

THE SURPLUS INTERPRETATION OF THE CLASSICAL ECONOMISTS

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1. Introduction

The economy the classical economists from William Petty to David Ricardo experienced typically generated an annual *social surplus* which was distributed amongst the propertied classes in the form of rents or profits and used for the purposes of consumption and capital accumulation. The surplus refers to those quantities of the different commodities that were left over after the necessary means of production used up and the means of subsistence in the support of workers have been deducted from the gross outputs produced during a year. In this conceptualization the necessary real wages of labour were considered no less as indispensable inputs and thus agents of production than raw materials, tools or machines. What became known as the "surplus interpretation" of the classical economists focuses attention on the mature classical economists' approach to how the surplus is distributed and which system of exchange values of the different commodities can be expected to emerge as the result of the gravitation of "market" or "actual" prices to their "natural" or "ordinary" levels, or "prices of production". In conditions of free competition, that is, the absence of significant barriers to entry and exit from all markets, prices can be taken to oscillate around levels characterized by a *uniform rate of profits* on the value of the capital advanced at the beginning of the uniform production period and a uniform rate of rent for each of the different qualities of land.

The determination of the general rate of profits, the rents of land and the corresponding system of relative prices constitutes the analytical centrepiece of classical political economy. It was designed to lay the foundation of all other economic analysis, including the investigation of capital accumulation and technical progress; of development and growth; of social transformation and structural change; and of taxation and public debt. The pivotal role of the theory of value and distribution can be inferred from the fact that the latter is typically developed right at the beginning of major classical works: think of Adam Smith's *The Wealth of Nations* (WN, I.vi-xi); or of David Ricardo's *Principles* (*Works*, Vol. I, Chaps I-VI).

The importance of this part of classical analysis is also reflected in the following. When in 1951, in his introduction to Ricardo's *Principles* in Volume I of *The Works and Correspondence of David Ricardo* (Sraffa, 1951), and then in 1960, in his book *Production of*

Commodities by Means of Commodities (Sraffa, 1960), Piero Sraffa re-established the surplus interpretation of the classical economists which had been "submerged and forgotten since the advent of the 'marginal' method" (Sraffa, 1960, p. v), after some notable delay this caused a major controversy whose end is not yet in sight. (According to Sraffa, the classical approach to the theory of value and distribution had already been submerged and forgotten for the first time shortly after Ricardo's death. He credited Marx (1954a) with having rediscovered and then further elaborated it.) Had Sraffa's historical and analytical reconstruction been only concerned with a peripheral aspect of classical economics, then it could have hardly attracted the attention and triggered the debate it did. It was precisely because his interpretation concerned the very foundations of classical economics – its theory of value and distribution – that his alternative point of view caused a major stir amongst historians of economic thought and met with stiff opposition from those who advocated one form or other of the received Marshallian interpretation. The latter perceived the classical economists as essentially early and somewhat crude demand and supply theorists, with the demand side in its infancy. It was this interpretation and the underlying continuity thesis which Sraffa challenged.

If Sraffa were right, this could have been expected to have important implications ranging far beyond the field of the history of economic thought. These implications began to emerge when, equipped with Sraffa's reformulation and generalization of the classical approach to the theory of value and distribution, in the 1960s and 1970s some authors successfully questioned the validity of the dominant long-period demand and supply theory in the so-called "Cambridge controversies in the theory of capital" (see Kurz and Salvadori, 1995, Chap. 14.) This demonstrated vividly that a concern with the classical approach did not involve morbid antiquarianism.

In this paper the attention will focus exclusively on Sraffa's interpretation of the classical authors. (See also Garegnani (1984, 1987) and Kurz and Salvadori (1995, 1998a, 1998b, 2002).) As is well known, Sraffa published very little during his lifetime. What is less well known is that he left a huge amount of notes and manuscripts. Many of those which relate directly to our theme were written as early as the late 1920s. (A selection from his papers and correspondence is currently being prepared for publication.) Sraffa was then in the midst of recovering the classical approach to the theory of value and distribution from underneath thick layers of interpretation, a task the accomplishment of which can only have benefitted when, in 1930, he was entrusted with the Ricardo edition on behalf of the Royal Economic Society. Sraffa in private conversation is reported to have called his notes and papers the "iceberg", the tip of which is his published work.

