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Abstract. In two passages of *Production of Commodities*, Sraffa states very concisely that the analysis presented also applies to viable economic systems in which the means of production consumed are not fully replaced. This aspect of the book has been nearly ignored for a long time, and only in the last two decades have some scholars begun to discuss it in depth. Since these scholars basically rely on the terse references to non-self-replacing systems appearing in Sraffa's published works, however, a question is left pending in their contributions—what exactly was Sraffa's position as regards the nature and relevance of those systems? The present note seeks to shed light on this question by systematically examining the pertinent passages of Sraffa's unpublished manuscripts. On the basis of this examination, the final section briefly comments on some debatable aspects of current renditions of Sraffa's theory.

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1. Introduction

In two passages of *Production of Commodities*, Sraffa states very concisely that the analysis developed in the book is not confined to the economic systems that are in a self-replacing state, but also applies to viable economies in which the means of production consumed are not fully reproduced (cf. the footnote in Chapter 1 and paragraph 26 of Chapter 4). This aspect of *Production of Commodities*, which is implicitly recalled in Sraffa's (1962) reply to Harrod, has for a long time been ignored by the scholars adhering to the modern reappraisal of classical theory—except for the brief remarks by Harcourt & Massaro (1964: 715), Garegnani (1989: 358) and Piccioni (1989: 215, n. 42). Only in the last two decades, a few scholars have begun to discuss in depth the non-self-replacing (NSR) systems mentioned by Sraffa (cf. Chiodi, 1998; Piccioni, 2000; Ravagnani, 2001; Sinha, 2016; Bellino, 2018). Since these scholars basically rely on the terse references to NSR systems appearing in Sraffa's published works, however, a

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relevant question remains pending in their contributions—what exactly was Sraffa's position as regards the nature and relevance of NSR systems?

We will seek to shed some light on the above-mentioned question in the present note by systematically examining Sraffa's unpublished manuscripts. To pave the way for this examination, it must be said that NSR systems are mentioned for the first time in the manuscripts of the 1940s. Moreover, it is useful to outline the particular context in which those systems are taken into consideration.

As pointed out by Gehrke & Kurz (2006: 107), it was towards the end of 1943 that Sraffa decided to express wages, within the price equations, in the way we encounter in the last part of Chapter 2 of his book—namely, as a share of the national income that is paid to the workers *post-factum*. In precisely the same period, Sraffa began to discuss an issue to which he would repeatedly return over the years, the extension of the notion of national income to the case of economies that are not in a self-replacing state. Sraffa's reflection on that issue was quite tormented and reasoned reconstruction of its evolution would certainly be worthwhile. We shall, however, refrain from engaging in this task and primarily consider, from the several documents addressing the extension of the concept of national income, the specific parts in which Sraffa puts forward noteworthy considerations about NSR systems as such.

The paper is structured as follows. Section 2 discusses the passages of the manuscripts of the 1940s in which Sraffa manifests his views as regards both the possible origin and the relevance of NSR systems. Section 3 moves on to examine the pertinent passages contained in the manuscripts of the 1950s, which seem in line with the position held by Sraffa in the previous decade. Finally, in the light of the textual evidence reported, Section 4 briefly comments on some debatable aspects of current renditions of Sraffa's theory.

2. The manuscripts of the 1940s

The first document in which Sraffa discusses the extension of the notion of national income to 'non-repetitive systems'—as he initially labelled the systems that are not in a self-replacing state—consists of sixteen pages numbered consecutively and was composed between November 27 and December 17, 1943.[1] On pages 5-6 of that document, Sraffa writes:

> 'A non-repetitive system is one in which some of (or part of) the commodities which compose the Constant Capital are not reproduced (or are reproduced in smaller quantities) in the product. Thus any annual system that forms a stage in the change of some methods of production is a non-repetitive one: for it will still use, but not reproduce in such large quantities, the means of production which are being superseded (e.g. horses), and at the same time produce, but not yet have in use, the new means of production (e.g. tractors). Any annual system in which accumulation is in progress will thus in general be non-repetitive, for accumulation … requires not merely addition to the existing means of production, but also discontinuing (or at least continuing on a reduced scale) of the production of some of them.' (D3/12/35: 12 (5-6), dated 9.12.1943)

