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EQUILIBRIUM AND DYNAMICS IN MARX AND THE CLASSICS: A COMPARATIVE STUDY

Giovanni Scarano
Roma Tre University
Department of Economics
E-mail: giovanni.scarano@uniroma3.it

Abstract

The paper discusses the possible presence and role of the concept of equilibrium in the formulations of the 'classical economists' and Marx, also examining the characteristics of the 'long-period positions' attributed to these authors.

The paper argues that the 'classical economists' and Marx only considered all real economic phenomena as momentary results of an unstoppable historical and dynamic process, characterised by continuous conflicts and recompositions. In this context, so-called long-period positions could play a role in determining the dynamics of adjustment without ever being the point of arrival or stasis. This means that, for these authors, long-period positions could be drivers of the gravitation of economic variables, but not necessarily final resting points.

It is also argued that the concern to determine the long-period positions of the prices of production did not have a central place in Marx's analysis.

Key Words: Equilibrium, Dynamics, Attractor, Long-Period Positions, Uniform Rate of Profit, Classical economists.

JEL Classification Codes: B120, B140, B510, D500, E320

1. Introduction

Today, the notion of equilibrium is the cornerstone of most theorisation in economics. It is therefore not surprising that many historians of economic thought search for it, or its embryonic cores, even in the early stages of modern political economy (Mosini 2007).

However, the meaning and role of the notion of equilibrium itself have undergone so many profound changes over time that we can almost find as many meanings of the term as there are economists (Machlup 1958). Moreover, there is no consensus on what role, if any, this notion played in the theoretical frameworks of early political economy. Therefore, in order to discuss the presence and role of the notion of equilibrium in the early stages of economic thought it is first necessary to clarify the different notions of equilibrium that we have to refer to.

The main notion of equilibrium in economics – drawn from mechanics (Knight 1969 [1935]: 161; Samuelson 1943) – refers to the equal weights that must be placed on the two arms of a lever pivoted at its centre in order to balance it, and to the fact that the effects of a force can annihilate the force itself, as in the case of water finding its level (Arrow 1968). The notion of general equilibrium, therefore, usually needs a set of mathematical relations, in the form of equations, which must express a balance of forces (Arrow 1968) and every equilibrium has to be characterised by the forces at play. This notion of economic equilibrium, of course, presupposes a mathematisation of economic theories that was only fully developed after the period of classical political economy, and it is extremely difficult to find it or its embryonic cores in the early stages of economic thought.

The notion of equilibrium in today's economics, however, is often only a methodological device in abstract theory. It is a 'useful fiction' – i.e. a mental experiment – designed to analyse causal connections between 'events' or 'changes of variables' that is usually employed in 'models' with several interrelated variables (Machlup, 1958).

From this viewpoint, equilibrium can be defined as 'a constellation of selected interrelated variables so adjusted to one another that no inherent tendency to change prevails in the model which they constitute (Machlup 1958). It is a 'state', in which we do not necessarily observe 'forces' that can produce changes in the involved variables. Thus, no explicit 'balance of forces' has to be implied and the term 'equilibrium' can merely assume the 'neutral minimal sense' of a mathematical solution to a model (Caravale 1997). This meaning of the term equilibrium is again a mathematical one, but it can also be applied to the objective conditions of *viability* for the actual functioning of the economic system, which can be easily investigated in non-mathematised theories. Again, however, the ultimate significance of the notion of equilibrium depends on the fundamental forces, if any, at work in determining these viability conditions as actual dynamical attractors for the variables of the economic system.

There is also an 'apologetic' notion of equilibrium, which is associated with harmonious views of hypothetical economic systems – with no class antagonisms or conflicts of interests – where there are automatic mechanisms capable of bringing the main economic variables – such as the allocation of the available resources, the functional income distribution of the social product between the factors of production and the prices of goods – to their optimal values for social welfare (Caravale 1997). This notion, of course, takes the form of a *value-judgement* on an alleged spontaneous tendency towards *social harmony* in market economies and can be in turn easily investigated in the early stages of economic thought.

Finally, some Sraffa's followers, who usually deny any close continuity between the analytical approach of 'classical economists' and that of the later 'marginalists', emphasise in turn that the 'marginalists' 'shared with the previous classical tradition of Adam Smith and David Ricardo the aim of determining long period positions [LPPs]' (Petri 2004: 4) and sometimes consider the 'natural' and 'normal' prices of Smith and Ricardo and 'production prices' of Marx to be components of a 'long-run equilibrium' price system (Bellino 2011).

The notion of LPPs, indeed, was precisely defined by Sraffa's followers in order to cover both the Marshallian notion of 'long-run equilibria' between supply and demand and the notion of 'position of the economic system characterised by 'natural' prices, wages and profits attributed to whom they call 'classical economists' (Garegnani 1976). In the neo-Ricardian approach (Hahn 1982), however, the term 'position' is preferred to 'equilibrium' to emphasise in 'classical economists' the absence of any role played by the balance of supply and demand in determining these values.

Nevertheless, the notion of LLP has been, from its origins, closely associated with that of "gravitation" of market prices around it. Thus, as far as gravitation is viewed as a deterministic dynamical process[1] (Nikaido 1983, 1985; Boggio 1985; Hosoda 1985; Duménil and Lévy 1987; Kubin 1989; Bellino 1997; Bellino & Serrano 2018), it can give LPP the meaning of *centre of gravity* or dynamical attractor, which – when implemented – no longer induce changes in itself or other variables. Yet in dynamics this is a typical feature of equilibrium, understood as a situation in which there is no change. From a dynamical viewpoint, therefore, LPPs can be viewed as equilibrium points to all intents and purposes – even though their values are not determined by the balance of supply and demand.

