The political economy of *Production of Commodities by Means of Commodities*: a comment on Pasinetti and Sraffa

Roberto Scazzieri*

Luigi Pasinetti's contribution in this Special Issue highlights the complexity and richness of Sraffa's sources and points to the diversity of the streams of thought that may be detected behind Sraffa's original research programme. In particular, Pasinetti calls attention to the heuristic value of Sraffa's unpublished manuscripts in assessing the constructive effort of *Production of Commodities by Means of Commodities* (*PCC*). This paper moves further along the above line of investigation and explores the Smithian strand of *PCC*. In particular the paper highlights that the duality between 'horizontal' and 'vertical' prices, explored by both Sraffa and Pasinetti, points to the existence of different complementary causal linkages in classical political economy. Vertical integration makes it possible to 'resolve' prices into a sum of weighted quantities of labour and calls attention to the system of weights needed for this operation. Alternative weighting systems may be associated with alternative institutional arrangements. For example, a traditional wage–profit economy would attach increasingly higher weights to increasingly remote quantities of labour. But the analytics of vertical integration also raises the institutional possibility of increasingly lower weights as increasingly remote labour quantities are considered. The paper argues that by assessing together the horizontal (Ricardian) and vertical (Smithian) strands of *PCC* it is possible to grasp more fully the theoretical potential of this work. In particular, it becomes possible to distinguish between the identification of general causal principles and the instantiation of those principles in specific historical contexts.

Key words: Sraffa, Pasinetti, Vertical integration, Pure theory of value, Institutionally specific theory of value
JEL classifications: B12, B16, B24

1. Sraffa's political economy

In the paper read at the Sraffa Celebratory Conference, and published in this Special Issue, Professor Luigi Pasinetti calls attention to the intellectual sources for Piero Sraffa's *Production of Commodities by Means of Commodities* (1960) and takes us on

a fascinating journey back to the classical influences on Sraffa. His paper highlights the intriguing complexity and richness of Sraffa's sources and points to a new and challenging field of research. In particular, Professor Pasinetti calls attention to the 'streams of thought' that may be detected behind Sraffa's unpublished notes and emphasises the constructive element running through Sraffa's manuscripts (Pasinetti, 2012, pp. 1304–6). It is interesting that Pasinetti's reconstruction of Sraffa's intellectual development points to the fact that the horizon of Sraffa's research programme got 'drastically restricted' (ibid., p. 1307) as he moved from his early lectures[1] to the editorial work on David Ricardo's works and correspondence and ultimately to the publication of *Production of Commodities by Means of Commodities* (henceforth, *PCC*). Indeed, Pasinetti mentions the 'wide gap' growing in time 'between the original intentions and what Piero Sraffa finally actually published' (ibid., p. 1308). In Pasinetti's view, the pruning of historical material from *PCC* (except for the extremely concise Appendix D—References to the Literature) makes the constructive effort of *PCC* difficult to interpret, especially as a comprehensive discussion of *PCC* against the benchmark of classical political economy is missing. It is at this point that Pasinetti formulates his most suggestive (if perhaps controversial) comment, when he notes that *PCC* points to the possibility of 'pure economic theory' conceived as a set of propositions independent of institutional premises, or perhaps dependent on those premises only in a limited way (ibid., p. 1310). Pasinetti's call to younger economists to take up this foundational aspect of *PCC* is also an invitation to go back to Sraffa's original research programme and to organise in its light the constructive work yet to be accomplished. In fact, a specific reading of the classical heritage is behind Sraffa's project and a disentangling of that reading may be necessary to the interpretation of Sraffa's own work. Smith's theory of 'commercial society' provides the backbone of *PCC* insofar as it is at the level of a fully interlinked commercial society that a network of interdependent commodity flows is most likely to be identified. Smith's commercial society is a privileged route to the analysis of an economic system associated with a developed division of labour. The latter points to the possibility of manifold connections among specialised production processes. The expansion of market linkages in a mature commercial society can be seen as a trigger to the expansion of the material linkages described in *PCC*. In this way, *PCC* can be considered to be a product of the political economy programme associated with Smith. At the same time, *PCC* is also a reminder that material connections may have an independent existence *beyond* markets and market interdependencies (see also Pietranera, 1963). For this reason, *PCC* is both a product of Smith's research programme and a prelude to its critique.