A similar exemplification of how non-repetitive systems may arise is then provided on pages 8-9:

> '… suppose a system which represents a transitional stage from handloom to mechanical weaving: there will be in the {Constant Capital} (l.r.s.) a larger number of handlooms than are found in the Product (r.h.s.), while {on the other hand}[2] there will be more mechanical looms in the Product than there are in the Const. Cap.' (D3/12/35: 12(8-9), dated 11.12.1943)

For proper assessment of the foregoing passages, it should be noted that at the end of 1943 Sraffa was in the middle of a long and detailed examination of the impact of accumulation on the rate of profits, with the corresponding induced switches in production methods (for this aspect of Sraffa's work, cf. Gehrke & Kurz, 2006: 118-124; Sinha, 2016: 116). The allusion, in the quotations above, to the various 'stages' through which a change in the means of production employed establishes itself in the economy, thus plausibly reflects the specific investigation of the effects of accumulation that Sraffa was carrying out at the time. Differently, only one of those stages is discussed in the book published seventeen years later, namely the case of machines that have been rendered obsolete by the new

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1 Cf. D3/12/35:12(1-16). Throughout the present note, the references to Sraffa's manuscripts follow the catalogue prepared for Trinity College by Jonathan Smith. All changes made in the passages quoted with respect to the original text are indicated by curly brackets.

2 With 'on the other hand' we translate the Italian expression 'in compenso' actually used by Sraffa.

'dominant' (cost-minimising) methods and that, for this reason, are kept in use for what they can get but are no longer produced (Sraffa, 1960: § 91).

Before going on with the examination of the 1943 document, let us return to the non-repetitive system described in the second passage quoted above. Reversing the order of Sraffa's exposition, we could say that within that system, it is the comparison of the commodity composition of the social product and the commodity composition of 'constant capital' (with the latter displaying more handlooms and less mechanical looms than the former) that reveals the nature of the change occurring in the economy. This remark can be helpful for interpreting a third passage appearing on p. 10 of the document under consideration, in which Sraffa introduces a further and completely distinct example of the circumstances that may give rise to non-repetitive systems. In particular, Sraffa mentions the situation in which

> '… the change in the methods of production, foreshadowed in the comparative quality-composition of the product {and} of the capital, {is} in the direction (*not of producing cloth by different means*) *but of producing less cloth and more of a totally different article*.' (D3/12/35: 12(10), dated 11.12.1943; emphasis added)

Here Sraffa seems to refer to a hypothetical 'annual system' in which the means of production consumed by the cloth industry are not reproduced in full simply because a contraction of output is taking place in that industry (while, at the same time, the positive net outputs of other means of production 'foreshadow' the expansion of a different sector). It should be noted that this second exemplification of the possible causes of non-repetitive systems is compatible with the case of economies that, by assumption, employ only circulating capital goods. The passage under discussion therefore sheds light on the nature of the 'systems which are not in a self-replacing state' that are mentioned so concisely in Part I of Sraffa's book.

As far as we could ascertain, the most explicit statements in Sraffa's manuscripts concerning the origin of NSR systems are those hitherto reported. On the other hand, Sraffa is very clear as regards the relevance of those systems in the notes of the 1940s addressing the extension of the notion of national income. For example, a document written between the end of 1945 and the first days of 1946, titled 'On the Quantity called Social Revenue or National Income or Net Social Product',[3] begins with the following sentence:

> 'This idea {i.e., the concept of National Income} is based on a Repetitive System. Under its conditions it is perfectly clear {and} unambiguous: the perplexities arise when we try to extend it to non-repetitive systems – *and all real systems are such*.' (D3/12/17: 6, dated 30.12.45; emphasis added)

Moreover, on p. 3 of that document Sraffa remarks that '{the} capital cannot "be maintained intact" in a non-repetitive system' and then affirms: 'It thus appears that in such a case (*i.e. in* *all* *real cases*, {and} particularly when there is change in course) the distinction between Gross and Net product becomes blurred' (D3/12/17: 8; emphasis added). Finally, the view clearly emerging from the italicised parts of the previous quotes is reiterated, in slightly milder form, on p. 4:

> 'The composite commodity which forms the National Income is always the difference between the Gross Product and the Means of Production used. It is made up of Positive terms (those composing the Gross Product) and of Negative terms (those composing the Means of Production). *In the special case of a Repetitive System*, all the Negative terms can be eliminated.' (D3/12/17:10, dated 1.1.1946; emphasis added)

Further evidence of the opinion that non-repetitive systems are the ordinary case is a note of 1946 in which Sraffa, commenting on Pigou's (1935) essay 'Net Income and Capital Depletion', affirms: 'Nat. Inc. is a composite comm. with {positive} and {negative} terms. That's all. *In some cases* (rep. syst.) the {negative} terms can be eliminated'[4] (D3/12/2: 22, dated 13.2.1946; emphasis added).

When the foregoing note was written, Sraffa had already slowed down his work on the theory of value and distribution due to commitments with the Ricardo edition. Then, in 1948, the increasing pressure of those commitments forced him to interrupt that activity for a number of years (cf. de Vivo, 2003: 3; Sinha, 2016: 153-154).

[3] The document consists of four sheets taken from a ring book and numbered consecutively by Sraffa.

3. The manuscripts of the 1950s

Sraffa resumed his theoretical work in 1955. In March of that year, he composed a long document, the 'Maiorca Draft', which is a first attempt at systematically exposing the analytical propositions that will constitute Part I of *Production of Commodities*. On p. 8 of the document, we find the equations of production for an economy in a self-replacing state with a surplus, expressed in the same general form as in paragraph 11 of the 1960 book (cf. D3/12/52: 9). On p. 13, Sraffa points out that '{the} basic notion of National Income is clearly reflected in these equations, … since we find in the product all the commodities that have been used in consumption, in at least in the same quantities', and then remarks:

> 'However, this notion cannot be extended to a system which is not capable of reproducing itself, i.e. one in which for any reason (e.g. because a change in the methods of production is in course of being effected), the same equations occur in different proportions, such that the raw materials are not fully reproduced.' (D3/12/52: 14, dated 18.3.1955)

In the latter passage, the concept of NSR system is introduced indirectly through imaginary re-proportioning of the equations of the generic self-replacing system.[5] Moreover, Sraffa is vague as regards the reasons that may lead an economic system to replace only partially the means of production consumed. It should be noted, however, that the presence of fixed capital (and, therefore, of obsolete machines) is ruled out in the document under examination. We can thus plausibly conjecture that the 'change in methods' to which Sraffa alludes is analogous to that indicated in 1943 as a second possible origin of non-repetitive systems—namely, a change in the direction of contracting the production of some commodity, which is foreshadowed in this case by the deficits of raw materials displayed by the 'annual system'.

The foregoing conjecture is corroborated by the fact that in the manuscripts subsequent to the Maiorca Draft, we find echoes of the circumstances that Sraffa identified in the previous decade as causes of NSR systems. Moreover, we find

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4 In the original manuscript, Sraffa writes '+ive' and '-ive' as abbreviations of 'positive' and 'negative'.

5 The same indirect way of presenting the NSR systems is adopted by Sraffa later on in his comment on Harrod's review of *Production of Commodities* (cf. Sraffa, 1962: 477-478).

that Sraffa continues to be quite explicit as regards the relevance of those systems. To substantiate these assertions, let us consider the following quotes, drawn from two documents composed at the end of 1956 in which Sraffa discusses once again the extension of the notion of national income to NSR systems:[6]

> '… the economic system of reality are not self-replacing. They are in a constant state of transition and obsolescence, due to changes both in the kind of commodities produced and in the methods of their production.' (D3/12/75: 16)

> '… the economic systems of reality are never in a completely self-replacing state. Their state is one of constant transition, due to changes in the methods of production and to shifts in the type of goods produced.' (D3/12/73: 12, dated 25.12.1956)

The reference to 'obsolescence' and to 'shifts in the type of goods produced' in the last parts of these passages is reminiscent of the two causes of incomplete replacement of the means of production indicated by Sraffa in the 1940s—that is, the presence of obsolete machines that are used but not reproduced and the contraction of some industries accompanied by the expansion of others. At the same time, in the first part of both passages Sraffa confirms his conviction that the NSR state is the norm. As regards this latter aspect, the persistence of Sraffa's position also emerges from a manuscript written in 1956 or 1957,[7] in which the Italian economist remarks that 'the … theoretical puzzles {with the notion of national income} arise from the extending of the concept to non-self-repl. systems *– as indeed are all systems of the real world*' (D3/12/73: 19, emphasis added).