Thus, in Section 2, we discuss the presence and role, if any, of the notion of equilibrium as viability and harmony condition as well as the presence and role of LPPs in the works of the Physiocrats, Smith and Ricardo, who – according to Marx – characterised 'political economy in its classical period' (Marx 1989a [1861-1863]: 30).

In Section 3 we discuss some of Marx's views that are often understood as examples of naive general equilibrium schemes or LPPs, trying to show how they can be viewed from a completely different analytical perspective.

2. **Equilibrium and dynamics in the "classical political economy"**

2.1.The Physiocrats

The Physiocrats first emphasised the essential circularity of the production process (Blaug 1985). Quesnay, in fact, described the economic process as a whole – with each part viewed as dependent on and interconnected with every other part, and with the different parts held together through mutual market exchanges. The modern schemes of

[1] There is also a stochastic interpretations of gravitation, in which LPPs are considered as *normal macrostates*, which can emerge also by a state of randomness at the micro level of elementary economic agents (Parrinello 1990, 1998, 2013; Parrinello & Fujimoto, 1995). However, normal macrostates are only peculiar kinds of *normal state*, which is the general notion to which, according to Parrinello himself, all the notions of equilibrium in economics can be traced back (Parrinello 1998).

general economic equilibrium since Walras and Pareto, in turn, were themselves certainly characterised by emphasising the interdependence of markets. However, this interdependence was dealt with in rigorous mathematical terms (Ingrao & Israel 1990).

The attempt to use procedures similar to those adopted in the natural sciences to describe economic phenomena is evident in the work of the Physiocrats who derive their name from it. They attempted a quantitative representation of economic processes, paving the way for the mathematisation of the social sciences. Condorcet, in turn, explicitly formulated a global project of *social mathematics*, with the aim of founding a rational science of human behaviour using the same analytical methodologies as physics, which stimulated the work in applied statistics and quantitative studies of many other Physiocrats (Ingrao & Israel 1990).

Moreover, the *Tableau Économique* of Quesnay can be easily converted into a closed Leontief table (Phillips 1955; Barna 1975; Pasinetti 1977; Blaug 1985). Therefore, insofar as Leontief's input-output model can be considered a special case of the Walrasian general equilibrium system – as Leontief himself suggested (Leontief 1941, 1966; Davar 1989) – the same can be done for the *Tableau* (Negishi 1989). Schumpeter, indeed, believed that it 'was the first method ever devised in order to convey an explicit conception of the nature of economic equilibrium' (Schumpeter 1986 [1954]: 232).

However, the parallel with the Walrasian general economic equilibrium cannot be pushed too far. Indeed, Quesnay, although he recognised interdependence between economic variables, broke the chain of causes and effects, emphasising some factors as primary and major causes (Meek 2003 [1962]).

According to Quesnay and other Physiocrats, the quantity of the entire social product was determined by the level of agricultural production, which in turn was determined by the size of the net product, because landowners spend more on agricultural products when the net product increases (Meek 2003 [1962]). The *Tableau Économique* of Quesnay, therefore, describes what we can see today in modern terms as a stationary state of an economic system of the *ancien régime*, with rent but no profit.

A stationary state, of course, is a dynamic equilibrium. However, Quesnay's scheme was not actually analysed in a dynamic context.

The first specific contributions paving the way for general equilibrium theory are often attributed to Isnard and Canard – lesser-known figures in intellectual circles influenced by the Physiocrats who were partly on the critical side – in which the ambitious task of constructing a "rational mechanics" of exchange was first formulated (Ingrao & Israel 1990; Mosini 2007).

However, the comparison between the mechanical equilibrium of gravitational forces and the harmonisation of opposing individual interests within society had also been typical of 18th century English moral philosophers who in turn had influenced the laissez-faire economic doctrine of the Physiocrats.

According to Quesnay, society is governed by laws established *ab aeterno*. The *natural laws* of the social world, like those of the physical world, are an expression of universal harmony, "the general order of the formation of the universe" (Ingrao & Israel 1990). This natural order, however, is not already expressed in the history of nations, which – due to human imperfections – are often characterised by 'disorder'. The 'natural' laws of the social world are only ideal rules discovered by reason which must become necessary rules for good government.

Thus, even though the 'ideal state' illustrated by the *Tableau* can be viewed in modern terms as a 'dynamic equilibrium', it was rather a view of *social harmony* – or better, of right proportions between the different spheres of production. In the *Tableau*, moreover, no adjustment forces are explicitly considered in the case of possible disproportions (Meek 2003 [1962]).

Turgot, in turn, regarded 'capitals' as 'accumulated movable values', and consequently dealt with the rate of profit and interest on money as the opportunity cost of spending money as capital rather than on the purchase of land – i.e. as the average proportion of the rent to the price of land. From this viewpoint, he considered the average rate of profit and interest on money to be *in equilibrio* – through arbitrage – with the relationship between rent and land price (Marx 1988 [1861-1863]: 356).

However, the first explicit use of the term 'equilibrium' in economics is attributed to James Steuart (Milgate 2008). In Chapter X of his *An Inquiry into the Principles of Political Oeconomy,* Steuart used this term with reference to the balance between 'work' – understood as supply by manufacturers – and demand (Steuart 1767: 217). He states that:

> when we say that the balance between work and demand is to be sustained in equilibrio, as far as possible, we mean that the quantity supplied should be in proportion to the quantity *demanded*, that is, *wanted*. While the balance stands justly poised, prices are found in the adequate proportion of the real expense of making the goods, with a small addition for profit to the manufacturer and merchant (Steuart 1767: 217).

