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The complementarity of the post Keynesian and Marxian paradigms: the case of labour value

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> I sympathise ... with the ... doctrine that everything is *produced by labour*, aided by [the] ... technique, by natural resources ... and by the results of past labour, embodied in assets...
> It is preferable to regard labour ... as the sole factor of production
>
> (Keynes 1936, p. 213-14)

Abstract

Focusing on labour value, this paper shows that post Keynesian and Marxian approaches are complementary rather than contradictory. The argument is based on Pasinetti – one of the most prominent scholars in the post Keynesian tradition. Besides the fact that post Keynesian and Marxian schools share the same classical paradigm, this complementarity results from the fact that the labour theory of value, that some post Keynesians thought to have destroyed, is indeed strongly reinforced by Pasinetti's contribution. In fact, Marx's contention that prices of production are transformed values is analytically confirmed because, in the "natural" system, prices are directly proportional to values. However, in capitalist systems this basic relation is distorted by the existence of workers' exploitation, because prices of production are computed on the basis of a rate of profit higher than the "natural" one.

[1] I thank two anonymous referees for their helpful comments. Usual caveats apply.

I. Purpose

In this article I argue that, on "fundamentals" (i.e. the theory of value), the post Keynesian and Marxian approaches to economic theory are complementary rather than conflictual. My purpose is far from being self-evident because some post Keynesians have explicitly rejected the Marxian theory of labour value as an unnecessary detour to explain prices (of production). Moreover, they considered it as leading to inconsistent results.

To make the subject more appealing for the non-specialist reader I shall start by putting it into the broader context of the competing paradigms that characterise economic thought (section II of the paper). Then, in section III, I shall show that, in spite of many diversities, Marxian and post Keynesian theories share a common ground – the production approach – that calls for the adoption of the theory of labour value. In sections IV and V my thesis is further substantiated on the basis of Pasinetti's contributions: it will appear that, on the basic level of analysis (the "natural" system), the post Keynesian approach reinforces the main Marxian insights by providing the notion of exploitation with further analytical content (section IV) and by showing that, in a growing "natural" system, prices are entirely explained by labour values (section V).

II. On Conflicting Paradigms

1. From the beginning, it may seem useful to recall the evident truth that *all* economic theories are based on a set of general assumptions and a on a "vision" of society which are not logically proven by definition. Faced with an extremely complex reality, the social scientist is obliged to make drastic simplifications in order to distinguish what is essential for the understanding of such reality and what is of secondary importance. The theorising process is thus "a sort of telescope, which is used in both directions: to magnify, in one direction, those aspects on which the theorist has chosen to concentrate; and to shrink, in the opposite direction, ... those aspects that are to play a secondary role" (Pasinetti, 1986, p. 428)[2]. Hence, the scholar makes a reasonable however arbitrary choice,

[2] Hicks (1975, p. 320) expresses the same concept saying that, "In order to analyse, we must simplify and cut down. .... Our theories, regarded as tools of analysis, are blinkers in this sense. Or ... they are rays of light, which illuminate a part of the target, leaving the rest in darkness."

the deep motivations of which are to be found in his "vision" of society. This choice, situated at the pre-analytical level, characterises a school and materialises in a so-called "scientific paradigm"[3].

Of course, the mere fact that the basic hypotheses of any economic theory are not logically cogent does not mean that all paradigms are equivalent. Quite on the contrary, is it important and legitimate to question the "vision" and the unifying principles underlying a theory[4] and to do this from a double point-of-view:

- their pertinence with respect to reality: by focussing our attention on the essential, do the simplifications which are at the roots of the theory help us to attain a better understanding of it ? Or do they rather obscure it by putting at the forefront aspects which are indeed only of secondary importance ?
- their "efficiency", as measured by two criteria:
  i) the profundity of the explanation: do the paradigm and the theory in question allow reaching a deeper understanding of the causes of epiphenomena?
  ii)) the degree of generality, represented by the extent of the phenomena which can be explained within the paradigm.

2. A rational reconstruction of the evolution of economic thought shows that all theories derive from two competing paradigms – one dealing primarily with *exchange* ("catallactics"), the other with *production* (Pasinetti 1965, p. 572-8; Pasinetti 1981, chapter I; Hicks 1975; Baranzini and Scazzieri 1986)[5]. The exchange paradigm provides the foundations of the marginalist theory (or neoclassical theory, as it was denominated later) while the production paradigm is at the roots of the late 18th-19th centuries "classical" economists' "political economy". Leading figures of these latest were Smith, Malthus, Ricardo and Marx.

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3 This term, popularised by Kuhn, refers to a set of theories which, for a certain period, are deemed valid on the basis of past science. It is an "outlook" that implicitly defines the relevant problems and methods in a specific field of research. A paradigm provides the scientific foundations for one or more generations of scholars

4 In Hicks's (1975, p. 320) words: "a theory ....must be well chosen; otherwise it will illumine the wrong things"

5 Bliss (1986) denies this systematisation; Steedman (1998) takes a more cautious attitude.

What distinguishes these two schools is a contrasting notion of what the dominant features of modern societies are. With a view to study the long-term dynamics of capitalist economies as well as income distribution and the relations between social classes, the *classical* economists deemed that, of the two main economic activities – production and exchange – the former was by far the most important. They thus emphasised the reproductive ability of commodities: each individual commodity can be made available in unlimited quantity if we devote enough resources to produce it.

Exchange and the "scarcity" connected with natural resources were not ignored but they were put into the background. Ricardo justifies this choice by noting that the commodities the value of which is determined by scarcity alone "form a very small part of the mass of commodities daily exchanged in the market. By far the greatest part of those goods which are object of desire are procured by labour" (Ricardo 1976, p. 6). In other words, the classicals presupposed exchange and went more in depth by focussing on the production phenomena; hence their main concerns were social relations, social organisation of production and structural change. Sraffa (1960) provided an analytical justification for the classical approach by showing that land and natural resources play the same limited role as the "non-basic" commodities[6] do, in the sense that they do not influence any result concerning the "basic" commodities. Therefore, they can be left out in the first stages of the analysis[7].

The *marginalists* took an opposite stance. Instead of considering man as a producer, they looked at the *individual* as a consumer, whose aim is to maximise the utility he derives from a given stock of resources. The economic problem became primarily a problem of choice and allocation, and the concept of rationality was confined to its narrow sense of maximisation of a utility (or profit) function.

