4. At the origin of imperfect competition: different views?

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Sraffa's article in the December issue of the Economic Journal of 1926 (Sraffa, 1926) paved the way for development of the theory of imperfect competition in Cambridge, England, in the 1930s. Although Sraffa's article was referred to as the source and the inspiration of both Kahn's The Economics of the Short Period and Robinson's The Economics of Imperfect Competition, the ideas presented in these works can hardly be regarded as genuine developments of Sraffa's arguments.

In this chapter I will argue that the contributions by R.F. Kahn and J. Robinson differ from Sraffa's in the reasons given for abandoning perfect competition and, consequently, in the role assigned to imperfect competition. After summarizing Sraffa's argument (section 2) I shall discuss Kahn's peculiar measure of the imperfection of the market (section 3) and Robinson's approach to cost curves (section 4). My conclusion is that in its early stage, the theory of imperfect competition reflected different views on what should be accepted or discarded in the received doctrine. While Sraffa was inclined to dispose of the entire Marshallian apparatus, Kahn and Robinson came to rescue it (section 5).

Kahn introduced market imperfection to account for an observed fact, that firms worked below capacity. His approach consisted in investigating the shape of the actual cost curves faced by the firms in the short period. According to Kahn, the usefulness of the device of the short period is based 'on the fact that the life of fixed capital is considerably greater than the period of production. . . . It cannot be too strongly emphasized that this is a fact, which could not be deducted by a priori reasoning'. (Kahn, 1989, p. xiii).

Joan Robinson introduced market imperfections to prove the generality and validity of the partial equilibrium approach based on the theory of monopoly which had been adapted to this purpose by employing the marginal technique. In so doing she discarded the analysis based on the actual costs incurred by an observed firm in favour of the analysis of possible configurations of supply and demand curves.

It was her view – derived from 'a purely a priori set of assumptions' (Robinson, 1979, p. 114) – which proved successful and became the 'accepted' view.
II

The reasons Sraffa gave for abandoning the hypothesis of perfect competition were twofold. First, he held that the theory in which that hypothesis was embedded was logically inconsistent; second, that the behavioural descriptions implied in the hypothesis of perfect competition were at variance with the known facts.

The particular theory under attack was of course the Marshallian–Pigouvian representation of the working of individual markets. Drawing on his previous article, published in Italian, Sraffa showed that many of the assumptions upon which the theory rested were ill founded. (Sraffa, 1925).

The assumption that long period costs for the firm are increasing when conditions of perfect competition hold was the result of attributing to a single firm what was attributable, under particular circumstances, only to an industry. Since each firm is too small to have an appreciable influence on the price of its factors, the result of an increasing marginal cost for the firm can be obtained only by assuming that the number of firms is fixed within each industry and that each firm, as it expands production, experiences a decrease in productivity by the factor which is constant for the industry (Sraffa, 1925, p. 301). But this can be justified only for an industry that happens to be the only employer of a factor that cannot be augmented. Furthermore, the assumption that the number of firms within a given industry is fixed violates one of the postulates of perfect competition, that is, open entry and exit of firms from any industry.

The assumption of decreasing average costs is also shown to be inconsistent with the theory of perfect competition. If it is admitted that there is a firm whose costs per unit of output decrease when production increases, what prevents that firm from expanding production indefinitely and becoming a monopolistic producer in that market?

The assumption that firms operate with constant costs creates a further difficulty for the theory of perfect competition in the Marshallian–Pigou tradition, which assumes that the firm faces a perfectly horizontal demand curve. Thus, given constant costs, either the equilibrium is undetermined or, if it is postulated that firms always produce as much as possible, the possibility of one single firm monopolizing the market cannot be ruled out.

The lack of realism in the assumption of perfect competition is revealed by the common knowledge that producers are not usually constrained by costs — which are normally diminishing for the producers of manufactured consumer's goods — but by demand. However, the theory of perfect competition assumes that while firms can sell any quantity whatsoever at the given market price, they are unable to lower prices or to increase marketing expense in order to increase their market share. Unfortunately, quite the opposite behaviour is observed in most markets.

