Ricardo's 93 Per Cent Labor Theory of Value: A Final Comment

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A few years ago Stigler pointed out the mistake of those interpretations of Ricardo's chapter on value that attribute "more than quantitative importance to labor in determining values" (1958, p. 358). Stigler's argument that Ricardo held an empirical rather than an analytical labor theory of value is correct, although it is also obvious from a careful reading of chapter i of the third edition of the *Principles*. It is surprising that, as Stigler notes, so many people did not view Ricardo's theory of value in this light. In this sense Stigler's reaffirmation is a valuable corrective. Nevertheless, there is one footnote to the story that has not yet been examined fully. The relative unimportance of factors other than labor that Ricardo finds (that is, that the relative value between two commodities could not vary by more than 6 or 7 per cent due to factors other than the *quantity* of labor) arises solely from three assumptions for which there is little apparent empirical evidence and, interestingly enough, from abandonment of the formulation of value in the first and second editions of the *Principles*. Ricardo's 93 per cent labor theory of value is obtained only because in the third edition he assumes, first, that the beginning rate of profit is 10 per cent, second, that the lowest rate it could be is 3 per cent, and, third, that the lengths of the respective periods of production are two and one in his illustration of the modifications occasioned by differing capital structures and periods of production. In other words, with varying production periods or capital structures, a rise in wages, which under Ricardo's assumptions causes a fall in profits, will alter the relative values of commodities at most by 7 per cent if actual and minimum rates of profit are 10 and 3 per cent, respectively. Furthermore, this change in relative value only occurs under a revised value formula first appearing in the third edition. We take up the latter point first.

In the first and second editions, the competitive value (or price) of any commodity is given by the equation

$$P = V + (C + V)i + \frac{Ci}{(1 + i)^n - 1},$$

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where V is variable capital equal to the wage bill, C is fixed capital, essentially machinery, and i is the rate of profit. The final term in the expression is the annuity required to replace capital equal in value to C that has durability of n time periods. Ricardo did not, of course, use such an equation, but his examples imply this more precise formulation (Sraffa, 1951, I, 59–60).

Using this formulation and comparing the relative values of two commodities, A and B, we have:

$$\frac{P_A}{P_B} = \frac{V_A + (V_A + C_A)i + C_A i/[(1 + i)^n - 1]}{V_B + (V_B + C_B)i + C_B i/[(1 + i)^n - 1]}.$$

Ricardo's general procedure is to move from the simplest to the most complex case. Following this technique, it is clear that the simplest case (except where no fixed capital is employed, which more or less corresponds to that "early and rude state of society") is where the amount of capital, both fixed and circulating, employed in the production of A and B is equal, where the proportions between V and C are equal, and where the durabilities of the constant capital (n) are equal. In this case $P_A/P_B = 1$.

Now, modify the amount of capital, but keep everything else fixed. Then, $P_A/P_B = V_A/V_B$. This is a pure labor-quantity theory of value, since wage rates are given.[1]

However, it is also the case that varying only the amount of capital makes relative value not only equal to V_A/V_B but also to C_A/C_B. Thus, the theory under these assumptions could just as well be viewed as a capital theory of value or even a depreciation theory of value. Of course, if capital is viewed as stored-up labor and depreciation as a portion of stored-up labor added to the product during the production process, it would then be legitimate to retain labor as the sole creator of value.

If, however, we now modify not only the amount of capital but also the proportions between V and C and assume that

$$\frac{C_A}{V_A} = \alpha_A \qquad \text{and} \qquad \frac{C_B}{V_B} = \alpha_B,$$

the relative value of A and B becomes

$$\frac{P_A}{P_B} = \frac{V_A\{1 + (1 + \alpha_A)i + \alpha_A i/[(1 + i)^n - 1]\}}{V_B\{1 + (1 + \alpha_B)i + \alpha_B i/[(1 + i)^n - 1]\}}.$$

