PIERO SRAFFA

Alessandro Roncaglia

Gerhard Michael Ambrosi
ARTHUR C. PIGOU

J.R. Stanfield
JOHN KENNETH GALBRAITH

Warren Young and Esteban Perez
ROY HARROD

G.C. Harcourt and Prue Kerr
JOAN ROBINSON

Roger Middleton
ROBERT SOLOW

Paul Mosley and Barbara Ingham
SIR ARTHUR LEWIS

Robert Dimand
JAMES TOBIN

Piero Sraffa

Alessandro Roncaglia

Contents

Figures

Introduction

Piero Sraffa is, together with Keynes, probably the greatest economist of the twentieth century, and among the outstanding figures in the European culture of his times. This book sets out to substantiate this assertion, which is far from universally accepted.

In fact, apart from periods (the 1930s and the 1960s–1970s) in which controversy raged around the central nucleus of economic analysis – the theory of the firm and the industry, and the theory of capital and distribution – Sraffa's contributions appear to be a field of interest for specialists only, with no substantive role in present-day economic debate. However, this is an easy way around certain crucial difficulties in the field of economics which have yet to be surmounted. As a matter of fact, mainstream economic theory has neither demonstrated the existence of errors in Sraffa's analysis (as we shall see, there were attempts in this direction, but all failed) nor adjusted to his results, which would have implied a drastic change in the direction of research, with the abandonment of its core, namely the marginalist approach to value and distribution. The mainstream consensus has simply followed a strategy of ignorance and detour, with the result of fragmentation between 'high-brow' analysis, internally consistent but based on unrealistic assumptions and incapable of providing clear-cut results, and hence irrelevant when it comes to dealing with real-world issues, and a host of disjointed 'low-brow' analyses of specific issues, such as those dominating textbook macroeconomics, the theoretical foundations of which are irremediably faulty.

The distinction between 'high-brow' and 'low-brow' analyses was explicitly invoked by Paul Samuelson (1962: 193–4) in answer to the Sraffian critiques of the mainstream economic theory consensus of the post-Second World War decades. If you care for internal consistency, you choose high-brow analyses (that is, pure general equilibrium theory); if you care for practical relevance, you choose the simplified models of low-brow analyses. These, however, are marred by indefensible simplifying assumptions, the role of which is to circumvent issues such as those raised by Sraffa, with recourse, for instance, to one-commodity macro models, or partial equilibrium analysis.

The result is to be seen in the marked fragmentation of present-day economics, with researchers specialised each in a separate sub-field.

With this degree of fragmentation 'normal science' is pursued within each sub-field, paying mere lip-service to the connections between it and the general views of how a market economy works. However, vague hints at the existence of a basic structure (the general equilibrium theory of value and distribution) are not sufficient to establish the required connection, since the general equilibrium structure is by its very nature far too general and abstract to be applied to any specific issue. Indeed, the specific assumptions introduced into the general equilibrium structure in order to adapt it to deal with the specific issues at hand regularly embody elements of the traditional marginalist theory which had come under devastating criticism from Sraffa. Confronted with this situation, it might well be the case to recognise that Sraffa's suggested reconstruction of economics on the basis of a Classical-Keynesian approach provides better foundations for each specific field of economic research.

In order to substantiate the thesis summarised above, we need to consider Sraffa's contributions in some detail. They are part of a grand project, to shunt the car of economic science in a direction opposed to the one followed by the mainstream marginalist/neoclassical/subjective approach. Thus, the project itself needs to be illustrated, together with its background.

Some terminological clarification may be useful here. Any simple bipartition of the theoretical battlefield beclouds the differences within each of the two sides. In the following pages, we obviously focus on the 'Sraffian' variety of the Classical approach, setting out to illustrate its distinctive features. Conversely, the mainstream/marginalist/neoclassical/ subjective approach, which Sraffa opposes, embraces different streams, ranging from the mainstream of the period in which Sraffa's book was published (as represented, for instance, by Samuelson's influential 1948 textbook) to the 'Austrians' explicitly criticised by Sraffa, or to Wicksteed, referred to as 'the purist of marginal theory' (Sraffa 1960: v). The fact is that Sraffa's criticisms apply to all of them, even if occasionally along different roads.

We begin, in Chapter 1, with some background elements, useful but also of no little interest in themselves, briefly illustrating Sraffa's life and early writings. This includes his early views on money and banking, in connection with which he got into touch with Keynes; the political connection with Antonio Gramsci, a leader of the Italian communist party; and the celebrated articles in which he undermined the foundations of the Marshallian theory of the firm. In Chapter 2, 'An Italian in Cambridge', we consider the background to his 1960 book, *Production of Commodities by Means of Commodities*. This means looking into the

Cambridge cultural environment dominated by such personalities as Keynes and Wittgenstein and their relations with Sraffa; the strenuous efforts spent on the critical edition of Ricardo's works and correspondence, aiming at re-proposing the Classical approach in its original characteristics, based on the notions of division of labour and surplus, after long decades of misinterpretations. Chapter 3 considers Sraffa's main contribution, the short book – little more than a pamphlet – with explosive potential but cryptic in its conciseness, *Production of Commodities by Means of Commodities*. Chapters 4 and 5 are then devoted to considering in greater detail some important aspects of Sraffa's analysis: respectively, the distinction between basic and non-basic commodities, and the standard commodity. The critique of marginalist approaches to value and distribution is then considered in Chapter 6. Chapter 7 presents my interpretation of the conceptual framework which constitutes an integral part – indeed, the foundations – of Sraffa's 1960 book, including the important connections with Wittgenstein's and Keynes's thought. Finally, the post-1960 contributions to reconstructing a Classical-Keynesian approach are briefly surveyed in Chapter 8, where the variety of avenues opened to economic research by Sraffa's work is illustrated by means of an artifice, namely distinguishing three 'Sraffian schools'.

I am grateful to Tony Thirlwall and to Palgrave Macmillan for inducing me to reconsider my views on the Sraffian revolution and to try and present them anew in a systematic way. Sraffa once said to a colleague of mine: 'It took me more than thirty years to write this book, obviously you need more than a few months to understand it!' It is now about 40 years since I started studying Sraffa's works, and more than 30 years since I first published on the subject (Roncaglia 1975); this is of course no guarantee in itself of a correct interpretation, but I can say that I have done my best.

In this long period, I accumulated a number of debts. First, to Paolo Sylos Labini, who introduced me to Sraffa's thought (and, with a letter of presentation, to Sraffa himself) shortly after introducing me to economic research as a life activity not estranged from the real world. Second, to Piero Sraffa himself, whom I first met in the summer of 1970 and under whose guidance I studied in 1971–3, discussing with him – then and subsequently – the book I was writing as well as many other issues. For most Italian students in Cambridge at the time he was a familiar friendly figure, interested in our studies and in our lives, eager to discuss Italian politics. He exercised a strong influence on many of us, in different ways – but never by giving us 'the truth', or simply his views on any subject: he preferred to listen to our ideas and discuss them, so

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Early Life and Writings:
The Critique of Marshallian Theory

1.1 The early writings: Money and banking

Piero Sraffa was born in Turin on 5 August 1898. His mother, Irma Tivoli (1873–1949), and father, Angelo Sraffa (1865–1937), both came from Jewish families. His father was a well-known professor of commercial law and – for many years – rector of the Bocconi University in Milan. Piero was their only child, born about a year after their marriage, which took place in Courmayeur on 4 July 1897.

Following his father's career from one university to another, the young Sraffa began primary school in Parma, and continued his education in Milan (1906–13) and Turin (1913–17). In Turin, he attended a secondary school which specialised in classical studies (*liceo classico Massimo d'Azeglio*) and went on to enrol in the Faculty of Law at the University even though his family had moved back to Milan, so his attendance was by no means assiduous; in particular he shunned the lectures of Achille Loria (1857–1943), holder of the chair in political economy, whom Sraffa did not held in great consideration. In fact, he spent the period 1917–20 doing military service, and at the end of the war was assigned to the secretariat of the 'Royal Commission for the Investigation of Violations of Human Rights Committed by the Enemy', which concluded with the seven volumes of reports published between late 1919 and early 1921. He was thus able to take his exams in uniform, a condition which used to gain the favourable attention of the examiners.

In November 1920 he graduated with a thesis on *L'inflazione monetaria in Italia durante e dopo la guerra* (*Monetary Inflation in Italy During and After the War*). The supervisor of the thesis was Luigi Einaudi

(1874–1961), professor of public finance, a liberal senator since 1919 who was to become Budget Minister, Governor of the Bank of Italy and president of the Italian Republic after the Second World War. Sraffa remained on friendly terms with him for the rest of his life. However, the subject of the dissertation seems to have been suggested by Attilio Cabiati (1872–1950), a friend of Sraffa's father, who was professor of economics at Genoa at the time.[1]

The graduate thesis was also his first publication (Sraffa 1920). A sharp rise in prices was associated with expansion in the circulation of money, in line with the dominant tradition of the quantity theory of money. Nevertheless the empirical analysis contained in it distances itself from that theory to consider pragmatically the differentiated trends shown by the various price indexes, their significance being sought in the consequences for the various groups taking part in economic life, and in particular the social classes of workers and entrepreneurs. The point is worth stressing, as it is precisely the non-univocally determined nature of the concept of a general price level (and of its inverse, the purchasing power of money) that underlies Keynes's criticism of the quantity theory of money in the opening chapters of his *Treatise on Money* (Keynes 1930).

This analysis implies that monetary policy can affect income distribution. That point is not stressed or discussed in this work, but it is to be noted here since it would assume a central role in the development of Sraffa's (as well as Keynes's) thought.[2]

The most significant original contribution offered by Sraffa's thesis lies in the distinction between stabilisation of the internal and of the external value of money, or in other words between stabilisation of the average level of domestic prices and stabilisation of the exchange rate. According to traditional gold standard theory the two variables coincide, but in principle, at least, they should be kept separate.

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[1] For fuller details of Sraffa's biography at this stage, cf. Naldi (1998a, 2004); D'Orsi (2001). Among other things, Naldi suggests that Sraffa may have collaborated on the report of the Royal Commission of Investigation, and in particular on the parts concerning economic issues, such as the long section dedicated to the Cassa Veneta dei Prestiti. On Einaudi and Sraffa, cf. also Faucci (1986).

[2] Panico (cf. for instance 2001: 287) attributes to Sraffa in this context a 'conventionalist' standpoint, 'according to which the *level* of economic variables under examination is not determined by natural or material forces […], but can establish itself at any level considered *normal* by the common opinion'. However, at this initial stage of development of Sraffa's thought such a standpoint is still neither explicit nor, possibly, conscious.

The distinction becomes essential both when considering short-period issues and inconvertible paper money systems, and hence was crucial for the economic policy of the time.[3] Moreover, the point is also connected with the development of Keynes's thought: while Keynes made no use of the distinction in *Indian Currency and Finance* (1913), he did bring it into his *Tract on Monetary Reform* (1923), having in the meantime (in August 1921) met Sraffa (who was to edit the Italian edition of the *Tract*).[4]

Sraffa's earliest publications continued to address monetary issues: an article of 1922 on the crisis of the Banca Italiana di Sconto in the *Economic Journal* and one on the bank crisis in Italy – again of 1922 – in the *Manchester Guardian Supplement on Reconstruction in Europe* edited by Keynes. The two articles reveal a thorough command of institutional and technical aspects of banking (probably owing in part to the practical experience the young Sraffa acquired in a provincial bank, the Banca di Legnano e Busto Arsizio, immediately after graduating), coupled with a strikingly well-informed approach and awareness of the interests at stake.[5]

The first of the articles reviews the story of the Banca Italiana di Sconto from its birth at the end of 1914 to bankruptcy in December 1921, illustrating the actual situation of the Italian financial system, with its systemic feeblenesses, collusive practices and frequent

[3] Cf. Roncaglia (1984); Ginzburg (1986); Panico (1988b); De Cecco (1993) and Ciocca and Rinaldi (1997).

[4] Sraffa was introduced to Keynes with a letter that Gaetano Salvemini (1873–1957) obtained for him from Mary Berenson, wife of the famous art critic and a friend to Keynes as well as to Salvemini, the anti-Fascist historian, himself a friend of Sraffa's family. Mary Berenson introduced Sraffa as 'a great friend of the Salveminis […] Professor Salvemini thinks very well of him', Cf. Roncaglia (1983, 1984). Berenson's letter is kept in the Keynes Archives at King's College in Cambridge; it was found by the author when the papers were in the Marshall Library and were being catalogued by Ms. Barbara Lowe.

[5] We should recall that Piero's father was a celebrated commercial lawyer, well acquainted with the Italian business and financial community; an uncle of his was Mariano D'Amelio (1871–1943), who was to become in 1923 the first president of the Supreme Court (Corte di Cassazione) of the Italian Kingdom, and who was also to help Sraffa in his actions in favour of the imprisoned Gramsci. We can therefore take Sraffa's word for it when he illustrates a secret agreement among the main Italian banks to set agreed maximum limits for passive interest rates and minimum limits for active interest rates and commissions (Sraffa 1922a: 179–81); he explicitly writes, referring to the press account of the events, 'This explanation is […] inadequate', going on to refer to unspecified 'competent authorities' for 'the true' explanation (Sraffa 1922a: 182).

resort to subterfuge, if not outright violation, with respect to laws and regulations. Sraffa concluded with some pessimistic remarks on the risks involved in direct relations between banks and enterprises and on the inevitability of such relations given the backwardness of Italy's financial markets, as well as the difficulty of bringing about any change in the situation, due in the first place to the lack of real will on the part of the politicians. New laws were called for 'to prevent the formation of trusts, to protect the independence of banks, to regulate the reserves to be held on banking deposits', although events in other countries showed that legislative reforms are in themselves insufficient to prevent crises. In Italy these risks were aggravated by connections between the fascist government and the financial elite, as Sraffa stressed in a strongly worded final sentence: 'But even if these laws were not futile in themselves, what could be their use as long as the Government is prepared to be the first to break them so soon as it is blackmailed by a band of gunmen or a group of bold financiers?' (Sraffa 1922a: 197).

All these points remain extremely relevant today, often cropping up in the debates on the choice between a specialised banking system (based on separation between short-term credit and medium- and long-term credit, adopted in Italy – and in many other countries – in the face of the difficulties subsequent to the 1929 world crisis) and a universal banking system (re-introduced, 60 years later and after a long debate, with the Italian bank bill of 1993). Sraffa saw both advantages and disadvantages in each of the two settings, universal ('mixed') banking favouring the channelling of funds to industrial investments but increasing the risk of dangerous connections between industrial companies and banks. Sraffa's attack on the role of cross-shareholdings and interlocking directorates foreshadows Berle and Means (1932); his remarks on the perverse connections between top politicians and financiers have also proved to retain enduring relevance on a number of occasions in recent years, such as in the bankruptcies of Michele Sindona's Banca Privata Italiana (1974) and Roberto Calvi's Banco Ambrosiano (1983).

The second article (Sraffa 1922b) highlights the weakness of Italy's three leading commercial banks (Banca Commerciale, Credito Italiano and Banca di Roma), casting serious doubts on the correctness of their official accounts and of the institutional expedient (resorting to a consortium for industrial stock subsidies) adopted to sidestep the law which had set limits on the support that issuing banks could lend to commercial banks.

The first article, published in an academic journal,[6] went unnoticed in Italy. The second article, however, was soon noticed and signalled to Mussolini, who, seriously irritated and possibly worried by the impact the article could have on international financial circles in the presence of impending risks of a banking crisis, telegraphed Angelo Sraffa demanding – to no avail – a public recantation from his son.[7] The Banca Commerciale also threatened to sue him, but then failed to implement the threat. Its chairman, Toeplitz, wrote a letter of protest to Keynes, the editor of the *Manchester Guardian Supplement*, who published it in a subsequent issue (29 March 1923) with a curt rejoinder.

Given these circumstances, Keynes decided to invite the young Italian economist to Cambridge. Sraffa accepted, but was refused entrance to the UK when he landed at Dover in January 1923, possibly because the British authorities had kindly complied with a request to this effect from the Fascist government (which was both Sraffa's and Keynes's interpretation of the event), or possibly because Sraffa had already been labelled as *persona non grata* on account of the relations he had entered into with the British Marxist left on his previous visit in 1921.[8]

Monetary issues were subsequently to re-emerge among Sraffa's interests. He wrote in Piero Gobetti's (1901–26) *Rivoluzione liberale* in 1923 a brief, biting attack against an article published in *Popolo d'Italia* on the exchange rate movements of the lira; two letters on the

[6] As Sraffa later recalled (in a private conversation with the author), some time after their acquaintance in Cambridge in August 1921, Keynes requested of him a short contribution on the Italian banking system for the *Manchester Guardian Supplement* he was editing. The young Sraffa, recently graduated, set out to do his best and wrote the article on the Banca di Sconto, clearly outdoing his assignment. On receiving the paper, Keynes found it unfit for the *Manchester Guardian Supplement*, but it was so good that he decided to publish it in the *Economic Journal* instead. Sraffa's eyes still shone when recalling the incredulous joy with which he received such good news. Thus, while the first paper went to the *Economic Journal*, he proceeded to write a shorter article for the *Manchester Guardian Supplement*.

[7] Sraffa's article was published on 7 December 1922; Mussolini's telegrams were dated 20 and 21 December 1922. The story of Mussolini's telegrams was first presented in Roncaglia (1983a, 1984); Sraffa had related the story to various Italian economists, including Pierangelo Garegnani, Sergio Steve and myself (in 1975 he showed me the text of the telegrams). Their existence was put in doubt by Finoia (1988: 301–2), after some unsuccessful attempt on the part of the highly competent historian Renzo De Felice to locate them in the State Archives; they were subsequently found by Nerio Naldi (1998c) in the archives of the Ministry for Foreign Affairs.

[8] Cf. Naldi (1998a, 1998c).

revaluation of the lira were published by Angelo Tasca (1892–1960) in *Stato operaio* in 1927.[9] In the letters Sraffa criticised the simplistic idea, held at the time by the leaders of the Italian communist party, that the revaluation of the lira was in the interests of the bourgeoisie, as opposed to the working class; against this idea, Sraffa pointed out the contrasting interests of different sectors of the bourgeoisie and of the fascist political leadership. From 1928 to 1930 he held courses in Cambridge on the Italian and German financial systems, along with his more celebrated courses on the theory of value. The 1932 controversy with Hayek, to which we shall return, also had to do with problems of monetary theory.

All in all, Sraffa's early publications show us a 'complete' economist, whose interest in pure theory is tempered by a solid knowledge of institutional details and exemplary analyses of specific real-world issues.

1.2   Friendship with Gramsci[10]

In 1919, at the University of Turin, Sraffa met Antonio Gramsci (1891–1937). They were introduced by Umberto Cosmo (1868–1944), who had been Sraffa's Italian literature teacher at upper secondary school; he also taught courses at the university, with Gramsci as one of his most brilliant students. In 1919 Gramsci founded *L'ordine nuovo* (The new order), and Sraffa contributed some translations from German and three short articles which he sent from London on the occasion of his visit there in 1921. The same year saw the foundation of the Italian Communist Party in Livorno – Gramsci became its secretary in 1924; Sraffa never joined the party, pursuing his independence of views while maintaining a close intellectual relationship with his friend.

An important piece of evidence documenting the two friends' political exchanges is provided by a letter from Sraffa that Gramsci published

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[9] These letters were published anonymously by Tasca, then in exile in Paris. Tasca's own copy of *Stato Operaio*, now kept at the Feltrinelli Foundation in Milan, exhibits a pencilled addition, most probably by Tasca, the letters 'P. S.'; this allowed for identification of their author in 1971. Tasca had requested Sraffa's permission to publish these letters, but Sraffa's positive answer was only sent on 21 December 1927 (the letter is now among the Tasca papers preserved at the Fondazione Feltrinelli in Milan: cf. Potier 1987: 114) and, apparently, Sraffa was then never informed of their publication; at least this is what he told me and others in 1971.

[10] The interpretation here presented was proposed in Roncaglia (1983). Cf. now Fausti (1998); Naldi (1998c, 2000); Vacca (2000).

(unsigned, initialled S.) in the April 1924 issue of *L'ordine nuovo* with his reply (Gramsci and Sraffa 1924). In his letter Sraffa stressed the function played by bourgeois forces of opposition in the struggle against fascism and the importance of democratic institutions for the social and political development of the proletariat. In a scenario dominated by the rise of fascist dictatorship, he found the working class absent from the political scene and trade unions and the communist party incapable of organising political action, so workers had to face their problems as individuals, rather than as organised groups. 'The main issue, taking first place over any other, is one of "freedom" and "order": the others will come later, but for the time being they can be of no interest to workers. Now is the time for the democratic forces of opposition, and I think we must let them act and possibly help them'. (Sraffa 1924b: 4)

Antonio Gramsci's response was flatly negative, in line with the position of Amadeo Bordiga, then secretary of the communist party (where the centralist principle prevailed and no dissent to the official line could be shown). Gramsci rejected Sraffa's suggestions as conducive to the liquidation of the communist party, subject as it would be to the strategy of the bourgeois forces of opposition, and went so far as to accuse his friend of 'having failed so far to get rid of the ideological residues of his liberal–democrat intellectual background, namely normative and Kantian, not Marxist and dialectical'. However, Gramsci's thesis – that the communist party should advance 'its own, autonomous solutions to the general, Italian problems' – did not in itself contradict the proposal of an alliance for action with the other anti-fascist parties, while he could not have openly advanced it, since it differed from the party line.

Nevertheless the very fact that Sraffa's letter was published, probably after a heart-searching discussion between the two friends, amounted to significant recognition of the problems it raised and the political ideas suggested by the young economist. Indeed, Gramsci drew attention to this strategy again, and far more explicitly, in a private letter to comrades closer to his position, and thus less subservient to the Bordiga orthodoxy (reprinted in Togliatti 1962: 242ff.).[11]

The episode suggests that Sraffa played some role in the development of Gramsci's political thinking and the distance he maintained from Bordiga's line, and in particular from the idea of the total opposition

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[11] Failure to take into account this second letter explains why some commentators (such as Sen 2004: 36) attribute to Gramsci only 'contemptuous dismissal [of Sraffa's views] in classical communist rhetoric'.

of the communist party to all other political forces for the sake of the Bolshevik revolution. Years later, the position which Gramsci's political reflections reached towards the end of his life appeared close to the position Sraffa had taken as early as 1924, when Gramsci in turn proposed a pact between the anti-fascist political forces for the reconstruction of a democratic Italy after the anticipated fall of the fascist regime. Indeed, we may see a particular significance in the fact that, apparently in their last meeting in March 1937,[12] it was to Sraffa that Gramsci entrusted a verbal message for the comrades still enjoying freedom, one he attached great importance to – the watchword for the constituent assembly, encapsulating his proposal for collaboration of the Italian communist party with all democratic, anti-fascist, forces.

   Along with this fundamental point in the political debate, we must also recall the help Sraffa gave to Gramsci after his arrest in 1926. He took pains to get books and magazines to his friend in prison.[13] He explored the possible paths to freedom (on the one binding condition that Gramsci insisted on, and to which Sraffa agreed, that no concessions be made to fascism, such as a petition for pardon would imply).[14] He liaised with the communist leaders in exile, stopping in Paris for meetings with Giorgio Amendola and others in his travels between Italy and Cambridge.[15] And he provided Gramsci with further food for

[12] Cf. Spriano (1970: 150); Spriano (1977: 108–11); Gerratana (1991: xlvi). On Gramsci's position (at the time painfully isolated within the party) on the constituent alliance in the early 1930s cf. Spriano (1969: 281–6).

[13] Cf. Gramsci (1965: 15, 23, 25, 27, 30, 33, 37, 289, 290, 353–6, 362, 400, 411, 412, 428, 448, 449, 454, 455, 480, 481, 552, 569, 589, 603, 626–8, 745–9); Sraffa (1991: 5–7, 11–12, 14–15 etc.). The latter book is a posthumously edited volume of letters from Sraffa to Tatiana, Gramsci's sister-in-law, who regularly copied and sent Sraffa Gramsci's letters to her from prison – so they were in fact letters directed to Sraffa. In his letters, Sraffa instructed Tatiana on how to answer Gramsci's letters to her.

[14] Cf. Spriano (1977: 66, 71–4, 151).

[15] The Italian authorities had some suspicion of this, and Sraffa was put under surveillance, shadowed by security men. There are, in the Italian State Archives, the police reports to the Casellario Politico Centrale of their shadowing activity, which make for an amusing reading: apparently, Sraffa was capable of 'shaking off his tail' whenever he wanted to. On 30 May 1931 the Ministry of Interior ordered that Sraffa be arrested when entering Italy, but the order was not executed when he entered Italy by car, through the Moncenisio route on 24 September 1931, though his luggage was searched. The ministry sent a reprimand on this account to the Prefect of Turin. The order of arrest was however converted to an order of 'surveillance'. Sraffa's interrogations by the police on his visits to Gramsci were clearly carried on as a bureaucratic duty. Sraffa invariably

thought (through his sister-in-law Tatiana) in the reflections that were to take shape in the *Quaderni del carcere*.[16]

Sraffa's friendship for Gramsci signals an intense passion for politics which must be borne in mind to understand fully the ideological roots of the research project Sraffa was to pursue in the field of economic science. It should, however, be emphasised that Sraffa's economic research and its results must be judged independently of his political background. Moreover, it seems that Gramsci had no influence on the gradual switch in Sraffa's interests from problems of applied economics to theoretical issues in the first half of the 1920s. At any rate, it would be outrageously unscientific to evaluate Sraffa's analytical results on the basis of his political ideas.

1.3   Critique of Marshallian theory[17]

In the years following his graduation, Sraffa's interests ranged from politics to questions of applied economics, and in particular – but not only – monetary economics.

After his brief experience as a bank clerk, Sraffa spent a year in London attending courses at the London School of Economics. He was then appointed director of the Labour Office of the Milan Province, at the time under the socialist administration presided over by a lawyer, Nino Levi, a socialist and a good friend, whom Sraffa respected and with whom he remained in touch until Levi's death. Levi was, however, soon to resign when the fascist regime took over and the socialist

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answered that his visits to Gramsci were motivated by simple friendship, that he had obtained permission for the visits from the competent authorities, that no political issues had been discussed and that the talks turned around old friends, literary and historical issues. In the police reports, occasionally Sraffa's name is written as Truffa, Sgraffa or Sraffo. Reports from London ensure that in England Sraffa was not involved in political activities (in fact, he was very careful never to discuss politics with his Cambridge colleagues). In a report of 11 May 1937, the Italian General Consulate in London refers that Sraffa is 'fully absorbed in the great work commissioned to him', namely 'a work on the economist Riccardo [*sic*] – he has already published 14 volumes of it' (my translation; Keynes, who was very worried about Sraffa's delays in completing the edition of Ricardo's *Works and Correspondence*, would have been very amused by this report on Sraffa's publishing accomplishments!).

[16] Cf. Gramsci (1965, 1975); Sraffa (1991).

[17] See Roncaglia (1991), from which some material for this and the following section is drawn, for a more extensive exposition. Cf. Rosselli (2004) for a discussion of Sraffa's papers in the Sraffa Archives concerning the critique of Marshallian analysis.

administration of the province of Milan fell. Thus Sraffa, elected to this office on 26 April 1922, resigned, and his resignation was promptly accepted on 15 December 1922.[18]

Sraffa then turned to an academic career, which he began as lecturer in political economy and public finance at the Faculty of Law of the University of Perugia.[19] Sraffa had probably read at least some of the works of Marx and the major classical and marginalist economists before 1923, but evidence suggests that his interest in theoretical problems developed at this stage, possibly stimulated during his 1921–2 stay in London, to deepen when he took on the task of teaching a general course in political economy.[20] He found himself having to confront the academic framework then dominant in Italy, namely marginalism in the Marshallian version of Maffeo Pantaleoni (1857–1924), whom Sraffa (1924: 648) called 'the prince of [Italy's] economists'.

In fact, keeping faith with the principle he often recommended to his students (always confront yourself with the best exponent of the approach to be criticised), Sraffa adopted for his lessons Marshall's *Principles of Economics* which, although conceived as a reference book for university courses, was by no means the simplest textbook that students of a Faculty of Law could wish for.[21]

The fruits of Sraffa's reflections – a radical critique of the Marshallian theory of the equilibrium of the firm and of the industry – were set out in a long article published in 1925 in the *Annali di economia*, entitled 'Sulle relazioni fra costo e quantità prodotta' ('On the relations between cost and quantity produced'). Five years had passed since the publication of the eighth edition of Marshall's *Principles*, and one year since his death.

Sraffa's article was a contribution to the debate on the 'laws of returns' sparked off by a paper, 'Of empty economic boxes', that John Harold Clapham (1873–1946) published in the *Economic Journal* in 1922. The point in question was of vital importance for the Marshallian theoretical construction and, more generally speaking, for the marginalist theory of value.

According to the marginalist approach, prices are to be seen as indexes of relative scarcity; the equilibrium values for prices and quantities

[18] Cf. Potier (2000: 26–7).
[19] On Sraffa's academic vicissitudes in Italy, cf. Bellofiore and Potier (1998: 58–60); Pasinetti (2007: 139–40, 149–50).
[20] Naldi (1998a: 502) refers to a notebook containing notes on Marshallian theory dated April 1923 and conserved among the Sraffa Papers in Cambridge.
[21] Cf. Naldi (1998b).

produced are determined through a confrontation between the preferences of economic agents and the scarcity of available resources, or in other words by the balancing of demand and supply. Marshall's own version of the marginalist approach is based on the method of partial equilibrium by which the market for each commodity is analysed in isolation, and the balancing of supply and demand is analysed by comparing the demand curve for the product under consideration with the corresponding supply curve. The latter curve represents, for each quantity produced by the individual firm or by the industry, the minimum price at which producers are willing to supply the market with that quantity; hence the curve expresses the marginal cost (i.e. the cost of obtaining an additional unit of product) as a function of the quantity produced, both for the individual firm and for the industry as a whole.

Marshallian theory singles out three cases accounting for all eventualities: constant, increasing and decreasing returns, according to whether the average unit cost remains constant, decreases or increases when the quantity produced increases. Clapham, a professor of economic history, set out to tackle the problem of the concrete application of these theoretical categories and came to a startling conclusion when he found the theoretical apparatus in question to be sterile: the three categories of constant, increasing and decreasing costs were 'empty economic boxes' (this was also the title of his paper), impossible to fill with concrete examples of real industries.

Clapham's article provoked immediate response, with an article in the subsequent issue of the *Economic Journal* by Arthur Cecil Pigou (1877–1959), who was Marshall's successor to the chair of economics at the University of Cambridge and the champion of a line in Marshallian orthodoxy that led to the 'geometrical method' of demand and supply curves for the firm and the industry, for the short and the long term. This construct, it should be noted, does not fully correspond to Marshall's view of the matter. Indeed, wavering between ambiguities, constantly veering back en route, in subsequent editions of the *Principles* Marshall attempted to reconcile an evolutionist – and thus intrinsically dynamic – conception of the industry and the firm with an analytic apparatus based on the conditions of equilibrium between demand and supply, thus intrinsically static.[22] Greater fidelity to Marshall's ideas was in fact shown by Dennis Robertson (1890–1963), who raised further doubts on Pigou's analytic apparatus in an article published in the March 1924 issue of the *Economic Journal*.

[22] Cf. Bharadwaj (1989, Chapter 7) and Ridolfi (1972).

The debate continued in the pages of the *Economic Journal*, unflagging after the publication of Sraffa's articles (the Italian article of 1925 and another, published in the December 1926 issue of the *Economic Journal*, which we shall deal with subsequently). There were contributions by Allyn Young, Pigou, Lionel Robbins, Joseph Schumpeter, Roy Harrod and, in 1930, a symposium on 'Increasing Returns and the Representative Firm' with Robertson, Shove and Sraffa as protagonists.

Clearly, it was a 'battle of giants', largely fought in an outstanding arena, the economists' major academic periodical of the time. It is all the odder, therefore, that its conclusions have been systematically ignored in economics textbooks ever since, the trend being set by Paul Samuelson's highly successful textbook *Economics* (over three million copies sold in various languages from 1948 to the present day), as if the theoretical debate held no implications for the parables used in the education of students, even when their erroneousness was evident to all.

Sraffa joined the debate Clapham had begun by arguing that the problem of 'empty boxes' was not a matter of applying the theoretical categories of constant, increasing and decreasing returns to real situations, but lay rather in the insurmountable difficulties already encountered at the theoretical level. Underlying the Marshallian theory of firm and industry equilibrium based on increasing and decreasing returns, Sraffa pointed out, was a conceptual confusion: in classical political economy the 'law' of decreasing returns was associated with the problem of rent (theory of distribution), while the 'law' of increasing returns was associated with the division of labour, or in other words general economic progress (dynamic theory of production, technological progress). Marshall and other neoclassical economists had tried to put these two 'laws' on the same plane, co-ordinating them in a single 'law of non-proportional returns' (where decreasing returns must prevail after some level of production) with the aim of expressing costs as a function of the quantity produced, for the firm and the industry alike. These functions were then applied in the theory of prices, transformed into supply curves for the various products, to be set against the corresponding demand curves, obtained by applying the 'law' of decreasing marginal utility. Thus, as Marshall suggested, the demand and supply curves may be compared with the two blades of a pair of scissors. However, this meant transposing increasing and decreasing returns into a single framework, different from either of the original ones; it is therefore difficult to apply in the new context the explanations

originally advanced to account for cost trends. Sraffa illustrates these difficulties analysing the literature on the subject while focusing on the long period.

In particular, Sraffa emphasises that decreasing returns have to do with changes in the proportions of factors of production, while increasing returns are associated with expanding production and increasing division of labour.

The former case – decreasing returns – comes about when a factor of production proves scarce. Now, unless we identify the industry with all the firms using a certain scarce factor, the variations in the average cost associated with an increased production in the industry using this factor will be accompanied by variations in costs similar (i.e. having the same order of magnitude) to those experienced by other industries using the same production factor. Thus, the demand curve for the product of the industry under consideration turns out not to be independent from the corresponding supply curve.[23] Here we have a clear violation of the *ceteris paribus* condition necessary to the Marshallian analysis of partial equilibria.

As for increasing returns, they cannot accrue to firms within a certain industry, for otherwise the firms would go on expanding, transcending the limits of competition. They cannot accrue to various industries at the same time either, or the *ceteris paribus* clause would be breached again. It is only the case of production economies external to each firm but internal to one industry that guarantees consistency between increasing returns, the assumption of competition and the partial equilibrium method. However, Sraffa rightly considers such a case as unrealistic.[24] In conclusion, it is clear that the analytic construct of the Marshallian tradition can only be reconciled with the canons of logical coherence by means of unrealistic *ad hoc* hypotheses – hardly a sound basis for a framework designed for general interpretative application.

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[23] The requirement that the demand curve be independent from the supply curve also means that marketing expenses should not be included among costs of production. Sraffa notes this point in a handwritten note commenting on Shove's contribution (Sraffa Papers D 3.7.23, quoted by Marcuzzo 2001: 90).

[24] There is actually a case in which the economies external to the firm but internal to the industry prove important, namely industrial districts, cf. Becattini (1989). However, obviously this case cannot be extended to the *entire* economy, as would in fact be necessary if we were to accept Marshallian theory as a general theory of value for competitive markets.

1.4 Imperfect competition

Sraffa's 1925 paper attracted the interest of Francis Ysidro Edgeworth (1854–1926), who was co-editor of the *Economic Journal* with Keynes. Prompted by Edgeworth, Keynes asked Sraffa for an article to be published in the British periodical, and the young Italian economist responded with alacrity.[25]

The English paper (Sraffa 1926) is much shorter than the Italian version, and correspondingly far less rich in collateral elements of noticeable importance: half of the article consists of a summary of the main points in the Italian article, while the other half elaborates an original line of research based on negatively sloped demand curves hypothesised also in the case of individual firms and thus compatible with constant or moderately increasing returns. Here we have a theory of imperfect competition which, in fact, takes up certain cues for 'realism' scattered through Marshall's work. However, Sraffa is quick to point out the limits to this line of research, remarking in the conclusion 'that in the foregoing the disturbing influence exercised by the competition of new firms attracted to an industry the conditions of which permit high monopolist profits has been neglected'. Basically, this meant neglecting competition in the classical sense of the term, consisting in the shifting of capital from one sector to another in pursuit of maximum returns.

In the following years the theory of imperfect competition was to prove a rich minefield. In particular, Richard Kahn dwelt on it in his 1929 King's Fellowship dissertation (published only much later, in 1983 in Italian and in 1989 in English: Kahn 1989), developing a short-period framework which had an important influence on Keynes's *General Theory*;[26] Joan Robinson (1933) elaborated a systematic treatment of the

[25] The letter to Keynes in which Sraffa accepts the offer is published in Roncaglia (1975: 11–13). Together with the *Lecture Notes* and other material conserved in the Sraffa Papers at Trinity College (Cambridge), publication of which has now been impending for several years, it is an essential document for our understanding of the development of Sraffa's thinking from 1925 to 1930. Cf. the interpretation presented in Roncaglia (1975), Chapter 1, and in Roncaglia (1991). Naldi (1998a: 503–4) refers to a note on imperfect competition that Sraffa apparently showed to Maurice Dobb in the spring of 1925 and which, not having used it for the 1925 article, he subsequently returned to, on his friend's suggestion, when preparing the 1926 article.

[26] Among other things, Kahn (1989: 93–5) criticises Sraffa's (1926: 549) thesis 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'; as Kahn (1989: 95n)

subject, while at the same time, with his theory of monopolistic competition, Edward Chamberlin (1933) offered an approach exhibiting various points in common with it. However, while Robinson worked in the conceptual terms of Marshall's 'partial equilibrium', developing a theory of imperfect competition regarding firms operating within a given industry, the confines between industries become somewhat blurred in Chamberlin's theory: each firm operates in its own market under the constraint of competition from outside, without any need to specify whether the competition comes from firms producing more or less the same commodity as the firm in question, or quite different products that might nevertheless serve sufficiently well in their place.[27]

Although Sraffa's was the crucial first step behind this line of research, he was soon to abandon it; yet, it still exerts a certain influence today and, above all, still finds its way into the textbooks: curiously enough,[28] it is perhaps to this contribution that our Torinese economist owes most of his fame today, especially in the US. It was based on a notion of competition – the notion upon which the marginalist approach focused, implying a large number of firms supplying an identical product – that differed from the classical economists' idea of free flows of capital between the various sectors of the economy.

The latter notion and its importance were however recalled in the conclusion to Sraffa's 1926 paper. It was Sraffa's prompting, then, that opened the way to the modern theory of non-competitive market forms, and in particular Paolo Sylos Labini's theory of oligopoly (1956), based on the presence of obstacles to the entry of new firms into the market. It was the classical notion of competition, furthermore, that constituted the basis for a line of research that Sraffa was already developing in a first draft,

notes, Sraffa accepted his criticism, cf. Marcuzzo (2001) and Dardi (2001). Dardi hypothesises that this discussion, with the unavoidable conclusion 'that dealing with imperfect markets renders the mental determinants of equilibrium unavoidable, was one of the reasons for Sraffa's estrangement from the entire problem' (Dardi 2001: 131). The point is certainly important, but should not be taken too far: in 1929 Sraffa had already moved on from imperfect competition to the classical line of research on prices and distribution which was to lead to his 1960 book.

[27] Chamberlin's approach thus leads to Triffin's (1940) contribution, which points in the direction of general equilibrium theory.

[28] Not so very curiously, however: little as it may appeal to supporters of the optimality of market economies, the theory of imperfect competition developed following Sraffa's contribution remains part of the marginalist approach, based as it is on the notion of simultaneous equilibrium of quantity and price determined by the contrasting forces of demand and supply.

which was discussed with Keynes in 1928, and which was eventually to find expression in *Production of Commodities by Means of Commodities*.

1.5 Criticism of the representative firm and the evolutionary side of Marshall's analysis

Sraffa's radical departure from the traditional framework of the theory of the firm and the industry is evident in the last writings he dedicated to the subject, namely his contributions to the symposium on 'Increasing returns and the representative firm', published in the *Economic Journal* of March 1930. In fact, the conclusion of Sraffa's brief contributions is clear-cut, marking a frontal opposition to the received view: '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'; thus 'I think [...] that [it] should be discarded' (Sraffa 1930: 93).

Sraffa's criticism is here levelled at a version of Marshallian theory more faithful to Marshall's own original framework than Pigou's static cost curves, namely the evolutionary version Robertson presented in his contribution to the symposium (Robertson 1930). The latter is based on the concept of the firm's 'life cycle' which Marshall had employed in an attempt to make increasing returns compatible with the firm's competitive equilibrium. Like a biological organism, the firm goes through successive stages of development, maturity and decline, the 'representative' firm being halfway through the process of development and thus at a stage of increasing returns to scale. As Marshall himself pointed out, a concept of this type, that sees the expansion of firms depending on the 'life cycle' of entrepreneurial capacities, can be contemplated in the case of directly family-run concerns, but could not apply to modern joint stock companies.[29] This destructive self-criticism, however, was not considered in the 1930 symposium.