2. Intellectual roots

It may be argued that there is in *PCC* an inherent tension between the horizontal and the vertical dimensions of material interdependence.[2] The former is in view when considering the interindustry framework of Sraffa's reproduction schemes; the latter is

---

[1] These are the lectures on 'Advanced Theory of Value' delivered at the University of Cambridge from Michaelmas Term 1928-29 to Lent Term 1931.

[2] On the distinction between horizontal and vertical representations of economic structure as a conceptual grid for interpreting distinct formulations of classical economic theory, see Quadrio Curzio and Scazzieri (1983, 1986) and Baranzini and Scazzieri (1990).

apparent through Sraffa's elaboration of the subsystem view of interdependence and his reduction of prices to 'dated' quantities of labour. This analytical tension derives from the very structure of classical political economy and may be traced back to Smith's theory of commercial society. In fact, the relationship in *PCC* between horizontal and vertical representations of material interdependence (interdependence among production processes) has an analogue in the relationship between the point of view of commercial society and the point of view of division of labour in Smith's *Wealth of Nations* (Smith, 1976 [1776]) . The division of labour draws attention to the central position of the human contribution in the formation of income and wealth, and thus also to the central role of labour as the ultimate foundation of value in society. Commercial connectivity draws attention to historically specific contexts in which markets trigger connectivity between the demand and the supply of specific goods or services. A commercial society in which markets have expanded into the production sphere is one in which production processes are interconnected through market exchanges, so that the division of labour appears to be a *result* of market interdependence rather than one of its *necessary conditions*. The dual representation of productive structures in *PCC* derives from the tension within classical political economy between two distinct concepts of interdependence, i.e. the interdependence of labour activities and that between material commodity flows. In particular, the correspondence between horizontal and vertical representations is complete when considering the quantity system but only partially achieved in the case of the system of prices. This is because, in the quantity system, the horizontal or vertical integration of processes may be considered as alternative representations of the same system of commodity flows. It is in fact possible to construct an algorithm allowing the expression of the same set of quantities in one or the other type of representation (see Pasinetti, 1980 [1973], 1981) . On the other hand, in the case of the system of prices, the results obtained by considering horizontal interdependence are not necessarily identical to those that would be obtained by considering the complete vertical integration of production processes. This is because complete vertical integration allows for the identification of fundamental (and, in Pasinetti's view, pre-institutional) properties of the economic system in a way that horizontal integration does not (see Section 3). In short, *PCC* points at the same time to a symmetry and to a cleavage. There is symmetry, in the quantity system, between the horizontal interdependencies of commodity flows and the connections between vertical subsystems. There is cleavage, in the value system, between the horizontal (cost-of-production) prices subject to institutional constraints on the distribution of income and the vertical prices directly reflecting the technological structure of division of labour in society.

3. Horizontal and vertical structures of value

The work on the intellectual sources of *PCC* is work on the analytical structure of that book.[3] Sraffa's explicit awareness of his sources is further proof of the analytical relevance of the historical approach in the case of *PCC*. The tensions within Staffa's political economy (see above) may help to explain important features in the structure

---

[3] Sraffa himself, in his lectures on the advanced theory of value, expressed the view that knowledge of the history of theory is an essential condition for an adequate understanding of its current state. In a similar vein, John Hicks wrote that economists need to know the history of their subject in order to know what they are doing (Hicks, 1977).

of *PCC* and suggest further lines of research in economic theory. As we have seen (see Section 2), the distinction between the system of quantities and the system of prices is central to Sraffa's theory. Vertical integration allows for a rearrangement of Sraffa's quantities in such a way as to preserve the one-way relationship between labour funds and consumption goods. On the other hand, Sraffa's prices *may or may not* preserve that relationship (ultimately, they may or may not allow the formulation of a labour theory of value), depending on whether horizontal or vertical prices are considered.

Horizontal prices point to what we may describe as a 'mixed' value structure. This structure may be expressed by the equation below, in which $\mathbf{p}$ is the price vector, $\mathbf{a}_{[n]}$ is the vector of direct labour coefficients for the production of commodities, $\mathbf{A}$ is the matrix of technical coefficients for the produced inputs needed in the different industries, and w and π are, respectively, the rate of wage and the rate of profits:

$$\mathbf{p} = \mathbf{a}_{[n]}w + \mathbf{p}\mathbf{A} + \mathbf{p}\mathbf{A}\pi = \mathbf{a}_{[n]}w + \mathbf{p}\mathbf{A}\,(1 + \pi) \qquad (1)$$

