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From Addition to Multiplication: The Labour Theory of Value and the Economic Institutions of Capitalism.

Part Two: Neither Micro nor Macro: Understanding the Evolution of Aggregate Variables in a Capitalist System

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From Addition to Multiplication: The Labour Theory of Value and the Economic Institutions of Capitalism.

Part Two: Neither Micro nor Macro: Understanding the Evolution of Aggregate Variables in a Capitalist System.

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Abstract: This three-parts study propounds an institutional and evolutionary - or qualitative and inter-subjective- re-interpretation of Marx's version of the labour theory of value.
More specifically, this second part begins the general and dynamic extension of the static and partial analysis presented in the first part. Consequently, the analysis of the division of labour among firms is added to that of the division of labour within the firm.
The key notion in this regard is that of interdependence between the "sphere of production" and the "sphere of circulation", that is, the interdependence between the phase of value creation – or appropriation- that takes place within the firm and the phase of its realization – or appropriation- that takes place in the market of goods.
Indeed, it follows from the analysis of this interdependence that the aggregate variables should not be understood as being determined by the sum of separate and independent individual variables, nor, even less, as a series of 'wholes' endowed with a logic different from the individual ones, without this leading at least to a departure from the same additive framework of the methodologically individualistic approach discussed in the previous part.
On the contrary, aggregate variables turn out to be micro-founded by the production relationships that prevail within the firm, and in their turn they macro-found the individual ones making it possible to retrieve and re-interpret the mechanisms of cumulative causation on which, respectively, Marx and Smith based their theories of crisis and growth.
In other words, since even the aggregate production function turns out to be non-additively separable, the problem of determining the value of the joint product of the firm arises in basically the same way for the aggregate product. Accordingly, it, too, can be solved with the notion of exchange value introduced in Part One.
Consequently, this situation further weakens the neo-classical theory of value and distribution, making it even more appropriate and urgent to retrieve and re-interpret the classical perspective and in particular the Marxian one where, again because of the interdependence between the "sphere of production" and the "sphere of circulation", such theories are interdependent.
From this interdependence there ensues the inseparability of efficiency and distributional considerations, the importance of property rights as a rule rather than an exception, and the role of conflict as a positive principle.

Key words: crisis; growth; competition; scarcity; business cycle; abstraction.

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1.Introduction

In the first part of this study, the division of labour within the firm was analysed from a static and partial point of view. The next step, as suggested also by Hayek's statement quoted in the conclusions of that first part, is to extend the analysis in a general sense in order to analyse the division of labour among firms.

Indeed, if the presence of non-additively separable production functions within the firm implies the recognition of the relationship of mutual complementarity between the production factors, such a relationship cannot in turn fully unfold, and therefore cannot be fully understood, regardless of the relationships among firms in the market of goods.

Accordingly, the key notion in this regard is that of interdependence between the "sphere of production" and the "sphere of circulation", or in other words the interdependence between the phase of value creation (or appropriation) that takes place within the firm and that of its actual realization (or appropriation) in the market of goods (see footnote 2, Part One).

First, from this interdependence the interdependence between the Marxian theories of value and of distribution follows. This, in fact, is the feature that distinguishes Marx's approach from the neo-classical one, for which such theories are instead understood as coincident, and from that of Ricardian-Marxism, which regards them as independent. This interdependence also entails the inseparability of efficiency and distributional considerations, and therefore both the relevance of property rights as a rule rather than as an exception and the role of conflict as a positive principle.

Secondly, since also the aggregate production function prove to be non-additively separable, nor should aggregate variables be understood as the sum of separate and independent individual variables or as a series of "wholes'' endowed with a logic different from the individual ones, without this interpretation leading at least to a departure from the additive context which, as we have seen in Part One, defines standard economic theory and especially the general equilibrium model.

On the contrary, aggregate variables are micro-founded by the process of value creation which takes place within the firm and in their turn macro-found the individual ones, thus making it possible to find again and re-interpret the

mechanisms of cumulative causation on which, respectively, Marx and Smith based their theories of crisis and growth.

In this regard it may be useful to point out from the outset that if the first part of this study can be interpreted as being guided by the re-dis-covery of Marx's contribution as a critical economist, completely lost in the first place because of the demise of the labour theory of value by Marxist economic theory and in the second place by the neo-classical 'restoration', the second part of this study could at least as easily be interpreted as driven by the re-discovery of Smith's contribution which, as mentioned in the first part, played the role of the 'collateral victim' of the removal from economic theory of every possible link between labour and value.

In effect, in the prevailing interpretation that sees Smith as the 'father' of standard economic theory, his thought is generally associated with a static interpretation of the metaphor of the Invisible Hand and therefore with a sort of intuitive and informal anticipation of the general equilibrium model. Moreover, this interpretation is also reinforced by the Ricardian-Marxist approach which, having sacrificed the figure of Marx as a critical-economist to that of Marx as a political-ideologue, even sees Smith as the *alter ego* of Marx, in the misleading antinomy between the state and the market that followed the Cold-War ideological climate determined, and in some sense justified, by the enormous practical impact of the Marxian conceptual framework.[1]

However, since Smith was by far the first economist to use the labour theory of value and to introduce the notion of natural price in the sense specified in footnote 1 of Part One - that is, as the price that determines the movements of

[1] In this respect, since it is the only sentence of Capital where Marx seems to envisage the possibility of the first phase of single firm Socialism, moreover in a way which could be more precisely characterized as 'ante-Keynesian' or 'ante-Coasean' rather than 'old-fashioned communist', and in this sense justifying the distinction between Marx's role as a critical economist and his role as a political-ideologue on which this study is based, it is apposite to quote the entire sentence about the difference between the *ex ante* coordination typically provided by the firm and the *ex post* coordination typically provided by the market (footnote 11, first part): **"**The same bourgeois mind which praises division of labour in the workshop, (…), as being an organization of labour that increases its productiveness –that same bourgeois mind denounces with equal vigour every conscious attempt to socially control and regulate the process of production, as an inroad upon such sacred things as the rights of property, freedom and unrestricted play for the bent of the individual capitalist. It is very characteristic that the enthusiastic apologists of the factory system having nothing more damning to urge against a general organization of the labour of society, than that it would turn all society into one immense factory." (Marx, 1867, p. 246-247). See footnotes 5 and 13, first part and Coase (1936, p.98, quoted in the same part, section 3).

market prices- it seems equally legitimate at the very least to identify Smith's contribution with the first explanation of the relationship - of interdependence- between the process of value creation, which depends on the division of labour, and the endogenous and spontaneous market mechanisms that can spread it through the economic system, thus creating the basis for the triggering of a self-reinforcing mechanism. This dynamic interpretation, in which the problem of the accumulation of capital is also dealt with, is the one which sees Smith as the 'pioneer' of the classical approach. Moreover, as already discussed in Part One, it was also the one prevailing in the times of Marx and his contemporaries.

Naturally, this contribution too must be re-interpreted. In particular, it will be extended to take account of the collective nature of production and the material conditions of existence, thus avoiding the risks of mystification entailed by the idea that the canonical condition of individual maximization can yield optimal results at a social level. As already noted in Part One, in fact, much of the ambiguity surrounding Smith's theory, from which derives the possibility of the different interpretations to which reference has just been made, depends on the fact that his perspective remains at least partially individualistic, so that the additive theories of value and distribution and the classical ones turn out to be substantially indistinguishable (see Section 3 and footnote 24, Part One).

However, framed in the perspective of this study, the most important consequence of the retrieval of Smith's approach is that not only the firm but also the various forms of market, or more precisely of competition, can be understood as endogenous to the capital accumulation process and therefore as mechanisms with which to appropriate or share the benefits of cooperation, by which is meant a situation characterized by the presence of non-additively separable productions functions. Analogously, crisis and growth, too, turn out to be better understood as structural features of the normal operation of a capitalist system rather than as imperfections with respect to the general equilibrium model.

The rest of this second part of the study is organized as follows. In the next section the original Marxian theory of the crisis is presented, both with reference to its link with the theory of surplus-value, and with reference to the differences that ensue from the qualitative interpretation proposed here. In this regard, the uniqueness of Marx is that such crises do not originate from exogenous shocks as

is necessarily the case in the general equilibrium model, nor from financial excesses, as has been argued especially in the wake of the most recent crises**.** Rather, as just pointed out, they are endogenously determined by the real contradictions characterizing the production process, which from there extend to the phase of circulation.

Consequently, in Section 3 the analysis of this relationship of interdependence between the "sphere of production" and the "sphere of circulation" begins by combining the asymmetric coordination game that represents the division of labour within the firm with a symmetrical coordination game that represents the division of labour among firms.

For the time being, however, both are inserted only informally in the evolutionary framework that will be analysed more rigorously in the third and last part of this study. As anticipated in the Introduction to the first part, indeed, the replacement of the circular view of the production process with the afore-mentioned evolutionary perspective represents - together with the replacement of the Ricardian notion of production cost with the Coasean notion of transaction cost- the main difference between the re-interpretation proposed here and the original Marx's version of the labour theory of value.

Basically, unlike the axiomatic models where individuals, or - more precisely- their theories, represent the beginning and the end of the analysis, in an evolutionary framework players are in the middle of a process over which they have limited control and knowledge - a point of view, indeed, which is common to both the Marxian and evolutionary approaches.

Within the liberal theory itself, moreover, two different schools of thought can be identified: the one which refers to the tradition of the 'social contract' or the 'constitutional design'; and the one that instead refers to the notion of 'spontaneous order' or 'self-organizing systems', which no doubt includes both Smith and Schumpeter and probably Hayek as well.

In this conceptual framework, in which the interdependence between production and circulation develops both in synchronic and diachronic terms, the point is that the presence of strategic complementarities that characterizes the production process within the firm extends to the relations among firms in the

corresponding game and to the relationship between strategies in the two complementary games (see Section 3, and footnote 20, Part One).[2]

Consequently, as in the case of the asymmetrical coordination game that represents the division of labour within the firm, so in the case of the symmetrical coordination game that represents the division of labour among firms the equilibria will tend to be the extreme ones with possible jumps from one to the other.

In addition, given the interdependence between the theories of value and distribution and the partial overlap between players in the two games, the equilibria of these games will also tend to be pairs of 'coherent' equilibria, in the sense that the same principle of labour adopted in the game within the firm will tend to be adopted also in the game that represents the division of labour among firms. One can be interpreted as corresponding to the general case and the Marxian maxim according to which "anarchy in the social division of labour and despotism in the division of labour in the factory are conditions of one another"; the other one can be instead interpreted as corresponding to the generally ideal case which may be characterized as 'collaboration within the firm and cooperation in relations between firms' and which, as just mentioned, may be associated with the virtuous circle between the division of labour and the size of the market identified by Smith - to which is added a theory of the firm in the absence of wealth effects (see Section 3.3, Part One).