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[6] By "basic" commodities Sraffa (1960) means the commodities that are required, directly or indirectly, for the production of all commodities. "Non-basic" are those commodities which are not technically necessary for the production of basic commodities, though they may be required for their own production.

[7] Thus, when land and natural resources are introduced into the model, we obtain information about their rent and prices, but their effects remain limited to that part of the model that refers to them, without affecting the results of the previous analysis. In other words, this possible extension of the model will not affect the price of "basic" commodities nor modify the profit/wage relationship (Pasinetti 1981, p. 24)

Obviously, marginalists also dealt with production, but this was done by extending to production the analytical tools already developed for exchange (Pasinetti 1981, p. 14-17; Pasinetti 1986, p. 419-421; Baranzini and Scazzieri 1986, p. 27). Thus, production was studied as a particular case of the allocation of given quantities of resources instead of being a process where additional resources are made available. A continuous, convex and differentiable "production function" took the place of the utility function, marginal productivity replaced the marginal utility of the exchange framework and the postulate of profit maximisation was the mirror image of utility maximisation. Labour force, like land, was treated as a scarce resource.

3. To outline the differences between the two paradigms, it is useful to compare their conceptual frameworks, an exercise that is relevant for present day debates since these conceptual frameworks still form the foundations of the post Keynesian and neoclassical theories.[8]

- the *theory of value*
  - as a logical consequence of their production approach, the classicals had a labour theory of value[9]. Emphasising human "sweat and toil" to obtain commodities, they presented an "objective" theory, based on cost: the value of a commodity is determined by the quantity of (direct *and indirect*) labour embodied in it;
  - the marginalists had a subjective theory of value, founded on utility: "value depends solely on the final degree of utility", stated Jevons (1879, p. 178). Desire and consumption replaced the previous notions of cost and labour, and the main reference became the stock exchange instead of the factory[10]. "*To maximise pleasure*, is the problem of Economics" (Jevons 1879, p. 40, emphasis in the original);
- the *origin of profit*
  - for the classicals, profit is a residual income that arises when wages are deducted from the net product of the economic system. For Ricardo this

[8] For this comparison I rely on Baranzini and Scazzieri (1986, pp. 29-47)

[9] This is clear in Ricardo and Marx, while in Smith and Malthus there are ambiguities

[10] Goux (1998, p. 182) notes that "les néoclassiques ne partent pas du monde de l'indigence, de la pénurie, de la disette. Ils partent du monde de l'abondance et de la satieté. *Ils interrogent avant tout l'homme repu*" (emphasis added)

residual is an unexplained magnitude while, for Marx, profit is fully explained by surplus value (i.e. the difference between the value of the commodities and the value of labour employed to obtain them). Income shares are determined by the class structure of society

- for the marginalists profit is the reward of the productive contribution of capital. Class relations are not taken into account and all factors are placed on the same footing. The remuneration of the factors of production exhausts the net product and, when perfect competition prevails, this generates a just income distribution because each factor receives exactly what corresponds to its contribution to production (the marginal productivity);

- the *accumulation of capital*

- for the classicals the accumulation process concerns produced means of production and depends from the magnitude and the distribution of "surplus"[11] between social classes

- for the marginalists capital accumulation arises because individuals decide to postpone their present consumption in order to be able to consume more in the future. As such, it is a special case of exchange (less consumption now is traded with more consumption later);

- the *nature of commodities*

- as already noted, for the classicals is reproducibility. This view of "producible commodity" is dynamic in nature because the focus is on the historical evolution of the production process, technical change and the long-term structural issues determined by income distribution and accumulation

- for the marginalists, it is scarcity. This entails an essentially static approach: at the beginning of each period there is a fixed and exogenously given stock of resources and the purpose of the analysis is to formulate criteria for the best utilisation of these resources;

- the *nature of production process*

- the classicals considered production as a circular process, where commodities are produced by means of commodities

[11] Surplus is the excess of the net product over the total means of production.

– the marginalists followed a one-way avenue, in which given factors of production materialise in outputs which end up in consumption;

• the *method of analysis*

On this point the two paradigms converge:

– the classical method is based on the long-period positions, conceived as the levels the variables assume under the influence of the fundamental and stable forces governing the system. They thus distinguished market values – that reflect all sorts of temporary and accidental factors – from the "natural" (or normal) values, and assumed that market values tend to gravitate towards their natural values

– the marginalists adopted the same method: like the classicals they were concerned with explaining the normal rate of profit and the normal prices. The long-period "equilibrium" of the neoclassical theory is just an adaptation of the classical notion of normal positions.

Of course, the adoption of this method – that was almost universal until the 1930s – did not exclude the analysis of short-term issues, but these studies were performed having in the background a clearly specified long-period theory (Kurz and Salvadori 1998, pp. 6-7).

4. The production and exchange paradigms have always been present in modern economic thought, that evolved in a cyclical way: none of the two rival approaches succeeded in eliminating the other but they were alternatively dominating the scene[12].

The exchange paradigm was presented first, in connection with Mercantilism; then the production paradigm became dominant from about a century, from the late 18th century to the 1870s; it was superseded by the marginalist "revolution", that represented the generally accepted view until the 1930s, when Keynes's *General Theory* produced a regain of interest for the classical approach. The recent history shows the importance (if not really the domination) of the classical paradigm during the long economic expansion of the 1950s and 1960s, and the subsequent take over of the rival paradigm from the long economic stagnation of the 1970s.

[12] In this sense one can argue that there is no real progress in economics, the only advances being confined to the technical aspects within each paradigm.

A question that puzzles economic theorists and historians concerns the causes of the transition from the classical to the marginalist paradigms that occurred in the 1870s. Hicks's opinion (1975, p. 323) that the triumph of marginalism was due to its intellectual superiority is unconvincing, as I have just noticed that marginalism never arrived at definitely defeating its rival approach. Rather, I would tentatively suggest that the true reason for the success of the intellectual revolution of the 1870s be found in the economic and social conditions of that period[13].

I would start by noting that economic thought experienced a phenomenon similar to what happens in long-waves between invention and scientific discoveries, on the one side, and innovations, on the other. While inventive activity follows its own (and unexplained) path, innovations[14] do not appear at random, but requires some precise favourable conditions to materialise. Thus, one usually observes a considerable time lag between inventions/discoveries and the corresponding innovations. For marginalism happened something like this. In fact, during the period in which the classical paradigm was prevailing, there was the publication of two seminal contributions of the competing school – Cournot in 1838 and Gossen in 1854[15] that, nevertheless, were practically ignored. Times became ripe few decades later, under the influence of two kinds of factors.