From this it follows that, if $\alpha_B < \alpha_A$, then $P_A/P_B > 1 > q_A/q_B$. Thus, we have Ricardo's assertion that "here then are capitalists employing precisely the same quantity of labor annually on the production of their commodities, and yet the goods they produce differ in value on account of

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[1] That is, if the wage rate $= W$, then the quantity of labor required to produce one unit of $A = q_A = V_A/W$ and for $B = q_B = V_B/W$; therefore $(P_A/P_B) = (q_A/q_B)$.

the different quantities of fixed capital ... employed by each respectively"
(Sraffa, 1951, I, 34). In this illustration Ricardo assumes $V_A = V_B$, but the
same conclusion holds when $V_A \neq V_B$. Note, in this case, that the more
capital-intensive process is relatively more valuable in this static sense.

Next, modify the durabilities of capital (n) as between the two produc-
tion processes. Thus, we have

$$\frac{P_A}{P_B} = \frac{V_A\{1 + (1 + \alpha_A)i + \alpha_A i/[(1 + i)^{n_A} - 1]\}}{V_B\{1 + (1 + \alpha_B)i + \alpha_B i/[(1 + i)^{n_B} - 1]\}}.$$

Taking P_A or P_B alone, the price varies inversely with n and directly with
α and V, and the ratio between the values of A and B depends upon the
respective values of n, α, and V as between A and B. There is no point in
pursuing this static comparison further, for the values of n, α, and V are
essentially technical parameters of production and Ricardo's main con-
cern was to explore how variations in i would affect the relative values of
A and B, given different magnitudes for n, α, and V.

From the formulation of the value equation for either A or B separately,
it is clear that P varies directly with i, but, if α and/or n differs as between
A and B, the *relative* changes in P_A and P_B will differ so that the ratio
P_A/P_B itself will undergo change due to anything that may cause i to
fluctuate. To stress Ricardo's main point, this change in relative value is
independent of any change in the relative quantities of labor required to
produce A and B.

Abstracting from general changes in the price level, for Ricardo the only
thing that could cause i to change was a change in the wage rate. We
need not belabor this theory here. Rather, the main purpose is to check
Ricardo's assertion or "proof" that, while changes in i influence relative
value independently of quantity of labor, this is only a comparatively
minor influence.

Curiously enough, however, when Ricardo revised the *Principles* after
the first and second editions, the illustrations used to determine values
(absolute and relative) changed. The above implicit formulations of value
no longer appear. Rather, a much simplified form of value is employed
which omits all of the annuity calculations so carefully worked out in
editions one and two. In fact, although he continues to talk about the
durability of capital assets, he switches in the third edition to a period of
production calculation which omits all reference to the annual annuity
required to replace the capital at the end of its life. His illustration in the
third edition, furthermore, limits the discussion to a comparison of a two-
period and a one-period production process. Indeed, if one tries to deduce
relative value variations using the equations which appeared in editions
one and two, results differ substantially from those obtained by utilizing
a more simplified value formula. In short, the so-called 93 per cent labor

theory of value is derived only by scrapping the value equation of the two earlier editions. Indeed, in these editions no reference is made to anything remotely resembling a maximum source of variation of 7 per cent. In fact, he asserts, with reference to absolute value to be sure, that a 7 per cent rise in wages will cause the value of a commodity produced exclusively by fixed capital with a life of one hundred years to decline by 68 per cent. But such a rise in wages "has no effect on the prices of commodities wholly produced by labour" (Sraffa, 1951, I, 59–60). Thus, in the first two editions, variation in relative value of 68 per cent is at least conceivable even though farfetched. It is probable that this was giving too much to non-labor factors so that, in the third edition, such possibilities are eliminated in the examples. Thus, the claims of those who held that Ricardo *retreated* from a labor theory of value in subsequent editions are quite wrong. The revisions of the third edition in fact tended to reinforce the labor-embodied theory even though they might have been introduced primarily for expository purposes. Furthermore, while Sraffa's general critique of Hollander (1904) and Cannan (1929, pp. 176 and 185) with respect to a retreat is correct, it is not quite accurate to conclude that "the theory of edition 3 appears to be the same, in essence and *in emphasis*, as that of edition 1" (Sraffa, 1951, I, xxxviii; emphasis added). If the above interpretation is accepted, in the third edition Ricardo in fact did shift the emphasis in the direction of reducing the variability in value due to non-labor factors.