The composition of the essay is the following. Section 2 deals with characteristic features of the classical method in the theory of value and distribution. Section 3 turns to the central classical concept of "physical real cost" and exemplifies its presence in some major authors. Section 4 deals with the reasons why that concept was gradually abandoned and replaced by that of "labour". Section 5 shows that the classical approach to value and distribution can adequately be formulated in terms of simultaneous equations. Such equations Sraffa began to elaborate from 1927 onward. Section 6 summarizes the analytical structure of the classical approach to the theory of value and distribution. Section 7 concludes with a few illustrations of how the classical authors employed this theory in an attempt to come to grips with the dynamism of the capitalist economy and the factors shaping its long-term trend.

2. Scope and method of the classical approach

The concern of the classical economists was the laws governing the emerging capitalist economy, characterized by the stratification of society into three classes: workers, land owners, and the rising class of capitalists; wage labour as the dominant form of the appropriation of other people's capacity to work; an increasingly sophisticated division of labour within and between firms; the co-ordination of economic activity via a system of interdependent markets in which transactions were mediated through money; and significant technical, organizational and institutional change. In short, they were concerned with an economic system incessantly in motion. How to analyse such a system? The ingenious device of the classical authors to see through the complexities of the modern economy consisted in distinguishing between the "actual" values of the relevant variables – the distributive rates and prices – and their "normal" values. The former were taken to reflect all kinds of influences, many of an accidental or temporary nature, about which no general propositions were possible, whereas the latter were conceived of as expressing the persistent, non-accidental and non-temporary factors governing the economic system, which could be systematically studied.

The method of analysis adopted by the classical economists is known as the method of *long-period positions* of the economy. Any such position is the situation towards which the system is taken to gravitate as the result of the self-seeking actions of agents, thereby putting into sharp relief the fundamental forces at work. In conditions of free competition the resulting long-period position is characterized by a uniform rate of profits (subject perhaps to persistent inter-industry differentials reflecting different levels of risk) and uniform rates of

remuneration for each particular kind of primary input. Competitive conditions were taken to engender *cost-minimizing behaviour* of profit-seeking producers.

The classical economists proceeded essentially in two steps. In a first step, on which attention will focus in this essay, they isolated the kinds of factors that were seen to determine income distribution and the prices supporting that distribution in specified conditions, that is, *in a given place and time*. The theory of value and distribution was designed to identify *in abstracto* the dominant factors at work and to analyse their interaction. In a second step, the classical authors then turned to an investigation of the causes which *over time* affected systematically the factors at work from within the economic system. This was the realm of the classical analysis of capital accumulation, technical change, economic growth and socio-economic development.

It is another characteristic feature of the classical approach to profits, rents and relative prices that these are explained essentially in terms of magnitudes that can, in principle, be observed, measured or calculated. The *objectivist* orientation of classical economics has received its perhaps strongest expression in a famous proclamation by William Petty, who was arguably its founding father. Keen to assume what he called the "physician's" outlook, Petty in his *Political Arithmetick*, published in 1690, stressed:

The Method I take to do this, is not yet very usual; for instead of using only comparative and superlative Words, and intellectual Arguments, I have taken the course (as a Specimen of the Political Arithmetick I have long aimed at) to express my self in Terms of *Number, Weight or Measure*; to use only Arguments of Sense, and to consider only such Causes, as have visible foundations in Nature; leaving those that depend upon the mutable Minds, Opinions, Appetites and Passions of particular Men, to the Consideration of others ... (Petty, [1899] 1986, p. 244; emphasis in the original)

Notwithstanding their many differences, classical economists generally shared in one form or another an essentially objectivist outlook on the problem of value and distribution. This will become clear when, in Section 3, we will turn to the concept of "cost" entertained by them.

Finally, the following aspect of the classical method deserves to be mentioned. In his 1960 book, which was explicitly designed to revive the "standpoint" of the old classical economists, Sraffa stressed: "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 proportion of 'factors'" (1960, v). To focus attention on such properties of an

economic system does not mean, of course, to maintain that there are no such changes. It only means that these changes are set aside in the respective investigation. What is at stake is a method designed to analyse an aspect of the economic system under consideration. In contradistinction, the method adopted by the marginalist authors focuses attention on (marginal) changes in the scale of production and in the proportions of factors. It attempts to determine relative prices and the distributive variables in terms of incremental quantitative changes. This is in stark contrast with the classical method which takes the levels of gross outputs as known magnitudes, designed to reflect the degree of the division of labour reached by a particular economy at a given stage of its development.

3. Circular flow and physical real cost

According to Sraffa there are especially two interrelated features characterizing the classical theory of production and cost. First, the classical concept of production is essentially that of a *circular flow*. This idea can be traced back to William Petty and Richard Cantillon and was most effectively expressed by François Quesnay ([1759] 1972) in the *Tableau économique* (see Aspromourgos, 1996). The classical view that commodities are produced by means of commodities is in stark contrast with the view of production as a one-way avenue leading from the services of original factors of production to consumption goods, as it was entertained by the "Austrian" economists.