In Sraffa, abandonment of the hypothesis of perfect competition means abandoning a particular theory, i.e. a theory that sees competition as a situation where the expansion of firms is halted by rising costs. While the producer cannot have any influence on price, the consumer is indifferent among the products of any given industry. The assumption of a perfectly elastic demand curve encapsulates the idea that products are homogeneous and therefore that there is perfect substitution or indifference in consumption.

Assumption of variable costs is necessary to the theory of perfect competition in the Marshall–Pigou tradition for reasons imposed by the particular price theory adopted, but it is not required by the theory of competition in the classical tradition.

In the Marshall–Pigou apparatus costs are made dependent on the quantity produced in order to exhibit the fundamental symmetry of demand and supply curves in the determination of relative prices. The theory is based on the symmetry between the forces of supply and demand holds on the condition that the law of variations in costs, as output varies, has the same degree of generality as the law of variation of demand price, in relation to the quantity demanded (Sraffa, 1925, p. 317). If costs were not made dependent on the quantity produced, there could be no symmetry and commodity price would be dependent on the expenses incurred in production while demand would influence only the quantity produced, as the classical economists had it.

Sraffa's point was that the assumption of constant costs was the correct hypothesis to derive a general theory of competition, that is, a first approximation to reality, which needed to be supplemented with the analysis of the actual mechanism of price formation by firms. This explains why Sraffa favoured the approach based on constant costs, since:

it does not lead us astray when we desire to study in greater detail the conditions under which the exchange takes place in particular cases, for it does not conceal from us the fact that we cannot find the elements required for this purpose within the limits of its assumptions. (Sraffa, 1926, p. 541)

For Sraffa the adoption of the hypothesis of imperfect competition is only one of the three potential alternative routes for the elaboration of the theory of prices', the other two being 'first, to attribute general importance to the case of constant returns; second, the recognition of the general interrelations among the costs of production of various industries and the analysis of these interrelations by means of a system of general equilibrium' (Roncaglia, 1978, p. 12).

On one hand, adopting the hypothesis that competition is imperfect seems to serve the purpose of illustrating a paradox. Far from being restricted to very special circumstances, the hypothesis that — within the Marshall–Pigou
apparatus—firms can be regarded as single monopolies, functioned better than perfect competition, in accounting for the evidence, that is, that the expansion of firms is halted not by rising costs but by the limitation of the market. On the other hand, the idea of competition, conceived in the context of a different theory, could still be retained as a "first approximation". This point became clear only much later, in the writing of Production of Commodities by Means of Commodities. (See Panico, 1991). Only then did Sraffa succeed in providing a satisfactory analysis of simultaneous determination of all prices, showing that the assumption of constant returns could be dispensed with in a different theory of competition. 5

III

In the first major contribution to the theory of imperfect competition in the Cambridge tradition,7 The Economics of the Short Period by R.F. Kahn, the reason given for abandoning perfect competition is that the Marshallian—Pigouvian apparatus could not account for an observed fact; that firms could earn a positive profit while working below capacity. In competitive conditions, when price is greater than average cost firms are supposed to produce up to capacity output; if price falls below average cost, they should close down. However, the observed behaviour of firms during the Depression was that, when demand fell, firms stayed in business by working below capacity.

The short period is a situation in which plants and machinery are assumed to remain unchanged. It is characterized by two types of costs: quasi-fixed costs, which remain unchanged irrespective of the level of output, and prime costs, which respond to changes in output.

Kahn’s approach is to investigate the shape of the firm’s prime cost curves by looking into the technical method with which output can, in practice, be varied in the short period. In the face of a fall in demand, and on the assumption that the effective length of the working day is given, the firm has to decide ‘whether to work part of the machinery every day or all of the machinery some days’ (Kahn, 1989, p. 46).