In fact, Sraffa's criticism focuses on logical consistency: a theory based on the representative firm must retain an internal logic concerning the behaviour of individual firms. If, as Robertson suggests, the representative firm may be a different individual firm for any level of output in

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[29] 'And as with the growth of the trees, so was it with the growth of businesses as a general rule before the great recent development of vast joint-stock companies, which often stagnate, but do not really die' (Marshall 1890: I, 316; the reference to the joint-stock companies was introduced in the sixth edition, 1910: cf. Marshall 1890: II, 341).

the industry, this in itself is insufficient to reconcile competitive market equilibrium with increasing returns to individual firms.

> When individual firms retained their identity throughout the discussion, the question which Mr. Robertson had to answer was: 'If firms could increase their output and thereby reduce their costs – why didn't they increase it before the expansion of the industry?' Now that firms lose their identity, the question to be answered is: 'If the new firms can turn out a larger output at a lower cost than the old firms, why didn't they come into existence before? Why in the new, and not in the old position of equilibrium?' (Sraffa 1930: 91–2).

Thus the biological analogy proved a false exit to the blind alley Marshallian analysis had got into, hemmed in by the contradiction between increasing returns and competitive equilibrium. In this way Sraffa points out the *deus ex machina* nature of the biological metaphors utilised by Robertson in Marshall's wake: such metaphors could not fill in the gaps in logical consistency of the Marshallian theoretical building, which remain intact in its evolutionary version as well. 'At the critical points of his argument the firms and the industry drop out of the scene, and their place is taken by the trees and the forest, the bones and the skeleton, the water-drops and the wave – indeed all the kingdoms of nature are drawn upon to contribute to the wealth of his metaphors' (Sraffa 1930: 90–1).

To sum up, Sraffa's critiques of the Marshallian theory of the firm focus on three aspects. First, to explain increasing and decreasing costs Marshall resorts to analytical constructs based on different foundations, hence involving different sets of assumptions and having different fields of application: the Smithian theory of the division of labour and the 'Ricardian' theory of the differential rent. Second, we have his criticisms of the partial equilibrium method: the elements brought into play in Marshallian analysis may have effects of the same order of magnitude on industries beyond the industry under consideration. Third, the condition of equilibrium is shown to be compatible with the notion of perfect competition only under very specific, unrealistic, circumstances, such as the absence of increasing returns to scale.

Decades have now rolled by since Sraffa illustrated his 'destructive criticisms'[30] of the Marshallian theory of the firm and the industry.

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[30] The expression is Keynes's, in the introduction to the 1930 Symposium: cf. Keynes (1930b: 79).

In many fields of economic analysis such critiques have simply been ignored: one has simply to look, for instance, at the introductory text-books in microeconomics, in environmental economics, or in the field of tax incidence theory.[31] There have also been attempts to limit the scope of Sraffa's critiques; let us briefly recall two major cases.

First, there is Samuelson's (1987) presentation of Sraffa's 1926 critiques[32] as referring to partial equilibrium method, but no longer holding for general equilibrium analysis.[33] This remark is only partially true. In fact, Sraffa considered general equilibrium theory as too abstract to be of any use; hence his criticisms concerned those streams of the marginalist approach which could be considered relevant as interpretations of real world issues: the Marshallian partial equilibrium approach, which in fact exerted, and still exerts, a great influence in many fields of analysis; and the traditional marginalist theories of value and distribution, which were to be the object of criticism in his 1960 book. However, the criticisms concerning the fragile conceptual foundations of U-shaped supply curves and the inconsistency of competitive equilibrium with increasing returns to individual firms remain applicable to the pure theory of general equilibrium, where, for instance, the assumption of convex production sets plays a basic role.[34]

More subtle, and fairly widespread among non-neoclassical economists, is the thesis that Sraffa's critiques only concern the textbook (*vulgata*) version of Marshallian analysis, or the Pigou–Viner graphical interpretation of it, but not Marshall's original evolutionary ideas, as embodied in his notion of the representative firm and in a representation of competition which is different from (more complex and realistic than) the textbook notion of perfect competition.

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[31] Cf. for instance Varian's microeconomics textbook, subtitled *A Modern Approach* (Varian 1987). A curious instance concerns one of the most influential and better-documented original contributions to oil economics, Adelman (1972), who was led by his Marshallian apparatus to interpret the oil market as a competitive one, thus forecasting (in 1972!) a downward tendency in oil prices. Cf. the criticisms in Roncaglia (1983b, Chapter 3).

[32] The 1925 article is simply ignored, possibly because the English translation, prepared in 1973–4 by John Eatwell and myself under Sraffa's supervision, was only published in 1998, although it was deposited in the Marshall Library in Cambridge and circulated widely before then.

[33] On similar lines, cf. Steedman (1988b).

[34] For a more extended criticism of Samuelson's views, cf. Panico (1991). Samuelson (1991) retorts by attacking the idea that under constant returns prices are independent of demand; but, clearly, this is not the issue at stake in Sraffa's critique of Marshall's economics.

Now, it is true that Marshall's own analysis embraces the elements thus brought to the fore, intermingled with the foundations of a static analysis where Pigou and Viner found all the elements required for their *vulgata*. Economic evolution, as is well known, is central to Marshall's thinking; his insistence on 'the element of time' (Marshall 1890: vii) is to be understood in this context, rather than as a Böhm-Bawerkian stress on a second element determining value jointly with (direct and indirect) labour requirements. However, for Marshall this does not mean throwing out static analysis: '*statical treatment alone* can give us definiteness and precision of thoughts'; it is thus considered as 'a *necessary* introduction to a more philosophical treatment of society as an organism' (Marshall 1890: 461; italics added).

The logic of the analytical framework requires that static supply curves should be counterposed to static demand curves; this is also required by the use of the comparative statics method based on comparisons of partial equilibria ('with which [Marshall's] name will always be associated', Whitaker 1987: 357). In fact, this is the direction in which the standard presentation of partial equilibrium analysis was to proceed, with Pigou (1928) and Viner (1931).

The evolutionary elements superimposed by Marshall on the static analytical framework were lifted from it as forming a self-consistent whole by the new stream of 'evolutionary Marshallians'. However, this both contradicts Marshall's own idea of the necessary connection between static and evolutionary analysis just recalled above, and implies a number of internal unresolved contradictions.

Firstly, a problem of co-ordination of supply and demand curves emerges. Their joint use in an analysis aimed at determining quantity–price equilibria requires that the two variables – demand and supply – which are supposed to come into equilibrium with each other be on a similar level of abstraction. In pure subjective theories, like Jevons's, utility for consumption and disutility for work satisfy this requirement (as, in Menger's Austrian approach, the utility of the chosen path and the 'opportunity cost', i.e. the utility of alternative paths). In Walras's general equilibrium approach, in a pure exchange model the given resources represent a constraint against which agents maximise their utility, comparing similarly defined utilities obtainable from alternative consumption choices. In Marshall, particularly when the representative firm is introduced, the supply curve no longer appears as a purely static set of alternative choices available at a moment in time. The conceptual contradiction with the demand side which thus arises is reinforced, in the successive editions of the *Principles of Economics*, by Marshall's

attempts to elude the analytical contradiction between increasing returns to scale and the assumption of competition.[35]

Thus we are confronted with a dilemma. Either we follow the path of equilibrium analysis to its logical conclusions, and in this case the supply curves need be purged of all elements of time and evolution, or we choose the escape path of evolutionary notions; in this case we are confronted with a conceptual contradiction between the two terms to be equalised, supply and demand.

Indeed, when both supply and demand are considered as path-dependent (which is the main characteristic of evolutionary notions, and which is something more than considering these variables as functions of price and time simultaneously), supply and demand curves can no longer be considered independent of each other, as required by partial equilibrium analysis. Thus Marshall's suggestions in this direction (in Appendix H, Marshall 1890: I, 807–9) cannot provide a solution, at least within his partial equilibrium approach.

The second aspect concerns the assumption of competition, and the recourse to the representative firm. For instance, Loasby (1989: 58–68) and Whitaker (1989: 184–6) appear to reduce Sraffa's criticisms to the contradiction between increasing returns and competition. Thus Loasby (1989: 62) rescues Marshall by maintaining that his theory of value is not based on perfect competition; but in fact Sraffa's other criticisms (on partial equilibrium analysis, on the co-ordination of increasing and decreasing returns into a supply curve, on the joint use of supply and demand curves considered independent from one another) do not depend on the assumption of competition.

Whitaker (1989: 184) recalls that Marshall's notions of the representative firm and the life cycle of firms avoid 'the need for every firm to be in equilibrium if the industry is to be in equilibrium'. However, this point was already criticised by Kaldor (1934: 61): in the context of a finite life cycle of firms, it is not necessary for the product of the individual firm to be constant (i.e. in equilibrium) in order to have constant output for the industry as a whole (which is needed for the analysis of supply-and-demand equilibrium); but the increase in production of younger firms must exactly offset the decrease in production of decaying firms. With a stationary age distribution of firms, this requires that each individual firm produces its equilibrium quantity, that is, the quantity appropriate to the ruling price and cost conditions,

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[35] More detailed discussion of the issue of the different time dimensions of supply and demand curves has been presented by Currie and Steedman (1990).

and to its age: otherwise, a constant industry output can only be obtained by mere chance. But Marshall fails to provide any mechanism ensuring that each individual firm produces the appropriate quantity: the derivation of the representative firm from the conditions of the industry is swept under the carpet but does not eliminate the need of microfoundations, at the level of individual firms, for the equilibrium of the industry as a whole.

Thus, Sraffa's critiques of Marshall's analysis remain a contribution of the greatest importance, often only imperfectly understood, the impact of which is still far from being fully appreciated in present-day economic analysis.

2
An Italian in Cambridge

2.1   Cambridge

The 1926 paper published in the *Economic Journal* had considerable impact, especially in Cambridge, and Keynes had no difficulty in offering Sraffa a position as lecturer at the university which was then – and would continue to be for many years to come – the most prestigious centre for the study of economic theory in the world. In 1926 Sraffa had also been awarded a professorship in political economy in Italy, at Cagliari, but after Gramsci's imprisonment and the threats he himself received as an anti-fascist,[1] he decided to move to England. He lived there from 1927 until his death, on 3 September 1983.

Up to 1939 he was associated with King's College, where Keynes was Bursar; he was not a fellow, but 'had high-table rights' and 'regularly took his meals in College' (Kaldor 1985: 615). Then in 1939 he succeeded his friend Dennis Robertson as a Fellow at Trinity College. On his arrival in Cambridge, he lived in one of King's College hostels, then in a small college-owned flat in St. Edward's Passage, above the one which Keynes, who at the time lived in London, utilised when in Cambridge during the weekends. Sraffa never married; though he clearly appreciated female beauty, nothing is known (and nothing came to surface in his papers) about this side of his personal life. Since 1937, when his father died, his mother lived with him in Cambridge, up to her death in 1949. Subsequently, he held a set of rooms in Trinity College's Nevile's Court.

Sraffa liked walks and bike rides. In Cambridge, he always moved around by bike. He used to get up late in the morning and work late

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[1] Cf. the documentation in the appendix to Naldi (1998a: 510–12).

into the night. In Trinity as well as when associated with King's, he regularly dined in the college. As I noticed when he invited me to dinner at Trinity, he took care to arrive after supper was served, so as to skip the *benedicite* prayer (he was agnostic, with a leaning for atheism). He did not care what he ate, though once he insisted, as a quite rare point of nationalistic pride, for having some good Chianti served as an alternate to the usual French wine.

From Cambridge, he often returned to Italy (on many occasions with a stop in Paris). There was the family house in Rapallo, a beautiful seaside resort in Liguria, utilised in winter (especially during the Christmas holidays) as well as in the summer, which was sold before the war under the urge of the anti-Jewish legislation introduced by the Fascist regime, to be replaced by a smaller apartment after the war. He also liked the mountains, and some occasional amateur climbing. He kept in touch with relatives, friends and colleagues, and during his visits to Rome or to Milan he liked to meet them. However, when some opportunity opened up for a return to an Italian university, though occasionally tempted, he invariably decided to remain in Cambridge.[2] In his pocket diaries, now preserved among the Sraffa Papers, he took note, day by day, of his activities.

Holding a teaching position in a prestigious foreign university, Sraffa was entitled by Italian law to maintain (on leave) his chair in Italy, although he decided to pass his salary on to the economics library of the University of Cagliari. Eventually, when all Italian professors were called upon to swear loyalty to Fascism, Sraffa resigned,[3] in my opinion

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[2] Cf. Sraffa Papers, B 16/1.

[3] The draft letter of resignation, dated 1 November 1931, is conserved among the Sraffa Papers; the resignation was accepted with the decree of 10 November 1931. He was reinstated after the war, in 1950, together with the few other Italian professors who had not taken the oath of fidelity to fascism, but he remained on leave from his chair in Cagliari up to retirement. In 1953 Sraffa was also elected corresponding member of the Accademia Nazionale dei Lincei (and national member in 1965). Here, among other things, he played a crucial role – together with his friend Sergio Steve – in bestowing the 1966 Francesco Saverio Nitti prize on Ernesto Rossi, one of the founders of the Italian Radical Party, who had studied economics (particularly Wicksteed) in the long years spent in the fascist prisons (Fiori 1997: 288–90), thus upholding in both politics and economics ideas quite different from Sraffa's. On the attitude of Italian university professors towards the oath of fidelity to fascism, see Goetz 2000 (on Sraffa, p. 41 n). In the post–Second World War years, Sraffa was also adviser to the Einaudi publishing house (founded and directed by Giulio Einaudi, a son of his university professor Luigi) and to the Istituto (now Fondazione) Feltrinelli (cf. Potier 2000, Daniele 2000), as well as a member of the selection committee for Banca d'Italia

(*Continued*)

wishing neither to take such an oath nor to dissociate himself from the line chosen by the Communist party, which was to fulfil what might be seen as a purely formal obligation in order to keep channels of communication open with the younger generations (a line that meant a painful volte-face for the famous Latinist, Concetto Marchesi, a militant communist who took the oath after a public declaration that he would never do so).

After a year spent settling in (despite his previous stays in England, his English was by no means perfect when he arrived, his French being rather better), Sraffa taught courses in Cambridge on the theory of value and on the German and Italian financial systems.[4] His lessons caused something of a stir: Sraffa discussed the theories of the classical economists, Ricardo in particular, and the theories of general economic equilibrium expounded by Walras and Pareto – little of which was known in England – as well as advancing his own criticisms of the Cambridge (Marshall–Pigou) tradition, concerning in particular the theory of the firm. However, Sraffa found himself growing increasingly shy about speaking in public, and thus about giving lectures, too. As a result, thanks to Keynes, he was then appointed librarian of the Marshall Library, the library of the economics faculty (since 4 May 1931), and assistant director of research (1935).[5]

In the cloistered calm of Cambridge Sraffa developed his research along three lines connected in one great design: the work on the critical edition of Ricardo's writings, entrusted to him in 1930 by the Royal Economic Society on the initiative of Keynes; research in the field of the theory of value, which was to culminate after 30 years' labour in *Production of Commodities by Means of Commodities* (in the Preface Sraffa recalls showing Keynes an outline of the central propositions as early

(*Continued*)

'Stringher' grants for postgraduate studies abroad, reserved to young Italian economists. In these and many other ways (as in his connections with the leaders of the Italian Communist Party, especially relating to publication of Gramsci's writings: cf. e.g. Vacca 2000), Sraffa maintained very strong connections with Italy, which he regularly visited up to 1973.

[4] The notes for these lectures are preserved in the Sraffa Papers: D2/4 for the lectures on *Advanced theory of value*, and D2/5 for the lectures on *Continental banking*. On the content of these latter ones, which were focused on a comparison between the English (specialised banking) system and the German one, cf. Panico (1998: 170–3). In the Sraffa Papers (D2/8) there are also the notes for short courses on *Industry* given during the war (1941–3); in these, as Marcuzzo (2004: 131) remarks, Sraffa discusses how control over the biggest firms had moved from the capitalist entrepreneurs to the financiers.

[5] On Sraffa's activities in Cambridge, cf. Marcuzzo (2004).

as 1928); and a collateral interest in the development of Keynesian theory, in particular during the early 1930s. It was, moreover, at Cambridge that Sraffa made acquaintance with the Austrian philosopher Ludwig Wittgenstein (1885–1951), who became a friend and on whom Sraffa exerted a significant influence.

In the following sections we shall be considering, in order, Sraffa's relation with Wittgenstein and with Keynes, his critique of Hayek, his interpretation of Ricardo and the classics. In the next chapter we shall consider his 1960 *magnum opus*.

2.2   Wittgenstein

Sraffa met Wittgenstein in 1929. The Austrian philosopher had just arrived in Cambridge, invited there by Bertrand Russell who had had Wittgenstein's *Tractatus Logico-Philosophicus* (1921) published in English a few years before. The book constituted a fundamental contribution to the development of modern philosophy, and is considered by many the culmination of logical neo-positivism. Wittgenstein had pondered and drafted it during the First World War, first on the Russian front, then on the Italian front, and finally during his period of imprisonment in Italy at the end of the war (up to August 1919). Wittgenstein himself conceived it as the terminus of philosophical research; having completed it, he was convinced that he had no further work to do in the philosophical field. A difficult, withdrawn character, he thus retreated to teach in a small Austrian village primary school and work as a monastery gardener. His contact with the philosophical research of this period was indeed scant: a few letters and the occasional meetings with Bertrand Russell or the young Frank Ramsey, another philosopher and mathematician at Cambridge, who was also a friend of Sraffa's and who died in 1930 at the early age of 26, but above all with the so-called Circle of Vienna, whose moving spirit was Moritz Schlick.

It may well have been the Vienna Circle discussions – and in particular a celebrated lecture Brouwer gave on the foundations of mathematics – that finally persuaded Wittgenstein that after all some work remained to be done also in the philosophical field. So it was that Wittgenstein arrived in Cambridge early in 1929, to become fellow of Trinity College after a few months and to remain there – with a few odd breaks – until his death in April 1951.

During the periods in which they were both in Cambridge, Wittgenstein and Sraffa would in general spend one afternoon a week together, discussion ranging far and wide rather than specifically

dwelling on philosophy or economics as such. However, their debates had a decisive influence on the Austrian philosopher, with his transition from the logical atomism of the *Tractatus Logico-Philosophicus* to the mature positions emerging in the *Philosophical Investigations*, published posthumously in 1953.

Georg von Wright, a pupil of Wittgenstein, reports him as once having said 'that his discussions with Sraffa made him feel like a tree from which all the branches had been cut'.[6] Wittgenstein himself is still more explicit in his Preface to the *Philosophical Investigations*: 'I am indebted to [the criticism] which a teacher of this university, Mr. P. Sraffa, for many years unceasingly practised on my thoughts. I am indebted to *this* stimulus for the most consequential ideas of this book' [the italics are Wittgenstein's].

There is some disagreement among the specialists on the relation between the early and late Wittgenstein: some speak of continuity, others of a hiatus. My impression is that, gradual as the change may have been, showing no evident sudden breakthrough, it was nevertheless very deep.

With drastic simplification, and disregarding various other aspects (by no means secondary) of Wittgenstein's thought, we may illustrate his position as follows. The *Tractatus Logico-Philosophicus* argued a correspondence between the world and the elements that constitute it ('facts') on the one hand, and our representation of the world (whose constituent elements are 'thoughts', expressed in 'propositions') on the other. On this basis Wittgenstein argued that it is possible to build a set of propositions, each describing a 'fact' and all together describing the world, or more precisely all those aspects of the world that can be described in a rational form: in other words, that which can be the object of scientific knowledge. Moreover, concerning all that is not susceptible to rational description (feelings, religious beliefs, aesthetic judgements, etc.) 'one must be silent'.[7]

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[6] von Wright (1958: 15–16). Among those who had experienced Sraffa's critical powers, this anecdote was a source of admiration for Wittgenstein: 'only the branches are cut, while his tree survives!'

[7] '1. The world is everything that is the case. [...]
    1.2 The world divides into facts. [...]
  3. The logical picture of the facts is the thought. [...]
  4. The thought is the significant proposition. [...]
    4.26 The specification of all true elementary propositions describes the world completely. [...]
  7. Whereof one cannot speak, thereof one must be silent'. (Wittgenstein 1921: 31, 43, 61, 91, 189.) We shall be returning to the subject in § 3.4.

Later, in *Philosophical Investigations*, Wittgenstein went on to abandon the idea of language as a univocal representation of the world, as well as the idea of the 'unspeakable'. Discussions with Sraffa seem to have played a role in this change. In this connection, there is an anecdote that Wittgenstein himself told his pupils, one of whom – Malcolm (1958: 69) – recounts it in his biography of the master: one day, as they were travelling together on the train from Cambridge to London, 'Sraffa made a gesture, familiar to Neapolitans and meaning something like disgust or contempt, of brushing the underneath of his chin with an outward sweep of the finger tips of one hand'. The gesture can only acquire a specific meaning within the context in which it is performed, in particular in the context of prevailing social conventions, thus contradicting Wittgenstein's idea that every proposition ought to hold a definite place in rational language, independently of the various contexts in which it may be employed.[8]

Thus, in *Philosophical Investigations* Wittgenstein develops a new theory of language and the relations between it and the world it should describe. There is not just one type of language, Wittgenstein (1953: 21, 33) asserts, 'but there are *countless* kinds: countless different types of use of what we call "symbols", "words", "sentences". And this multiplicity is

[8] According to Malcolm (1958: 69), the object of the discussion was Wittgenstein's idea 'that a proposition and that which it describes must have the same "logical form", the same "logical multiplicity"'; according to von Wright, as Malcolm reports in a footnote, the object of the discussion was the idea that each proposition should have a 'grammar'. In a conversation (21 December 1973) Sraffa confirmed the anecdote, telling me that von Wright was right. The correctness of von Wright's interpretation is also confirmed in a letter by Sraffa, dated 23 October 1974 (now in the Sraffa Papers, C 303) quoted in Bellofiore and Potier (1998: 73).

After repeating the anecdote, Monk (1990: 259–60 of the Italian translation) recalls that once Wittgenstein told Rush Rhees that Sraffa's influence had driven him to adopt an anthropological approach: namely, while the *Tractatus Logico-Philosophicus* analysed language in itself, abstracting from the circumstances in which it is used, the *Philosophical Investigations* focus on contextualised language.

Sen (2004: 30–1) recalls that, when he tried to enquire of Sraffa about the anecdote, Sraffa answered that he did not recall it; Sen concludes that the anecdote must be 'more of a tale with a moral than an actual event'. However, anyone acquainted with Sraffa knows that, when confronted with enquiries about the facts of his life (most frequently in connection with Gramsci), the 'do not recall' answer was his habitual, gentle way of escape. Let us add that Wittgenstein, the original source of Malcolm's and von Wright's accounts, was most certainly not the kind of person who had the habit of inventing anecdotes.

not something fixed, given once for all; but new types of language, new language-games, as we may say, come into existence, and others become obsolete and get forgotten'. In general, 'the meaning of a word is its use in the language'. However, words do not correspond to simple elements of reality, and these simple elements cannot be defined; nor is it possible to produce a general theory of language. Wittgenstein demonstrated these theses with a series of examples of 'language games' – theoretical models focusing attention on particular aspects of the real language, presenting them as the general language of a group of people.

We shall see later on (§ 3.4) how the changes in Wittgenstein's philosophical position can be compared with the differences between the marginalist approach of general economic equilibrium and Sraffa's theoretical contribution. Here suffice it to point out that the Austrian philosopher's initial position prompted some critical remarks from the Italian economist, which were to play an important role in Wittgenstein's subsequent thinking. We may perhaps detect Sraffa's political interests behind his opposition to an *a priori* theory of language, and his preference for a theory open to recognition of the role played by social factors (the environment within which the 'language game' takes place). Although it is difficult to specify its precise nature given the scant documentation, there can be no doubt that Sraffa had a significant influence on Wittgenstein's thinking, and in this way on the course of contemporary philosophy.[9]

2.3   Friendship with Keynes and criticism of Hayek

After Gramsci and Wittgenstein, the third protagonist of the twentieth century culture who had fecund exchange with Sraffa was John Maynard Keynes, though in a rather different way. In the first place, it came within Sraffa's own field of professional research, economics; secondly, while the evidence shows fruitful communication in both directions, it seems probable that Keynes – who was 15 years older – played the major role.

Keynes was of great help to Sraffa on various occasions: he asked Sraffa for a contribution for the *Manchester Guardian Supplement* (Sraffa 1922b), and decided to publish the 24-year old Italian economist's 1922 paper in the prestigious *Economic Journal* (Sraffa 1922a). Again, it was Keynes who asked him – although acting on a suggestion of Edgeworth's – for the

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[9] The Sraffa-Wittgenstein correspondence recently acquired by Trinity College (Cambridge) might cast further light on this.

paper criticising the Marshallian theory of the firm which came out in the *Economic Journal* in December 1926; he also called him to Cambridge, had the Royal Economic Society entrust him with the editing of the critical edition of Ricardo's *Works and Correspondence* (Ricardo 1951–5) and found him congenial roles such as director of research and librarian, as well as helping him get released from the detention camp Sraffa had been sent to as 'enemy alien' when Italy went to war. Sraffa's only co-authored publication was with Keynes: both were keen bibliophiles,[10] and in 1938 they edited the reprint of an extremely rare booklet, *An Abstract of a Treatise of Human Nature*, complete with a learned introduction containing decisive proof for its attribution to Hume rather than Adam Smith, as was previously supposed (Hume 1938).[11] Sraffa also took care of the Italian edition (1925) of Keynes' (1923) *Tract on Monetary Reform*, and played a primary role in stimulating the publication in Italian of other writings of the Cambridge economist.

More relevant to our immediate concern, however, was the cultural exchange in the field of economic theory. Four episodes deserve particular attention.

The first, referred to earlier (§ 1.1), was the likely influence on Keynes of an idea developed by Sraffa in his graduate thesis, i.e. the distinction between the stabilisation of money in relation to the level of domestic prices and in relation to the exchange rate.

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[10] Sraffa's magnificent library, bequeathed to Trinity College, included some rare, occasionally unique, gems, such as the first-edition copy of Smith's *Theory of Moral Sentiments* which had been owned by Madame de Pompadour, or the first-edition copy of Marx's *Capital*, vol. 1, with Marx's handwritten dedication to the German Communist Party successor of the League for which he and Engels had written the *Manifesto*, or one of the three original typewritten copies of Wittgenstein's *Blue and Brown Books*, and so on. Sraffa had the habit of buying (and occasionally selling at a profit) first-edition copies of Ricardo's *Principles of Political Economy and Taxation*, Keynes's *General Theory* and Wittgenstein's *Tractatus Logico-Philosophicus*, in search of copies with special features or as a reserve for gifts to friends. Once he bought, for a few pounds, an item advertised in the bookseller's catalogue as something like 'List of commodities sequestered on board of […] with on the back some notes on […]' which from the description Sraffa had realised was a manuscript of William Petty's.

[11] As Sen (2004: 41) stresses, there are certain important similarities in approach between Hume and the two editors of his pamphlet; the latter two, in their Introduction, 'focus particularly on the influence of custom as opposed to reason on our thinking'; a few pages earlier, Sen (2004: 26) recalls Sraffa, in private conversation, telling him: 'aren't people creatures of habit, rather than reflective choosers?' This is, of course, an important element underlying Sraffa's opposition to the marginalist representation of consumers' behaviour.

The second episode is recalled by Sraffa himself in his Preface to *Production of Commodities by Means of Commodities*. There he tells us that 'when in 1928 Lord Keynes read a draft of the opening propositions of this paper, he recommended that, if constant returns were *not* to be assumed, an emphatic warning to that effect should be given'. Keynes is the only economist to be (implicitly) thanked in the Preface (his explicit thanks go to three mathematicians – Ramsey, Watson and Besicovitch – and, in the Italian edition, to Raffaele Mattioli, a banker who long played a leading role in the Banca Commerciale Italiana and was a very close friend to Sraffa, who had a *magna pars* in the preparation of the Italian edition of the book). The point Keynes intervened on is of fundamental importance, since – as we shall see more clearly in the following chapters – the absence of hypotheses on returns to scale constitutes a crucially distinctive feature of Sraffa's book, implying among other things the abandonment of the marginalist concept of equilibrium. Thus, it seems quite likely that his discussions with Keynes played an important role in the development of Sraffa's ideas.

The third episode concerns Sraffa's participation in the so-called Cambridge Circus: a group consisting of the best of Cambridge's young economists – including, along with Sraffa, Richard Kahn, who liaised with Keynes, James Meade, Austin and Joan Robinson – who discussed Keynes's 1930 *Treatise on Money* and his ideas in the transitional phase between the *Treatise* and the *General Theory of Employment* (1936). However, the role played by the Cambridge Circus in the development of Keynes's ideas is far from settled, and it is still harder to pick out the particular contributions of individual members. From the debate material published in the Royal Economic Society edition of Keynes's *Collected Writings*, Sraffa's contributions do not appear particularly significant (cf. Keynes 1973, 1979), but things may well have been different in reality.[12]

The fourth episode has to do with the development of an analytic construct, namely the own rate of interest that Keynes uses in chapter XVII of the *General Theory* (1936: 222 ff.). This analytical tool was utilised by Sraffa in an article published in the March 1932 issue of the *Economic Journal* which amounted largely to a markedly critical review of

[12] Cf. Ranchetti (1998) for the first attempt to use the Sraffa Papers conserved at Trinity College, Cambridge, to this end. One cannot escape the impression that the illustration of the Cambridge Circus debates in vol. 13 of Keynes's *Collected Writings* reflects the relative propensities of the participants to give their accounts of the discussions, 40 years after the events, more than the events themselves.

Prices and Production by Hayek (1931a). The following issue of the *Economic Journal* included a reply by Hayek (1932) and a brief rejoinder by Sraffa.

The review article came just six months after the publication of Hayek's work – a reaction as prompt as it was severe, justified by the need to stress as drastically as possible the difference between the Keynesian analysis presented in the *Treatise on Money*[13] and Hayek's theory of money and business cycle, which rests explicitly on the marginalist (Austrian, to be precise) apparatus of value theory. Sraffa's paper was thus part of a reaction, stimulated by Keynes himself, against attempts at reabsorbing Keynes's analysis into the general current of traditional marginalism, much as was to be successfully attempted by the exponents of the so-called neoclassical synthesis after the publication of the *General Theory*.[14] The incisiveness of Sraffa's criticism of Hayek had a significant role in deepening, at least for a time, the abyss separating Keynes from the more rigorous versions of the marginalist tradition, i.e. the continental – and in particular Austrian – version.[15]

Hayek observes that 'monetary influences play a dominant role in determining both the volume and direction of production' (Hayek 1931a: 1). For traditional marginalist analysis, however, 'at a condition of equilibrium […] no unused resources exist' (1931a: 31), among other things because any fall or rise in the interest rate would bring about 'a transition to more or less "round-about" methods of production' (1931a: 33). Thus Hayek sets himself the task of reconciling marginalist theory and reality.[16] Evidently, Hayek's analysis of the influence of

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[13] A few months before the *Treatise on Money* had been reviewed by Hayek (1931b), who received a sharp reply from Keynes (1931). On the debate between Hayek and Keynes, see also the other writings contained in Hayek 1995.

[14] Hicks (1937) introduced the IS-LM apparatus; Modigliani (1944, 1963) added to it, among other specifications, the inverse relationship between real wage and employment.

[15] Significantly, it is precisely for this reason that a dim view is taken of these debates by a Keynesian of conservative bent like Roy Harrod (1900–78), who rejoiced when Keynes and Hayek subsequently drew closer together: cf. Harrod (1951). At the analytic level, in the *General Theory* Keynes was to adopt a framework differing at least in part, the Kahnian marginalism of short period equilibrium, which can however be seen mainly as a handy sort of scaffolding: cf. Tonveronachi (1983).

[16] In this respect, Hayek followed a road already suggested by Marshall and Wicksell, attributing to real forces the determination of equilibrium, and to monetary forces the origin of (short run) disturbances. While Hayek referred mainly to Wicksell (and to Böhm-Bawerk, with respect to the determination of equilibrium), British economists such as Robertson (1915) and Hawtrey (1919) analysed trade cycles on Marshallian lines.

monetary factors on real variables cannot be a matter of 'static analysis': it only concerns 'fluctuations of production', 'to build on the foundations given by the concept of a tendency towards an equilibrium' (1931a: 31). In other words, Hayek elaborates an analysis of the 'dynamics of disequilibrium' with particular reference to situations where the 'monetary' rate of interest diverges from the 'natural' rate (as understood by Wicksell 1898), focusing on the effects of monetary perturbations on the relative prices of consumption goods and producer goods (cf. also Hayek 1932: 238).

Hayek's analysis, with its theory of real economic equilibrium, rests on the concept of 'average period of production', as developed by Böhm-Bawerk (1889), and on his proposition that the capital intensity of production processes is a decreasing function of the interest rate. This thesis is but a variety of the marginalist tenet of an inverse relation between the 'quantity of capital', however measured, and its price. As we shall see later (§ 6.2), the concept of the average period of production comes in for destructive criticism from Sraffa in Chapters 6 and 12 of his 1960 book; in the 1932 article his attention focuses, instead, on Hayek's monetary analysis.

By characterising monetary phenomena as disequilibrating elements in the system, Hayek draws attention to bear on the 'forced saving' brought about by the deviation of the market interest rate from the 'natural' interest rate. Thus he purports to demonstrate how under sufficiently general hypotheses the capital accumulated through forced saving in the ascending phase of the cycle is economically destroyed in the descending phase, restoring the economy to its original equilibrium.

In short, the mechanism described by Hayek runs as follows: when the natural rate of interest is higher than the money rate, entrepreneurs are induced to apply for bank loans in order to cope with investment expenditures aiming at lengthening the period of production. This implies, at some stage, a decrease in the production of consumption goods, and hence an increase in their price, which provokes 'an involuntary reduction in consumption' (Hayek 1931a: 75). These elements constitute the ascending stage of the trade cycle. However, the increased incomes of the productive factors are transformed into greater demand for consumption goods; hence, 'a new and reversed change of the proportion between the demand for consumers' goods and the demand for producers' goods, in favour of the former' (ibid.). The relative prices of consumption goods increase. Thus it becomes more advantageous to shorten the average period of production, and the capital goods

characterised by higher duration lose value. Hence the descending phase of the trade cycle.

Given the sequence of cause and effect linkages determining the latter stage, a policy in support of demand for consumption goods as proposed in under-consumption theories (which Hayek took to include Keynes's theory) proves counterproductive. Indeed, according to Hayek, the capital accumulated in the ascending stage of the trade cycle (corresponding to forced saving) is economically destroyed in the descending stage, so that the economic system returns to its original equilibrium. The only consequence of active anti-cyclical intervention is to postpone adjustment to full employment equilibrium.[17]

In his review Sraffa points out that Hayek's argument fails to take into account certain features typical of a monetary economy, where money is not only a means of payment but also a unit of measurement in contracts and a store of value, so that inflation (and monetary policy) affects income distribution (Sraffa 1932: 42–3 and 48). It can therefore by no means be taken for granted that – in the presence of debts and money contracts, wage agreements and rigid prices – capital accumulated with forced saving will be economically destroyed through the play of actions and reactions of market automatisms; in general the new capital will imply bringing about a new state of equilibrium in the economic system.

Here Sraffa adds a further critical observation. When relative prices as a whole are not constant in time, there is no single 'natural' interest rate to be compared with the money rate of interest: each commodity has its 'own interest rate', defined as the interest paid on the money necessary to buy spot a unit of the commodity added to the (positive or negative) difference between spot and forward prices of the commodity, in per cent. This happens even in barter economies, in phases of transition from one equilibrium to another, since relative prices change over time due, for instance, to differential technical progress

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[17] 'If the proportion [between the demand for consumers' goods and the demand for producers' goods] as determined by the voluntary decisions of individuals is distorted by the creation of artificial demand, it must mean that part of the available resources is again led into a wrong direction and a definite and lasting adjustment is again postponed. [...] The only way permanently to "mobilise" all available resources is, therefore, not to use artificial stimulants [...] but to leave it to time to effect a permanent cure by the slow process of adapting the structure of production to the means available for capital purposes'. (Hayek 1931a: 87).

in the various sectors.[18] Thus, apart from the highly unlikely case of invariance in technology or homothetic variations, growth phases are characterised by the impossibility of defining *one* equilibrium interest rate, whether in barter or monetary economies. Hayek's answer on this account – that 'there might, at any moment, be as many "natural" interest rates as there are commodities, *all* of which would be *equilibrium rates*' (Hayek 1932: 245) – may be taken as one of the first signs of the appearance of a new analytic concept, namely that of intertemporal equilibrium (cf. Milgate 1979), but amounts to renouncing the idea of automatic mechanisms ensuring a tendency to a macroeconomic equilibrium of the economy.

We may well imagine Hayek's dismay, faced with a position such as Sraffa's must have appeared to him.[19] Here we are in a world where monetary factors exert an evident influence on real variables, and where the marginalist theory of value is universally accepted. What, then, could the outcome possibly be of rejecting what appeared as the only possible way to reconcile faithfulness to the theoretical foundations of marginalism with the realities of unemployment and cyclic trends in the economy? Today it appears quite clear that what to Hayek seemed like nihilism on the part of Sraffa was simply rejection of the marginalist approach (much like the attitude he showed towards Marshallian theory in the 1930 article) – not as a 'leap into the dark', but in favour of a reconstruction of political economy based on the alternative approach of the classical school.

[18] A point that Sraffa did not stress in his comment on Hayek is that not only are there multiple 'own rates of interest', but also that, due to the impossibility of foreseeing with a sufficient confidence the future path of technical progress for more than a very limited time span, it is impossible to rely on them for analysis of the structure of the economy, namely in the context of the theory of value and distribution. Limited exceptions (hence, insufficient as a foundation for a theory which purports to be general) are represented by those commodities whose nature is not affected by technical progress, and can therefore be forward traded, although within very finite time horizons. We should also recall that evaluations (having the nature of informed guesses) on rates of return have to be made by entrepreneurs when deciding on investment projects; however, this is a different (sectoral, not general) context, sufficient for evaluation in terms of higher or lower than a reference interest rate (embodying a risk element); also, the investment bet (when real investment projects are concerned) is typically an isolated bet, and no betting market exists in which betting quotients can be determined.

[19] Hayek (1932: 238) perceives in Sraffa's article 'an extreme theoretical nihilism which denies that existing theories of equilibrium provide any useful description of the non-monetary forces at work'.

2.4   The critical edition of Ricardo's writings

The difficulties economists like Hayek and Robertson met in understanding just what Sraffa was getting at (and, generally speaking, the widespread opinion that Sraffa's critiques were destructive, but not constructive) show the extent to which the marginalist approach had encroached on the classical tradition in the first half of the twentieth century, actually submerging it. Sraffa's critiques were considered as solely destructive simply because the possibility of an alternative approach was not recognised: hence the goal Sraffa set himself with the critical edition of Ricardo's works, namely to clarify the framework that the classical economists had built for political economy, which was also the framework Marx had taken up and further developed. It was already clear to Sraffa, at the time, that the classical approach could – albeit with significant modifications – provide a better foundation for economic theorising than the marginalist one.

Once again it was Keynes, as secretary of the Royal Economic Society, who in 1930 assigned to Sraffa the task of editing the critical edition of Ricardo's *Works and Correspondence*, previously allotted to Theodore Gregory (1890–1970), an economic historian and professor at the London School of Economics. More than once, in the years to follow, Keynes was to step in to defend Sraffa harried by the Royal Society and the publisher over delays in completing the work. Finally, it was with Keynes's help that Sraffa engaged in a painstaking manuscript hunt that was soon to bear its fruits.

Sraffa began working on Ricardo's writings in 1930, and went on with it for over a quarter of a century, while at the same time pressing ahead with the theoretical work that would lead to *Production of Commodities by Means of Commodities*.

As early as 1930 a chest containing the letters received by Ricardo from his correspondents was found in the house of one of his descendants. On many other occasions the search proved fruitless, but Sraffa succeeded nevertheless in collecting a huge amount of material, thanks to which he was able to fill out a richly detailed picture of Ricardo's cultural and human environment. Then, in 1943, after 13 years' research and with the six-volume edition ready in proofs, a number of extremely important letters from Ricardo to James Mill were found in an Irish castle, together with various other manuscripts including the essay which Ricardo had been working on in the last weeks of his life, entitled by Sraffa 'Absolute value and exchangeable value'.

For the final stages of the work, with pressure from the Royal Economic Society and the publisher mounting relentlessly, Sraffa was

partnered in his labours by Maurice Dobb, a Marxist economist and one of his best friends. Keynes and Austin Robinson saw him as the only one who could stand up to the meticulousness and timetables (late into the night) of the Italian economist.[20] At last, between 1951 and 1955, the now ten volumes of the *Works and Correspondence* of David Ricardo made their appearance, to be followed in 1973 by a painstakingly compiled volume of indexes.