Possibly, the revised version of the value formula was not explicitly presented to preserve the labor theory. More likely, Ricardo's annoyance at being taken literally in the above example (Sraffa, 1951, I, 60, n. 1)— which assumed that a machine did all the work, unassisted by labor— induced some modifications and substantial simplification of the value formula. Our guess is that he did not fully realize the extent to which this change also reinforced the significance of labor as the main source of variation in relative value. Ricardo was simply too intellectually honest to have made these changes strictly to rescue a "labor mainly" theory of value.

Briefly, the revised version of value in the third edition may be summarized as follows. Assume two commodities, A and B. The amount of labor required to produce a unit of A is a and of B, b. The time required to produce a unit of A is N_A and of B, N_B.[2] With these assumptions, the exchange ratio between A and B is as follows:

$$\frac{A}{B} = \frac{a(1 + i_0)^{N_A}}{b(1 + i_0)^{N_B}},$$

[2] Note that the N_i here do not refer to the same phenomenon as in the annuity calculations in editions one and two.

where i_0 is the rate of profit in period zero. In the general case, the percentage change in relative value (v) due to fluctuations in the rate of profit is

$$v = \frac{(1 + i_0)^{N_A - N_B} - (1 + i_1)^{N_A - N_B}}{(1 + i_0)^{N_A - N_B}}.$$

If there is no difference in the period of production of A and B, then $v = 0$ as far as changes in profits are concerned. In the case corresponding to Ricardo's illustrations in chapter i, $N_A = 2$ and $N_B = 1$, and, therefore,

$$v = \frac{i_0 - i_1}{(1 + i_0)}.$$

Under this assumption, or any other assumption in which $N_A = 2N_B$ and a production and interest (= profit) period is defined as N_B, it is evident that for different values of i_0 this change in relative value (v) for i_1 equal to Ricardo's assumed minimum (about 3 per cent) will vary substantially. For example, with $i_0 = 10$ per cent, the percentage of change in relative value of B to A can be at most between 6 and 7 per cent, since this implies a value of i_1 of roughly 3 per cent.[3] However, if i_0 were greater than 10 per cent, a decline in profits to the 3 per cent minimum would entail a greater possible variation in relative value (v). In general, the maximum possible change is strictly a function of what is assumed about i_0, since

$$v = \frac{(1 + i_0) - (1.03)}{(1 + i_0)},$$

when $N_A = 2N_B$. Thus, when $i_0 = 20.0$ per cent, $v = 14.2$ per cent; when $i_0 = 25.0$ per cent, $v = 17.6$ per cent; and so on. Thus, Ricardo may be just as legitimately assumed to have an 86, 82, or 97 per cent labor theory of value even in the third edition, unless some reason for selecting i_0 as 10 per cent and the minimum as 3 per cent can be offered. If there is no objective reason for making both of these assumptions, then the importance of labor quantity may be substantially changed. This is a good example of Ricardo's device of apparently selecting numbers at random to illustrate certain points and then using the numbers themselves as "proof" of what they were merely designed to illustrate.[4]

[3] Specifically, if the change in relative value is to be 7.0 per cent, $i_1 = 2.4$ per cent and, if the change is to be 6.0 per cent, $i_1 = 3.4$ per cent, assuming $i_0 = 10.0$ per cent. For a rock-bottom profit rate of 3.0 per cent, the maximum change in relative value would be 6.4 per cent.

[4] A literary "proof" that "economy in the use of labour never fails to reduce the relative value of a commodity" is the following: "To convince ourselves that this is the real foundation of exchangeable value, let us suppose any improvement to be made in the means of abridging labour regarding the production of stockings.... If fewer men were required ... the stockings would inevitably fall in value.... They would fall, because a less quantity of labour was necessary to their production" (Sraffa, 1951, I, 25). This "proof," which is clearly a tautology and explains or proves nothing, is another manifestation of what Schumpeter refers to as the "Ricardian Vice."