In Section 3.1., the assumption that only one good is produced in the economic system is relaxed, to include the possibility that intermediate goods are produced in the non-capitalist sector of independent or small to medium-sized producers. Most importantly, from this analysis emerges the role of scarcity as endogenous

[2] For the reader's convenience, the three basic features of super-modular functions, a more general notion than that of non-additively separable functions which however in this study are considered equivalent between them, the difference being that the former do not need the existence of cross derivatives, as well as equivalent to that, typical of game theory, of strategic complementarity, are repeated as follows: **(i)** the simultaneous increase of the variables yields better results than their separate increase, so that optimal choices are not necessarily marginal; (**ii**) the marginal return from a player's strategies is dependent on the level at which such strategies are employed by the other players, so that pay-offs actually vary according to a parameter, a feature known as 'increasing differences' which also illustrates the fact that the representation in normal and numerical form is not fully correct, while it is preferable in terms of clarity of presentation; (**iii**) the demonstration of the existence of the equilibria of games of this type is not based on Brower's fixed point theorem but on that of Tarski, where the main difference lies in the fact that such fixed points are not the intermediate ones but rather the extreme ones, so that such equilibria are typically also extreme ones with the possibility of jumps from one to another (see Vives, 2005).

to the process of value creation, and therefore the relationship between natural prices and market prices.

Finally, Section 4 sets out some brief conclusions which also serve as an introduction to the third and last part of this trilogy.

2. The Marxian theory of crisis: quantitative version and qualitative version.

To start from the beginning, however, given the variety of ways in which Marx's thought has been adapted to the objectives of those who have interpreted it, the Marxian theory of the crisis - or at least the way in which it is understood in this study- should be briefly summarized.

Like the rest of his scientific production, also this theory is based on the theory of surplus-value and therefore on the identification of the link between value creation and the use of labour-power within the production process. In the sentence immediately after the one quoted in Part One referring to the economy as the "Eden of the innate rights of man", Marx points out yet again that, in order to dis-cover profit as well as the capital accumulation process, the analysis must start from the production process and the relations of production governing it**:** "The consumption of labour-power is completed, as in the case of every other commodity, outside the limits of the market or of the sphere of circulation. Accompanied by Mr Moneybags and by the possessor of labour-power, we therefore take leave for a time of this noisy sphere, where everything takes place on the surface and in view of all men, and follow them both in the abode of production, on whose threshold there stares us in the face: "No admittance except business". *Here, we shall see, not only how capital produces, but how capital is produced. We shall at last force the secret of profit making*." (Marx, 1867, p. 123, emphasis added).[3]

[3] Given the evolutionary framework to which also this part of the study belongs, it may be useful to point out that this somewhat hidden feature of the process of production of capital should relate Marx's contribution not only to that of Darwin but also to that of Mendel, who explained how genes pass from one generation to the other. And, with respect to the possible analogy between the gene and the principle of differential replication on the one hand, and capital and the principle of profit maximization on the other**,** it should at least be noted that the combination between cooperation and the division of labour analysed in this paper has its archetype in sexual reproduction, which is also a non-additive phenomenon. Accordingly, even the self-expanding nature of the gene seems to be only apparent.

And it is of course this feature that distinguishes it from the others, particularly because the tendency to crisis that derives from it is endogenous rather than exogenous as is necessarily the case in the general equilibrium model, and real in nature rather than due to the excesses of finance, as has been especially argued recently. Naturally, those excesses are not beneficial because of their role in amplifying the underlying trends. But, since they derive from the unstable foundations on which finance is built up, which in their turn depend on a flawed understanding of the value creation process, they prove derivative and secondary – provided, of course, that the wealth which financial markets continuously price and re-price is not totally invented.[4]

The starting point is what, mimicking Marx's terminology, might be called the 'fundamental contradiction of capitalism in the phase of production' or, as already pointed out in Part One, the separation between ownership and control of labour power. Put otherwise, the premise is the fact that, while on the one hand profit - which however capitalists contribute to extract- is basically unpaid labour, on the other hand profit has an inverse relation with wages. This contradiction is therefore a consequence of the presence of the class divide between those who make the decisions, i.e. the owners of the means of production, and those who are subjected to them, i.e. subordinate labour, and the conflict that derives from this distinction (see Section 3, Part One).

From this contradiction it follows that, once an economic activity has been incorporated into the circuit of capitalist production, its subsequent development takes place through the substitution of variable capital, or labour power, with constant capital, or capital provided by the capitalist. Given the just-mentioned class divide, while the increase in constant capital is an investment, an increase in variable capital corresponds to an increase in costs. Accordingly, it seems possible

[4] The "fundamental idea of the prevailing theory of capitalization, namely that the value of an income-yielding property is merely formed by the summation of properly discounted returns" (Schumpeter, 1911, p. 165) is itself still awaiting a satisfactory justification, because, for a start, "There is no rigid rule of addition here, since value quantities are mostly *non additive*" (*ibid*, emphasis added). In this regard to be borne in mind is why Schumpeter thought that the introduction of new machines could not explain how interest is paid for: in competitive conditions, foreseen efficiency gains are already included in the selling price; the unforeseen ones, because of the theory of imputation in the same competitive conditions, would flow to the original production factors, i.e. land and labour but not capital. This basically leaves only arbitrage and monopolistic power as sources of value, of course in addition –according to Schumpeter- to innovation. See also footnotes 5, 8 and 29, and Schumpeter (1911, Ch. 5).

to argue that, while unit labour costs are minimised, 'unit capital costs', or the value of shares, are maximised.

This process, which takes the form of technical change and makes goods less and less expensive, thus stems from the unavoidable need for capital to self-expand but has the ultimate effect of undermining the foundations on which the process of value creation itself is based.

Physical or constant capital, in fact, does not create surplus-value, i.e., something which is worth more than what it costs; it merely transfers its exchange-value to that of the product according to its share. This in turn confirms that, under competitive conditions, the exchange of goods – capital and machines included- is an exchange of equivalents, and any profits can only result from the failure to satisfy such conditions; situations –monopoly rents or arbitrage mechanisms- that Marx tellingly summarized with the term 'cheating'. In the extreme case where only constant capital is present, and therefore the production function is additively separable (which is not very different from the Walrasian view of economic relationships as relationships between things rather than between people mentioned in Part One) there would be neither surplus-value nor industrial or Marxian profit, and therefore not even relative growth, either at a rising or at a decreasing rate.

According to Marx, indeed, capital is not a 'thing' creating value by itself alone, so that its "productive power" is another appearance; to the contrary, it is a relationship where its value appreciation strictly depends on the fact that on the other side of such relationship there is labour, a position whose obviousness is second only to the reason why it is not considered as such (see footnote 4, Part One and Battistini 2019b).[5]

[5] For the purpose of this study it is important to point out that neither Smith nor Schumpeter, and apparently not even Keynes, thought that capital creates value, although this of course does not mean that it is not necessary: "Wealth, as Mr. Hobbes says, is power. (…). The power which that possession immediately and directly conveys to him, is the power of purchasing; a certain command over all the labour, or over all the produce of labour which is then in the market" (Smith, 1976, p. 48). See also footnote 14, Part One. Schumpeter's and Keynes' views in this regard, which are also linked to the determination of the rate of interest, are discussed in more detail –if in the same context, in Battistini 2019b, section 4. Alas, that – as in Marx- capital could not be understood as an independent production factors, was also pointed out by Sraffa (1961). The adoption of the Ricardian framework, however, made the alternative problematic in its own. A friend of Keynes, moreover, the two scholars wrote almost a century ago and probably shared the same basically quantitative view of the economic system. See footnote 6, Part One.

This conclusion is reinforced by the finding that this fundamental contradiction in the "sphere of production" generates two more in the "sphere of circulation", i.e., in the phase of profit realization on the goods market.

On the one hand, that of supply, since the increase in constant capital in itself decreases the rate of profit, even its mere maintenance requires an increase in the volume of profit. However, since, as just noted, this substitution does not create new value but appropriates what is already there, such an increase can only happen at the expense of other capitalists. Whence derives the circumstance whereby competition among capitalists takes the form of an attempt to increase their own market share with constant market size and ultimately results in a situation characterized by high concentration and profit rates – Marxian or industrial – decreasing.[6]

On the other hand, that of demand, since technical progress reduces the number of hours socially needed to produce the goods necessary for subsistence, this process of reducing the cost of commodities also involves the exchange-value of labour by determining what Marx called the "tendency towards the impoverishment of workers", in its turn at the basis of his prediction about the inevitable superseding of capitalism and his characterization of the crisis in terms of under-consumption.

These three contradictions combine to form what may be called the 'general contradiction of capitalism': the fact that, due to the separation between ownership and control of the labour force and to the inevitable conflict that ensues, the increase of productive forces, or technical change, is functional only to the – apparent- self-expansion of capital rather than to the society as a whole, or at least to the economic system.

The original quotation concerning this last contradiction is useful. Although it is actually from Engels, it does not seem written so long ago and this circumstance is one of the reasons for the significance, still today, of Marx's contribution from the point of view of praxis: "The *real barrier* of capitalistic production is *capital itself*. It is that capital and its self-expansion appear as the starting and the closing point, the motive and the purpose of production; that

[6] Naturally, this tendency to concentration implies that the tendency to decrease Marxian or industrial profits may be accompanied by a tendency to increase monopoly profits, which further weakens the 'law' on the tendency of profit to fall. See also the subsequent footnote.

production is production for capital and not vice-versa, the means of production are not mere means for a constant expansion of the living process of the society of producers. (….) The means – unconditional development of the productive forces of society- comes continually into conflict with the limited purpose, the self-expansion of the existing capital. The capitalist mode of production is, for this reason, a historical means of developing the material forces and creating an appropriate world market and is, at the same time, a continual conflict between this historical task and its own corresponding relations of social production." (Marx, 1867, vol. III, p. 171, emphasis in the text).

Without questioning, of course, the fact that every human phenomenon has its end and, even more so, every phase in which these phenomena occur, the first of the consequences that ensue from the substitution of the quantitative measure of the exchange value of labour power in terms of working hours with the qualitative measure in terms of the amount that can be earned from an independent participation to the production process - or in other words from participating in the pre-capitalist or non-capitalist Commodity → Money → Commodity circuit- is that the implication concerning the progressive impoverishment of workers collapses, and so too does the one concerning the inevitability of the superseding of capitalism, at least capitalism understood in the general sense defined by private property, inclusive of the means of production, markets and firms.