After a century of near oblivion and misleading interpretations, Sraffa's philological rigour played a decisive role in the rediscovery of the classical economists' framework based on the surplus approach. When Sraffa began his work, let it be remembered, the most commonly accepted interpretations were those of Marshall (1890, Appendix i), who saw Ricardo as a somewhat imprecise and limited precursor of modern theory (in that he took account of the cost of production, i.e. supply, but not of demand in the determination of prices), and Jevons (in the Preface to the second edition of the *Theory of Political Economy*, 1879), who found Ricardo responsible for having perniciously diverted economics from the path of true science. Given either interpretation there was no reason to waste time on Ricardo's works.

This opinion was shared, for instance, by such distinguished economists as Robertson and Hicks, as their correspondence with Keynes reveals.[21] Acknowledgements extended, at the most, to the 'Ricardian' theory of rent as forerunner of the principle of decreasing marginal productivity, to Ricardo's theory of money and to his theory of international trade based on the principle of comparative costs.

Nevertheless, expectations were stirring about Sraffa's work. Publication was signalled as imminent on a number of occasions – by Luigi Einaudi in *Riforma sociale* in 1931, by Keynes in his 1933 essay on Malthus, by Sraffa himself in a letter to Rodolfo Morandi in 1934, etc. In his *History of Economic Analysis*, published posthumously in 1954, Schumpeter expresses the hope that '[s]ome day, perhaps, we may see the completion of Professor Sraffa's comprehensive edition of Ricardo's works, which we have been eagerly awaiting these twenty years'.[22]

Such expectations were more than justified. Sraffa's critical edition of Ricardo's *Works and Correspondence* is unanimously recognised as a

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[20] On Dobb's role in the edition of Ricardo's *Works and Correspondence*, cf. Pollitt (1988).
[21] Letter by Robertson of 3 February 1935, in Keynes (1973, vol. XIII: 504); and letter by Hicks of 9 April 1937 in Keynes (1973, vol. XIV: 81).
[22] Schumpeter (1954: 471).

model of philological rigour, and it was above all for this that in 1961 Sraffa was awarded the Söderström Gold Medal of the Swedish Academy of Science. Keynes (in 1939) and Myrdal (in 1947) were Sraffa's immediate predecessors among the 12 recipients in the history of this prize, which has been seen as in a sense anticipating the Nobel Prize for economics, awarded only as from 1969. The ten volumes of writings, many of which made available for the first time, together with the apparatus of notes and, in particular, Sraffa's introduction to the first volume restore Ricardo – and through him the whole school of classical political economy – to a central position in economic theory, freeing interpretation from the accretions of misleading marginalist readings.[23]

Let us now summarise, from our (post-1960) vantage point, Sraffa's interpretation of Ricardo. Sraffa stresses the importance of the notion of surplus, and of the conception of the economic system as a circular flow of production and consumption, which Ricardo inherited from an already robust school of thought: suffice it here to recall William Petty (1623–87) for the concept of surplus and François Quesnay (1694–1774) for the idea of a circular flow.[24] Ricardo's 'political' interest in the corn laws and the limits they set to accumulation led him to construct an analytic structure which would throw into sharp relief the negative effects of any obstacle to free trade on profits and, through them, on investments and growth. According to Sraffa's interpretation, at the outset (in the 1815 *Essay on the Influence of the Low Price of Corn on the Profits of Stock*) Ricardo implicitly relied on a simplified model (possibly set out in the lost 'Papers on the profits of capital') where a certain amount of corn used as means of production (seeds and subsistence wage for the

[23] Sraffa's interpretation of Ricardo is set out in the second part of the Introduction to the *Principles* (Sraffa 1951). Apart from this Introduction, as one of the leading neoclassical economists, George Stigler (1953: 587), remarks, 'Sraffa's editorial prefaces and notes serve an informative, rather than an interpretive, function. […] The editorial notes are superb. They seem unbelievably omniscient; they are never obtrusive or pedantical; and they maintain unfailing neutrality. Their presence not only clarifies much of Ricardo's work but also provides a vast fund of information on the economics of the period'.

[24] Cf. Roncaglia (1977) on Petty, Vaggi (1987) on Quesnay, and more generally Roncaglia (2001, Chapters 3–9), on the development and evolution of the classical school. Cf. also Gilibert (2000) on circular flow models in 1927–37, the first period of Sraffa's work on the Ricardo edition and on his 1960 book. It is worth recalling here that in 1948, advising the publisher Giulio Einaudi on a series presenting the major works of the classical economists, Sraffa singles out (together with Marx's *Theories of surplus value*) Petty, Cantillon and Quesnay (Potier 2000: 34–5).

workers engaged in the productive process) would yield a greater amount of corn; with the initial supplies of means of production and subsistence reconstituted, a surplus thus remains that accrues to the owning classes (as profit to the capitalists and as rent to the landowners). Should the land exhibit varying degrees of fertility, the result of competition between the farmers, who try to rent the most profitable lands from the landowners, will be a rent paid for these lands. Such rents will be determined by the difference between the unit cost of production that each plot of land entails and the corresponding cost for the worst lands under cultivation.[25] As the population increases, ever less fertile lands must be brought under cultivation: the cost of wheat obtained on the worst lands under cultivation rises and profit falls accordingly, while rents on the other lands increase, real wages remaining unchanged at the subsistence level. The rate of profits will also diminish. As in the simplified system considered by Ricardo, this can be determined as the ratio between two physical magnitudes of the same commodity: the quantity of corn accruing to capitalists as profit, and the quantity of corn advanced by the capitalists as means of production. The 'competition of capitals' ensures that the same rate of profits will prevail in the manufacturing sector.[26]

In his correspondence with Ricardo, Malthus criticises what would later be called the 'corn model', arguing that in no sector of the economy do product and means of production consist of one and the same commodity. Ricardo tackles this objection in *The Principles of Political Economy and Taxation* (1817), resorting to the labour-embodied theory of value (according to which the value of every commodity is given by the quantity of labour directly or indirectly necessary for its production) to measure the surplus and the capital advanced. The rate

[25] This is the so-called Ricardian theory of rent, or theory of differential rent, which Ricardo actually published after Robert Malthus (1766–1834) and Edward West (1782–1828), while the work by Robert Torrens (1780–1864) came out on the same day: in fact, the pamphlets by the four economists came out in rapid succession between 3 and 24 February 1815; cf. Sraffa's editorial notes in Ricardo (1951, vol. IV: 4–6).

[26] Sraffa's suggestion of a corn model underlying Ricardo's *Essay on profits* has been criticised by Hollander (1973b). A lively and complex debate ensued (Eatwell 1975a, Hollander 1975, Hollander 1979: 123–63, Garegnani 1982, Bharadwaj 1983, Peach 1993: 39–86, etc.), but no agreement was reached. A 'commodity-ratio theory of profits' was explicit in Torrens in 1821 (as shown by Roncaglia 1972), and De Vivo (1985, 1996) suggests that this may derive from Ricardo's corn model. As Sraffa himself stressed, the arguments in favour of the corn model hypothesis are circumstantial: no fully developed exposition of the corn model on the part of Ricardo is extant.

of profits is thus obtained, once again, as the ratio between physically homogeneous quantities (units of labour now rather than corn). Taking this line, the theory of value plays an instrumental role to the theory of distribution, which is thus able to bring to the fore the clash of interests between the social classes of workers, capitalists and landowners.

However, the real importance of Ricardo's theory[27] lies in offering analytic representation – albeit imperfect – of the classical conception of the economic system as a circular flow of production and consumption in a society based on the division of labour. In such a system the product of each firm does not correspond to its requirements in terms of means of production (including means of subsistence for the workers employed). Thus, in isolation, no producer is able to continue, but must enter into relations with other producers in other sectors of the economy to obtain the necessary means of production in exchange for at least a part of her/his own product. Hence, we have a logical circuit of production and exchange stages; the market, conceived as the network linking up the various firms and sectors of the economy, operates in such a way that the economic system continues to function. In other words, the exchange ratios characterising the inter-industry flows of commodities and services must be such as to guarantee to each sector the necessary reconstitution of means of production and subsistence, as well as a profit sufficient to induce firms to go on with their activities. As we have seen, profits, together with rents (and possibly with wages in excess of subsistence level) constitute the result of the distribution of the surplus. The latter is given by what is left of the society's product after all that is needed to reconstitute the means of production and subsistence has been subtracted.

The size of the surplus (Smith's 'wealth of nations' problem), its distribution among the various social classes (the central problem in political economy for Ricardo in his *Principles of Political Economy and Taxation*) and its employment between 'unproductive' consumption and accumulation constitute the issues which the classical economists focused their attention upon. The characteristic features of classical political economy are thus division of labour, the notion of the surplus and the circular production–consumption flow.[28]

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[27] The deep respect Sraffa had for Ricardo's analytic powers was accompanied by recognition of Ricardo's cultural feebleness; thus, in a letter to Gramsci dated 21 June 1932 he writes (Sraffa 1991: 74; my translation): 'Ricardo was, and always remained, a stockbroker with a mediocre culture'.

[28] For a reconstruction of the history of economic thought substantiating this dichotomy between a classical/circular flow and a subjectivist/marginalist approach, cf. Roncaglia (2001).

Actually, there was one particularly important weak point in the analytic representation Ricardo offered of the classical conception of the economy, and that was the hypothesis of relative prices proportional to the quantity of labour required for the production of the various commodities, which is inconsistent with the assumption of a uniform rate of profits in the various industries. For a coherent representation of the capitalist economy the problem had to be solved. Sraffa's efforts were already moving in this direction when he began work on the Ricardo edition, and the two lines of research were pursued in parallel and alternately for decades. Finally, in 1960, Sraffa published his little jewel, *Production of Commodities by Means of Commodities*.

The next chapters are devoted to this work: a general presentation of it (Chapter 3), and a more detailed analysis of two aspects, the distinction between basic and non-basic commodities (Chapter 4) and the construction of a unit of measure, the standard commodity (Chapter 5).

3
Production of Commodities by Means of Commodities

3.1   From Ricardo to Sraffa

This chapter is devoted to Sraffa's major contribution: a relatively slender volume – 92 pages of text, including the Preface – work on which began in 1927, when the author moved to Cambridge, and was finally published in 1960 in English, with the Italian edition following a few weeks later.[1] As we shall see, in *Production of Commodities by Means of Commodities* Sraffa comes up with a solution to the problem of value framed in terms of the classical conception, simultaneously determining relative prices and one of the two distributive variables, the wage rate and the rate of profits, with the other distributive variable considered as exogenously given.

There is a close link between the critical edition of Ricardo's *Works and Correspondence* and the theoretical research Sraffa himself was engaged in. In the 1930s and 1940s his work proceeded along two parallel paths, with greater intensity on the Ricardo edition in the 1930s and with renewed focus on the book in the early 1940s;[2] in the second half of

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[1] The Italian edition was prepared, as mentioned before, under the impulse and with the decisive help of Sraffa's life-long friend, the banker Raffaele Mattioli. The publisher, Giulio Einaudi, was also a friend of Sraffa's and son of his professor, Luigi Einaudi; for years Sraffa was a highly respected adviser to his publisher, who played an important role in the shaping of Italy's left-wing culture.

[2] A multi-volume edition of the Sraffa Papers has been announced as forthcoming since about a decade ago, under the general editorship of Heinz Kurz, with Cambridge University Press. For a general presentation of the Sraffa Papers cf. Kurz (1998), Smith (1998, 2000); the catalogue prepared by Jonathan Smith is available on the Internet at http://www.lib.trin.cam.ac.uk. In the meantime, availability of the Sraffa papers held in Trinity College, Cambridge, stimulated, at an increasing rate over the past decade, researches on the original development

the 1950s, as the work on Ricardo came to completion (apart from the indexes, which at the time Sraffa hoped would be drawn up by somebody else), Sraffa concentrated on preparing his more strictly analytic contribution for publication.[3]

A crucial point in the development of Sraffa's thinking consists – as he himself points out in the Preface to his 1960 book, and as we shall see more clearly in Chapter 7 – in the transition from the idea that analysis of competition requires the assumption of constant returns to scale to the idea that no hypotheses on returns need be involved. The need for such hypotheses was disturbing for Sraffa not only on account of the analytic difficulties which they entailed, discussed in his 1925 and 1926 papers and directly concerning the Marshallian partial equilibrium approach, but also for a more general, methodological, reason, namely his aversion to relying on 'any idealistic argument that obscured […] objective reference' and his reliance on 'physical' data.[4] The transition took place somewhere between 1927 and 1930 (probably closer to the latter part of the period), constituting the culmination of Sraffa's efforts, beginning with the 1925 article, to supersede the Marshallian approach. In this period Sraffa also realised that physical costs alone are insufficient for determining exchange values, and that income distribution between wages and profits is also relevant.

(*Continued*)

of Sraffa's ideas in the second half of the 1920s (Garegnani 2004, Rosselli 2004), on the role of Marxian influences (De Vivo 2004, Gilibert 2004), on the developments in the 1930s and 1940s (De Vivo 2000, 2001, Rosselli 2001 focused on the work on the Ricardo edition, Pasinetti 2001, Gilibert 2004), on Sraffa's biography (Bellofiore and Potier 1998, Naldi 1998, Potier 2000, Daniele 2000, D'Orsi 2001, Naldi 2001 and 2004, Marcuzzo 2001 and 2004) and on specific issues, such as money and banking (Panico 1998 and 2001, Bellofiore 2001) or Sraffa's interaction with his mathematical friends while working on his 1960 book (Kurz and Salvadori 2001, 2004, 2008). We should recall, however, that this literature, though interesting and useful in itself, can only have an indirect bearing on the interpretation of Sraffa's thought, which – as Sraffa himself always insisted – must be firmly grounded on his published writings. In other words, in the hierarchy of sources, published material must always take precedence over unpublished material (and this, of course, must take precedence over the oral tradition).

[3] In the early 1950s Sraffa's work was delayed by 'a terrible mountaineering accident in a sadly famous holyday in Norway' (Pasinetti 2007: 178).

[4] Kurz (1998: 24–5) quotes the passage above from Sraffa Papers D3/12/9.46, where Sraffa takes a few notes from a paper on 'Goethe's view of nature', and recalls Sraffa's preference for the 'physician's outlook of Petty' (Sraffa Papers D3/12/4.3). On this cf. also Naldi (2004: 100). On Petty and Sraffa, cf. Roncaglia (1977).

After this brief introduction, the rest of this chapter is devoted to survey of the content of Sraffa's 1960 book (§ 3.2), illustration of its classical (mainly Ricardian) roots (§ 3.3), and discussion of certain aspects of Sraffa's conceptual framework. Thus we will look into the notion of socially necessary techniques (§ 3.4), the assumption of wages paid at the end of the period of production and the very notion of period of production (§ 3.5). In conclusion we will take a general overview of Sraffa's impact on economic culture, amounting to what may indeed be considered a Sraffian revolution, as slow in the making as in the deploying of its effects (§ 3.6).

In Sraffa's analysis, as in that of the classical economists and Marx, the analytic condition upon which determination of the prices of production (the 'natural' prices of the classical economists) rests, consists quite simply in an equal rate of profits in the various sectors. This assumption corresponds to the idea, pondered by Smith and Marx among others, that the unity of the capitalist system is guaranteed by the free flow of capital from one sector to another in pursuit of the most advantageous employment. Nothing is stated on the relations between demand and supply for each commodity; the hypothesis that equilibrium prices correspond to equality between demand and supply, characteristic of marginalist economic theory, finds no place in Sraffa's treatment (a point we shall return to below, in § 3.3).

3.2   *Production of Commodities by Means of Commodities*

Let us now briefly survey the line of investigation followed in *Production of Commodities by Means of Commodities*.

When commodities are at the same time products and means of production, the price of any one commodity cannot be determined independently of the others, nor the complex of relative prices independently of the distribution of income between profits and wages (which are expressed in terms of the commodity chosen as the unit of measurement, and are thus real wages). One must therefore consider the system as a whole, with all the interrelations running between the various productive sectors, tackling simultaneously income distribution and the determination of relative prices.

As a first step, Sraffa (1960: 3) shows that in a system of production for mere subsistence, with no surplus product, and where 'commodities are produced by separate industries and are exchanged for one another' at the end of the production period, 'there is a unique set of exchange values which if adopted by the market restores the original

distribution of the products and makes it possible for the process to be repeated'.

If the economic system under consideration is able to produce a surplus, 'the distribution of the surplus must be determined through the same mechanism and at the same time as are the prices of commodities'. (Sraffa 1960: 6). If the wage can exceed the subsistence level, the relative prices and one of the two distributive variables – wage or rate of profits – are jointly determined, once the technology and the other distributive variable are known. The higher the wage, the lower the rate of profits will be.[5]

Let us recall here Sraffa's equations for this case (Sraffa 1960: 11):

$$(A_a p_a + B_a p_b + \ldots + K_a p_k)\,(1 + r) + (L_a\,w) = A p_a$$

$$(A_b p_a + B_b p_b + \ldots + K_b p_k)\,(1 + r) + (L_b\,w) = B p_b$$

$$\cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot \quad \cdot$$

$$(A_k p_a + B_k p_b + \ldots + K_k p_k)\,(1 + r) + (L_k\,w) = K p_k$$

where A_a, B_a, $\ldots$, K_a; A_b, B_b, $\ldots$, K_b; $\ldots$; A_k, B_k, $\ldots$, K_k and L_a, L_b, $\ldots$, L_k are the quantities of the various commodities and of labour required for the production of quantities A, B, $\ldots$, K of the same k commodities; p_a, p_b, $\ldots$, p_k are the prices of the k commodities; w is the wage rate and r is the rate of profits. We thus have k equations for a system with k commodities, and $k + 2$ unknowns (k prices, the wage rate and the rate of profits).

Let us choose a commodity as the standard of measure (so that we remain with $k – 1$ relative prices as unknowns). Let us then consider as exogenously determined either the rate of profits or the wage rate (which is a real wage rate, being expressed in terms of the commodity chosen as the standard of measure). The k equations are now sufficient for determining the k remaining unknowns.

Let us go on to assume that the system produces a surplus: namely, for each commodity the total quantity required as means of production in the various sectors is less or equal to the quantity produced, with the strict inequality holding for at least one commodity. It can then be proved that the system has economically meaningful (i.e. positive) solutions for the unknowns. It can also be shown that the rate of profits is a decreasing function of the wage rate, varying from a maximum corresponding to a zero wage rate (the case in which all the surplus accrues to profits) down to zero when the wage rate is maximum (and the whole surplus accrues to wages).

[5] Cf. Pasinetti 1975, Chapter 5, for a broader mathematical treatment of this simple model.

When there is a surplus, the possibility opens up to produce 'luxury' commodities, that is, commodities which are neither means of production nor part of necessary (subsistence) consumption. On the opposite side, we have 'basic' commodities, which are directly or indirectly required as means of production in all production processes. We shall discuss this distinction in greater detail in Chapter 4. Sraffa then briefly illustrates the distinction between prices of production and market prices, followed by the distinction between necessary and surplus wages, before presenting the general solution for the model in the case where each industry has a single product (thus leaving aside by assumption the case of joint production, to be considered in the second part of his book).

Sraffa (1960: 12–13) goes on to analyse changes in relative prices connected to changes in income distribution. As the classical economists and Marx already knew, such changes are determined by 'the inequality of the proportions in which labour and means of production are employed in the various industries'. Indeed, 'it is impossible for prices to remain unchanged when there is inequality of "proportions"'.

Two chapters (Sraffa 1960: 18–33) are then devoted to constructing a particular analytic tool, namely the 'standard commodity', and to proving the uniqueness of the underlying 'standard system'. Thanks to this construct, as we shall see later (Chapter 5), Sraffa is able to tackle the Ricardian problem of an invariable measure of value and to illustrate important characteristics of his own analysis.

Part 1 of the book closes with a chapter (Sraffa 1960: 34–40) on the 'Reduction to dated quantities of labour'. This analysis is relevant to a number of issues, including the Smithian idea that the natural price can be resolved into wages, profits and rents (see § 3.3) and the Austrian theory of capital, developed by Böhm-Bawerk and adopted by Hayek, whereby capital is measured in terms of an 'average period of production' (discussed later, § 6.2).

In Part 2 of the book Sraffa's analysis of production prices goes on to consider the case of joint products and, within this category, fixed capital goods and scarce or non-reproducible means of production such as land.[6] The book closes with Part 3, consisting of a single chapter on the choice between economically alternative methods of production in

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[6] On the problems which arise with transition from single product systems to joint production – problems concerning the positivity of prices, the definition of basics, the monotonicity of the wage–profit curve, the choice of the methods of production – there is an ample literature, referred to later (§ 8.3).

relation to variations in the rate of profits (which, as we shall see later in § 6.3, is of relevance for the critique of marginalist theories) and with four appendices including the 'References to the literature', where Sraffa explicitly associates himself with the classical economists.

3.3   Sraffa's analysis and the classical approach: Critique of 'cost of production' theories, distinction between market and natural prices

Sraffa himself points out in the Preface to his book that the point of view he adopts is similar to that of the classical economists, such as Smith and Ricardo. In section 7 of his book, Sraffa (1960: 9) discusses the significance to be given to the prices that are the object of his analysis. There he affirms that 'such classical terms as "necessary price", "natural price" or "price of production" would meet the case' of his own theory.

Sraffa gives his own conception of the proper use of such classical terms in the form of negation, that is in terms of what they do not mean. In this way he highlights the principal errors that should be avoided in a proper analysis of the determination of relative prices. First, Sraffa explains that the term 'cost of production' is too one-sided: the idea that the prices of products are determined by costs, that is, by the quantities and prices of the means of production directly required in their production, involves circular reasoning, since the means of production are a subset of the commodities which constitute the product. In general (with the exception of non-basic commodities) there is a bi-directional relationship between the prices of commodities and their costs of production: we need to know prices to determine production costs, and these in turn need to be considered in price determination. Thus, in order to determine the price of a basic commodity it is necessary to consider the entire system of technical relationships among the various productive sectors: not only the direct or indirect use of other commodities in the production of the commodity in question, but also the use made of that particular commodity in the production of all other commodities and itself must be taken into direct consideration.

Such specification of the concept of prices of production implies critical reference to the so-called 'adding-up-of-components' theories, according to which the price of a commodity is given by the sum of the elements that enter into its cost of production.[7] This type of theory

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[7] These have been christened 'Adding-up of components theories' by Maurice Dobb (1973: 46, 122), following Sraffa's exposition in Sraffa (1951).

came in for severe criticism, by Ricardo, to begin with, and later by Marx, who attributed it to Adam Smith. In this context Sraffa also recalls 'the "real costs" of Marshall and the "quantity of capital" which is implied in the marginal productivity theory'.[8]

According to the theory attributed to Smith, '"as soon as stock has accumulated in the hands of particular persons", and "as soon as the land of any country has all become private property", the price of commodities is arrived at by a process of *adding up* the wages, profit and rent'.[9] This implies that the price can be entirely reduced to wages, profits and rent, which Smith seems here to be implicitly considering as independent of each other. In fact his contention, that a rise in wages would produce a rise in prices, may be rationalised by attributing him with this implicit assumption.[10] Ricardo, in an unbroken line that extends from his *Essay on Profits* to the *Principles*, goes to great lengths to demonstrate that a rise in real wages produces a reduction in profits, while causing some prices to rise and others to fall, when considered in terms of the particular commodity chosen as the standard of measure.[11] Pursuing his criticism of Smith's position to the extreme, Ricardo (1817: 62–3) goes so far as to show that, by adopting a very particular standard of measure (a commodity produced only by labour and with the shortest possible period of production), all prices fall when wages rise – the exact opposite of the inference drawn from Smith, or rather from the position attributed to him.

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[8] Sraffa (1960: 9). Dobb (1973: 122) points out that it is possible to identify, as Schumpeter had already done, a 'Smith-Mill-Marshall line' in this regard. In my opinion, the role of Smith and J. S. Mill in this line of descent should be treated with the greatest caution, since their representation of the economy in the most important aspects corresponds to that of other classical economists such as Ricardo, so that the difference between them and Marshall is wide indeed. Cf. Roncaglia (2001).

[9] Sraffa (1951: xxxv). The passages from the *Wealth of Nations* quoted by Sraffa are in Smith (1776: 65, 67).

[10] 'Adam Smith, and all the writers who have followed him, have, without one exception that I know of, maintained that a rise in the price of labour would be uniformly followed by a rise in the price of all commodities'. (Ricardo 1817: 46). The position attributed to Smith is undermined by the assumption, common to all the classical economists, that wages and prices are measured in terms of some commodity (usually gold) and not in inconvertible paper money.

[11] Initially, before the 1815 *Essay on profits*, Ricardo shares Smith's position. See, for example, the letter to Malthus dated 25 July 1814 in Ricardo (1951–5, vol. 6: 114). Sraffa elaborates on the role of this position in the development of Ricardo's thinking in Sraffa (1951: xxxiii ff).

Let us recall at this point that the theory of labour-values that Ricardo finally adopts in his *Principles* is not so much the result of any particular belief about the prices of commodities being precisely proportional to the quantity of labour directly or indirectly required for their production[12] as, rather, instrumental in providing a basis for his criticism of the theory of prices which he attributes to Smith. Labour-value is thus used by Ricardo as an instrument to demonstrate more forcefully that the distributive variables are not independent from each other. By fixing the wage at its subsistence level, the rate of profits can be shown to depend solely on the conditions of production of the industries directly or indirectly involved in the production of wage goods. Once rent has been disposed of with the 'Ricardian' theory of differential rent, profits can be directly identified with the surplus produce of the economic system. With the problem of income distribution thus solved, the ground is ready for the issue of relative prices to be tackled.

As already mentioned above, the 'adding-up-of-components' price theory requires the cost of production of each commodity to be fully reducible to wages, profits and rents. Smith (1776: 68–71) seems to believe that this supposition can be proved by simply noting that the prices of the means of production are also composed of wages, profits, rent and the prices of the remaining means of production, which could also be so divided, and so on, in a sequence that he seems to consider finite. Ricardo does not concern himself with this particular aspect of Smith's theory, limiting his criticism to Smith's implicit consideration of wages and profits as independent.[13] Later Marx, and then Sraffa, were to demonstrate that Smith's belief in such total 'decomposition' of the price of each commodity is also erroneous.

The explanation for this error resides in a well-known deficiency in Smith's analysis, namely underestimation of the importance of what Marx calls 'constant capital', that is, the produced and reproducible commodities used in the process of production. In fact, whenever there is at least one commodity directly or indirectly necessary for the production of all the other commodities in the economy (a basic product, in Sraffa's terminology), total decomposition is impossible. If the costs of production of a commodity are reduced to wages, profits, rents and the price of

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[12] Ricardo himself is fully conscious of the error implicit in this statement, and explicitly points it out from the very first pages of the *Principles*. See sections IV and V of Chapter 1, Ricardo (1817: 30–43). In fact Ricardo frets over the problem in innumerable places throughout his written work.

[13] 'The whole price still resolves itself either immediately or ultimately into the same three parts of rent, of labour and profit' (Smith 1776: 68).

the means of production, then again these latter means of production are decomposed into wages, profits, rents, and the price of their means of production, and so on, we never arrive at a commodity residuum whose cost of production consists solely of wages, profits and rents because, by definition, there exists no commodity which does not require at least one basic commodity for its production. There will always be a residue composed of the basic commodities of the system under consideration, even if the value of this 'commodity residue' is made as small as we wish through a sufficient number of stages of reduction.

One additional consequence of the impossibility of total decomposition of price into profits, wages and rents (except as a limit to a reduction process taken to infinity) is that there is a finite limit to the maximum value of the rate of profits, corresponding to a zero rate of wages. If total decomposition were possible, the rate of profits corresponding to a zero wage rate would be infinite, for the rate of profits would be obtained from the division of a finite quantity (total profit, which would be equal to total output) by a zero quantity (capital advanced, which would be composed entirely of wages, taken equal to zero).[14]

After pointing out that his theory of prices is radically different from the 'adding-up of components' theories, Sraffa (1960: 8) also points out that it would be misleading to say, in the context of his analysis, that price 'depends as much on the demand side as on the supply side', and goes on to stress that his analysis 'contains no reference to market prices'. The terminology that Sraffa proposes, and in particular his use of 'prices of production', is precisely that used by classical economists to distinguish the prices considered as theoretical variables in their analyses from 'market prices', or the prices that are encountered from day to day in the markets.[15]

The fact that Sraffa never talks of an 'economic equilibrium' or of 'equilibrium prices' in relation to his system is also worth stressing. In the absence of any consideration whatsoever of the factors that determine the quantities supplied or demanded of the various commodities, there is no reason to suppose that prices of production should be such

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[14] Marx goes to great length on this point: cf. for example Marx (1905–10, vol. 1: 78–125); or Marx (1894: 815–30). For Sraffa's view see Sraffa (1960: 35).

[15] This point is discussed in Roncaglia (1990b, 2009a), and with reference to Smith, in Roncaglia (2001: 139–45). The point is also stressed in the Sraffa Papers (D3/12/11, quoted by Garegnani 2004: 182): 'When A. Smith etc., said "natural" he did not in the least mean the "normal" or the "average" nor the "long run" value. He meant that physical, truly natural relation between commodities, that is determined by the equations'.

as to equal the quantity demanded with the quantity supplied for any commodity in the long period, or that market prices should fulfil this function in the short (or very short) period. Indeed, the Classical (and Sraffian) analysis does not involve a long–short period dichotomy; what is involved is a dichotomy between actual and theoretical variables. Moreover, without any theoretical analysis of market prices, which are considered actual and not theoretical variables, the relation between market prices and prices of production must remain undetermined. Therefore, there is no textual evidence for attributing to Sraffa the idea that prices of production are 'centres of gravity' for market prices. It is, then, incumbent to try to grasp the sense in which 'prices of production' constitute a theoretical benchmark that increases our understanding of economic reality. Let us now consider this issue.

It has already been repeatedly indicated that Sraffa's point of view is in many – though by no means all – respects similar to that of the classical economists. They explicitly view the general framework for their analysis of relative prices and income distribution in a manner that can be summarised as follows. The determination of prices is studied at a given moment in time, given the prevailing technology. But technology can be considered as given only with reference to a given instant of time, as it is subject to ever-continuous evolution over time. Technology is always reacting to changes rooted in past history (expansion of the market, growing division of labour), and going through a process of ceaseless renovation.[16] In other words, the classical economists' analysis of prices examines the situation of a given economic system at a given moment in time, much like a photograph of the system at an instant in time.[17]

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[16] Torrens (1821) is even more explicit on this point. His position in this respect is discussed in Roncaglia (1972).

[17] The metaphor of the 'photograph' (or 'snapshot', as my Italian was at first translated), originally proposed in my degree dissertation (Roncaglia 1969: 73), then in Roncaglia (1975: 119), is opposed both to the interpretations of Sraffa's scheme as the supply side of a general equilibrium model (cf. for instance Hahn 1982) and to Garegnani's 1976b notion of 'long period positions', on which see § 8.5 later and Roncaglia (2009a). In a letter to Rüdinger Soltwedel of 28 February 1968 (Sraffa Papers, C 294/2, quoted by Bellofiore and Potier 1998: 64 as well as by Potier 2000: 39 and Pasinetti 2007: 190) Sraffa himself utilises the term 'photograph' in relation to his analysis. In an otherwise interesting article, Ginzburg (2000: 126n), clearly unaware that Sraffa himself had used it, criticises the metaphor of the photograph – and through it my interpretation of Sraffa's analysis – as implying the absence of any abstraction; there is however no implication of this kind in my interpretation, as the discussion of the assumption of 'socially necessary' techniques in the following section shows; cf. also Roncaglia (1975: 27–9).

In this way, all the economic variables which are not the object of analysis can be taken as given. Theoretical investigation can focus attention on the 'virtual' movement of specific variables and on the relations between these variables as if they were being considered 'isolated in a vacuum'.

In the case of *Production of Commodities by Means of Commodities*, the choice of the variables to be analysed falls on the relations that exist between prices of production and the distributive variables, the wage rate and the rate of profits. Everything else (technology, levels of production) is assumed to be given for the analysis of the particular problem chosen.

It must be pointed out, however, that this choice does not represent an *a priori* refusal to analyse the problems of technological change, the determination of the levels of production or the policies of firms. Instead, it simply represents a decision to analyse each particular problem separately, one at a time, isolated from the others. The assumptions and the methods of analysis need not necessarily be the same for each and every problem. It is necessary to choose, for each particular problem, only those variables most relevant to the analysis of the problem at hand, leaving aside those factors which, as Ricardo says, lead only to 'modifications' in the analysis, but not to changes in the substance of the analysis.[18] Thus, in his analysis of production prices and their relationship with income distribution, Sraffa abstracts from technological change, from movements in the levels of activity, from differences in the market forms prevailing in each specific sector of the economy, from different kinds of labour, and so on. Sraffa's prices of production, that is, represent in the simplest possible way the conditions of reproduction of a capitalist society based on the division of labour.

3.4 Socially necessary techniques

Let us now turn to discussion of the possible existence of different techniques of production in use among the various productive units that make up an industry. Does Sraffa's analysis of prices of production implicitly refer to the most efficient (the most recent) among the techniques in use, or to an average of the techniques employed in the various productive units within the industry? This problem is obviously significant only if Sraffa's analysis is intended as an attempt to describe real mechanisms or basic tendencies at work in market economies. If, on

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[18] We shall develop this point later on, in § 7.5, on the basis of a discussion of Sraffa's relationship to Wittgenstein's thought.

the other hand, the analysis is proposed as a solution to a purely formal theoretical problem (determination of the prices that produce a uniform rate of profits in the various industries), then the relation between the theory and the world that it is supposed to describe ceases to have any importance. This dilemma is open to different answers in different contexts; thus, it may be useful to pursue the issue somewhat further.

Sraffa gives no direct indication concerning the problem of the type of technology in use. However, given his continual reference to the classical economists, it seems reasonable to refer in this context to socially necessary techniques of production, interpreting this term in the same sense that Marx uses when introducing the notion of the labour time 'socially necessary' for the production of a given commodity, implying reference to the dominant technique in the historical period under consideration.[19] This need not necessarily correspond to the average of all the techniques actually adopted by the various producers of the commodity under analysis. The two concepts coincide if the industry is composed of a large number of small firms, for then each of these is 'dominated' by all the others.[20] The distinction becomes important if the industry contains some firms of large size which perform the role of price leaders. The relevant technology for the determination of prices would then be the techniques to which these firms refer to when taking price decisions with the aim of maximising profits under the constraint of no entrance of new competitors into the industry. Should there be several large producers, each at the same time using different techniques, then the choice of the 'socially necessary' technique depends, among other things, on the structure of the industry considered. It is thus necessary to consider the structure of the industry as one of the givens of the problem.

It is, therefore, not sufficient to refer to the engineers to obtain empirical estimates of the technical coefficients to be used in the construction

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[19] 'The labour time socially necessary is that required to produce an article under the normal conditions of production, and with the average degree of skill and intensity prevalent at the time'. (Marx 1867: 39). See also the passage cited in the following note.

[20] Marx is evidently referring to this situation when he says: 'On the one hand, market-value is to be viewed as the average value of commodities produced in a single sphere, and, on the other, as the individual value of the commodities produced under the average conditions of their respective sphere and forming the bulk of the products of that sphere. It is only in extraordinary combinations that commodities produced under the worst, or the most favourable, conditions regulate the market-value'. (Marx 1894: 175). Soon after (on p. 176), Marx makes it clear that 'what has been said here of market value applies to the price of production as soon as it takes the place of market value'.

of a Sraffian system of price determination; nor is it sufficient to use a sectoral input-output table showing the average techniques. Study of specifically economic factors, such as the structure of each industry, is also required. Moreover, study of what might be called socio-political factors is also necessary, in order to take into account the influence that these factors have on the technical coefficients of production, in particular on the coefficients expressing the labour necessary to production in the various industries. Such factors include the length of the average working day, the speed of work and absenteeism. More generally, the technology in use is also influenced by factors that originate outside the capitalistic or market sectors of the economy: for example, public services like education, the administration of justice, health and sanitary requirements and services, influence technical coefficients in production processes.

The extreme difficulty in taking all these factors into consideration, thus the difficulty in determining, with any exactness, a concrete concept of a 'reference technology', should not in itself be considered as an objection to Sraffa's analysis. At any given instant the various factors cited above can be considered as given and thus, in principle at least, the technology can be identified. The actual process of description is extremely complex and can be no more than approximated. However, a certain amount of approximation is common in any application of a theoretical scheme to the study of real life situations.

The 'dominated' techniques still in use correspond to investments carried out in the past, which would not be chosen today. These techniques, translated into a corresponding number of equations to be added to the system of equations illustrated earlier in § 3.2, can serve, as Sraffa (1960: 78) points out, to determine the relative prices of the corresponding fixed capital equipment still in use. It can be shown that the set of prices corresponding to the dominant techniques are not influenced by the dominated techniques.

In this manner the problem of the transition period of technological change can be dealt with. An example of such a situation might be the case of mechanical loom weaving as the dominant technique, although artisan weaving is still carried on. On the other hand, in a situation in which an innovation has just been introduced on a limited scale, such that it has yet to constitute a dominant technique, the innovating firms enjoy an extra profit, determined in a way much like that of a quasi-rent. More precisely, this extra profit is equal to the difference between the discounted price of the means of production incorporating the new innovation and their price of production. The discounted

price is computed subordinately to determination of the set of prices of production for the old technique, so that the price of the means of production utilised in the new technique is formed with reference to the already determined magnitudes: the product price, the wage and the rate of profits. The only remaining unknown in the equation for the new technique is the price of the total means of production. This price is then compared, as indicated above, with the value of these means of production computed on the basis of their prices of production. It is, however, to be noted that competition exerts a continuous pressure on the system to incorporate fully any new innovation. In this way the new technology is diffused throughout the system and the quasi-rents described above can only prove transitory.

Finally, it should be noted that the assumption of a uniform rate of profits can be replaced with the assumption of a given range of profit rates, a different rate of profit being associated with each particular sector.[21] This assumption allows us to take into account the possibility of structural differences across sectors, as is the case, for instance, when competitive sectors coexist with oligopolistic sectors exhibiting legal or technical barriers to entry or high starting-up costs. Although Sraffa's scheme is incompatible with the neoclassical theory of the firm, based on the interaction of marginal costs and marginal revenues, it is perfectly compatible with the classically derived theories of oligopoly, based on the existence of barriers to the free entry of producers into the sectors considered.[22]

[21] Cf. Sylos Labini (1984: 141–3).

[22] According to the classical idea of competition, when there are no obstacles to the entry of new producers in any sector of the economy, movements of capital from one sector to another in search of maximum profits determine a tendency to a uniform rate of profits throughout the economy. When there are insurmountable obstacles, the firms already present in the sector under consideration are easily led to collude and to behave like a monopolist. When there are obstacles, but such obstacles are surmountable, we have a market form intermediate between free competition and monopoly. The main instances of such market forms are concentrated oligopoly (where the barriers to entry stem from the existence of economies of scale and technological discontinuities, so that big plants are at an advantage over smaller plants, and the opening of a new big plant implies a drastic increase in the industry's product, and hence a downward pressure on the product price) and differentiated oligopoly (where large advertising expenses are necessary to render the product of the new firm acceptable to the market). Cf. Bain (1956) and Sylos Labini (1956). In fact, as the latter author indicates, the intermediate cases where barriers to entry are neither nil nor infinite can be considered as the general, while the two extremes may be considered as borderline cases, with scant practical relevance.

3.5   The post factum wage payment and the period of production

In order to further clarify some points of the frame of reference thus far outlined, let us take a look at two minor but interrelated problems. These are the length of the period of production to which the analysis refers and the moment within the cycle of production in which wages are paid.

Sraffa assumes that the wage is paid at the end of the production process. This assumption seems to disregard the fact that for almost all commodities (except those with a very short production period) an allowance for profit on wages advanced to labourers is an integral part of the price. As a matter of fact, however, the wage is paid not at the beginning, but at the end of a prearranged working period (for example, weekly, monthly). As Marx repeatedly stresses, the capitalist pays for labour power *post factum*, that is, after it has been used; this is necessary for the capitalist to control the process of production.[23] At the same time Marx, following the tradition of the classical economists, observes that in computing the prices of commodities it is necessary to consider profit not only on fixed but also on variable capital, that is, on wages advanced.

The two assumptions on wage payment, both present in Marx's writings, can be traced to the existence of two distinct problems: study of the social relations between labourers and the owners of the means of production in a capitalist system and study of the exchange relations between commodities. In the former case, payment of wages after work has been expended can be seen as a weapon in the hands of the employer to ensure regular execution of the work contracted for. In the latter case, payment of wages before the product is obtained and sold corresponds to the fact that wages are commonly included in the capitalists' advances, so that a profit must be computed on them as on other means of production.

The assumption of wages being paid at the end of the production period can, however, be justified even if our interest is primarily in the relation between the wage and the rate of profits. In this context, such an assumption implies the existence of a period of production uniform for all industries and equal to the period of wage payments. But this requirement poses no special problem, as definition of the unit for the length of the period of production is arbitrary. Sraffa speaks in his examples of a period equal to one year: an obvious consequence of his initial reference, typical of the classical tradition, to agricultural processes

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[23] See for example Marx (1905–10, vol. 1: 182).

of production.[24] But there is nothing inherent in Sraffa's scheme that makes the one-year assumption essential.