Furthermore, if $N_A = kN_B$ where $k > 2$, the source of variation in v is further extended. If the production and interest periods are defined as equal to N_B, then

$$v = \frac{(1 + i_0)^{(k-1)} - (1 + i)^{(k-1)}}{(1 + i_0)^{(k-1)}}.$$

That is, v depends upon k, as well as upon the values of i_0 and i_1 postulated. Unless one assumed a constant value of k and one equal to two as between any pair of commodities, the so-called 93 per cent theory of value vanishes, even if Ricardo's 10 per cent and 3 per cent illustrations are accepted. In essence, then, three assumptions regarding k, i_0, and i_1 must be made.

If, however, it could be shown that values of k, i_0, and i_1 were in some sense "realistic," then they would be far more than merely illustrative, and the Ricardian theory of value would be empirical in the historical sense as well as in the sense implied by Stigler. That is, if values of k, i_0, and i_1 of 2, 10, and 3 per cent, respectively, can be shown to have been descriptive of the values generally prevailing during Ricardo's lifetime, they would be something more than numbers pulled out of the air. They would truly, in that case, verify Gonner's assertion that Ricardo treated facts "as the essential basis of theory, as the phenomenon that is, out of which theory is evolved" (Gonner, 1923, p. xvii).

Little more can or probably should be said about the issue of the "period of production." Much depends upon one's vision of the productive process and whether it is preferable from an analytic point of view to regard production as a sequential or synchronous process. In any event, it is possible, analytically, to define a finite period of production even under the synchronous version of production (Dorfman, 1959). Ricardo fudged the definition of the period of production so that it included, in his illustrations regarding the production of stockings, the following: "First, there is the labour necessary to cultivate the land on which the raw cotton is grown; secondly, the labour of conveying the cotton to the country where the stockings are to be manufactured [and so on until] the labour of the retail dealer, and of many others, whom it is unnecessary further to particularize" (Sraffa, 1951, I, 25). But, casting aside such modern nuances unwittingly generated by Ricardo,[5] clearly no empirical basis whatsoever exists for assuming $N_A = 2N_B$. It is, indeed, little more than a convenient ratio obviously selected with no reference to the so-called realities of the productive process. The value of k selected by Ricardo is therefore purely illustrative. This is, of course, completely independent of the question of whether the period of production can be meaningfully quantified under any view of the productive process.

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[5] Part of this is no doubt taken from John Locke, who viewed the production process in a similar sequential fashion.

Of more interest is the realism of the assumptions regarding rates of profit and interest in England during the period in which Ricardo's views were being formed.

Rates of Return in England, 1775–1820

Information on rates of return in any general sense is very hard to come by. Indeed, as Blaug has noted, "We know next to nothing about variations in the rate of return on capital invested" (1961, p. 368). A few isolated examples will therefore have to suffice in the present context. Ricardo himself has argued that from 1801–15 the profits of the Bank of England exceeded the annual dividend and that in 1815 the bank "could have paid a dividend of 19 per cent instead of 10 per cent" (Sraffa, 1951, IV, 103–4). The dividend plus bonus as a percentage of total capital of the bank varied between 7 and 17 per cent between these dates, according to Ricardo's calculations (Sraffa, 1951, IV, 101). Since these figures exclude retained income, it is probably fair to suggest an over-all rate of return of between 12 and 20 per cent.

Clapham estimates a dividend rate of about 24 per cent for successful canal companies in 1825 (1926, p. 81). The profits of an ironworks company cited by Ashton (1924, p. 47) varied between −7.7 per cent of capital invested and 18.8 per cent, for the years 1813–14 through 1816–17. Rates of profit for a company described as being a microcosm of the industrial revolution averaged between 16 and 20 per cent from 1804 through 1815 (Birch, 1955, p. 73).

