

Comment

Burmeister on Sraffa and the Labor Theory of Value: A Comment

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I. Introduction

In a recent contribution to this *Journal*, Burmeister (1984) formulated several objections to Sraffa's concept of the standard commodity and concluded that it is basically flawed. Similar criticism has been put forward by Burmeister on several other occasions (cf. Burmeister 1975, 1980a, 1980b). According to Burmeister, Sraffa aimed at the invention of "a different labor theory of value" (1984, p. 509) by constructing a new wage measure such that the linearity of the relationship between the rate of profit and the wage rate remains valid even when there is not equal organic composition of capital. By this token "all the Marxian analysis that is based on the linearity . . . can proceed free of the objectionable equal organic composition of capital assumption" (p. 514).

In this comment Burmeister's interpretation and criticism of the standard commodity and his view of the relationship between it and the labor theory of value are scrutinized, and it is shown that many of his claims are untenable. The structure of the paper is as follows. Section II prepares the ground for the subsequent discussion by explaining the labor theory of value, the role of the standard of value in

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economic theory in general, and Sraffa's standard commodity. In Section III it is argued that Burmeister's contention that the standard commodity was meant to provide a kind of surrogate labor theory of value finds no support in Sraffa (1960) and the writings of major authors in the Sraffian tradition. Section IV demonstrates that Burmeister's discussion of the standard commodity contains serious flaws, logical and other. Section V draws some conclusions.

II. Preliminaries

A. Basic Definitions

A *technique*¹ is defined by the pair $(\mathbf{a}, \mathbf{a}_0)$, where $\mathbf{a} = [a_{ij}]$ is the $n \times n$ material input matrix and $\mathbf{a}_0 = (a_{01}, a_{02}, \dots, a_{0n})$ is the labor input vector; that is, a_{ij} and a_{0j} are the amounts of commodity i and of homogeneous labor,² respectively, that are directly necessary to produce one unit of commodity j . Technique $(\mathbf{a}, \mathbf{a}_0)$ is taken to be viable; that is, it is assumed that there exists a semipositive column vector $\mathbf{q} \geq \mathbf{a}\mathbf{q}$. If technique $(\mathbf{a}, \mathbf{a}_0)$ is used and if wages are assumed to be paid *post factum*, that is, at the end of the production period, then the price (row) vector \mathbf{p} , the wage rate w , and the uniform profit rate r are related by the following equation:

$$\mathbf{p} = (1 + r)\mathbf{p}\mathbf{a} + w\mathbf{a}_0. \quad (1)$$

However, if wages were to be paid *ante factum*, as the classical authors and Marx tended to assume (cf. Garegnani 1984), we would have

$$\mathbf{p} = (1 + r)(\mathbf{p}\mathbf{a} + w\mathbf{a}_0). \quad (1')$$

For each given r the system (1) (or system [1']) is linear and homogeneous in (\mathbf{p}, w) . This implies that only relative prices can be determined. In order to simplify the notation, (\mathbf{p}, w) is commonly normalized by setting

$$\mathbf{p}\mathbf{d} + wd_{n+1} = 1, \quad (2)$$

where \mathbf{d} and d_{n+1} are a column vector and a scalar chosen by the theorist. By this token the basket consisting of d_i units of commodity i ($i = 1, 2, \dots, n$) and d_{n+1} units of labor is set as the standard of value. Such a basket is known as the numeraire.

¹ Like Burmeister we shall concentrate on the simple case of single-product industries and refer, when necessary, to the more interesting case of multiple-product processes of production.

² The problem of the heterogeneity of labor will be touched on in Sec. IVC below. For a detailed discussion on this problem in relation to the labor theory of value, see Steedman (1985).

Whereas the vector \mathbf{a}_0 is the vector of direct labor inputs, the vector \mathbf{l} satisfying the equation

$$\mathbf{l} = \mathbf{l}\mathbf{a} + \mathbf{a}_0 \quad (3)$$

is the vector of quantities of labor "embodied"; that is, its elements are the amounts of labor necessary directly and indirectly to produce the various commodities.