Second, the classical economists held a concept of *physical real cost*. Their starting point can be summarized in the following way: Man cannot create matter, man can only change its form and move it. Production involves destruction, and the real cost of a commodity consists in the commodities destroyed in the course of its production. This concept differs markedly from the later marginalist concepts, with their emphasis on "psychic cost", reflected in such notions as "utility" and "disutility", "abstinence", "waiting" or "opportunity cost".

We encounter the classical view in Petty who reckoned as the costs of a commodity the means of production and the means of subsistence in support of the workers necessary in order to carry out the production. Yet, as Sraffa noted, Petty was probably not the first author to have advocated such a point of view. Traces of it can also be found in the concept of "just price" in the canonists. After Petty the new science of political economy was taken up and further developed by the Physiocrats, who adopted essentially the received view.

The concept of physical real cost recurs in the writings of Adam Smith, James Mill, David Ricardo, Robert Torrens, and Karl Marx. Despite some ambiguities in Smith's argument, Sraffa insisted that the scotsman's use of the term "natural" referred to that physical, purely natural relation between commodities. (The natural relation referred to is implicit in what Sraffa called the "first equations" of production, that is, production without a surplus; see below Subsection 5(a).) The same relation is meant when Ricardo spoke of "absolute value". The physical real cost approach is clearly discernible in the concept of "capital", which Ricardo defined as "the food and clothing consumed by the labourer, the buildings in which he works, the implements with which his labour is assisted" (*Works*, Vol. I, p. 52). Particularly clear expressions of the physical real cost approach are encountered in James Mill's *Elements of Political Economy*, first published in 1821. Mill insisted that, in the last instance, *the agents of production are the commodities themselves*: (i) the food of the labourer; (ii) the tools and the machinery with which he works; and (iii) the raw materials which he works upon.

Mill also drew the attention to a problem which was to become a major stumbling block of classical analysis: the tension between physical real costs, on the one hand, and labour, on the other. In the third edition, published in 1826, he wrote:

[T]he terms, Labour and Wages, are sometimes, incautiously used; and confusion of ideas, and some fundamental errors, are the consequence. It is clear that, when we speak of the labour of a man, for a day, or a month, or a year, the idea of his subsistence is as necessarily included, as that of the action of his muscles, or his life. ... If wages be taken as synonymous with the consumption of the labourer, the labour cannot be taken, as one item of an aggregate, and its wages as another. As often as this is done, an error is the necessary consequence." (Mill, [1826] 1844, pp. 9-10)

While there is no reason to presume that James Mill was fully aware of the deficiencies of the labour theory of value, he seems to have sensed that replacing physical real costs by, or confounding it with, quantities of labour may be the source of potential "error". We may now ask: What were the reasons for the shift from the concept of physical real costs to that of labour?

4. From physical real costs to quantities of labour

The move away from physical real costs and towards labour can be seen as the result of the fact that the relatively backward analytical tools at the disposal of the classical economists did

not allow them to translate the former concept into an adequate analytical framework. In order to determine coherently the general rate of profits and the exchange ratios of different commodities in terms of given physical real costs of production, the problem would have to be stated in terms of a set of *simultaneous equations*. Lacking the proper tools, the classical authors attempted to cope with the problem of the heterogeneity of commodities by trying to reduce them to a common measure. Since labour was considered an indispensable input in the production of all commodities, labour was gradually identified as the common measure, or, in the case of Marx (1954b), as the "substance", of value.

Here it must suffice to illustrate the move away from the "loaf of bread" and towards "labour" essentially in terms of a single author: Robert Torrens. (On Torrens, see de Vivo's commentaries in Torrens (2000).) In the 1820 edition of his *Essay on the External Corn Trade* Torrens put forward the simplest conceptualization possible of the surplus approach to the theory of value and distribution: the *corn-ratio theory of profits*. He laid down as a "general principle"

that in whatever proportion the quantity of produce obtained from the soil exceeds the quantity employed in raising it, in that proportion the value of the manufactured goods will exceed the values of the food and material expended in preparing them. (Torrens, 2000, Vol. II, p. 362)

Here the rate of profit in agriculture is determined as a ratio between two given quantities of corn: the surplus corn produced and the corn capital advanced in corn production (seed and corn wages). This rate of profit is then used in order to determine the price of manufactures which, in competitive conditions, yields the manufacturer the same rate of return on his capital advances as the rate obtained by the farmer.

