E. A. G. Robinson 1977: 26; italics added)

However, Keynes made the best prediction in writing to Lydia on 28 November 1927: 'On Saturday I had a long talk with Sraffa about his work. It is very interesting and original – but I wonder if his class will understand it when he lectures' (JMK PP/45/190/3/268).

Among Sraffa's class there were two outstanding pupils who were later to epitomise much of what is understood by Cambridge Economics, R.F. Kahn and J. V. Robinson. While I was not able to find direct evidence of Joan Robinson's attendance of Sraffa's lectures, apart from a letter to Kahn where she mentioned it, we have records of Kahn's attendance both in his papers and in the Sraffa papers.

Here I shall be concerned with a point raised in Kahn's Fellowship dissertation on The Economics of the Short Period – written between October
1928 and December 1929 – and conceived under Sraffa’s influence,10 where, according to Kahn, the ‘exposure of a serious error in Sraffa’s exposition’ (in the 1926 article) can be found. In that article Sraffa writes (Sraffa 1926a: 549) that ‘for an industry consisting of firms which are all similar and similarly situated the final position of equilibrium is the same as would be arrived at if the whole industry were controlled by a single monopolist’ (Kahn 1989: 94).11 According to Kahn, the implication of Sraffa’s point is that, under conditions of uniformity among firms, provided that the market is slightly imperfect, the magnitude of the imperfection is irrelevant to the equilibrium price.12

Kahn’s challenge to Sraffa’s conclusion is based on his analysis of the individual demand curve facing each seller. This curve, according to Kahn, indicates:

what he imagines to be the relation between his price and his output, and the position of equilibrium depends on the slopes of these individual demand curves. These in their turn depend on the particular assumptions that are in the minds of the individuals when they draw up their demand curves.

(Kahn 1989: 98)

The assumptions – ‘that are in the mind of the business man when he maximises his profits’ (Kahn 1989:100) – can be reduced to three cases; when he assumes that if it altered its price, (a) the prices of all other firms remain constant; (b) the outputs of all the other firms remain constant; (c) the other firms will alter both their prices and their output. Kahn proves that, in all three cases, the aggregate demand curve of an industry in the hands of a single monopolist is steeper than the demand curve facing each firm (identical and similarly situated) in a oligopolistic industry. It therefore follows that, contrary to Sraffa’s assertion, ‘under conditions of polyopoly the equilibrium price is less than under conditions of monopoly’ (Kahn 1989: 117).

In the dissertation, Kahn had declared in a footnote that ‘Professor Sraffa has admitted, subject to a possible reservation, the force of my objection to his argument’ (Kahn 1989: 95). Moreover, in the 1989 preface he added: ‘An unpublished letter from Sraffa to Keynes (King’s College, Cambridge, Library) is of interest’ (Kahn 1989: xvn). Unfortunately, I have found no evidence of this. Rather, in Sraffa’s papers, I found a note added to the Lecture Notes, and clearly written after Sraffa read Kahn’s dissertation, in which Sraffa says:

To say that in imperfect competition price is always less than in monopoly, it means to fall into the same error as above, which is based on assumption that problem is independent of the relation between individual and collective elasticity of Demand. . . . The point is that I

assume a slight, but finite, degree of imperfection (elasticity of Demand not infinite). But in this case, with the rise in prices, the elasticity decreases all the time, without limit. (This argument would be conclusive if the final equilibrium were reached when all imperfection has vanished: but in fact it is reached long before that happens. Imperfection disappears for infinite price, whereas equilibrium is reached at finite price.)

(SP D 2/4 10 (verso))

The tentative reconstruction I offer of the point at stake between Sraffa and Kahn is the following. Kahn based his analysis on conjectural demand curves whose slopes embody various assumptions about the behaviour of other firms within the industry. A change in price by any one firm does not leave the slope of the demand curves of all other firms unchanged because the reactions of competitors are taken into account. In general, when there is only one producer (as in monopoly), its demand curve is steeper than when there are many producers (as in oligopoly), because in the latter case firms are aware of the behaviour of others firms since there are alternative sources of supply for that commodity within the industry. Since equilibrium price, for given supply curves, is determined by the slope of the demand curve, it follows that in monopoly it is higher than in oligopoly.