In fact, different processes of production will, as a rule, generally have different length (namely, different periods of production). In order to determine prices in such circumstances we may construct a system of equations in terms of the highest common denominator of the various different periods of production. In such a system each industry is subdivided into a number of parallel production processes, each corresponding to a stage in the overall process of production. The semi-finished outputs obtained at the end of the first stage can then be treated as means of production for the next stage, and so on up to completion of the process, when the final output emerges as finished goods. In theory this highest common denominator of the various periods of production could be infinitely small, or, more realistically, one working day. In practice, as the most important period of payments is usually that for wages, the outlays on both raw materials and the other means of production can be arranged in a period or groups of periods of length equal to the period of payment of wages. Reference can then be made to the latter as the proper length (or unit of time) of the period of production. This approach obviously accords with the assumption that wages are paid *post factum*. At the same time, the prices of those final commodities requiring a period longer than the period of payment of wages for their production will include an element of profit calculated on the wages advanced for the period between the payment of wages and the emergence of finished goods.[25]

3.6   The Sraffian revolution

Taking an overall view of Sraffa's work, we can see it as the sum of three parts: reconstruction of the authentic nature of the classical approach with his edition of Ricardo's *Works and Correspondence*; critique of marginalist theory, whether in the Marshallian version (with the papers of 1925, 1926 and 1930) and in Hayek's macroeconomic version (with the 1932 paper), or when it proposes a theory of capital as a factor of production (with the 1960 book and a brief reply, in 1962, to a review by Harrod,1961); finally, an analysis of value and distribution that is

[24] Cf. for example Mill (1821: 185): 'A year is assumed in political economy as the period which includes a revolving circle of production and consumption'. (This passage is quoted in Sraffa 1951: xlii.)

[25] For illustration of the assumptions of wages being paid at the beginning or the end of the production period, and the respective implications, cf. Roncaglia (1975: 84–94).

both analytically consistent and rooted in the classical conception of the functioning of the economic system.

Thus, through his research Sraffa provides us with all the basic pointers necessary to set economic science on a path away from the marginalist tradition and back towards the classical tradition. Reviving the classical approach, he frees it from the misleading interpretations accruing from marginalist readings; he provides a logically self-consistent solution to the problem of exchange values where Ricardo – and Marx after him – had fallen short of the goal, constituting one of the causes that led to the abandonment of the classical framework and the rise of the marginalist approach. Indeed, Sraffa demonstrates that what the marginalist approach offers is marred by an equally basic flaw regarding the theory of capital – a flaw, moreover, which cannot be remedied.

There are at least two points in this contribution that deserve closer consideration in view of the interpretative controversy they gave rise to, namely the relevance of his critique of the marginalist theory of value and the relations between the revival of the classical approach and Keynesian theory. We shall consider the two issues in Chapters 6 and 7, but it may be useful to anticipate here a summary treatment.

As we have suggested (and as we shall see in more detail later, in Chapter 6), in *Production of Commodities by Means of Commodities* Sraffa provides the tools for a radical, and indeed destructive, critique not only of the version of the marginalist theory implying an aggregate function of production, but also of all the versions in which the distribution of income among social classes is tackled as a problem of 'equilibrium prices' (rent, wage and rate of profits) of 'factors of production' (land, labour and capital) determined by demand and supply just like all other commodities. It has been argued that this criticism does not apply to the modern theory of general economic equilibrium, which contains no mechanism to ensure a uniform rate of return on all the various capital goods, if valued in terms of their costs of production. However, as early as 1926 Sraffa points out that the general equilibrium approach is in its generality utterly sterile.[26] Indeed, it is precisely for this reason

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[26] 'To examine the conditions of simultaneous equilibrium in numerous industries: a well-known conception, whose complexity, however, prevents it from bearing fruit' (Sraffa 1926: 541). In those happy times economists did not rely solely on internal consistency when evaluating a theory, but also required theories to be useful in the analysis of the real world; thus, for instance, in 1922 another participant in the debate on the theory of the firm, Allyn Young, wrote (in a letter to Knight): 'I have yet to see that the method of general equilibrium gives us anything at all that gets us anywhere' (quoted by Marchionatti 2001: 70).

that Sraffa originally concentrates his critical fire on Marshallian theory, whose apparent realism then exerted (and, despite the lack of any good answer to Sraffa's critiques, still exerts, especially for applied economists) a powerful appeal. After the Marshallian theory, Sraffa goes on in the early 1930s to tackle the somewhat more solid Austrian theory of value, the developments of which in the macroeconomic field (particularly by Hayek) seem at the time to offer the major alternative to Keynesian theory, then entering the arena. Still susceptible to the appeal of the Austrian theory in the 1960s and 1970s we find economists like Harrod and Hicks, but the problems raised by Sraffa – both in his 1932 review of Hayek and in Chapters 6 and 12 of the 1960 book – stand in the way of any progress along that path.

Sraffa's criticisms of the concept of capital also amount – at least in principle – to a deadly blow delivered to the very foundations of the so-called 'neo-classical synthesis'. Combining Keynes's thesis on the possibility of fighting unemployment by adopting adequate fiscal and monetary policies with the marginalist tradition of a simultaneous determination of equilibrium quantities and prices as a method to study any economic problem, this approach has in the last few decades come to constitute – in its many variants – the dominant doctrine in textbooks the whole world over. It is only due to increasing specialisation in the various fields of economics that the general equilibrium theorists are able to construct their abstract models without bothering about their applicability to real world issues, while macroeconomists can claim that their 'one commodity models' constitute an acceptable tool for analysing economies where the division of labour prevails, and hence where the existence of a multiplicity of commodities is a basic characteristic. For those who believe that the true task facing economists, hard as it may be, is to seek to interpret the world they live in, Sraffa's contributions still mark out a path for research that may not (as yet) have yielded all it was hoped for, but is certainly worth pursuing.

The problem that, perhaps more than any other, stands in the way of progress along this path is the difficulty in throwing a bridge to the other major line in non-neoclassical research offered by modern theory, which is the line proposed by Keynes and developed by his most direct followers. Issues like the role of uncertainty and expectations in the economy, the influence of monetary and financial phenomena on real ones and the possibility for unemployment to persist alongside unused productive capacity, all appear, at least at first sight, to have nothing to do with the conceptual world of *Production of Commodities by Means of Commodities*. However, contrasting Sraffian 'long period' analysis with

Keynesian 'short period' analysis means contradicting both the conceptual foundations of the classical approach as proposed anew by Sraffa and those of the Keynesian approach. A solution may be sought – as we seek to argue more fully in the concluding chapters – in recognising that we are faced with a diversity of problems and that there are diverse areas of analysis. These need not be related by the – chimerical – requisite of a general model embracing them all. We should, rather, focus on the requisite of conceptual consistency, less stringent perhaps, but more so than is often recognised, and of great utility in providing indications for the development of theories within the various fields of analysis.

4
Basic and Non-Basic Products

4.1 Basics, non-basics and wage goods: Sraffa and the classics

In *Production of Commodities by Means of Commodities* Sraffa proposes and resolves a number of specific but important problems, thereby contributing to the development of the classical approach and bringing to light elements which differentiate his analysis from the marginalist theory of value and distribution. Two of these problems will be investigated in the present chapter and in the following one. The first concerns the distinction between basic and non-basic products, namely between commodities that enter directly or indirectly as means of production in every and each process of production, and commodities which do not serve as means of production or which are used, directly or indirectly, only in a limited number of processes. The second is the construction of the standard commodity, a composite commodity with special characteristics that make it particularly suitable for use as a measure of value.

The differences between Sraffa's theory, based on physical costs of production and a circular flow of production and consumption, and the subjective marginalist approach are thus eloquently highlighted; at the same time, the roots of Sraffa's frame of reference in the theories of the British classical economists and Marx, which at first sight might seem obvious, will require careful investigation if the relationship is to be made sufficiently precise.

Analysis of the standard commodity, and of the distinction between basic and non-basic products, will help us to a better understanding of the similarities and differences between Sraffa's line of enquiry and classical political economy. As we shall see, in Sraffa's contribution analytic refinement is accompanied by important modifications in the very conceptual framework underlying the analysis. In fact, Sraffa not only offers solutions

to these problems, but at the same time implicitly highlights the limitations of the solutions proposed by the classical economists, thereby giving more precision to the definition of the problems themselves. As will be seen in the next chapter, this is especially evident with regard to the second problem, the search for an invariable standard of value, in relation to which Sraffa develops the notion of the standard commodity.

Reference to the classical economists also allows for a better understanding of the way the problems mentioned above relate to the theory of prices, and yields some interesting indications concerning the limits intrinsic to the solutions proposed by Sraffa. This is especially true in relation to the first problem at hand, the distinction between basic and non-basic products, which is our main concern in this chapter.

The most apparent difference between Sraffa's analysis and that of the classical economists, in terms of the two questions under investigation, lies in the treatment of wage goods. They constitute the central nucleus of the classical system of price determination, but are relegated to a secondary role as non-basic products within Sraffa's analysis, although with important qualifications. This difference stems mainly from differences concerning the determination of the distributive variables, the wage rate and the rate of profits.

The classical economists generally considered the wage as fixed at subsistence level; it could thus be taken as given in physical terms. Sraffa, on the other hand, allows for the possibility that workers participate in the distribution of the surplus produced in the economy with a (variable) real wage rate above the subsistence level; at the same time he considers the rate of profits as given independently of the price system, so that the wage turns out to be a dependent variable in his analysis.[1] The analytical implications of this difference, as will be seen, relate to issues which may be taken as matters of economic policy. However, a great deal of caution is advisable in such exercises, and the reader should consider the examples concerning policy issues presented in the following discussion of use only insofar as they serve to elucidate the analytical consequences of various assumptions on the method of wage determination.

4.2 The classical distinction between necessaries and luxuries

The distinction between 'necessaries' and 'luxuries' (according to the terminology in use at the time) was introduced by the British classical economists in order to differentiate between those commodities

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[1] Cf. Sraffa (1960: 33).

whose conditions of production influence the entire economy (more specifically, the entire system of relative prices), and those which have no such overall impact.[2] In the framework commonly adopted by classical economists, the wage is fixed in physical terms as a given quantity of a particular commodity. This 'wage good' is then considered as the sole 'necessary' commodity in the economic system. It can be so considered because it is also assumed that the commodity can be produced by labour alone, or by labour in combination with a certain quantity of the very same commodity.[3]

The distinction between 'necessary' and 'non-necessary' commodities put forward by the classical economists thus appears as a distinction between wage goods and luxury goods. It is in this form that the distinction is employed in *The Wealth of Nations*, where Adam Smith (1776: 870–2) distinguishes between taxes on goods of primary necessity and taxes on luxury goods, suggesting that a tax on necessaries brings about a general increase in prices, while a tax on luxuries only increases the price of those goods actually taxed.[4] Ricardo, who criticised Smith's theory of prices, accepts the proposition concerning a tax levied on luxuries, but rejects Smith's analysis of the effect of a tax levied on necessaries. It is true that a tax levied on luxury goods does not produce a general variation in relative prices; however, the effect of a tax levied on wage goods is not a general rise in prices but, rather, a reduction in the rate of profits (Ricardo 1817: 205). The commodity chosen as the standard of measure cannot rise in price relative to itself and thus at least one price cannot rise. At the same time, an increase in the cost of labour – that is, an increase in the wage – is required in order to leave the real wage (that is, the workers' purchasing power) unchanged at subsistence; hence, profits are reduced. Thus a tax on wage goods produces a reduction in the rate of profits, with each specific price free to rise or fall.

Ricardo's reasoning on this point is logically indisputable; his critics can only attack his general assumptions, claiming that they are far from realistic. Malthus observes on various occasions in his correspondence

[2] Cf. Roncaglia (1996b). This is not to say that luxury goods are not important; cf. Berg (2005) for an appraisal of their cultural and economic role in the Enlightenment period.

[3] In the so-called 'corn model' implicit in Ricardo's *Essay on Profits* (Ricardo 1815; cf. § 2.4), corn is the unique 'necessary' good in the system, consisting of the corn necessary as seed for planting plus the corn necessary to support the labour required for its cultivation; by assumption, manufacturing commodities only required corn and labour for their production.

[4] Smith (1776: II, 870–1).

with Ricardo[5] that workers do not consume only wheat, and that, in general, there are several means of production often heterogeneous with respect to the product. In Torrens's approach,[6] which can be considered a reply to Malthus's objections on these matters of realism, there are two distinct 'necessary' goods, each of which is required as an input in its own production as well as for the production of other commodities, either directly as a means of production or indirectly as a wage good. In fact, the two commodities that Torrens distinguishes are composite aggregates of heterogeneous goods. One represents the output of the industrial sectors of the economy (and includes machines, tools and manufactured consumption goods), while the other comprises the output of the agricultural sector, that is, food and raw materials.

Torrens (1821: 43–5) also suggests that the distinction between 'necessaries' and luxury goods may serve for the analysis of non-competitive market situations. If, for whatever reason, a condition of monopoly exists in the market ('when, for example, nature has limited the quantity of soil necessary to the production of a particular sort of wine') an exception arises to the principle of proportionality of prices to the value of the means of production employed in production. In such conditions capital yields more in one employment than in another. The price of a product produced under conditions of monopoly may then exceed its competitive price, 'if those desirous of procuring it are numerous, and possessed of incomes much beyond what their necessities require'. However – and at this point the distinction between necessaries and non-necessaries comes into play – while this is the sole limit to increase in the price of luxury goods, there is another limit, imposed by technology, for necessaries: 'A monopoly affecting these, can never, for any permanency, raise their value so high, that the product of a day's labour, or of a capital sufficient to put a day's labour in motion, shall not be exchangeable for a day's subsistence'. This will be the case even if for a short period the market price of necessaries may increase more rapidly than the prices of luxury goods because of what in modern terms we call inelastic demand for the former goods and elastic demand for the latter.

[5] See the letters dated 5 August 1814, and 12 and 14 March 1815, in Ricardo (1951–5, vol. 6: 117–18, 185–7), for examples. An assessment of the importance of this criticism in the development of Ricardo's theory of value is given in Sraffa (1951: xxi–xxxiii). It should be noted that the complexities of the theory of value emerge as soon as the assumption of a system with a single basic product is abandoned.
[6] Torrens (1821). The system for the determination of prices proposed by Torrens can be considered as a crude predecessor of Sraffa's more complete system. On this cf. Roncaglia (1972: xviii–xxiii).

A line of argument similar to that proposed by Torrens to demonstrate the different effects of monopoly on necessaries and on luxury goods can be pursued with reference to the theory of decreasing returns to land and the tendency towards a stationary state. Let us briefly recall Ricardo's (1817: 120) analysis. In the absence of technical progress, expansion of production in agriculture (following an increase in population) requires that ever less fertile lands be taken under cultivation, or it necessitates a more intensive and less profitable cultivation of the land already in production. Since the wage in terms of agricultural output must remain unchanged at the level of subsistence, the rise in costs of production due to the expansion of cultivation implies a reduction in the rate of profits. The process comes to a halt when the rate of profits falls to zero (or, more precisely, below the minimum level necessary to induce capitalists to continue to invest). At this point the accumulation of capital comes to a halt, the increase in output stops and the size of the population becomes stationary. From this point on, assuming still that there is no technical progress,[7] the economic system continues to reproduce itself through time at the same level. This is the position that the classical economists named the 'stationary state'.[8]

We can distinguish two cases. In the first, the commodity produced under decreasing returns is a luxury. The general effect described by Ricardo cannot result in this case because the change in the method of production of a luxury only affects its own price relative to other commodities. The rate of profits and the wage in terms of necessaries remain unchanged. The alternative case involves a necessary commodity whose physical cost of production increases, while the wage remains unchanged at the subsistence level, namely in terms of the necessary commodity (or in terms of a basket of necessaries of which the commodity is a constituent element); in this case the rate of profits must decrease.[9] Only in the latter case does the system tend towards a stationary state.

The distinction between necessaries and luxuries was also adopted by Dmitriev (1904, especially the first essay) and by Bortkiewicz (1906–7, 1907). These writers develop mathematical formulations of Ricardo's

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[7] Ricardo (1817: 120) emphasises that 'the natural tendency of profits […] to fall […] is happily checked at repeated intervals by the improvements in machinery, connected with the production of necessaries, as well as by discoveries in the science of agriculture which enable us to relinquish a portion of labour before required, and therefore to lower the price of the prime necessary of the labourer'.

[8] Cf. Ricardo (1817: 109). J. S. Mill, in Book IV of his *Principles of Political Economy* (Mill 1848), discusses the subject at length.

[9] This distinction is recognised by Ricardo (1817: 118).

model to demonstrate rigorously that both wage goods and the goods directly or indirectly necessary to their production must be considered as 'necessaries'.

Bortkiewicz's analysis also suggests the correction of an error made by Marx in his presentation of the problem. Marx defines the average rate of profits as the ratio of the system's total surplus value to the total value of capital advanced. He is thus led to conclude that the conditions of production of all commodities, including luxuries, are relevant to the determination of the rate of profits. However, as shown by Bortkiewicz, if the wage rate is given in physical terms, only the conditions of production of wage goods, together with those commodities directly or indirectly required in their production, play a part in the determination of the rate of profits.[10] The reasons behind Marx's error on this point are difficult to explain, for Marx himself, in various other passages in his writings, accepts the traditional distinction between necessary and luxury commodities, pointing out that a change in the conditions of production has an effect on the rate of surplus value only if such a change takes place in a sector producing a necessary, while an increase in the productivity of a sector producing a luxury commodity only diminishes the value of the luxury commodity produced.[11]

However, even in relation to the more complete formulations by Dmitriev and Bortkiewicz the treatment that Sraffa proposes for the problem is substantially different, in that he abandons the assumption that the wage is given in terms of physical commodities. Probably in connection with this, Sraffa also abandons the classical terminology, which suggests a distinction based on the use of particular commodities for final consumption ('necessary' and 'luxury goods', although the latter term does occasionally appear in *Production of Commodities by Means of Commodities*). Instead he proposes a terminology more directly linked to technology ('basic' and 'non-basic' products). In the next two sections, 3 and 4, we will look into Sraffa's treatment of the problem, concluding with a comparison between the implications of Sraffa's approach and treatment as opposed to the Ricardian tradition.

4.3   The distinction between basic and non-basic products

According to Sraffa's (1960: 8) definition, 'The criterion [for distinguishing basics from non-basics] is whether a commodity enters

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[10] On this point see Meldolesi (1971) and Vianello (1970: 131–9).
[11] Cf., for example, Marx (1905–10, vol. 1: 215–7).

(no matter whether directly or indirectly) into the production of all commodities'.

Obviously this does not coincide with the distinction between consumers' goods and producers' goods, not only because non-basics may include workers' consumption goods (necessary or productive consumption in classical economists' traditional terminology) which should be included, according to the classics, in the category of 'necessaries',[12] but also because there may exist cases of non-basic products being classed as means of production, as Sraffa himself points out.[13] In addition, the distinction between basic and non-basic products can be precisely defined. The distinction between producers' goods and consumers' goods is arbitrary to the extent that some goods may be used both for consumption purposes and as means of production.

Sraffa's definition coincides with the Ricardian and classical definition (according to which basic products are wage goods and those inputs directly or indirectly necessary for their production) only under the assumption that the wage is fixed at the subsistence level (or that it is given in terms of a workers' consumption basket). In this particular case it is possible to substitute quantities of wage goods for the quantities of labour required in the various processes of production which make up the technical specification of the system. Since it can be presumed that labour is directly or indirectly necessary to every process of production, the wage goods, together with the goods that are directly or indirectly required for their production, will also be necessary to every process of production. The first system of production with a surplus that Sraffa presents in *Production of Commodities by Means of Commodities* may be interpreted in this sense.[14]

However, Sraffa (1960: 9–10) very quickly abandons the assumption of wages being given in terms of wage goods at a subsistence level, allowing for their participation to the distribution of the surplus. In this

[12] The role of productive consumption for the classical economists also depends on it being part of productive advances, not of the surplus; expansion of production requires accumulation of (investment in) additional necessary consumption goods as well as additional means of production.

[13] See, for example, Sraffa (1960: 90–1) (Appendix B). Despite the clarity of Sraffa's analysis some commentators misunderstood the two definitions. For instance, Blaug (1974: 31–2) restricts the category of basics to those commodities alone which enter into *all* processes of production *directly*, and then uses this blatant misreading of Sraffa's definition to produce completely groundless criticisms of some of Sraffa's main results.

[14] Sraffa (1960: 6–7). Such a line is explicitly followed by Spaventa (1971, Chapters 2–3).

context, Sraffa considers the possibility 'to separate the two component parts of the wage and regard only the "surplus" part as variable; whereas the goods necessary for the subsistence of the workers would continue to appear, with the fuel, etc., among the means of production'. In this way, variations in the methods of production of wage goods (or of goods necessary to their production) continue to produce variations in the rate of profits (for a given 'surplus' wage) and in relative prices, in the same way that variations in the methods of production of technologically 'basic' products affect relative prices and the rate of profits.[15]

However, Sraffa (1960: 10) prefers to 'follow the usual practice of treating the whole wage as variable'. This choice 'involves relegating the necessaries of consumption to the limbo of non-basic products'. This is inconvenient because 'necessaries however are essentially basic'. Sraffa, in fact, supposes that labour is necessary to all processes of production (there are no completely automated processes of production); as a consequence the wage goods necessary for the maintenance of the labourers enter, indirectly, in every process of production. Contrary to what might be expected from the fundamental property of basic products, however, it becomes now possible that a change in the technical conditions of production of a wage good has no influence on the relation between the wage and the rate of profits, or on the relative prices of all commodities. Suppose, for example, that labour is paid in terms of a basic product which is also taken as the standard of measure and that the structure of consumption changes with changes in wages, not only in terms of the quantity consumed of each particular commodity, but also the number, type and proportion of the commodities that enter the labourers' consumption basket.[16] For those wage goods that are not also 'technologically' basic products there will be no general repercussion on

[15] Such is the case, for example, with an escalator clause applied only to a part of wages corresponding to a basket of consumption goods considered indispensable. It should be pointed out, however, that escalator clauses in post–Second World War economies apply to money wages, while the analysis carried out here is in real terms; that is, it concerns relative prices. A more precise analogy to Sraffa's case would thus be the case of an escalator applied to the entire money wage and based on variations in the money price of the commodity chosen as the standard of measure, corrected for the part of wages destined to necessary consumption expenditure, by applying to it the relative variation of prices between the necessary consumption goods and the commodity chosen as the standard of measure.
[16] This particular assumption is not necessary to the reasoning that follows. However, together with the two preceding assumptions, it highlights – given its plausibility – the difficulties involved in defining a subsistence wage in terms of physical goods once the assumption of pure biological subsistence is abandoned.

the system stemming from a change in their conditions of production, so that both the rate of profits and the prices of basic products remain unchanged, unless the change in their prices produces a change in the prevailing wage rate.

4.4   The wage–profit relationship

By considering the whole wage as variable, Sraffa is able to put emphasis on the conflict of interests between capitalists and workers over the distribution of the economic surplus. A higher wage corresponds (except in special cases) to a lower rate of profits.[17] With the publication of *Production of Commodities by Means of Commodities* the curve that expresses the relationship between wages and the profit rate was brought back into the centre of discussion in economic theory (it was renamed 'the factor-price frontier' by neoclassical economists in an attempt to place capital and labour on the same footing, as 'factors of production'). The existence of a relation between wage and rate of profits is naturally also recognised within the marginalist tradition, but as their approach establishes unique equilibrium values for the two distributive variables, it becomes possible to disregard any possible conflict of interest for there exists a natural solution endowed with the desirable attribute of optimality. Such a solution is also equitable, since each factor of production receives the equivalent of its contribution to production. In distinct contrast, Sraffa rejects the possibility of determining distribution within the analysis of the theory of prices, and this allows for the conflict over the distribution of the economic surplus to be brought back into the forefront of economic analysis, though within another 'analytic area', distinct from the one relating to the determination of relative prices.[18]

The inverse relation between the wage and the rate of profits, as suggested earlier (§ 3.3), is at the centre of Ricardo's theory and of his critique of Smith's theory of prices. However, for Ricardo and his closest followers this proposition provides the basis for attacking the landed classes and rents, rather than for elucidating the conflict of interest between capitalists and workers. The explanation lies, evidently, in the

[17] There are no exceptions to the inverse relation between wage and rate of profits in the case of a system of simple production, i.e., in which each industry produces a single commodity. For demonstration, see Sraffa (1960: 38–9). In the case of a system of joint productions it is possible for the wage, measured in terms of some particular joint-products, to be positively related to the rate of profits. Again, see Sraffa (1960: 61–2).
[18] This point is developed in Roncaglia (1993).

fact that the wage is considered as fixed at the level of subsistence. It is thus not from the workers that the capitalists had to defend their incomes, but from the possibility of an increase in rents, which would imply an increase in the costs of production of wage-goods and thus, given technology, a reduction in capitalists' profits. Since the classical economists suppose that profits are entirely destined to accumulation, profits are also seen as originating increases in the demand for labour. There is thus a common interest that serves to link both capitalists and workers in defending themselves from the common enemy to capital accumulation and economic growth, the landlords. Only a few years after Ricardo's death, the Ricardian socialists and some classical economists (such as Torrens 1834) pointed out that there also exists a conflict of interest between capitalists and workers over the distribution of national income. This conflict occupies a central position in Marx's analysis, even if pride of place is reserved for the criticism of the capitalistic system as a whole. Sraffa's analysis instead directly illustrates the distributive conflict between wages and profits, which is smoothed over by marginal analysis, but which is, indeed, of fundamental importance for an understanding of the capitalistic society.[19]

4.5   Subsistence goods and the distinction between basics and non-basics

It has already been seen how consideration of the whole wage as variable – rather than as consisting of a given subsistence component and a variable surplus component – masks the importance of subsistence commodities. In order to take the particular position of these commodities into account, Sraffa suggests that the minimum limit of the wage rate be determined by the price of the subsistence basket of consumption commodities. Changes in the production conditions of subsistence commodities would thus directly influence this minimum of the wage rate. A change in the methods of production of wage commodities

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[19] Let us recall, however, that the wage–profit curve is constructed on the basis of a given technology and given output levels: the dynamic relationship between wages and profits is far more complex. Traditional marginalist theories determine equilibrium values for the distributive variables (corresponding to a point on the wage–profit frontier) through comparison between demand and supply functions for the 'factors of production' capital and labour. As we shall see later (Chapter 6), Sraffa criticises these theories, thus denying the existence of an equilibrium point on the wage–profit frontier. On dynamic analyses of income distribution in a Sraffian framework, see § 8.6.

affects distribution and the set of relative prices if, and only if, the change in the minimum wage rate influences the actual wage rate. However, if the changed conditions of production only concern a wage commodity which is technologically non-basic, there will be no influence on the wage–profit curve whenever the wage is measured in terms of a technologically basic product. If the technological change under consideration affects income distribution, what takes place is only a shift along the wage–profit curve; if the rate of profits does not change, then the relative prices of all basic products remain unchanged.

There is a uniform equi-proportional shift in the curve depicting the relationship between wage and rate of profits, only if the wage is measured in terms of the technologically non-basic product whose technique of production is changed (or in terms of a basket of commodities of which the commodity in question is a component part). In this case, relative prices measured in terms of this specific commodity all change in the same proportion. Those commodities composing the workers' 'surplus' consumption, just as the luxury goods consumed by the capitalists, do not have even this indirect influence on prices, since they do not enter into the determination of the minimum subsistence limit of the wage rate.

It is very difficult to distinguish those commodities that can be considered part of the subsistence consumption from those that can be considered part of workers' surplus consumption. However, the analysis carried out above indicates that a greater flexibility of definition is possible, without altering the system's basic analytical relationships. Changes in the technique of production, thus in the price, of a non-basic product consumed by workers will in fact imply a different impact on wages, depending on whether the commodity is attributed by workers' greater or lesser importance in the consumption basket. On the other hand, the general – economic and social – situation in which such changes take place will also be of major importance in determining the extent of the actual change in the wage.

The results presented in *Production of Commodities by Means of Commodities* are, as Sraffa confirms, independent of whether the wage is treated in the manner there suggested, or dividing the wage into a fixed portion representing pure subsistence and a variable portion representing the participation of labour in the distribution of the economic surplus.[20] Nonetheless, at this point it should be evident

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[20] For an analysis of the effects of the different treatments of the wage (as wholly variable, or as made up of a necessary and a surplus part), cf. Roncaglia (1975, Chapter 5).

that Sraffa's distinction between basic and non-basic products rests on entirely technological factors, and is independent of the consumption habits of workers which had provided the basis for the classical economists' distinction between necessary (subsistence) and luxury goods.

4.6 The relation to von Neumann's theory of proportional growth

In order to gain a better understanding of the definition of a basic product, especially in relation to the problem of wage goods discussed in the preceding section, we may usefully draw a comparison between Sraffa's scheme and the similar formulation by von Neumann (1945–6).

The object of *Production of Commodities by Means of Commodities* is the study of the relationship between the wage and the rate of profits and the relation between these two distributive variables and relative prices. The distinction between basic and non-basic products is therefore founded on the need to single out those commodities that influence these relationships in a general way. The system put forward by von Neumann, on the other hand, proposes a description of the essential characteristics of an economic system under the assumptions of given techniques of production and constant returns to scale. In a von Neumann system, as is well known, the economic system undergoes balanced expansion at a rate of growth which is equal to the rate of surplus (the ratio, computed for each commodity separately, of surplus product to the quantities of the same commodity utilised in production), which is uniform for all goods, including wage goods. Thus, the solution proposed by von Neumann also yields the conditions for the maximum rate of growth for the system, under the assumptions noted above. For given techniques of production and constant returns to scale, a given rate of expansion of output requires a proportionate expansion of the quantity of labour employed and therefore, for an undisturbed rate of real wages, an equivalent proportionate expansion of the wage fund, or in other words of the quantity of wage goods. These goods, however, as we saw above have no particular place within the category of basic products as defined by Sraffa.

Let us examine some implications of this difference. We may consider, as an example, a centrally planned economy with constant returns to scale. Imagine that the Economic Planning Board wants to produce a

plan that would yield proportional growth[21] with prices such as to yield a uniform rate of profits in all sectors.

Sraffa's system appears to suggest that the central planner concerned with the setting of prices could limit intervention in the first instance solely to the basic products in the system. However, these are to be considered all together, because of the interdependence that exists among their several processes of production. The fixing of the prices of the non-basic products, including wage goods, can then be considered in a second step, taking as given the prices already determined for basic products. Additionally, if for any reason the price of any commodity is set at a level different from its 'price of production', this will directly or indirectly affect the cost of production of all the other commodities, if the commodity in question is a basic product. If, on the other hand, the good is non-basic, there will be no effects on the costs of production of the other goods, or at the most on a limited number of connected non-basic goods. For the same reasons, taxes and subsidies on non-basic products in a market economy should not in themselves cause repercussions on the entire system of relative prices. There may be only indirect effects occurring if such taxes or subsidies induce changes in income distribution.

Let us return to a centrally planned system, with the objective of a uniform rate of expansion in all sectors. In this case, the planning of the quantity of wage goods to be produced cannot be overlooked (nor, in general, can the quantity of consumption goods) even in the first instance. Indeed, as has already been seen, the quantity of labour employed must grow at the same rate as the other means of production; under the assumption of a constant real wage, we also need a growth of consumption equal to the general rate of growth of the system taken as a whole.

If the objective of uniform growth in all sectors is abandoned, the problem can be restricted to determining the levels of production corresponding to a target net product composed of the various commodities. In this case, we can use a well-known dual relationship to that applicable for the determination of prices. In fact, the levels of activity of non-basic industries required to obtain a given net output of these commodities can be determined anterior to the levels of activity of the basic product industries, which can then be determined subject to the levels set for the former group of industries.[22] What should be pointed out in this context is that in the planning of outputs, wage goods can be treated just as

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[21] Suppose that the economic system is already on such a path at the moment considered.

[22] For example, cf. Zaghini (1967a: 262–3).

basic products, since labour is required for all productive processes: the levels of output of those sectors producing wage goods are determined simultaneously with the levels of output of the technologically basic industries, subordinately to the levels of activity of the industries producing luxury goods, when target outputs have been set for them.

The same example can be used to understand the limits of applicability of the distinction between basic and non-basic products. The crucial assumption is that of a given technology. If there is a change in the technique adopted in one or more industries, the composition of the group of basic products may change. Commodities that were previously considered basic could become non-basic in the new technological conditions and vice versa.

Consider, as an example, a system that produces two commodities, wheat and coal. Each of these commodities is required as a means of production for both commodities. If there were a change in the technique of production employed in the industry producing wheat, such that it could be produced under the new conditions without the use of coal as an input in production, then wheat would become the only basic product in the system. Coal, which had previously been a basic product, would now be classed as a non-basic product. If the example is then reversed, with the technique for wheat production changing so as to newly require coal as a means of production, the change turns out to be from a system with one basic product (wheat) to a system with two basics (wheat and coal).

It is also possible for the technique behind a basic product to be changed with the introduction of a new machine which had not previously been produced in the system. In such a case a commodity not previously present in the system, namely the new machine, becomes a basic commodity.

The distinction between basic and non-basic products is thus strictly valid only within the limits of the assumption of unchanged techniques of production, and can therefore be used in the context of a dynamic problem only with the greatest caution. Rigorous use of Sraffa's distinction is only possible within the limited confines of the theoretical problem proposed by Sraffa, namely the determination of prices of production and of their relationship with distributive variables.

4.7   The effect of taxes on basic, non-basic and wage goods

In conclusion, the Sraffian notion of basic products, though rooted in British classical political economy, implies a substantial modification to the conception in which basic products were simply identified with the

wage goods. A step in the right direction was taken by writers intermediate between the classics and Sraffa, such as Dmitriev and Bortkiewicz, who constructed systems in which basic products included not only wage goods but also all commodities directly or indirectly necessary to their production (a point that had been overlooked in the classics' more simplified conception) – that is, including all those products that are technologically basic. Sraffa's definition satisfies its operational purpose (namely the specification of those commodities which have a generalised influence on relative prices) only when the commodities consumed by workers which are technologically non-basic are excluded. This modification can be illustrated by examining the effects of a tax levied on a particular commodity, one of the principal problems in which the classical economists employed a distinction between basic and non-basic goods.

A tax levied on a basic commodity shifts the wage-rate of profits curve inwards and, if the commodity is used in differing proportions in the various industries, produces a variation in the relative prices of all commodities. A tax levied on a non-basic product, on the contrary, leaves the wage-rate of profits curve unchanged (always subject to the condition that the commodity is not used as – or does not enter, directly or indirectly, into – the standard of measure). If there is no direct influence on distribution, such a tax also leaves relative prices unchanged (except, of course, for the change in the after-tax price of the commodity in question, and eventually of all the other non-basic products for which it is a production input, relative to the price of all other commodities).

In comparison, what are the effects of a tax levied on a wage good? In Ricardo's system, with the wage fixed at the subsistence level, a tax on a wage good cannot produce a reduction in the real wage and must thus be deducted from profits, so that the rate of profits falls. On this basis, Ricardo attacked the excise tariff on corn (wheat), the epitome of wage goods, and proposed instead that rent be taxed, either directly, or indirectly by means of a tax on luxury goods. Since wages could not be reduced, any tax levied on wage goods would in fact fall on profits, thus hindering accumulation, and thereby reducing the rate of growth achievable by the economy.

Within the framework of Sraffa's system, on the contrary, a tax levied on a wage good falls initially on the workers, while the rate of profits, determined by the conditions of production of basic products and the given level of the wage, does not change. The possible reaction of the workers to a reduction in their real purchasing power can only be explicitly considered in a second approximation; this can only be done by taking into consideration demands for and concessions of money wage increases and the consequent changes in real wages and relative prices.

The final result thus depends on many factors and can be considered identical to Ricardo's only on condition that the workers have complete success in restoring their real purchasing power to its original level.

4.8 On the existence of positive prices for non-basic commodities

The category of non-basic products obviously acquires more relevance once it is recognised that it includes wage goods as a result of the fact that the whole wage is considered as variable. However, economists often make the simplifying assumption that there are no non-basic products in the system being considered. Such an assumption is useful as an initial approximation if it leads to the determination of initial results, which are however subsequently verified for analytic models that take non-basics explicitly into account. The assumption should not be used to avoid analytical difficulties which are directly related to the existence of the non-basic products.

As a matter of fact, this kind of procedure has been even adopted for the solution of an important analytical question, namely demonstration of the existence of positive prices for a system capable of reproducing itself with a surplus.[23] In a mathematical exposition of Part I of *Production of Commodities by Means of Commodities*, Newman (1962) shows that in some cases the prices of non-basic products may be negative. Unable to find an economic significance for the mathematical restriction required to constrain the system to non-negative prices, Newman (1962: 66–7) suggests that the assumption of the non-existence of non-basic products be generally adopted in such systems.

In fact, this problem had already been investigated by Sraffa in an appendix to his book. The case of negative prices for non-basic products can only arise for non-basics required as inputs in their own production. More precisely, this case arises when the 'surplus ratio' of the non-basic commodity under consideration turns out to be lower than the rate of profits in the system composed of the basic industries. (The 'surplus ratio' of a commodity is given by its 'surplus product' – namely, quantity

[23] Naturally no such problem arises in a system in a state of simple reproduction; a system, that is, just capable of reproducing itself but unable to produce a surplus. In such a system, non-basic products cannot exist because their production requires as inputs the output of some basic product, which either implies a deficiency of the basic product for use as means of production in some basic industry or the availability 'from outside' of the basic commodity to be employed in the production of non-basics.

produced less quantity used up in production – divided by the quantity required in production; it is thus equal to the rate of profits in the industry considered under the assumption of zero prices for all means of production other than the commodity produced in the industry.) In the example in Sraffa's appendix (Sraffa 1960: 90–1) this occurs when 100 beans, in addition to labour and other means of production, are required to produce 110 beans, while the rate of profits in the system of basic industries is greater than 10 per cent. The economic significance of this condition is easily understood. As Zaghini (1967a: 261) explained,

> [b]ecause […] the rate of profit is, by hypothesis, uniform in the system, the non-basic industries are compelled to accept the rate of profit which has been independently determined in the group of the basic industries. The fact, however, that they must accept it, does not mean that they can accept it. They can accept it if, and only if, their structure satisfies [the conditions mentioned above].[24]

The problem has also been examined in an exchange of letters between Sraffa and Newman. In these letters Sraffa points out not only the economic significance of this condition, but also the extent of its plausibility:[25]

> It is in the nature (or, if you wish, the definition) of basic goods to be interconnected and form a system. It is, on the other hand, the

[24] Zaghini (1967a: 263–6) also considers the case of interconnected groups of non-basic products in which some non-basic products are used in the production of other non-basic products.

[25] P. Sraffa, letter to P. Newman dated 19 June 1962, and published as an appendix to Bharadwaj (1970: 428). In mathematical terms what Sraffa says can be expressed as follows. The maximum rate of profits (and the rate of profits for a given wage) is an inverse function of the characteristic root of the matrix of the technical coefficients of the basic industries. The characteristic root in turn is a positive function of each of the elements of the matrix, given that these are all non-negative. Thus it will tend to rise with an increase in the rank of the matrix, or in other words moving on from a matrix composed of only one positive element (which is the position of a system with a single commodity) to a matrix with more than one row and more than one column not linearly dependent; that is, with more than one positive element (the matrix relevant for an interconnected system of production with all commodities used directly or indirectly in the production of all other goods). It is thus improbable that the characteristic root of a matrix of rank 1 should be superior to that of a matrix of rank n, with n a reasonably large number. As a consequence it is improbable that the 'individual' rate of profit of a system formed from a single non-basic product (assigning a zero price to all the means of production other than the commodity produced) should be inferior to the rate of profits of the basic system formed from many interconnected industries.

peculiarity of non-basics to be unconnected with one another, and they are incapable of forming an independent system. At best, each of them can be formally treated as constituting a separate single-commodity system, with its own rate of profits: this rate (for each separate non-basic) can be compared with the rate of the basic system. It is a priori extremely unlikely that any individual rate will be smaller than that of the basic system, composed, as the latter is, of many products, all used directly or indirectly in one another's production.

In any case, although we can in principle imagine cases such as Sraffa's 'beans', the obvious implication is that such non-basic commodities will not be produced since the entrepreneurs engaged in their production will be unable to earn the competitive rate of profits, however high the price of their product might be, and their capitals will be consequently invested in some other industries.

The existence of non-basic products does not pose any insurmountable problems for Sraffa's theory of prices of production. Rather, as our discussion in the present chapter implies, it constitutes an element of notable interest. The distinction between basic and non-basic products also provides potential for the clarification of a number of problems concerning the effects of indirect taxation. Thus, we may conclude that the distinction between basic and non-basic products is indeed arguably the aspect of Sraffa's theory of greatest direct interest in terms of potential application to problems of economic policy.