The answer is given by the shape of the average cost curve under the two methods. The crucial factors are the quasi-fixed element of costs: the expenditure on fuel, lighting, repairs and salaries of foremen and key-men, and the degree of uniformity of machinery. Clearly the quasi-fixed costs are greater when production is carried on every day—which we shall call Method 1—than when the number of days in which work is done is reduced, which we shall call Method 2. However, when production is reduced by reducing the number of machines employed, as in Method 1, the degree of uniformity of machinery plays a major role. If the machinery is equally efficient, the average prime cost decreases continuously until it reaches a minimum at the point of full capacity output. If the machinery is not uniform, and more inefficient machinery is used to increase output, then minimum cost is reached at a lower level of output. The cost curve takes the characteristic U-shaped form, until full capacity output is reached.

With Method 2, the number of days of production is reduced and the fixed costs involved in the periods of idleness are assumed to be constant, whatever the length of the period of stoppage. Since the difference between the total cost of a full working day and the fixed cost per day—which is called the prime cost per day—is independent of the length of the period over which production is daily carried on, it follows that, for any given level of daily output, the average prime cost (the ratio of the prime cost per day and the daily output) is independent of output. Therefore, under the assumption that the machinery is equally efficient, marginal prime cost is equal to constant average cost until full capacity is reached. In Figure 4.1 the two methods are compared.

\[
\begin{align*}
\text{Average prime cost} & \\
\text{Output} & \\
\text{Method 1} & \\
\text{Method 2} & \\
\end{align*}
\]

Figure 4.1 Comparison of two methods of varying output

At X, the point of full capacity output, all machines are used each working day. Up to Y, where the two curves cross, costs are lower with Method 2 than with Method 1, because working fewer days entails lower quasi-fixed costs.

In the range from Y to X, working every day with a reduced number of machines is more economical than reducing the days in which production is carried on, assuming that the machinery is not uniform. The greater the importance of quasi-fixed cost and the more uniform the machinery, the higher will be the level of output at which the two curves cross and, consequently, the wider the range for which Method 2 is more economical.

Indeed, Kahn produced evidence which showed that the most common method of reducing output in the cotton industry and in coal mining was ‘to close down the whole plant on some days and to work the whole plant a full shift on other days.’ (Kahn, 1989, p. 57).
The shape of the marginal cost curve – a reversed L – and the evidence of short time working in the cotton and coal industries during the Depression, are a serious challenge to the theory of perfect competition. When faced by a perfectly elastic demand curve, a constant marginal cost curve loses its significance as the determinant of output. Whenever the price exceeds the average cost curve, firms are supposed to be producing at the full capacity level of output. But if this were so, the only firms that worked below capacity would be the inefficient ones whose prime cost exceeded price, and this goes against the evidence. Therefore the conclusion is that ‘the existence of short-time must often be incompatible with a state of perfect competition’ (Kahn, 1989, p. 83).

The obvious step is then to introduce the assumption of an imperfect market. The main difference with a perfect market is that output is no longer determined by the equality of price and marginal cost. As in monopoly, ‘the product of output and the difference between price and average prime cost [is] a maximum’ (Kahn, 1989, p. 86). Kahn applies here the standard definition of ‘maximum monopoly net revenue’ provided by Marshall (1961, p. 397), but he also offers an ingenious method for measuring market imperfection.

Assuming a linear demand curve and a perfectly horizontal prime cost curve until full capacity output is reached, Kahn starts his analysis by proving the following equation

\[(p - r)/x = \tan \theta\]

where \(r\) is the average prime cost, \(x\) the maximizing profit level of output, \(p\) the corresponding price and \(\tan \theta\) the slope of the individual demand curve. At the equilibrium level of output \(x\) is then equal to the excess of unit price over unit prime cost. This can be expressed as:

\[p - r = f q \quad f \leq 1\]

where \(f (= \frac{x}{q})\) is the ratio if \(x\), to the capacity output, \(x^*\), and

\[q = x^* \tan \theta\]

In Figure 4.2 we have drawn two demand curves with identical slope and an average cost curve shaped as a reversed L. As the demand curve and the cost curve are both straight lines, the maximum net revenue is given at a level of output equal to half of the horizontal cathetus and at a level of price corresponding to a point equal to half the vertical cathetus of the triangle formed by each demand curve with the horizontal segment of the average cost curve. The tangent to the angle formed by the demand curve with the average cost, \(q\), when \(x^*\) is set equal to 1, is termed by Kahn the ‘annihilation coefficient’. In his own words, ‘the function \(q\), which would be equal to the gradient of the individual demand curve if the capacity output were the unit of output, is a measure of the imperfection of the market’ (Kahn, 1989, p. 121). The reason for this name is that, for a linear demand curve, \(q\) is the increase in price necessary to reduce output by an amount equal to capacity output. In fact, a useful graphic interpretation of \(q\) is that it is equal to the ‘vertical distance between the points at which the individual demand curve cuts the y axis and the ordinate at the position of capacity output (Kahn, 1989, p. 121n).