On the contrary, Sraffa’s argument is based on the degree of consumer preferences as shown by the elasticity of demand. Following an increase in price by one firm, demand curves facing all firms are raised. Since prices of substitutes go up, each buyer is willing to pay a higher price for the product of the firm from which he prefers to buy (Sraffa 1926a: 547). The limit to the price increase is given by the loss of customers to the market, not to the individual firm, since customers will return to the firm they prefer when the other firms have also raised their price. He writes: ‘The question seems to be whether the number of customers a firm loses when it alone raises the price is equal to the number it loses when all firms have raised it by that amount (SP D 2/4 10). Thus for Sraffa, unlike Kahn, for an industry consisting of firms which are all similar and similarly situated’ there is no reason why the price corresponding to the Marshall’s ‘maximum monopoly revenue’13 would be different in monopoly and in oligopoly.

Demand curves

The impact of Sraffa’s challenge against the Marshallian approach was reinforced in the Symposium, held in the Economic Journal, in March 1930. Among the Sraffa papers, there is an invitation card to the Political Economy Club,14 signed by its Secretary, Richard Kahn, announcing for 24 February 1930, “G.F. Shove, D.H. Robertson and P. Sraffa on ‘Increasing Returns and the Representative Firm: A Symposium’” (PS D/3/7 13). This was perceived as quite an occasion as Keynes explained to Lydia in a letter
of 24 February 1930: ‘Tonight Dennis and Gerald and Piero are going to dispute together at my Economic Club and a large company will come to hear them. I shall need all my tea-cups and more than all my chairs’ (JM K PP/45/190/4/207).

A new piece of evidence can now be added to this matter, in the form of a copy of letter written (but perhaps not sent) by Sraffa to Shove, dated 26 February 1930 on the question of including marketing expenses in the cost of producing a commodity. Sraffa wrote:

My point, which I did not succeed in explaining properly in Monday’s [Political Economy Club] discussion, is this: The cost of producing an additional unit is a definite sum of money, which depends only upon the quantity produced. But the cost of marketing is different: the ‘cost of marketing 100 pairs of boots’ is indeterminate until we know at what price the boots have to be sold. You can always find a sufficiently low price at which you can sell your 100 pair of boots without incurring any marketing expenses; and, on the other hand, if you spend a sufficiently large sum in advert. etc., you can sell your boots at any desired price, however high. Therefore, when you speak of the cost (including marketing expenses) of putting an additional unit on your competitor’s market, I do not know what you mean until you tell me at what price it has to be sold.

(SP D 3/7 8)

Moreover, in a handwritten note, Sraffa made his point even clearer:

The chief objection to this point is that S [Shove] regards marketing expenses as part of cost of production: he overlooks that they are directed to affect the demand curve, and therefore there is no demand curve which can be used with a supply curve that includes them — they are not independent.

(SP D 3/7 23)

The issue of the marketing expenses had already been raised by Kahn during one of Sraffa’s lectures (see PS D 2/4 13(2)). In his answer Sraffa pointed to two cases, one represented by a horizontal demand curve and the other by a down-sloping demand curve. The first case is when all the expenses necessary to raise the demand curve to market level are included in the supply price; in this case the two curves are not independent. The second case represents the demand curve as it is at the current amount of advertisement; . . . The supply curve represents only factory expenses of production and does not change with advertisement. The price is fixed on monopoly principles, so as to maximise monopoly revenue. For each total amount spent in advertisement there is a different demand curve (to be coupled always with the same supply curve) and therefore a different monopoly revenue.

(SP D 2/4 13 (2))

Once again, Sraffa’s point seems not to have been taken since, in his dissertation, Kahn wrote:

Selling and advertising expenses are to be regarded as completely determined, being unambiguously dependent on the output. I understand from Professor Sraffa that when these expenses are de facto, if not de jure, a necessary adjunct to the process of production, both qualitatively and quantitatively, he would not regard them as marketing expenses at all. We are entitled therefore, on our special assumption [when a producer desires to increase his output he reduces his price rather than increases his advertising expenses], to disregard his objection that the inclusion of marketing expenses in cost of production renders the expression ‘cost of production’ ‘dependent upon elements quite extraneous to the conditions under which the production of a given undertaking takes place’ [Sraffa 1926a: 544]. And at the same time, of course, it is possible to regard the individual demand curve as a definite independent entity, since we get around Professor Sraffa’s plea that changes in marketing expenses should be conceived as shifting the demand curve’ [Sraffa 1926a: 543].