As already noted in the first section of Part One of this study, in Marx's original analysis, technical change also entails a reduction in the exchange value of labour power, the latter being determined by the amount of labour socially necessary to produce subsistence goods. This does not happen by skipping the step in terms of surplus-labour as required by the qualitative interpretation of the exchange value of labour power: an interpretation that, as mentioned in the first part and discussed in more detail in Section 4 of Battistini (2019a), would still be desirable, given the recent re-emergence of the piece rate system, even if the quantitative version had not given rise to the logical problems, primarily those concerning the transformation problem, which led to its total demise.

Consequently, given that the exchange-value of labour power has a lower limit which is not decreased by the reduction in the exchange-value of commodities, the law relating to workers' impoverishment and the consequent inevitability of the end of capitalism, at least in the general sense just recalled,

becomes more simply, but not necessarily less importantly, an inevitable tendency to real crisis.

Moreover, again as a consequence of the limited reduction in the exchange-value of labour-power, also the characterization of the crisis in terms of under-consumption is not necessary to the logic of the argument, which can be carried forward also by assuming that the relevant markets are always in equilibrium, an approach that by treating the opposing theory in its ideal conditions, as already mentioned in Part One, appears to be the one preferred by Marx. It is also preferable in conceptual terms since it highlights how profit and exploitation are in principle fully independent from market imperfections or market power, such as the one deriving, for instance, from unemployment.[7]

The second consequence follows from the first and likewise benefits at least in part from discussing such predictions after they should have occurred. It is that the Marxian notion of mode of production, in its turn composed of "productive forces" or technology, and "relations of production", or property rights, should not be referred to entire economic systems such as capitalism, feudalism, slavery etc. but to the spatio/temporal variety of forms that capitalism has assumed in the international global system from the First Industrial Revolution to the present day.

As said in the Introduction to Part One, this in turn requires replacing the unilinear view of history typical of Marx and his contemporaries with the more properly cyclical one of contemporary evolutionary analyses, which associate with every Industrial Revolution a given techno-economic paradigm, understood as the combination of technological, organizational and more generally institutional arrangements characterizing each of the phases into which it is possible to subdivide the evolution of the capitalist system (Perez, 2002; see also Maddison, 1982).

This literature may run the risk of identifying a sequence of events that would recur substantially the same throughout history, thus denying at least some potential for uniqueness, and also failing to clarify that a cyclical vision of history has no necessary relationship with a progressive one. Nevertheless, it has the merit

[7] Naturally, being a highly unrealistic assumption, the consequences of its relaxation will be discussed below. See section 3.1.

of identifying some regularities in the process of introducing, developing and exhausting these different techno-economic paradigms. In its turn, this feature averts the danger of mistaking these various stages for the rotating confirmation of the validity of the axiomatic models, which instead are independent of such material and historical conditions, and above all emphasizes the characteristics of complementarity among the various aspects - technological, organizational, and institutional in a more general sense - which define them at the level of the overall economic system.

However, rather than refer to the incremental innovations understood in Schumpeterian terms, which could also benefit from being interpreted as a deepening of the division of labour in the Smithian sense, it seems more appropriate to refer instead to radical or general purpose innovations, which exhibit the systemic features central to this study.[8]

Moreover, such radical innovations are nothing more than what Marx, in the just mentioned *incipit* of the Introduction to the Critique of Political Economy, called "productive forces" or technology, with respect to which the "production relations", or property rights, are initially "development forms" but rapidly transform "into their fetters", giving rise to the tendency to crisis, which can therefore also be interpreted as a tendency to fail to fully exploit a given techno-economic paradigm or, to use the Perez's expression, a tendency to fail to reach the 'turning point' at which the benefits of the new paradigm spread through the entire structure of the economic system.

While Perez links this turning point to a period of crisis leading to the resolution of the conflict between the old and the new system and the spread of the benefits of the new paradigm from the financial sector to that of the real

[8] In fact, as also discussed in Battistini (2019 a, b), the Schumpeterian approach is unassailable in logical terms but its validity depends on that of the general equilibrium and therefore on the lack of consideration of organizational elements. Once the latter enter the picture, incremental innovation is neither a necessary nor a sufficient condition for growth and the same is true for monopoly profit, since in this context the dynamics is driven by the Marxian or industrial type of profit. To arrive to the deepening of the division of labour in the Smithian sense, it is then enough to move from the somewhat elitist view of the Schumpeterian entrepreneur-innovator to the egalitarian view by Smith, according to whom: "A great part of the machinery 'made use of' in those manufactures in which labour is most subdivided, were originally the inventions of common workmen, who, being each of them employed in some very simple operations, naturally turned their thoughts towards finding out easier and readier methods of performing it." (Smith, 1776, p. 20). To summarize, the required is to pass from the idea of the 'selection of the extraordinary' to that of the 'transformation of the ordinary'.

economy, Marx links it to the effect of the aforementioned real contradictions in the formation of a "social consciousness" that can be interpreted as a sort of emphasis of the role, uniquely human, whereby change in the interpretation of reality arising from the recognition of conflict can in its turn determine change in reality itself, again in this case, because of the relationship of interdependence between praxis and theory (or more precisely between structure and super-structure); and, once again, laying the foundations for an original theory of institutional change.

For what matters here, however, the point is as follows: since the conflict between old and new and the class conflict will not coincide, but nor can they be understood as separate, if only as a consequence of the different degree of liquidity of labour and capital, the two observations are complementary rather than pertaining to different patterns of reasoning, as also illustrated by the frequent references made by the evolutionary approaches to the Marxist theory of the long waves (Freeman and Sousa, 2001).

These evolutionary approaches, mostly informal and descriptive, therefore provide the historical and material framework for the analysis that follows in the next section, as well as the more rigorous one in evolutionary game theoretic terms that will be introduced in the next part and that will be based on the attempt to formalize Marx's theory of institutional change just referred to (see also Battistini, 2011).

Finally, the third and most important consequence, also at least in part arising from or in any case confirmed from the privileged position of discussing these matters almost two centuries afterwards, but in any case based on the theoretical approach mentioned in Part One, in part different from that of Marx and already in his times, not without contradictions, attempting to propose a qualitative and inter-subjective labour theory of value, is the following: while the quantitative formulation suggested a centralised solution to the fundamental contradiction of capitalism, the one associated with the notion of 'single firm Socialism', designed at least in theory to incorporate and resolve by elimination the other two present in the sphere of circulation, the qualitative formulation outlined in this study suggests instead a decentralised solution to this contradiction, which in turn can be at the basis of the positive solution of the other

two secondary contradictions characterizing the phase of profit realization on the market of goods.[9]

Hence the already mentioned recovery of Smith's theory is made by taking account of the collective character of production and of material living conditions. In this regard, it does not seem redundant to note that Smith, writing one century before Marx, only saw the first phases of the Industrial Revolution. As a consequence, their differences may be due less to their view of the 'mechanics' of the capitalist system per se than to their different or even opposite view –positive versus negative- about its potential, which also explains the generally ideal character of the Smithian perspective.

This extension of Smith's theory, however, is illustrated by analysing the relationships of interdependence between the phase of production and the phase of circulation, which, as anticipated in the Introduction, is discussed in the following section.

3. The interdependence between markets and firms and the interdependence among firms.

The analysis of the previous section comprised two implicit extensions to the static and partial analysis of the division of labour within the firm carried out in the first part of this trilogy.

The first extension was of a dynamic type, in the sense that the analysis focused less on the determinants of the creation of surplus-value than on its temporal evolution. The second extension was of a general nature, in the sense that the analysis of the division of labour within the firm was linked to that of the

[9] The paradox, indeed, is that, because this model of single-firm socialism eliminates these two derivative contradictions but actually leaves untouched the fundamental one in the production process, that is, the one deriving from the presence of wealth effects, it may be considered the prototype of the state as a profit-maximizing institution. In those conditions, in effect, public property is no different from private property in capitalist systems, especially as far as its dynastic properties are concerned. Since to be added is the monopoly on the use of physical force, the result has been worse than the problem which this model aimed to solve –as anticipated to Marx in person by the area to his left just mentioned in the text and in Section 2, Part One. Naturally, in democracy things may be different, but not so much as far as the problem of the separation between ownership and control is concerned. While in this case state-owner enterprises may not maximize profits directly, they do maximize the benefits of special interests, whether regional or sectorial. The general interpretation as an economic institution of capitalism, i.e. as a mechanism with which to appropriate or share the benefits of cooperation still applies. And, as in the case of workers' full autonomy, even this case there is a kind of ideal solution: independence from politics. The ideal element, of course, stems from the fact that what is needed as a necessary condition are not competent elites but generalized competence.

division of labour among firms. Put otherwise, the analysis of what happens in the "sphere of production" was linked to the analysis of what happens in the "sphere of circulation".

As anticipated, this section mainly addresses this last extension, combining the game within the firm presented in Section 3 of the Part One ($\boldsymbol{\gamma_w}$) with another game taking place among firms ($\boldsymbol{\gamma_b}$) as in the figure below –which is presented in slightly more general terms.[10]

2 / 1	comp	coop
Comp	$V-\overline{w}, \overline{w}$	0, 0
Coop	0, 0	$\frac{V}{2}, \frac{V}{2}$

Fig.1a $\boldsymbol{\gamma}\,(_{\boldsymbol{w}})$

B / A	COMP	COOP
COMP	$\bar{V}, \bar{V}$	$\bar{V}, \tilde{V}$
COOP	$\tilde{V}, \bar{V}$	$\bar{\bar{V}}, \bar{\bar{V}}$

Fig. 1b ($\boldsymbol{\gamma_b}$)

As discussed on that occasion, represented in Figure 1a. is the game of the division of labour within the firm. There are two players, a capitalist (K) and a worker (L) or two partners as will soon become clearer. The strategies consist of a hierarchical or vertical division of labour, aimed at reducing the use-value of labour and thus the potential exchange-value of the joint product as discussed in the previous section (comp), or a more egalitarian and horizontal division of labour, aimed at increasing the use-value of labour and thus the potential exchange-value of the joint product (coop). In other words, the former strategy represents a division of labour based on the principle of minimising learning before doing, which can be attributed to Gioia-Babbage, while the latter represents a division of labour based on the principle of maximising learning by doing, which can be significantly associated precisely with Smith and the advantages of the specialization that he identified in the famous example of the pin factory (see

[10] Compared to the numerical formulation of the previous part, $\overline{w}$ = 1; $\bar{V}$ = 4; $\tilde{V}$ =3 and $\bar{\bar{V}}$ =5. The basic condition which ensures that group production is always attractive compared to individual production can instead be written as $\tilde{\boldsymbol{V}} \geq 2\bar{\bar{\boldsymbol{w}}} > 2\bar{\boldsymbol{w}}$ where $\bar{\boldsymbol{w}} < \bar{\bar{\boldsymbol{w}}}$ represents the relationship between the exchange value of subordinate and professional work, respectively. In the next Part, this basic condition will become the first distinguishing feature of those two games.