5
The Standard Commodity

5.1   The standard of measure in Smith and Ricardo

Despite the apparent convictions of many commentators and the rela-
tively great number of pages devoted to them, the standard commodity
and the standard system do not represent the central nucleus and prin-
cipal objectives of *Production of Commodities by Means of Commodities*.
Rather, they simply represent – together with joint production and
fixed capital – 'particular points' in the general problem of the relation-
ship between prices of production and the distributive variables, as
Sraffa himself indicates in his Preface (Sraffa 1960: vi). These 'particular
points' are obviously not simply accessories. However, they do not
imply substantial modifications to the 'central propositions' regarding
the system of relative prices developed on the basis of a very simple
analytical scheme, such as that presented by Sraffa in the first three
chapters of his book.

In an attempt to specify the role that the standard commodity does
play in Sraffa's system, and indeed to identify the limits of its applicabil-
ity in the solution of other related problems, let us begin by examining
the relation between the standard commodity and the classical problem
of the standard of measure.

The choice of a standard of measure is obviously connected to the
type of problem being discussed and the type of analysis applied. These
links will be clarified through examination of Smith's concept of 'labour
commanded' and Ricardo's idea of 'labour embodied'.

As is well known, the object of Smith's theory is the 'wealth of
nations'. Smith argues that the wealth of nations directly depends on
two factors, namely technology (the division of labour, furthered by the
growth of the size of the market) and the proportion of productive to

non-productive labour.[1] It can be argued, therefore, that the measure of capital, or of the economic surplus, most useful for Smith's analysis is given by the quantity of labour which could be exchanged for, or be 'commanded' by, a given capital or surplus. Thus Smith adopts a standard of measure based on 'labour commanded', which can be described as equal to the market price of the commodities composing the capital or surplus, divided by the ruling wage rate. The object of measurement, capital, is then equal to the total employment that it is capable of hiring. The surplus is measured by the number of labourers that could be newly employed in each period if it were fully invested to provide additional wages to hire new productive workers. The ratio between the two quantities yields the potential rate of growth of productive employment.[2]

It should be noted that Keynes (1936: 41–4) also found this same standard of measure useful in his analysis of the level of employment in the short period, for it allowed him to take effective demand as equivalent to the demand for labour.

Ricardo's criticisms of Smith's standard of measure stem primarily from the fact that he was interested in the analysis of a different problem. Ricardo's primary concern was, of course, investigation into the laws which regulate the distribution of the net product among the classes of society.[3] The amount of 'labour commanded' is of no use to investigation of this problem, since quantities expressed in terms of labour commanded are dependent on relative prices and the wage rate. As a consequence, the national income to be distributed among the three broad classes of society takes on different values in

[1] Smith (1776, Book 1, Chapters 1–3, and Book 2, Chapter 3). Much debate has been dedicated to the definitions of 'productive' and 'unproductive' labour. For some details of this debate and further bibliographical references, cf. Roncaglia (2001, § 5.4).

[2] On the relationship between Smith's chosen standard of value and the scope of his analysis, cf. Garegnani (1960: 189–95). As Garegnani (1960: 194) points out, '[h]owever, the use of such a standard in the theory of surplus encounters a very serious difficulty. The value of a commodity or group of commodities measured in this way will vary with variations in the proportions in which that value is composed of rent and profit'. For an innovative and sound interpretation of Smith's recourse to different units of measure, cf. Sylos Labini (1976 and 1984, Chapter 1).

[3] 'To determine the laws which regulate this distribution, is the principal problem in Political Economy'. (Ricardo 1817: 5). The issue of the standard of measure is also relevant in the context of Ricardo's theory of money: cf. Marcuzzo and Rosselli (1994).

terms of labour commanded for different distributions of the national income.[4]

Thus Ricardo prefers to measure commodities in terms of the labour directly or indirectly necessary for their production. This type of measure has the desirable property of being invariant to changes in the distribution of income. Ricardo is thus able to use a single magnitude, labour, to represent wages, profits and the national income (total profits being equal, in value terms, to the difference between the labour required to produce the national income and the labour required to produce means of subsistence and means of production). The advantage of this standard of measure is that the rate of profits is determined as a ratio of homogeneous physical magnitudes, since both profits and capital advanced are expressed in terms of quantities of labour (much like the 'corn model', where profits and capital advanced in the agricultural sector are both expressed in terms of corn).

However, the property of the labour standard that counts most for Ricardo is that it expresses the value of a commodity in terms of its cost to society, namely in terms of the labour that has to be exerted in order to obtain it. Thus it constitutes an invariable standard with respect to changes in the techniques of production (one hour of labour is one hour of labour). The effect of technical progress can be represented by the reduction in the amount of labour directly or indirectly required for production, hence by the reduction in the labour value of commodities directly or indirectly affected by technical progress. It was on this basis that the labour standard had already gained substantial support, even before Ricardo's introduction of the concept, from the exponents, such as Locke, of the 'natural law' proposition which holds that property rights derive from the act of expending labour in productive activities.[5] Ricardo seems to come very close to such a conception, especially in a passage from his last written work, the essay on 'Absolute value and exchangeable value'; 'I may be asked what I mean by the word value, and by what criterion I would judge whether a commodity had or had not changed its value. I answer, I know no other criterion of a thing being dear or cheap but by the sacrifices of labour made to obtain it.'[6]

[4] However, Ricardo criticises Smith's measure not on this ground, but rather in terms of the possible confusions that could result from the use of such a measure to analyse a situation where there are changes in technology. Cf. Ricardo (1817: 16–20).
[5] See, for example, Locke (1690: 129–41) (II.5). However, Locke uses such terms as 'labour' and 'property' in a special sense, differing from common use: cf. Roncaglia (2001, § 4.2). After Ricardo, a somewhat similar position is held by the so-called Ricardian socialists.
[6] Ricardo (1951–5, vol. 4: 397), quoted by Sraffa (1951: xlvi).

It is now generally recognised, however, that the labour directly or indirectly required for production is not an unambiguous standard of measure for the analysis of income distribution. As Garegnani (1960: 19 and 7) points out, capital in particular must be measured 'in terms of quantities: (a) independent of changes in distribution so that they can be included among the givens which determine the rate of profits; (b) which can be expressed in terms of a known relation to the value of capital to be measured'. In fact, 'in order for the results of the theory to be of significance [...] the commodities expressed in terms of the common standard of measure should be in the same proportions as they are exchanged in the actual situation examined'.

The second condition is not satisfied by the labour standard. When the rate of profits is positive, relative prices differ from the ratios of quantities of labour required to produce the different commodities, except when the various industries have an identical proportion of labour to (the value of) the means of production.[7]

This difficulty arises for Ricardo's analysis because he tries to use a single standard of value to deal with two different and distinct problems. The first problem relates to the identification of changes in relative prices due to changes in the methods of production. The second concerns changes in relative prices caused by a change in the distribution of income. For the first problem a measure of 'absolute' value, such as the labour required for production, is adequate. But, as Sraffa observes,[8]

> in this attempt to extend the application of absolute value to the second problem (that of distinguishing the two sorts of changes in exchangeable values) Ricardo was confronted with this dilemma: whereas the former application presupposes an exact proportionality between relative and absolute value, the latter implies a variable deviation of exchangeable from absolute value for each individual commodity. This contradiction Ricardo never completely succeeded in resolving, as is apparent from his last paper.

[7] Cf. Sraffa (1960: 13). Sraffa adds in a footnote that even if knowledge of the values is necessary for the calculation of this set of proportions, because it is necessary to aggregate the various means of production in a unique magnitude, when such proportions are equal (unequal) in the various industries for a given set of values (corresponding to a given level of wages), they are equal (unequal) for all sets of values obtainable when wages vary between zero and their maximum level, corresponding to a zero rate of profits.

[8] Sraffa (1951: xlvii). On this point cf. Meldolesi (1966: 612–35).

Ricardo simply tries to make his standard of measure serve two different purposes, and his major difficulties stem from this basic fact, rather than from any inherent insolubility of either of the problems that he poses for analysis. As we shall see, Sraffa shows in his book that the second problem has a solution if a composite commodity is adopted as the standard of measure. This composite commodity is Sraffa's 'standard commodity'. Nevertheless, the confusion originated by Ricardo's attempt to solve the two different problems at the same time (and his continual emphasis on the first problem) led to an erroneous (or at any rate imprecise) interpretation of his aims, which could be carelessly extended to produce an erroneous interpretation of the general significance of Sraffa's standard commodity. The next section illustrates an example of this misunderstanding in Bailey's (1825) criticism of Ricardo on these matters. Marx's observations on Bailey's criticisms will also be considered in assessing their import. Thereafter, Sraffa's position may be more exactly delimited in terms of the specific problem he tries to solve, thus clarifying the limitations of his solution with reference to other problems.

5.2   Marx on Bailey on Ricardo

Bailey's 1825 book, which consists of an extended critique of Ricardo, begins by putting forward the view that value is 'the esteem in which any object is held'. Value is thus considered as a purely relative concept which is unquantifiable without comparison between commodities:

> So long as we regarded objects singly, we might feel a great degree of admiration or fondness for them, but we could not express our emotions in any definite manner. When, however, we regard two objects as subjects of choice or exchange, we appear to acquire the power of expressing our feelings with precision, we say, for instance, that one A is, in our estimation, equal to two B.
>
> (Bailey 1825: 3)

And again Bailey (1825: 4–5) emphasises:

> It [value] cannot be predicated of one thing considered alone, and without reference to another thing. If the value of an object is its power of purchasing, there must be something to purchase. Value denotes

consequently nothing positive or intrinsic, but merely the relation in which two objects stand to each other as exchangeable commodities.

Therefore, according to Bailey (1825: 5–6), the search for a specific invariable standard of measure has no sense. On the one hand, every standard of measure is invariable with respect to itself. On the other hand, if it is only the relation of exchange between commodities that is of importance, there is no sense in saying that a commodity constitutes an invariable standard of measure when its rate of exchange with other commodities may vary. The search for such a standard would only have meaning if it were in reference to absolute value, and the commodity chosen as the standard of measure always contained, in whatever circumstance, the same quantity of absolute value. In this respect, Bailey (1825: 8) attributes to Ricardo the idea that the quantity of labour is the cause of value. But for Bailey (1825: 9–10) the concept of absolute value is a useless complication which is of no help in understanding the relations of exchange, or in the study of the origins of the value of a commodity.[9] In fact, as the passage cited above shows, Bailey considers the value of a commodity to be determined by the greater or lesser estimation in which it is held by the owner and the potential buyer. Since this assessment is subjective, it is impossible to consider any 'absolute' value, or to discover a commodity that under any circumstance would contain a given quantity of it.

In his posthumously published *Theories of Surplus Value*, Marx takes up Bailey's criticisms of Ricardo's attempt to find an invariable standard of measure. The motives behind Marx's critique are, however, completely different. Marx first of all distinguishes the problem of the measure from the problem of the nature of value. He agrees with Bailey that there is no sense in the search for an invariable standard of value. But, Marx points out, Bailey fails to realise that such a search expressed a real need, obscure in Ricardo's work but nonetheless highly important, which concerns the definition of the very concept of value, namely the nature of value. In relation to the problem of measurement Marx (1905–10, vol. 3: 133) observes:

in order to measure the *value* of commodities to establish an *external* measure of value – it is not necessary that the value of the commodity, in terms of which the other commodities are measured, should be invariable. It must on the contrary be variable […] because the measure

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[9] In effect, according to Bailey (1825: 17), 'one half of the causes concerned in the determination of value' was thus overlooked.

of value is, and must be, a commodity since otherwise it would have no *immanent* measure in common with other commodities. […] The problem of finding an 'invariable measure of value' is thereby eliminated.

According to Marx, even though Ricardo approaches the question of the measure of value on the wrong path, he nevertheless shows true insight into the need to define the very notion of value: a problem that Bailey solves along a different path, by reference to such subjective elements as the 'fondness for', or 'admiration' of, the commodities on the part of individuals. 'The problem of an "invariable measure of value" was simply a spurious name for the quest for the concept, the nature, of value itself, and consequently could not be subject to variations as value' (Marx 1905–10, vol. 3: 134).

Thus, the sense in which Marx accepts that in a capitalist society value is determined by 'embodied labour' has to do with a strong notion of absolute value: embodied labour as the substance of value (though it is not a natural property of things, but expression, specific to a given historical context, of a certain form – capitalism – of the social organisation of production).[10]

5.3 Sraffa's specific problem and its solution

In the light of Bailey's criticisms and Marx's additional observations, we can now evaluate Sraffa's solution of Ricardo's problem of the invariable standard of value. Let us begin by illustrating the construction of Sraffa's standard commodity and its salient characteristics.

Sraffa defines the standard commodity as that commodity which holds a position, whatever the rate of profits, at the midpoint (the watershed) between commodities produced by industries that stand to lose if existing prices do not change in consequence of a change in distribution, and those industries that would gain. It is clear that the price of this particular commodity varies, relative to other commodities, whenever distribution changes. In this respect Bailey's objection, cited above, appears justified. However, the problem that Sraffa solves with the standard commodity is rather different, concerning the identification of a commodity for which a change in wages would be exactly offset by an equal and opposite change in profits. The standard commodity would thus be invariant in price with respect to the totality of its means of production other than labour, so that a change in its price relative to

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[10] On this cf. Lippi (1976).

any other commodity 'would originate exclusively in the peculiarities of production of the commodity which was being compared with it, and not in its own' (Sraffa 1960: 18). This is only possible, however, when the industry that produces the commodity uses means of production which are physically homogeneous with the output produced. In all other cases, as Sraffa (1960: 13) points out, relative prices will vary when there is a change in the distribution of income.[11]

Now, leaving aside the possibility of a system with only one basic commodity (namely one in which there is an industry which only uses its own outputs and labour as means of production and whose output is directly or indirectly required as a means of production in all other industries, as in the 'corn model') an individual commodity that satisfies Sraffa's requirement of being at the midpoint (or watershed) of all other commodities cannot exist. In fact, under the assumption of several basic commodities, each industry will require commodities other than its own output, and the output of any industry must change in price with respect to the totality of its own means of production when distribution changes.

The solution often, though erroneously, attributed to Ricardo and Marx,[12] requiring the watershed commodity (average commodity) to be produced by an industry in which the proportion between labour and the value of the means of production is equal to the social average,[13] is thus not acceptable. The proportion between labour and the value of the means of production of any particular industry initially equal to the social average is no longer equal to it when there is a change in the distribution of income, for the aggregate of the means of production of such an industry varies in price with respect to the aggregate of the means of production employed throughout the system. This difficulty can be avoided only in the case in which the two aggregates are physically homogeneous – that is, composed of the same commodities, and in the same proportions. But in this case the single commodity

[11] To be ruled out, obviously, is the (very specific, practically impossible) case of equal proportion of labour to (the value of) means of production in all industries, where relative prices do not vary with variations in distribution. In the following pages it will be assumed that this is not the case.

[12] Erroneously because the two authors (especially Ricardo) were aware of the limits of such a solution, and because they (above all Marx) gave it a different interpretation than Sraffa's standard commodity. This point will be more fully developed later in § 5.5.

[13] And in which the period of production is also equal to the social average. This is given by assumption in Sraffa's scheme, because it is assumed that the period of production is the same for all industries. This assumption was discussed earlier, § 3.5.

produced in the industry should be obtained by means of a technique equivalent to that used to produce the entire net product. That is, the single commodity should be technically indistinguishable from the net product and the case would be indistinguishable from that ruled out above, of a system with a single basic commodity.

It is therefore necessary to use a composite commodity. This commodity corresponds to the net product of a system that Sraffa calls the standard system, and which is in fact an imaginary construction derived from the actual system by means of suitable modifications in the levels of activity of the various industries. The standard system – which, as will be pointed out below, bears a certain resemblance to von Neumann's system of proportional growth – is nothing more than an auxiliary construction in Sraffa's analysis, deduced from the properties attributed to the standard commodity. In it both means of production and products are composed by the same commodities in the same proportions.

Sraffa shows that when such a composite commodity is adopted as the standard in which the wage is measured, a linear relation is established between the wage and the rate of profits; this relation exists both in the standard system which produces the standard commodity and in the real system from which the standard system is derived.

In the standard system this relation simply signifies an aspect of the property attributed by definition to the 'watershed' industry. In fact, if the price of the total output of the watershed industry is made equal to unity, and the price of the total means of production of such an industry is denoted by K,[14] the following relationship can be derived:

$$K + rK + wL = 1$$

Hence when income distribution changes

$$\Delta(K + rK) = -\Delta(wL)$$

By definition the K in the 'watershed' industry does not vary when there is a change in distribution, while L is given; therefore this relationship can be rewritten as

$$K\Delta r = -L\Delta w$$

or

$$\Delta r = -(L/K)\Delta w$$

[14] The other symbols are those used by Sraffa: r is the rate of profits, w the wage rate, L the quantity of labour used in the watershed industry.

In the standard system, *K* does not vary when there is a change in distribution, since it is but a different quantity of the composite commodity which is obtained as output. Thus, the variation in the rate of profits, *r*, is proportional to the variation in wages, *w*.[15]

Both the standard system and the real system from which it is derived are composed of the same equations, though taken in different proportions; therefore their solutions are the same, and for any given wage the rate of profits must be the same.

Hence, when the standard commodity is used as the standard of measure for the wage, a linear relation between the wage and the rate of profits is also established for the actual system from which the standard system is derived. Sraffa (1960: 23) is thus led to conclude that 'particular proportions, such as the standard ones, may give transparency to a system and render visible what was hidden, but they cannot alter its mathematical properties'.

Thus Sraffa separates the two problems that Ricardo tried to solve simultaneously. The first is the search for a standard of value invariant to changes in technology; the second, determination of a standard of value invariant to changes in the distribution of income. Sraffa singles out the standard commodity simply as a point of reference for the study of changes in relative prices that are a result of changes in distribution, as a consequence of the fact that labour and means of production are utilised in different proportions in the processes of production of the various commodities. The particular proportions of the standard commodity, and its special properties outlined above, are of help in grasping the connection that exists between changes in the distribution of income and the system of relative prices. When the role of the standard commodity is restricted to this objective, it is no longer subject to the criticisms put forward by Bailey.

As seen above, Ricardo unsuccessfully tries to establish a standard of measure that at one and the same time served the dual function of

[15] The relation between Ricardo's use of a single magnitude to measure profits and capital advanced (either 'corn' or labour required for production) and the use of Sraffa's standard commodity can now be seen more clearly. In the sector which produces the standard commodity profits and capital advanced can be compared when the wage is expressed in terms of the standard commodity, for they are simply different amounts of this same commodity. The rate of profits can then be expressed as a ratio of like physical quantities. In relation to Ricardo's problem the standard commodity thus acquires the significance of a 'physical analogue' in the determination of the rate of profits. This point is made with particular emphasis by Eatwell (1974, 1975b).

being invariant to changes in the techniques of production and in the distribution of national income. Sraffa shows that the problem can be solved only if the two functions are distinguished, focusing on the second one in isolation. The standard commodity is invariable (in the specific sense given above) with respect to changes in the distribution of income on the assumption of a given technology. The standard commodity, however, changes with changes in the techniques of production in the basic industries.

Thus one problem about the relations of exchange can be solved, and the solution clearly shows how utterly different it is from the metaphysical problem concerning the nature of value, or 'absolute' value. Sraffa's contribution from this point of view is that of clarifying the exact relation sought by Ricardo, as well as the limits of the solution to Ricardo's dilemma and, implicitly, the difference between this issue – which is susceptible to analytical treatment and has a well-defined solution – and the issue addressed by Marx in his labour theory of value.[16]

5.4   Standard commodity, labour commanded and the von Neumann system

Another problem related to the standard commodity is a curiosum in the history of economic analysis that is pointed out by Sraffa himself (1960: 94) in his 'References to the literature': namely the fact that the standard commodity, identified in analysing a 'Ricardian' problem, has a strong connection to labour commanded, that is the standard of measure proposed by Smith and strongly opposed by Ricardo himself.

The curiosum is considered here not only for its intrinsic importance but also as an illustration of a more general issue, namely the dangers of attributing decisive importance to merely formal resemblances, without paying attention to possible substantial differences in the problems under analysis. Transferring mechanically the mathematical aspects of a theory from the problem for which the theory was originally intended to a different issue can cover up basic conceptual difficulties.

[16] The first to notice that Sraffa's conception of the function of the standard of measure is notably more restrictive than the original Ricardian conception is Napoleoni (1961: 109–12). However, he gives a different explanation, and a different (negative) judgement from that proposed here. An explanation similar to that adopted here is given by Meldolesi (1966). The need for closer specification of Ricardo's problem, discussed by Sraffa (1951), is investigated analytically, as seen above, by Garegnani 1960. In § 5.5 the differences between the standard commodity and the 'average commodity' of Ricardo and Marx will be discussed.

The analytical similarity between the standard commodity and Smith's 'labour commanded', pointed out by Sraffa, is not in itself very surprising and the demonstration that he gives is extremely simple. As Sraffa suggests, we may replace the standard net product as the unit of measure with 'the quantity of labour that can be purchased by the standard net product'. This magnitude 'will vary inversely with the standard wage and directly with the rate of profits', but 'according to a simple rule which is independent of prices'. It is a measure by definition equivalent to the standard net product, namely to a certain amount of the standard commodity, and, obviously, it has the same properties; in particular, a linear relation holds between the rate of profits and the wage when the wage is measured in terms of it.[17]

What is 'surprising' is the fact that Sraffa, in an attempt to find a solution to a Ricardian problem associated with relations of exchange, should come up with a standard of value similar to that which had been proposed by Smith for its usefulness in dealing with a different problem, that of economic growth. This might in fact be taken as indicative of the links existing between the different problems, although they can only be solved in separation.

Besides the similarities between the two standards of measure – Sraffa's standard commodity and Smith's 'labour commanded' – there is a parallel similarity between Sraffa's standard system and the system of proportional growth developed by von Neumann.[18] In both cases, the output and the means of production are composed of the same commodities in the same proportions. However, this superficial similarity between Sraffa's standard system and the von Neumann system of proportional growth conceals a very substantial difference in the purpose the two theoretical constructions were intended to serve. Sraffa's system is part of the search for a standard of measure endowed with particular properties. Von Neumann's system is related to the search for an equilibrium growth path which would produce the maximum possible rate of growth for an economic system with no technical progress and constant returns to scale. Sraffa's system is linked to the study of relative prices; von Neumann's has pri-

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[17] Sraffa (1960: 32), cf. also the demonstration given by Gilibert (1972).
[18] Von Neumann, (1945–6). This is perhaps the most important of the cases Sraffa obliquely refers to in his Preface: 'Others have from time to time independently taken up points of view which are similar to one or other of those adopted in this paper and developed them further or in different directions from those pursued here' (Sraffa 1960: vi). The other case of major interest is Leontief's input-output scheme, which presents certain similarities with Sraffa's system. Cf. (Pasinetti 1975).

marily to do with study of the levels of activity.[19] The point in which the two systems differ most obviously concerns the treatment of wage goods, whose production must expand at the same rate as the rate of expansion of all other commodities in von Neumann's system. On the contrary, as we saw in the previous chapter, in Sraffa's system wage goods only appear in the standard commodity insofar as they also are technologically basic commodities, and thus independent of their role as wage goods.

5.5   The relation of the standard commodity to the average commodity

Finally, another interesting aspect (which Sraffa, however, does not discuss) is the resemblance, as we saw above, between the standard commodity and the 'average commodity' of Ricardo and Marx. Comparison between the three positions will afford a better understanding of the transformation Sraffa performs on the original Ricardian propositions concerning the standard of measure, as well as the different aims pursued in Marx's and Sraffa's analyses. Such comparison can also serve as a safeguard against the temptation to extend application of the standard commodity to problems which only exhibit a purely formal similarity to those analysed by Sraffa.

The concept of the average commodity as used by Ricardo offers a useful starting point for this comparison. Ricardo's analytical framework led him to search for a standard of measure that could constitute a point of reference with respect to changes in both the distribution of national income and the techniques of production. The search for such a measure led to a blind alley. Ricardo himself realised this, and near the end of his life he was able to admit quite openly that 'it must then be confessed that there is no such thing in nature as a perfect measure of value'.[20] Thus, at the end of his life, in full awareness, Ricardo gave

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[19] From the point of view of the analysis of relative prices, von Neumann's system is equivalent to Sraffa's first system with a surplus and in which the wage is given as a basket of commodities. It is thus no more than an initial step towards the problem raised by Sraffa, that of the influence of changes in distribution on the structure of relative prices. Moreover, it is to be borne in mind that, unlike Sraffa, von Neumann assumes constant returns to scale (cf. § 7.1).

[20] In the manuscript on 'Absolute Value and Exchangeable Value': Ricardo (1951–5, vol. IV: 404). In order to understand the meaning of the search for a 'natural' standard of measure on the part of Ricardo, we must bear in mind the importance, in that period, of attempts to unify physical measures within each

(*Continued*)

up the quest for a precise solution to the problem of a perfect measure of value. He viewed the average commodity he proposed to adopt as his standard of measure simply as an imperfect solution which provided a better approximation to reality than resort to extreme cases would have yielded:[21]

> To me it appears most clear that we should chuse a measure produced by labour employed for a certain period, and which always supposes an advance of capital, because [...] a commodity produced by labour employed for a year is a mean between the extremes of commodities produced on one side by labour and advances for much more than a year, and on the other by labour employed for a day only without any advances, and the mean will in most cases give a much less deviation from truth than if either of the extremes were used as a measure.

Let us now consider the problem posed by Marx, and verify how it, too, differs from the problem raised by Sraffa. In the second section of Volume 3 of *Capital*, Marx discusses the attributes of that particular sphere of production in which the organic composition of capital (namely the ratio between the value of the means of production and the labour input) is assumed equal to the social average. He does so in the course of discussion of the relationship between values and prices (the so-called transformation problem). Marx, in fact, sets out to demonstrate that the results achieved on the assumption of exchange at labour values do not undergo modifications when considering exchange at prices of production. Indeed, according to Marx, the shift from labour values to prices of production only involves a redistribution of surplus value among the capitalists across the several productive sectors. In the former case – exchange at equal labour values – surplus value is distributed among the sectors in direct proportion to the labour directly employed in each sector (variable capital). In the latter case – exchange at prices of production – profits are distributed in proportion to the total value (computed at production prices) of the capital advanced

(*Continued*)

country. In the case of the metre, introduced in France in 1793, the natural foundation for the definition of the standard was found in the length of a meridian arch at a given latitude. Cf. Roncaglia (2001: 192n); more generally, on the importance, difficulty and graduality of introduction of standards of measure common to all, cf. Kula (1970).

[21] Ricardo (1951–5, vol. 4: 405).

(variable plus constant capital). Marx argues, in addition, that the price of aggregate output remains equal to the total value produced, and that total surplus value (or in other words the value of the surplus product expressed by the quantity of labour directly or indirectly required for its production) remains equal to the mass of profits. This same property of equivalence should be found, in his opinion, in a particular sphere of production: the one with the average organic composition of capital, for in that sector the price of production of the output would be equal to its value, and profits would be equal to surplus value.

Now, the mass of profits can equal the mass of surplus value if this equality is chosen as a constraint for the determination of the standard of measure.[22] In this case, however, the other condition of equality between the value and the price of the total product cannot be imposed at the same time without the system being overdetermined. The two conditions are simultaneously compatible only in the case where the system considered corresponds to Sraffa's standard system. In such a case, indeed, means of production, output and surplus are simply different amounts of a single composite commodity. In addition, only in such conditions can there be a composite commodity with the organic composition of capital equal to the social average, at any level of the rate of profits, and only in such a case can the two equivalence conditions stated above be simultaneously satisfied. But again, this implies that the output and the means of production of the system as a whole are simply different amounts of the same (average) composite commodity.

At any rate, the case of a real system which coincides with its standard system must be considered as a very special case: indeed, something that could only occur by a sheer fluke. The simple possibility of the existence of this particular case, then, cannot be used as the basis for the Marxian attempt to provide a general proof of the simultaneous equality between the value of output and its price of production, and between total surplus value and total profits, either for the system as a whole or for any particular commodity that might be representative of it, in the sense of being the 'average' of the relations occurring in the system taken as a whole.

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[22] Which is what Sraffa does when he considers the subsistence wage as being either included in the means of production or equal to zero, makes the total quantity of labour employed in the system equal to unity (in this way establishing a physical unit of measure for working time) and sets the price of production of the aggregate of commodities which make up the surplus or net product equal to unity (thereby establishing a unit of measure for prices). Cf. Sraffa (1960: 10–11).

Nonetheless, whatever the validity of any particular thesis put forward by Marx, it seems evident that the goal he pursued with his research on the average commodity was not the same as Ricardo's. In Marx's case the importance of the average commodity is subordinate to the property of equivalence between profits and surplus value and between the (labour) value and the price of output, which he believed to be valid for the sector producing the average commodity as well as for the system as a whole. The analytical relations studied by Marx thus constitute part of a quest in search of a bridge between the system of labour values and the system of prices of production. In Ricardo's case, the average commodity is a simple approximation to the desired theoretical standard that should constitute the perfect point of reference for the study of the relation between changes in relative prices, changes in distribution and changes in technology.[23] Sraffa solves Ricardo's problem with the concept of the standard commodity or, more precisely, he solves only the first half of Ricardo's problem for, as pointed out above, the standard commodity is not itself invariant to changes in technology.

Only confusion between the specific problems tackled by Sraffa and Marx could lead to the conclusion that Sraffa's standard commodity has any particular use or significance in solving the problem studied by Marx. For instance, a linear relation can be established between the rate of exploitation (evaluated in terms of labour values) and the rate of profits if the standard commodity is used as the standard of measure and wages are paid or consumed in terms of the standard commodity. But assuming wages are thus paid contradicts either one or the other of two fundamental points of Marx's analysis. Either (a) the assumption that wages are paid in terms of the standard commodity contradicts the Marxian theory of money, as Marx sees money as a commodity that is chosen by the process of history and not for its particular characteristics in the productive process;[24] or (b) the assumption that the workers'

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[23] Marx (1894: 202–3) also claims, in relation to the 'commodity of average composition', that 'a rise or fall in wages would not change the price of production, k + p ("cost-price plus profit") any more that it would change the value of the commodities, and would merely effect a corresponding opposite movement, a fall or a rise, in the rate of profit'. But it seems evident that Marx considers the two problems as distinct and that, of the two, the one Ricardo had in mind is attributed only secondary importance by Marx. On this point see also Marx (1905–10, vol. 2: 180).

[24] Particular qualitative characteristics of the chosen commodity may be relevant (its 'value in use'), namely divisibility, durability, etc., but not its use as a means of production.

consumption basket has exactly the same proportions as the standard commodity dismisses the qualitative distinction that Marx repeatedly stresses between wage goods and capital goods.

Sraffa's standard commodity is given a decisive role in the solution to Marx's problem by Medio (1972). He demonstrates that for the industry producing Sraffa's standard commodity (namely the standard system) the equality between price and value of output also implies equality between profit and surplus value. His analysis cannot, however, demonstrate this dual equivalence for the actual system. But this is exactly what would be required, in order to allow the average commodity to play the role Marx meant it to play, as an average representative of the actual system, for which the ratio of constant to variable capital should be the same as for the actual system taken as a whole. Sraffa's standard commodity is an 'average' only in relation to the standard system, but not, in general, in relation to the actual system; thus, it cannot exhibit those properties that Marx attributes to his conception of an 'average'. To Marx, the operation of an imaginary system with proportions different from the real system would have no particular relevance or interest.

In conclusion, let us stress that the standard commodity – a 'particular point' and not a 'central proposition' in Sraffa's analysis – cannot be seen as the 'perfect' unit of measure other than from a specific point of view, the study of the changes in relative prices when income distribution changes, under the assumption of a given technology. Thus, it is only a partial solution to Ricardo's quest for an invariable standard of value. Neither does it constitute a solution to Marx's search for an average commodity as a bridge from the world of labour values to the world of prices of production. However, its properties, when accurately specified and investigated, are remarkable and, as we have seen, turn out to have a certain relevance to the analysis of other issues concerning, in one way or another, the technological structure of the economy.

6
Critique of the Marginalist Approach

6.1   The analytical structure of the marginalist approach

As already noted, Sraffa aims at a complete turnaround in economic science, rejecting the dominant marginalist approach and proposing in its place the classical economists' approach, though modified so as to take Keynes's contributions into account. The first step he takes in the direction of his critique of the marginalist approach is to tackle the Marshallian variety that dominated the academic teaching of economics both in Italy and England (Sraffa 1925, 1926, 1930). The second step is taken with his critical edition of Ricardo's writings (Ricardo 1951–5), where the conceptual framework and the analytical scheme constituting the foundations of classical political economy are re-proposed, cleared from the misinterpretations superimposed on it in nearly a century of marginalism. Finally, the third and analytically decisive step is the publication, in 1960, of *Production of Commodities by Means of Commodities*: an analysis of the relationship between relative prices and income distribution that provides both a solution to fundamental problems left unsolved by classical theorists and the basis for an internal critique of the traditional marginalist theories of value and distribution.

Traditionally, the marginalist approach conceives the problem of value as concerning the determination of equilibrium prices and quantities, such as to ensure equality between supply and demand. Such equilibrium values stem from confrontation between, on one side, the endowments of resources and, on the other side, the preferences of economic agents.

This interpretation of how the economic system works remains unchanged when, having considered pure exchange models (where productive activities are ruled out and the endowments consist of final

consumption goods), we go on to models concerning both exchange and production. In the latter case, endowments include productive resources; the relationship between endowments and consumers' preferences is mediated by productive activity, which comes into play side by side with exchange and consumption activities. Three groups of givens are here considered: preferences of economic agents, initial endowments and technical knowledge. This basic model can then be further extended when produced means of production are included among the initial endowments, and it is recognised that they can be increased in amount over time through an accumulation process, the pace of which depends on investment decisions on the part of economic agents.

Thus, Sraffa is pointing to central features of the marginalist approach when referring, in the very first lines of his book (Sraffa 1960: v) to 'anyone accustomed to think in terms of the equilibrium between supply and demand', as well as when referring, at the end of his book (Sraffa 1960: 93), to 'a one-way avenue that leads from "Factors of production" to "Consumption goods"'.

These central characteristics hold whatever variety of marginalism we consider. Scarce endowments and final consumption (or satisfaction of the needs and desires of economic agents) are confronted and connected by market mechanisms acting in such a way as to bring out a balance between the two opposite sides, so that for each commodity supply is equal to demand. Differences in specification of this basic scheme may be seen, for instance, in the extent of the role attributed to the subjective element, which may underlie the demand side alone, or the supply side as well, as in Jevons's analysis of the producer's equilibrium, based on the disutility of working, or in Wicksteed's opportunity cost approach. Other differences are to be found in the specification of the original resources: either a detailed list of commodities in general equilibrium models, or the usual textbook list of 'factors of production' – land, labour and capital. In the latter case income distribution between rent, wages and profits[1] is not conceived as a separate issue, but as an aspect of the general question of value, with distributive variables being simply the prices of a particular kind of commodities, namely the 'factors of production'. Still other differences may emerge in aggregation (for instance, with the use of the category of 'industries' as

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[1] Traditional marginalist terminology uses interest and rate of interest instead of profit and rate of profits, as utilised by the classical economists and Sraffa. Here we follow Sraffa's terminology.

intermediate entities between the individual producer and the economy as a whole), or the way of dealing with the element of time (as we shall see in § 6.2 below when dealing with the notion of the average period of production).

Now, it is obvious that no critique can have direct and immediate application to all varieties of marginalist theory. Notwithstanding, as we shall endeavour to show, Sraffa's analysis can be attributed with general impact on the marginalist approach as a whole. Indeed, unless it is defined in such general terms (as in Debreu's axiomatic general equilibrium model) as to be inapplicable to the interpretation of any real issue,[2] then Sraffa's criticism, suitably modified, will apply. This is due to the very basic structure of the marginalist approach, where original resources are taken as given, unlike the classical approach, which represents 'the system of production and consumption as a circular flow' (Sraffa 1960: 93).

Clearly, economic theories, even when utilising axiomatic analysis, should not be conceived in terms of purely formal structure, but as a substantive attempt to understand reality. This implies, among other things, that the assumptions on which the analysis is based be realistically evaluated. Of course, any theory requires abstraction; the point to be considered is whether the specific abstractions involved (for instance, the idea of a single price for each commodity, or that of a uniform rate of profits), though far from being perfectly and systematically realised, are admissible simplifications for the purposes of the specific analysis under consideration. This requires, among other things, that, whenever a main feature of the model utilised in our analysis simplifies away the complexities of the real world, such complexities can be introduced in our model as successive approximations which do not overturn the analytical results of the first-approximation analysis. For instance, the aggregate income multiplier in its simplest form is based on the assumption of a closed system, with no external trade, and no government sector; but a generalised multiplier can easily be constructed without substantive modifications to the results of our first-approximation theory. On the contrary, generalisations of one-commodity models into multi-commodity models imply drastic changes in the analytical results; for instance, the monotonically inverse relation between the

[2] In particular, in general equilibrium models the idea of a uniform rate of profits is ruled out: competition only concerns the formation of a single price for each commodity. The only 'policy' result that can be derived from general equilibrium models is how specific and unrealistic the theoretical conditions are for the full and general validity of the idea of the 'invisible hand of the market'.

rate of profits (the price of the factor of production capital) and the 'quantity of capital' per worker no longer holds, as we shall see below.

Secondly, the theory must provide some results in terms of delimiting the scope of possible events. For instance, as we have seen earlier in Chapter 4, Sraffa's analysis brings out the distinction between basic and non-basic products with a number of interesting implications. Conversely, general equilibrium analysis, notwithstanding certain very restrictive assumptions (such as the convexity of production sets), does not provide definite results: we can have multiple equilibria (which rule out comparative static analysis), instability (which rules out the 'invisible hand of the market' thesis, together with the possibility of indicating the direction of change whenever there is a change in endowments, preferences or technology) and even no univocal relationship between the available quantity of individual original resources and their price (Montesano 1995). As a matter of fact, whenever the so-called 'general equilibrium models' are employed to say something about specific features of the real world, new restrictions are introduced within the model (a one-commodity world, a single representative agent, and so on) in order to obtain some definite results.[3]

Axiomatic general equilibrium analysis is in itself wholly abstract: apparent reference to reality is only provided by the names attributed to the mathematical entities considered (goods, prices and so on). However, a meaning can be attributed to such entities only in the context of the specific rules of the game being considered in the model, in connection to the set of assumptions adopted. All too often, the axiomatic nature of the analysis is used as a pretext to avoid entering into any discussion about the nature of the assumptions adopted and their relationship with the real world; but then, there is no justification for adopting a set of 'real' names (namely, terms referring to actual economic entities). Thus, in Debreu's (1959) general equilibrium analysis there is no reason not to speak of angels (or demons, or avatars) instead of economic agents, and of souls to be saved or damned (to lower or higher circles of hell or paradise depending on the evaluations of the angels themselves) instead of commodities.

[3] This is, for instance, the common practice with the 'new Keynesian' models, which purport to prove results with a strong appeal to common sense, under untenable simplifying assumptions. In this case it is the plausibility of the results which subtly stimulates acceptance of the theory rather than the other way round, as should be the case when the theory is used to enhance our understanding of the world, rather than as a display of personal ability on the part of the theoretician.

Sraffa's criticisms concern, in various ways, the main attempts at building marginalist theories aiming at robust results in interpretation of the real-world economy. Such is the case of the Marshallian theory of the firm and the industry, in the 1925, 1926 and 1930 articles; such is the case of the Austrian theory, based on the average period of production, in Chapter 6 of the 1960 book; and, more generally, such is the case for all theories interpreting 'capital' as a 'factor of production' the demand for which is inversely related to its price (Chapter 12 of his 1960 book). In the following sections of this chapter we shall briefly illustrate the latter criticisms, the case of the Marshallian theory of the firm and the industry having been considered already (§§ 1.3–1.5). Viewed in its general outline, Sraffa's point is that the marginalist representation of the economy encounters difficulties because we are confronted with a multi-commodity world in which 'capital' cannot be conceived, together with natural resources, as part of the given data of the problem.

6.2 Critique of the Austrian theory

As we have seen, Sraffa's 1960 book provides not only a theory of prices of production within the framework of the classical conception of the economic system but also the tools for a radical critique of the traditional marginalist theory of value, aiming at its very foundations. In this respect we can focus our attention on two chapters: the sixth, on the average period of production, will be considered in this section, while the final, twelfth chapter, on the choice of techniques, will be discussed in the next section.

The concept of the average period of production was first proposed by Jevons (1879, Chapter 7), to be later taken up and developed within Austrian marginalist theory, and in particular by Böhm-Bawerk (1889), as a measure of the capital intensity of production.[4] Capital is here interpreted as 'waiting', measured in terms of time, and more precisely as the length of the average period of time between the employment of (direct and indirect) inputs of labour and the completion of the process of production.

In order to compute the average period of production, each commodity input in the production process is substituted by the labour

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[4] Cf. Böhm-Bawerk (1889). An attempt of the same sort was undertaken by Wicksell (1893). Subsequently, however, Wicksell (1901) recognised the imperfections of his attempts.

directly required for its production, plus its commodity inputs; the operation is then repeated on the latter, until we have a series (as long as we like) of dated labour inputs and a residuum (as small as we like) of commodities. Sraffa (1960: 34) calls this procedure 'reduction to dated quantities of labour'. We can then compute the average period of production by taking a weighted average of the intervals of time between the date of each direct labour input and the date on which the output is obtained, where for each interval the corresponding amount of direct labour input is utilised as weight, once the total amount of labour directly or indirectly required to obtain the commodity under consideration has been set equal to one.[5] Austrian capital theory then interprets the average period of production as a measure of the quantity of capital employed in the production process, thus considering 'time', together with labour, as the factors of production.