Equilibrium, therefore, is the proportion between supply and demand that guarantees a 'right' or 'fair price' – i.e. a price that equals the cost of production plus a small profit. Out of the equilibrium, demand excesses could push prices to increase over the 'right price'. However, in this case, competition between manufacturers will increase their supply, pushing the prices again to their 'right' level.

2.2. Adam Smith

Adam Smith embraced many of the ideas of the Physiocrats, including that of 'natural price'. When talking about the *natural and market price of commodities*, in chapter VII of Book I, Smith says that:

> When the price of any commodity is neither more nor less than what is sufficient to pay the rent of the land, the wages of the labour, and the profits of the stock employed in raising, preparing, and bringing it to market, according to their natural rates, the commodity is then sold for what may be called its natural price (Smith 1976 [1776]: 72).

Natural prices, therefore, are seen as possible actual prices qualified by satisfying the 'natural rates' of income of the participants to production process. These 'natural rates' of income, however, are not theoretical notions, but they are rather 'ordinary' – i.e. usual and customary values (Kurz & Salvadori 1995: 1–4). No economic law is identified for their determination.

In this passage, when Smith speaks of the 'natural rates' of the three main forms of income, he means – in common parlance – simply the amounts of money that are normally paid to their recipients, according to the current social conventions and morals. Since the 'wage rate' is usually intended as the amount paid to a worker per unit of time or per unit of output, the 'profit rate' is simply the amount of profit, expressed as a percentage of the initially invested capital, that must be achieved for a venture to be sound. Smith's 'natural rates', therefore, retain 'some flavour of *jus naturalis* notion of the just price' (Roncaglia 1990). The 'profit rate' is a moral and customary magnitude too, and not a 'theoretical variable' – determined as the ex-post ratio of profit, seen as a residual portion of social surplus, to advanced capital – as later sustained by Ricardo and Marx.

Smith's 'natural prices', therefore, can only be considered LPPs to the extent that they are characterised – by definition – by a uniform rate of profit and uniform rates of remuneration on primary production inputs (Kurz & Salvadori 1995, 2003). However, no objective forces are identified for the determination of their values other than social conventions. On the contrary, it is these conventional values that bring into play impersonal forces, through competition between producers, that make actual market prices gravitate towards them, counteracting the accidental fluctuations from them caused by the interaction between supply and demand.

From this point of view, Smith's 'fair' levels of 'natural prices' may indeed be the average of 'market prices', but only to the extent that the latter are random perturbations – with zero mean – around them:

> 'The market price of every particular commodity is regulated by the proportion between the quantity which is actually brought to market, and the demand of those who are willing to pay the natural price of the commodity, or the whole value of the rent, labour, and profit, which must be paid in order to bring it thither. Such people may be called the effectual demanders, and their demand the effectual demand; […]
>
> When the quantity of any commodity which is brought to market falls short of the effectual demand, all those who are willing to pay the whole value of the rent, wages, and profit, which must be paid in order to bring it thither, cannot be supplied with the quantity which they want. Rather than want it altogether, some of them will be willing to give more. A competition will immediately begin among them, and the market price will rise more or less above the natural price. […]
>
> When the quantity brought to market exceeds the effectual demand, it cannot be all sold to those who are willing to pay the whole value of the rent, wages and profit, which must be paid in order to bring it thither. Some part must be sold to those who are willing to pay less, and the low price which they give for it must reduce the price of the whole. The market price will sink more or less below the natural price, according as the greatness of the excess increases more or less the competition of the sellers, or according as it happens to be more or less important to them to get immediately rid of the commodity. […]
>
> When the quantity brought to market is just sufficient to supply the effectual demand and no more, the market price naturally comes to be either exactly, or as nearly as can be judged of, the same with the natural price. […]
>
> The natural price, therefore, is, as it were, the central price, to which the prices of all commodities are continually gravitating (Smith 1976 [1776]: 73–75).

Therefore, according to Smith, the natural price is the centre of market price fluctuations or, in other terms, the *average price*. However, this is true only if the midpoint of the oscillations, as in the motion of a pendulum, corresponds to the central gravitational point, on which the forces of attraction that prevent market prices from moving away from it indefinitely depend. In this case, it is both the *centre of gravity* (*barycentre*) and the *central gravitational point* of market prices.

This is precisely the mechanism referred to by many economists following the *modern surplus approach* to emphasise both the gravitation process and the probability distribution of market prices around LPPs – seen, nevertheless, as theoretical variables – that are sometimes assumed to be characteristic elements of all "classical economists" (Garegnani 1976; Vianello 1989).

According to Arrow (1968) there is no evidence that Smith derived this view from an analogy with the notions of equilibrium that had already been developed in mechanics. However, Smith was writing in a period strongly influenced by Newton's scientific revolution and his view of the gravitation of market prices to natural prices can certainly be modelled in analogy with mechanical or astronomical systems.

Moreover, as is known, according to most mainstream economists, Smith's 'invisible hand' can also be interpreted as the effect of impersonal balance relations (Arrow & Hahn 1971; Mosini 2007) – i.e. as the notion that 'through the workings of an entire system effects may be very different from, and even opposed to, intentions' (Arrow 1968).

In any case, as a matter of fact, the main focus of Smith's analysis – as made clear in his introduction to the *Wealth of Nations* – was what today is called *economic development* – i.e. the long-term forces governing the growth of nations' income (Blaug 1985). From this viewpoint, Smith's main focus was the evolution of the economic system over time although, of course, no formal dynamic model is specified in modern terms.

Of all the long-term forces governing economic growth, Smith particularly emphasised the advantages of the division of labour – understood both as the specialisation of tasks within an industrial enterprise and as the separation of several multi-product enterprises through a process of horizontal or vertical disintegration, followed by the concentration of the production of individual products – pointing out how that division of labour is limited by the extent of the market.