First, the industrial bourgeoisie – that when the classical paradigm was framing its way was the mounting class, struggling with the old class of land-owners for political power – was firmly settled in power in the 1870s. The theory of labour value was very functional for this ascent – since it emphasised the importance of productive activity as opposed to the passive role of the rentier – but its interest vanished when the industrial bourgeoisie had not to justify any more its position. Moreover, the classical theory of labour value had taken a dangerous turning-point with Marx who, relying on the same classical postulates, demonstrated that at the origin of profit there is exploitation.

Secondly, the social situation was upsetting: Europe was threatened by a revolutionary wave (e.g. the C*ommune de Paris*, 1871) and Socialism was gaining a

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[13] In an interesting paper Goux (1998) shows that the revolution in economic thought had deeper cultural implications, and extended to aesthetics

[14] Innovations are the successful launching on the market of new processes or products.

[15] A. Cournot: *Recherches sur les principes mathématiques de la théorie des richesses*, and H.H. Gossen: *Entwicklung der Gesetze des menchlichen Verkehrs und der daraus fliessenden Regeln für menschliches Handeln* (The Laws of Human Relations),

growing momentum. In such circumstances, "if only one could find an economic theory that made no reference to labour, no reference to means of production, possibly even to production itself.... that would surely be the sort of thing that a frightened Establisment could not but most warmly welcome. Marginal utility provided precisely that." (Pasinetti 1981, p. 13).[15]

Of course I am not suggesting that there was a "plot" to overthrow the classical paradigm to protect the interests of capitalist class, nor that intellectuals were cynical or in bad faith. Reality is subtler than that, as there is a multitude of structures and mechanisms that allow to reach spontaneously the useful results for those who hold power (the cultural formation of economists and their vision of the world, the impact of traditions, the better prospects of career for the scholars adhering to "mainstream", etc.)

III. Post Keynesians and Marxians – common ground and controversiesies

1. After the 1870s the production paradigm practically disappeared, giving the impression of being dead but, as a Karst river, it had a long underground life and reappeared much stronger in the 1930s with Keynes's *General Theory*, temporarily defeating its opponents. Then we assisted to the flourishing of a body of production oriented theories covering macro, meso and microeconomic levels of analysis. They can be classified in six broad groups (Pasinetti 1981, p. 17-19):

- Kalecki's theory of unemployment
- Harrod-Domar macrodynamic model and the post Keynesian theories of growth and distribution
- Leontief's input-output analysis, Sraffa's production of commodities scheme and Pasinetti's multi-sectoral model of structural change

[16] Pasinetti (1981, p. 14) reports the impressive cases of Cournot and Gossen, whose fundamental books were a complete failure when first appeared. Gossen died in 1858 without any glory. However – as Pasinetti writes – three decades later the shrewd publisher R. L. Prager, after realising that marginal theory has become fashionable, bought the old printed material still lying unsold. He added a short foreword, put up a new title page with the new date (1889) and the addition "neue ausgabe", and reissued the book. This time it was a great success.

- the long-wave theory, the neo-Schumpeterian school of technical change[17], as well as the theories of business cycle
- the managerial theories of the firm and the theory of organisations and institutions
- the full-cost principle and the studies of oligopolistic behaviour inspired by these approaches

Moreover, the classical model was completed by introducing into it rent and scarcity (Quadrio Curzio and Pellizzari 1999).

The term of *radical* political economy is now used to encompass the above range of theories that, in spite of their heterogeneity, share the concern for production. Another common feature is that, instead of the neoclassical concept of maximisation, these theories rely on a broader and more realistic notion of rationality. For instance, in the models of structural change rationality consists first of all in learning while, in other models, it manifests itself with the attainment of a satisfactory level of an objective (instead of maximisation); in any case, rationality is always bounded by the knowledge available, irreducible uncertainty and limited computational abilities.

The post Keynesian label was used in the 1950s and early 1960s to designate scholars opposed to the grand neoclassical synthesis of the *General Theory*[18], and was further extended to those Cambridge theorists who, like Pasinetti, reconciled the principle of effective demand with the long-period classical analysis. In what follows I shall refer to post Keynesians in the latter sense, as encompassing the first three groups of production-oriented theories.[19]

Post Keynesian developments stimulated the evolution of Marxian theory, particularly in the 1960s and 1970s under the influence of Kaleckian and Sraffian schools as well as by institutional and evolutionary thought. Thus, market power was organically introducend into the original Marxian framework (e. g. Baran

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[17] The original Schumpeter's ideas are developed by this school on the basis of the evolutionary metaphor and the core concepts of "techno-economic paradigms", "trajectories" and national systems of innovation.

[18] Or the "bastardisation" of Keynes, as Joan Robinson called it.

[19] Note, however, that this classification is not universally accepted. For instance, focusing on methodological aspects, Dunn (2000) maintains that Sraffians should not be integrated in post Keynesian analysis

and Sweezy's *Monopoly Capital*), the theory of labour value found new analytical contents – particularly in connection with the long discussion of the "transformation" problem[20] –, the "laws of motion" of capitalist economies (especially the falling rate of profit) were extensively discussed and assessed at both theoretical and empirical level, the theory of economic fluctuations and crises was enriched by considering the role of institutions (the French theory of *régulation* and the American *Social Structure of Accumulation*).

2. As I stated before, the theory of labour value was the most logical consequence of the classical approach, since labour and social relations were at the centre of the inquiry. Considering that post Keynesians belong to the same paradigm, it would have been legitimate to expect an analogous agreement on "fundamentals". However, things did not evolve so linearly because, in the 1970s, a leading post Keynesian (Steedman 1977) raised two strong objections to the Marxian theory of value, i.e.

(i) at best, to derive prices of production[21] the reference to labour values is redundant because both prices and values are determined by the same physical conditions of production (and the wage rate, for prices; see below);

(ii) even worst, when there is joint production – a rather common case in contemporary economies – labour values could lead to inconsistent results, because positive prices could be associated with negative values.

The first point is easily illustrated by writing the equations of prices of production and labour values. I suppose, to simplify, that the economy uses only circulating capital, and define the technology of the system by a row vector $\mathbf{a}_n$ of direct labour requirements, and a non-negative matrix $\mathbf{A}$ of inputs. Supposing that wages are paid at the end of the production process, and denoting by w and π the uniform wage rate and the rate of profit, the vector of prices of production is:

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[20] The "transformation" problem concerns the relation between labour values and prices of production.

