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Reply to Gehrke

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ABSTRACT This paper responds to Christian Gehrke’s comment, and argues that the main conclusion of my earlier paper is sustained—that, contrary to Sraffa, Marx did not ‘adopt’ in any sense of the word the joint product method of treating fixed capital. It agrees with Gehrke that Torrens adopted a form of the joint product method, and that Malthus seems to have followed Torrens in this regard. However, it argues that Ricardo did not adopt the joint product method, not even in the one instance cited by Sraffa. Finally, it argues briefly that Marx’s ‘transformation of value’ method of treating fixed capital and depreciation is superior to Sraffa’s joint product method.

1. Introduction

I appreciate very much Christian Gehrke’s thoughtful and knowledgeable comment on my paper, and I welcome the opportunity to reply. The issue of the proper treatment of fixed capital is obviously of great importance in a theory of capitalism, in which fixed capital is so prominent.

2. Marx’s Treatment of Fixed Capital

The main issue in my paper was whether or not Marx ‘adopted’ the joint product treatment of fixed capital in his theory of prices, as Sraffa claimed in Appendix D of his book, and Sraffian economists continue to claim. I argued that Marx definitely did not adopt the joint product method in his theory of prices. He discussed this method several times in his works, but these few discussions were all about the use of this method by other authors, especially Torrens and also Malthus, not by himself in his own theory. Therefore, Sraffa’s attribution of the joint product method to Marx is erroneous. Marx’s emphasis throughout the three volumes of Capital was the opposite of Sraffa’s—that the entire fixed capital is not entirely consumed and does not enter into the determination of prices in each period.

Gehrke does not seem to dispute this main conclusion about Marx’s theory, although he states somewhat ambiguously that:

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Marx was aware of the joint production method to the treatment of fixed capital, which he had encountered in Torrens and Malthus. However, in much of his own analysis Marx employed a simplified version of the ‘transfer of value’ approach... (Emphasis added)

I would revise and clarify this statement as follows: Marx was indeed aware of the joint product method, but he never ‘employed’ this method in his own theory in any sense of the word. And Marx used the ‘transfer of value’ method of depreciation in all of his own analysis, not just ‘much’ of it. He never once adopted the joint product method in his own theory.

3. The Classical Economists and the Joint Product Method

My paper discussed the classical economists (Torrens, Malthus and Ricardo) only tangentially, and the latter two only in footnotes. Gehrkke’s comment has to do mainly with these classical economists. I accept Gehrkke’s argument that Torrens did indeed adopt a kind of joint product method of dealing with fixed capital and price determination, and probably also Malthus—but not Ricardo.

3.1. Torrens

A key point in Torrens’s theory was his ‘general principle,’ according to which ‘equal capitals produce equal exchange-values.’ According to Torrens (1821, pp. 28–29), the ‘exchange-value’ of the ‘results’ of production (EV) is equal to total capital invested (K) plus the average profit on this total invested capital (rK). Thus (giving one of Torrens’s numerical examples below the equation):

\[ EV = K + rK = K(1 + r) \]

\[ £2,200 = £2,000 + 0.10(£2,000). \]

These details are important for later comparisons with Ricardo and Sraffa.

Also according to Torrens, the ‘results’ of production consists of both regular products (e.g., wool) and the net fixed capital. Therefore, the ‘exchange-value’ of the ‘results’ consists of the price of the regular product (\( P_r \)) and the remaining value of the net fixed capital (NFC):

\[ EV = P_r + NFC \]

\[ £2,200 = £850 + £1,350. \]

The price of the regular product is in turn equal to the sum of the circulating capital (CC) plus the depreciation cost (D), which is equal to the product of an assumed depreciation rate (10%) plus the profit on the total capital:

\[ P_r = CC + D + rK \]

\[ £850 = £500 + £150 + £200. \]

And the net fixed capital is equal to the difference between the fixed capital (FC) and the depreciation cost:

\[ NFC = FC - D \]

\[ £1,350 = £1,500 - £150. \]

Therefore, we can see that the total capital, including the total fixed capital, enters in its entirety into the ‘exchange-value of the results’ (\( K + rK \)), and that the net value of the fixed capital is included as one component of the ‘exchange-value of the results.’ It is in these two senses that Torrens can be said to have adopted a joint product method of dealing with fixed capital.

3.2. Malthus

With respect to Malthus, Sraffa cited two passages to support his interpretation. I argued in my previous paper that the first passage (from Malthus’s Principles, [1820] 1989) is ambiguous and difficult to interpret, and that the second passage (from The Measure of Value, 1823) is weak evidence, because although Malthus cites Torrens’s method approvingly in one sentence, he does not say anything more about this method, nor use it in any way. Instead, the rest of Malthus’s discussion on these pages is about the price of the ‘new produce,’ with no mention of the price of the ‘whole produce,’ including the net value of fixed capital.