When demand is equal to \(D'\), \(p - p' = q\) and \(f = f' = 1\), that is, the equilibrium level of output is full capacity. In this case the difference between the profit maximizing level of price, \(p'\), and the average cost, \(r\), is equal to \(q\), given that \(p - p' = p - r\). When demand drops to \(D''\), \(p'' = r = q\), the maximizing net revenue level of output falls to \(x''\), i.e. to \(f'' = (1/1)\) of capacity output and \(p'\) falls of \((1-f'')q\). In this case the difference between the profit maximizing level of price, \(p''\), and the average cost, \(r\), is less than \(p'' - r = q\). A proportionality is therefore maintained between \(f\), the degree of utilization of the plant, and the difference between price and cost, which is given by \(q\): ‘Imperfection of the market is now playing the role for which it was cast. It provides an explanation of the apparent paradox that firms work short time although they are making a prime profit.’ (Kahn, 1989, pp. 122–3).

For a linear demand curve, when \(x^*\) is set equal to 1, \(q\) is equal to its slope. So the flatter the demand curve is, ceteris paribus, the lower the degree of
market imperfection will be. When the demand curve is perfectly horizontal, \( q = 0 \) and the market is said to be perfect.

It must be noted that Kahn reached his results along a route that did not take in the tool of marginal revenue – a concept that had yet to see the light of day when he was engaged on his fellowship dissertation. Formally the results are equivalent, but above and beyond the interest of historical accuracy, the importance of stressing this element lies in the fact that Kahn’s analysis requires special assumptions, that is to say, linear demand curves and linear average cost curves. Moreover Kahn’s analysis was meant to be applicable to particular circumstances, an exceptionally low level of demand, which would induce firms to reduce the level of plant utilization, thus finding themselves on the horizontal segment of their marginal costs curve.

However, the ‘view’ expressed in the dissertation was not successful. Keynes followed an alternative route to explain the persistence of underutilization of resources in the short period that did not require imperfect competition, and remained unconvinced of its importance; while Joan Robinson although she wrote the *Economics of Imperfect Competition* under the close scrutiny of Kahn – adopted a completely different ‘view’.

IV

Joan Robinson did not invent the marginal revenue curve nor christen it, but she was responsible for its extensive use. The novelty of the approach taken by Joan Robinson in *The Economics of Imperfect Competition* was the extension of the rule of marginal revenue = marginal cost to all market forms.

The purpose of the analysis contained in *The Economics of Imperfect Competition* is to apply the technique based on individual decisions as they are incorporated in the supply and demand curves of commodities and factors of production. The starting point is Sraffa’s proposal ‘to rewrite the theory of value, starting from the conception of the firm as a monopolist’ (Robinson, 1969, p. 6), but with the aim of extending the marginal technique to market forms other than perfect competition. By doing so it is possible to unify the analysis of monopoly and perfect competition according to a single principle.

The supply side of value theory became firmly based on the profit-maximizing equilibrium of the individual producer. The demand side of value theory allowed for substitution and preferences on the part of consumers. Perfect competition becomes a special case in a general theory of competition allowing for different values of the elasticity of demand. As she remarked in the final chapter of her book:

It is customary, in setting out the principles of economic theory, to open with the analysis of a perfectly competitive world, and to treat monopoly as a special case.