[21] Prices of production are long-term prices determined on the basis of a uniform rate of profit that, in turn, results from inter-sectoral capital mobility and perfect competition in all industries.

$$\mathbb{p} = \mathbb{p}\,\mathbb{A} + w\,\mathbb{a}_n + \pi\,\mathbb{p}\,\mathbb{A}$$

$$\mathbb{p} = w\,\mathbb{a}_n\,[\,\mathbb{I} - (1+\pi)\,\mathbb{A}\,]^{-1} \tag{1}$$

and the vector of labour values is:

$$\mathbb{v} = \mathbb{a}_n\,[\,\mathbb{I} - \mathbb{A}\,]^{-1} \tag{2}$$

The transformation of prices into labour values (and vice-versa) is easily done by multiplication with a linear operator. Taking the wage rate as numéraire ($w = 1$), we have

$$\mathbb{p}\,\mathbb{T} = \mathbb{v} \tag{3}$$

where

$$\mathbb{T} = [\,\mathbb{I} - (1+\pi)\,\mathbb{A}\,]\,[\,\mathbb{I} - \mathbb{A}\,]^{-1}$$

As already said, the "redundancy" argument stems from the fact that $\mathbb{p}$ and $\mathbb{v}$ are derived from the same elements (matrix $\mathbb{A}$ and vector $\mathbb{a}_n$); thus there is no need to compute labour values to determine prices.

3. Marxian scholars reacted to Steedman's objections in two ways. For some of them these criticisms were mortal blows to Marx's labour theory of value and therefore abandoned it (Bandyopadhyay 1984-85). Nevertheless, they tried to rescue the main Marx's insights on capitalism presenting, for instance, a theory of exploitation without the labour theory of value (Hodgson 1980, 1982; Roemer 1982). On the other hand, the orthodox Marxists, besides providing specific refutations of Steedman's thesis, took a defensive stance, organising their counter-critique on two broad lines. A first line of defense consisted in arguing that Marx's logical method is fundamentally different from Sraffa's method (i.e. linear production theory) and thus Sraffian interpretation of Marx is completely misconceived (Moseley 1993). A second line of defense criticised Sraffa's model and its use by some of his epigones (the "neo-Ricardians") to demonstrate that, owing to its numerous drawbacks and limitations (true or presumed), this model cannot be taken as an appropriate reference for studying capitalist society (Mandel and Freeman 1984).

I disagree with all these ways of tackling the problem. Concerning orthodox Marxists, although I share many of their particular criticisms to the neo-Ricardian attack to labour values, I deem that their attitude is fundamentally sterile. As it will appear from this paper, in spite of many important differences Sraffian/post Keynesian approach to the theory of labour value is indeed complementary rather than contradictory with respect to the Marxian approach[22]. As for radicals who rejected Marx on such fundamental topic, I shall try to show that this is a misuse of Sraffa's model, especially in a dynamic context.

In this paper I do not intend to resume the never ending "value controversy" (Steedman ed. 1981), but I pursue the narrower scope of showing how some positive post Keynesian results invalidate the claim that Sraffa has made a fire of Marx's analysis (Colletti, quoted by Roncaglia 1975, p. 151). For this purpose I shall focus on Pasinetti's contributions on structural change and vertical integration (Pasinetti 1981, 1986, 1988), which considerably strengthen Marx's theory of labour value by offering new analytical foundations and providing a generalisation of the "transformation" problem.

IV. THE BASIC LEVEL OF ANALYSIS: PASINETTI's NATURAL SYSTEM

a) Definition

1. The classical tradition is the inspiration for the notion of "natural" system: Pasinetti works out his model by studying "the 'primary and natural' determinants of the variables characterising an economic system", which are prior to, and independent of, any institutional set-up (Pasinetti, 1981, p. 149)[23]. "The [theoretical] problems... that emerge at this stage are either in terms of necessary relations, if certain goals are to be achieved (e.g. full employment, price stability, etc.), or in terms of logically consistent relations, or in terms of normative rules, or in terms of those problems which are generated by the basic forces

[22] For a contribution in this direction see Sinha (1995)

[23] Let us note that, within this context, the "institutional set-up" encompasses also social relations

at work in a dynamic context" (Pasinetti, 1994, p. 41). All these relations can be developed without referring to specific behavioural and organisational assumptions; they reflect the basic characteristics of any modern industrialised economy.

2. In Pasinetti's opinion, the natural system has a double function: it is, first, a *methodological device*; secondly, it shows the goal for the actual economic systems.

The first aspect (the methodological device) is an application of the familiar "step by step method": we start with a system without institutions and, in successive phases of the analysis, we take into consideration institutional aspects. The second aspect (the *normative* dimension) comes from the fact that the natural system brings with it efficiency and fairness. The *efficiency* component applies, for instance:

- to prices, which should decline in accordance with productivity increases;
- to wages, which should increase at the (weighted) average rate of productivity growth of the economic system (the "standard" rate);
- to the rate of profit, which should correspond to what is required by the accumulation of capital in a growing system. In each sector i, the natural rate of profit π_i^* is thus the sum of: (i) the rate of growth of population (g), and (ii) the rate of increase of per capita demand for the corresponding final commodity (r_i) (Pasinetti 1981, p. 130-131):

$$\pi_i^* = g + r_i \tag{4}$$

- to the rate of interest, which has to preserve intact through time the purchasing power of all loans in terms of labour[24].

[24] In Pasinetti's model, the natural rate of profit belongs to the productive sphere whilst the natural rate of interest pertains to the consumption sphere. In fact, if natural prices prevail, and therefore include a natural rate of profit, each sector will receive an amount of profits exactly equal to the amount of its equilibrium investments: enterprises consequently do not need to borrow or lend (Pasinetti 1981, p. 171). At the individual level, however, the situation is different because some persons can decide not to consume all their income (and save) while others want to spend more (and dissave). On this point Pasinetti makes the simplifying assumption that all final commodities are perishable: to have full employment, what is produced in one period should be consumed in the same period, otherwise it is lost forever. Inter-personal lending and borrowing now become possible, and this necessitates financial assets and liabilities, representing claims on future consumption by some individual agents against others.