The above price equation does not allow for the identification of an unambiguous relationship between quantities of labour and commodity prices. As it is well known from *PCC*, this is due to the 'distortion' induced by the specific institutional set-up of a wage–profit (capitalist) economy and to the associated influence of income distribution on commodity prices. Vertical prices present a different picture. This is because these prices reflect in a more immediate manner one-way relationships and are, in principle, compatible with a direct reduction of prices to labour quantities under institutional constraints. This may be seen by considering the price equation associated with the first-order vertical integration of quantities of labour and produced means of production (see Pasinetti, 1980 [1973], p. 29). In this equation $\mathbf{v}$ is the vector of vertically integrated labour coefficients, $\mathbf{H}$ is the matrix of the units of vertically integrated productive capacity for each commodity produced in the system, and the rate of wage is chosen as *numéraire* (Pasinetti, 1980 [1973], pp. 16-24):

$$\mathbf{p} = \mathbf{v} + \mathbf{p}\mathbf{H}\pi \qquad (2)$$

In the above equation, the prices of the different commodities result from adding to the quantities of vertically integrated labour a profit mark-up proportional to the quantities of produced means of production. If we repeat the operation of vertical integration a sufficient number of times, the physical residual gets gradually smaller, until it eventually disappears in the limit (Pasinetti, 1980 [1973], p. 30). In other words, vertical integration allows one 'to resolve the price of every commodity into a sum of profit-weighted quantities of labour' (Pasinetti, 1980 [1973], p. 31), as shown below:

$$\mathbf{p} = \mathbf{v} + \mathbf{v}_{k}\pi + \mathbf{v}_{k2}\pi^2 + \ldots + \mathbf{v}_{ks}\,\pi^s + \mathbf{p}_{ks}\,\mathbf{H}\,\pi^{s+1} \qquad (3)$$

where the $(s+1)$th order physical residual 'can be made as small as may suit one's purpose by making s as great as is necessary' (Pasinetti, 1980 [1973], p. 30).

Horizontal and vertical prices, while mutually compatible, draw attention to different properties of the economic system. Horizontal prices emphasise interdependence and mutual influence between productive sectors. Labour is essential but ultimately plays a subordinate role due to the fact that intersectoral relationships are governed by commodity flows rather than by flows of direct labour. Vertical prices also presuppose the interdependence of processes but are also a pointer to something else: they

suggest the fundamental role of a non-produced input such as labour as the ultimate source of the social product, and the central function of institutions in determining which way the influence of labour would go. As a matter of fact, the system of vertical prices clearly shows the interplay between the fundamental technological properties of an economic system based on the division of labour and the arrangements associated with a particular institutional set-up. Price equation (3) may in fact be interpreted in two different ways: (i) on the one hand, it shows how to 'resolve' prices into a sum of weighted quantities of labour; and (ii) on the other hand, it points to the role of the *system of weights* and suggests the possibility of alternative criteria that may be adopted in order to resolve prices into quantities of labour.

In other terms, Sraffa's reconstruction of classical political economy can be seen *both* as an attempt to express structural properties associated with a given configuration of the economic system in a wage–profit economy and as an attempt to identify properties belonging to a deeper (technological) level of economic structure independently of which institutional set-up is considered. This dual nature of Sraffa's political economy may be seen by comparing the horizontal and vertical price equations. In the horizontal price equation (1), labour costs, capital costs and profit mark-ups are at the same level, and structural constraints through the price–distribution interdependence without suggesting a deeper level of investigation. In the vertical price equation (3), all costs are subsumed under the category of labour costs, although institutional constraints determine a particular distribution of weights for the different cost components. It is immediately apparent that the particular configuration taken by the vertical price system in equation (3) reflects a specific rule adopted for profit accountancy and has no intrinsic structural necessity. For example, we would still be able to resolve prices into an infinite sum of weighted quantities of labour even if profits were not levied on invested capital stocks. In this case, a whole range of different pricing alternatives may be considered. This could be done by substituting a sequence of 'general' increasing or decreasing weights for the profit factors in equation (3).