It has been the purpose of the foregoing argument to show that this process can with advantage be reversed and that it is more proper to set out the analysis of monopoly, treating competition as a special case. (Robinson, 1969, p. 307)

Joan Robinson’s book, *The Economics of Imperfect Competition* is built upon a general relation between average value, marginal value and elasticity of the average value. If \( e \) is the elasticity of the average value, \( A \) the average value, \( M \) the marginal value, then:

\[
e = \frac{A}{A - M}; \quad M = A \left(\frac{e-1}{e}\right); \quad A = M + \frac{e}{(e-1)}
\]

The above set of relationships (See Robinson, 1969, p. 36) can be applied both to the average and marginal revenue curve and to the average and marginal cost curve. For the revenue curve, there are two points to note. First, it is only with a down-sloping demand curve that the marginal revenue becomes a distinct curve. Second, with a down-sloping demand curve any assumption about the shape of the marginal cost curve provides for the determinacy of equilibrium.

For the purpose of the condition of maximum profit, i.e. \( MR = MC \) equality, it makes no difference whether marginal costs are constant, rising or falling, provided that the MR revenue curve is downward sloping. The generality of the statement that, both in competition and monopoly, production will be carried up to the point where marginal cost is equal to marginal revenue lies in the fact that it can equally accommodate constant, decreasing, and increasing costs.

There are three logical situations to consider the determination of equilibrium: (i) the short period, when the productive equipment of the firm is fixed, and some costs do not vary with output; (ii) the quasi-long period, when the productive equipment is adapted to changes in output, 'and all costs except the minimum reward of the entrepreneur may vary with output' (Robinson, 1969, p. 47); (iii) the long period, when the number of firms vary. However, from the point of view of the existing firms within a given industry, the quasi-long period and the long period are equivalent. In the short period, the marginal cost is constant, because prime costs do not vary with output; the average cost curve is decreasing, because of the fixed element of cost, and lies above the marginal cost curve.

The characteristic of the long period is that profits are normal, that is, there are no incentives for the number of firms to change. Since each firm is earning normal profits when price equals average cost, and the condition of maximum profit is given by marginal revenue = marginal cost, full equilibrium requires the demand curve to be tangential to the average costs (Robinson, 1969, p. 94).
Under perfect competition, full equilibrium can only be obtained when marginal cost is equal to average cost. Since marginal revenue is equal to price, the ‘double condition’ for equilibrium becomes MC = P and AC = P, i.e., MC = AC. Marginal and average cost are equal at the minimum point on the average cost curve; therefore only in perfect competition is each firm at the optimum size. The following passage summarizes the argument:

Now if average costs are continually falling, as the firm expands, and never reach a minimum point, marginal cost will always lie below average cost. Marginal costs may be rising (over a certain range of outputs) or may be falling. If marginal costs are rising it will be possible for the firm to reach equilibrium, where price is equal to marginal cost. But price will be less than average cost, profits will be less than normal, and the industry will not be in equilibrium. And if marginal costs are falling the firm will continue to expand. The expansion of one firm (or the growth of the firm by amalgamation with others) will reduce the number of firms until competition ceases to be perfect. Thus, under perfect competition, marginal and average cost must be equal in equilibrium, and average cost must be at a minimum, simply because, if this condition is not fulfilled, competition is not perfect. (Robinson, 1969, p. 96)

Under monopoly, since average cost is falling and the demand curve is downward sloping, the tangency solution implies that the equilibrium level of output is to the left of the point of minimum average cost and therefore less than full capacity.

Joan Robinson’s discussion of equilibrium conditions shows a change of perspective in the notion of costs. Far from representing the actual costs incurred by an observed firm, the cost curves necessary to the construction of the supply curve of a commodity or of a factor of production, reflect the assumptions of the particular theory embraced.

The shape of the supply curve of a factor of production is said to reflect the degree of homogeneity and heterogeneity of a factor. Land, labour, capital and entrepreneurship can be heterogeneous from the point of view of the industry for which the supply curve is drawn and homogeneous from the point of view of other industries. Heterogeneity of the factor from the point of view of the industry is not a sufficient condition for the supply curve of a factor to be rising, since if the factor is homogeneous from the point of view of other industries – if it has the same efficiency in other industries – it will have an elastic supply.