Pagano, 1991)[11]. Finally, the pay-offs represent the interdependence between the theory of value and distribution, given that the exchange-value of the product that will be distributed in the manner indicated in (γ_w), is the one which is actually realized in the market of goods, that is, one of the pay-offs in (γ_b).

More specifically, it may be useful to recall that V represents the potential exchange-value of the joint product: that is to say, how much it would cost to obtain the same product using the market of independent or small production that does not participate in the capitalist circuit Money → Commodity → More Money but rather in the non-capitalist Commodity → Money → Commodity one.

On the other hand, by applying, as Marx did, the same pricing rule as used for other commodities, $\overline{w}$ represents instead the exchange-value of the labour force: that is to say, how much as it would have been possible to obtain from an independent participation in the production process, but without specific means of production in the common sense of the term.

Whence derives that, since the step in terms of surplus-labour is skipped for both theoretical and practical reasons, the use-value of labour coincides with the potential exchange-value of the product. Therefore, once realized, it is possible to re-dis-cover the original notion of profit in the Marxian or industrial sense: that is to say, the one which derives from the difference between the use-value and the exchange-value of labour. As such, this type of profit is not eliminated by competition; the latter instead determines the conditions of its extraction and is in turn determined by it because of the relationship of interdependence between the process of value creation (or appropriation) and that of its realization (or appropriation) which is the focus of this Part Two (see also Battistini, 2013).

As pointed out in the Introduction to Part One, this re-dis-covery is the fundamental finding of the entire study, for two reasons. Firstly, it is a counter-example to the general equilibrium model, given that, although there is free-entry and the product can be considered as homogenous, profits are not only positive but even increase or decrease. Secondly, it is at the basis of the general objective

[11] As a consequence of the extension of Smith's theory, however, both must be understood, in the light of what in Part One was called Marx's 'step forward' with respect to Smith, i.e. the observation that the division of labour consists not only in an ever-increasing fragmentation of tasks but also in the need to coordinate them in order to obtain the joint product. See sub-section 3.1.

of interpreting the principle of the maximization of this kind of profit as a positive general principle for the economic domain - of which conflict and Pareto-efficiency turn out to be special cases.

Figure 1b., which is the novelty of this second part of the study, instead depicts the game of the division of labour between firms. Consequently, the two players are two firms (A and B), again of two possible types and each consisting of two players of the type participating in the game in Figure 1a. (and in its twin, not shown).[12]

The strategies consist of competing by reducing the exchange-value of the joint product, thereby attempting to increase the volume of profit by increasing the market share with demand constant at most - offsetting the decrease in the profit rate at the expense of the other firm as in the Marxian theory of the crisis recalled in the previous section (COMP). Or competing by increasing the exchange-value of the joint product, and thus attempting to increase the volume of profit by increasing the profit rate at constant market shares and increasing demand - which amounts to a common interest situation as in the original Smithian theory and therefore also in the re-interpretation proposed here (COOP).

Moreover, as may perhaps become clearer in the next sub-section when the fact that the relationship between the capitalist sector in the proper sense and the non-capitalist sector is fundamental also for the relationship among firms will be made explicit, in this case too reference can be made to the just-mentioned principles concerning the division of labour within the firm.

Finally, in this case, too, the pay-offs, for which the relation $\overline{\overline{\boldsymbol{V}}}>\overline{\boldsymbol{V}}>\widetilde{\boldsymbol{V}}$ applies, illustrate the interdependence between the Marxian theories of value and distribution since the surplus value actually realized depends not only on the production relations within the firm but also on the relationships among firms in the market of goods.

Also in this case, therefore, which may be referred to the neo-classical context where it is the contribution that determines the reward, adopting the lenses of methodological individualism, may create the 'optical illusion' - already discussed in regard to the approach of Alchian and Demsetz - that, since the

[12] In the more general context of the next part, players range from i=1,..., n while firms G are equal to m=n/2.

.

surplus-value resolves itself in the distributional shares, one may gain the impression that it is instead determined by them in an additive way, in this context at least determined by the equilibrium between supply and demand in their respective markets and therefore coincident with what is supposed to be the corresponding contribution. From Figures 1a and 1b, in effect, it follows that $(V - \overline{w}) + \overline{w} = V$ and $\frac{V}{2} + \frac{V}{2}$ = V or, in the numerical terms of Part One, 4=3+1, 5= 2,5+2,5, and 3=1,5+1,5

From the standpoint of the distinguishing features of these two games, the first is a sort of 'anomaly' that formalizes the 'fundamental contradiction of capitalism from the point of view of production' as discussed in the previous section. Indeed, a slightly subtle point, so to speak, is that, to the extent that the game within the firm is non-cooperative, players are individuals interacting in that domain and taking their decisions independently. However, since from the point of view of the workers the (comp) strategy amounts to accepting the authority of the capitalist within the limits of the contract whereas the (coop) strategy presupposes a consensus-based form of decision-making, those who make decisions concerning the division of labour among firms –capital owners or partners, respectively- are also decision-makers as far the division of labour within the firm is concerned. Workers, on the other hand, are only left with the alternative between accepting or not accepting such a decision. Because this point concerns the difference between optimal choice and satisfying choice, in the sense that the latter is associated with only an improvement, it will be critical also in the evolutionary game theoretic perspective presented in the next part of this study.

Basically, the fundamental structural element represented by the initial distribution of property rights (**η**) determines both the distribution of the types of players in the two games within the firm - capitalists and workers or partners, as just mentioned – as well as the decision-makers in both games. The derivative structural element represented by the potential or expected size of the market (**δ**) determines instead the distribution of the types of firm - classical capitalist firm or 'collaborative' firm - in the game between firms. This element is called derivative because it derives from the systemic nature of the fundamental one that represents the significance of the wealth effects in the economic system under discussion. As

a consequence, it is probably more correct to understand the relationship between these two elements as a relation of co-determination.[13]

Both elements are instead called 'structural' because they correspond to the combination of "production relations", or property rights, and "material forces", or technology, and therefore, combined with organizational aspects, the size of the market, which in their turn correspond to the economic structure of society in the Marxian approach discussed in the previous section.

From the point of view of game theory, on the other hand, such structural elements instead represent the material counterpart of the role typically played by beliefs (**β**) and expectations (**ϵ**), namely the players' understanding of the relationship between strategies and pay-offs, and therefore basically the probability distribution on the types of players.

In this sense, by co-determining the actual relationship between strategies and pay-offs, these structural elements determine the actual distribution of the types of players in the two games, to which correspond the super-structural elements just recalled. However, unlike beliefs in the classical game theory where, like expectations in the evolutionary one, reality coincides with theory, from a Marxian point of view they are in the first place uniquely determined by the material element and then play a role of either confirmation or change as a result of the updating process. This feature also derives from a relation of interdependence but it is one between structure and super-structure or between reality and theory (see footnote 5, Part Three). To take account of this feature, in the next part of this study they will be understood as a probability distribution on the cognitive perception of the types of players rather than simply on the types of players.

In any case, it is from this 'anomaly' - that is, the separation between ownership and control of the use of the labour force- that the contradictions at the

[13] With regard to the cumulative causation mechanisms under discussion a point which may generate confusion is the idea that establishing the starting point basically amounts to the question of what came first, the chicken or the egg. Both in general and in particular for this case this is not true because, for instance, increasing the demand without changing property rights only leads to an increase in profits for the capital owners, artificially prolonging the crisis situation. To give another example, the same thing happens with the relationship between reality and culture because, if it is reality which is determined by culture, and not the other way around, then this latter can only come from religion, which obviously makes it difficult to understand or even observe change. See the Conclusions.

centre of the Marxian theory of the crisis follow. Consequently, it is from correcting this anomaly, or from restoring the coincidence between players and decision-makers, that a solution to this tendency to crisis, albeit rare and temporary, may originate.

The second distinguishing feature of these games is that, due to the interdependence between the theories of value and distribution and the partial overlap between players and decision-makers in the two complementary games $\boldsymbol{\gamma}\ (_{\boldsymbol{w}})$ and $\boldsymbol{(\ \gamma_b)}$, the latter can also be understood, as also in Part Three, as two stages of a single multi-level game. In this context, the – hopefully obvious enough- intuition behind the relevant equilibrium concept is that equilibrium strategies should not be best replies only with respect to the game in which they are played but also with respect to the strategies that are played in the complementary game or stage. In other words, strategies must be optimal with respect to the players and especially decision-makers in both games.

Whence it follows that, as a consequence of the relationships of synchronic interdependence between these two games or stages, the relationship of mutual complementarity between strategies that characterizes the production relationship in the game within the firm extends to the relationship between complementary strategies in the two games $\boldsymbol{\gamma}\ (_{\boldsymbol{w}})$ and $(\ \boldsymbol{\gamma_b})$. Indeed, since the exchange-value distributed within the firm is the one realized in the market of goods, if with regard the division of labour within the firm the decision-makers adopt the principle of the minimization of learning before doing (maximization of learning by doing), the same decision-makers will adopt the same principle also with regard to the division of labour between firms.[14]

In other words, from the point of view of the multi-level game it is as if the relationship of strategic complementarity may extend to the strategies chosen by the same player in a single game. Therefore, the property whereby the optimum with regard to one variable may not be such when the variables are considered together, applies. [15]

[14] A similar type of complementarity was seemingly at play for the forms of political-economic organizations characterizing hunter-gatherers' societies and the subsequent agricultural ones, which gave rise to the state. See Carneiro (1970), Bohem (1999) and Battistini (2005).

[15] From the general definition given in footnote 20, Part One, it follows that when they are defined it is possible to understand super-modular functions perhaps more transparently in terms of cross-derivatives, or to be more precise in terms of non-additively production functions. It is then

However, since, as noted above, the actual surplus-value realized in the goods market depends not only on the process of creation or appropriation of value within the firm but also on the relationships among firms, the attractiveness of a certain strategy in (γ_b) $[\gamma\ (_w)]$ does not depend only on the strategy adopted in $\gamma\ (_w)$ $[(\gamma_b)\ ]$; obviously, it also depends on the strategies' profile prevailing in (γ_b) $[\gamma\ (_w)]$.

In this regard, given that from the diachronic point of view, the interdependence relationship between these two games or stages implies a relationship of interdependence between individual and aggregate variables -a relationship that is captured neither by standard microeconomic theory nor by the macroeconomic one- the point is that the non-additive context that characterises the game within the firm also extends to the game between firms. Consequently, applying in this case is the property whereby the marginal return of a given strategy increases as the level at which that strategy is played by other players increases.