In the former case (increasing weights), vertical prices may be expressed as follows:

$$\mathbf{p} = \mathbf{v} + \mathbf{v}_k \lambda + \mathbf{v}_{k2} \lambda^2 + \ldots + \mathbf{v}_{ks} \lambda^s + \mathbf{p}_{ks} \mathbf{H} \lambda^{s+1} \tag{4}$$

In the latter case (decreasing weights), vertical prices may be expressed as follows:

$$\mathbf{p} = \mathbf{v} + \mathbf{v}_k/\lambda + \mathbf{v}_{k2}/\lambda^2 + \ldots + \mathbf{v}_{ks}/\lambda^s + \mathbf{p}_{ks} \mathbf{H}/\lambda^{s+1} \tag{5}$$

An increasing-weights economy (for which the wage–profit economy is a special case) attaches increasing importance for dated labour as we consider more and more distant layers of means of production. On the other hand, a decreasing-weights economy would work on opposite principles, since one would take the attitude that 'bygones are bygones', and pricing would primarily be based on the consideration of direct labour and of labour needed in the finishing stages of the production process. We may expect that different institutional set-ups would encourage different weighting criteria. In a standard wage–profit economy, 'remote' labour is an important cost component for any given size of physical residuals (see equation 3). This follows from the mark-up profit criterion successively applied at the various stages of the production process. However, a different institutional set-up may lead to completely different results. As a matter fact, depending on which institutional set-up and accountancy rule are considered, vertical prices may express entirely different criteria for the assignment

of weights to dated quantities of labour. For example, a technologically stationary capitalist setting would attach increasingly higher weights as we consider more and more 'remote' quantities of labour. On the other hand, a more dynamic set-up could be one in which increasingly lower weights are attached to remote quantities of labour. In this case there would be no *institutional* reason to expect that investment at t would be associated with the expectation of higher (private) income at $t + k$. Indeed, a set of declining weights may be associated with the expectation of *lower* returns as one moves from the present into the future. Symmetrically, one can expect an increasingly lower influence for the quantities of indirect labour upon commodity prices as one considers increasingly remote layers for dated quantities of vertically integrated labour. *There would thus be no structural justification for rewarding 'abstinence'.*

To conclude, the dual formulation of prices that is possible in an economic system in which commodities are produced by means of commodities calls attention to a dual structure of causation. Horizontal prices can be directly explained in terms of technology in use and income distribution, whereas vertical prices may be explained in terms of dated quantities of labour and a system of weights. The two causal structures are compatible with one another but clearly belong to two different levels of explanation. In particular, the standard formulation of horizontal prices presupposes a specific institutional set-up (i.e. a wage–profit economy with mark-up pricing), whereas vertical prices allow the identification of a *causal mechanism* independent of any specific institutional set-up. However, the way that mechanism is instantiated in specific contexts depends on a particular system of weights, which in turn reflects particular institutions.

In short, vertical integration brings to the fore the hierarchical structure of causality that is only implicit in the horizontal price–distribution system and highlights the existence of a fundamental level of causation that is *prior* to the influence of any specific institutional set-up. Sraffa's subsystems, and the associated theory of vertical integration due in particular to work by Luigi Pasinetti (Pasinetti, 1980 [1973]), provides the analytical bridge between the theory of circular interdependence and the identification of a hierarchical configuration of causal relationships. In the pure production economy of *PCC*, vertical prices call attention to the central role of labour as the original fund from which wealth and value are generated.

The reconstruction of political economy in terms of vertically integrated structures alerts us to the possibility for different causal layers in the economic system and to the need of distinguishing between fundamental and context-specific relationships. There is a sense in which horizontal prices conceal (institutional) alternatives, which are instead highlighted when vertical prices are considered.

4. Sources and ways ahead

Sraffa's intellectual sources in *PCC* are to a large extent economic writers in the classical tradition. However, that tradition is manifold and Sraffa's utilisation of those sources is revealing as to the routes taken by Sraffa's reconstruction of classical economic theory. What is most remarkable is the attention paid to certain elements of Adam Smith's theory, and in particular to Smith's attempts to identify the material foundation of a 'commercial society' in the set of processes and connections supporting the division of labour and the accumulation of capital. The central role of labour in the production of commodities by means of commodities (i.e. the role of vertical causation behind horizontal linkages) bears the unmistakable mark of Smith's theory

of commanded labour as the fundamental tool for the analysis of economic dynamics. Sraffa's measurement of national income aggregates in terms of commanded labour brings to the fore the growth potential associated with any given amount of production. It also bears the mark of Karl Marx's reading of classical political economy in his *Theories of Surplus Value* (Marx, 1951), as it is related to Marx's view on the central role of labour in the formation of commodity values beyond the alterations that may ensue from particular ownership arrangements.[4]