Our examination of the manuscripts of the 1950s could stop here, as no further statement of some interest seems to be present in them concerning the origin and relevance of NSR systems. It should be noted, however, that Sraffa continued to work on the extension of the concept of national income until the end of 1957, when he eventually decided to omit any reference to that issue in the book. We may therefore conclude this section by reporting how Sraffa justifies that decision:

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[6] The second of these documents is essentially a re-writing of the first.

[7] The file folder D3/12/73, from which the manuscript is drawn, contains documents composed in both years.

> '… my work … starts by fixing wages as a proportion of a self-replacing national income {and} that is what gave me the impression that it was necessary to extend to the non-self-replacing – but in fact it is not necessary. That is only an example,{and} then we go on to the Standard Nat. Income (which is common to all states) and to <u>any</u> good as standard.' (D3/12/73: 11, dated 19.12.1957)

Since by December 1957 Sraffa had almost completed the final version of his book (cf. de Vivo, 2003: 3), it is legitimate to read this passage in the light of the strategy of exposition adopted in Part I of *Production of Commodities*. Thus recall that in Chapter 2 of the book, Sraffa fixes wages as a fraction of the national income of an economy that is self-replacing by assumption. That particular setting, however, has exclusively the function of preparing the ground for the introductory discussion of the effects of distributional changes developed in Chapter 3 (and in this sense, it is 'only an example'). Then Sraffa moves on to rigorously analyse the wage-profits relationship, first by taking wages as a share of the Standard net product (a composite commodity that is well-defined in both self-replacing and NSR systems) and finally, in the last paragraphs of Chapter 6, by generalising the measure of wages to any numeraire.

4. Concluding remarks

The textual evidence reported in the previous sections elicits some considerations. To begin with, we have seen that according to Sraffa the NSR state, far from being a singular and uninteresting case, is the usual condition of the economic system. This view sharply contrasts with the renditions of Sraffa's theory that postulate the self-replacing state and, on this basis, assert that the fundamental role of relative prices in Sraffa's system is to enable industries to rebuild the stocks of means of production used up, thereby ensuring the 'reproduction' of the economy (for example, Gilibert, 1989: 186-187; Schefold, 1989: 284-85; for a critique of this interpretation, cf. Ravagnani, 2001).

A second consideration is that the emphasis placed on self-replacing states has led some authors to illustrate in a misleading way the conception of the system of production as a circular process that Sraffa revives in opposition to the marginalist image of a one-way avenue leading from the factors of production to consumption goods. To clarify this point, it should be noted that Sraffa is sufficiently clear, in the unpublished manuscripts, as regards the condition that characterises the 'circular' production systems. For example, he writes:

> '… Jevons, B-B, J.B. Clark and their followers … believe … that commodities composing capital are "ultimately" produced by the labourer with his bare hands out of nothing – without need of tools or raw materials: where "ultimately" stands for a finite number of steps (e.g. cotton yarn is produced by labour and machinery {and} raw cotton: but the machines are made, {and} the r. cotton grown, by labour alone). … *But it is not so, {and} labour at all stages uses tools {and} raw materials*. … This … is only an aspect of the general marginal view that the economic process begins in "human efforts {and} sacrifices" (production) {and} ends in "human satisfactions" (consumption). It does not know that it is a circular process, {and} thus ignores a discovery even older than A. Smith – The Tableau Economique.' (D3/12/15: 9; emphasis added)

From this passage it emerges that a system of production is 'circular' in Sraffa's sense when in no industry the reduction to labour of the means of production can be completed in a finite number of steps (cf. also D3/12/42: 81). Considering that this condition obviously holds in the presence of basic commodities, we thus realise that when crediting the *Tableau* for the discovery of the circular nature of social production, Sraffa implicitly refers to a well-identified feature of Quesnay's schemes, namely the assumption that agricultural products enter as means of production into all sectors (an assumption recalled in the Appendix D, paragraph 1, of *Production of Commodities*).