Analysis of the determination of prices was only an integral part of his wide-ranging investigation into the causes of the wealth of nations and he often analysed them in a merely empirical manner, not considering their theoretical systematic consistence with other parts of his work.

In his *adding up* approach to price determination (Sraffa 1951), for example, Adam Smith regarded the wage as a determinant of the value of commodities. According to this view, wage rises could cause commodity values to rise. The important conclusion that wage increases do not increase the value of commodities, but only reduce the capitalists' profit, only belongs to Ricardo (Ternovsky 1988).

Smith also empirically accepted that an *average rate of profit* tended to prevail in the real economy. However, he did not identify any law to determine this average profit rate and did not seem to perceive the contradiction of this empirical evidence with his view that profit consists purely of the unpaid surplus labour – due to the fact that in different branches of production advanced capital is not proportional to the number of workers. This, according to Marx, depended on the fact that he allowed many other theories to coexist alongside his main labour theory of value and could invoke one or another at will (Marx 1989b [1861-1863]: 258).

According to Marx, when dealing with 'the natural rate or the natural price of profit', Smith fell into 'meaningless common places and tautologies' (Marx, 1988 [1861-1863]: 401–402). On the one hand, he seems to believe that it is the value of the commodity which regulates wages, profit and rent. On the other, he deals with the natural price of commodities by adding together the natural prices of wages, profit and rent. According to Marx, therefore, 'it is one of Ricardo's chief merits that he put an end to this confusion' (Marx 1988 [1861-1863]: 402).

2.3. Ricardo

Although Ricardo makes 'labour the foundation of the value of commodities, and the comparative quantity of labour which is necessary to their production, the rule which determines the respective quantities of goods which shall be given in exchange for each other', he does not of course deny 'accidental and temporary deviations of the actual or market price of commodities from this, their primary and natural price' (Ricardo 1951 [1821]: 88). These 'accidental and temporary variations of price', due to variations in supply and demand, cause capital to be 'apportioned precisely, in the requisite abundance and no more, to the production of the different commodities which happen to be in demand' (Ricardo 1951 [1821]: 88).

Following the path opened by Smith, therefore, Ricardo believed that 'with the rise or fall of price, profits are elevated above, or depressed below their general level, and capital is either encouraged to enter into, or is warned to depart from the particular employment in which the variation has taken place' (Ricardo 1951 [1821]: 88).

Nevertheless, he specified that 'it is perhaps very difficult to trace the steps by which this change is effected: it is probably effected, by a manufacturer not absolutely changing his employment, but only lessening the quantity of capital he has in that employment' (Ricardo 1951 [1821]: 89). Therefore, gravitation to 'natural price' cannot be instantaneous and develops over time, through the new investment choices that characterise capital accumulation.

Analysing the divergence of market from natural prices for silks and woollens, produced by fashion-led changes in demand – i.e. socially determined changes in consumers' preferences – Ricardo pointed out that the rate of profit rises above the general and adjusted rate' in the production of silk and falls below in the production of woollens. This produces inflows of capital into the former and outflow of capital from the latter, pushing, by means of changes in supplies, the market prices to their 'natural value', which does not depends on the action of supply and demand. The balance of these forces simply eliminate accidental divergences from what is determined independently by the forces brought into play by competition between individual capitals.

Ricardo's simple principle that regulates the gravitation of market to natural prices is that it 'apportions capital to each trade in the precise amount that is required'.

Supply and demand forces, therefore, regulate produced quantities and only determine gravitation to natural prices, not their value. Thus, they cannot be the explanation of natural prices which are independently determined.

However, just as Smith was interested in the evolution of the wealth of nations over time, Ricardo explicitly emphasised that 'the principal problem in Political Economy' is 'to determine the laws which regulate' distribution– i.e. 'the proportions of the whole produce of the earth which will be allotted to each of these classes, under the names of rent, profit, and wages' (Ricardo 1951 [1821]: 5). Ricardo, therefore, although starting from Smith, focused for the first time explicitly on the distribution of income between wages, profits and rents at a given time. His analysis, therefore, became overwhelmingly static, although, of course, there are also dynamic considerations in his work, as in the case of the tendency of the rate of profit to decrease over time due to the expansion of agricultural production on progressively less fertile land.

Moreover, Ricardo first understood that the problem of determining distribution was closely connected with the problem of determining exchange values. From this viewpoint, therefore, he first outlined the connection between *value* and *distribution* in modern terms.

Therefore, compared with his predecessors, Ricardo was ‘an original thinker’ who first tried to formulate a consistent theory of *value and distribution* ‘within the framework of analysis handed down from the Physiocrats and Adam Smith’ and was ‘himself conscious of his ‘peculiar’ opinions and doctrines’ (Bharadwaj 1989).

Furthermore, Ricardo first reflected on the relationship between the determination of the value of commodities and the phenomenon whereby capitals of equal size produce equal profits (Marx 1989b [1861-1863]: 258). In this context, he took up the notion of *gravitation* developed by Smith. According to Ricardo, free movements of capitals and competition between them keeps non-agricultural profits in the same proportion of the invested capital as returns on marginal land do. This means uniformity of the rate of profit across the different economic branches – i.e. profit in proportion to the size of the capitals employed in the various spheres of production (Brewer 2008). Unfortunately, Ricardo discovered that this was not consistent with his determination of exchange values by means of labour time.

His focus on ‘normal prices’ and gravitation of market prices towards them, therefore, emerged from his attempt to solve the problem of consistence between his theory of value – which was to be used to explain distribution – and what he believed should be the obvious result of competition between capitals. Nevertheless, normal prices did not play any role in solving his original problem of determining distribution.