(Kahn 1989 : 89-90)

Among Kahn’s papers an extended criticism of this passage by Sraffa is kept, probably to an early draft of the dissertation:

When we say ‘cost of production’ we mean ‘necessary cost’. And necessary cost implies a reference to a condition to be fulfilled, i.e. ‘x costs are necessary if an amount of the article has to be produced’. We do not always repeat this condition once it is common to all costs of production properly so called. But it is not common to marketing expenses. These are only necessary ‘if a given amount of product has to be produced and sold.’ Besides, a reference to the price at which it must be sold is required, since a firm could sell practically any amount, without any marketing costs, at a price sufficiently near to zero: just as it could produce any amount, without any marketing costs, if it hoards the product. Nothing is said about this price in §8 [Kahn 1989: 89-90]; and therefore marketing expenses are not unambiguously dependent upon output. (Any definition that can be given seems unacceptable. The one relevant to the problem, i.e. such a price that covers all kind of costs and gives the maximum profit in general enables us to draw not a curve, but a point — the maximum to be sought: in solving the problem we start from a single datum — and it is the solution itself).

(RFK 3/13/153)
Once again – following Marshall and Shove’s teaching – Kahn was adhering to a notion of the individual demand curve ‘as a definite independent entity’. On the contrary, Sraffa’s effort was to show that in general it was not, and in most cases that a given quantity (a point) rather than a schedule relating hypothetical or conjectural quantities to price was all which was needed for the problem to be solved.

The issue of how to draw demand curves was heavily debated between Joan Robinson and Richard Kahn when The Economics of Imperfect Competition was being written. In a letter to Kahn of 10 November 1930 – i.e. soon after the work on the book had begun – Joan Robinson wrote:

I am prepared to believe that stuff now without your geometrical proof, though I think it should be done as a work of art. But it knocks a hole in Piero’s stuff about monopoly analysis, as far as I can see. (v. p. 547 EJ, Dec. 1926 bottom of the page). When the demand curve for Rowntree is raised by the fact of Cadbury having raised his price, Piero says that Rowntree would only lower his price if the demand for his chocolate is very elastic and his private supply curve sharply decreasing. According to you it would lower it in any case. How’s that?

(JVR vii/228/1/3)

An entire chapter of The Economics of Imperfect Competition was devoted to analysis of the assumptions relating to the elasticity and slope of demand curve in affecting price in monopoly conditions (Robinson 1969 [1933]: 60-82). Just before the book was published she summarised aptly what was going on, in writing to Kahn, on 18 January 1933: ‘Piero has sent back the proof of Book III [of The Economics of Imperfect Competition] which I sent him. He can’t swallow the modern demand curve, but otherwise makes no big point – some useful minor ones’ (RFK 19/90/1/58).

By that time Sraffa must have given up any hope that he could persuade the ‘younger generation’ of Cambridge economists to move away from the Marshallian demand and supply curves. I shall now turn to the other and certainly more important ‘revolution’ going on in Cambridge in the early 1930s where, perhaps, Sraffa was more hopeful of exercising some influence.

Arguing the Treatise

In the Michaelmas Term of 1929 Keynes was lecturing from the proofs of his Treatise on Money, but the book was published only in October 1930. He had been busy revising and rewriting it, under the stimulus and criticisms coming from different quarters, which did not stop after publication. Hawtrey, Hayek and Robertson on the one hand, and the members of the ‘Circus’ on the other, kept the argument about its validity and implications going.

As we know, the ‘Circus’ was the Treatise informal discussion group that met between late 1930 and the spring of 1931, including Richard Kahn, James Meade, Piero Sraffa, Joan and Austin Robinson and also some of the most brilliant economics students of the recent generation. Unfortunately, scant written material has survived to document the group’s activities, later reconstruction being based on the individual and collective recollections of the participants, and including a number of contrasts in the interpretation of how things really went.