B. *The Labor Theory of Value*

The labor theory of value states that prices are proportional to labor-embodied requirements, that is,

$$\text{there exists a scalar } \theta: \mathbf{p} = \theta\mathbf{l}. \quad (4)$$

It can easily be shown that statement (4) holds if and only if \mathbf{p} , \mathbf{l} , \mathbf{a}_0 , and $\mathbf{a}_0\mathbf{a}$ are all proportional (if two of them are proportional, where \mathbf{p} corresponds to $r > 0$, then all the others are). Moreover, it can also be shown that statement (4) is equivalent to each of the following: (a) if (w, \mathbf{p}, r) satisfy equation (1), then

$$\frac{w}{\mathbf{p}\mathbf{b}} = \frac{1 - (1 + r)\lambda^*}{\mathbf{a}_0\mathbf{b}} \quad \text{each } \mathbf{b} \in \mathbb{R}^n;$$

(b) if (w, \mathbf{p}, r) satisfy equation (1'), then

$$\frac{w}{\mathbf{p}\mathbf{b}} = \frac{1 - (1 + r)\lambda^*}{\mathbf{a}_0\mathbf{b}(1 + r)} \quad \text{each } \mathbf{b} \in \mathbb{R}^n,$$

where λ^* is the Perron-Frobenius eigenvalue of matrix \mathbf{a} .

C. *The Standard Commodity*

The concept of the numeraire introduced in Section IIA is well known in economic theory. The numeraire is chosen by the theorist and does not depend on "observed facts." However, some numeraires have useful properties that can be utilized by the theorist. For example, if some price can vanish, it is convenient to set $\mathbf{d} > 0$ in equation (2) (the most common setting is perhaps $\mathbf{d} \equiv \mathbf{e}$ and $d_{n+1} \equiv 0$, where \mathbf{e} is the summation vector). Other examples of useful numeraires in models of production described by technique $(\mathbf{a}, \mathbf{a}_0)$ are the following: if the chosen standard of value is labor (i.e., $\mathbf{d} \equiv 0$, $d_{n+1} \equiv 1$), then prices are increasing and convex functions of r ; if the chosen standard of value is the consumption basket (i.e., $\mathbf{d} \equiv \mathbf{c}$, $d_{n+1} \equiv 0$, where \mathbf{c} is the consumption basket), then the relationship between the wage rate and the rate of profit is identical to the relationship between consumption per worker and the rate of growth.

Sraffa (1960, chap. 4) constructed a particular numeraire because of the useful properties it has. He normalized prices by setting $\mathbf{d} \equiv (\mathbf{I} - \mathbf{a})\mathbf{x}$, $d_{n+1} \equiv 0$ in equation (2), where \mathbf{x} is an n vector such that

$$\mathbf{x} = (1 + r^*)\mathbf{a}\mathbf{x},$$

$$\mathbf{a}_0\mathbf{x} = 1,$$

$$\mathbf{x} \geq 0,$$

where r^* is a scalar that is to be determined simultaneously with \mathbf{x} .

Sraffa used this numeraire, which he called "standard commodity," to simplify the analysis of the mathematical properties of the prices of production. More specifically, he used it to show that (i) r reaches a finite and unique maximum, r^* , when $w = 0$ and the corresponding prices of basic commodities are positive (secs. 39–41); (ii) r^* is the lowest possible real number such that equation (1) is satisfied with $w = 0$ (sec. 42); (iii) for $0 \leq r \leq r^*$ the prices of basic commodities in general vary with r but remain positive and finite (sec. 47); (iv) prices can rise and fall as r changes, but none of the prices in terms of the standard commodity can fall more rapidly than the wage rate; therefore, the relationship between the wage rate w and the profit rate r is decreasing (for $w \geq 0$ and $r \geq 0$) irrespective of the numeraire chosen (secs. 48–49).

In order to demonstrate these statements Sraffa also showed that (v) there exists a standard commodity provided there is at least one basic commodity (sec. 37) and the former is unique (sec. 41); (vi) if the standard commodity is chosen as numeraire and wages are paid *ex post*, then $w = (r^* - r)/r^*$ (secs. 30–31);⁵ (vii) nonbasic products play no role in the construction of the standard system (sec. 35).