As is known, according to Ricardo, rent is autonomously determined by the diminishing returns to investment on pieces of land of varied qualities. Wages, in turn, are autonomously determined by workers' necessities. Profit, in the end, is no more than the difference between returns on marginal land – which yields no rent – and costs (including wages). Thus, profit is the surplus over given wages in accordance with the production technique on marginal land. Rent and profits, in turn, absorb the surplus for the whole economy (Brewer 2008).

Not by chance, therefore, most economists usually hold views that the most significant achievements of Ricardo were the theory of rent, based on the principle of diminishing returns, and the notion of a subsistence ‘equilibrium’ wage (Bharadwaj 1989).

However, to give profit as a percentage return on investment implies that costs and returns have to be calculated in terms of prices. So, either prices can be calculated without reference to the profit rate – as Ricardo sought to do by means of a labour theory of exchange values – or prices and the rate of profit have to be simultaneously determined – as Sraffa’s system does (Brewer 2008). That is exactly why Sraffa was described by Blaug ‘as Ricardo in modern dress’ (Blaug 1985: XIII). From this viewpoint, we could say that ‘long-period positions’ certainly characterise ‘Sraffa’s Ricardo’(Bharadwaj 1989) – i.e. the new interpretation of Ricardo by Sraffa.

In conclusion, as emphasised by Arrow 1968, none of the classical economists had a true general equilibrium theory because none dealt with an explicit role for demand conditions. The classical economists, moreover, had no true theory of resource allocation in a modern sense, and the influence of prices on quantities was completely ignored (Arrow, 1968).

Indeed, while Walras’s major aim was to emphasizes the mutual interdependency of economic variables, classical political economy aimed to establish the laws of causal relations among the main economic variables (Negishi 1989).

3. **Equilibrium and dynamics in Marx**

Marx, in turn, was no run-of-the-mill classical economist in accordance with the neo-Ricardian view, but a philosopher, social scientist and political thinker who applied his version of Hegelian dialectics to the critique of classical political economy. For this reason, he has often been seen as an anomalous economist outside the mainstream. Some Marxists, in turn, accepted the divide between him and those he identified as earlier classical economists, suggesting that, after the disintegration of the Ricardian school in the 1830s, Marx's *critique of classical political economy* represented a radical break with the past.

In any case, there is no doubt that Marx's reflection starts from Ricardo's analysis, which was explicitly considered by Marx the 'most complete and final expression' of *English classical political economy* (Marx 1986 [1857-1861]: 6).

However, as representatives of the rising bourgeoisie, the classical economists before Marx had as their main objective to explain the rules of the functioning of the new bourgeoisie economy, underlining its merits in improving the wealth of nations. Marx's objectives, by contrast, were those of a social and political thinker who wanted to contribute to a political programme to revolutionise and regenerate this economy.

In his preface to Volume I of *Capital*, Marx states that his work aims to examine "the *capitalist mode of production*, and the *relations of production and forms of intercourse* [*Verkehrsverhiiltnisse*] that correspond to it" (Marx 1990 [1867]: 90; our italics). Thus, Marx's interest in classical political economy derived from his own *materialist conception of history,* according to which *every mode of production* is only a transitory moment in the history of humankind (McLellan 1973). Consequently, also the capitalist mode of production has to have its origin, rise, development, decline and disappearance (Mandel 1990). Marx, therefore, was not seeking *universal laws of functioning* of economic systems, as the classical economists did, and his main objective was to discover and analyse the *laws of motion* of the prevailing mode of production in his age, in order to forecast the main turning points in its evolutionary path and probable end.

In his preface to *A Contribution to the critique of political economy*, Marx also says that the objective of his work is to examine 'the *economic conditions of existence* of the three great classes into which modern bourgeois society is divided' (Marx 1986 [1857-1861]). This claim would be very unusual for a current economist, because, in the context of the present division and specialisation of intellectual work, it would appear to be more a sociological objective than an economic one. However, it would also have been a very unusual task for classical economists, who dealt with classes only as agents of production of the wealth of nations, which was the real objective of their analysis.

Furthermore, in accordance with his research programme, Marx was essentially interested in discovering the *laws of motion* of the economic systems in which the capitalist mode of production *prevails*. Consequently, he was primarily interested in analysing the historical dynamics of the main aggregates that describe these systems and his major objective undoubtedly was analysis of the *movement of their aggregate magnitudes*. According to him, these dynamics could substantially be described in terms of value – i.e. incorporated labour – which had the additional advantage of being an ‘invariable’ unit of measure[2].

Marx’s schemes of reproduction – simple and on an extended scale – combined with his prices of production, have often been seen as an early form of general equilibrium (Samuelson 1957, 1959a, 1959b; Arrow 1968). Marx’s equation system for determining production prices also bears similarities to Sraffa’s price system (Negishi 1989).

Nevertheless, Marxian schemes of reproduction were originally formulated in terms of labour values and were intended to outline how a competitive capitalist economic system should evolve over time to reproduce its socio-economic characteristics. In other words, like Quesnay’s *Tableau*, they are *viability schemes*.

Marx’s original analysis, however, though insightful, was not a true dynamic analysis in modern terms. The schemes of reproduction can, of course, be interpreted as hypothetical dynamic equilibria. However, they should be better understood as dynamic attractors which can only be achieved by chance in the anarchic conditions of capitalist markets. In other words, they are theoretical tools for identifying the forces continually brought into play by the ongoing disequilibria of these markets. Furthermore, the required adjustments must occur mainly in the proportions of the quantities produced.