Torrens expressed his indebtedness to David Ricardo's "original and profound inquiry into the laws by which the rate of profit is determined" (*ibid.*, p. xix). This provides indirect evidence in support of Sraffa's corn-profit interpretation of Ricardo (Sraffa, 1951, p. xxxi-xxxiii). According to Sraffa, "The advantage of Ricardo's method of approach is that, at the cost of considerable simplification, it makes possible an understanding of how the rate of profit is determined without the need of a method for reducing to a common standard a heterogeneous collection of commodities" (*ibid.*, p. xxxii). It also provides a first confirmation of Ricardo's conviction that the laws of distribution "are not essentially connected with the doctrine of value" (*Works*, Vol. VII, p. 194).

It was, of course, clear to Ricardo and Torrens that, as Malthus had objected, the capital advanced in a single industry is never homogeneous with the industry's product. However,

there may be homogeneity between product and capital in terms of a composite commodity with regard to the economy as a whole. In this case the general rate of profits may again be conceived of in purely physical terms. In all three editions of Ricardo's *Principles* we encounter a numerical example which satisfies this requirement. In the example of every 100 units produced of three commodities – hats, coats, and quarters of corn – workers are paid 25 (or 22) units of each of them and landlords are also assumed to receive 25 (or 22) units; accordingly, profits consist of 50 (56) units of each commodity (see *Works*, Vol. I, p. 50). On the assumption that capital consists only of the real wages bill, the rate of profits can be determined independently of the problem of the valuation of the different commodities and amounts to $\frac{50}{25} = 2$ (or $\frac{56}{22} = \frac{28}{11}$). Similarly, in his *Essay on the Production of Wealth*, published in 1821, Torrens put forward an example with two industries, one producing corn, the other suits of clothing, where both industries use both products in the same proportions (and actually in the same absolute amounts) as inputs (see Torrens, 2000, Vol. III, pp. 372-73). With the social surplus and the social capital consisting of the same commodities in the same proportions, the general rate of profits can be determined without having recourse to the system of relative prices. Moreover, given the exceedingly simple conditions underlying the example, the exchange ratio of the two commodities corresponding to a uniform rate of profits is obvious: since both commodities exhibit the same physical real costs per unit of output, a quarter of corn is necessarily exchanged for one suit of clothing.

(In the debate about whether Ricardo or Torrens or any other classical author had put forward a "corn model", this possibility is frequently, and surprisingly, overlooked by some critics of Sraffa's interpretation. In order for a concept of the general rate of profits in purely physical terms to hold there is no need to discern in the classical authors the fiction of a single industry whose product is physically homogeneous with its capital. (Corn models are however to be found in these authors.) Therefore, the concern with the corn model in the writings of some critics appears to be out of proportion with regard to the importance of that model in the classical authors: helpful as it may have been at an early stage in the conceptual development of the classical approach to the theory of profits, that approach can do very well without the corn model.)

It had not escaped Torrens's attention that physical homogeneity of product (and surplus) and capital cannot be expected to hold in any real economy. In his attempt to deal with more general cases he was, however, confronted with the complexity of the relationship between income distribution and relative prices. In yet another attempt to contain this complexity and arrive at a clear-cut determination of the general rate of profits, Torrens resorted to the special assumption we just encountered, namely, that in all lines of production the same commodity input proportions apply. This assumption implies, of course, that relative prices are correctly

explained by the labour theory of value (see below, Section 5). More specifically, echoing the physical real costs approach in labour terms, commodities exchange for one another according to the quantities of labour contained in the *capitals* (means of production and means of subsistence) used up in the course of their production. In the preface to the *Essay* Torrens stressed:

The principle that the *accumulated labour*, or, in other words, *the capital expended on production*, determines the exchangeable value of commodities, while it is derived from an extensive induction from particular cases, affords a *satisfactory solution* of some of the most important phenomena connected with the distribution of wealth. Without this correction or limitation of Mr. Ricardo's theory of value it is impossible to give a clear and unexceptionable demonstration of that gentleman's very original and valuable doctrine respecting the profits of stock." (Torrens, 2000, Vol. III, p. vii; emphasis added)

That this did not afford a generally "satisfactory solution", as Torrens was inclined to believe, became clear at the latest, if not earlier, in the context of the criticism of Marx's so-called "transformation" of labour values in "prices of production" (see below).