It deserves mentioning that these results can also be obtained by using the Perron-Frobenius theorem. In fact, Sraffa's demonstration of the existence and uniqueness of the standard commodity can be considered a (not fully complete) proof of this theorem. His presentation has the advantage of being easily accessible to the nonmathematical reader. Furthermore, he provided an economic rationale of the analytical tools he used.

III. Burmeister on the Labor Theory of Value

Burmeister correctly points out that quite strong assumptions are required in order for the labor theory of value to hold and states and proves some of the assertions contained in Section IIB (cf. Burmeister

⁵ If wages were paid *ex ante*, we would have $w = (r^* - r)/r^*(1 + r)$.

1980a, pp. 157–60; 1980b, pp. 84–87; 1984, p. 512).⁴ However, interestingly enough, after having dismissed this theory as “unrealistic,” he introduces the notion of a “generalized labor theory of value” (1980a, p. 142; 1980b, p. 89) and claims that “Sraffa’s celebrated contribution was to invent a *different* ‘labor theory of value’ by constructing a new wage measure such that the linearity [of the w - r relationship] remains valid even when there is not equal organic composition of capital” (Burmeister 1984, p. 514; emphasis added; similarly p. 509).

Three comments should be made here. They concern (i) the content of Burmeister’s notion of a “generalized labor theory of value,” (ii) the question whether this notion finds any support in Sraffa (1960), and (iii) whether it can be substantiated in terms of the writings of major authors in the Sraffian tradition.

Burmeister seems to think that the demonstration of a linear relationship between the wage rate and the rate of profit and the adoption of *some* kind of labor theory of value are one and the same thing. In another paper he was even more explicit by emphasizing that that linearity “is crucial for a proper evaluation of Sraffa’s analysis . . . and of various interpretations of the labor theory of value”; he stressed that it “depends upon arbitrary and unrealistic assumptions”; for example, it “is lost if the presumption of a *post factum* wage is replaced by a symmetric assumption regarding factor payments” (Burmeister 1980b, p. 88; see also Burmeister 1968, p. 87). How erroneous this idea is can already be inferred from the “classical” case of *ante factum* payment of wages. In fact, in such a case the labor theory of value may still hold (see statement *b* in Sec. IIB). Clearly, the timing of wage payments and thus the shape of the w - r relationship are quite irrelevant in this respect. Rather, it is the uniform organic composition of capital that assures prices that are proportional to quantities of labor embodied. Burmeister’s preoccupation with the linearity of the w - r relationship thus appears to be mistaken even with regard to those

⁴ In this context it is worth mentioning that Burmeister (1980b, p. 88) implies that with the depreciation rates δ_i being not all equal to one and nonuniform, the labor theory of value cannot hold. This cannot be sustained. Let $\mathbf{D} = [d_{ij}]$ be a matrix such that $d_{ii} = \delta_i$ and $d_{ij} = 0$ ($i \neq j$). Then the following relationships hold:

$$\begin{aligned} \mathbf{p} &= \mathbf{p}(\mathbf{D} + r\mathbf{I})\mathbf{a} + w\mathbf{a}_0, \\ \mathbf{I} &= \mathbf{I}\mathbf{D}\mathbf{a} + \mathbf{a}_0. \end{aligned}$$

i.e.,

$$\begin{aligned} \mathbf{p} &= r\mathbf{p}\mathbf{a}(\mathbf{I} - \mathbf{D}\mathbf{a})^{-1} + w\mathbf{a}_0(\mathbf{I} - \mathbf{D}\mathbf{a})^{-1}, \\ \mathbf{I} &= \mathbf{a}_0(\mathbf{I} - \mathbf{D}\mathbf{a})^{-1}. \end{aligned}$$

Thus the labor theory of value holds if and only if there exists a scalar λ such that $\lambda\mathbf{I} = \lambda\mathbf{a}(\mathbf{I} - \mathbf{D}\mathbf{a})^{-1}$, i.e., $\lambda\mathbf{a}_0 = \mathbf{a}_0(\mathbf{I} - \mathbf{D}\mathbf{a})^{-1}\mathbf{a}$.

authors, such as Ricardo and Marx, who used the labor theory of value as a (provisional) working hypothesis.⁵

However, Burmeister does not state *explicitly* what he means by a "different labor theory of value." This being so, we may ask whether Sraffa regarded his demonstration of the linearity of the $w-r$ relationship in terms of the standard commodity as a device that opens up the possibility of returning to what the labor theory of value has traditionally been considered to be, that is, the statement that prices are proportional to total labor requirements. There is clear evidence that this is not the case.