Marx constructed a series of numerical examples that illustrate how extended reproduction schemes require quite different proportions of capital goods production and consumption goods production from those required in simple reproduction schemes (Marx 1992 [1885]: 586–595). According to Marx, in order to ensure regular extended reproduction, the composition of the social product must change in favour of the capital goods department – which drives the accumulation process – and the consumer goods department must see the capital employed grow to ensure the growth of variable capital within the capital goods sector. This assumes, of course, the availability of an adequate ‘industrial reserve army’, but shows the theoretical possibility of the absence of a structural deficit in effective demand. Marx, of course, did not presuppose any automatic co-ordination mechanism that would guarantee the proportions between the different departments of social production adequate for a regular development of the accumulation process. In more modern terms, according to Marx, a dynamic equilibrium exists for expanded reproduction, but, under the anarchic conditions of the market, this is by no means stable (Scarano 2023).

Marxian reproduction schemes, therefore, helped understand the permanent problem of private capital which must continuously find new market outlets, and Marx actually thought that disproportion between investment and consumption could produce periodic crises. Marx’s view of capitalist production process was that of a continuous state of disequilibrium, produced by the anarchy of private capital production.

Originally, in his manuscripts of 1861-1863, Marx was not very interested in dealing in detail with the possibility of deriving prices of production from labour values because he considered the former to be a mere ‘accident’ related to the transitory state of production techniques. He changed his mind only in the course of his critique of Rodbertus’s rent theory, developed in his *Theories of Surplus Value*. In this analytical context, he came to the conclusion that the explanation of the absolute rent in general

[2] The desirability of an “invariable measure” of exchange-values has often been emphasised in economic literature because expressing the relative prices in terms of a numeraire makes it impossible to distinguish the effect of any change of the technical features of the commodity itself from that of changes in technological features of the numeraire (Bellino 2004).

could only take place in the context of the explanation of the 'difference between value and price of production' (Ternovsky 1988).

According to Marx's view, prices of production are a special set of prices at which rates of profit are equal in all sectors of industry and towards which market prices are alleged to lead through capital movements across sectors in pursuit of higher profit rates, that result, in accordance with Ricardo's view, from competition (Nikaido 1985).

Starting from the first attempts by Bortkiewicz and Shibata, mathematical models of Marxian economics have been constructed and analysed by many economists such as Okishio, Morishima, Seton, Nikaido, Steedman, Samuelson and Roemer. However, all these contributions, of which Morishima's *Marx's Economics* 1973 is perhaps the most representative, are attempts to apply the linear economic models developed in Walrasian general equilibrium theory, input-output analysis and linear programming to Marx's analysis, in order to better present some aspects of it to non-Marxian economists. Nevertheless, most aspects of Marx's work cannot be expressed by these mathematical models of economic equilibrium (Negishi 1989).

It is also very hard to find a notion of LPPs in Marx's thinking. Marx, indeed, explicitly states that:

> fluctuations of supply and demand continually bring the price of a commodity back to the cost of production. The real price of a commodity, it is true, is always above or below its cost of production; but rise and fall reciprocally balance each other, so that within a certain period of time, taking the ebb and flow of the industry together, commodities are exchanged for one another in accordance with their cost of production, their price, therefore, being determined by their cost of production (Marx 1977 [1849]: 208).

However, for Marx, the average price of commodities is not a LPP at all.

> The economists say that the average price of commodities is equal to the cost of production; that this is a law. The anarchical movement, in which rise is compensated by fall and fall by rise, is regarded by them as chance. With just as much right one could regard the fluctuations as the law and the determination by the cost of production as chance, as has actually been done by other economists. But […] it is solely in the course of these fluctuations that prices are determined by the cost of production. The total movement of this disorder is its order. In the course of this industrial anarchy, in this movement in a circle, competition compensates, so to speak, for one excess by means of another (Marx 1977 [1849]: 208).

According to Marx, therefore, the commodity price around which market prices fluctuate is only a theoretical abstraction. It is simply the average of market prices that occur over time.

> We see, therefore, that the price of a commodity is determined by its cost of production in such manner that the periods in which the price of this commodity rises above its cost of production are compensated by the periods in which it sinks below the cost of production, and vice versa (Marx 1977 [1849]: 208)

4. Conclusion

To sum up, a truly extensive use of *long-run equilibria* and LPPs of economic variables is not so evident in the works of the economists that Marx identified as being "classical" and Marx himself. The only notions that can be interpreted as *centres of gravitation* or *attractors* of market prices are that of 'natural price' in Smith, 'normal price' in Ricardo – as far as the latter closely follows Smith himself – and *prices of production* in Marx.

Marx, however, dwelt on what can today be seen as LPPs just in defining his *prices of production*, which – in the overall context of his theoretical system – were only a corollary to solving Ricardo's uniform rate of profit problem, but did not play a crucial role in the development of his explanation of the evolution of the capitalist mode of production.

Indeed, the 'classical economists' and Marx considered all real economic phenomena only as momentary results of an unstoppable historical and dynamic process, characterised by continuous conflicts and recompositions. According to Marx, for example, the business cycle and crises constitute the actual evolution of economic reality and not accidental fluctuations – due to exogenous shocks – around a predetermined process of sequential equilibria.

In our view, what some economists today identify as long-run equilibria in the classical authors and Marx should be better identified as "attractors" of a dynamic process, rather than possible final stable achievements. In this perspective, they could play a role in determining the dynamics of adjustment without ever being the point of arrival or stasis, just as stars exert attractive actions on their planets without ever being the point of arrival of their trajectory.

Marx – as well as Schumpeter after him – saw capitalist development as a dynamic process which denies by its very nature any notion of equilibrium understood as a state of rest or of linear uniform motion. He saw capitalism as being inherently contradictory and self-disequilibrating. According to him, economic movements – as social phenomena – are characterised by continual changes, inequality and uneven development and are plagued by crises and violent catastrophes that are not external to the market but generated by its internal *law of motion*.