However, homogeneity of the factor from the point of view of the industry, but heterogeneity from the point of view of other industries, implies a rising supply curve. Furthermore, if a factor is heterogeneous both from the point of view of the industry for which we are drawing the supply curve and from the point of view of other industries, the supply curve of the factor will be rising.

So when a factor is in imperfectly elastic supply to an industry, it means that it is ‘scarce’ from the point of view of that industry. A scarce factor is a factor which earns rent, and rent is the difference between the earnings actually received by a certain factor and its transfer price to other industries. (Robinson, 1969, p. 110).

It follows that if a factor is in perfectly elastic supply, it means that it is homogeneous and that it will not earn rent. If a factor is not homogeneous, it means that it is scarce, therefore there is rent and its supply curve will be rising.

Besides the heterogeneity of a factor, from the point of view of either one industry or the other industries or both, the shape of the supply curve of a factor of production also depends on the elasticity of substitution among various factors, i.e., on the technical possibility of substituting factors for each other, which expresses the possibility of economizing in the use of the scarce factor as its cost rises (Robinson, 1969, p. 123):

When the scarce factors are not homogeneous, so that there is rent, their cost will rise, as more is employed, both because the efficiency of a marginal unit, relatively to its price, is reduced as more of the factor is employed, and because the transfer cost of intramarginal units is raised. (Robinson, 1969, pp. 142-3)

Thus the shape of the supply curve of a factor, and therefore the supply curve for a commodity, depends both on the degree of heterogeneity and indivisibility of the ‘factors’ of production and on the degree of their substitutability in the production process. The theoretical framework can accommodate any possible world and by enlarging its scope it gains generality.

V
Kahn took seriously Sraffa’s charge that the theory of perfect competition lacked realism. He showed that demand sets limits to the expansion of the firms, since, in the short period and for low levels of demand, the relevant range of the marginal cost curve is horizontal. However, it was the theory of effective demand – which Kahn contributed to with his analysis of the short period and of the multiplier – which gave true general validity to this proposition. Joan Robinson tried to by-pass the inconsistencies of perfect competition, by extending the condition of MC = MR to all market conditions, i.e., perfect and imperfect competition. In so doing, however, she blurred the distinction between two different approaches to the theory of competition which was implied or, rather, adumbrated in Sraffa’s articles. Furthermore, while Kahn was concerned with the short period, Robinson followed Sraffa through the intricacies of the long period and looked into the theoretical – as opposed to actually observed – cost curves of the firms and the supply curves.
of commodities and factors of production. So one is tempted to agree with
Loasby that 'Joan Robinson's first book gave a powerful impulse towards
the development of formalism which has been so characteristic of the last fifty
years, and which she came to regard with such dismay' (Loasby, 1991, p. 41).

The point is that with Joan Robinson imperfect competition lost its para-
doxal nature, i.e. that of showing the 'impossibility' of perfect competition
in the conditions postulated by the Marshall–Pigou apparatus. Rather than
changing the apparatus or looking for the actual conditions in which firms
operate, she successfully sought out the new conditions in which the
Marshallian theory of value could be made consistent. A central piece of
this strategy was acceptance of the technique of marginal analysis and its under-
lying assumption:

It is the assumption that any individual, in his economic life, will never undertake
an action that adds more to his losses than to his gains, and will always undertake
an action which adds more to his gains than to his losses, which makes the
analysis of value possible. And it is this assumption that underlies the device of
drawing marginal curves. (Robinson, 1969, p. 6)

The Economics of Imperfect Competition was a response to Sraffa's chal-
lenge, although – as Kaldor noted – the book gave the impression that the
points raised were not addressed. The challenge was to construct tools that
did not break down when confronted with facts.

In the meanwhile, the theory of effective demand provided the alternative
explanation – more promising and exciting than imperfect competition – of
the malfunctioning displayed by free competition. Her collaboration with
Kahn, which had started with work on her book, was cemented with their
common involvement in the Keynesian revolution. She came to consider her
first book 'a blind alley' (Robinson, 1979, p. x) and rehabilitation of imper-
fect competition was confined to its connection with the theory of effective
demand. In fact, it was Kalecki's 'view' – once again centered on observed
rather than imagined costs curves – that she ended up by praising.