The rate of interest is thus obtained by the balancing of two forces. On the one hand we have the supply of capital, namely waiting, corresponding to the readiness of economic agents to postpone consumption: the length of time agents are willing to wait is assumed to be a positive function of the rate of interest. On the other hand, we have the demand for capital, namely the relationship between additional waiting (increased length of the average period of production) and additional product; the postulate of decreasing marginal productivity implies a decreasing relation between the average period of production and the rate of interest. Thus, the rate of interest can be considered as the price of 'capital', determined by the usual mechanism of equilibrium between supply and demand.

This construction is criticised by Sraffa (1960: 37–8). The point is that the average period of production is computed without allowing for compound interest; when it is considered, the results may change dramatically. Thus Sraffa shows that if the inputs of the various productive processes are reduced to dated quantities of labour, when the rate of profits changes we can have 'complicated patterns of price-movements with several ups and downs'. This is shown with an example, where the price of product *a* ('old wine') at first rises, then falls, then rises again relatively to product *b* ('oak chest') as the rate of profits increases from zero to its maximum value. The reversals in the direction of the movement of relative prices, in the face of unchanged methods of production, cannot be reconciled with *any* notion of capital as a measurable

[5] For an algebraic treatment cf. Kurz and Salvadori (1995: 437).

quantity independent of distribution and prices'.[6] The difficulty had already been sensed by Wicksell (1901), but later exponents of the Austrian school went on utilising the notion of the average period of production. In particular, Hayek (1931a) built his analysis of employment and the trade cycle on it.

The full implications of Sraffa's criticism were not immediately grasped. In a review of Sraffa's book, Harrod (1961) tried to defend the average period of production by pointing out that it can always be calculated, given the rate of profits. Apparently, Harrod failed to realise that in such conditions the average period of production can no longer be used to explain the distribution of income, for its very definition depends on an exogenously given rate of profits, as Sraffa (1962) pointed out in a short reply to Harrod. This, of course, is precisely the import of Sraffa's original criticism of the Austrian method of measuring 'capital'.

The difficulties illustrated above must be borne in mind also when evaluating later attempts at utilising dated quantities of labour for the analysis of dynamic issues. Reference here is to the so-called 'neo-Austrian' approach proposed by Hicks (1973) for the analysis of such issues as the transition between different technologies. In fact, Hicks's model involves both the use of a static framework for the analysis of dynamic issues and a serious underevaluation of the capital theory difficulties mentioned above. Let us consider this issue in somewhat more detail.

Sraffa's analysis makes it clear – and indeed the point was denied neither by Böhm-Bawerk nor by Hayek – that the reduction to dated quantities of labour is a theoretical construct, simply presenting in a different way the technology which underlies the Sraffian system of simultaneous equations illustrated earlier (§ 3.2) and not a historical reconstruction of the way in which the different means of production have actually been obtained. Marginalist capital theory aims at determining static equilibrium solutions, hence marginalist analysis of technical change refers to static substitution between capital and labour; technological changes over historical time are not considered. This should be borne in mind for two reasons. First, it is clear

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[6] A critique similar to Sraffa's was developed by Garegnani (1960), with a direct analysis of the theories of the various authors who made similar attempts to construct a theory of distribution based on this conception. The criticisms of the average period of production are now generally accepted. Cf. for example Samuelson (1966).

that the difficulties in capital theory stemming from the existence of a multiplicity of commodities cannot be overcome by shifting to a presentation of the technology in terms of dated labour inputs: if no new restrictive assumption is in one way or another introduced in the shift, such difficulties cannot but reappear in the latter presentation as well.[7] Second, what is analysed with the reduction to dated quantities of labour are the implications of a given technology, ruling at a given moment in time: the presence of dated quantities is an analytical construct, which does not correspond to periods of historical time. Comparison between two different technologies is simply an exercise in static comparative analysis.[8]

Analysis of what Hicks calls 'traverse', namely the transition between two different technologies, involves either historical analysis, leaving aside any attempt at theoretical construction, or an exercise in comparative static analysis: the comparison, that is, between an initial and a final equilibrium. The latter case implies that there must be a unique equilibrium both in the initial and in the final position. Also, analysis of the 'out of equilibrium' transition between the two techniques requires specific assumptions concerning the 'laws of movement' of the variables out of the equilibrium position, which in turn can give definite results only under restrictive assumptions. Typical in this respect is the (usually tacit) assumption of no basic commodities in the model – an assumption even more restrictive than that of a one-(basic)-commodity world.

Even in the presence of just one basic commodity, the series of labour inputs is potentially infinite: the residuum of commodities, though small as we like, can never be fully eliminated; however small, it becomes all-important in the determination of the price system when the rate of profits is at its maximum. This leads us to conclude that,

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[7] For illustration of how Hicks's (1973) simplifying assumptions allow him to circumvent reswitching and other problems in capital theory, and more generally for a detailed analysis of his book, cf. Burmeister (1974).

[8] In modern terminology, it is common to place Böhm-Bawerk's theory among the analyses of intertemporal equilibrium due to the fact that the rate of interest is interpreted, on the consumption side, as a rate of intertemporal preference. However, on the side of production the choice between alternative techniques (represented by different lengths of the production period and the corresponding different levels of productivity: more 'roundabout' techniques are assumed to be more productive) takes place on the basis of a given – hence static – technical knowledge. Thus, intertemporal equilibrium is a static construct, being determined with reference to a given state of technology, and so to a given moment in time.

while the simultaneous equations method and the series of dated labour inputs can be considered as equivalent ways of representing technology,[9] the former method is safer. In other words, no result derived under the second method that cannot also be reached by the simultaneous equations method can be accepted as having full generality in a multi-commodity world with basic commodities.

6.3   Critique of capital as a factor of production

The traditional marginalist theories (those theories that Keynes mis-leadingly called 'classical', pointing as an example to Pigou's analysis) have as their central tenet the thesis that an economic system where perfect competition prevails, externalities are absent and which is not subject to repeated exogenous disturbances, tends to an equilibrium position endowed with characteristics of Pareto optimality, in the sense that it is not possible to improve the position of any economic agent without worsening the position of some other. In particular, traditional marginalist theories maintain that under perfect competi-tion real wages move towards a level which ensures equality between demand and supply of labour, or in other words full employment. Among the automatic equilibrating mechanisms bringing the economy towards full employment, traditional marginalist theories stress the flexibility of the capital–labour ratio: if the real wage falls under the pressure of unemployment, firms will find it more profitable to adopt productive techniques with a lower capital–labour ratio, so that a given endowment of capital becomes compatible with the employment of an increasing number of workers; increase in real wages and the con-sequent fall in the capital–labour ratio proceeds until full employment is reached.

This thesis takes different forms with authors belonging to different streams of the marginalist approach. Garegnani (1960) examines the theories developed by a few representative writers within this tradition (Walras, Böhm-Bawerk, Wicksell), bringing out explicitly the criticisms formulated in their most essential terms in Sraffa (1960). Here it is also worth pointing out that Sraffa's critique is more general than that devel-oped (on at least partly parallel lines) by Joan Robinson (1953), who directly refers to the aggregate notion of capital used in the so-called aggregate production function. Sraffa's critique of marginalist theories refers more generally to the very idea that the 'prices' of 'factors of

[9] For a clear illustration of this fact, cf. Kurz and Salvadori (1995, Chapter 6).

production' (identified with capital and labour) are determined by the forces of supply and demand; that is, indirectly, by the confrontation between resource endowments and consumers' final preferences. By implication, aggregate production functions such as the Cobb-Douglas fall under Sraffa's critiques.[10]

The analytical point that Sraffa focuses his attention upon concerns the consequences of the fact that 'capital' is a set of produced means of production, the relative prices of which change in a non-univocal way when income distribution changes, so that it is impossible to state a priori whether a reduction of the real wage would bring about a decrease, rather than increase, in the capital–labour ratio.

Even more basically, with regard to the problem of the choice among alternative techniques of production, when the rate of profits changes, Sraffa (1960: 103–6) points out the possibility of a reswitching of techniques. In other words, a given technique that proves the most advantageous for a given rate of profits may be superseded by another technique when the rate of profits is raised, but may once again turn out to be preferable when the rate of profits rises still higher.

The implication here is that however capital, and hence the capital–labour ratio, of the two techniques is measured, the traditional marginalist theories of employment and distribution are contradicted. In fact, the marginalist theories consider the distributive values, wage and rate of profit, as prices of the corresponding factors of production determined by the law of demand and supply, so that the capital–labour ratio should diminish as the rate of profits rises (and the wage consequently falls). With the reswitching of technique, if this happens when one technique gives way to another with a rising rate of profits, the contrary necessarily obtains when the second technology is once again replaced by the first, as the rate of profits rises yet higher.

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[10] The Cobb-Douglas production function is still widely utilised because of the apparent good fit of real world data with it. However, as Shaikh (1974, 1980) showed, this is a necessary algebraic consequence whenever profit and wage shares are sufficiently constant; even a data set spelling out the word HUMBUG may turn out to be well fitted by a Cobb-Douglas production function. Moreover, as Sylos Labini (1995) stressed, the coefficients of the Cobb-Douglas should add up to one, since they represent the wage and profit shares in national income; but if this requirement is not imposed as a constraint on the form of the function, as is usually done, then it turns out to be systematically violated. For a systematic treatment of these issues, cf. Felipe and McCombie (2005) and, on growth accounting, Felipe and McCombie (2006).

   The problem illustrated here is analogous to the one, discussed in the previous section, regarding the attempt to measure capital by the average period of production. In fact, the problem lies in the basic structure of the marginalist approach, where the rate of profits is considered as the price of the 'factor of production' capital, however it be measured. In our case, the issue concerns the possibility of using a 'well behaved' demand curve for capital, characterised by an inverse relationship between the rate of profits and the capital intensity of production. With reswitching, it is clear that however capital is measured, the techniques cannot be arranged in an order of ascending capital intensity as the rate of profits decreases. Hence, the rate of profits cannot be interpreted as the equilibrium price of the factor of production capital, with equilibrium for both price and quantity determined by the usual supply–demand mechanism.

   Subsequent to the publication of Sraffa's book, the critique has been presented in a variety of ways. Brief illustration can be made with a few simple graphs depicting wage–profit curves, representing what have come to be known as 'Wicksell effects'. Such effects are labelled as 'price' or 'real', according to whether a single technique is considered, or the choice between two (or more) alternative techniques.[11] That is, a price Wicksell effect is due to the change in relative prices brought about by a change in income distribution, while the commodity composition of the capital stock remains unchanged; while the real Wicksell effect is due to a change in technology, and so in the composition of the capital stock. Wicksell effects are also classified as positive or negative, according to whether the value of capital per worker (the capital intensity of the technique) is positively or negatively related to the rate of profits.[12]

   Let us begin by illustrating positive price (Figure 6.1) and negative price (Figure 6.2) Wicksell effects. The rate of profits r is represented on the horizontal axis, and the wage rate w on the vertical axis; the wage–profit curve represents the w–r relation derived from a set of simultaneous Sraffa-type price equations (like those illustrated earlier, in § 3.2), representing a given technology. For any given level of the rate

[11] The real Wicksell effect is also occasionally referred to in the literature as the Ricardo effect.

[12] Occasionally in the literature the terminology is reversed, so that positive effects are those which conform to neoclassical theory (inverse relationship between the price and the quantity employed of the 'factor of production' capital, i.e. between the value of capital per worker and the rate of profits) and negative effects are those which contradict neoclassical theory.
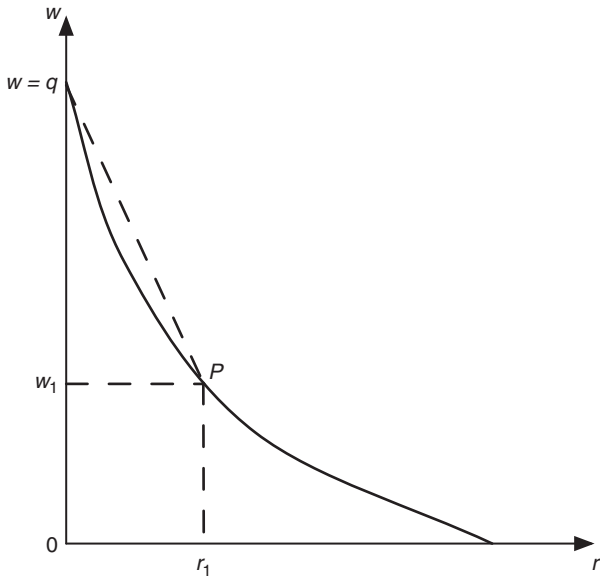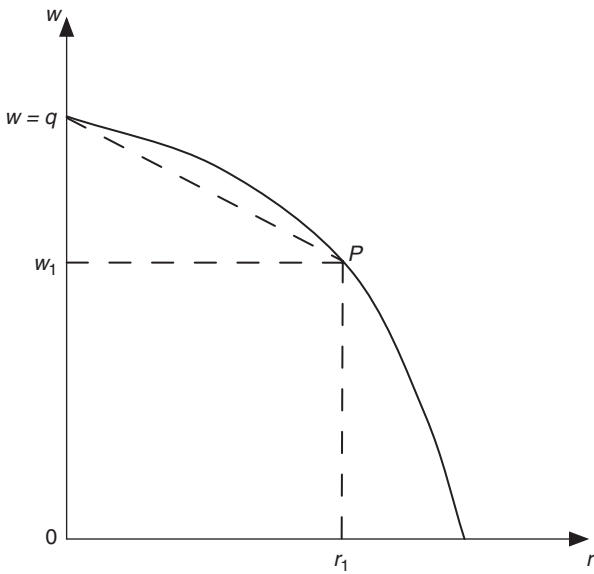
Figure 6.1   Positive price Wicksell effect.

Figure 6.2   Negative price Wicksell effect.

of profits, say r_1, we can read in the figure the corresponding wage rate w_1. In the case of a stationary economy,[13] the maximum wage rate W corresponds to the net output per worker q; hence the difference $(q - w)$ represents the amount of net output per worker going to profits, and is equal to $k \times r$, namely the amount of capital per worker multiplied by the rate of profits. Thus k, the amount of capital per worker, is equal to $(q - w)/r$, namely the trigonometric tangent of angle $q \, P \, w_1$. As Figures 6.1 and 6.2 make clear, in the first case, with a convex to the origin wage–profit curve, we have a positive price Wicksell effect: the capital intensity of the production process measured by capital per worker increases when the rate of profits – the 'price' of capital – increases, contrary to the basic tenet of traditional marginalist theories of value and distribution. Conversely, in Figure 6.2 capital per worker decreases when the rate of profits increases: we thus obtain an inverse relationship between the amount of capital employed and its price, which is considered to be the general case by standard neoclassical macroeconomic theory, while here we see that it all depends on the concavity or convexity of the wage–profit frontier. Let us recall that the wage–profit frontier can also be a straight line, but only when there is a single basic commodity in the economy; in this case we have a zero, or neutral, Wicksell effect.[14]

Figure 6.3 below illustrates real Wicksell effects, with the choice between two alternative techniques represented by two wage–profit curves. The curves intersect twice, so we have reswitching: when the rate of profits increases from zero to its maximum, technique β is at first adopted, followed by technique α, which is in turn followed again by technique β. It is clear that, however capital is measured, a 'well-behaved' transition from one technique to the other conforming to the negative relationship between the rate of profits and capital intensity (negative real Wicksell effect) is preceded or followed by a 'badly behaved' transition corresponding to a positive relationship between the profit rate and capital intensity (positive real Wicksell effect). In Figure 6.3, as can readily be verified, a negative real Wicksell effect obtains at the first switch point s_1 and a positive real Wicksell effect at the second switch point s_2.

[13] For illustration of the more general case (with a constant, but possibly different from zero, rate of growth) cf. Kurz and Salvadori (1995: 113–16).

[14] Without going into details, let us recall that this is the case considered by Samuelson (1962) in his 'parable' based on the so-called surrogate production function, which was one of the main targets for criticism in the sixties, as recalled later.
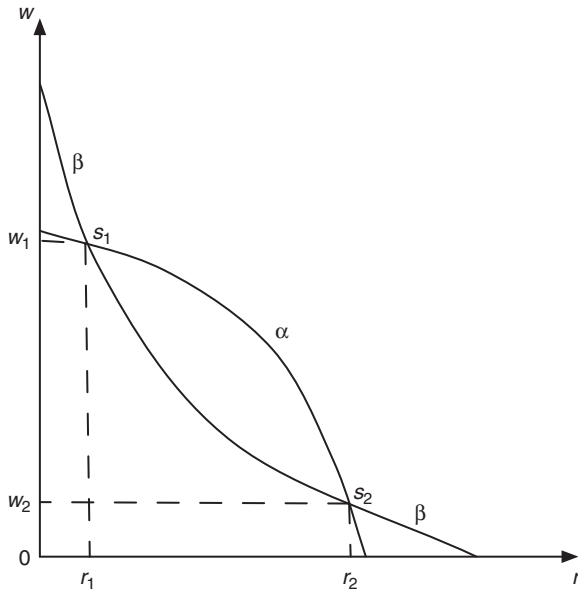
Figure 6.3   Reswitching and real Wicksell effects.

The implication of this is that a decrease of the wage rate, interpreted by traditional neoclassical macroeconomic theory as the reaction of a competitive labour market to the presence of unemployment, may equally well produce either of the following outcomes: (i) an adjustment in the correct direction, with a decrease in the amount of capital per worker (negative real Wicksell effect) which would allow for the use of a greater amount of labour with the available quantity of capital, or (ii) an adjustment in the wrong direction, with a decrease in the amount of capital per worker (positive real Wicksell effect), so that unemployment increases and the economy moves further away from the equilibrium situation.

This critique gave rise to much debate,[15] while the crucial question of its relevance has received relatively scant attention. Contrary to the apparent belief of many, it does not only apply to the aggregate production function: a tool which nevertheless continues to be used in all the various versions of the dominant macroeconomic theory, from 'real cycle' theories to 'old' and 'new' growth theory models, up to the overlapping

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[15] For a survey, cf. Harcourt (1972).

generations models. It also applies to all those cases in which, while acknowledging the fact that capital is in reality a collection of heterogeneous means of production, the attempt is still made to determine the rate of profits as the price of a factor of production, i.e. capital, however it be defined (aggregate of value, 'waiting', average period of production).

In particular, Sraffa's critique undermines the very foundations of the idea – crucial to marginalist macroeconomic theory – that a competitive labour market in a closed economy moves automatically towards full employment equilibrium, since the decrease in real wages caused by unemployment prompts an increase in the quantity of labour employed per unit of capital.[16]

6.4   Extensions of the critiques

As we know, Sraffa's book only purports to 'serve as the basis' for a critique of the marginalist tradition. And as already noted, at the same time as Sraffa, and following similar lines of enquiry, Garegnani (1960) put forward his direct critique of some of the main theoretical contributions in the marginalist tradition. The publication of Sraffa's book was promptly followed by lively debate.

It emerged from an initial skirmish, recalled above in § 6.2 (Harrod 1961; Sraffa 1962), that the possibility of measuring capital once the rate of profits is given offers no escape from Sraffa's strictures, since they refer to the necessity, for the traditional marginalist theories of distribution, to measure capital *independently* of income distribution (a point which Garegnani 1960 stresses as well). Another clash came with Samuelson's (1962) attempt to depict the aggregate production function as a 'parable' not betraying the essential characteristics of a productive system. Then it was the turn of Levhari (1965), who set out to show that the problems raised by Sraffa (such as the possibility of the reswitching of techniques) referred only to the single industry and not to the economic system as a whole. These propositions were immediately refuted.[17] Debate then turned to the issue of the relevance

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[16] Cf. Roncaglia and Tonveronachi (1985).

[17] Samuelson's theses were refuted by Garegnani (1970a) and Spaventa (1968); Levhari's by Pasinetti (1966), followed by various other authors, among which was Garegnani (1966). Samuelson (1966), and Levhari (with Samuelson, 1966) themselves recognise the erroneous nature of their thesis. Notwithstanding, in the following years some argument dragged on, though without adding to the results of the previous debate: cf. for instance Gallaway and Shukla (1974) and Garegnani (1976); Burmeister (1977, 1979) and Pasinetti (1979a, 1979b).

of Sraffa's critiques to the foundations of the marginalist approach. The claim that such critiques only concerned the 'lowbrow' versions of the marginalist theories[18] implied a retreat towards the rarefied atmosphere of intertemporal general economic equilibrium models and abandonment of the assumption of a rate of profits uniform across the various sectors of the economy.[19]

Sraffa's analysis also provided the foundations for criticisms of specific varieties or of specific aspects of the marginalist approach.

Among the critiques of specific streams of the marginalist approach, let us recall those proposed by Steedman on the theory of value and distribution as originally proposed by Jevons and by Wicksteed.[20] Pasinetti criticises Solow's use of the Fisherian notion of the rate of return, which Solow considers as 'the central notion of capital theory', by maintaining that it indicates the return to society of an increase in savings (the demand price of savings) and can be defined independently of the rate of profits, so that it could be used, together with the intertemporal preferences of economic agents (the supply price of savings), to explain it.[21]

Of the critiques of specific aspects of the marginalist approach, let us recall the criticism levelled at the Heckscher–Ohlin–Samuelson theory of international trade. According to this theory, each country tends to specialise in the production of those commodities that require relatively larger quantities of those factors of production which are relatively more abundant in that country. Critiques were originally proposed independently by Parrinello (1970) and by Metcalfe and Steedman (1972, 1973), to be developed in a long series of articles, in some cases attempting to build a 'neo-Ricardian' theory of international trade as well.[22]

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[18] Occasionally recourse to analytical tools such as the aggregate production function is justified with the distinction between 'high-brow theories', internally consistent but wholly irrelevant on the practical level, and 'low-brow theories', relevant for practical matters but based on foundations already recognised as mistaken. In the latter case, the use of more or less advanced mathematical tools should not lead us to forget, as unfortunately happens all too often, that these contributions are precisely 'low-level' contributions, and as such should be excluded from the field of economic science. Cf. Bliss (1970); Hahn (1982).

[19] Cf. Garegnani (1970b, 1979); Roncaglia (1975, Chapter 6); and more recently Kurz and Salvadori (1995, Chapter 14); Schefold (1997, Chapter 18).

[20] Cf. Steedman (1989, Chapter 8) on Jevons; Steedman (1992) on Wicksteed.

[21] Cf. Solow (1963, 1967) and Pasinetti (1969); for the discussion which followed Pasinetti's critiques, cf. then Solow (1970) and Pasinetti (1970); Dougherty (1972) and Pasinetti (1972).

[22] Cf. for example the readings edited by Steedman (1977b, 1979a) and Steedman (1979b).

In addition, various commonplaces in marginalist theory came in for criticism from Steedman with reference to the theory of consumers' choice, the theory of technical progress and the theory of fiscal incidence.[23] We may then recall the critiques of the 'neoclassical synthesis', and specifically of Modigliani's (1944, 1963) attempt to set up a theory of aggregate income and employment retaining the basic principles of the marginalist tradition, while opening the door to the use of Keynesian fiscal and monetary policies.[24] Another aspect of the 'neoclassical synthesis', and more generally of mainstream macroeconomic theory – the assumption of a 'representative agent', a trick that can be considered the other face of the choice of single-commodity models – is criticised in various works by Lippi and others.[25]

Clearly, the criticism of the marginalist tradition generated by Sraffa's work achieved highly significant results on a much wider front than is often recognised. The marginalist theoreticians were then driven into concentrating their efforts in three fields. Firstly, we have intertemporal or temporary general equilibrium models, so general[26] as to prove sterile as guidance in interpretation of economic reality: any event can be rationalised *ex post*, within these models, by assigning a particular set of values to the parameters, or by assuming opportune changes in these parameters. Secondly, we have disequilibrium models, requiring *ad hoc* assumptions on the adjustment mechanisms in order to obtain definite results, and which often use an aggregate notion of capital. Finally, especially in the field of macroeconomics, both the theoretical debate[27] and most textbooks have fallen back on one-commodity models (with the misleading use of the label of general economic equilibrium models as soon as more than one single period is considered, as in overlapping generations models), conveniently forgetting the results of the capital theory debates recalled above, though never attempting to deny the validity of those critiques.

[23] Cf. respectively Steedman (1989, Chapter 11; 1985a; 1985b). Deep-reaching critiques of the theory of consumer's choice are also formulated by Parrinello (1982a).

[24] These critiques, hinted at in Garegnani (1964–5), are developed in Roncaglia and Tonveronachi (1978, 1985), and in Roncaglia (1988).

[25] Cf. for example Forni and Lippi (1997).

[26] Notwithstanding the adoption of highly restrictive assumptions, such as that of convexity (namely, decreasing returns) both in production and in consumption, as already recalled above.

[27] To give just two examples, the theory of real business cycles, or to the so-called 'new growth theory'.

The growing remoteness of such analyses from real world issues on the one hand, and from theoretical rigour on the other, opens the way to the revival of an approach alternative to the marginalists': the classical approach, enhanced through assimilation of Keynes's ideas. Chapters 7 and 8 consider some aspects of, and some contributions already made to, such an alternative approach.

7

Interpreting *Production of Commodities by Means of Commodities*

7.1   Interpreting Sraffa: The assumption of given quantities

Nearly 50 years have passed since *Production of Commodities by Means of Commodities* was first published, but interpretation of the text still arouses lively debate. Any particularly concise dissertation – and Sraffa's certainly is – may be open to various interpretations, but the extraordinary precision of Sraffa's prose should leave little room for misunderstanding. Nevertheless, some misunderstanding did arise from an additional difficulty, namely the radical difference between his type of analysis and the lines of argument customarily followed by the vast majority of contemporary economists. Sraffa himself refers to the problem in the opening lines of his book:

> 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.

> (Sraffa 1960: v)

Two related themes emerge from this short passage (and from the pages that follow it). In the first place, Sraffa suggests that at least two categories of economists exist: those who are 'accustomed to think in terms of the equilibrium of demand and supply', and those who are not. Secondly, Sraffa points out that a crucial difference between these two groups of economists – or between these two approaches, paradigms or theoretical frameworks – lies in the role that the quantities produced play in the analysis of prices and their relationship to income distribution.

In his analysis Sraffa is quite unequivocal on the point that he takes the quantities produced as given. Thus he is able to consider as given the techniques of production, while avoiding any assumption on returns to scale.[1] In a text of exemplary concision, he actually repeats himself to stress the point:

> No changes in output and (at any rate in Parts I and II) no changes in the proportions in which different means of production are used by an industry are considered, so that no question arises as to the variation or constancy of returns. The investigation is concerned exclusively with such properties of an economic system as do not depend on changes in the scale of production or in the proportions of 'factors'.
>
> (Sraffa 1960: v)

For Sraffa the point is not only crucial, but also a potential source of misunderstanding. It is, indeed, an assertion that can hardly go down well with readers taking demand and supply equilibrium theory to their perusal of the book. For such readers – the overwhelming majority of contemporary economists – it is easier to see *Production of Commodities by Means of Commodities* as half (the half they consider the supply side) of a system of general economic equilibrium. Indeed, flying in the face of these explicit statements (which, moreover, are not *obiter dicta* but the pondered opening to a deeply pondered text), a number of economists have advanced this interpretation.[2]

This interpretative mistake re-evokes the error Marshall made in relation to the theory of Ricardo, and of the classical economists in general. Marshall, as we well know, held that they were aware of only one of the two 'blades of the scissors' determining price – the supply side, but not the demand side.[3] In this case, too, classical analysis was rendered

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[1] Cf. earlier, §§ 3.3–3.5, and Bellofiore-Potier (1998: 94–5).

[2] Cf. for instance Johnson (1962); Robinson (1961); Hahn (1982). Joan Robinson did, however, eventually modify her interpretation: cf. Robinson (1978: 122).

[3] Cf. in particular the appendix to Marshall's *Principles* (1961: 813–21; here we find – on p. 820 – the famous reference to the blades of scissors: 'The "cost of production principle" and the "final utility" principle are undoubtedly component parts of the one all-ruling law of supply and demand; each may be compared to one blade of a pair of scissors. When one blade is held still, and the cutting is effected by moving the other, we may say with careless brevity that the cutting is done by the second; but the statement is not one to be made formally, and defended deliberately'.). For Sraffa's critique of Marshall's economics, cf. above, Chapter 1.

comparable to analysis in terms of demand and supply equilibrium by introducing the assumption of constant returns. Such an assumption, however, cannot be held to represent a general constitutive element of classical analysis: the classical economists had quite different ideas about returns to scale, and moreover conceived them in the context of a dynamic analysis. Let us recall, for example, Smith's ideas about the relationship connecting division of labour (and hence productivity) to the size of the market, or the role played by decreasing returns in agriculture in determining land rent in the analyses of Malthus, West, Torrens, Ricardo and others.

Sraffa foresaw quite clearly that the same error would once again crop up in connection with his own analysis. Indeed, he appeared ready to accept the inevitable, though up to a point. If you really cannot help reasoning in terms of demand and supply equilibrium, he says in effect, then go on and assume – but only as an initial step – that I am considering the case of constant returns: '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'. (Sraffa 1960: v: these lines come between the first and second of the two passages quoted above.)

Here a problem arises. If the hypothesis of constant returns constitutes such a dangerous misunderstanding, how can Sraffa possibly deem it acceptable for the first few steps?

Luckily, the answer here is simple enough. The fact is that Sraffa's aim in writing *Production of Commodities by Means of Commodities* was twofold. On the one hand, he set out to provide the 'prelude to a critique of economic theory', as indicated by the subtitle (where 'economic theory' means 'the marginal theory of value and distribution', as Sraffa himself takes care to specify in his Preface: Sraffa 1960: vi); at the same time, on the other hand, he intended to solve certain analytical problems – in particular the link between relative prices and the distribution of income – that the classical economists left unsolved, and which contributed to the crisis of the classical approach and thus to the rise to dominance of the marginalist approach. Now, those brought up in the marginalist tradition must first of all learn to recognise the logical difficulties inhering therein; only then will it prove useful to discover that the classical approach does not collapse simply because the labour theory of value does not hold. But criticisms – or the premises for a critique – of the marginalist theory of value and distribution can perfectly well be advanced, studied and discussed referring to one particular case of marginalist theory itself, namely that of constant

returns: Sraffa's analysis may be considered as internal to the theory of general economic equilibrium *solely to this end*.[4] One point must, however, be made quite clear here: when we move on from criticism of marginalist theory to reconstruction of the classical approach, the hypothesis of constant returns must be abandoned. It is this, we may infer, that Sraffa has in mind when he repeats that 'no changes in output […] are considered' or, in other words, the quantities produced by the various industries are given.

7.2　The clash between the classical and marginalist approaches

Production of Commodities by Means of Commodities constitutes both a critique from within the marginalist approach and a contribution within the classical approach. This is possible because certain logical relations between economic variables must hold in any case; however, they occur in different contexts, as attested by the fact that the hypothesis of constant returns is necessary if we are to read these propositions in the context of marginalist theory, while it is not if we read them as a part of classical theory.

　　The point emerges more clearly if we turn our attention to the basic differences between the classical and marginalist approaches, considering them as two 'paradigms' (in the sense suggested by Kuhn 1962) expressing two different conceptions of the way the economic system works. It is a difference that Sraffa points up in the conclusion of his book, in Appendix D, 'References to the literature'. Here, as already recalled, Sraffa contrasts 'the picture of the system of production and consumption as a circular process', characterising the classical approach, 'to the view presented by modern theory, of a one-way avenue that leads from "Factors of production" to "Consumption goods"' (Sraffa 1960: 121).

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[4] In this respect, it is worth pointing out that Sraffa himself refers to Part III of his book, dedicated to the 'switch in methods of production', as an exception with regard to the absence of any hypothesis on returns. There we must, in fact, consider changes – albeit only notional – 'in the proportions in which different means of production are used by an industry' (Sraffa 1960: v). However, essential as it is for criticism of the traditional marginalist theory of value and distribution, this part is of minor utility in understanding the phenomena of technological change. To this end it is more useful to adopt a dynamic evolutionary approach, as did the classical economists from Smith's theory of the development of the division of labour to Babbage's 1832 theory of the links between division of labour and mechanisation. Cf. Corsi (1984); Sylos Labini (1984, Chapters 3 and 4); Sylos Labini (1993).

These expressions sum up the radical differences in the 'vision' of the economic world, both in the conceptual apparatus used to represent it and in the theoretical structures built on those bases.

Let us begin with the classical approach. The economic system is based on the division of labour, which does not derive from differences in the original individual endowments of resources but rather from the intrinsically social nature of human beings.[5] The division of labour is both macroeconomic, i.e., between sectors, and microeconomic, i.e., within each production process.[6] As a result of the macroeconomic division of labour, each economic subject – whether individual or firm – must at the end of the production process enter into relations of exchange with other economic subjects to obtain the wherewithal to survive and relaunch the production process. In the economic system as a whole, the quantity of each commodity produced is usually more than enough for these purposes.[7] That portion of the total output that exceeds the strict needs of reproduction – the surplus – may be channelled into consumption exceeding subsistence or into investments, the choice here being associated with the way in which the value of the surplus is distributed between the various economic subjects.[8] Thus exchange

[5] Smith, who insisted on this point in the *Wealth of Nations*, came in for severe criticism from Pownall (1776) in this respect: cf. Roncaglia (2001, Chapter 5; 2005, Chapter 4). According to the marginalist conception (and Pownall might be considered a precursor of it from this viewpoint), by contrast, the division of labour arises from differences in the abilities of the various workers. To assume the original endowments of abilities of the different individuals as a given datum of the analysis is in fact a requirement stemming from the very structure of marginalist analysis based on a 'one-way avenue' representation of the economy.

[6] Analysis of the division of labour can be carried out from various viewpoints. For example, the distinction between the horizontal and vertical division of labour is relevant to analysis of the link between technological change and evolution in the social structure. Moreover, the microeconomic division of labour (or organisational division of labour) is itself a source of the macroeconomic division of labour: consider the case of certain areas of activity externalised by firms, giving rise to new firms. On these points cf. Corsi (1991).

[7] Strictly speaking, this applies to a closed economic system. For an economy open to international trade, we might see exchange between domestic and foreign commodities as an additional production process, with a procedure similar to the closure of input-output tables.

[8] Let us remember that product, total means of production and surplus are all sets of physical quantities of different commodities, which can be represented in mathematical terms by vectors in the space of commodities. The distribution of the surplus (between social classes and between sectors) occurs in terms of value, and is thus connected to the determination of exchange ratios (values) for the commodities.

relations are called 'natural' when they express the conditions of repro-
duction in the circular process of production and consumption, or in
other words when producers recover what is needed to repeat activities
in the following period, and when they find it advantageous to do so,
the distribution of surplus complying with the condition of a uniform
rate of profits in the various sectors and thus reflecting the essential ele-
ment of capitalist competition, namely the free flow of capital between
the various sectors of the economy.[9]

In this tradition the concept of market does not correspond to a
point in time and space upon which purchasers and sellers converge
but rather to a network of repetitive and sufficiently regular trade
flows, and thus to a network of interpersonal relations underlying
these flows, essential for the reproduction of the economic system.
This conception can be found in classical economists from William
Petty on.[10] Here prices indicate the conditions for reproduction recalled
above and not the relative scarcity of commodities vis-à-vis the wants
of consumers.

Thus we find a sharp contrast between the approach of the classical
economists and an even older conception, where the concept of market
refers to a place upon which purchasers and sellers converge and where
trade relations are therefore determined by confrontation of demand
and supply. The ideal reference point here is the Medieval fair, and then
the Stock Exchange. It is from a development of this representation of
the economic problem – as determination of the equilibrium arising
from the demand/supply confrontation – that the subjective concep-
tion of value derives. The 'equilibrium' price (a term that found its
place in economics only after the 'marginalist revolution' of the 1870s,

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[9] The labour theory of value in this respect (disregarding its metaphysical aspect,
connected to the idea of labour as cause or substance of value) is merely a simple
way of expressing the relative difficulty in the production of a commodity using
a mono-dimensional variable. However, the second condition for reproduction
(uniformity of the rate of profits in the various sectors) calls for a multidi-
mensional description of the difficulty of production: for each sector, a vector
including as many elements as there are means of production (including labour)
represents the physical costs of production. This relationship between labour
and physical cost of production is quite clear, for instance in William Petty: cf.
Roncaglia (1977, Chapter 8). In the Sraffa Papers there are a few, though often
quoted, documents in which Sraffa shows negative appraisal of the transition
from Petty's physical costs to the labour theory of value: cf. for instance Sraffa
Papers, D3/9.89 (quoted by Kurz and Salvadori 2000: 429): 'It is a purely mystical
conception that attributes to labour a special gift of determining value'.
[10] Cf. Roncaglia (1977: 73–6).

alongside adoption of a methodological model inspired by physics, and in particular static mechanics) is that which ensures equality between demand and supply, or in other words allows for the balancing of opposed forces deriving from the scarcity of commodities and the desire for them. The problem remains essentially the same if it is the original factors of production that are scarce, equilibrium between demand for final consumption goods and the supply of original factors being mediated by production.[11]

In the classical approach, the theory of value is based on technology, taken as given, and the principle for the distribution of the surplus – uniform wage rate and uniform rate of profits – while the marginalist approach takes as given the endowment of resources and consumers' preferences (to which technology may be added). Here we come to the point of differentiation signalled by Sraffa: according to the classical approach the problem of value does not consist in determining the equilibrium values simultaneously for prices and quantities exchanged (and quantities produced, if the model includes production). More simply, it consists in determining the exchange ratios that satisfy the conditions for reproduction of the economic system. It is only when the marginalist conceptual framework of supply–demand equilibrium is superimposed on the classical problem that it appears necessary to determine quantities and prices simultaneously.

In the classical approach, of course, separating the problem of 'reproduction prices' from that of quantities produced and exchanged does not imply that the problem of determining production levels lies outside the economist's field of work. An economist like Marx who starts from the classics makes a clear distinction between three logical stages: the firms' decisions on the quantities to produce, the subsequent theoretical analysis of the link between prices and distribution and, finally, the problem of realising on the market through sales the value of the commodities produced.

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[11] Actually, the very idea of original factors of production needs looking closely into. In fact, 'land' normally requires substantial investment before it can be used in the production process, but it cannot be considered scarce in absolute terms. As regards 'labour', we must bear in mind both the importance of professional training in contemporary economies and a whole range of elements (from customary practices and legal norms to the existence of social services such as kindergartens) determining both rates of activity (especially for women) and migratory flows. We have already seen (in Chapter 6) the Sraffian critique of 'capital' interpreted as a factor of production.

Furthermore, the classical economists traditionally consider as sepa-rate problems that of determining exchange values (or natural prices) and their relationship with income distribution and that of the mar-ket mechanisms set into action by a discrepancy between supply and demand. The latter mechanisms essentially concern the analysis of com-petitive processes and, insofar as they do not presuppose a systematic market clearing, do not lead to definite results: 'market prices' are not a theoretical variable explained by a – purely metaphorical – 'principle of gravitation'.[12] Let us stress that all this does not imply that 'demand' – whatever is meant by such a term[13] – has no effect on prices or on quanti-ties produced, within the framework developed by classical economists. 'Demand' influences the entrepreneurs' decisions on how much of each commodity to produce and hence, whenever constant returns do not prevail, the relative difficulties of production; thus demand acts on the data of the problem that Sraffa isolates for analysis. What cannot be found in the Classical (and Sraffian) framework is the assumption of an equilibrium set of prices and quantities determined by market clearing processes and by consumers' choices stemming from preference maps defined by (bi-univocal and convex) functions connecting the quantities demanded of the different commodities to prices and to the economic agents' endowments. In the classical economists' view, the changes in consumption habits that take place over time are generally the effect rather than the cause of changes in technology and in the structure of production; in any case, these aspects are to be kept quite distinct from those concerning the competitive processes of adjustment to the 'sud-den changes in channels of trade' (as Ricardo calls them in the title of Chapter 19 of the *Principles*).

The separation of the problem of exchange value from that of the realisation on the market of the commodities produced, and indeed its separation from the problem of analysis of competitive processes and

[12] See for example Smith (1776), book I chapter 7 (and the commentary in Roncaglia 1990b, 2009a), or Ricardo (1817), chapters 19 and 30.

[13] The classical economists do not refer to demand functions relating the quan-tity demanded to prices (of the commodity under consideration as well as of other commodities, thus implying substitution among consumption goods depending in a well-defined way on their relative prices); they commonly refer to needs, customs and habits, and occasionally to status, in explaining the con-sumption structure. Equally extraneous to the classical approach is the notion of the economic agent, connected to methodological individualism, maximising utility through consumption and production choices; the classical economists utilise, rather, categories such as workers, capitalists and landowners, firms and productive sectors.

market prices, exemplify the classical economists' practice of addressing different analytical areas separately. As we shall see, the possibility of distinguishing various logical areas within economic argumentation, and indeed the utility of breaking down the problem of representing the functioning of the economic system into different 'theoretical pieces', correspond to a methodological line that Sraffa seems to have suggested in his exchanges with Wittgenstein.