In his comment, Gehrkke calls attention to a third passage (from a paper of 1825 by Malthus entitled ‘The supply of commodities’), in which Malthus seems to endorse Torrens’s method of dealing with fixed capital (without mentioning Torrens explicitly). I am persuaded to some extent by this additional bit of evidence, even though it is only a one-sentence footnote. Again Malthus does not use this method in any way, but he does seem to accept it. Malthus was not much concerned about fixed capital, but when he briefly considered it in these later papers (after the publication of Torrens’s Principles in 1821), he seems to have accepted Torrens’s method.

\[ 2^2 On the other hand, Torrens’s method of dealing with fixed capital and depreciation was more similar to Marx’s than to Sraffa’s in the following respects: the original capital investment (£2,000) is taken as given (not determined simultaneously with the prices of the output), and the depreciation component of the price of the regular product is determined by the same ‘straight-line’ method of dividing the total fixed capital by the expected lifetime.

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1 As Sraffa (1960, p. 95) put it in his comment on Torrens in his Appendix D: ‘the “results” are regarded as including, besides the product in the ordinary sense of the word, e.g., “the woollens,” also the “residue of the fixed capital employed in their manufacture.”'
3.3. Ricardo

However, I think that it is erroneous to say that Ricardo ‘adopted’ the joint product method of dealing with fixed capital in any sense of the word. Gehrke acknowledges that Ricardo used a joint product formulation only once, but he still argues that Ricardo ‘adopted’ the joint product method on this one occasion, and that this weak meaning of ‘adopted’ is what Sraffa intended. I contend that Ricardo did not ‘adopt’ the joint product method even on this one occasion.

The one passage is from Section IV of Chapter 1 (in a part of the section added to the 3rd edition in 1821). Ricardo presents an example in which corn is produced by 100 unassisted men, and cloth and cotton goods are produced by 100 men working with machines, and the machines are produced by 100 men in the previous year. Ricardo ([1821] 1951, p. 33) remarks:

consequently if the corn be of the value of 500l, the machine and cloth of the clothier together ought to be of the value of 1000l, and the machine and cotton goods of the cotton manufacturer, ought to be also of twice the value of the corn. But they will be of more than twice the value of the corn …

This is the extent of Sraffa’s textual evidence, and it is very meager indeed. This does not seem like a joint product method to me. I don’t think Ricardo is saying that the machines should be considered a part of the output of the current period along with the cloth; he is simply saying that, since the machine and the cloth together required twice as much labor to produce as the corn, the price of the machine and cloth together should be twice as great as the price of the corn. But it is more than twice as great, because profit has to be paid in the production of cloth on the capital invested in machinery. This conclusion does not depend on a joint product interpretation of fixed capital.

The main point of Section 4 is that, in the case of unequal proportions of fixed and circulating capital, an increase of wages causes a change in relative prices, even though there is no change of labor-times required to produce the commodities. The whole section is about the relative prices of regular products. Nothing is said about Torrens’s expanded ‘exchange-value of the results.’

In the next paragraph (not cited by Sraffa), Ricardo continued with the same numerical example, which provides further evidence concerning the meaning of the ambiguous previous paragraph. In this paragraph, Ricardo presented a numerical example of the determination of the prices of the corn, cloth and cotton goods according to the following equation (not given explicitly) (the example of the cloth is given below):

\[ P = W(1 + r) + (FC)r \]

\[ £6,050 = £5,000(1 + 0.10) + (£5,500)(0.10). \]

What is most striking and most relevant about this equation is that the fixed capital is not entirely transferred to the price of the output all in one period, contrary to Torrens’s joint product method. Indeed, there is not even a component for the depreciation cost of the machines, so the fixed capital is never transferred to the value of the output. Gehrke comments that, in this numerical example, Ricardo was assuming that fixed capital is ‘of a perennial nature,’ in which case he was definitely not assuming the joint product method.3

In this equation, fixed capital enters into the determination of prices only through the product \( FC \times r \); its own magnitude does not enter in as a separate component. In other words, fixed capital enters in as \( (FC)r \), not as \( (FC)(1 + r) \), as in Torrens. Ricardo says nothing in this example about the ‘exchange value of the whole produce’ in Torrens’s expanded sense, including the value of the net fixed capital. Therefore, in this example, Ricardo is definitely not adopting a joint product method, which strongly suggests that he was also not adopting this method in the ambiguous previous paragraph.