Indeed, Sraffa points out (1960, p. 12) that at the maximum level of wages corresponding to a zero rate of profit "the relative values of commodities are in proportion to their labor cost, that is to say to the quantity of labor which directly and indirectly has gone to produce them. *At no other wage-level do values follow a simple rule*" (emphasis added). And later in his discussion of the standard system he emphasizes that the latter "is a purely auxiliary construction" that "may give transparency to a system and render visible what was hidden, but . . . cannot alter its *mathematical properties*" (pp. 31, 23; emphasis added). Therefore, the idea invoked by Burmeister according to which there is a close link between the standard commodity and the labor theory of value cannot be substantiated in terms of Sraffa's analysis.

Since the labor theory of value was conclusively shown to be inappropriate in general by Sraffa (1960), it may be asked whether it was advocated in one way or another by major authors who adopted his approach. Burmeister focuses on a passage taken from a book by Meek (cf. Burmeister 1980a, pp. 142-43; 1980b, p. 91; 1984, pp. 514-15) and a paper by Eatwell (cf. Burmeister 1980a, p. 143; 1980b, p. 92). However, neither of them mentions a "generalized" or "different" labor theory of value; nor do they hold the traditional version of it, that is, the one summarized in Section IIB above.⁶ Remarkably

⁵ More precisely, in Ricardo and Marx the labor theory of value was introduced for the *analytical* purpose of measuring the surplus product and the social capital, i.e., the physical aggregates the ratio of which defines the rate of profit, independently of distribution. (see Sraffa 1951, p. xxxii; Garegnani 1984, pp. 299-309). These authors were of the opinion that if the value expression of either aggregate were to depend on the rate of profit, the determination of the latter in terms of the surplus approach would result in circular reasoning. As we now know, this fear is unfounded since the rate of profit and relative prices can be determined only simultaneously, given the real wage rate.

⁶ Clearly, Eatwell's (1975) attempt to use the standard system in order to determine the Marxian rate of exploitation is ill conceived. Sraffa himself had clarified that "there would . . . appear no reason to expect that in the actual system, when the equivalent of the same quantity of Standard commodity has been paid for wages, the value of what is left over for profits should stand in the same ratio to the *value* of the means of production as the corresponding *quantities* do in the Standard system" (Sraffa 1960, p.

enough, Burmeister does not refer to what is perhaps the best-known critique of the labor theory of value, that is, Steedman's *Marx after Sraffa* (1977). As is well known, Steedman's book contains a comprehensive account of the criticism of Marx's labor value-based approach implicit in Sraffa's analysis. Incidentally, it is worth noting that the standard commodity is not mentioned in Steedman's treatise.

We may conclude, therefore, that Burmeister's attempt to construct a close link between the use of the standard commodity and the adoption of the labor theory of value is mistaken.⁷

IV. Burmeister on the Standard Commodity

In section 4 of his paper, Burmeister formulated what he calls "five fundamental economic objections" to the standard commodity (cf. Burmeister [1984, pp. 515–18]; some or all of these objections are contained in Burmeister [1968, 1975, 1980a, 1980b]). In what follows we shall deal with these in turn.

A. *The Standard Commodity: A Consumption Basket?*

Burmeister wrongly conceives the standard commodity as a "consumption basket."⁸ Somewhat in contradiction to his own interpretation he then points out that this basket is constructed from the technology alone without regard for human needs and wants. He tries to ridicule the concept by noting that relatively large weights may be assigned to "steel beams" (Burmeister 1984, p. 515) or to "pig iron" (Burmeister 1980a, p. 143; 1980b, p. 92), which are never consumed by humans.