Not seeing their way through the complexities of the relation between relative prices and income distribution, given the system of production in use, without a "common measure" of value applies *cum grano salis* to all classical economists and Marx. (There is however a notable exception: the critic of the Physiocratic doctrine, the French ingeneer Achille-Nicolas Isnard; see Kurz and Salvadori (2000, pp. 159-61).) And they all thought they had found such a measure in one way or another in terms of human labour. Some authors can even be said to have considered the problem of the "measure" of value as but another expression of the problem of the "cause" of value. Ricardo, as is well known, struggled with the problem of value and distribution until his death: the manuscript fragments on "Absolute Value and Exchangeable Value" (see *Works*, Vol. IV) document in detail his attempts to come to grips with this problem and his failure to elaborate a fully correct theory. They also contribute to a better understanding of why Ricardo (and other classical economists) were so "obsessed" with one version or another of the labour theory of value, as one commentator remarked. This theory had allowed them, however imperfectly, to see through the complexities of the problem under consideration and determine the general rate of profits. As long as no better theory was available, there was no compelling reason to abandon the admittedly defective labour value-based approach.

However, granting for a moment for the sake of the argument the alleged prior necessity to express the different commodity inputs in terms of labour quantities which could then be aggregated: how can those amounts of labour, or "labour values", be ascertained when production is a circular flow? How can commodities which are produced by means of commodities be reduced to labour alone? Obviously, beside the labour term there will always be a "commodity residue" consisting of minute fractions of means of production and means of subsistence needed in the production of that residue. Is there reason to presume that the sum total of the dated quantities of labour representing the production conditions of a given commodity converges to a finite limit, as Smith (WN, I.vi) and Ricardo (*Works*, Vol. I, Chap. I, Sec. III) appear to have implicitly assumed? And does not the determination of labour values also presuppose the solution of a system of simultaneous equations, so that the route via "labour" the classical economists had taken was not a way out of the impasse in which they found themselves?

The question then is how could the whole process of production be analysed adequately and a coherent theory of value and distribution be elaborated that was faithful to what the classical economists appear to have been after but were unable to express in a satisfactory way.

5. Equations of production

What made it so difficult, if not impossible, for the classical authors to see that the theory of value and distribution could be firmly grounded in the concept of physical real cost? Given their primitive tools of analysis, they did not see that the information about the system of production in use and the quantities of the means of subsistence in support of workers was all that was needed in order to determine *directly* the rate of profits and relative prices. Solving a set of simultaneous equations of production accomplishes the task in a straightforward manner. In the following we deal only with single production and thus circulating capital and set aside joint production, fixed capital, and natural resources (see therefore Sraffa (1960) and Kurz and Salvadori (1995)).

(a) *Production without surplus*

We may start from James Mill's above case with three kinds of commodities, tools (t), raw materials (m), and the food of the labourer (f). Production in the three industries may then be depicted by the following system of quantities

$$T_t H M_t H F_t \emptyset T$$

$$\begin{aligned} T_m H M_m H F_m \oslash M \\ T_f H M_f H F_f \oslash F, \end{aligned} \quad (Q)$$

where T_i , M_i and F_i designate the inputs of the three commodities (employed as means of production and means of subsistence) in industry i ($i = t, m, f$), and T , M and F total outputs in the three industries; the symbol "H" indicates that all inputs on the left hand side of " \oslash ", representing production, are required to generate the output on its right hand side. Adopting the terminology of the classical authors, Sraffa calls these relations "the methods of production and productive consumption" (Sraffa, 1960, p. 3). In the hypothetical case in which the economy is just viable, that is, able to reproduce itself without any surplus (or deficiency), we have $T = \sum_i T_i$, $M = \sum_i M_i$, and $F = \sum_i F_i$.

From this schema of reproduction and reproductive consumption we may directly derive the corresponding system of "absolute" or "natural" values, which expresses the idea of physical real cost-based values in an unadulterated way. Denoting the value of one unit of commodity i by p_i ($i = t, m, f$), we have

$$\begin{aligned} T p_t + M p_m + F p_f &= T p_t \\ T_m p_t + M_m p_m + F_m p_f &= M p_m \\ T p_t + M p_m + F p_f &= F p_f \end{aligned}$$

Only two of the three equations are independent of one another. Fixing a standard of value whose price is *ex definitione* equal to unity, provides an additional equation without adding a further unknown and allows one to solve for the remaining dependent variables.

A numerical example taken from Sraffa's papers illustrates the important finding that the given socio-technical relations rigidly fix relative values:

	<i>Values</i>
$2p_t + 15p_m + 20p_f = 17p_t$	$p_t = 3p_m$
$5p_t + 7p_m + 4p_f = 28p_m$	$p_m = \frac{2}{3} p_f$
$10p_t + 6p_m + 11p_f = 35p_f$	$p_f = \frac{1}{2} p_t$

Hence values emerge as the solution of a system of simultaneous equations. These values depend exclusively on necessities of production. They are the only ones that allow to restore the initial distribution of resources.