The Smithian strand is central both in Sraffa's formulation of problems and in his construction of analytical solutions. First and foremost, it is central in Staffa's analysis of the standard system, in his introduction of new theoretical concepts and in his interpretation of the standard system in terms of commanded labour. In a way, Sraffa's introduction of the standard system could be interpreted as a Smithian solution to a Ricardian problem. This is because Sraffa's solution to the Ricardian search of an invariable measure of value leads him to move beyond Ricardo's horizontal point of view and to introduce concepts closely related to Smith's interest in a pure labour explanation of value and wealth. As a matter of fact, through the standard system, Sraffa moves back to the Smithian foundations of classical economic theory and makes it possible to introduce synthetic magnitudes close to central Smithian concepts, and in particular to concepts associated with Smith's consideration of the aggregate labour fund. In this perspective, Sraffa's reading of classical political economy appears to be in line with the view that it is possible to identify fundamental relationships by moving beyond the analysis of horizontal interdependence and considering the vertical connection between productive labour and final consumption goods. Later economists, and in particular Luigi Pasinetti (1993, 2007), have explored the implications of this view for what concerns the distinction between 'pre-institutional' and 'institutional' features of the economic system; they have also explored the structural constraints on system dynamics that this heuristic allows to identify. This is a field of ongoing research that has taken some of the analytical formulations of *PCC* back to the original complexity of Sraffa's research programme.

Bibliography

Baranzini, M. and Scazzieri, R. (eds) 1990. *The Economic Theory of Structure and Change*, Cambridge, UK, Cambridge University Press

Hicks, J. 1977. Capital controversies: ancient and modern, pp. 149–65 in Hicks, J. R. (ed.), *Economic Perspectives: Further Essays on Money and Growth*, Oxford, Clarendon Press

Marx, C. 1951. *Theories of Surplus Value: A Selection from the Volumes Published between 1905 and 1910 as Theorien über den Mehrwert*, edited by Karl Kautsky (transl. by G. A. Bonner and Emile Burns), London, Lawrence & Wishart

Pasinetti, L. L. 1980 [1973]. The notion of vertical integration in economic analysis, pp. 16–43 in Pasinetti, L. L. (ed.), *Essays on the Theory of Joint Production*, London, Macmillan

Pasinetti, L. L. 1981. *Structural Change and Economic Growth. A Theoretical Essay on the Dynamics of the Wealth of Nations*, Cambridge, UK, Cambridge University Press

Pasinetti, L. L. 1993. *Structural Economic Dynamics: A Theory of the Economic Consequences of Human Learning*, Cambridge, UK, Cambridge University Press

Pasinetti, L. L. 2007. *Keynes and the Cambridge Keynesians: A 'Revolution in Economics' to be Accomplished*, Cambridge, UK, Cambridge University Press

---

[4] The relationship between Marx's value theory and the vertical integration point of view was clearly identified by Nikolaj Ivanovich Ziber (1871), in a contribution praised by Marx himself (see Scazzieri, 1987).

Pasinetti, L. L. 2012. Piero Sraffa and the future of economics, *Cambridge Journal of Economics*, vol. 36, no. 6, 1303–14

Pietranera, G. 1963. *Teoria del valore e dello sviluppo capitalistico in Adamo Smith*, Milan, Feltrinelli

Quadrio Curzio, A. and Scazzieri, R. 1983. *Sui momenti costitutivi dell'economia politica*, Bologna, Il Mulino

Quadrio Curzio, A. and Scazzieri, R. 1986. The exchange–production duality and the dynamics of economic knowledge, pp. 377–407 in Baranzini, M. and Scazzieri, R. (eds), *Foundations of Economics: Structures of Inquiry and Economic Theory*, Oxford, Basil Blackwell

Scazzieri, R. 1987. Ziber on Ricardo, *Contributions to Political Economy*, vol. 6, 25–44

Smith, A. 1976 [1776]. *An Inquiry into the Nature and Causes of the Wealth of Nations*, edited by R. H. Campbell, A. S. Skinner and W. B. Todd, Oxford, Clarendon Press

Sraffa, P. 1960. *Production of Commodities by Means of Commodities: Prelude to a Critique of Economic Theory*, Cambridge, UK, Cambridge University Press

Ziber, N. I. 1871. Teoriia tsennosti i kapitala D. Rikardo, v sviazh s pozdniěshimi dopolneniiami i raz'iasneniiami (Ricardo's theory of value and capital, in relation to the latest additions and explanations), *Universitetskiie Izviestiia* (University News) (Kiev), nos 1–2 and 4–11