In 1831, at a meeting of the Political Economy Club, Torrens argued: ‘as to profits, it is clear that the part that goes to replacing the capital employed, which Ricardo had omitted to take into account, was decisive of the unsoundness of his views’ (Political Economy Club, 1921, pp. 223–224; emphasis added). John Lewis Mallet’s summary of the meeting continues: ‘Tooke and McCulloch admitted the truth of the last observation.’ And George Ramsay wrote in 1836 that ‘unfortunately, [Ricardo] seems always to consider the whole produce as divided between wages and profits, forgetting the part necessary for replacing fixed capital’ (Ramsay, 1836, p. 174; emphasis added). Thus, it appears that Ricardo’s legacy with respect to fixed capital had nothing to do with ‘joint products’ but was instead the failure to take fixed capital into account at all.

Another contemporary, Charles Cotterill wrote a book-length, section-by-section, critique of Chapter I of Ricardo’s Principles (Cotterill, 1831). In his critique of Ricardo’s Section IV, Cotterill (1831) discusses Ricardo’s key question: what is the effect of an increase of wages on the relative prices of commodities produced with unequal proportions of fixed and circulating capital. He analyzes this question with a straightforward ‘cost of production’ theory of value, with the depreciation cost of fixed capital as one of the costs (thereby correcting Ricardo’s mistake of neglecting fixed capital). Cotterill discusses in painstaking detail various cases that assume different proportions of fixed and circulating capital and different rates of depreciation of fixed capital (5%, 10% and 50%) (with six fold-out tables). In all these cases, the general method of calculating the depreciation cost is to take the total fixed capital as given, assume a depreciation rate, and calculate the depreciation costs as the product of these two. The ‘total produce value’ in all cases includes only the depreciation cost, and does not include the total fixed capital as a ‘joint product.’ This is, to my knowledge, the most exhaustive treatment of fixed capital among the classical economists. Thus, it appears that the ‘transfer of value’ method of depreciation was the general classical method of treating fixed capital, not the ‘joint product’ method. Torrens was an outlier.

In sum, I think it is an exaggeration to state, as Sraffa did, that the joint product method ‘was generally adopted, even by the opponents of Ricardo’s

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3There is also no component for the circulating costs of material inputs. Here, as elsewhere, Ricardo is following Smith in assuming erroneously that the cost of machines and materials can be ‘entirely resolved into wages plus profit.’
4. The ‘Correct’ Treatment of Fixed Capital and Depreciation

Finally, we come to a substantive, rather than an interpretative, issue—Gehrke’s claim that the ‘real fundamental difference’ between Marx’s treatment of fixed capital and Sraffa’s is that Marx ‘never got beyond a reckoning in labor-value terms, while Sraffa focuses on production prices.’ I argue that Marx did indeed ‘get beyond labor-values’ and also had a logically consistent theory of prices of production based on the labor theory of value, and that this theory was different from Sraffa’s. I have argued in a series of papers that the longstanding criticisms of Marx’s theory of prices of production are based on a fundamental misinterpretation of the method of Marx’s theory (which is entirely different from Sraffa’s logical method, i.e., linear production theory) (see Moseley, 1993, 2000, 2001). So we have two different logically consistent theories of prices of production.

And, as I have argued above, these two theories of prices of production treat fixed capital and depreciation in fundamentally different ways: transfer of value (Marx) versus joint product (Sraffa). Gehrke argues that Marx’s transfer of value depreciation ‘gives the correct annual depreciation’ only in the special case of zero profit and ‘constant physical efficiency of the fixed capital good.’

However, this conclusion is true only within Sraffa’s theory, i.e., only by assuming that Sraffa’s theory of prices of production is the correct theory. Within Marx’s theory of prices of production, the correct depreciation is the transfer of value method in all cases, including especially the case of positive profit. Which of these two theories of prices of production is ‘correct’ is of course the important question, but it cannot be decided by fiat.

In my view, a decisive flaw in Sraffa’s joint product method of fixed capital is that it assumes that the rate of profit is equalized across different ages of the same machine in the same industry. Each of the $n$ sections of a given industry in Sraffa’s equations produces a regular product of the industry plus a one-year-old machine. The rate of profit is equalized not only on the regular product, but also on the partially used machines. But in reality, this is not true. There is no competitive process or mechanism that tends to equalize the rate of profit across machines of different ages in the same industry, because used machines are in general not actually sold on the market.

Instead, the competitive process (the transfer of capital from industries with lower than average rate of profit to industries with above-average rates of profit) tends to equalize rates of profit across different industries, not across different age machines in the same industry. Indeed, the equalization of the rate of profit across industries implies that firms within a given industry with unequal costs and/or different capital structures (e.g., different ages of machines) will have unequal rates of profit, not equal rates of profit. Marx analyzed unequal rates of profit across firms within an industry due to unequal productivity and costs in Chapter 10 of Volume 3 of Capital. A similar analysis applies as well to machines of different ages within an industry. Machines of different ages will have different net capital values, and thus will have unequal rates of profit (perhaps offset by unequal costs). These unequal rates of profit across firms are averaged out in the industry as a whole, which is the level at which competition equalizes the rate of profit. This is what happens in reality and in Marx’s theory, but not in Sraffa’s theory.