Here, the question of the "common measure" of commodities is of no real import, once the problem is approached from a rigorous physical real cost point of view. Or rather, any valuable thing could serve as a "common measure", or standard of value. One may also "reduce" the value of one commodity to a certain amount of another commodity needed directly or indirectly in the production of the former. For example, one might reduce one unit of commodity t to an amount needed of commodity m . Hence one might say that each of the three commodities could serve as a "common measure" and that, for example, commodities t and f exchanged for one another in the proportion 1:2 because commodity t "contained" or "embodied" twice as much of commodity m as commodity f .

But what about the labour theory of value? Were the classical authors mistaken in thinking that in conditions without a surplus (profits) relative prices were proportional to the relative quantities of labour bestowed on, or "embodied" in, the different commodities? Obviously not. In the above equations labour may be rendered visible by replacing the sustenance of producers in the different industries with the amount of labour employed in them and by adding a new equation which shows the "production" of the sum total of labour employed by means of the sum total of the means of subsistence in its support. In this way one would see how labour produces the commodities (one equation for each commodity), so the commodities produce labour (one equation for labour). Hence in a system without a surplus (or a system in which the entire surplus is distributed to workers) a "Value Theory of Labour", as Sraffa dubbed it, holds. Labour values can rigorously be determined, but this involves solving a system of simultaneous equations.

(b) *Production with a surplus*

We now turn to systems with a surplus and assume that there is free competition. The surplus will then be distributed in terms of a uniform rate of profits on the "capitals" advanced in the different industries.

We start again from system (Q), but now we assume that $T \geq \sum_i T_i$, $M \geq \sum_i M_i$, and $F \geq \sum_i F_i$, where at least with regard to one commodity the strict inequality sign holds. The case of a uniform rate of physical surplus across all commodities contemplated by Ricardo and Torrens,

$$\frac{T - \sum_i T_i}{\sum_i T_i} = \frac{M - \sum_i M_i}{\sum_i M_i} = \frac{F - \sum_i F_i}{\sum_i F_i} = r, \quad (\text{S})$$

denotes a very special constellation: in it the general rate of profits, r , equals the uniform material rate of produce. *Here we see the rate of profits in the commodities themselves, as*

having nothing to do with their values. In general, the rates of physical surplus will however be different for different commodities. It cannot even be excluded that some of these rates will be negative.

"Profits", Ricardo stressed, "come out of the surplus produce" (*Works*, Vol. II, pp. 130-31; similarly Vol. I, p. 95). Unequal rates of commodity surplus do not, however, by themselves imply unequal rates of profit across industries. In conditions of free competition the concept of "normal" prices, or "prices of production", implies that the social surplus is divided in such a way between the different employments of capital that a uniform rate of profits obtains. This is reflected by the following system of price equations:

$$\begin{aligned} (Tp_t + Mp_m + Fp_f)(1+r) &= Tp_t \\ (Tm_p_t + Mm_p_m + Fm_p_f)(1+r) &= Mp_m \\ (Tf_p_t + Mf_p_m + Ff_p_f)(1+r) &= Fp_f \end{aligned} \tag{P}$$

Flukes apart, these three equations are independent of one another. Fixing a standard of value provides a fourth equation and no extra unknown, so that the system of equations can be solved for the dependent variables: the general rate of profits and prices.

The important point to note here is the following. With the real wage rate given and paid at the beginning of the periodical production cycle, the problem of the determination of the rate of profits consists in distributing the surplus product in proportion to the capital advanced in each industry. Obviously,

such a proportion between two aggregates of heterogeneous goods (in other words, the rate of profits) cannot be determined before we know the prices of the goods. On the other hand, we cannot defer the allotment of the surplus till after the prices are known, for ... the prices cannot be determined before knowing the rate of profits. *The result is that 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, p. 6; emphasis added)

This passage shows that the idea which underlies Marx's so-called "transformation" of labour values into prices of production (see Marx, 1959, Part II) cannot generally be sustained. Marx had proceeded in two steps; Ladislaus von Bortkiewicz (1906-7, essay II, p. 38) aptly dubbed his approach "successivist" (as opposed to "simultaneous"). In a first step Marx had assumed that the general rate of profits is determined independently of, and prior to, the determination of prices as the ratio between the labour value of the social surplus and that of social capital, consisting of a "constant capital" (means of production) and a "variable capital" (wages or

means of subsistence). In a second step he had then used this rate to calculate prices. Underlying his approach is the hypothesis that while the "transformation" of values into prices is relevant with regard to each single commodity, it is irrelevant with regard to commodity aggregates, such as the surplus product or the social capital, and the ratio of such aggregates. Yet this is not generally the case. It should be added, however, that with his formulation Marx can be said to have come within one step of a correct solution of the problem (see Garegnani, 1987, pp. 567-8).