The *fairness* of the natural system is justified by the fact that income distribution is governed by a "pure labour principle". In fact, "natural" profit is very different from profit in a capitalist society (see below), in such a way that all personal income comes from labour. The work of managers and entrepreneurs is thus remunerated as wages (Pasinetti 1993, p. 126) and does not spring from private appropriation of surplus value, because entrepreneurship is taken as some sort of skill. Moreover, in Pasinetti's model the wage rate is uniform (between sectors as well as for different skills), and this uniformity has a double meaning. As a methodological device, it is just a way to simplify mathematical notations; however, this is the less interesting part of the story because, in the normative context, the uniform wage rate has another fundamental implication, that of setting the objective of an egalitarian society[25, 26].

b) Discussion

3. It should be clear from above that "natural" in Pasinetti's sense is indeed completely different from what "natural" means for the first classical economists, such as Smith, Stuart Mill, Malthus and Ricardo. For them, the notion of natural magnitudes and natural economic laws was grounded on their explicit or implicit commitment to philosophical naturalism (Salanti 1994), and the system which results is characterised by social harmony. We are now aware that this so called "natural order" in fact amounts to an apology for capitalism, because its "natural" character is a means to show that such system is universal and legitimate. One of the main consequences is that exploitation is concealed. Let us think, at this purpose, to the "natural" wage rate which, for the Classicals, is given by the social "norm" of maintenance of workers – a norm that is gener-

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It is clear from above that, in the natural system, the rate of interest is conceptually very different from the rate of profit. In capitalist economies, however, things appear different because the institutional set-up distorts relations operating at the fundamental level. In fact, financial markets are open to both individuals and firms: lending and borrowing among individuals are not separated from lending and borrowing among enterprises and all financial transactions occur in the same financial market. This creates the well known tendency for the real interest rate and the general rate of profit to equalise (Pasinetti 1981, p. 175)

25 For an interesting and thorough analysis of the desirability and feasibility of a society based on a uniform wage rate see Leroy (1985)

26 I thank professor Pasinetti for drawing my attention on this point, which is not treated explicitly in his writings

ated by custom and convention. When the working class is weak, this "norm" could be very low[27] and, by presenting it as the result of some "natural" economic law – a law which is as inescapable as the laws of physics – exploitation is not perceived any more.[28]

On the contrary, for Pasinetti the concept of "natural" refers purely to the logical level of the analysis, and has a normative content which has nothing in common with the content it assumes *de facto* with the first Classical economists. In fact, as a *methodological device*, "natural" simply means "pre-institutions". It is not a description of real world but an abstract construction which allows to discover, at a deeper level of analysis, what is there below and (logically) before actual economic systems, in which social relations and institutions play a fundamental role.

4. However, one can object that it is illusory to pretend to conduct the analysis making a complete abstraction from institutions and social relations. For instance, production is not a purely "engineering" phenomenon but, rather, a *social* as well as a physical process (Hodgson 1994, p. 47-48): the coefficients of the input-output tables are not at all institutions-free, but reflect the prevailing social and power relations[29]. Similar considerations can be put forward for prices and profits.

If we consider the natural system as a methodological device, it seems to me that the above criticism is not pertinent. In fact, the input-output tables that we consider at this basic level of analysis are not the concrete tables (referring to a specific country and year) but abstract tables, in which the similarity of their technical coefficients with the same coefficients of the real tables is purely for-

[27] To take a to-days' example concerning the USA, let us think to the thousands of people working for a wage which, according to the official standard for "poverty", is at the poverty level

[28] The term exploitation is not used here in its technical sense of the private appropriation of surplus value

[29] At this purpose, the long waves theory gives an interesting example showing that the availability of knowledge is a necessary but not a sufficient condition for technical change. As already noted, historical experience shows that quite often there was a very long delay between basic scientific discoveries and inventions, on the one hand, and their practical implementation as radical innovations, on the other (Van Duijn 1983, p. 176-179; Marchetti 1980). This is because radical technical change is adopted not only in response to market conditions but also as a capitalists' reaction to class struggle, to gain a stricter control of the labour force (Rosier and Dockès 1983). In this sense technology "incorporates" the social relations of each period.

mal. The true question is whether it is meaningful to conduct the analysis in two logical stages, as indicated above. In my view the answer is positive (paragraph 3 below).

Nevertheless, I think that Pasinetti's definition of the natural system must be slightly reformulated. As a matter of fact, the natural system is not build in an institutional *vacuum*, but there is a minimum set of institutions which is common to many (and alternative) actual systems, such as the State, the market and financial institutions. As suggested by Pasinetti himself, this makes possible "to abstract from a precise *description* of institutions as these are different from country to country" (Pasinetti 1994, p. 59-60; see also Bortis 1993).

The institutional kernel implicit in the natural system is very limited and so general that, in practice, it is not particularly binding. Let us consider, for instance, three basic institutional forms: Government, market and the wage relationship.

One of the results of the model is that full employment is never attained automatically but requires an active economic policy. Having stated this, the model leaves room for several institutional arrangements, because such a policy could be implemented in many alternative ways: different types of planning, or agreements with the Unions or whatsoever.

Pasinetti's model postulates some form of market (commodities should be bought by somebody). However, this is not as institutionally constraining as in the neo-classical general equilibrium system, in which the market materialises in pure and perfect competition. In fact, Pasinetti's model provides the basic "technical" results which come before the influence of market structures; institutional analysis will modify these results considering the features of the real markets. The model allows a lot of flexibility: for instance, the profit rate can be different from one sector to another because of non-competitive market structures.

The mere existence of wages could presuppose two social classes. However, on this point also Pasinetti's model is flexible, because nothing prevents us from considering a self-managed economy in which workers decide on the amount and allocation of surplus.