In this view, disequilibria and crises are the norm for a system that is intrinsically anarchic. In fact, *disequilibria* continuously produce forces which tend to modify the current state.

The role of the notion of "disequilibrium" has also increased in modern physics, in parallel with the overcoming of the classical physics approach. However, dynamic forces, continuously out of equilibrium, can still be rationally understood through the notion of *attractors*, as demonstrated by modern *deterministic chaos* theories (Medio and Gallo 1992).

An attractor, nevertheless, is not necessarily a point in the trajectory of a quantity that can be described as a function of time, as is often assumed for LPPs. Moreover, an attractor is not necessarily significant for its own value, but rather for the way it determines other quantities. The real object of analysis should be the gravitational process, not the value of the attractor. Of course, what determines the value of the attractor equally matters, because the vector characteristics of the gravitational forces ultimately depend on its value.

References

Arrow, K.J. 1968. "Economic equilibrium". In: Sills, D. L. (ed.), *International Encyclopaedia of the Social Sciences*. The Macmillan Company & The Free Press, London and New York.

Arrow, K. and Hahn, F. 1971. *General Competitive Analysis*, Elsevier North-Holland, Amsterdam.

Barna, T. 1975. "Quesnay's Tableau in Modern Guise". *The Economic Journal*, 85, 339: 485–496.

Bellino, E. 1997. "Full-cost Pricing in the Classical Competitive Process: a Model of Convergence to Long-run Equilibrium", *ZeitschriftfürNationalŒkonomie. Journal of Economics*, 65 (1):. 41–54.

Bellino, E. 2004. "On Sraffa's Standard Commodity". *Cambridge Journal of Economics*, 28: 121–132.

Bellino, E. 2011. "Gravitation of market prices towards natural prices". In: Ciccone, R., Gehrke, C. and Mongiovi, G. (eds.), *Sraffa and Modern Economics, Volume II*. Routledge, London and New York.

Bellino, E. and Serrano, F. 2018. "Gravitation of Market Prices towards Normal Prices: Some New Results". *Contributions to Political Economy*, 00: 1–40.

Bharadwaj, K. 1989. *Themes in Value and Distribution. Classical Theory Reappraised*. Routledge, Abingdon and New York.

Blaug, M. 1985. *Economic Theory in Retrospect*. Cambridge University Press, Cambridge and New York.

Brewer, A. 2008. "Surplus". In: *The New Palgrave Dictionary of Economics*. Vol. 8. Macmillan Publishers Ltd, Basingstoke and New York.

Cannan, E. 1917.*A history of the theories of production and distribution in English political economy*. Staples Press, London and New York.

Caravale, G. 1997. "The Notion of Equilibrium in Economic Theory" In: Caravale, G. (ed.), *Equilibrium and Economic Theory*. Routledge, London and New York.

Davar, E. 1989."Input–Output and General Equilibrium". *Economic Systems Research*, 1(3): 331–344.

De Vivo G. 1982, "Notes on Marx's Critique of Ricardo", *Contributions to Political Economy*, 1: 87–99.

Desai, M. 1974. *Marxian economic theory*. Gray-Mills Publishing, London.

Foley, D. K. 2001."Value, Distribution and Capital: A review essay".*Review of Political Economy*, 13, 3: 365–381.

Garegnani, P. 1976. "On a change in the notion of equilibrium in recent work on value and distribution: a comment on Samuelson". In: Brown, M., Sato, K. and Zarembka, P. (eds.), *Essays in Modern Capital Theory*. North-Holland Publishing Company, Amsterdam, New York, Oxford.

Hahn F. 1982. "The neo-Ricardians". *Cambridge Journal of Economics*, 6: 353–374.

Ingrao, B. and Israel, G. 1990. *The Invisible Hand: Economic Equilibrium in the History of Science*. MIT Press, Cambridge, MA.

Knight, F. H. 1969 [1935]. *Ethics of Competition and Other Essays*. Books for Libraries Press, Freeport, New York.

Kurz, H. D. 2019. "Classical Political Economy". *Munich Social Science Review, New Series,* 2: 17–51.

Kurz, H.D. and Salvadori, N. 1995. *Theory of Production. A Long-Period Analysis*. Cambridge University Press, Cambridge.

Kurz, H.D. and Salvadori, N. 2003. “Understanding ‘classical’ economics: a reply to Mark Blaug”. In: Kurz, H.D. and Salvadori, N. (eds.), *Classical Economics and Modern Theory. Studies in long-period analysis*. Routledge, London and New York.

Leontief, W. 1941.*The Structure of American Economy, 1919-1929*. Harvard University Press, Cambridge, MA..

Leontief, W. 1966.*Input-Output Economics*. Oxford University Press, New York.

Machlup, F. 1958. “Equilibrium and Disequilibrium: Misplaced Concreteness and Disguised Politics”. *The Economic Journal*, 68, 269, pp. 1–24.

Mandel E. 1990. “Introduction”. In: Marx K., *Capital: Volume I*. Penguin Books, London.

McLellan D. 1973. *Karl Marx. His Life and Thought*. The Macmillan Press Ltd, London and Basingstoke.

Marx, K. 1977 [1849]. “Wage Labour and Capital”. In: Marx, K., Engels, F., *Collected Works. Volume 9. Marx and Engels: 1849*, International Publishers, New York.

Marx, K. 1986 [1857-1861], “Outlines of the Critique of Political Economy (Rough Draft of 1857-58)”. In: Marx, K., Engels, F., *Collected Works. Volume 28. Marx: 1857-1861*, International Publishers, New York.

Marx, K. 1988 [1861-1863], “Theories of Surplus Value”, In: Marx, K., Engels, F., *Collected Works. Volume 30. Marx: 1861-1863*, International Publishers, New York.