Very little is known about the role of Sraffa in the ‘Circus’, but for an account by Joan Robinson, almost fifty years later, according to which: (a) the ‘Circus’ was ‘first proposed by Piero Sraffa’ and (b) that ‘[Sraffa] was secretly sceptical of the new ideas’ (Robinson 1978: xii). Of course, we also have the exchange between Sraffa and Keynes published in the Collected Writings in the form of a paper written by Sraffa, dated 9 May 1931, and of a letter by Keynes, dated 15 May 1931 (Keynes 1973a: 207–11).

New evidence has been found of Sraffa’s involvement in this discussion and more work is needed to understand the nature of his contribution. On this occasion I shall discuss one issue related to the ‘Fundamental Equations’, namely the asserted ‘independence’ of the determination of the price of consumption goods and investment goods, as contained in a paper of 15 April 1931 (SP D1/81).

It will be recalled that in the Treatise the price level of consumption goods is set as equal to the sum of two terms, the first being the cost of production, while the second is given by the difference between the current cost of production of investment goods (I) and saving (S), defined as the difference between monetary incomes and expenditure on consumer goods. This term is positive, nil or negative according to whether the cost of the new investment is greater than, equal to or less than the current saving. The difference constitutes what Keynes calls the extra-profits (if positive) or losses (if negative). When the difference is nil the production decisions taken by entrepreneurs on quantities of consumption and investment goods correspond to (are compatible with) the decisions taken by the public as a whole to allocate their incomes between consumption goods and savings.

On the other hand, the price level of investment goods – by which Keynes means both capital goods and securities – is determined jointly by the decisions taken by the public on how to allocate their savings between bank deposits and securities, and by the decisions of the banking system on whether or not to create new deposits with the purchase or sale of securities. The price of the securities, and thus of the investment goods produced, is given by the match between the demand for securities by the public and the supply of them by the bank system as a whole. Again in this case, a positive difference between the value of the new investment goods (I) and their cost of production (I') means extra profits for the producers of investment goods, or losses should the difference prove negative.

The equilibrium condition of the overall system (i.e. when the extra profits in both sectors are zero) is given by the equality of the value of investment to saving. Thus, we have:
\[ Q_1 = I - S \]
\[ Q_2 = I - I' \]
\[ Q = Q_1 + Q_2 = I - S \]

where \( Q_1 \) = extra-profits in the consumption goods sector; \( Q_2 \) = extra-profits in the investment goods sector.

Total profits (\( Q \)) are the equilibrating mechanism, whose effects on the system depend on how profits are spent. In the 'widow's cruse' example (Keynes 1930: 125), if entrepreneurs spend their extra-profits on consumption goods, the positive gap between the cost of investment goods and saving widens: the price of consumption continues to increase, and so do profits. (The opposite applies in the case of losses.)

The 'Fundamental Equations' apparatus was the object of criticism from the outset. Hawtrey, Robertson, Pigou and Kahn objected to some of Keynes' definitions and conclusions. In particular, one issue dominated, namely the asserted 'independence' of the forces underlying determination of the two price levels. This issue was linked to two points which, according to Joan Robinson's later recollection, came to the fore during the "Circus": the 'widow's cruse fallacy' and 'the-buckets-in-the-well fallacy'. The exposure of the widow's cruse fallacy was that an increase in the expenditure on consumption goods, in particular when there is unemployment, is likely to increase output rather than prices. The buckets-in-the-well fallacy - (Keynes 1973a: 223) - was the criticism of the contention made by Robertson according to which, as saving increases, more money would be channelled into the Stock Exchange via an increase in the demand for securities. If, then, there is an excess of saving over investment, the price level of consumption goods declines and the price of investment goods rises, moving therefore in the opposite direction, the two prices behaving, as it were, like 'buckets-in-a-well'. The argument of the Treatise implied, on the contrary, that the movements of the two price levels was usually in the same direction, but in general they were independent.

In early April 1931, in one of his many attempts that year, Kahn sought to persuade Keynes that variations in the price level of consumption goods (\( P \)) and investment goods (\( P' \)) contrary to what Keynes stated in the Treatise (Keynes 1930: 125) are not independent, and that Keynes' statement, therefore, had little ground to stand on in the face of the criticisms raised by Robertson and Pigou.