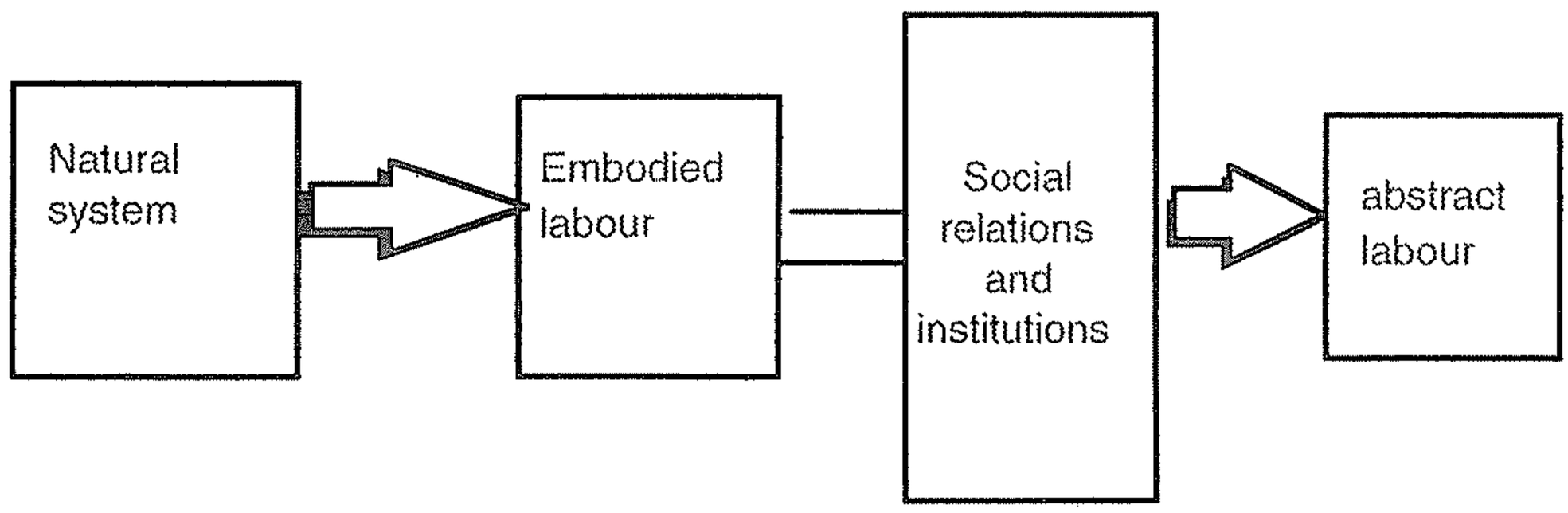
c) Complementarity with the Marxian approach

5. On this aspect I have to say that, in spite of my strong appreciation of Pasinetti's contribution, for quite a long time I have been very hesitant about accepting his idea of the natural system. In fact, my Marxian background had accustomed me to conduct economic analysis within the framework of a capitalist society, and a model in which social relations are absent was repugnant to my principles. However, a deeper reflection led me to the conclusion that, as an *analytical device*, the natural system is not at all misleading. On the contrary, it is an indispensable methodological perspective for discovering the basic relations and mechanisms which determine what appears in concrete economic systems.

To illustrate this, consider labour values. Within the natural system we derive *embodied* labour, which is the necessary logical step which precedes value as abstract labour. This analytical distinction has its empirical counterpart in production and exchange, in the sense that production creates value (embodied labour) while the validation of private labour through exchange determines the magnitude of value. This process is depicted in figure 1.

Figure 1

From the natural system to abstract labour



6. The concept of natural profit gives further analytical content to the Marxian notion of exploitation.

In fact, we can distinguish two components of exploitation which are quantitatively encompassed in surplus value: I would call them exploitation from "pure alienation" and exploitation from "pure appropriation". The first type of exploitation comes from the fact that, in a capitalist society, the *technical* relation of investing a share of social product to expand productive capacity becomes a *social* relation, which is performed by a class of people (the capitalists) who enjoy the privileges associated with that social role, in terms of income, power and prestige (Medio 1972, p. 329). The second component of exploitation ("pure appropriation") is the difference between total capitalist profit and what is required for the expansion of the economic system.

Natural profit provides the way to quantify what, in a capitalist society, corresponds to the two types of exploitation and, by showing the exact magnitude of what is technically required for accumulation in a growing system, it strengthens the awareness that capitalists usurpate such a function.

7. A close examination of the no*rmative* dimension of the natural system leads to the conclusion that, in fact, this system is incompatible with capitalism (Reati 1994, p. 53-54).

As we have already seen, the first aspect that puts the natural system at odds with capitalism is the egalitarian project connected with the uniform wage rate. An investigation of the practical meaning of the natural rate of profit confirms the above conclusion.

To justify my assertion, let us compare the mass of profits in the natural system with the profit in a capitalist system. As noted above, in the former the work of entrepreneurs is remunerated as wages; thus, the mass of profits equals the amount of new investments (depreciation being already accounted as a cost). As far as capitalists cannot directly appropriate this portion of total surplus (in the sense that it must be invested), no profits accrue to them, and they will never accept this. They would claim, for instance, that (extra) profit is necessary to compensate for the risk in a permanent way, not just occasionally as in the case of the Schumpeterian profit accruing to innovators. The argument also holds

with managerial capitalism, since the remuneration of top management has two components: a fixed one, represented by the salary, and a variable one which is profit, i.e. a share of the surplus exceeding the self-financing of investment. In the natural system this latter part of a top manager's salary does not exist ... and, moreover, the wage rate is uniform.

It follows that when we say that economic policy should aim to realise the natural system, we implicitly criticise capitalism, because, contrary to the natural system, there is a private appropriation of social surplus which has no theoretical justification. In other words, the search for the institutions which could implement the natural system is, de *facto*, an enquiry on the transition from capitalism to an alternative system (a market socialism or a self-managed economy, for instance).

Let us now pass to some analytical results, which confirm the Marxian insights on labour value.

V. Values and prices in the natural system...

1. One of the difficulties of the labour theory of value is that, in a capitalist system, the transformation of labour values into prices of production does not end up with a direct proportionality between values and prices. It is only in a dynamic context that such proportionality can be found, but at the price of very restrictive hypotheses. In fact, this can happen only if the system in on a von Neumann growth path, in which all industries expand at exactly the same rate, and capitalists' consumption is nil (Morishima 1973, chapter 12).

Pasinetti (1988) goes one step further by finding the same kind of result for a *natural system* in which each sector grows at its own rate, which is different from the rate of all the other sectors. With capitalism this proportional link between prices and values is broken because the (uniform) rate of profit is different from the natural rate of profit π_i^*, the difference being the "pure appropriation" component of capitalist profit. Exploitation is thus the cause of the discrepancy (non-proportionality) between values and prices. This novel post Keynesian finding strengthen considerably the Marxian insights on the topic because it demonstrates that, at the roots of prices of production (and conse-

quently of market prices[30]) there is labour value. In real economies this is not immediately apparent because the basic relationships are distorted by the capitalist social structure. This result should also eventually settle the discussion on the "transformation" problem.