As has been shown in Section IIC, the standard commodity was explicitly designed by Sraffa as a numeraire and just that. If Burmeister's objection were to be taken seriously, then it would also have to be applied, for example, to the normalization commonly used in general equilibrium theory, that is, $\mathbf{pe} = 1$.

In order to avoid misunderstandings, it is worthwhile to have a

23). This passage indicates the main mistake in Eatwell (1975). A criticism of Eatwell along this line has been put forward by Roncaglia (1978, pp. 78–79) and Garegnani (1984, p. 323 n).

⁷ In our attempt to give some meaning to Burmeister's expression of a "generalized labor theory of value," the only alternative interpretation to the one given above that came to our mind is the following one. Prices are functions of the quantities of labor $a_0, a_0a^2, \dots, a_0a^{n-1}$ and either the rate of profit or the real wage rate. However, this proposition cannot be criticized for the simple reason that it is correct.

closer look at Sraffa's position on the issue. Sraffa begins his analysis by assuming that wages consist of the necessary subsistence of workers. Accordingly, real wages are taken as given. He then observes that wages, besides the ever-present element of subsistence, may include a share of the surplus. Consequently, the real wage rate can no longer be considered given. Hence, *if* the wage rate were still to be given from outside the system of production, it would have to be "in terms of a more or less abstract standard, and [would] not acquire a definite meaning until the prices of commodities are determined" (Sraffa 1960, p. 33). Sraffa therefore reverses the practice, common to the classical economists and Marx, of treating the wage rather than the rate of profit as the "given" distribution variable: "The rate of profits, as a ratio, has a significance which is independent of any prices, and can well be 'given' before the prices are fixed" (p. 33). Thus the standard commodity is most certainly *not* used as a method for measuring "real" wages, as Burmeister maintains (cf. Burmeister 1980a, pp. 140-43; 1980b, pp. 88-94; 1984, pp. 514-16).

B. *Many Techniques*

It is well known and particularly emphasized by Burmeister that when there is more than one technique available, then, flukes apart, each technique has its own standard commodity. Burmeister continues: "Accordingly, unless only one production technique is optimal at all (feasible) interest or profit rates, the *appropriate* w^s will vary with r " (Burmeister 1984, p. 516; emphasis added), where w^s stands for the wage measure w_i^s associated with technique and standard commodity i ($i = a, b, \dots$). He concludes that, with a choice of technique instead of a single linear relationship between the wage rate and the rate of profits, "we will find a series of line segments" (p. 516). In an earlier contribution (Burmeister 1980b, pp. 92-93) he was even more explicit in directly comparing wages measured in terms of standard commodities related to two different techniques.

Clearly, Burmeister's procedure has to be rejected since magnitudes measured in different units of measure cannot be confronted. A careful reading of Sraffa (1960) could have prevented the underlying misconception. Indeed, a quick look at figure 8 in Sraffa's book (1960, p. 85) shows that the envelope of the two $w-r$ relationships plotted does not consist of a "series [pair] of line segments." Sraffa (1960, p. 85) explains: "A common standard being necessary for a comparison, the wage of *both* systems is expressed in terms of the Standard commodity of system II. As a result the relation is represented by a straight line for system II and by a curve for system I.

(This would of course be reversed if the Standard commodity of system I were adopted as common standard.)

C. *Many Primary Factors*

Burmeister argues that "no primary factors other than labor can be admitted" (1984, p. 516). This view cannot be sustained. As Sraffa indicates in the chapter on "Land" (1960, chap. 11), the standard system may exist even if, besides labor, there are natural resources such as land that are used in production. In the simple case of extensive diminishing returns and single production, the proof of the existence of the standard commodity is trivial. In the case of intensive diminishing returns, it can be shown by means of numerical examples that the standard commodity may or may not exist.

Surprisingly, Burmeister then questions "the choice of labor as the unique factor of production used to measure 'value'" (1984, p. 516). The reader is left wondering what the relationship of this remark is to Burmeister's criticism of the standard commodity as the measure of value. Burmeister continues "that this criticism includes the obviously realistic case in which there are many types of heterogeneous labor inputs" (p. 516). Thus he gives the misleading impression that Sraffa was unaware of the problem of the heterogeneity of labor. In fact Sraffa made use of the classical device of reducing differences in quality of labor to equivalent differences in quantity by means of the given wage structure, "so that each unit of labour receives the same wage" (Sraffa 1960, p. 10; see also Steedman 1985). The explanation of the wage structure is, of course, an entirely different matter and has no import for the question of the existence of the standard commodity.