Marx, K. 1989a [1861-1863], “Theories of Surplus Value”. In: Marx, K., Engels, F., *Collected Works. Volume 31. Marx: 1861-1863*, International Publishers, New York.

Marx, K. 1989b [1861-1863], “Theories of Surplus Value”. In: Marx, K., Engels, F., *Collected Works. Volume 32. Marx: 1861-1863*, International Publishers, New York.

Marx, K. 1991 [1861-1863]. “Capital and Profit”. In: In: Marx, K., Engels, F., *Collected Works. Volume 33. Marx: 1861-1863*, International Publishers, New York.

Marx, K. 1987 [1867]. “Marx to Engels. 27 June 1867”. In: Marx, K., Engels, F., *Collected Works. Volume 42 - 1864-1868*. International Publishers, New York.

Marx K. 1990 [1867].*Capital: Volume I*. Penguin Books, London.

Marx, K. 1992 [1885]. *Capital. Volume II*. Penguin Books, London.

Medio, A. and Gallo G. 1992. *Chaotic Dynamics. Theory and Applications to Economics*. Cambridge University Press, Cambridge.

Meek, R. L. 2003 [1962]. *Economics of Physiocracy*. Routledge, London and New York.

Milgate, M. 2008. “Equilibrium (development of the concept)”. In: *The New Palgrave Dictionary of Economics. Vol. 3*. Macmillan Publishers Ltd, Basingstoke and New York.

Morishima M. 1973.*Marx’s Economics. A Dual Theory of Value and Growth*. Cambridge University Press, London, New York, Melbourne.

Mosini, V. 2007. “Introduction. Three ways of looking at economic equilibrium”. In: Mosini, V. (ed.), *Equilibrium in Economics. Scope and Limits*. Routledge, London and New York.

Negishi, T. 1989.*History of Economic Theory*. North-Holland, Amsterdam, New York, Oxford, Tokyo.

Nikaido, H. 1985. “Dynamics of Growth and Capital Mobility in Marx’s Scheme of Reproduction”. *ZeitschriftfürNationalŒkonomie. Journal of Economics*, 45, 3: 197–218.

Parrinello, S. 1990. “Some Reflexions on Classical Equilibrium, Expectations and Random Disturbances”. *Political economy. Studies on the Surplus Approach*, 6, 1-2: 113–124.

Parrinello, S. 1998. “Equilibrium”. In. Kurz, H. D. and Salvadori, N. (eds.), *The Elgar Companion to Classical Economics. A-K.* Edward Elgar, Cheltenham and Northampton.

Parrinello, S. 2013. “Causality and normal states in economics and other disciplines”. The European Journal of the History of Economic Thought, 23, 1: 127–151.

Parrinello, S. and Fujimoto, T. 1995. “The transfer of statistical equilibrium from physics to economics”. *MPRA Paper*, 30830.

Pasinetti, L. L. 1977. *Lectures on the Theory of Production*. Columbia University press, New York.

Pasinetti, L. L. 1981.*Structural Change and Economic Growth*. Cambridge University Press, Cambridge.

Petri, F. 2004. *General Equilibrium, Capital and Macroeconomics. A Key to Recent Controversies in Equilibrium Theory*. Edward Elgar, Cheltenham and Northampton.

Phillips, A. 1955. “The Tableau Economique as a simple Leontief Model”. *Quarterly Journal of Economics*, 69: 137–144.

Ricardo, D. 1951 [1821]. *The Works and Correspondence of David Ricardo. Vol. 1. On the Principles of Political Economy and Taxation*. Cambridge University Press, Cambridge.

Roncaglia, A. 1990. “Is the Notion of Long-Period Positions Compatible with Classical Political Economy?”. *Political Economy. Studies in the Surplus Approach*, 6, 1-2, pp. 103–111.

Samuelson, P. A. 1943. “Dynamics, Statics, and the Stationary State”. *The Review of Economics and Statistics*, 25, 1: 58–68.

Samuelson, P. A. 1957. “Wages and Interest: A Modern Dissection of Marxian Economic Models”. *American Economic Review*, 47: 884–912.

Samuelson, P. A. 1959a. “A Modern Treatment of the Ricardian Economy: I. The Pricing of Goods and of Labor and Land Services”. *Quarterly Journal of Economics*, 73, 1: 1–35.

Samuelson, P. A. 1959b. “A Modern Treatment of the Ricardian Economy: II. Capital and Interest Aspects of the Pricing Process”. *Quarterly Journal of Economics*, 73, 2, pp. 217-231.

Scarano, G. 2023. *Financialiasation and Macroeconomics. The Impact on Social Welfare in Advanced Economies*. Routledge, London and New York.

Schumpeter, J. 1986 [1954]. *History of Economic Analysis*. Routledge, London and New York.

Smith, A. 1976 [1776]. *An Inquiry into the Nature and Causes of the Wealth of Nations*. Vol.1. Oxford University Press, Oxford.

Sraffa, P. 1951. “Introduction”. In: Ricardo, D., *The Works and Correspondence of David Ricardo. Vol. 1. On the Principles of Political Economy and Taxation*. Cambridge University Press, Cambridge.

Steuart, J. 1767. *An Inquiry into the Principles of Political Economy. Vol. I.* Printed for A. Millar, and T. Cadell, in the Strand, London.

Ternovsky, M 1988. “Preface”. In: Marx, K., Engels, F., *Collected Works. Volume 30. Marx: 1861-1863*, International Publishers, New York.

van Daal, J. and Jolink, A. 1993. *The Equilibrium Economics of Léon Walras*. Routledge, London and New York.

Vianello, F. 1989. “Natural (or Normal) Prices: Some Pointers”. *Political Economy. Studies in the Surplus Approach*, 5, 2: 89–105.