2. For the analytical demonstration of the above contentions, let us refer to a closed economic system with no joint production[31] and consider first the quantity system.

a) Physical quantities and dynamic labour values

Fixed capital is treated with the simplifying hypothesis of linear depreciation: in all industries a constant proportion ($1/T_i$) (i=1,2,...,m) of fixed capital drops out of the production process each year, where T_i corresponds to the average physical life of capital goods in sector i; of course, T_i could differ between industries[32].

The technology of the economic system is characterised by two elements:

(i) a row vector $\mathbf{a}_n$ ($1 \times m$) of direct labour requirements, and

(ii) a non-negative matrix $\mathbf{A}^{st}$ ($m \times m$), where each column j shows the amount of physical stock of fixed and circulating capital required to produce a physical unit of goods i. $\mathbf{A}^{st}$ is the sum of two other matrices, one concerning the stock of circulating capital ($\mathbf{A}^c$) and the other the fixed capital ($\mathbf{A}^f$) :

$$\mathbf{A}^{st} = \mathbf{A}^c + \mathbf{A}^f \tag{5}$$

30 I recall that, in the Classical approach, market prices deviate from prices of production because of disequilibria between supply and demand as well as for non-competitive market structures.

31 This is also the assumption of national accounting when defining "branch" as opposed to "sector". In fact, the first concept refers to an homogeneous activity ("product"), which implies that the activities of multi-product enterprises are split into different branches. On the contrary, "sector" groups enterprises according to their main activity. Sectoral data are thus heterogeneous since they include not only joint products but also the other commodities produced or traded by the company alongside its main activity.

32 Pasinetti (1988) deals with the general case, in which fixed capital is treated as a joint product. Thus he introduces the output inter-industry matrix **B**.

To transform that into flows, let us define the diagonal matrix $\mathbb{D}$, having the $(1/T_i)$ on the principal diagonal, and a new matrix $\mathbb{A}^{fl}$ of technical coefficients where, in place of fixed capital stock, there is the flow of depreciation:

$$\mathbb{A}^{fl} = \mathbb{A}^{c} + \mathbb{A}^{f}\,\mathbb{D} \tag{6}$$

Let us now suppose that there is no technical progress (i.e. the elements of $\mathbb{A}^{fl}$ and $\mathbb{A}^{st}$ remain constant) and no problems of full employment or shortage of labour power because of immigration, as in Pasinetti (1988, p. 126). This analytical device assures a continuous adaptation of the labour force to the requirements of production: workers are allowed to come in when demand is strong, and leave the country when demand slackens, in such a way that there is always full employment.

The system grows because demand increases. For any final commodity *i*, the percentage rate of change of demand is made up by two elements: (*i*) a general term *g* (the growth of population), which influences in a uniform way the demand for all commodities, and (*ii*) a specific element r_i, which in general is different from one consumption good to another ($r_i \neq r_j$). This growth of demand requires that, in each period, the output of capital goods increases not only for the replacement of the worn-out capacity but also to provide new investment for the expansion of final demand for commodity *i*, at the rate $g + r_i$.

The system of physical quantities at time t is:

$$\mathbb{X}(t) = \mathbb{A}^{fl}\,\mathbb{X}(t) + \mathbb{A}^{st}\,\mathbb{G}(t)\,\mathbb{X}(t) + \mathbb{C}(t) \tag{7}$$

$$L(t) = \mathbf{a}_n\,\mathbb{X}(t) \tag{8}$$

$$\mathbb{S}(t) = \mathbb{A}^{st}\,\mathbb{X}(t) \tag{9}$$

where :

$\mathbb{X}(t)$ is the column vector of the physical quantities of the *m* commodities produced in year *t*;

$\mathbb{G}(t)$ is the diagonal matrix having the $(g + r_i)$ on the principal diagonal

$\mathbb{C}(t)$ is the column vector of consumption goods produced in year *t*;

L(t) is total employment (scalar)

S(t) is the stock of capital goods at the beginning of year *t*.

Let us also define the row vector of dynamic labour values (t) (the "vertically hyper-integrated labour coefficients", in Pasinetti's terms[33]), which refer to the direct and indirect labour incorporated into commodity *i* (*i* = 1,2, ... , *m*) *plus* the total labour incorporated into the stocks of means of production which, in each period, are required to meet the increased demand for commodity *i*:

$$\ell(t) = \mathbf{a}_n\,[\mathbf{I} - \mathbf{A}^{fl} - \mathbf{A}^{st}\,\mathbf{G}(t)]^{-1} \tag{10}$$

b) The price system

To understand the meaning of the natural price system in the growing economy in question, let us refer preliminary to a capitalist system, in which the profit rate is assumed uniform because of competition. The well-known formula is

$$\mathbf{p}(t) = \mathbf{a}_n\,w + \mathbf{p}(t)\,\mathbf{A}^{fl} + \pi\mathbf{p}(t)\,\mathbf{A}^{st} \tag{11}$$

where

p(t) is the row vector of prices of production in year *t*

w is the uniform wage rate

Comparing the capitalist profit rate with the natural rate of profit π^* we notice that, usually, π is higher than π^* because of the already noted "appropriation" component (δ_i):

$$\pi = \pi_i^* + \delta_i \tag{12}$$

In matrix terms (taking into consideration formula 4):

$$\Pi = \mathbf{G}(t) + \Delta(t) \tag{13}$$

[33] The term "hyper" means: growing

where

Π is the diagonal matrix of the uniform rates of profit

$\Delta(t)$ is the diagonal matrix of the δ_i (i.e. $\pi - \pi_i^*$, for each i)

Rewriting formula (11) taking into account of (13) and developing we have:

$$\mathbb{p}(t) = \mathbb{a}_n\, w + \mathbb{p}(t)\, A^{fl} + \mathbb{p}(t)\, A^{st}\, \Pi$$

$$\mathbb{p}(t) = \mathbb{a}_n\, w + \mathbb{p}(t)\, A^{fl} + \mathbb{p}(t)\, A^{st}\, G(t) + \mathbb{p}(t)\, A^{st}\, \Delta(t)$$

$$\mathbb{p}(t) = \mathbb{a}_n\, [\mathbb{I} - A^{fl} - A^{st}\, G(t)]^{-1}\, w + \mathbb{p}(t)\, A^{st}\, \Delta(t)\, [\mathbb{I} - A^{fl} - A^{st}\, G(t)]^{-1}$$

and (by (10))

$$\mathbb{p}(t) = \ell(t)\, w + \mathbb{p}(t)\, A^{st}\, \Delta(t)\, [\mathbb{I} - A^{fl} - A^{st}\, G(t)]^{-1} \tag{14}$$

This is a remarkable result because it shows that, in the natural system (where $\Delta(t) = 0$) prices are directly proportional to labour values. In fact, in such a case the second term on the right of formula (14) vanishes and prices becomes:

$$\mathbb{p}(t) = \ell(t)\, w \tag{15}$$

It is only when the profit rate does not correspond to the natural one that this proportionality is broken, the distortion being due to the capitalist appropriation of a part of surplus value. These analytical developments reinforce Marx's insight that at the roots of prices of production there is labour value.