D. *Fixed Capital*

Burmeister (1984, p. 517) asserts that "generally Sraffa's standard commodity does not exist when there are durable capital goods; only a subset of the possible depreciation patterns will admit a standard commodity."

Here it is appropriate to draw attention to the following two points. First, it is well known that with joint production the standard commodity does not need to exist (cf. Manara [1968]; an English translation is contained in Pasinetti [1980]; see, in particular, pp. 9-11). Second, Schefold (1980, p. 153) proved that if the only joint products are used machines, which cannot be transferred and are not utilized jointly, then a unique standard commodity exists, irrespective of the

depreciation patterns of the durable capital goods, contrary to Burmeister's assertion.

E. The Standard Commodity and Steady-State Comparisons

Burmeister's final objection reads that "both Sraffa's standard commodity and the Ricardo-Marx labor theory of value involve comparisons of alternative steady-state equilibria," which "ignore the relevant intertemporal economic alternatives" (1984, p. 518; similarly 1980a, p. 102).

This elicits two remarks. First, both the classical economists, including Marx, and the leading exponents of the "marginalist revolution" considered the method of "long-period positions" to be generally appropriate to the study of permanent changes in the state of the economy. It has only been recently that its applicability was limited to steady states by modern neoclassical writers (cf. Garegnani 1976). As is well known, the classical authors were preeminently concerned with the problem of accumulation and structural change. However, they analyzed the structural shifts involved by comparing successive long-period positions of the economy characterized by a uniform rate of profit and uniform rates of remuneration for each particular kind of "primary" input in the production process. It is this "standpoint of the old classical economists from Adam Smith to Ricardo" that is characteristic of Sraffa's approach (cf. Sraffa 1960, p. v). The transition from one long-period position to another does not form a part of Sraffa's investigation. In order to deal with this problem, a proper dynamic analysis would be required (cf. Samuelson 1983, pp. 311-17), which, however, would have to go far beyond the analysis provided by Burmeister in sections 5 and 6 of his paper (1984, pp. 518-23).⁸

Second, Sraffa's standard commodity was most certainly *not* designed to provide an adequate description of the "relevant intertemporal options open to an economy" (Burmeister 1984, p. 518). There-

⁸ Although we shall not deal with these sections because they are not pertinent to a discussion of Sraffa's contribution, the following observations are worth making. First, the result proved in Burmeister's eq. (25) is well known and strictly dependent on the assumption of a one-commodity economy. Second, the result proved in his eq. (29) is irrelevant since what really matters is

$$\frac{d\omega}{dr} = \frac{\partial\omega}{\partial r} + \frac{\partial\omega}{\partial v} \frac{dv}{dr} = -v - r \frac{dv}{dr}.$$

Furthermore, his eq. (29) is a trivial consequence of eq. (28), which is a well-known result.

fore, Burmeister finds fault with an issue that is not and indeed *cannot* be part of the standard of value used by Sraffa.

V. Concluding Remarks

It has been shown that Burmeister's interpretation of Sraffa's analysis and the role of the standard commodity therein contains various flaws and misconceptions. In particular, Burmeister's attempt to discern a close link between the use of the standard commodity and the use of a "generalized labor theory of value," a notion introduced by Burmeister but never really defined by him, is mistaken. The so-called "five fundamental objections" raised by Burmeister against Sraffa's standard commodity are either wrong or not pertinent because they concern claims ascribed to Sraffa that either are not to be found in his book or are explicitly criticized by him.⁹

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⁹ The rejection of Burmeister's critique of Sraffa's analysis in general and his concept of the standard commodity in particular is one thing. How much importance the reader wants to attach to the particular standard of value utilized by Sraffa is of course an entirely different issue. As has been stressed by Sraffa (1960, p. 31), "the Standard system is a purely auxiliary construction. It should therefore be possible to present the essential elements of the mechanism under consideration without having recourse to it."

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