In this case, too, therefore, since also the aggregate production function is non-additively separable, the fact that the aggregated product resolves itself in the joint products of individual firms should not lead to the conclusion that the former is determined by latter separately and independently.

Incidentally, in some respects this situation recalls Marx's solution for the transformation problem already discussed in Section 2 of Part One: that is, the idea that the fact that profit may be higher in sectors with a high concentration of capital may actually be a consequence of the fact that the volume of profit is determined at an aggregate level and subsequently distributed according to the organic composition of capital, as indeed happens - and was also the case in Marx's time- in the case of corporations' shares in stock markets (see Part One, Section 2.1.).

From this point of view, even the Keynesian principle of effective demand, namely the expectation of the representative entrepreneur - and of his or her peers-

possible to distinguish between complementarity between the strategies of a single player ($\sigma_{ik} > 0$, with i and k indicating the generic components of the strategy of player i), complementarity between the strategies of two players within the same game ($\sigma_{ij} > 0$, with i and j indicating the generic strategies of the two players), and, as already mentioned in the first part and reiterated below, complementarity between the strategies of a player and a parameter ($\sigma_{i\mu} > 0$, with μ to indicate a generic relevant parameter).

on the level of income justifying a given level of employment, which coincides with the sum of expected consumption and investment, can be interpreted as a form of the optical illusion already encountered with regard to both the new-institutional treatment of team production and the neo-classical theory of value and distribution; namely, mistaking the fact that the value to be distributed resolves itself in the distributional shares for the confirmation of the a priori assumption that the former is determined by the latter, since, again by assumption, they coincide with individual or aggregate contributions.

To the extent that the move from the 'Say's Law' to the Malthusian perspective can also be interpreted within the conceptual framework of the general equilibrium model plus compatible imperfections, in turn characterized by the reversal of the direction of causality between contributions and rewards, also in this case, if it not the contribution that determines the reward but the other way around, then the latter cannot be subsequently determined as a sum of the former. Accordingly, in this case the 'optical illusion' takes the form of a full screen projection.

Indeed, as already noted in Battistini (2019b), value does not derive neither from aggregate supply nor from aggregate demand; on the contrary, the latter are micro-founded by the production process taking place within the firm and in their turn macro-found the individual ones.

In fact, as will be seen in a moment, from a logical point of view one cannot help but note that in this context the definition of aggregate variables net of inter-relationships among the individual ones (Keynes, 1936, footnote 3, p. 24) can only be interpreted as a sort of methodological individualism loosely applied to relationships among individuals. Accordingly, this model may be understood as a sort of 'single-firm capitalism', sharing the lack of consideration of the market with the more or less contemporary model of 'single-firm socialism', but also departing from the general equilibrium model only by assuming that the marginal disutility of labour is less than the wage –which remains equal to the marginal productivity of the same labour, confirming the quite contradictory feature of both the aforementioned expression and its content. From this methodological ambivalence, in effect, probably derived the two different interpretations of Keynes' thought – the 'neo-Keynesian' and the 'post-Keynesian'.

Above all, it is from the lack of a distinction between interest and profit, a feature which Schumpeter (1911, p.180) attributed to all "Ricardo's epigoni", but which also combines with the lack of consideration for the organizational aspects of production, that Keynes seemingly forgot that firms exist to maximize profit rather than employment, adding unrealism to logical issues.

As just mentioned, included in the latter are also aggregate variables *per se*, i.e. their supposedly different logic with respect to the individual ones. For instance, rather than to an unspecified representative individual, they should explicitly relate to class behaviour. But, as pointed out in footnote 21, Part One, without the labour theory of value, this kind of behaviour can only refer to some form of – unstable, if existent- collusion. The same can be said about the notion of opportunity cost of aggregate or national income, which is central to Keynes' definition of capital and, consequently, aggregate income itself. The first thing coming to mind is the national income of another country, but that is an untenable position from a theoretical point of view. Analogously, the notion of expectations themselves, when referred to the whole economic system, basically poses the same problems of the assumption of common knowledge in classical game theory, which, as will be discussed in the next part, requires the existence and knowledge of a 'unique and true model'. The fact that Keynes sometimes makes reference to 'radical uncertainty' or 'animal spirits' does not help; rather, it aggravates the problem, since the first and probably the only thing investors instinctively can agree on is how to make – aggregate- profits. This is all the more remarkable since expectation appear to be the 'real' source of value in Keynes' approach (see footnote 28).

Naturally, the problem has long be recognized and, in the case of the neo-Keynesian approach has given rise to the literature on the micro-foundations of macro-economics, not least because, ironically, the individual versions of aggregate variables have instead a clear and definite meaning. In this regard, however, the point is that this task will be difficult to perform starting from the general equilibrium model and adding some kind of imperfections, or none at all as in the rational expectations literature.

In any case, returning the main reasoning of this Section, these two types of strategic complementarity or non-additively separable production functions - the fundamental one that derives from the relations of production within the firm,

and the derived one that characterizes the relations among firms and depends on the market size- exhibit fundamental differences. In the former case, given that this relationship resolves itself in the joint product, it is organized or, as discussed in greater detail in Battistini (2019b), 'externalized' by the firm. In the latter case, fortunately enough, since the relationship between firms resolves itself in the aggregate product, it is organized or 'externalized' by the market.[16]

And, of course, the reason -which, as will be made clearer in Part Three is also the basis of the important difference between the notions of beliefs and expectations- is that the production relationships within the firm reflect the class relationship between capital and labour. And, in that relationship, neither party can create value without the other, so that each participant in the production process produces only a part of the final product that will then be sold on the market -a feature that Part One was identified as the *raison d'être* of the firm. Conversely, the derivative relationship represented by the size of the market - potential or expected- reflects the supply and demand relationships between firms where instead, apart from the borderline case of vertical integration, each produces the final product that will be sold on the market.

However, this consideration highlights the fact that, as a consequence of the interdependence between the phase of production and that of circulation, from which the one between individual and aggregate variables ensues, not only the firm but also the market or more precisely the prevailing type of competition and therefore its actual size can be usefully understood as endogenous to the principle of profit maximization.

This in turn implies that, as anticipated in the Introduction to Part One, between the market and the firm there is a relation of analogy where the similarity instead consists in the fact that both can be interpreted as mechanisms with which to appropriate or share the benefits of cooperation. Moreover, this feature is generally possessed by the other economic institutions in non-additive contexts. Therefore, the latter can also be understood as the economic institutions of capitalism, so as to distinguish them from the neo-institutional explanation and, before that, neo-classical one where, in deference to the postulate of

[16] With the recent pandemic, everyone knows how life looks life when the optimal level of coordination is, or is thought to be, the central or the governmental one.

methodological individualism, such institutions –market and prices *in primis*, but also the firm, property rights and, in some cases, even the state- are invariably understood as – abstract- mechanisms with which to align individual contributions and individual rewards.

From this point of view, although the qualitative version of the labour theory of value proposed here, which differs from the original Marxian one in terms of working time, considers markets as part of the solution from the first intermediate steps onwards, the difference from the neo-institutionalist approach - for example encapsulated in Williamson's (1985) well-known statement that "in the beginning there were markets" – should be sufficiently clear, not least because it is inspired by the retrieval and re-interpretation of Smith's thought and more generally, as anticipated in the Introduction, of classical political economy.

In other words, the point is that the capitalism has not only introduced the classical firm *and* the labour market, but has also changed the structure of the goods markets. In both Marx's and Smith's perspective, indeed, it is not production that adapts to market but the market that adapts to production.

Be that as it may, in both cases it is useful to employ Theorem 5 in Milgrom and Roberts (1990) to make the intensity of the strategic complementarities dependent on a parameter - the structural elements $\boldsymbol{\eta}$ and $\boldsymbol{\delta}$ - and even more to make use of the subsequent 'Momentum theorem' (Milgrom, Roberts, and Quan, 1991) to make the evolution of these parameters dependent on the interaction with strategies.

Indeed, from the first theorem follows the characteristic known as 'increasing differences', i.e., the circumstance according to which the pay-offs are non-decreasing functions of such parameters. Whence derives the observation already made in Part One and footnote 2 that the representation in normal form of such games can be useful in terms of exposition but is less than precise in formal terms. From a more substantial point of view, as also already observed in Part One, from this feature it follows that the equilibria of such games will tend to be the extreme ones with the possibility of jumps from one to the other, while the intermediate ones will tend to be unstable - if they exist.

From the second theorem instead follows the possibility to formalize the mechanisms of cumulative causation that derive from the interdependence

between the phase of production and that of circulation. As the degree of concentration of wealth decreases (increases) as a result of the increase (decrease) in the proportion or frequency with which the strategy (COOP) has been used in $\gamma\ (_b)$ in the preceding period, the proportion or frequency with which the strategy (coop) is used in the two games within the firm in the subsequent period increases (decreases). On the other hand, as the potential market size increases (decreases) as a result of the increase (decrease) in the proportion or frequency with which the strategy (coop) has been used in the two games $\gamma\ (_w)$ in the preceding period, the proportion with which the strategy (COOP) is used in the game between firms in the subsequent period increases (decreases). Finally, this in turn leads to a further decrease (increase) in the degree of concentration of wealth in the same period (fig. 2, where $\widehat{\sum}_g^{T=-1,0}$ and $\hat{\sigma}_i^{T=-1,0}$ represent respectively the strategies' profiles used in the two games or stages, but see also figures 4 and 5, Part Three).

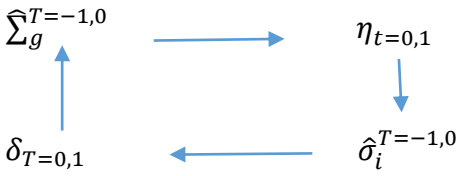

Fig. 2

Whence derives the validity of the statement that in this context aggregate variables are better understood as micro-founded by the process of value creation that takes place within the firm and in their turn as macro-founding the individual ones. Therefore, the possibility of using the theory of super-modular games to formalize the mechanisms of crisis and growth introduced in this second part of the study, without referring to the notion of scale returns that, as noted by the Milgrom, Roberts and Quan (ibid, footnote 1, p. 85), is a cardinal concept rather than an ordinal one like that of super-modularity.[17]

[17] From this point of view, the assumption of increasing returns in the aggregate production function, i.e. of economies external to the firm but internal to the economic system, typical of the growth models claiming to be inspired by Smith, is not necessary and is misleading. It is not necessary because it ties growth to an aggregate product's increase in physical terms that is not needed. It is misleading because it gives the impression of being compatible with the general equilibrium model since it is compatible with price-taking, but in fact it is incompatible with the neo-classical theory of value and distribution since Euler's product exhaustion theorem does not

Consequently, since the sum of super-modular functions is also super-modular, in both cases the production functions, the one within the firm and the aggregate one, can be represented by a Cobb-Douglass whose arguments are the quality of subordinate labour and the hierarchical or service nature of the management.[18]

To sum up, the result of this analysis of the complex network of interdependencies which, as in Marx, is set in motion by the process of capital accumulation, 'hidden' by standard economic theory as emerges from the quotation at the beginning of Section 2, is therefore that the pairs of equilibria that will prevail in the two games or stages will not only tend to be the extreme ones - with the intermediate ones unstable or, more likely, not existing at all. They will also tend to be consistent 'pairs' of equilibria, or, indeed, a single multi-level equilibrium.