VI. ... AND IN CAPITALIST ECONOMIES

1. It is worth noting that the above results obtained within the framework of the "natural system" are not just a logical exercise but reflect quite precisely what happens in real economies. In fact, the bulk of available empirical research leads to the conclusion that labour values are the best approximation of prices of production and market prices, in terms of levels as well as in terms of their movements over time. This is because, quantitatively, the underlying technical

structure of production (i.e. total – direct and indirect – labour embodied in commodities) dominates the complex influence of the rate of profit in the transformation of labour values into prices (matrix **T** in formula 3 above).

Indeed, mainstream economists are well aware of the strong *long-term* inverse relationship between the increase in labour productivity and the declining evolution of prices (measured in terms of a numéraire that neutralises inflation) but, curiously, they do not draw the obvious conclusion that this is a confirmation of the theory of labour value. In fact, since by definition productivity is the inverse of value,[34] to ascertain a correlation between prices and productivity[35] is equivalent to saying that the same correlation exists between prices and labour values.

2. A first systematic enquiry of the long-term evolution of (market) prices was undertaken by Fourastié (Fourastié 1969; Fourastié and Bazil 1984), who considered the set of the main reproducible commodities and services sold in large quantities in France over almost two centuries[36]. Although Fourastié did not aim to test the link between prices and labour values, his results are useful for this purpose because they show that price evolution was correlated with labour productivity.

Also Marzi and Varri's (1977) research on productivity changes in the Italian economy further confirms the connection between labour values and prices of production. Taking Sraffa's model as a theoretical framework, they calculated the prices of production for each of the 25 input-output table industries for 1959 and 1967. This calculation was performed for uniform profit rates (π) ranging from zero (when wages take all the net product and hence prices of production equal labour values) to P, the maximum rate of profit that is obtained when $w = 0$ (in this case ($P = 0.80$)[37]. Since, at the time, no data on fixed capital stock were available, the authors had to retain circulating capital only (as in formula 1 above).

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[34] The pertinent concept is the productivity of *total* labour, i.e. labour directly engaged in the production of the commodity in question *plus* labour required for the corresponding means of production (circulating and fixed capital). Such a concept is entirely different from the neoclassical notion of "total factors productivity".

[35] For a theoretical proof of this relation, that becomes a causal link, see Pasinetti's (1981) model.

[36] To take out inflation, Fourastié choose the wage rate as numéraire. Nominal prices were thus divided by the hourly wage of an unskilled worker.

[37] P is determined by the technical structure of the system. More precisely, considering the economic system summarised by formula (1), P is the inverse of the dominant eigenvalue of matrix $\mathbf{H} = \mathbf{A}\,(\mathbf{I} - \mathbf{A})^{-1}$.

Marzi and Varri's results were used by Shaikh (1984, pp. 71-74), who juxtaposed the sectoral labour values (when $\pi = 0$) with the prices of production obtained on the basis of (a uniform) $\pi = 0.40$ (the midpoint between the two extremes). A cross-sectional comparison of the *levels* of the two variables for a given year shows that the typical percentage deviation (the absolute value of the average price/value deviation as percentage of the average price) was about 17% for 1967, and 19% for 1959. The evolution over time confirms the close relationship between the two: on average, from 1959 to 1967, almost 92% of the changes in prices of production were explained by changes in labour values.

Ochoa (1989) measured the deviations of prices of production from labour values and market prices for the US economy during the years 1947, 1958, 1961, 1963, 1967, 1968, 1969, 1970 and 1972, using the 71- industry input-output tables and the corresponding series of fixed-capital stock. The results show clearly that labour values are strongly connected with prices of production: in fact, the average values/prices of production deviations for the nine years – measured with three different statistics[38] – were quite small (around 17%), and similar results come out for the deviations between values and market prices.[39] Ochoa's comment on this was that "the 'transformation problem', therefore, appears to be of limited importance" (id., p. 420). Shaikh (1998) further reworked Ochoa's data applying a more sophisticated procedure. The general conclusion was that, at the empirical level, labour values turn out to be "an extremely good approximation of ... prices of production....and hence an equally good explanator of market prices" (Shaikh 1998, p. 243).[40]

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[38] They were: the mean absolute deviation, the mean absolute weighted deviation and the normalised vector distance (Ochoa 1989, p. 419)

[39] As precised by Shaikh (1984, p. 233), Ochoa computed prices of production using the actual uniform rate of profit in each input-output year.

[40] Petrovic (1987) empirical findings for the Yugoslav economy in 1976 and 1978 show the same order of magnitude on value/price deviations

VII. Conclusions

1. Focusing on "fundamentals", in this paper I have shown that post Keynesian and Marxian approaches are complementary rather than contradictory. Besides the fact that post Keynesian and Marxian schools share the same Classical paradigm, this complementarity results from the fact that the labour theory of value, that some post Keynesians thought to have destroyed, is indeed strongly reinforced by Pasinetti, one of the leading exponents of the post Keynesian thought.

In fact, Marx's thesis that prices of production are transformed values is analytically confirmed because, in Pasinetti's "natural system", prices are directly proportional to values. However, in capitalist systems this basic relation is distorted by the existence of workers' exploitation, because prices of production are computed on the basis of a rate of profit higher than the natural one.

2. Pasinetti's natural system could be difficult to accept by Marxists because it encompasses an extremely limited set of social relations and institutions. Contrary to this, I argued that, as a methodological device, this way of approaching reality is fully acceptable. First, by providing new analytical content to the notion of exploitation, this concept helps in developing a Marxian analysis of society. Second, an approach based on the concept of "natural system" is not at all preclusive of a more realistic analysis that takes full account of class and social relations in a further phase of the inquiry. Furthermore, as a goal for economic policy, the "natural system" contains an egalitarian project that is in line with the long term Socialist objectives for society.

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