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1 I was surprised by Gehrke’s argument that the value of the fixed capital in Sraffa’s theory is not transferred entirely in one period to the value of the current output, but is instead transferred ‘bit by bit.’ My guess is that Gehrke has in mind the value of the net fixed capital, which is gradually reduced ‘bit by bit.’ However, in the determination of the prices of the total current output (including the one-year older machines as joint product), the total value of the net fixed capital at the beginning of the period is entirely transferred to the price of the total current output. In Sraffa’s equations on p. 65, all the $M_{period}$ terms on the right-hand side are multiplied by $(1 + r)$, similar to Torrens’ method, not just by $(d + r)$, nor just by $r$ as in Ricardo. In other words, the entire $M_{period}$ is transferred to the price of the total output. This imaginary cost is recovered, together with a profit, through the imaginary ‘revenue’ from the ‘sale’ of the one-year older machines. The net result is a ‘bit by bit’ reduction in the net fixed capital, but the first step in each period is the transfer of the entire net fixed capital at the beginning of the period to the price of the ‘total output’ of the period. If the ‘results’ include the ‘residue of the fixed capital,’ as Sraffa stated in his Appendix D comment on Torrens, then the whole of the fixed capital has to be transferred to the results in every period, not ‘bit by bit’ as Gehrke argues. Kurz & Salvadori (2005) discuss in detail Sraffa’s decades-long efforts to transform fixed capital into circulating capital. Circulating capital is entirely consumed in every period and entirely transferred to the value of the product in every period.

2 Kurz & Salvadori (2005) discuss Sraffa’s earlier rejection of the joint product method of dealing with fixed capital in the late 1920s and again in the early 1940s, because Sraffa was concerned about the ‘purely abstract character’ of the joint product method, due to the fact that there is no actual market exchange of used machines. In December 1942, Sraffa wrote in his notebook that such a method would be an absurdly artificial procedure, as these things (half-worn machines, burning coal, undeveloped photos, etc.) have no market (Kurz & Salvadori, 2005, p. 508; emphasis added). Sraffa eventually decided that this problem could be solved by considering a whole group of (similar) machines together, rather than a single individual machine (what Sraffa called the ‘social point of view’). But I don’t see how this ‘social point of view’ solves the problem of the ‘purely abstract character’ of the joint product method. Even considering a complete set of machines of different ages, the fact of the matter remains that all the prices of the partially used machines do not correspond to actual market exchanges, which means that there is no competition to enforce that these prices will equalize the rate of profit across machines of different ages. Sraffa’s initial intuition about the joint product method was right on target, and it is too bad that he changed his mind about this decisive objection to the joint product method.
In addition, the joint product method of fixed capital is based on the following extremely unrealistic assumptions: (1) there is only one type of fixed capital good in each industry; or (2) the different types of capital goods in an industry have the same lifetime (including buildings and equipment, which usually have quite different actual lifetimes), and are analyzed together as a 'plant,' with only one price for all the capital goods in the 'plant' (and thus the prices of individual capital goods are indeterminate); and (3) the 'age distribution' of every type of fixed capital good is 'uniform,' i.e., that the quantity of each age of a given fixed capital good must be exactly the same, and the total quantity of each type of capital good must be an integer multiple of its lifetime (e.g., Sraffa's example of 20 tractors with a lifetime of 4 years, divided into 4 age groups of 5 tractors each: 1960, p. 68; this is what Sraffa meant by the 'social point of view'). Surely this is not the way the actual rate of profit and prices of production are determined in the real capitalist economy? The assumptions necessary to sustain this theory deprive it of empirical relevance.

Gehrke argues that a fatal flaw of Marx's 'linear' transfer of value method of depreciation is that it implies that different prices will be charged for identical products that are produced with fixed capital of different ages, because the profit component of the price will decline over time as the net value of fixed capital declines. However, this argument, which was original with Sraffa (or was it Wickself?), and has been repeated by many Sraffians, assumes that the profit component of the price of a commodity produced by a given age of a machine is determined by the net fixed capital invested in that single age of machine alone. But again, in reality, this is not true. The profit component of the price of a commodity is determined by the net fixed capital invested in the industry as a whole, not by the net fixed capital invested in a single age of machine. Unequal net fixed capital across different ages of the same machine in the same industry results in unequal rates of profit across these machines, not in multiple prices of the commodity.

Therefore, on the basis of these considerations, I conclude that Marx's 'transfer of value' method of fixed capital and depreciation is the correct method, or at least is superior to Sraffa's joint product method.

Thanks again to Gehrke for his stimulating comment. Further discussion of this important issue is obviously necessary and desirable.

References