Moreover, confirming the importance of the relationship of interdependence between the theory of value and the theory of distribution -as well as the significance of property rights as a rule rather than as exception- the reason why, in the game between firms, the Pareto-dominant equilibrium is not easily attainable as it would be if the game were played independently of the other, is that, in the transition from one to the other, capital owners would pass from the Pareto-efficient equilibrium (comp, comp) to the one, also Pareto-efficient, but that from their point of view would correspond to a Pareto 'worsening' (coop,

hold. In this sense, the state-separator in Romer (1986) is more or less in the same situation as the entrepreneur-separator in Alchian and Demsetz (1972): that of separating individual contributions to make them coincident with individual rewards, the total value of which, however, is indeterminate. Presumably, this logical quirk generates the odd idea that growth may arise from non-internalized externalities. Finally, as shown by the outcome of the debate on convergence and the public nature of knowledge from which the theory of endogenous growth originated, it is also an unrealistic assumption, not to mention its treatment of capital as a single production factor and the fact that, of course, increasing returns, too, can be interpreted as a consequence of the value creation process (see Battistini, 2019b and the next footnote).

[18] On this Cobb-Douglas, however, it is important not to operate the logarithmic transformation to avoid going reverting into the additive context of the standard macro-economic models. In such models, differently from this paper and the General Theory itself, capital is treated as a single and separate production factor like labour and therefore the just-mentioned product exhaustion theorem is valid even at an aggregate level. The ubiquity of such additively separable contexts in standard economic theory is therefore a direct confirmation that the postulate of methodological individualism, although, as already noted, this is rarely made explicit, is really central to it. Alas, the multiplier itself, though promising in terminological terms, does not actually multiply and therefore does not create surplus-value but – mostly- debt.

coop).[19] Hence, as repeatedly noted, the fact that with non-additively production functions and wealth effects the multiplicity of Pareto-efficient equilibria makes this criterion basically useless as a positive principle, a role which is instead played by conflict.

In other words, from the point of view of the interpretation in terms of a single multi-level game, the point is that the equilibrium strategies must be responses optimal with respect to the types of players, and therefore with respect to the decision-makers, in both games. It is for this reason that the democratic entrepreneur referred to in the first part turns out as irrelevant in theoretical terms - at least so far.

In this regard, although both of these last remarks and the rest of the discussion in this section must be confirmed in the more rigorous framework of the next Part, the interpretation in terms of a single multi-level equilibrium may make more transparent the representation and the analysis of the cumulative causation mechanisms charactering both the general case of the Marxian maxim -according to which "anarchy in the social division of labour and despotism in the division of labour in the factory are conditions of each other"- and the generally ideal one, inspired by the Smithian theory of growth extended to take into account the collective nature of production and the material conditions of existence - according to which even 'collaboration in the division of labour within the firm and cooperation in the social division of labour' can be conditions for each other.

Finally, to anticipate the more formal treatment in terms of evolutionary game theory that will be presented in the next part, to be noted is that the third distinguishing feature of such games or stages is that they are characterized by a relation of recursiveness, in the sense that the equilibria of the two games or stages determine the rules of the other game in the subsequent period (fig. 2). By 'rules of the game' it is meant the set of physical and cognitive constraints that determine the relationship between strategies and pay-offs, and their understanding by players. Compared to the usual definition of rules of the game, also called 'belief systems' in the stream of literature known as epistemic game theory (Aumann and

[19] The fact that the expression itself – 'Pareto worsening'- sounds strange corroborates the claim that standard economic theory is based on the transformation of this normative principle into the universal positive principle for the economic domain. As the quotation from Mokyr (2001) in section 3.1. of the third part will show, however, this stance has less to do with reality than with the desired results. See also footnote 19, Part Three.

Brandeburger, 1991), the one just given is at the same time narrower and wider: narrower because it does not explicitly include players, strategies and pay-offs, since it is not these that change during the analysis; wider because in addition to the constraints of a cognitive nature it also contains their material basis, that is, what determines them and is justified by them in the first place.

In effect, this definition closely follows the Marxian notions of structure and super-structure. It can therefore be used to formalize the Marxian theory of institutional change in terms of changes in the rules of the game.

For the present purposes, however, it follows from this notion of recursiveness that the type of interdependence represented in these two games or stages of a single multi-level game is not necessarily the usual notion of strategic interdependence by which the pay-offs of a given strategy depend on the strategies chosen by other players in the same game. Indeed, from a practical point of view this notion excludes the cases where the number of players is so high that the effects of their actions on the other players is negligible, while from the cognitive point of view it poses more problems than is generally recognized (see footnote 12, Part Three). To that notion it is in fact possible to add one of structural or systemic interdependence whereby which the pay-offs of a given strategy also depends on the strategies chosen in the complementary game and therefore also on the structural or systemic elements, since such interdependence passes through the determination of the rules of the game, meant in the sense just defined.

On the basis of this notion, the claim that even the aggregate product is not determined by the sum of independent and separate individual products of the single firms is explained by the fact that, also in this case, it is possible to identify the presence of a residual which is not due to the actions of any particular firm but to their relationship, in this case the structural derivative element represented by the size of the market and therefore ultimately again the fundamental one represented by the relations of production within the firm. Moreover, as mentioned in footnote 18, Part One, the presence of this residual and therefore the non-additive character of the underlying process represent the difference between the notions of externality and strategic complementarity and in particular the fact that

the latter, unlike the former, is not compatible with the general equilibrium model and the associated theories of value and distribution. [20]

3.1. Discussion

There are three possible considerations regarding the retrieval and extension of Smith's contribution just presented. They refer respectively to relaxation of one of the three axioms that in Section 3 of Part One were associated with the neo-classical approach.

The first consideration is that this retrieval is based on the recovery of the notion of competition as a process rather than as an assumption. However, given that both of the types of competition just discussed are compatible with free entry and price-taking, here too the most important issues concern an enlargement of the perspective.

Indeed, these two types of competition - the 'malignant' one in which profits increase through an increase in market share at fixed market size, which leads to crises, and the 'benign' one where profits increase through an increase in the rate of profit for a fixed individual market share, which leads to growth, do not correspond to the usual distinction between perfect competition and monopolistic competition, that is between price competition and quality competition, through some form of horizontal or vertical differentiation.

Since in the equilibrium (comp; comp) in $\gamma\ (_w)$ no surplus-value is created but rather it is appropriated the one which already exists, decreasing the use-value of labour and the exchange-value of the joint product, so that the size of the market or expected demand are left at best unchanged, its realization in $\gamma\ (_b)$ cannot be other than a zero-sum game where every firm tries to appropriate market shares at the expense of the other firms. Accordingly, the point is not to intercept an

[20] The formal difference between localized externalities and strategic complementarities is that the former represent the effects of an individual's actions on the utility of another individual while the latter represent instead the effects of an individual's actions on the marginal values of the utility of another individual (Bowles, 2004, p. 160). Consequently, the former can be 'internalized' by institutions that, like prices, align individual costs and benefits, restoring the canonical condition of the individual optimization. Instead the latter can be 'externalized', i.e. distributed or more precisely appropriated or shared by the firm or the market as noted in the text, but the canonical condition of individual optimization is never the relevant one because it is discarded in the first place when passing to capitalist production. Finally, the terminological difference between 'internalization of externalities' and 'externalization of strategic complementarities' is due to the fact that the former represents external effects of separated activities, while the latter represents internal effects of joint activities. See Battistini (2019b, section 4.).

unsatisfied demand deriving from an artificially high price but to grab market shares in an attempt to off-set the decrease in the rate of profit with an increase in its volume for a given level of the size of the market. This again illustrates that the aggregate supply does not result from the sum of the separate and independent supplies of the individual firms, as well as the new interpretation of the working of the market in the capitalist sector proposed in this paper.[21]

Conversely, since in the equilibrium (coop, coop) in $\gamma\ (_w)$ surplus-value is created, increasing the use-value of labour and the exchange-value of the joint product, and consequently increasing also the extent of the market or expected demand, its realization in $\gamma\ (_b)$ is a common interest game where the increase in the profits of one firm is not in conflict with that of the others because it derives from an increase in the rate of profit for given market shares and increasing market size. This type of competition therefore does not consist in differentiating the product to create a niche escaping from competitors and exhausting profit opportunities (a situation that from an evolutionary point of view is actually the same as the one just discussed), but to create profit opportunities by realizing the increased exchange-value of the joint product. This determines an increase in the demand for the final good, which in turn leads to a cumulative increase in the exchange-value of the aggregate product and thus creates the conditions in which the process can be self-reinforcing.[22]

Accordingly, this feature illustrates how the decentralized solution to the 'fundamental contradiction of capitalism from the point of view of production' may lead to the solution of the two derivative contradictions from the point of view of supply and demand.

As already highlighted in Part One, the point is that since also in Smith value arises from the division of labour rather than from scarcity as in the neo-classical

[21] A terminological clarification may be appropriate: 'aggregate demand' denotes the potential or expected size of the market; 'aggregate supply' denotes the potential exchange value of the aggregate product, and 'aggregate income' denotes the actual exchange value of the aggregate product. All of these expressions refer to the capitalist sector in the proper sense of the term.

[22] Simply put, aggregate supply and demand are non-additively separable because, on the one hand, the demand for inputs is not independent of the level at which the other inputs are demanded; on the other hand, the supply of output is not independent of the level at which it is supplied by other firms.

approach, imitation does not eliminate profits, i.e. the benefits of specialization, and it is possible to create value by doing the same thing (see footnote 8).