Notes
1. I wish to thank the participants to the History of Economics Society Annual Meeting,
George Mason University, to the Seminar of the National Research Council Group on
'Economic theory and Realism of Hypotheses', Università di Venezia and to William
Darby Jr., Gary Mongiovi and Fernando Viastello for helpful comments. I am grateful to
Annalisa Rosselli for her help in improving the paper in many respects.
2. The English translation of the 1925 article has not yet been published. For a summary and
a comparison with the 1926 article, see Maneschi, 1986.
3. Whitaker (1989, p. 169) pointed out that while, according to Marshall, 'competition is
defined broadly, resting fundamentally on the openness of markets', for Pigou it was
identified with atomistic price-taking behaviour.

4. Sraffa's point was not that in real life constant costs prevail. This is also confirmed by
the following passage contained in the letter sent by Sraffa to Keynes on June 6, 1926, a few
months before the publication of the 1926 article: 'although I believe that Ricardo's
assumption is the best available for a simple theory of competition (viz. a first approxima-
tion), of course in reality the connection between cost and quantity produced is obvious. I
simply cannot be considered by means of the system of particular equilibria for single
5. In the Preface to his book, Sraffa wrote, 'Anyone accustomed to think in terms of the
equilibrium of demand and supply may be inclined, on reading these pages, to suppose
that the argument rests on a tacit assumption of constant returns in all industries. If 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. ... 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 led him in 1923 into an
attempt to argue that only the case of constant returns was generally consistent with
the premises of economic theory' (Sraffa, 1960, pp. v–vi).
6. This section is mainly derived from Marcuzzo, 1994.
7. The 'Cambridge tradition' is taken here as the development of ideas stemming from the
works of Marshall and Pigou. No attempt is made to compare it with the theory of
imperfect competition in the Young–Chamberlin tradition. The reader is referred to O'Brien,
1983.
8. Cost conditions under a monopoly are represented by Marshall with a downward-sloping
supply curve. With a downward-sloping demand curve, the maximum revenue corre-
sponds to the point at which the difference between the two curves times output is a
maximum.
9. 'If the demand curve is assumed to be linear, this equation i.e. $\frac{p}{q} = \frac{r}{u}$ can be rewritten
$p - q = \frac{p}{u} = \frac{r}{u} = \frac{p}{n} = \frac{r}{n}$, where $n$ stands for capacity output] which can be readily
recognized as equating marginal revenue to marginal cost ...' (Maneschi, 1988, p. 162).
See also Newman, 1986, p. 116, who also points out that Kahn did not use marginal
revenue.
10. In 1941, in defence of Kalecki, Joan Robinson wrote to Keynes: 'I must protest at your
calling Imperfect Competition an esoteric doctrine. It may be awful rot – as you have
always suspected – but for better or worse it is in all the textbooks now.' (See Keynes,
11. Harrod is probably right when he claims he was the first to present the concept of MR, in
print, albeit under a different name, in his article Notes on supply (Harrod, 1930, p. 239).
As he explained in a letter to Joan Robinson on 1 July 1933:

As a matter of history it may interest you to know that I devised and wrote an article
about the M.R. curve which I sent to the Journal in the Summer of 1928. Unfortunately
the article contained some other matter with which Maynard didn't agree and he
handed it over to Ramsay to refute. I became ill about that time and didn't bother about
it for a year or so. When I took it up again, I wrote to Ramsey replying to his refutation,
and he replied in a letter which I have got, entirely surrendering and indeed provides a
rather elaborate mathematical demonstration of my points – as these points were points other
than those connected with the M.R. curve. Meanwhile I became dissatisfied with the
article on other grounds and did not press for its publication. I scrapped it; and in 1930
wrote quite a different article but embroidered in it my original construction of the
M.R. curve. (JVR Papers, Correspondence, King's College Archives)

Permission from Dominic Harrod to quote from this unpublished letter is gratefully
acknowledged.
12. Apparently the name was given by Austin Robinson. According to his recollections, he
was supervising a young undergraduate mathematician who had turned to economics.
Charles Gifford, who had produced early in 1930, what 'we subsequently called a mar-
ginal revenue curve on a day that Richard Kahn was lunching with us' (Robinson, 1977a,
Method, competition, conflict and measurement

p. 27). In Austin Robinson’s opinion, imperfect competition ‘started as a joint game’ between Joan and Richard Kahn’ (Robinson, 1977b, p. 80).