In the current renditions of classical theory, however, the circularity of the social production system is sometimes associated with a totally distinct feature of the *Tableau*, the hypothesis that the economy is in a self-replacing state. For example, Pasinetti (1977: 20) states that in both Quesnay's construction and Marx's schema of simple reproduction, 'production is represented as a circular process which reproduces, from year to year, all the means of production used up in the production process and yields, in addition, a surplus of goods'. In the light of the unpublished manuscripts, it should be stressed, instead, that the circularity of production in Sraffa's sense depends exclusively on the presence of basics and has nothing to do with either the full replacement of the means of production consumed or the formation of a social surplus product.

Finally, we can briefly address the question of how the theoretical positions of the economy displaying negative net outputs of means of production should be interpreted. It has recently been argued that these positions should be seen as ‘snapshots’ of a dynamically evolving economy (Sinha, 2016: 130, 206). This interpretation seems, however, in conflict with the justification that Sraffa provides in the manuscripts for the assumption of a uniform rate of profits, namely the traditional view that competition *tends* to equalise the sectoral profit rates (cf. D3/12/27: 5(1-2), D3/12/2: 21); for a thorough discussion of this point, cf. Levrero, 2018). On the other hand, an alternative interpretation is possible, which better conforms to Sraffa’s traditional justification for the uniform profit rate. An illustrative example, consistent with Sraffa’s remarks concerning the possible causes of NSR systems, may clarify this point.

Consider the following system of production with four commodities, in which the workers’ subsistence is included in the means of production and wheat and fabric are the only consumption goods:

$$\begin{array}{rlcrlcrlcll}
115 & \text{wheat} & \oplus & 46 & \text{iron} & & & & \rightarrow & 248.4\ \text{wheat} & \\
80 & \text{wheat} & \oplus & 120 & \text{iron} & & & & \rightarrow & 192\ \text{iron} & [S] \\
16 & \text{wheat} & \oplus & 16 & \text{iron} & \oplus & 8 & \text{cotton} & \rightarrow & 41.6\ \text{cotton} & \\
13.6 & \text{wheat} & \oplus & 6.8 & \text{iron} & \oplus & 34 & \text{cotton} & \rightarrow & 34\ \text{fabric} & \\
\hline
224.6 & & & 188.8 & & & 42 & & & &
\end{array}$$

To use Sraffa’s 1943 expression, we can say that the deficit of cotton in system [S] ‘foreshadows’ a perspective fall in the production of fabric. This means that the surplus of iron must in turn foreshadow a rise in the produced quantity of wheat. Now consider the theoretical position of the economy defined by system [S] together with the prices in terms of wheat (p_i = 2, p_c = 1.8, p_f = 3.12) and the rate of profits (20%) determined by the associated price equations. Under certain conditions, that position could be plausibly interpreted as a normal position reflecting the basic tendencies at work in the ‘actual’ economy. To substantiate this claim, assume that the ‘actual’ economy is experiencing a phase of moderate fall in the social demand for fabric, and therefore in the produced quantity of that commodity, accompanied by a corresponding induced contraction in the production of cotton. Assume further that in the phase in question, the quantity of wheat produced is gradually increased in order to meet an analogous increase in the social demand for that good. At the level of abstract theory, those circumstances could be appropriately represented by the production system [S], with its deficit of cotton and surplus of iron. More precisely, system [S] could legitimately be seen as representative of the production conditions of the actual economy provided that (a) the production levels appearing in it conform to the quantities of commodities demanded on average in the phase under discussion, and (b) the production methods correspond to those that emerge as 'dominant' in the actual economy. If these conditions are fulfilled, system [S] and the associated prices of production and uniform profit rate would therefore provide a sound representation of the normal position of the economy in the specific phase taken into consideration (for a similar interpretation of the NSR economies mentioned in Sraffa's 1962 reply to Harrod, cf. Ravagnani 2001).

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