Kahn argued his case imagining - as he wrote in a letter to Keynes on 17 April 1931 - drawing 'a cordon' (Keynes 1973a: 206) to separate the sector producing consumption goods from the rest of the economy and doing the same for the sector producing investment goods. The value of monetary expenditure channelled into the consumption goods sector is equal to the value of the monetary expenditure channelled into the rest of the economy by the consumption goods sector. Similarly, the value of monetary expenditure going into the investment goods sector equals the value of the monetary expenditure flowing from the investment goods sector into the rest of the economy.

Let us suppose, Kahn continues, that there is a fall in savings equal to \( a \). This means a rise, equal to \( a \), in the monetary expenditure in the consumption goods sector and a corresponding fall in the monetary expenditure in the investment sector. The expenditure on investment goods by the producers of consumption goods increases by \( a \), while the inflow into the investment sector remains unchanged (the extra monetary expenditure coming in from the consumption goods sector exactly offsets the initial fall in saving). In principle, there is no reason why the price of investment goods should change. However, if the price of the investment goods were to increase, the expenditure on consumption goods would further increase by a corresponding amount (say \( b \)), so that total expenditure on consumption goods would increase by \( a + b \). Given that an increase (or decrease) in the expenditure by one sector always implies an increase (or decrease) in the demand for the goods produced in the other sector, the two price levels are always connected. Thus, Kahn concluded: 'It is quite possible for one price level or the other to remain unchanged, but not for both' (Keynes 1973a: 207). In other words, given the price level of one sector, the price level of the other sector was also determined.

Kahn's argument here was the logical consequence of the reasoning underlying the multiplier principle, where the focus is not on how profits are spent, but how expenditure in one sector affects expenditure in the other sector.

Sraffa's paper of 15 April 1931 was conceived as a criticism of an earlier note by Kahn of 5 April 1931 (Keynes 1973a: 203-6), in which Kahn exposed the fallacy of the independence of the two price levels by adhering more closely to the terminology of the Treatise, rather than that of the multiplier article. Sraffa's paper provides us with his criticism of both the 'widow's cruse' and the asserted independence between the price of investment goods and consumption goods, which unlike Kahn's argument, is based on consideration of production.

As we saw in the Treatise, the profits in the consumption sector, \( Q_1 \), arise when there is an excess of expenditure over costs, meaning that more consumption goods are demanded than produced. This implies that fewer investment goods are demanded than have been produced, giving rise to an amount of losses (for the producers of those goods) equal (but of opposite sign) to the profits made by the entrepreneurs in the consumption goods sector. Thus, entrepreneurs in the investment sector, to make up for the losses - measured by the (negative) difference between the value of the new investment goods and current savings - can either sell securities or reduce their bank deposits. Keynes writes: 'The bank deposits thus released and the securities thus sold are available from, and are exactly equal to, the excess of current savings over the value of new investment' (Keynes 1930: 203-4).
Unlike the *Treatise*, the 'mainspring of change' (Keynes 1930:126) was expected rather than realised profits. In fact, in the fragment of what, according to Moggridge was probably Chapter 6 of the first 1938 table of contents, the level of employment is made dependent on prospective rather than actual magnitude:

... we are basing our conclusions about employment on the proper criterion, namely whether it is expected to pay a firm in possession of capital equipment to spend money on incurring variable costs; i.e. whether the result of spending money on employment and of selling the output is expected to result in a larger net sum of money at the end of the accounting period than if the money had been retained.'

(Keynes 1973a: 66)

By 1932 the direction of Cambridge economics as far as its most important development is concerned had taken a turn in which the Marshallian apparatus was adapted rather than discarded. Unlike the *Treatise*, the *General Theory* gave a prominent place to aggregate demand and aggregate supply, although the implications of Keynes' theory were dramatically opposed to the vision of the economic system inherited from Marshall.

Concluding remarks

The new evidence coming from the Archives gives further support to our perception that Sraffa was deeply influential in the debates with the younger and older generation of Cambridge economists. In this chapter I have argued that, although he was praised and relied upon, the impact of his criticism of the Marshallian theory and of his attempts to gain acceptance for an alternative approach were surprisingly ineffectual. Rather, his suggestions gave rise to developments which took a direction quite different from the approach which inspired them. Sraffa remained an isolated intellectual figure, feared and admired, rather than actually understood. This is perhaps another example – it is tempting to conclude – of the impossibility of 'penetrating' the insularity of an established body of economic doctrine.