7.3   Classical versus marginalist conceptions of competition

A fundamental element in the frame of reference used both by Sraffa and the classical economists for the analysis of prices is the assumption of equality of the rate of profits in the different productive sectors of the economy. Classical economists, as well as Marx, consider this equality as a limit condition, unlikely to be effectively achieved in reality. Nonetheless, they believe that the mobility of capital between productive sectors, in search of maximum profitability, would ultimately bring out a tendency of profit rates to move towards this benchmark position.

It is only in this sense, and not in the marginalist sense of the conditions that ensure equality of supply and demand, that one can speak of 'equilibrium prices' within Sraffa's system. Obviously, the tendency towards a uniform rate of profits comes about through decisions taken in each individual sector, taking into account the expected ease and profitability of the market as well as past levels of sales, which also influence the decisions concerning the levels of production. However, supply and demand are not expressed as mathematical functions of prices as in the theories of prices developed within the marginalist approach. The assumption of a uniform rate of profits for given levels of production does not necessarily imply that the prices and/or quantities that are actually realised are those that were initially expected. Nor does it imply equality between supply and demand in the period considered, either for each individual product or for production in the aggregate, as we shall see more clearly in the following section.

The assumption of a uniform rate of profits in the various sectors thus reflects the classical and Marxian conception of competition based on freedom of entry of new firms into each productive sector. Under such conditions it is, in fact, impossible for any single sector to realise an above-average rate of profits continuously, for new firms would be attracted into the sector in question by the possibility of earning higher profits. As a consequence, productive capacity and supply would rise relative to demand, putting a downward pressure on prices (and vice

versa in the case of a rate of profits below the average). This type of competition bears little relation to any particular firm's ability to set the price of its own product. Nor is it related to the size of any individual firm as a proportion of the entire industry. The only necessary conditions are that technological discontinuities related to a minimum plant size do not play a relevant role, and that legal (and more generally, institutional) obstacles to the free movement of capital between sectors do not exist, so that no barriers to entry exist for new (potential) producers.[14] The classical (and Sraffian) conception of competition thus relies on completely different foundations than the traditional marginalist definition, which is based on the requirement of a large number of firms forming an industry, such that it is impossible for any one of them to exert an influence on the price of their output.[15]

From the point of view of their respective analytical implications, the different conceptions of competition can be distinguished by noting that the classical one is linked to the simple assumption of a uniform rate of profits across the different productive sectors of the economy, while the marginalist conception is linked to the stricter hypothesis that each single producer in a given industry should consider the market price as given. Sraffa's 1925 critique of the marginalist theory of the firm (discussed earlier in Chapter 1) suggests that the marginalist conception of competition is either logically incoherent or based on *ad hoc* assumptions leading to a distorted representation of reality. The classical concept of competition, on the other hand, is a useful analytical instrument in relation to modern industrial conditions, just as it was in the time of Smith and Ricardo.[16]

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[14] Sylos Labini's (1956) and Bain's (1956) theories of oligopoly are based on 'barriers to entry'. The two authors reached analytically similar results independently. However, the role of barriers due to technological discontinuities ('concentrated oligopoly') and the link between this view of oligopoly and the classical notion of competition are stressed only by Sylos Labini, while both stress the role of product differentiation ('differentiated oligopoly').

[15] For a reappraisal of the classical conception of competition, in contrast to the traditional marginalist approach, cf. Breglia (1965: 89–93 and p. 92: 'competitive conditions are not assured by a large number of producers, but by the possibility that an additional producer may join the existing producers: competition is assured by an "open door" (or free entry) rather than a "closed door"'). Cf. also Sylos Labini (1976).

[16] As Sylos Labini (1956) suggested, oligopoly – which can be considered the dominant market form in contemporary economies – can be studied by means of the notion of the barriers to entry in any given sector, utilising free competition and the competitive rate of profit as the reference (extreme) case.

7.4   The realisation problem

Sraffa's approach also recalls the Marxian representation of the influence of demand on prices. In Marx's writings the problem of demand is implicitly broken down into two distinct problems, analysis of the levels of production and analysis of the absorption or sale (realisation) of the outputs produced. Neither of these problems is considered in Sraffa's analysis. From a logical point of view, the determinants of the levels of production (which enter into Sraffa's analysis as givens) are upstream of the problem of prices as analysed by Sraffa, while the determinants of the realisation problem are downstream, in as much as they concern the analysis of the relation between quantities produced and quantities sold and the relation between prices of production and market prices which lie outside the scope of Sraffa's analysis. As a result of the assumption of given levels of production, and the distinction between prices of production and market prices, Sraffa, in effect, can isolate the problem of prices of production without assuming anything with respect to the determinants of the levels of production and the sale of the quantities produced (realisation).

By keeping the problem of the level of production distinct from the problem of realisation, the direct link between quantity demanded, quantity supplied and price found in traditional marginalist theory is broken.

At the same time it is possible to achieve a closer correspondence between theory and reality, because the existence of two different types of autonomous decision-making centres can be recognised with this separation. The first includes the entrepreneurs, who are ultimately responsible for the decisions that determine the levels of production in the various sectors; the second, the 'buyers', who take the decisions that determine the actual purchase (sale from the point of view of the entrepreneurs) of the products produced. This second category is, as we will see a little later on, substantially different from the traditional definition of 'consumers' used in orthodox theory.

In the case of the neoclassical mechanism of price determination by means of supply and demand curves, the independence of the two centres of decision making is only apparent. Producers are in fact only free to make mistakes relatively to the only correct solution, corresponding to the equilibrium quantity of product to be sold at the equilibrium prices; this solution is externally imposed upon them by the factors considered as given for the analysis (technology and consumers' tastes), and under profit maximising condition will eventually assert itself.

In this way the producer, as an autonomous agent differentiated from the consumer, in practice disappears from the scene. The market economy thus takes on the appearance of being truly subject to the sovereignty of the consumer.

In the classical conception of the economy recalled above, the decisions of the entrepreneurs are independent because they are logically antecedent to, and not concomitant with, the decisions of the consumers. The elements of uncertainty that characterise entrepreneurial decision making are thus placed in the forefront of the analysis. This uncertainty should be considered as necessarily intrinsic to society, for it stems directly from the very organisation of the economic system around several diversified decision-making centres.[17] It does not simply refer to the possibility that entrepreneurs have limited knowledge of the relevant information such as the final consumers' preferences.

Obviously, this does not mean denying that consumer behaviour influences the behaviour of the producers, for in the final analysis it is the consumers who spend their money in the market and thereby finally determine the level of output sold. To the extent that differences between producers' expected and realised levels of sales and between production and selling prices influence the actual level of production, the consumers have an indirect bearing on producers' decisions. But there is also an influence that works in the opposite direction, for the decisions of the entrepreneurs on output levels determine aggregate income, and thus the consumers' overall capacity to spend on consumption.[18]

Decisions about production levels also determine, in a more direct way, the intersectoral demands for means of production, given the technical coefficients corresponding to the chosen levels of output. However, there is no necessary unidirectional causation or univocal functional relationship between levels of production of the various industries and demands for intermediate input goods for two primary reasons. Firstly, producers may have the possibility of drawing on, or adding to, inventories of means of production. Secondly, an open economy has the possibility of satisfying part of its demand for intermediate goods in foreign markets. Indeed, there is no major logical problem in

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[17] This seems to be the notion of uncertainty developed by Keynes: cf. Roncaglia (2009b).
[18] Such influence is emphasised both by Keynes (1936, 1937) and by Kalecki (1971). A system placing emphasis on this link is presented by Pasinetti (1965, 1981).

considering Sraffa's analysis as referring to an open economic system, as well as a closed one. Part of internal demand can be satisfied by imported commodities, and part of the demand for internally produced commodities can come from outside the system. Moreover, once the levels of output have been decided, it is always open to producers to try to influence levels of consumption directly by means of advertising, special offers and discounts, or direct special agreements with retailers for preferential display or single supply in shops. Consumer behaviour is thus influenced in a very important measure by the producers' selling strategies; especially in the case of new products, it is often the case that producers rather than consumers determine the evolution of consumption habits.

The 'buyers' who, in the last analysis, make the decisions that determine the absorption or sale of the outputs produced by the autonomous decisions of entrepreneurs are, in fact, a much larger and more heterogeneous category than the 'consumers' of traditional analysis, who simply acquire the final consumption goods produced. To shift from 'consumers' to 'buyers' we must add the demands by firms for means of production and investment goods to the demands for final consumption goods.[19] We should also distinguish the demand for final consumption goods by the commercial sector, both wholesale and retail, from the demand from households. Thus another link in the chain of decision-making elements that runs from producer to consumer can be identified. This link, although closely related to the other two, may exhibit quite special characteristics, for example in terms of the inventory, discount and display policies of retailers and wholesalers.

All these factors furnish a frame of reference for the analysis of prices that is compatible with what may be considered the essential elements of a capitalist system (separation of the moment of production from the moment of consumption, multiplicity of decision-making centres, uncertainty, etc.). At the same time they also highlight the difficulties of a theory that attempts to determine the quantities purchased (or demanded), on the basis of given extra-economic factors such as consumers' tastes and preferences, with interpretation of the capitalist

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[19] This is obviously recognised by the marginalist theoreticians themselves. But they tend to believe in the possibility of a precise derivation of the demand for intermediate goods on the basis of the demand for final consumer goods. Hence, decisive importance is placed on final demand as an exogenous factor, obscuring thereby the various factors outlined in the texts which make the impulses that run between demand for final consumption goods and demand for intermediate goods anything but automatic.

process of production as 'a one-way avenue that leads from "factors of production" to "consumption goods"'.

The interpretation of Sraffa's system thus far outlined not only requires the assumption of constant returns but rather implies that no assumption on returns be made. The assumption of given levels of production is also important in that it allows for the compatibility of Sraffa's system with Keynesian underemployment equilibriums (under-full capacity utilisation of plant, equipment and labour). There is nothing in Sraffa's analysis requiring that the number of labourers corresponding to the given levels of production be equal to the number of labourers seeking employment in the economic system considered. This relationship with Keynes's analysis, already referred to earlier (§ 2.3), will be taken up again below (§ 7.6).

7.5 Sraffa and Wittgenstein: The problem of method in economics

As we have seen, in his book Sraffa delimits with close rigour the object of his analysis, and thus the data necessary to work it out. The first given datum is technology; in the absence of hypotheses on returns to scale, this means that the technology (which can be represented by a matrix of technological coefficients) corresponds to given production levels (which can be represented by a vector) of the various industries.[20] Where a surplus is obtained, the manner of distribution must be specified: Sraffa does it by taking as given one of the two distributive variables – real wage or rate of profits – and by embracing the competitive principle of a uniform rate of profits as the rule for the division of profits among the various sectors. On this basis, without any reference to demand, let alone to functions linking the quantities demanded of each commodity to their prices (and, in general economic equilibrium models, to the prices of other commodities, including the services of

[20] In the general case, where fixed capital goods are present, the technology adopted as given for the determination of prices corresponds to what is considered a normal degree of utilisation of plants; it is in fact to this specification of technology that firms make reference for decisions on prices. A point worth stressing is that in Sraffa's analysis it is technology that is taken as directly given, while the production levels of the various sectors are taken as indirectly given, being – in the absence of hypotheses on returns to scale – implicit in the technology, so that, referring as they do to a normal degree of capacity utilisation, they do not have as direct empirical correlate the levels of production actually prevailing at a given time.

factors of production), Sraffa shows how to determine production prices and the residual distributive variable, and analyses the movements of these variables when the exogenous distributive variable changes.

Although there is no need for direct reference to demand, indirect reference is implicit in the assumption of given levels of production. It is in fact obvious that the quantities to be produced are determined by the decisions of the entrepreneurs, who take into account the foreseeable market absorption. In practice, what is ruled out is any reference to a demand–supply mechanism for the determination of prices: demand can only have a significant but indirect effect on 'natural' prices, since, over a period of time, it affects entrepreneurs' decisions concerning productive capacity and the normal degree of plant utilisation, and thus the technology and the relative bargaining power of wage-earners and profit-earners.[21]

The method Sraffa follows has a certain affinity with Marshall's (and Keynes's) principle of focusing on short causal chains. The reason is that each link between cause and effect is an abstraction; as such, it disregards a great many secondary elements; thus it seems likely that the distortions due to disregarded elements can add up in a long chain of causal links, leaving any connection between the initial and final terms extremely unreliable. We might say that Sraffa's method consists in focusing on one link in the chain. Of course, while in this respect there is some analogy in method between Marshall and Sraffa, there are considerable differences in their conceptions of the way the economy functions: let us recall that Marshall employs the concept of equilibrium between demand and supply, and conceives of partial equilibrium analysis (of the firm or the industry) as a segment of general equilibrium analysis – a view that Sraffa vigorously criticised.

This procedure – that is, the rigorous delimitation of the problem, reduced to the interplay of relationships between a limited number of variables – stands in contrast to the approach dominant in general economic equilibrium theory. Within this latter framework, all economic variables – prices, quantities, distributive variables (considered as prices of factor of production services) – are simultaneously determined in a single great analytic scheme. From this standpoint, the criticisms

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[21] This is the dynamic evolutionary view that, for example, includes Smith's theorem according to which the division of labour (and thus the technology) is limited by the extent of the market (i.e., by demand, but in the broad sense and not as a functional relationship linking quantities in demand with prices and incomes).

Sraffa raised against the Marshallian theory of the firm (contradiction between the hypothesis of competition and the *ceteris paribus* hypothesis typical of partial equilibria) are sometimes said to hold in relation to partial equilibrium analysis, but to be irrelevant to 'truly general' analysis, which is the only analysis legitimate for the pure theoretician.[22] Much the same evaluation is advanced with regard to the 'Cambridge' criticism of the aggregate concept of capital, merely conceived as a simplified parabola, a 'low level theory' compared to the 'true' theory, i.e., general equilibrium.[23]

   In every field of science the idea that a general, all-embracing theory is superior to 'partial' theories has shown its appeal. The problem here – at least as far as the marginalist approach is concerned – is that we must sacrifice to the fetish of a general theory, either rigour (in the case of 'parables') or relevance (since the theory of general equilibrium provides scant heuristic scope, once the multiplicity and possible instability of equilibriums are granted, and has nothing to do with the real world once we recognise the need for hypotheses on the convexity of production and consumption sets, corresponding to the hypothesis of generalised decreasing returns for production and consumption alike). This is no new problem. It has been addressed on various occasions in the philosophical and epistemological debate, and it is worth recalling that, thanks to his influence on Wittgenstein, Sraffa played a very important role in this field too.

   As mentioned earlier (§ 2.2), Wittgenstein's change of views, which took place under Sraffa's influence, can be seen in the light of comparison between the methodology of general economic equilibrium analysis and a methodology of distinct and separate pieces of analysis, which in our interpretation underlies Sraffa's approach.

   Let us recall Wittgenstein's (1921) initial view, based on a correspondence between the 'facts', constituting the world, and 'propositions', constituting our image of the world, so that we can describe the world

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[22] Cf. Samuelson (1987: 458–9); Newman and Vassilakis (1988). Actually, as already stressed earlier (§ 1.3), the criticisms posed by Sraffa in the articles of 1925 and 1926 are far more radical, regarding the very foundations of any analysis based on functional relationships between cost and quantities produced and the hypothesis of the convexity of production sets.

[23] In reality the 'Cambridge' criticisms only initially concerned the aggregate concept of capital (Robinson 1953); after the publication of Sraffa's book (and of Garegnani 1960) the emphasis shifted to the concept of capital as a factor of production (and, correlatively, to the notion of profit as the price for the service of this factor of production). Cf. Chapter 6.

with a set of propositions, each one describing a 'fact'. The set of all 'true' propositions constitutes, in a sense, our general theory of the world; only what cannot be the object of such a representation ('the unspeakable') is excluded from our rational representation of the world.

The marginalist theory of general economic equilibrium seems to be founded on philosophical positions much like those ('analytical positivism') of this early Wittgenstein: an atomist base ('economic subjects' and 'commodities'), correspondence between the facts of the world and the elements of theory, the claim of a complete description according to general rules regarding all that is describable in the world (the general theory).[24]

As we saw earlier (§ 2.2), Wittgenstein (1953) eventually abandoned his initial views and developed instead the idea of 'language games', namely models that focus attention on particular aspects of real language. A commentator interpreted it this way:

> There is not […] any unique analysis of propositions into their intrinsically unanalysable elements. What sort of analysis will be useful and provide a real clarification depends on the circumstances, on just what is problematic about the propositions under examination.[25]

Of course, this is not to say that having criticised the early stages of Wittgenstein's reflections Sraffa then went on to endorse his point of arrival. Nevertheless, we can see a distinct analogy with the method Sraffa follows in his book, focusing on a specific problem (fundamental

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[24] As a matter of fact, most marginalist theorists – though by no means all – explicitly or implicitly adopt a somewhat less refined version of positivism, the so-called 'received view' (cf. Caldwell 1982). In a nutshell, the idea is that scientists work by applying the methods of logical analysis on the raw material provided by empirical experience. To evaluate their results, objective criteria for acceptance or rejection can be established. More precisely, analytic statements, namely those concerning abstract theoretical reasoning, are either tautological, that is, logically implied in the assumptions, or self-contradictory, that is, they contain logical inconsistencies; in the former case, the analytic statement is accepted, in the latter rejected. Similarly, synthetic statements, namely those concerning the empirical world, are either confirmed or contradicted by the evidence, and hence accepted or rejected for objective reasons. All other statements for which no analogous criteria of acceptance or rejection can be found are termed metaphysical and are considered external to the field of science. This implies, however, that the set of analytic statements and the set of synthetic statements are kept completely separate; quite simply, economic research, in the sense of endeavour to understand the world in which we live, does not work in this way.

[25] Quinton (1968: 12–3).

as it may be) and on those variables directly relevant to the problem in question, without denying the existence of other problems to be addressed with other 'language games' and, in particular, without denying the indirect influence of other variables.

Hence, it is clear how misguided any attempt might be to extrapolate mechanically Sraffa's theoretical position in other fields from the analysis illustrated in *Production of Commodities by Means of Commodities*. In other words, we cannot expect to extend Sraffa's analysis by associating with his equations other equations, expressing other aspects of the economy, as if the new equations belonged to the same analytic area or were part of the same language game. Nevertheless this is precisely how neoclassical interpreters act when they set out to complete the half system of general economic equilibrium Sraffa is supposed to have analysed, adding to his 'supply' equations, which refer to given levels of production, a set of demand equations, representing quantities demanded as functions of prices.

A point worth stressing here is that this difference in method holds important implications for the significance to be attached to the concepts Sraffa analyses, generating appreciable differences from the corresponding concepts as approached within marginalist analysis. In particular, within the marginalist approach the concept of equilibrium refers to a state of equality between demand and supply (market clearing) throughout the economy. Within the classical approach, on the other hand, as far as the concept is applicable,[26] reference is simply to the absence of incentives to transfer capital from one sector of the economy to another ('competitive equilibrium'). Thus it is evidently a mistake to confuse Sraffa's prices of production (and the natural prices of the classics) with the 'normal prices' or 'long period equilibrium prices' of marginalist analysis.

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[26] As we have seen, the concept of equilibrium adopted in all the various streams of the marginalist tradition derives from physics, more precisely from classical mechanics, with reference to conditions of equilibrium implying static analysis. By contrast, reference to the dichotomy between static and dynamic analysis appears inappropriate in terms of the classical approach; cf. Roncaglia (1975: 119).

Some post-Keynesian economists (cf. for instance Kaldor 1972) argue that the concept of equilibrium is to be rejected *in toto*, given the frequent occurrence of increasing returns in the economy: there are good reasons for this idea, if reference is to the notion of equilibrium imported from classical mechanics into marginalist theory; but there is some exaggeration, if rejection also involves the competitive hypothesis of a uniform rate of profits in the various sectors of the economy, as employed by the classical economists and Sraffa.

At this point we are faced with a problem which we shall very briefly outline here. If we accept the idea of a separation between the various 'language games', and in particular between analyses of different problems – for example, if we distinguish the analysis of the link between prices and distribution from the analysis of the factors determining the levels of production or technology, or the distribution of income itself – there will no longer be any need to construct a single general model in which to include the various 'pieces of analysis' as fitting parts of a whole. Instead, each piece of analysis implies a distinct process of abstraction, belonging to its own 'analytic area', and no classification of decreasing generality can be determined between the various areas.[27]

A problem remains, concerning the internal consistency of the conceptual framework – or conception of the way the economic system functions – within which the various pieces of analysis addressing the different problems are to be inserted. For example, a monetary explanation of the rate of profits as referred to by Sraffa (and which we shall be returning to shortly) is not compatible with a marginalist theory of value, where the distributive variables are the prices of the services of productive factors. An issue we shall consider in this light – as a problem of consistency of their conceptual frameworks – is the complex question of the relationship between Sraffa's and Keynes's analyses.[28]

7.6   Sraffa and Keynes

As we have seen, Sraffa's analysis may be located as falling within a classical conception, where the task assigned to economic theory is to establish the conditions for reproduction of the system and to analyse its evolution over time. The various problems are obviously

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[27] For example, it would indeed be difficult to attempt such a comparison between Sraffa's analysis of prices and Harrod's analysis of the warranted growth rate. The term 'analytic area' was suggested by Ian Steedman since it does not imply the possibility of ordering in a sequence of decreasing abstraction the different analytic areas. This latter idea was possibly suggested by the term 'analytic level' that I had been using in previous works (e.g. Roncaglia 1990a: 264). The term 'field of analysis' is also better discarded, since it is commonly used for designating sufficiently homogeneous sets of objects of analysis, while here we refer to a technique of analysis, and specifically to the choices made in the process of abstraction underlying any theoretical reasoning.

[28] For an attempt along these lines, cf. Roncaglia (1995).

connected, but can be analysed separately. This applies in particular to the quantities produced by the various industries, which Sraffa – as noted above – takes as externally given for the purposes of his analysis. Here we find a bridge reaching out in the direction of Keynes's analysis of the possibility of persisting conditions of under-employment.

The best way to approach the issue is step-by-step, considering in succession the conception within which Sraffa's analysis is embedded, the applicability of 'Say's law' to Sraffa's analysis, the relationship between prices of production and market prices, Sraffa's indirect reference to Keynesian theory and, finally, the bridge that can be thrown between the two analyses.

As we have seen, although presented in a way that is formally compatible with marginalist analysis (in such a way that criticism of it can be developed from within), Sraffa's analysis is conceived in terms of a classical approach, albeit making a great stride ahead at the level of analytic rigour and with precise delimitation of the problem addressed. The classical approach revolves around the concept of surplus: its production, circulation through trade, distribution among the various social classes and sectors of the economy and the uses it is put to, i.e., accumulation or consumption beyond the bare necessity. Each of these aspects is related to the others, but for the sake of analysis it is better to take them in isolation: thus, for example, for the theory of production we have Smith's analysis (and Babbage's and John Stuart Mill's) of the factors determining the division of labour; we then have the theory of value in connection with exchange ratios and their relationship with the distributive variables; analyses carried out by Smith, Ricardo, Marx and various others for the theory of distribution; the classical theory of accumulation; and, as a separate issue, what Marx described as the problem of realisation, namely the sale of the quantities produced, with its logical appendix, the theory of crises. In other words, we have a range of fields of analysis, each taking variables as given, which are to be accounted for in other theories. This is, in fact, a procedure that Sraffa follows rigorously, leaving aside the problem of determining technology or quantities produced, which lie upstream from his analysis, but at the same time isolating his problem from what lies downstream, such as the question of realisation or the relationship between prices of production and market prices.

Given this practice, there are clearly no grounds to argue that Sraffa adheres to 'Say's law', which states that 'supply creates its own demand'. Quite simply, the problem of the relationship between quantities produced and quantities in demand – the problem of realisation – does not

arise in Sraffa's 1960 analysis. Therefore, there is no reason why there should be any automatic equilibrating mechanism connecting aggregate demand to aggregate supply.[29]

Another point to clear up is involved in the distinction between natural prices (or prices of production) and market prices, already discussed earlier (§ 3.3). Let us recall, first, that the problem of realisation comes in logical sequence after the problem addressed by Sraffa; second, that there is no good reason to establish any formal connection between prices of production and market prices (of the type of the connection between long and short period to be found in Marshallian theory). Thus, there is no reason to assume that the quantities produced coincide with the quantities in demand when prices of production prevail (Smith's 'effectual demand'), commodity by commodity. Obviously, this is a prerequisite for claiming that Sraffa does not adhere to 'Say's law', which concerns this equality in the aggregate, clearly implied by the equality at a micro level. Of course, if the technology considered in Sraffa's analysis corresponds to what entrepreneurs consider a normal utilisation of productive capacity, such normal utilisation must be realised over the average of a number of periods, if the entrepreneurs' expectations are to be satisfied. However, even if the normal degree of capacity utilisation does not change over time, in the course of time productive capacity changes. Consequently the realisation on the average, over a span of several years, of a normal degree of utilisation of productive capacity, holds no implications for any of the periods taken individually regarding the relationship between quantities taken as given and quantities in demand at the natural price. It should also be noted that the quantities taken as given may differ from those effectively produced if the degree of effective utilisation differs from what entrepreneurs see as normal.

We may, moreover, wonder what possible reason there could be, if not respect for the marginalist (or, more generally speaking, subjectivist)

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[29] At first sight there would be no reason for arguing the contrary, either. However, this would violate the requirement of consistency of the conceptual framework of *Production of Commodities* with Sraffa's more general conceptual framework, as expressed in many of his writings and in the Sraffa Papers. In fact, in the presence of savings and financial circuits, 'Say's law' (in the interpretation now dominant, as a proposition regarding macroeconomic equilibrium) implies that the rate of interest is determined by the equilibrium between demand and supply of loanable funds, and thus implies uniqueness of the real equilibrium, also for distribution variables, in contrast with one of the mainstays in Sraffa's analysis.

tradition, for adding the condition of equality between demand and supply to that of uniformity of the rate of profits in the various sectors of the economy synthesising the classical theory of competition. Indeed, with his clear distinction between the various problems, Sraffa achieves a far greater clarity than those classical economists who move some steps in the direction of a compromise with the subjectivist tradition.[30]

In the light of all these points we can suggest some connection between Sraffa's analysis and Keynes's. Evidently, the two analyses not only refer to different problems but also belong to different analytic areas. Thus they cannot be taken as belonging to a unique general model of the economy, and by consequence they cannot come into direct logical contradiction with each other. Moreover, if we avoid the neoclassical interpretations of Keynes (disregarding the question as to how much Keynes might have laid himself open to them), the two analyses refer to a largely shared conceptual framework, so that 'indirect' contradictions are avoided as well. In particular, both analyses reject the prices–quantities equilibrium associated with full employment of resources: Sraffa with his criticism of the marginalist theory of capital and distribution, Keynes with his opposition to the orthodox theory of interest.

Sraffa himself, for his part, appears to consider his analysis open to integration with central aspects of the Keynesian framework – though not necessarily with Keynes's specific theories. We may interpret in this sense an oft-cited passage from Sraffa's book: 'The rate of profits [...] is [...] susceptible of being determined from outside the system of production, in particular by the level of the money rates of interest'. (Sraffa 1960: 33). A dominant theme of Keynesian theory is that monetary and financial variables play a crucial role in determining the real variables (investments, income, employment).[31] In the passage cited above Sraffa

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[30] On the shifting of post-Ricardian classical economists in this direction – attributing to market prices the status of theoretical variable – cf. Bharadwaj (1978); the main references are to the late writings of De Quincey and to John Stuart Mill. Smith's 'compromise', on the other hand, consisted in isolating the natural price as a theoretical concept, relegating the role of demand and supply to influences on the market price, although no theoretical analysis is made of how the latter is determined. Cf. Roncaglia (1990b, 2009a).

[31] On the basis of the Sraffa Papers, Ranchetti (1998, 2001) offers important information on Sraffa's attitude towards Keynes's theory. Sraffa's criticisms of Keynes's theory of liquidity preference seems to be looking for a greater degree of radicalism in Keynes's reversal of the traditional marginalist thesis of the 'real' determination of the natural interest rate. Sraffa's criticisms concern both the

seems to be opening the way to a similar thesis on the distribution of income: contractual wage bargaining between entrepreneurs and unions determines money wages, but real wages depend upon money prices, which in turn depend not only on manifold elements including production and employment but also on the liquidity of the system and currency exchange rates, and so on monetary and financial policies.[32]

The similarity between the two theses, and the fact that Sraffa did not intend to address the problem of distribution in depth with these observations, suggest that one of Sraffa's concerns here, if not his primary concern, may have been to underline the similarity between his outlook and Keynes's, and the compatibility of his analysis with Keynes's analysis of a 'monetary production economy'. This suggestion is reinforced by the fact that the passage quoted is quite a rare case, within Sraffa's highly compressed exposition, of a statement not directly necessary to the analysis developed in the book. Furthermore, in the Preface to *Production of Commodities by Means of Commodities* Keynes is mentioned with reference to the assumption of given quantities (cf. § 2.3 earlier), which is also an indirect indication of the fact that Keynes did not oppose Sraffa's analysis.

direction of the causal link (not from the 'quantity of money' to the interest rate but vice versa, with an endogenous view of the supply of money much like the one subsequently developed by various post-Keynesians) and the attempt to express the demand for money for speculative purposes as a decreasing function of the interest rate defined in a sufficiently univocal way (although Keynes makes the attempt with far more caution than the 'Keynesian' manuals suggest, given the role he attributes to expectations and their extreme variability). Sraffa also seems to be following a more radical line of differentiation from the neoclassical tradition when criticising the confusion Keynes ran into in chapter XVII of the *General Theory* between own rates of interest and the marginal efficiency of capital goods. Panico (1998: 179–80) also stresses that behind the passage quoted above there are documents in the Sraffa Papers pointing in the direction of an influence of monetary and financial factors on income distribution, and in the direction of a conventional theory of the interest rate. Panico (2001: 300, 309) indicates documents in the Sraffa Papers where Sraffa criticises the idea of assuming the real wage as given, as not adequate for modern economies.

[32] Cf. Roncaglia (1993) for indication of the lines along which to develop an analysis of income distribution conceptually compatible with Sraffa's prices–distribution link. This line of research seems to me to be in agreement with what Sraffa says in a letter to Garegnani (13 February 1962; Sraffa Papers D3/12.111, quoted by Pivetti 2000b: 304–5) on the need to avoid a mechanical theory of income distribution which does not leave room for attempts to modify it on the part of the contenders. Alternative suggestions based on the link between interest rate and rate of profits are offered by Panico (1988) and Pivetti (1991).

The bridge between Sraffa's analysis of prices and Keynes's analysis of production levels can be built along the following lines. In Sraffa's analysis, which focuses on the conditions for reproduction of the economic system, the prices of commodities used as means of production are equal to the prices of the same commodities included in the product, and the technology is given. When technology changes, if we rule out the entirely hypothetical case of an equi-proportional reduction in all the coefficients of production, relative prices also change. If the changes in technology were known *ex ante*, we would have continual arbitrage between current and future products, with a mechanism of forward prices and own interest rates which constitutes a theoretical contribution by Sraffa (1932) taken up by Keynes in Chapter 17 of his *General Theory* (and modified by the introduction of liquidity preference and the liquidity premium).[33] However, in general it is implausible to consider changes in technology as known *ex ante*, and all the more so when reference is not to productivity growth in the economy or in the manufacturing sector as a whole but to sectoral technical changes, as is necessarily the case in the context of an analysis of relative prices. Indeed, we may argue that it is precisely here that the major element arises – in so far as it operates continually and systematically, even in 'normal times' – of the all-pervasive uncertainty which constitutes a key feature of Keynes's vision.[34] For this reason the two problems – Sraffa's and Keynes's – must be kept apart. Nevertheless given Sraffa's approach to his problem – isolating it from the determination of quantities produced, while avoiding any opening to 'Say's law' – we may consider his analysis of the prices–distribution link conceptually compatible with Keynes's analysis of employment, once the latter has been cleared of marginalist encrustations.

7.7   Summing up

In short, *Production of Commodities by Means of Commodities* is open to two quite different readings. On the one hand, we may draw from Sraffa's book a number of analytical results that can be used for a critique

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[33] On the relationship between Sraffa's 1932 article and the chapter in Keynes (1936), cf. Kregel (1983), Tonveronachi (1991), Ranchetti (1998, 2001). Among other things, Ranchetti shows, on the basis of the Sraffa Papers, how Sraffa objected to Keynes's notion of liquidity preference, which implies a unique functional relationship between quantity of money held and the rate of interest. More generally, for interpretations of Keynes oriented in the direction suggested here, cf. Kregel (1976) and Tonveronachi (1983).

[34] Cf. Roncaglia (2009b).

from within, demolishing the traditional marginalist theories of value and distribution; in this context, some parts of the book – such as the discussion of the standard commodity – may appear pleonastic or esoteric. On the other hand, we may read Sraffa's book as a foundational contribution for an analytically solid reconstruction of the classical approach, focused on a central but specific issue. The distinction between these two different readings is connected to recognition of the existence of two clearly distinct representations of the working of market economies: on the one hand the classical vision, based on the circular flow of production and consumption and on the notion of the surplus, and on the other hand the marginalist approach, based on a one-way avenue leading from factors of production to consumption goods and the satisfaction of consumers' preferences.

Failure to grasp the distinction between these two different readings of Sraffa's book has often led to a number of crucial misunderstandings. Sraffa's critical contribution is often seen as a nihilist, purely destructive attitude; the constructive elements of Sraffa's analysis have been overlooked or, under the influence of the marginalist tradition, are inserted in an inappropriate framework. Yet, the distinction between the two readings is clearly stated in the opening pages of Sraffa's book. Bearing this in mind, together with the inferences we may draw from the Sraffa–Wittgenstein connection, we can appreciate the open nature of Sraffa's constructive contributions, and specifically the possibility of integrating the classical and Keynesian approaches.

8
The Sraffa Legacy

8.1 Introduction

This chapter aims at providing a broad overview of the role played in the current economic debate by the contributions of Piero Sraffa and those contemporary economists who joined in with his proposal of a return to the approach of the classical economists, from William Petty to François Quesnay, from Adam Smith to David Ricardo, up to Karl Marx. To begin with, it must be stressed that our discussion of the different positions will not be neutral, if any discussion can be, given the present writer's direct participation in the debate to be surveyed in the following pages.

The previous chapters considered the cultural project pursued by Sraffa: to shunt the car of economic science back on the road opened by the classical approach, submerged for over a century by the marginalist approach. Here we shall briefly survey the contributions offered to the cultural project by an ever-growing number of economists since the publication of *Production of Commodities by Means of Commodities* in 1960. For the sake of clarity in exposition, we will divide the contributions into three groups: the critique of various aspects of marginalist theory, already discussed in Chapter 6; the defence and development of the classical conceptual framework reconstructed by Sraffa, in particular with his critical edition of Ricardo's *Works and Correspondence* (§ 8.2); and the mathematical treatment and extension of the analytical propositions developed by Sraffa on the relationship between relative prices and income distribution (§ 8.3).

The contributions illustrated in these sections share a common foundation – opposition to the marginalist approach – but they also occasionally display differences in the lines of research along which the reconstruction of political economy is pursued. Again for the sake of exposition, we will concentrate attention on the three main lines of research

that appear more widely developed, at least at the present stage of the debate, and are closely connected in particular with the names of Luigi Pasinetti, Pierangelo Garegnani and Paolo Sylos Labini respectively. More precisely, in § 8.4 we consider in its broad outline the 'Ricardian' proposal for a reconstruction of classical political economy as developed mainly in Pasinetti's writings; in § 8.5 we briefly illustrate Garegnani's 'Marxian' proposal; and in § 8.6 we turn to Sylos Labini's (and the present writer's) 'Smithian' proposal.

Finally, § 8.7 offers some critical remarks on the difficulty that the project of reconstructing classical political economy would come up against if either of the first two lines of enquiry were considered as autonomous and self-contained. Clearly, this section in particular reflects my personal involvement in the debate. The suggested conclusion is that the most fruitful line of enquiry for the reconstruction of classical political economy implies integrating within the 'Smithian' approach some important original contributions developed within the 'Ricardian' and 'Marxian' approaches.

Two caveats are in order from the outset. First, reference to Smith, Ricardo and Marx to identify the three lines of research is an expository device, since reference to the works of these writers holds for some aspects but not for others. Secondly, the differences – which should not be exaggerated – mainly concern 'bets' on the perspectives of the different lines of research proposed for the reconstruction of economics within a substantially common paradigm, that of the classical approach. On no account should the different lines of research be crystallised into rival schools of thought. The term 'Sraffian schools', which might seem to suggest the idea, aims in fact only at countering the opposite misunderstanding, which is more widespread and probably more dangerous, namely the idea that there is a monolith, the 'Sraffian school', characterised by complete identity of views on the most disparate economic issues on the part of all its adherents. Independent of specific ideas on the greater or smaller potentialities of the three lines of research, the following pages point to the wealth of contributions springing from within the stream of thinking christened in turn, and always reductively, 'Sraffian' or 'neo-Ricardian school'.

8.2   The rediscovery of the classical approach

Together with the critique of the marginalist theory, the second objective pursued by Sraffa – as already noted earlier – consists in re-proposing the classical economists' approach, freed from the misunderstandings superimposed on it by decades of marginalist interpretations.

Sraffa's work for the critical edition of Ricardo's *Works and Correspondence* (Ricardo 1951–5) goes on for more than a quarter of century, interacting with the work on *Production of Commodities by Means of Commodities*. Sraffa's celebrated philological rigour is not pursued solely as an end in itself, but is also, and perhaps mainly, the means to highlight the very foundations of classical political economy. Thus the debate beginning in the 1970s on the Sraffian reconstruction of the history of economic thought is also part of the more comprehensive debate on the lines of development of economic science.

The attempt to deny that there is a specific classical approach to economics, distinct from the marginalist one, had already got under way with Alfred Marshall (1961, appendix i). As is well known, Marshall conceived Ricardian analysis as one of the two pillars of the 'modern' theory of value and distribution: the pillar corresponding to the analysis of production costs, or supply curves, connected to the principle of decreasing marginal productivity of land. The 'modern' theory, according to Marshall, completes the theoretical building with the second pillar, namely the analysis of demand curves based on the principle of decreasing marginal utility.

In a subtler way, Jacob Hollander (1904, 1910) tells the story of Ricardo's gradual retreat from a labour theory of value towards a theory of prices based on costs of production, thus opening the way to the marginalist developments connected to the principle of decreasing marginal productivity, considered in turn a development of the 'Ricardian' theory of differential rent.

Marshall's and Jacob Hollander's views, here briefly outlined, came in for devastating criticism from Sraffa (1951). His interpretation of the classical approach as based on the notion of the surplus is in fact counterposed to their views. Reconstruction of the history of economic thought based on a clear-cut distinction between the classical and the marginalist approach, as proposed by Sraffa, is then developed in a long stream of writings – too numerous for all to be mentioned here.[1]

In opposition to this broad stream of literature (which embraces a variety of views, though on the common basis of recognition of the central role of the surplus for the classical school and of the distinction between the classical and marginalist approaches), some marginalist historians of

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[1] Let us recall, at least, Maurice Dobb's (1973) synthesis and Krishna Bharadwaj's researches focused on the transition stage from the classical to the marginalist approach (Bharadwaj 1978 and 1989, Chapter 6). For my own contribution and some further references, cf. Roncaglia (2001).

economic thought re-propose the thesis of continuity between the two approaches. This thesis has twofold implications: first, to deny the existence of a specific classical 'vision' of the economy; and, secondly, to depict classical economists once again as the forerunners, rough and approximate in their analyses, of marginalist theories. Thus, in the history of economic thought this debate appears as a central aspect of the more general debate opposing 'Sraffian' and 'marginalist' economists – an element at least as significant as the strictly analytical one (i.e. that concerning the theory of capital, recalled in Chapter 6). This shows just how relevant issues in the history of economic thought are to the contemporary economic debate.

In this respect, let us recall Samuel Hollander's writings on the classical economists, and the replies they received, both as far as a specific aspect is concerned (namely Ricardo's 'corn model') and with regard to a more general proposal of a 'marginalist' reading of Ricardo.[2] In different but substantially similar ways various authors have embarked on a somewhat subtler venture, namely to re-propose as common to both classical and marginalist economists 'at least' a view of value and distribution where the condition of equality between demand and supply of capital and labour determines the equilibrium values for the wage rate and rate of profits;[3] it can be maintained, however, that these interpretations are once again based on a misreading of Ricardo, introducing elements that are extraneous to his thought.[4]

The debate, still under way, on the reconstruction of the history of economic thought thus plays a central role and constitutes an integral part of that reconstruction of classical political economy that began with Sraffa.