From the point of view of the division of labour, indeed, the difference is that whereas in Smith the differences among 'talents' are the *consequences* of the division of labour, in the neo-classical approach such differences are the *causes* of the division of labour.[23] And, as noted in an interesting article by Buchanan and Yoon (2000), in Smith gains from exchange are possible also in a world of equals: a feature from which derives the possibility of cumulative causation mechanisms in the size of the market. By contrast, in the neo-classical approach, which Buchanan and Yoon see as originating from the Ricardian theory of comparative advantage, gains from exchange are only possible in a world where there are given differences: a feature from which instead derives the assumption of decreasing returns on the various production factors considered individually and therefore the compatibility with the zero –monopoly- profit condition typical of general equilibrium analysis as well as that of monopolistic competition.[24]

The second and related consideration concerns the extension of Smith's contribution described in the previous section and therefore to his definitive detachment from the postulate of methodological individualism. As already noted in Part One, Smith's approach cannot be classified as 'methodologically individualistic' since it admits the explanatory role of relationships among individuals such as those represented by the size of the market (see footnote 22, Part One). However, this feature does not call into question the corollary from the point of view of the practice of this postulate, namely, the restriction of the analysis to additively separable situations.

[23] "The difference of natural talents in different men is in reality much less than we are aware of; and the very different genius which appears to distinguish men of different professions, when grown up to maturity, is not upon many occasions so much the cause, as the effect of the division of labour." (Smith, 1776, p. 28).

[24] As can be seen, it is therefore possible to establish a relationship between the prominence of a given economist and the variety of interpretations that are given to his thought, more often than not, one being the opposite of the other. This study has shown that this situation applies to Marx, Smith, Schumpeter, Keynes and, indeed, Ricardo. Consequently, references to such theoretical points of view should be understood more as a presentation method than as an attempt to establish the 'correct' interpretation - the same role assigned to formal aspects. The models of monopolistic competition claiming to formalize the Smithian relationship between specialization and the division of labour by associating the benefits of the latter with increasing returns on capital and consequently seeing the capital accumulation process as determined by saving, should be therefore be understood in light of this consideration.

In this sense, the extension to take account of the collective nature of production and the material conditions of existence - that is to say, the addition of a theory of the firm in the absence of wealth effects- is what has already been referred to as Marx's breakthrough with respect to Smith, namely his understanding of the division of labour not only as an ever-increasing division of tasks but also as the need to coordinate them in order to obtain the joint product (see section 2.2., Part One).

On the one hand, therefore, Smith's original contribution can be seen as a broadening of perspective with respect to the neo-classical approach or, more correctly in chronological terms, with respect to the additive theory in the sense already emphasized in the text, i.e. that the former can be associated with the principle of maximization of learning by doing while the latter can be associated with the minimization of learning before doing. On the other hand, this maximization of learning by doing refers not only to specialization in individual tasks but also to the coordination needed for the provision of an overall result, whether this is the joint or the aggregate product.[25]

More generally, therefore, the enlargement of perspective due to the transition from competition as an assumption to competition as a process, and to the definitive detachment from the postulate of methodological individualism, can be understood primarily as the rediscovery of the link between competition and the division of labour and, secondly, as an extension of the way in which the division of labour is actually conceived.

Moreover, moving from competition as an assumption to competition as a process also makes it possible to move from the intrinsically static perspective of the neo-classical approach to the intrinsically dynamic perspective on which the treatment of growth and more generally of the operation of the economic system presented in this study are based. In this regard, the idea of representing the dynamics of the economic system as a 'moving equilibrium' may be considered as internally correct but hardly realistic.

Consequently, it may also be useful to note that the two types of competition just discussed are present also in the biological domain. In Ghiselin

[25] For instance, as Milgrom, Roberts and Quan (2000, p.81) point out regarding the situation to which their 'Momentum theorem' refers, "The model incorporates the possibility that learning by doing and high levels of activities in one industry increase learning in the other".

(1995, p. 1034), for example, these two forms of competition are respectively called 'competition push' and 'opportunity pull', where the difference is that the former refers to saturated environments with "one species 'wedging' another out of its place" while the latter refers to unsaturated environments where "New places are created, and occupied". Even more inspiring is the distinction proposed by Simon (1983, pp. 42-44) where these two types of competition are respectively called 'niche competition' and 'niche elaboration'. The difference is that in regard to the second type besides explaining how genes are reproduced, it is also necessary to explain how the environment in which such reproduction takes place is itself reproduced – a role that in the present context is played by the relationship between the production process within the firm and the market. And, as will be clearer in the next Part, these cumulative causation mechanisms are also typical of the evolutionary game theoretic analyses, which are based on the replicator dynamics and on the notion of evolutionary stable strategies (Maynard-Smith, 1982).

Moreover, it is of interest that both Ghiselin and Simon associate Darwin with only the former type because of the influence exerted on him by the Malthusian theory of the population and the decreasing returns of land, and that Ghiselin, probably due to the fact that he did not receive an economics education in the first place, and was therefore accustomed to thinking in terms of organisms, had no problem in understanding the division of labour not only in terms of an ever greater parcelling out of tasks but also in relation to the need to coordinate them, which – as just noted- was Marx's own step forward compared to Smith. In the same way, corresponding to such different principles of the division of labour (as far as individual organism are concerned) are the two types of competition just referred to since: "[…] the reason why a physician specialize in ophthalmology is not to avoid competition with dentists. To think of competitive situations in such negative terms, as something merely to be avoided, is to overlook the significance of economic opportunities (Ghiselin, 1999, p. 40).[26]

[26] In fact, rather than extending Smith's theory in light of Marx's, Ghiselin seems to be more influenced by the figure of the innovative entrepreneur conceived by the Austrian school. On the problems of an evolutionary interpretation of Schumpeter's approach, which he himself explicitly excluded from the outset, see the Introduction to Part Three and Battistini, 2019a, Section 3.

Of course, these considerations also confirm the essentially ideal character of this re-interpretation and extension of Smith's theory. On the one hand, a situation in which there are no wealth effects from the beginning has never existed at least since the advent of agriculture about 10,000 years ago. On the other hand, the example of the partnerships discussed in Part One, although relevant because it illustrates its real possibility, does not seem easy to generalize because the profit that is shared in partnerships is the profit produced in the capitalist sector in the proper sense – after all, they sell their services to firms belonging to this sector, which are managed by professionals belonging to the same professional labour market and not by chance remunerated in a similar way.

However, as repeatedly mentioned and as will be further discussed in Part Three, albeit rarely and temporarily, a situation where wealth effects are of scant importance, which in turn corresponds to superseding capitalism in the strict Marxian definition – the one which refers to the combination of the firm and the labour market, which in turn requires the previous presence of the class divide and is summarized in the expression of 'wage labour' - can be obtained and has been obtained through a process of institutional change.

Finally, the third and perhaps most important consideration has to do with the relaxation of the postulate that scarcity is the defining principle of what is economic and what is not. This in turn makes it possible to analyse the role of endogenous changes in the degree of scarcity of the resources and therefore the relationship between natural prices or exchange-values and market prices. More specifically, these changes and this relationship play the role of 'automatic stabilisers' preventing the just-discussed cumulative causation mechanisms from exploding.

However, since they derive from the process of accumulation of capital and since a typical feature of scarcity is that its movements in one direction create the conditions for a reversal of its course, they are not strong enough to overturn the underlying trend so as to restore the intermediate equilibria between supply and demand populating the economic textbooks.

Indeed, according to Smith, scarcity is either exogenous in the sense that it is determined by non-economic factors such as the rise in the price of black cloth in the case of funerals (Smith, 1976, p.76) or it is endogenous to the value creation

process and as such is better understood from the point of view of both efficiency and distribution.

Perhaps the best way to illustrate this feature, at least as an indication for further research, is to relax the assumption that the economy produces only one good, assuming instead that intermediate goods are produced in the non-capitalist sector.

Accordingly, the changes in the strategy profiles in the two games in Figure 1 are not caused only from the players who actually participate and therefore already belong to the capitalist sector; they are also caused by external players entering -or leaving- that sector.[27]. This in turn makes it possible to relax also the assumptions of full employment and equilibrium in all the markets with which the Marxian theory of the crisis was described in Section 2 (see footnotes 6 and 7).

In this context, in effect, as the exchange-value of the final product increases (decreases), that is, as the difference compared to what it would have cost to obtain the same good in the non-capitalist sector increases (decreases), the attractiveness for independent producers belonging to this sector to switch to the capitalist sector increases (decreases), given that the rate of profit -Marxian or industrial- increases (decreases).

Consequently, in a situation of crisis (growth), whereas the number of firms expelled from the capitalist circuit returning to provide the intermediate goods increases (decreases), the number of firms providing the end product decreases (increases). Accordingly, as the scarcity of the intermediate and the final goods respectively decreases (increases) and increases (decreases), their market- or short-term price will respectively decrease (increase) and increase (decrease), thereby countering the tendency towards the decrease (increase) in profits. Similarly, again in a situation of crisis (growth), unemployment and therefore the number of independent participants in the production process without specific means of production like subordinate workers, also expelled from the capitalist circuit, will increase (decrease). As a result, since the scarcity of the latter decreases (increases), their market- or short-term price will decrease (increase)

[27] As will be clearer in the next Part where these two games or stages are embedded in the replicator dynamics, this complication may be interesting as far as interpretation is concerned but has no formal consequences.

together with the wage paid within the capitalist circuit, thus countering even in this way the tendency towards the decrease (increase) of profits.

However, both in the case of the decrease (increase) of the prices of the production factors (subordinate labour and intermediate goods understood as a form of capital), and in the case of the increase (decrease) of the price of the end product, these price movements create the conditions for their reintegration into the capitalist (non-capitalist) sector thus giving rise to a series of mini phases of expansion and contraction that may conceal the underlying trend towards the crisis (growth). As is already noted, in fact, scarcity-induced price movements typically create the conditions for a change of course, so that they do not prove strong enough to reverse the underlying trend, which is determined by the capital accumulation process and the dynamics of transaction costs.

As Marx (1867, p. 42) put it, and Smith certainly would concur, "It becomes plain, that it is not the exchange of commodities that regulates the magnitude of their value; but, on the contrary, that it is the magnitude of their value which controls their exchange proportions".