These are, of course, isolated, random, and not always consistently defined statistics relating to rates of return. Yet, for the period in which Ricardo would more or less have been expected to obtain the evidence or impressions regarding such rates, little support can be found for the 10 per cent figure. Apparently it was selected as a nice, round number solely for purposes of illustration. Despite the crudity of the above driblets of evidence, it would seem that, in this respect at least, Ricardo did not treat facts "as the essential basis of theory," as Gonner contends.

Furthermore, in his correspondence with Malthus and in his other writings, illustrations of the "usual rate of profit" varied substantially although the 10 per cent figure was the one figure most often used.[6]

[6] For example, in a letter to Malthus dated October 11, 1816, he uses an illustration with profits of 20 and 15 per cent (Sraffa, VII, 79). On October 14, 1816, in a letter to James Mill, a rate of 10 per cent is used (Sraffa, VII, 83). Writing to Malthus on April 4, 1815, Ricardo states, "Whilst the labour of ten men can produce 100 quarters of wheat it is difficult to suppose profits only 10 per cent" (Sraffa, VII, 210). Another letter to Malthus on April 17, 1815, uses an illustration that implies profits of between 19 and 25 per cent (Sraffa, VI, 214). A letter to Barton dated May 20, 1817, again uses a 10 per cent rate (Sraffa, VII, 157–58). In his *Essay on Profits* (1815), Ricardo uses a beginning rate of profit of 50 per cent in the illustration of the decline

Rates of Interest in England, 1775–1820

A consistent time series showing yields on 3 per cent consols shows that from 1793 to 1815 yields ranged well above 4 per cent, to a high of 5.9 per cent in 1797 and 1798 on an annual average basis (Mitchell, 1962, p. 455). In short, the yields on one of the safest, most liquid securities was well in excess of what Ricardo deemed to be rock bottom during his entire lifetime.

Other evidence tends to reinforce this. For example, from May 13, 1773, to June 20, 1822, the minimum Bank of England rate of discount was 5 per cent (Gilbart, 1882, p. 98; Mitchell, 1962, p. 456). Monthly data for several years prior to the actual writing of the *Principles* indicate minimum yields on 3 per cent consols of over 4 per cent.[7]

Conclusions

The foregoing evidence, although scattered and fragmentary, clearly offers no support for the belief that Ricardo's illustrations or even the main general features of his value theory derived much from the facts that were presumably available to him. In this segment of his work, the divorce of fact and theory seems to have been substantially complete. This remark is not intended as a criticism. Few economists seek real-world experience or facts to illustrate abstract principles, as even a casual perusal of the various textbooks will amply verify. We wish, rather, to suggest that attempts by others to make the *Principles* in some sense "realistic" misrepresent the true situation. The *Principles* is, in fact, abstract. It makes no use of real-world data. The illustrations have no basis in fact. It is, in short, pure theory. And there is nothing wrong with that! There is much wrong, however, with assertions to the contrary.

Furthermore, while one can still uphold the view that Ricardo's theory of value was empirical and not analytical, in no sense is it correct to view it as a 93 per cent labor-embodied theory, although Ricardo himself believed it to be so. This figure results from numerical illustrations using numbers having no apparent connection with reality. From the point of view of Ricardo's pure theory, therefore, all one can say is that, as long as the rate of profit is not permitted to vary too much and as long as periods of gestation and capital structures are not significantly different among industries, it is logically tenable to stick with an empirical or at least a labor-mainly theory of value.

Finally, it should be noted that, contrary to some rather widely held

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in profits to 11 per cent as population grows (Sraffa, IV, 13–18). However, in this work it is clear that the numbers are illustrative only, for in a footnote to the tables Ricardo states that "the data on which this table is constructed are assumed and are probably very far from the truth" (Sraffa, IV, 15).

[7] Data from a sampling of the *Annual Register* (London) for the years 1810–16.

interpretations, Ricardo's third edition *reinforced* a labor-mainly theory of value, whether it was done consciously or not.

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