8.3   The analytical contributions stemming from Sraffa

Parallel to the use of Sraffian results for the critique of authors and ideas central to the marginalist tradition, and to the reappraisal of classical political economy, the publication of Sraffa's book was followed by

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[2] Cf. Hollander (1973a, 1973b, 1975, 1979, 1987, 1989, 1997); for a critique of his thesis on the non-existence of the corn model attributed to Ricardo, cf. Eatwell (1975a) and Garegnani (1982); for a critique of his thesis of a 'marginalist' Ricardo, cf. Roncaglia (1982), Bharadwaj (1983). Peach (1984, 1993) criticises both the defence of the corn model on the side of Eatwell and Garegnani and the thesis of a 'marginalist' Ricardo proposed by Hollander.

[3] Cf. Casarosa (1974, 1978, 1982); Hicks and Hollander (1977); Caravale and Tosato (1980).

[4] Cf. Roncaglia (1982: 347–50, 373); Rosselli (1985); and, along partly different lines, Pasinetti (1982).

various pieces of research refining and developing his analysis of the relationships connecting relative prices to income distribution.

Leaving aside a long stream of reviews (some of which raise important issues),[5] the first writings on Sraffa's book addressed the translation of his analysis into mathematical terms.[6] The idea of substituting the assumption of a set of sectoral profit rates for Sraffa's assumption of a uniform rate of profits, first suggested by Sylos Labini, was discussed and developed in a long stream of articles.[7] A problem raised by Newman (1962), the possibility of non-positive prices for non-basic commodities, is tackled in an exchange of letters between Sraffa and Newman himself and in a few other writings.[8] The distinction between basic and non-basic commodities is widely debated, to the extent of considering its applicability to actual problems of planning.[9] A number of writings focus on the standard commodity, including mathematical specification of its properties,[10] some attempts at generalising it[11] and especially its use in solving the problem of transformation of labour values into production prices (cf. earlier, § 5.5).

During the 1970s the focus of the work of analytically deepening Sraffa's analysis shifts from the first to the second and third part of Sraffa's book. Two mathematical treatments of joint production are given by Lippi (1979) and Schefold (1989).[12] The latter then develops specific aspects, mainly concerning the choice of techniques and technical change, in a series of articles now collected in Schefold (1997).

[5] For a survey of the book reviews on *Production of Commodities*, cf. Bellino (2008); cf. earlier, § 6.2, for Sraffa's reaction to Harrod's 1961 review.
[6] Cf. Newman (1962), for the case of simple production; Manara (1968), for the case of joint production; cf. then the wide treatments of Pasinetti (1975), Abraham-Frois and Berrebi (1976), and, more recently, the careful analysis by Kurz and Salvadori (1995).
[7] Let us recall here Parrinello (1982b) and Steedman (1989, Chapter 6). On this and other issues touched on in this section, cf. the bibliography in Roncaglia (1975), which in its English edition lists the works associated with the various aspects of the Sraffian analysis published up to 1977. Cf. also the readings edited by Pasinetti (1977), Steedman (1988), Salvadori and Steedman (1990).
[8] Cf. earlier, § 4.8. The exchange of letters between Sraffa and Newman is published in Bharadwaj (1989), Chapter 11.
[9] For a concise survey and evaluation of this debate, cf. Roncaglia (1990c), which also provides an assessment of the relevance of Sraffa's analysis to applied economics.
[10] Among the earliest contributions, cf. Newman (1962), Blackley and Gossling (1967).
[11] Cf. for instance Miyao (1977).
[12] This book includes Schefold's PhD thesis, 'Mr Sraffa on joint production', which circulated in mimeo since 1970.

These writings are important not only for their analytical results but also for the idea that Sraffa's analysis provides a better basis than traditional theory for the study of important practical issues, such as technological change, the energy issue and environmental issues.[13]

The treatment of fixed capital and rent is developed and discussed in a long stream of articles.[14] The subsystem method, presented by Sraffa in a short appendix to his book (Sraffa 1960: 89), and characterised by the fact that through a notional partition of the economy it obtains a surplus consisting of a single commodity, also received immediate attention.[15] As reconstructed by Pasinetti in terms of vertically integrated sectors, it came recently to be used as a tool for empirical analyses of productive inter-relations within the economy.[16] On the choice of techniques, apart from the debate raised by Levhari's 1965 article, recalled earlier (§ 6.4), we may also mention Bharadwaj (1989, Chapter 11), showing that the maximum number of points of 'switch of techniques' is equal to the number of basic commodities in the system: an important result, which explains the apparent rarity of reswitching in numerical examples with a small number of commodities.

A debate on the interpretation and the limits of Sraffa's analysis started in the late 1970s, revolving about the choice of techniques, especially with reference to the case of joint production. More specifically, Steedman (1980a), followed – as pointed out by Salvadori himself, and contrary to what the year of publication indicates – by Salvadori (1979a), showed that the assumption of constant returns to scale is necessary for the treatment of the choice of techniques presented in Part Three of Sraffa (1960); also, in the case of joint production difficulties arise in identification of the cost minimising technology.[17] These results, and in particular the latter point, lead Salvadori to suggest a blending of Sraffa's (1960) and von Neumann's (1945–6) approaches, and a generalisation of the 'equations approach' into a 'weak inequalities approach'.[18]

[13] Cf. also the essays collected in Pasinetti (1977), in Salvadori and Steedman (1990), Schefold (2004).

[14] A number of papers on fixed capital are collected in Salvadori (1981). On the theory of rent let us recall at least Quadrio Curzio (1967, 1977); Montani (1972); Kurz (1990, Chapter 6).

[15] Cf. Harcourt and Massaro (1964), Zaghini (1967), and especially Pasinetti (1973).

[16] Cf. Momigliano and Siniscalco (1982, 1984).

[17] Cf. Salvadori (1979b, 1982), and, independently, Bidard (1984).

[18] Cf. Salvadori (1979b, introduction to 1981, 1982: 295, and in particular 1985); among subsequent contributions, cf. Kurz and Salvadori (1995, Chapter 13).

This debate is still open, and is crucial for the interpretation of Sraffa's analytical contribution. Here we will simply recall that Sraffa himself stresses (Sraffa 1960: v) that the point made about the absence of any assumption on returns to scale, strictly speaking, only holds for the First and Second Part of his book. There is thus a difference with respect to Part Three, which deals with the problem of the choice of techniques. Such a difference suggests that the analysis of the choice of techniques in Part Three of Sraffa's book, while essential for the critique of traditional marginalist theories of value and distribution, is not to be interpreted as providing the foundations for analysis of how technical choice and technical change take place in the real world.

8.4 The 'Ricardian' reconstruction: Pasinetti

When attempts at reconstructing classical political economy go beyond the limits of Sraffa's explicit analysis, and set out to tackle the issues connected with the development of the economy over time, no single path of research can be univocally deduced from Sraffa's analytical results. Indeed, a multiplicity of lines of enquiry are actively explored and confronted. In this and the following sections we discuss the distinguishing characteristics of three main lines of research along which contributions have been made to the reconstruction of the Classical approach started by Sraffa.

An initial, wide-ranging development of Sraffa's analysis is proposed in particular by Pasinetti in a number of writings, culminating in his 1981 volume on *Structural Change and Economic Growth*, subtitled *A Theoretical Essay on the Dynamics of the Wealth of Nations*, and more recently in the 2007 volume on *Keynes and the Cambridge Keynesians: A 'Revolution in Economics' to be Accomplished*.

Notwithstanding the reference to Adam Smith's *magnum opus* in the subtitle, Pasinetti's 1981 main reference is to Ricardian analysis. On methodological grounds, Pasinetti follows the principles of logical deduction, leaving a purely illustrative role for historical references, in analogy with Ricardo and in direct opposition to Smith's predilection for historical generalisations as opposed to analysis through models. Furthermore, Ricardo's 'model' is the subject of Pasinetti's 1965 growth model, which also incorporates Pasinetti's 1962 formulation of the post-Keynesian theory of distribution, connecting income distribution between wages and profits to the level of investments, once the saving propensities of workers and capitalists and the 'natural' growth rate are given. Subsequently, the development of the theory of vertically

integrated sectors (Pasinetti 1973) constitutes a decisive analytical step in moving on from the Sraffian analysis of the relationship between relative prices and income distribution to the analysis of economic growth. *Lectures on the Theories of Production* (Pasinetti 1977a) can, then, also be considered as a reinterpretation of the history of economic thought, and especially its recent history (Sraffa, Leontief and von Neumann). This set of writings contributes to providing the basis for a specific view of the nature and role of economic science: a view which cannot be considered as opposed to that implicit in Sraffa's writings, but which can neither be identified with, nor logically deduced from it.

A number of economists – particularly among the Italians – support Pasinetti in developing this line of enquiry. Let us recall at least the reappraisal of the history of economic thought proposed by Quadrio Curzio and Scazzieri (1984), based on the counterposition between the classical and the marginalist approaches as stemming from the distinction between the 'basic notion of reproducibility' and the 'basic notion of scarcity'.[19] Let us also recall the studies on the Sraffian analysis of fixed capital considered as a premise for the analysis of growth (Baldone 1974, Varri 1974), as well as Marzi–Varri (1977), employing the wage–profit frontier for the analysis of technical change (although with recourse to excessively simplificatory assumptions in their applied analysis).

As already noted, Pasinetti (1981) represents a synthesis of this line of research, and so serves as our main reference in discussing the nature and limits of this line of enquiry.[20]

Pasinetti's aim is 'to build a unifying theory behind all the new contributions to economics' (1981: 19): Kalecki and Keynes, the theory of the firm, Leontief and Sraffa, business cycle theories, the Harrod–Domar model and post-Keynesian distribution theories. Such a unifying theory has its main pillar 'not in the caprice and scarcity of Nature, but in the progress and ingenuity of Man' (1981: 23).

Proceeding on this basis, Pasinetti aims to develop 'a theory which remains neutral with respect to the institutional organisation of society',

[19] On the limits of an interpretation of the counterposition of the marginalist and classical approaches in terms of scarcity and reproducibility, cf. Roncaglia (1975: 5–6, 124–6).
[20] For further developments, cf. then Pasinetti (1988, 1990, 1993 and 2007, Book Three). In a direction at least partly analogous to it, but focusing on the role of scarce resources and hence of rent in the analysis of economic dynamics in the presence of technological change, cf. Quadrio Curzio (1967, 1975, and with Pellizzari, 1996).

concentrating on 'the "primary and natural" features' of the economic system, by which he means 'the conditions under which it may grow and take advantage of exploiting all its potential possibilities' (1981: 25). A model of non-proportional growth based on the full employment assumption is used to identify such conditions, interpreted as 'necessary requirements for equilibrium growth' (1981: 25). Specifically, in any vertically integrated sector the 'natural' rate of profit – which differs from sector to sector – must be such as to ensure an amount of profits equal to the 'equilibrium' value of investments, that is, to the amount of investments required to expand productive capacity at a rate equal to 'the rate of population growth' plus 'the rate of increase of per capita demand for each consumption good' (1981: 130).

To explain changes over time in the structure of demand, Pasinetti draws on 'Engel's law', thus avoiding any reference to subjective elements such as utility maps and consumers' preferences. In equilibrium, the increase in per capita income and demand corresponds to the increase in per capita product due to technical progress (which can proceed at a different pace in different sectors).

In this context the notion of equilibrium assumes a *normative* significance, linked as it is to the assumption of a full employment of the available labour force and productive capacity (cf. also 1981: 96–7, where the 'dynamic' equilibrium corresponds to the conditions allowing for continuous full employment over time). In other words, Pasinetti's analysis focuses on what should happen to ensure full employment, not on the actual behaviour of an economic system necessarily tied to specific institutions.

From this point of view the issue of the relationship between the short and the long period is discussed: '*the very nature* of the process of long run growth requires a structural dynamics which leads to difficulties in the short run'. Hence the methodological suggestion 'of singling out first the fundamental structural dynamics which must take place and then of trying to facilitate them' (Pasinetti 1981: 243–4): a suggestion which tends to affirm the priority of normative analysis.

All this is not to deny the possibility and usefulness of a direct analysis of 'short period' issues, or more generally of the – certainly not optimal – way of functioning of concrete economies. In fact, various hints in Pasinetti's writings point in this direction.[21] But there is no doubt that, compared to the long-run normative analysis discussed above, such hints are far less developed: they appear to

[21] Cf. Pasinetti (1981, particularly the final four chapters; 1993; 2007, Chapter 11).

constitute a second stage of analysis, subsequent to that decisive first stage which is the object of systematic formal analysis in Pasinetti's work.

Another aspect of Pasinetti's research concerns international economic relations. Among other things, in the treatment of this theme we can clearly see emerging a central element in which Pasinetti's views on the way of functioning of modern economies differ from those characterising classical political economy, namely the nature of the wealth of nations. Using his model, Pasinetti shows that 'trade' (i.e., the Ricardian principle of the exploitation of comparative advantages among different countries involved in international trade) is 'a secondary source of international gain', while 'the primary source' is given by 'international learning' of technical knowledge.[22] Hence the distinction mentioned above:

> In a pre-industrial society, wealth is mainly a stock of material goods – something that people have inherited from the past or have appropriated from 'nature' [...] But the wealth of an industrial nation is something quite different, or rather it is something deeper. It is not so much the material goods that people have; it is the technical knowledge on how to make them [...] If, in the pre-industrial world, the main way for a country to increase its wealth was to dominate and exploit its neighbours, today it has become to emulate them and do better.
>
> (Pasinetti 1981: 275–6)

8.5   The 'Marxian' reconstruction: Garegnani

Some economists are convinced that the potentially most fruitful way to pursue the reconstruction of classical political economy along the line started by Sraffa consists in restoring Marx's vision to a primary position within the classical approach re-proposed by Sraffa. As Garegnani (1981: 113) puts it, 'a revival of the Classical economists' theoretical approach cannot [...] take place but starting from the highest point of development which such an approach received in the past: the point which was reached with Marx'.

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[22] Pasinetti (1981: 283 ff). On the role of learning as a human right, and the free communication of achieved knowledge as a social duty, cf. also Pasinetti (2007: 356–8).

Obviously the 'Marx' thus re-proposed is a specific Marx: not neces-
sarily a travesty, as many orthodox Marxists maintained (cf. for instance
Medio 1972), but certainly a Marx in which some elements are placed
in the forefront, while others – though undoubtedly present in his writ-
ings, such as dialectical materialism – are played down. As a matter of
fact, Sraffa's analytical contribution could not leave untouched Marx's
'vision' (in the broader sense of the term).

For example, the use of Sraffian analytical tools shows that the
Marxian 'law of the falling rate of profit' is devoid of general validity.[23]
Furthermore, as we saw earlier in § 5.5, the standard commodity does
not constitute an analytical tool capable of connecting the world of
labour values to the world of production prices. Most notably, the widely
debated problem of the 'transformation of labour values into production
prices' is substantially solved, in the light of Sraffa's analytical results, by
concluding that the results reached in terms of labour values are gener-
ally not confirmed by analysis in terms of production prices.[24]

There have been lengthy discussions on the precise extent to which
this 'renewed Marx' ('Marx after Sraffa', following the happy title of
Steedman's 1977 iconoclastic book) corresponds to the original Marx.[25]
At one extreme some, such as Colletti (1968: 431), maintain that 'Sraffa
made a bonfire of Marx's analysis'. Among the various forms which this
thesis took, a central element seems to be the idea that discarding dia-
lectical materialism means leaving aside such a central aspect of Marx's
thought as commodity fetishism.

By contrast, some economists, notably Garegnani (1981, 1984), main-
tain that the differences between Sraffa's and Marx's analyses are not
substantial. We are confronted with the development of the same para-
digm, as Marx retains the analytical structure of classical economists,
centred on the notion of surplus, which is then taken up by Sraffa with
greater analytical rigour. In fact, a 'return to Marx' is considered to be
precisely the road which Sraffa has in mind for the reconstruction of
political economy.

Marx's exploitation is considered as a matter of fact, since the surplus
generated in the productive process is at least partly appropriated, as

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[23] Cf. Steedman (1977a, Chapter 9); the problem is discussed in various papers
collected in Screpanti and Zenezini (1978).
[24] Cf. in particular Steedman (1977a); for a history of the 'transformation
problem', cf. for instance Vicarelli (1975).
[25] For a bibliography of this debate, cf. Roncaglia (1975: 161–6). Let us recall in
particular Lippi's book, 1979, and more recently the wide collection of essays
edited by Caravale (1991).

profits and rents, by social classes other than the workers. Besides, the antagonistic relation between wages and profits – expressing on the ground of income distribution the class conflict opposing capitalists and workers – is highlighted with exceptional clarity by means of an analytical tool developed by Sraffa, namely the standard commodity. Indeed, when the standard commodity is used as numeraire for measuring the wage rate, we get a negative linear relationship between the wage rate and the rate of profits. These foundations are considered as sufficient for retention of the central aspects of Marx's thought: 'the contingent nature of capitalism is demonstrated by Marx on the basis of an analytical nucleus consisting in what he often calls "the internal nexus of bourgeois economic relations", that is, basically, the antagonistic relation between wages and profits' (Garegnani 1981: 112).

The analytical core common to the classical economists, to Marx and Sraffa, is located by Garegnani[26] in the set of relations connecting production prices and distributive variables analysed in Sraffa (1960). More precisely:

> surplus theories have […] a *core* which is isolated from the rest of the analysis because the wage, the social product and the technical conditions of production appear there as already determined. It is in this 'core' that we find the determination of the shares other than wages as a residual: a determination which […] will also entail the determination of the relative values of commodities. Further, as a natural extension of this, we shall find in the 'core' an analysis of the relations between, on the one hand, the real wage, the social product and the technical conditions of production (the independent variables) and, on the other hand, the shares other than wages constituting the surplus, and the relative prices (the dependent variables).
>
> (Garegnani 1984: 296)

Two notes of caution are to be stressed. First, side by side with the relations considered *internal* to the core, these variables (both dependent and independent) can also be connected by other relations, which 'were left to be studied outside the "core"' (Garegnani 1984: 297). Secondly, the notion of a core of the surplus theories remains substantially unchanged when the profit rate replaces the wage as the independent distributive variable exogenously determined, that is, outside the core (Garegnani 1984: 321–2).

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[26] Cf. the essays collected in Garegnani (1981, 1984, 1990).

The dominant role attributed to the 'analytical core', which Marx shares with classical economists and Sraffa, influences the line of enquiry followed in the reconstruction of political economy. The 'core' is taken as the foundation on which to develop the analysis in different directions, corresponding to the elements considered as exogenous data in Sraffa's book (income distribution, production and employment levels, technology).

Furthermore, the analyses of the relations internal to the core and of those external to it are said to constitute 'distinct logical stages' (Garegnani 1984: 297): the nature of the enquiry is substantially different in the two cases. Garegnani (1990a: 124–5) characterises this difference in a clear-cut way. He points to a 'distinction between two fields of analysis: a field where general quantitative relations of sufficiently definite form can be postulated', namely the 'core'; 'and another field where relations in the economy are so complex and variable according to circumstances, as to allow not for general quantitative relations of sufficiently definite form', namely the rest of economic theory: 'The relations pertaining to this second field had accordingly to be studied in their multiplicity and diversity according to circumstances'.

Departing from what appear to be the implications of Pasinetti's contributions, Garegnani and his followers seem thus to interpret the analytical core common to Sraffa and classical economists not as a set of formal relations to be extended in more general models but rather as a set of relations of causes and effects that should constitute prior foundations for the analyses of other aspects of economic life. More precisely, central relevance is attributed to the causal chain running from the wage rate, determined by socio-historical conditions (or alternatively by a profit rate determined by conventional and institutional factors explaining the interest rate), to relative prices and the second distributive variable, on the basis of a given technology. This core of causal relations continues to constitute the necessary reference point also when the focus shifts to other parts of political economy, precisely because these relations are the only ones that can be considered as 'general quantitative relations'.

Another idea repeatedly pursued by Garegnani (for instance in Garegnani 1990b) is the 'gravitation of market prices towards natural prices', already discussed earlier in § 3.3. In fact, the metaphor of gravitation, both imperfect and suggestive as all metaphors are, seems to be used by Garegnani essentially to stress the relative 'stability' and 'persistence' over historical time of those elements (techniques in use, distribution) which are employed to explain 'natural' prices; along this road the point of speaking of 'long period positions' is reached. In this respect the idea of the gravitation of market prices towards natural

prices is invoked in order to explain the central role attributed to the relations connecting economic variables within the 'core' of economic analysis, whose aim is to interpret the working of basic forces acting in reality. It is precisely this element – the central role of the 'core' – which characterises Garegnani's theoretical views, both in his interpretation of the connection between Sraffa and classical economists and Marx, and in his view of the line of research to be followed in the reconstruction of political economy initiated by Sraffa.

8.6   The 'Smithian' reconstruction: Sylos Labini

A new departure in interpretation of the central aspects of classical political economy was developed in a number of writings by Paolo Sylos Labini.[27] This line of research is characterised by the central role attributed to market forms, which are relatively overlooked by classical economists, in their interaction with the division of labour and the process of accumulation. This approach implies bringing to the centre of analysis a certain view of the process of capitalistic development which draws more on Smith than on Ricardo or Marx: a view focused on the deepening of the division of labour (or, more specifically, of technological change). Changes in the division of labour drive changes over time in market forms and in the pace of accumulation. Developments in income distribution are then made to depend on these elements, together with aspects concerning public policy and the political–institutional setting. In this way, while the notion of surplus retains a central role in economic analysis, the functional relations connecting natural prices to income distribution lose their role as the central pillar of economic theorising.

   More generally, Smith's vision of a process of development characterised by both positive and negative elements, though fundamentally beneficial, is re-proposed in a somewhat different form by Sylos Labini. His 'Smithian' vision is developed as an alternative, if not in opposition, to the traditional Marxian view of a progressive deterioration of capitalism (with the law of increasing misery, proletarisation, tendency to a falling rate of profits) up to the inevitable breakdown and the unavoidable revolutionary outcome.[28]

[27] Cf. Sylos Labini (1954, 1974, 1976, 1983, 1984, 2004).
[28] This counterposition is particularly clear in Sylos Labini's writings on social classes (1974) and on underdevelopment (1983); for a direct critique of the Marxian 'vision', cf. Sylos Labini (1994: 3–24). On Sylos Labini's liberal–socialist views, cf. Roncaglia (2008).

In comparison to the 'Smithian' vision of reconstruction of political economy, Sraffa's contribution can be characterised exactly along the lines illustrated in this book: that is, as a critique of the marginalist tradition, reconstruction and revival of the classical conceptual apparatus and a solution to the analytical problem constituting a feeble point in the classical theoretical apparatus (the relationship connecting production prices and income distribution). This problem constituted then, and continues to do so, a crucial knot – in fact, *the* crucial knot – for the construction of a theoretical system based on the notion of surplus. However, it did not constitute for classical economists, nor should it constitute today, the main objective of economic enquiry. Such an objective should rather be located in the 'wealth of nations' and in the factors determining its development over time and in different countries, especially the distribution of income and wealth (and – too often forgotten – the distribution of power, which has also to do with the role of market forms) among different groups of economic agents.

Sraffa's contribution is thus decisive for the vitality of any cultural project of a reconstruction of classical political economy. However, it should also be recognised that in order to re-propose an interpretation of the development of the economic systems in which we live it is not sufficient to 'build on' the analysis developed by Sraffa in *Production of Commodities by Means of Commodities*: neither in the sense of gradually extending a basic formal model, nor in the sense of gradually extending a restricted analytical nucleus of cause-and-effect relations. As a consequence, we should recognise that the attempt at reconstructing classical political economy can be – and should be – developed, at least in certain aspects, independently of Sraffa's contribution.

For instance, Sylos Labini (1956) rescues the classical conception of market forms, based on the difficulty of entry of new firms into a given sector, rather than on the number of firms currently operating in that sector, and analyses the factors determining the 'barriers to entry' facing new firms. These factors are viewed as determining a deviation of the sectoral profit rate from the 'basic' profit rate, which would prevail under free competition, i.e., in the case of unrestrained freedom of entry. Such an analysis of market forms is clearly compatible with the idea of a tendency to a uniform rate of profits in the case of free competition in all sectors. It is thus compatible with Sraffa's analysis: in comparison to the assumption of a uniform rate of profits, the introduction of non-competitive market forms could be considered as a secondary approximation. But the objective of an analysis of the barriers to entry into the different sectors of the economy can be pursued independently

of an analysis of relative prices under competition, such as the one conducted by Sraffa (1960). Among other things, too direct a link between the two lines of analysis, such as the attempt to simultaneously enclose both of them within the boundaries of a single mathematical model, would have the effect of limiting the horizon of study of the barriers to entry to the determination of sectoral profit rate differentials: these are in fact the only formal link connecting analysis of market forms to analysis of the relation between natural prices and income distribution. On the other hand, alongside sectoral profit rate differentials, and even more importantly, perhaps, the analysis of market forms improves our understanding of issues such as the influence of barriers to entry on the pace of technological change, on accumulation and on income distribution (especially when the nature of the barriers to entry and their level are different in the various sectors of the economy).[29]

The connection between the different lines of research contributing to the reconstruction of classical political economy (and in particular the connection between the two lines of enquiry concerning the relationship between relative prices and income distribution, and concerning market forms) is to be found in the reference to a common conceptual framework. This is given by the representation of the economy as a circular process, centred on the causes which allow for the production of a surplus and determine its distribution among the different social classes and the different sectors of the economy, and the patterns of its utilisation. We should also recognise that, within this common conceptual framework, it is possible to distinguish a whole series of analytical issues, obviously connected, but best dealt with at the level of separate analysis (although without losing sight – 'in the back of our minds', as Keynes used to say – of their interconnections).

The *analytical separability* of different issues[30] opens the way to the use of *different analytical areas* for dealing with different analytical issues. The idea is fairly widespread in modern science, with the noticeable exception of economics, where the dominant marginalist tradition favours the idea that all problems should be dealt with by adopting one and the same method, namely constrained maximisation (or minimisation).[31] For instance, in the study of intelligence, analysis of the interaction

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[29] Cf. Sylos Labini (1956, 1972, 1984, 2004).
[30] This 'separability' is suggested in Roncaglia (1975,Chapter 7) as a possible interpretation of the method implicit in Sraffa (1960); cf. earlier, § 7.5.
[31] This is, for instance, the main thesis of Samuelson's *Foundations*, cf. Samuelson (1947: 3).

between symbols in the human mind is conducted in 'a different analytical area' from analysis of the interaction of neurons in the human brain (Hofstadter 1979). Then, obviously, the two analyses may prove compatible with some common interpretation of human intelligence in general.

With recourse to the notion of different analytical areas we can address, within the 'Smithian' approach, the problem of the relationship between what Garegnani calls 'the core' of classical political economy and 'the rest of economic theory'. When research in different analytical areas is considered useful in dealing with different issues, the notion of a 'core' of economic analysis loses meaning, and the problem of *formal* consistency with the core cannot even be raised, nor can it constitute a 'logically prior' stage with respect to the 'logically subsequent' stages consisting in the treatment of other issues. A *conceptual*, not a formal, consistency is required between the different theories developed to interpret different aspects of economic reality, if such theories are to represent parts of a common *corpus* of doctrines. The relevance attributed to this kind of consistency[32] lies in the fact that it constitutes the main defence against possible abuses of the idea of 'different analytical areas'.

It is only here that we find reasons for attributing a particularly important role to the set of analytical relations usually included in the field of the theory of value. It is within this field, in fact, that the differences between different conceptions of the way of functioning of the economy most clearly appear, and it is here that they can be expressed with the greatest precision. Clearly, from this point of view Sraffa's (1960) analytical contribution continues to play a central role also within what we term here the 'Smithian' reconstruction of classical political economy.

8.7 A preliminary evaluation of the three lines of enquiry

The argument expounded in the preceding pages does not imply basic contradictions between the three lines of enquiry – 'Ricardian', 'Marxian' and 'Smithian' – proposed for the reconstruction of classical political economy as initiated by Sraffa. However, the differences are, of course, there. This section deals with some difficulties arising when the 'Ricardian' and 'Marxian' lines of enquiry are interpreted as counterposed to the 'Smithian' approach.

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[32] This fact at least partly explains the importance attributed to the debates concerning the history of economic thought: cf. Roncaglia (1996).

Let us begin with the 'Ricardian' analysis developed in particular by Pasinetti. As we saw above (§ 8.4), it is, at least at an initial, fundamental stage, a *normative* analysis aiming at determining the conditions of continuous full employment (or, in general, of a predetermined employment dynamics), in the presence of exogenous changes in labour forces, technology, consumers' tastes. This implies a counterposition to the traditional marginalist view according to which market economies automatically tend to full employment. Vice versa, the conditions of economic growth under continuous full employment analysed by Pasinetti are not automatically realised by market forces; they may only constitute targets for policy interventions.

However, once the aim of analysis is thus specified, some problems arise. First, along with the assumption of full employment, important elements are determined from outside the model, and in particular the parameters determining the pace of technical change. Secondly, even if we accept the point of view of the 'full employment planner', we still lack the second point of reference necessary to any policy action, namely analysis of the tendencies of actual economic systems. According to Pasinetti, this kind of analysis represents a subsequent stage, given the bare indication in his work, logically subsequent to the analysis of what he calls the 'natural' properties of an economy, namely the conditions of growth under persistent full employment.

It may be noted here that the term 'natural' as utilised by Pasinetti has a somewhat different meaning from the use common among classical political economists or in other modern reconstructions of classical theory. 'Natural' in the sense of 'corresponding to the nature of things' implies that those referred to as natural values constitute the best possible characterisation of reality, when contingent and accidental elements do not disturb the scene. In our interpretation of Sraffa's 1960 analysis, natural prices – or prices of production – are those theoretical variables which derive from the very structure of our theory, namely from the choice of those which our theory considers the main forces in action with respect to the issue under consideration. Since persistent full employment can be seen as an optimal path for the economy, the meaning Pasinetti attributes to the term 'natural' retains a flavour of much older traditions such as 'natural law' (*jus naturalis*), where the natural law is not automatically realised by human beings but is rather the aim to be pursued, and so a basic reference point in the interpretation of human behaviour.

Concentrating analysis on the optimal growth path, however, may itself tend to obscure some aspects that are decisive for an understanding

of the path actually followed by the economy. Let us briefly recall three such aspects: market forms, monetary and financial elements and the relationship between long- and short-run issues.

The first aspect, market forms, can differ from sector to sector and can be modified, within each sector, by the very process of development. As we saw above (§ 8.6), some economists attribute to market forms a decisive influence on the actual development of economic systems. However, analysis of vertically integrated sectors leaves on a secondary plane the possible differences in market forms in the various industries, which are recombined in varying proportions across hypothetical vertically integrated sectors. As a consequence, each vertically integrated sector embodies different market forms within, and we lose sight of the strategic behavioural differences across different sectors, which may indeed influence the shape of economic development.

The second aspect consists in the limited and largely passive role played by monetary and financial factors in Pasinetti's analysis (1981, Chapter 8). These factors are, in fact, relegated to that second stage of research, which should follow on analysis of the 'natural' properties of an economic system. This is a logical corollary of the line of enquiry favoured by Pasinetti: in his analysis the potentialities of development are defined by 'real' factors such as the growth of population, the pace of productivity growth and the choices of final consumers; monetary factors do not play any role in this account. Vice versa, the economists within the Keynesian tradition usually stress the relevance of the latter factors in determining the actual path of economic development.

The third aspect consists in the link between short- and long-run problems.[33] As we saw above (§ 8.4), in Pasinetti's analysis, short-run problems are reserved for a secondary stage of analysis, subordinate to analysis of the long-run problems. However, the opposite procedure – namely considering long-run tendencies as stemming from short-run trends – appears, at least in some cases, as more appropriate to the analysis of the evolution of actual economic systems. This holds especially for the employment issue, which is the central objective of Pasinetti's analysis: 'Keynesian' short-run unemployment, due to short-run insufficiency of effectual demand, implies underutilisation of available productive capacity, and thus negatively influences investments aimed at enlarging productive capacity; as a consequence, the latter may maintain a pace insufficient to balance the growth of population and technical progress in the long run (see Roncaglia 1988, § 8.6).

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[33] Cf. Shapiro (1984) and Pasinetti's reply, Pasinetti (1984).

Technical change itself, which in Pasinetti's analysis is considered as an exogenous factor, is in fact influenced by the actual path of investments and production.

The assumption of continuous full employment, which is the central pillar of Pasinetti's analysis, also constitutes the premise for the idea, mentioned above (§ 8.4), that the international learning of technical knowledge constitutes the primary source of advantages stemming from international economic relations. These relations, however, also influence the degree of utilisation of available productive capacity and the pace of accumulation in the countries involved: it is only with the assumption of continuous full employment that Pasinetti can concentrate attention solely on the evolution of technical knowledge. Once all this is recognised, the contrast perceived by Pasinetti between his own notion of wealth of nations and the traditional one falls away. Undeniably, the classical notion attributes a central role to technical knowledge in explaining the wealth of nations (for example, with the Smithian analysis of the division of labour). At the same time, alongside the stage reached by technical knowledge we must also keep in sight, precisely as classical economists used to do, the 'material' aspect of the wealth of nations as well, namely the actual path of production and accumulation, once the possibility of a difference between such a path and the potential full employment one is recognised. In other words, the notion of the wealth of nations proposed by Pasinetti, in so far as it concentrates attention *exclusively* on technical knowledge, is connected to the normative orientation of his analysis, focused on the identification of the conditions of persistent full employment. By contrast, the classical (Smithian) notion of wealth of nations recognises the relevance of technical knowledge, along with other elements, in determining the actual path of development of economic systems.

Of course, these remarks do not deny the usefulness of a normative analysis like Pasinetti's. Rather, they point to the desirability that, along with such analysis, and not as a second and logically subsequent stage, attention be given also, perhaps mainly, to analyses of actual economic events.

Let us now proceed to examine the second line of enquiry illustrated above (§ 8.5), the 'Marxian' one developed in particular by Garegnani. Here we leave aside, as not relevant to our purposes, the philological issue concerning the correctness of Garegnani's interpretation of Marx's thought. We focus, rather, on two related aspects, decisive for this line of enquiry: the notion of 'the core of the surplus theories' and the notion of the 'gravitation of market prices towards natural prices'.

The latter thesis has been the object of long debate. Various economists stress that as a matter of fact natural prices do not remain unchanged over the time span necessary for the completion of the gravitation process of market prices towards natural prices; the 'natural position' may or may not be reached, depending on the assumptions adopted on the speed of change of the elements determining the natural prices, on the one hand, and the time required for the adjustment of market to natural prices, on the other.[34] Additional difficulties arise when it is recognised that the path followed by market prices may influence those very elements (technique in use, income distribution) determining natural prices. Other economists stress that gravitation requires strict formal conditions, through analyses where market prices are treated as theoretical variables determined by supply and demand conditions, and where supply and/or demand respond to divergences between market and natural prices.[35] Such a notion of market prices is necessary when interpreting gravitation as a theory concerning the level of market prices and their path over time. But such a notion can be attributed neither to the classical economists nor to Sraffa. To them, market prices represent the exchange ratios actually observable in reality, influenced by a multiplicity of factors, both systematic and unsystematic; natural prices, instead, are the theoretical variables expressing the action of those factors alone, on which the economist chooses to focus attention.[36]

However, as already suggested, the thesis concerning gravitation of market towards natural prices is not necessarily to be interpreted as a precise *theory* of market prices. Analysis of the relationship between market and natural prices may be pursued not by trying to theorise the path actually followed by market prices, but rather by pointing to the direction of their movement in each given situation, towards – or away from – natural prices. When interpreted in this way, the thesis of gravitation emerges as nothing more or less than a different name for the classical (Smithian) theory of competition, according to which any deviation of market from natural prices provokes reactions on the part of economic agents which tend to move the market towards natural prices.

[34] Cf. in particular Parrinello (1977). We may think, for instance, of the extremely rapid technological change in sectors such as that of personal computers, in counterposition to the near-staticity of other sectors; let us recall, in this context, that natural (or production) prices are relative prices and as such they depend on the relative difficulty of production (and on income distribution).

[35] Cf. for instance Arena (1981); Steedman (1989, Chapter 6); Boggio (1985, 1990).

[36] Cf. Roncaglia (1990b, 2009a).

Garegnani, however, seems to add two other elements: (i) the idea, already mentioned, that the elements determining natural prices are 'persistent', that is, relatively stable, so that the speed of movement of natural prices, due to exogenous changes in the factors determining them, would turn out to be significantly lower than the speed of movement of market prices in their process of competitive adjustment towards natural prices; (ii) the idea, which is a corollary of the first, that natural prices, and hence their determinants, are (or can be considered) independent of short period movements in market prices. Both these ideas, as noted above, have been disputed in the course of the debate concerning gravitation. (In that debate – as on so many other occasions – two aspects were sometimes confused: first, whether these ideas represent more or less faithfully the classical economists' views; secondly – and particularly relevant here – whether they are useful in representing the working of contemporary economic systems.)

These critiques hit the central aspect of the thesis of gravitation, namely the strong characterisation of the idea of 'persistence'. In fact, according to the thesis of gravitation, the forces regulating the process of economic reproduction would be persistent, not only in the commonly accepted sense that their mode of action is stable and systematic, but in the stricter sense of attributing persistence (stability) to the quantitative expression (the 'levels') of the factors determining the system of relative prices. Specifically, persistence (stability) is thus attributed to technology and the corresponding levels of production, which – together with the system of natural prices they imply – constitute the 'long period positions' towards which actual economic systems are said to gravitate.

Together with this strong notion of gravitation, Garegnani's line of enquiry is characterised by the central role attributed to the 'analytical core of the surplus theories'. As we saw above (§ 8.5), Garegnani attributes logical priority to the 'analytical core', in the sense that only within it is it possible to identify 'general quantitative relations' connecting economic variables. In some respects, this idea resembles – even if the boundaries of the analytical core differ – Pasinetti's idea, discussed above, concerning the two stages of analysis, of which priority is attributed to the one analysing the 'natural' properties of the economy.[37]

[37] When pushed to its extreme limits, this distinction between the 'analytical core' and the rest of economic analysis tends to coincide with the distinction between *economic theory* and *political economy* as proposed by Lunghini (1975) in his interpretation of Sraffa: a distinction with which Lunghini means to show how limited the scope of constructive theoretical reasoning is in the economic field.

However, this constitutes an unnecessary constraint for the investigation of issues such as technical change, or the link connecting division of labour, market forms and income distribution, which are better dealt with as separate, but not subordinate, areas of analysis.

Another interpretation of Sraffa's analysis (developed in Roncaglia 1975, and re-proposed in the present book) is based on a 'weaker' notion of natural prices, considered as the theoretical outcome of the action of certain forces 'isolated *in vacuo*', namely those which influence exchange ratios in a systematic way. Such an interpretation proves more fruitful in overcoming the barrier which arises in other interpretations, between the 'general quantitative relations' and 'the rest of economic theory'. As suggested above, different 'analytical pieces' may coexist within a common process of theoretical reconstruction, once the possibility of 'different analytical areas' is recognised for the investigation of different aspects of the functioning of economic systems, and if we avoid attributing too rigid a meaning to the central role assigned within the theoretical debate to the problem of value when distinguishing between different economic 'visions'.

In the case of the 'Marxian' approach, and especially in the case of the 'Ricardian' one, the critical remarks illustrated in the present section concern certain aspects of the lines of research proposed for the reconstruction of economic theory, and not the general vision underlying such a reconstruction, namely the central idea of a very close link between Sraffa's analysis and classical political economy, and the objective of a reconstruction of classical political economy as an alternative to the marginalist approach.

Let us summarise the results of our reasoning. We saw, in the preceding sections, that there are different lines of enquiry which, stemming more or less directly from Sraffa's contributions, aim at a reconstruction of classical political economy. However, this does not imply that such lines of enquiry are mutually exclusive. In particular, following the 'Smithian' line of enquiry discussed above, and accepting the possible coexistence of different analytical areas, we may find useful elements for the reconstruction of classical political economy in each of the other lines of enquiry discussed above.

Thus, for instance, Pasinetti's analysis can be interpreted in terms of analysis of a well-defined issue (the conditions for growth under continuous full employment, and their implications), rather than as a 'general model' of the functioning of an economy. It should also be recognised that the notion of 'natural values' has a different meaning in the context of Pasinetti's analysis and of the classical tradition.

Similarly, various aspects of Garegnani's contributions are useful for the reconstruction of political economy, provided that his thesis of the supremacy of the relations analysed within the 'core' over those external to it is abandoned. At the same time, the 'Smithian' line of enquiry itself cannot but gain in clarity and analytical robustness by paying greater attention to its links with the classical surplus approach and with Sraffa's analytical contributions.

Here we cannot attempt to sketch out the setting which could emerge from a critical synthesis of the different lines of enquiry stemming from Sraffa's contribution. It is clear, in any case, that while the reconstruction of classical political economy can be said to be well under way, much work still remains to be done. We should recall, moreover, that economists analyse a continuously changing reality, requiring a continuous adaptation of the theoretical apparatus itself. It is precisely for this reason that economic research today, in particular within the revival of the classical approach, far from going through a crisis, is a lively and fascinating enterprise.

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[When more than one edition is quoted, as with translations, page references in the text refer to the last quoted edition not in parenthesis. When quoting from a non-English text for which no published translation is indicated, the translation is mine.]

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Index