The passage quoted from Sraffa (1960) also contains the key to his critique of the long-period marginalist concept of capital. This concept crucially hinged on the possibility of defining the "quantity of capital", whose relative scarcity and thus marginal productivity was taken to determine the rate of profits, independently of the rate of profits. However, according to the logic of Sraffa's above argument the rate of profits and the quantity (i.e. value) of capital can only be determined simultaneously.

(c) *Workers participating in the surplus*

So far we have assumed that real wages are given at some level of subsistence. The classical economists however saw clearly that the share of wages in the product may rise above, or temporarily even fall below, mere sustenance of labourers (see, for example, Ricardo, *Works*, Vol. I, p. 95). The question was close at hand (see, e.g., Mill, [1826] 1844, p. 105): How does the rate of profits and do relative prices depend on wages?

The answer should now be obvious: one simply has to plug in the different level of the real wage rate in system (P) and solve it for the rate of profits and prices. This can be done for any technically feasible real wage rate. As a result of this analytical exercise we get the constraint binding changes in the distributive variables, the real wage rate and the rate of profits. This constraint was discovered, though not consistently demonstrated, by Ricardo in terms of his labour value-based approach: "The greater the portion of the result of labour that is given to the labourer, the smaller must be the *rate* of profits, and vice versa" (*Works*, Vol. VIII, p. 194; emphasis added). He was thus able to dispel the idea, generated by Adam Smith's notion of price as a sum of wages and profits (and rents) (WN, I.vi), that the wage and the rate of profits are determined independently of each other.

Ricardo also realised that the labour value principle cannot be sustained as a "general rule": it is considerably modified by different proportions of (direct) labour to means of production (and different degrees of durability of fixed capital items). The "variety of circumstances under which commodities are actually produced" (*Works*, Vol. IV, p. 368) in conjunction with the fact that "profits [are] increasing at a compound rate[,] ... makes a great part of the

difficulty" (*Works*, Vol. IX, p. 387) – and is responsible for the dependence of relative prices on distribution, given the system of production. This is so because with different input proportions and compound interest relative prices would not only depend on the quantities of labour "embodied" in the various commodities, but also on the level of the rate of profits, and would change with that level. Ricardo's search for a measure of value that is "invariable" with respect to changes in distribution may be considered as a further attempt to simplify the theory of distribution (see Sraffa (1951, pp. xxxi-xxxiii); see also Kurz and Salvadori (1993)). The measure of value that he was in search of was meant to corroborate his conviction, mentioned above, that the laws of distribution "are not essentially connected with the doctrine of value".

Here it suffices to note that Ricardo's problem of defining a measure of value that was invariable with respect to changes in distribution, given the system of production, was finally solved by Sraffa in terms of the "Standard commodity" (Sraffa, 1960, Chap. IV). The corresponding Standard system is derived from the actual system by virtually reproportioning the industries in such a way that uniform rates of surplus with regard to all commodities which enter directly or indirectly in the production of all commodities (similar to (S) above) obtain.

6. Analytical structure of the classical approach to value and distribution

According to Ricardo an investigation of the laws governing the distribution of income was the "principal problem in Political Economy" (*Works*, Vol. I, p. 6). This involved (1) isolating the factors determining that distribution *in a given place and time* and (2) studying the causes of changes in these factors *over time*. The analytical structure of the classical approach to the theory of value and distribution may now be summarized. In determining the distribution of income and relative prices in a given time and place, the classical authors isolated the following factors, or independent variables, or "data":

- (a) The set of technical alternatives from which cost-minimizing producers can choose, reflecting the attained level of technical knowledge.
- (b) The size and composition of the social product, reflecting, *inter alia*, (together with (a)) the attained social division of labour, the needs and wants of the members of the different classes of society, and the requirements of reproduction and capital accumulation.

- (c) The ruling real wage rate of common labour (and the scale of wage differentials), reflecting the balance of power between workers and the propertied classes in the conflict over the distribution of income.
- (d) The quantities of different qualities of land available (and the known stocks of depletable resources, such as mineral deposits).