13. Shove’s priority in developing the analysis of ‘conditional monopoly’, i.e. the intermediate cases between competition and monopoly, is more difficult to assess. We can rely mainly on the lecture notes taken by John Saltmarch for the 1928–29 academic year of his Economic Theory course. (See in particular, Part II, lectures 5–10, King’s College Archives.) Here, without explicitly using the concept of marginal revenue, Shove defines equilibrium as equality between marginal cost and the algebraic sum of the two component parts of the variation in revenue. He states the equilibrium condition as $\Delta c = \Delta d - \Delta p x$, where $x$ = quantity produced; $p$ = price; $c$ = cost. The issue of ‘priority’ between Joan Robinson and G. Shove is documented by the extant letters by Shove in Joan Violet Robinson Papers, Correspondence, King’s College Archives. (Excerpts are published in Turner, 1989, pp. 27–8). On this point see Marcuzzo, 1991.

14. Joan Robinson considered this an advance on Marshall’s approach:

‘It is clear that the marginal method of analysis will produce exactly the same results as the method, used by Marshall, of finding the price at which the area representing ‘marginal net revenue’ is at a maximum, since net revenue is at a maximum when marginal revenue and marginal cost are equal. Both methods can be applied to problems of competition and monopoly. Marshall introduced in his system of analysis an artificial cleavage between monopoly and competition, by treating competitive problems only by the ‘marginal’ method, and monopoly problems only by the ‘areas’ method’. (Robinson, 1969, p. 54a).

15. According to Shackle (1967, p. 11), Joan Robinson ‘abandoned value theory itself in favour of her new invention, the theory of the firm’. Also according to Whakiter (1969, p. 187) Robinson provided ‘a full and unified treatment of profit-maximising equilibrium for a firm facing a fixed market environment’.

16. The algebraic demonstration of the relation between the curves of average and marginal values is given by Harrod (1931, pp. 566–76).

17. As it has been noted ‘nobody had previously wanted the general concept of marginal revenue since they conceived of marginal revenue in the special form of price’ (Shackle, 1967, p. 42).

18. ‘Two portions of a certain factor ... will be counted as consisting of an equal number of efficiency units if they can be substituted for one another without altering physical productivity’ (Robinson, 1969, p. 109).

19. The transfer cost is the price that has to be paid to keep a factor in a particular employment; it resembles the modern concept of opportunity cost (see Robinson, 1969, pp. 105–7).

20. Although she did not read the original Italian article, she must have been familiar with its contents, since she attended Sraffa’s lectures. Whakiter is not right in saying that ‘Sraffa had ceased to lecture by the time the Robinsons returned from India.’ (op. cit. p. 191n.).

21. Also in Lonsby, 1989, p. 79.

22. In the ‘introduction’ she noticed that ‘When Mr. Sraffa declared that the time had come to re-write the theory of value, starting from the conception of the firm as a monopolist, he suggested that the familiar tool, “maximum monopoly net revenue”, was ready to hand and that the job could begin at once. But that tool is at best a clumsy one and it is inappropriate to many of the operations which are required of it. In its place the “marginal” technique must be borrowed from the competitive chapters of the old textbooks, and adapted to new purposes’ (Robinson, 1969, p. 6). The wording of the last sentence was suggested by J.M. Keynes. (See Draft of Book I in JVR papers, King’s College Archives.) Moreover, the first draft of the introduction presented many similarities with the passage of Robinson, 1932 in which she defended the methodology of considering economics as a ‘box of tools’.

23. ‘One almost has the feeling that Mrs. Robinson could have written much the same book if Mr. Sraffa’s path breaking article (to which she acknowledges so much debt) had never been written’ (Kaldor, 1980, p. 55).

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