In this regard, although again only as a direction for future research, it may be interesting to note that basically the same role is performed by standard, anti-cyclical economic policy. Because the latter is based on a model lacking what Schumpeter would call the 'fundamental element', i.e., the creation of surplus-value, it can have neither a theory of crisis nor a theory of growth, with the inevitable consequence of focusing on the symptoms rather than the disease. Indeed, the inflationary (deflationary) pressures of expansive (restrictive) anti-cyclical economic policies have precisely the same, just-discussed effects on the market- or short-term prices of both production factors and the final good.[28]

[28] Standard, anti-cyclical economic policy as emerges from this study is not the one Keynes had in mind. He instead advocated a continuous and durable management of the economy to ensure full employment. This point will be further discussed in the next Part where it is argued that Keynes' real contribution has less to do with the theoretical elements explicitly highlighted than with a 'super-structural change in the perception of the appropriateness and efficacy of the existing distribution of property rights. Indeed, the very idea of a permanent transfer of profits from capitalists to workers in order to make it possible that the former will continue to obtain profits in the future, is another confirmation of the contradictions of both the actual functioning of the system and its conceptualization by Keynes. As for the idea of maintaining a long-term interest rate so low that the implied 'marginal efficiency of capital' induces a level of investment which in turn guarantees full employment, in addition to the lack of a distinction between interest and profit highlighted in the text, the problem is the one already pointed by Schumpeter and reported in footnote 4. Since in competitive conditions the expected return of an investment is included in the supply price, the only way the 'marginal efficiency of capital' and therefore expectations, which,

For what matters here, these series of 'artificial' booms and busts add to the previous ones, making the distinction between the business cycle and long-term tendencies more complicated.

Finally, this extension confirms that the driving force of the complex network of interdependencies analysed in this second part of this study is the production process that takes place within the firm and is due to the distinctive feature of labour as the only resource able to transform itself so as to create value - after all, firms, like social classes, do not have a life of their own independently of the individuals who are part of them.

As noted at the beginning of the discussion of this extension of the basic 'model', as the exchange-value of the aggregate product increases (decreases) the gains for the firms belonging to the non-capitalist sector moving to the capitalist one increase (decrease). Whether this happens through an increase (decrease) in the size of such firms, a merger (separation) of two of them or the extreme case of vertical integration (disintegration), it is clear that it is the non-additive feature that characterises relations within the firm which extends and determines the non-additive feature that also characterises relations among firms.

In the limiting case of vertical integration (disintegration), this observation is particularly evident given that the joint product of the new firm (of the two new firms) is a sort of mini aggregate product, which by definition is greater (at most equal) than the sum of its parts.

From this standpoint, Stigler's (1963) well-known observation that in the early stages of development firms are vertically integrated and subsequently, as a result of a deepening of the division of labour, they outsource parts of the production to other firms, i.e. they dis-integrate vertically, appears correct and also in line with the Marxian perspective recalled in Section Two. What appears more questionable, even to Stigler himself, is that this process is associated with a phase of growth given that the division of labour is understood in the neo-classical sense, i.e., the one that aims less at the creation of new capacities than at the exploitation

as also mentioned in the text, appear to be the 'real' source of value in Keynes' framework, can pay for a permanent and positive stream of income like interest (and profit) is a stable form of collusion from the 'business class' or, again for want of a better term, the coalition of Messrs. Moneybags. While this observation may lend credit to the view that the post-Keynesian approach is a more correct interpretation of the original, it does not add much to its overall correctness. See Battistini 2019b, Section 4.

and devaluation of the existing ones. This in turn illustrates the greatest obstacle to the understanding of the phenomenon of growth within this conceptual framework, which, as Smith's analysis shows, is instead based on overcoming scarcity.

In any case, it is clear from the latter observation that also the phenomenon of vertical integration can be understood as endogenous to the capital accumulation process and therefore as a structural feature of the functioning of the capitalist system rather than as an imperfection compatible with the general equilibrium model (see footnote 18, Part One).

4. Conclusions.

In this second part of the study, the view of the economic system has been complicated through analysis of the interdependence between the firm and the goods market, which has been added to that of the interdependence between the firm and the labour market that was the focus of the first part.

It follows from the analysis of this interdependence that not only the joint product of the firm but also the aggregate product of the economic system belongs to contexts that are non-additively separable. Consequently, the issue of how the value of the aggregate product can be determined arises in essentially the same terms as those in which it arises for the joint product of the firm.

In the standard neo-classical model, i.e. the one of the general equilibrium in which it is the contribution which determines the reward, the problem is that the product exhaustion theorem does not hold. Therefore, the value of the aggregate product cannot be understood as the 'sum of the sum' of the individual contributions of the various production factors. In the model of general equilibrium *plus* compatible imperfections, in which instead it is the reward that determines the contribution, the former cannot then be determined by the sum of independent and separate individual contributions. This is true whether such contributions are considered at the level of social classes, as in the Keynesian principle of effective demand, or at the individual level in the proper sense as in the neo-classical theories of growth, especially those that interpret Smith's theory of growth as an imperfection with respect to the general equilibrium model.

If anything, this problem is even more severe because, whilst in the case of the majority of the neo-institutionalist approaches the partial nature of the analysis and the subordination of distributional considerations to efficiency ones makes it possible to refer to *ad hoc* notions such as quasi-rent or the difference between external costs and benefits in the case of localized externalities, in the general context of the analysis referred to above, by definition, these *ad hoc* concepts cannot be considered sufficient (see the Conclusions, Part One).

On the one hand, this situation further weakens the neo-classical theory of value and distribution, which is based on the idea that the value of economic relations is invariably determined by the sum of independent and separate individual contributions and therefore restricts the analysis to additive contexts only as prescribed by the postulate of methodological individualism.

On the other hand, it makes it more legitimate, as well as more urgent, to look again at the classical theory of value and distribution, in which the value of the product is given and resolves itself in distributional shares rather than being determined by them in an additive way. In this theory, and most notably in Marx's version in which such theories are interdependent and which has been re-interpreted in the qualitative terms discussed mainly in the first part of this study but repeated also in this one, profit has a residual nature, from which the possibility of an inverse -and therefore conflictual- relationship with wages ensues.

It follows from this re-dis-covery of the Marxian or industrial profit that the principle of its maximization can serve as a general positive principle of which Pareto-efficiency and conflict are special cases. The puzzling status of profit in standard economic theory and business practice –an invisible but nevertheless decisive driver of the dynamics of the system- seems to be more appropriate for other concepts and other domains. If possible, this puzzling status of profit is even more consequential in macro-economic analyses both because of their association to economic policy and because aggregate variables, particularly if meant as endowed with a different logic with respect to individual ones, present serious problems starting from the definition. And, as pointed out in the text and footnote 28, this seems especially true for expectations, which are apparently – but also at least debatably- the source of value in Keynes' framework.

To continue to verify the just-mentioned hypothesis, which is the one fundamental to the study in its entirety, in the next Part the view of the economic system is further complicated with analysis of the interdependence between structure and super-structure. In other words, the complication arises from the analysis of the interdependence between the material constraints that determine the effective relationship between strategies and pay-offs and the cognitive constraints that perform a function of legitimization or contestation of such material constraints and most notably of the fundamental one represented by the degree of concentration of wealth.

The key issue, as said, is institutional or structural change; and the result is that conflict plays a 'doubly' positive role: that of an explanatory principle and that of a determinant of the efficient result that consists in the transition from the Pareto-efficient situation that maximizes the profit of the capital owners to the one that is also Pareto-efficient but maximizes the total value, and which is therefore more effective or productive whatever the relevant notion in this regard may be (apart from ideological or normative ones like the Pareto one).

Finally, this view of the economic system, which is also characterized by a relation of interdependence between the capitalist sector in a proper sense and the non-capitalist sector comprising small- and medium-sized firms, can be compared with the abstract analyses characterizing standard economic theory, from both the micro and the macro perspectives.

From the point of view of this study such abstract approaches have three types of problems. The first is that, since they purposely abstract from the historical specificities of a particular economic system or phase thereof in order to concentrate on aspects considered immutable or 'natural', they run the risk of referring to situations that do not have an especially direct relationship with actual reality. The basic idea of the general equilibrium model - that of immediate and impersonal exchanges- or even the largely misleading antinomy between the state and the market are examples of this problematic relationship with the evolution of reality.

Secondly, this process of abstraction risks generating an excessively simplified view of economic reality, and most notably of the functioning of the capitalist system. For example, if, as seen in Part One, micro-economic theory

generally abstracts from the role of the firm or at least from a non-ancillary role, macro-economic theory, as seen in this Part, abstract from both the firm and the market. Moreover, the same happens with the neo-institutional approach, which likewise abstracts from the market, as well as with the neo-classical analysis of growth, which likewise abstracts from the firm.

The second and related problem is that because such abstract analyses are largely based on variables that do not actually exist in reality, they are somehow immune to falsification, which exacerbates the first problem just discussed. The main example in this regard is represented by the notion of marginal productivity of production factors considered individually, which not by chance end up by being measured -as already noted, in a manner very difficult to understand- by prices, at both the individual and, perhaps even more questionably, at the aggregate level. Especially with regard to the marginal productivity, or efficiency, of capital, the issue is not trivial since it depends on the belief that capital creates value, on his own (see footnote 28 and Battistini, 2019b, section 4). With regard to macro-economics, more specifically, then the temptation is to argue such immunity to falsification essentially also stems from the transformation of identities in equations.

Finally, the third and perhaps most important problem is that such abstract analyses are based on the axiomatic approach and the latter can only be justified in terms of self-evidence of the reality. This in turn implies that, by definition, such analyses must present themselves as 'unique and true', with the consequence that when they are not, they can only provide logically flawed or plainly false results. The clearest example of this problem is the notion of 'team production', discussed in Part One, since this notion is defined in terms of non-additive separability but is then dealt with in the –additively separable- context of common goods. This evidences the risks of ideological thinking: that is, of a single conceptual framework considered valid for each and every situation (see section 3.1., Part Three).

To paraphrase Friedman's well-known statement (1953), from false or meta-physical assumptions only false or mistaken conclusions can follow.

Paradoxically, even in this case the problem appears more serious in the less rigorous framework of macroeconomics since this 'unique and true' model is

required but not sufficiently specified for the all-important notion of expectations. Forced to choose between rational expectations and global breaking news, in effect, one may well select the former.

Of course, this does not mean that such analyses are pointless. For example, both the monopoly and the Prisoner's Dilemma, to which standard economists tend to attribute every aspect that falls outside the scope of the standard economy, not only exist and are extremely relevant in their own right but, as has been seen earlier, may emerge as a *consequence* of the fundamental mechanism represented by the process of capital accumulation. And, of course, the same is true also for crisis, growth and employment, among others.

What can, however, be questioned with a certain degree of confidence is their claim to generality.

In this regard, finally, albeit only in passing because of space limitations, to be noted is that the problems discussed above recur in a surprising but essentially same way also for the approaches in which culture is understood as the determinant of reality and therefore of the diverse wealth of nations, suggesting that the developments in the standard economic theory after Marx were not determined solely by the so-called 'envy of physics' (see footnote 13 and footnote 16, Third Part).

From this point of view, one of the most significant similarities between Marx and Darwin could be the common rejection of the religious roots of the abstract thought.

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