Notes

1 Earlier versions of this paper were presented at the Conference on 'Sraffa and Modern Economics', Rome, October 1998 and at the session 'Sraffa's Centenary', ASSA Conference, New York, January 1999. I wish to thank my discussants M. Dardi and D.A. Moggridge, without implicating them, for helpful comments and suggestions. I am grateful to the Provost and Fellows of King's College, Cambridge, for permission to quote from unpublished letters by J.M. Keynes and J.V. Robinson, and P.A. Garegnani for permission to quote from unpublished manuscripts by P. Sraffa.

2 References are given as JMK, RFK, JVR, respectively, according to the classification in their respective catalogues, King's College, Modern Archives, Cambridge.
For Sraffa papers (SP) references are given according to the classification in the catalogue in Trinity College Library, Cambridge; for Austin Robinson papers (EAGR), since the catalogue is not yet available, references are given to the box where the document is kept in Marshall Library, Cambridge.

Letter to Austin Robinson of 28 September, 1931 (EAGR, box 9).

In Michaelmas Term 1931 Joan Robinson gave her first course of lectures on 'Pure Theory of Monopoly'.

Garegnani locates in the winter 1927–8: 'an initial (and decisive) turning point . . . which led to examination of the classical economists with consequent abandonment of the Marshallian interpretation of them that had been behind the articles of 1925–26' (Garegnani 1998a: 152). Also De Vivo (1998: 6) argues that 'while preparing his Lectures he must have (re)-read Marx and the Classical economists'.

However, in the letter sent by Sraffa to Keynes on 6 June 1926, he again referred to constant costs as 'Ricardo's assumption' (Roncaglia 1978: 12).

'I owe in fact far more to Piero's lectures and private conversations than I owe to any of Gerald [Shove] outside his published works', letter of 7 April 1933 (RFK 15/90/1). We have also E.A.G. Robinson's account (Robinson 1994: 7): 'Joan had got to know R.F. Kahn as a fellow participant in Piero's Sraffa's very unorthodox lecture course.'

We have the notes taken by Kahn and his essays written for the course (RFK/3/3/359–384) and the answers given by Sraffa to a question raised by Kahn in one of the lectures (SP D 2/4 13 (2)).

In the 1929 preface to the dissertation, Kahn wrote that 'Chapter 7 [Imperfection of the Market] derives its inspiration from an article by Professor Sraffa' (Kahn 1989: viii); the point is reiterated in the 1989 preface (Kahn 1989: xv).

The same argument was reiterated in the Lecture Notes.

Sraffa, however, adds: 'In itself, this case is of no importance, because it is extremely unlikely that such uniformity would actually be found; but it is representative of a tendency, which prevails even in actual cases where the conditions of the various undertakings differ among each other, whereby the cumulative action of slight obstacles to competition produces on prices effects which approximate to those of monopoly' (Sraffa 1926a: 549).

If \( y = f_1(x) \), \( y = f_2(x) \) be the equations to the demand and supply curves respectively, the amount of production which affords the maximum monopoly revenue is found by making \( (xf_1(x) - xf_2(x)) \) a maximum; that is, it is the roots of the equation \( \frac{d}{dx} (xf_1(x) - xf_2(x)) = 0 \) (Marshall 1961 [1890]: 704).

The Political Economy Club met on alternate Mondays during term time. It was started in 1912 and lasted until 1927, when Keynes became ill. In October 1927 R.F. Kahn became a member and later Secretary. Meetings started at 8.30. There was a large kettle and cakes. A bowl was handed out from which numbers had to be drawn. People were expected to rise and talk according to the number drawn (from conversation with Kahn, autumn 1986). The Club was revived after the war and continued to meet until the 1980s (I am grateful to D. Moggridge for pointing this out to me).

In the 1929 preface, Kahn wrote: 'It is difficult . . . to make sufficient acknowledgement of the advantage that I have derived through having been taught by Mr Shove. Much of what I now believe to be my own must in reality belong to him' (Kahn 1989: ix).

Joan Robinson started writing the 'nightmare' – as she nicknamed The Economics of Imperfect Competition – probably in the summer 1930, in close consultation with Kahn. However, she read Kahn's dissertation only in January 1933, when her book was at proof stage (Marcuzzo 1996).