We may exemplify these givens with regard to Ricardo's writings. To him the actual state of technical knowledge in a given situation was of great importance in ascertaining the levels of the rate of profits and the rents of different qualities of land. For instance, when discussing the tendency of the rate of profits to fall, Ricardo started from the assumption of a given technical knowledge and then added that this tendency "is happily checked at repeated intervals by the improvements in machinery ... as well as by discoveries in the science of agriculture" (*Works*, Vol. I, 120). The levels of total output were of great importance for the same purpose, because with diminishing returns in agriculture (and mining) it matters whether little or much corn is to be produced and little or much ore to be extracted, given the information summarized in (d). As Ricardo stressed: "The exchangeable value of all commodities, whether they be manufactured, or the produce of the mines, or the produce of land, is always regulated ... by the most unfavorable circumstances, the most unfavorable under which *the quantity of produce required*, renders it necessary to carry on the production" (*Works*, Vol. I, p. 73; emphasis added). Finally, Ricardo insisted that the rate of profits and relative prices depends on the level of the real wage rate (see Kurz and Salvadori (1995, 472-3)). Ricardo singled out these factors as the dominant ones determining the rate of profits, the rates of rent and prices in a given place and time.

It deserves to be stressed that Ricardo's intuition was correct: on the basis of the above data we can in fact determine in a coherent way the unknowns or dependent variables. No other information or data are needed. This is an important fact in itself. In addition it is to be emphasized that *any* coherent long-period theory of value and distribution must start from a set of data which implies the set (a)-(d) of variables the classical authors took as given.

7. Putting the theory of value and distribution to work

The overwhelming importance of the theory of value and distribution in the classical economists derives from the fact that all other economic analysis was developed in terms of it: the theory was indeed designed to provide a solid base from which such intricate problems as capital accumulation or different forms of technical change or various economic policy issues could be studied. A few illustrations must suffice.

The data (a)-(d) singled out in order to determine the rate of profits, rents and relative prices in a given time and place at the same time contain the key to the problem of the long-run development of income distribution and relative prices. Any tendency of the rate of profits to fall or rise in Ricardo, for example, is traced back to the interaction of changes over time in techniques, output levels and wages. Ricardo stressed: "If the necessaries of the workman could be constantly increased with the same facility, there could be no permanent alteration in the rate of profits or wages, to whatever amount capital might be accumulated" (*Works*, Vol. I, p. 289). Yet, due to diminishing returns in agriculture (and mining), and setting aside technical progress, physical real costs of producing necessaries are bound to rise with rising output levels. With a given real wage rate, as less and less fertile lands (mines) have to be cultivated (worked), or given qualities of lands (mines) have to be cultivated (worked) more intensively, the rate of profits is bound to fall and rents will have to be paid to the owners of intramarginal lands (mines) as well as of lands (mines) cultivated (worked) intensively. This describes what Ricardo called the "natural course of events", that is, the path the economy would take in the hypothetical case in which capital accumulates but there are no further technical improvements. In terms of the above schema, independent variable (b) changes (and, a fortiori, mines are depleted), but all other data are frozen in.

Over time the set of technical alternatives of production can be expected to change due to technical and organisational innovations of various kinds: see especially Ricardo's discussion of different forms of agricultural improvements and of machinery (*Works*, Vol. I, Chaps II and XXXI). Over time the size and composition of output can be expected to change, reflecting a multitude of influences interacting in a complex way. The availability of entirely new commodities or of better qualities of known commodities would interact with the needs and wants of the different classes of society and thus give rise to new patterns of consumption and a changing composition of output. (An approach which starts from given consumer preferences obviously cannot capture the changes under consideration.) Hence, what in the determination of the rate of profits and the rates of rent in a given place and time was taken as given under (b) is bound to change over time, involving changes in income distribution and relative prices. Obviously, also the real wage rate of common labour is not given and constant forever. As Ricardo kept stressing: "It is not to be understood that the natural price of labour, estimated even in food and necessaries, is absolutely fixed and constant. It varies at different times in the same country, and very materially differs in different countries. It essentially depends on the habits and customs of the people. ... Many of the conveniences now enjoyed in an English cottage, would have been thought luxuries at an earlier period of our history" (*Works*, Vol. I, 96-7).

The classical economists studied the dynamics of the economic system essentially in terms of comparisons between different long-period positions characterized by different specifications of the "data" (a)-(c) (considering land as a non-depletable resource and setting aside exhaustible resources). The long-period method was seen as the best available in order to come to grips with an ever-changing world characterized by on-going technical progress, capital accumulation and far-reaching structural change.

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