

**ON MEANS AND ENDS IN STRUCTURAL ECONOMIC ANALYSIS:
BROADENING THE FIELD OF ENQUIRY**

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Abstract

Structural economic analysis (SEA) can be characterized as addressing means-ends problems at the systemic level. The paper argues that SEA can provide the theoretical tools for a broader field of enquiry, where the production system shapes the constraints and opportunities not only of a ‘systemic actor’ who pursues objectives on behalf of the entire system, but also of a variety of possible political-economic actors who pursue their own objectives. Doing so requires three analytical steps. First, instead of assuming the relevant actors at the outset, each model in SEA can be taken as suggesting different social aggregations that might count as actors. Second, productive structure can be interpreted, from the viewpoint of different actors, as imposing different constraints and offering different opportunities to those actors. Third, we need to study which aggregations will come to count as the relevant actors in the situation under analysis.

Keywords: Political economy of structural change; Structural economic analysis; Structural political economy; Special interest groups; Systemic interest

1 Introduction

Structural economic analysis (SEA henceforth) builds on Physiocratic and Classical approaches to study the systemic conditions for reproduction and expansion of an economic system, and hence for the subsistence and material development of industrial societies (Leontief, 1941, 1951, 1991 [1928]; von Neumann, 1945-46; Sraffa, 1960; Pasinetti, 1960, 1973, 1981, 1993; Lowe, 1976; Hicks, 1965; Napoleoni, 1976, 1985; Quadrio Curzio, 1967, 1986; see Baranzini and Scazzieri, 1990; Landesmann, 2018).

SEA can therefore be characterized as addressing system-level means-ends problems: studying the conditions, typically having to do with material aspects (such as proportions between productive activities, technology, available resources) and distribution between relevant social groups, that must be satisfied in order to achieve systemic objectives such as reproducibility of means of production, full employment or maximum growth. Therefore, the conditions identified by SEA can be thought of as constraints on the pursuit of systemic objectives. For example, a long-standing preoccupation has been to identify the proportions between productive sectors, that is to say the distribution and organisation of human activity across different employments that would act as conditions for the achievement of systemic objectives such as the reintegration of inputs used in production, possibly with a surplus (Quesnay, 1772 [1759]; Sraffa, 1960; Leontief, 1941, 1951, 1991 [1928]; Hawkins and Simon, 1949). This approach is consistent with the study of constraints imposed by the ‘objective’ configuration of an economy and the relations between its parts to the pursuit of systemic objectives that shaped the seventeenth-century roots of political economy (Serra, 2011 [1613]; Montchrétien, 1999 [1615]; see Cardinale and Scazzieri, 2016, 2018). In early political economy, the objectives were those of a sovereign; in SEA, they are those of the ‘system’ defined on the basis of its material interdependencies.

Adopting a Structural Political Economy perspective (SPE henceforth; see Cardinale, 2015, 2017, 2018b, 2018c, 2019c; Cardinale and Landesmann, 2017, 2020; Cardinale and Scazzieri, 2018, 2020), this paper will argue that SEA can provide the theoretical tools for a broader field of enquiry, where each model in SEA can be taken as providing a different understanding of the functioning of an economy, i.e. its constitutive social entities, their relations, and the systemic properties and dynamics that ensue. These understandings can be reinterpreted as providing the constraints and opportunities for the pursuit of a variety of possible objectives on the part of different social groups, aggregated along different possible

dimensions, which can constitute political-economic actors. Potentially relevant actors therefore include the ‘policy-maker’ or ‘systemic’ actor that is assumed to pursue systemic objectives on behalf of a polity, as well as non-systemic actors that pursue their own objectives. The representations of the economy and its working adopted by each actor will shape what constraints and opportunities they perceive and the actions they take.

Such an extension of the material conditions studied by SEA to the means-end problems of a variety of actors, besides the ‘systemic’ actor, is necessary for at least three reasons. First, in SEA there often are social aggregations that are implicitly or explicitly understood as being actors but whose means-ends problems are not explicitly studied. For example, while it is often recognised that ‘classes’ can in principle obtain a higher share of surplus, their means-ends problem (“How can a higher share be obtained? What are the constraints?”) is seldom posed as such, let alone investigated.¹

Second, the analysis can be generalised to non-systemic actors which include but are not limited to classes. Industries, for example, can be relevant in influencing collective choices. But also other social aggregations are revealed by the analysis as being possible, such as vertically integrated sectors or groups defined by income type within each industry (Cardinale, 2018b). One can then study their means-ends problem, i.e. what objectives they might pursue and what the constraints might be.

Third, the extension of SEA makes it possible to address a broader spectrum of problems than just the means-ends problem of a systemic actor, thereby making the analysis relevant in a wider range of contexts. For a systemic actor may in some contexts not exist, such as in international settings where no actor has the mandate or power to pursue objectives on behalf of the entire system. Pursuing systemic objectives would therefore depend on decentralised, even if possibly coordinated, actions of the various relevant actors. And even in systems where there is a systemic actor (say, the ‘government’ or ‘policy-maker’) the process of centralisation of power is never fully complete or unidirectional.² In fact, actors other than the systemic actor remain present, and the degree to which a central authority can

¹ In what follows, we will refer interchangeably to ‘means-ends problem’ or ‘action problem’ as something more general than the decision problems, typically studied by rational choice theory, where means and ends are assumed at the outset. The means-ends problem of actors within structures is usually not considered in SEA either, where actions are assumed to follow straightforwardly from actors’ positions in the system. But since each structure can be represented in different ways, as discussed above, it cannot be seen as determining interests and actions (Cardinale, 2018b). In the view explored in this paper, actors implicitly or explicitly adopt a representation of the system out of those which are possible, and thereby construe their objectives and constraints.

² See Bourdieu’s (1994, 2012) theory of the state for an attempt to bring together the different dimensions of centralisation of power.

impose behaviour on other actors, as opposed to having to interact and possibly negotiate with them, varies across contexts. This can happen in different ways. For example, the ‘decentralised’ actions of a private enterprise economy influence overall dynamics and will thereby enter the problem of the ‘systemic’ decision-maker. Moreover, there are the actions, made by a variety of actors, which aim to influence collective decisions, for example about policies. We will argue that whenever actions have systemic implications, actors need to take into account system-level conditions in order for their particular objectives to be achieved. Therefore, the material conditions at the systemic level that SEA uncovers are relevant not only as collective objectives or as constraints to the systemic actor, but also as constraints on the pursuit of a variety of objectives on the part of different actors. The production system studied by SEA can be then seen as providing material resources for the pursuit of a variety of ends on the part of many possible actors, including the ‘systemic’ actor. In other words, productive structure imposes constraints and offers opportunities to a variety of actors who will have to take structure more or less as a given (at least at a given time) in the pursuit of their own objectives.³ Moreover, the decision problem of the systemic actor now needs to take into account decisions of other actors, which cannot be taken as being structurally determined or to follow simple rules.

SEA models can moreover be interpreted as providing heuristics to determine the actors that are relevant in a given situation. The idea is that the production system can be seen as structuring society by providing possible aggregations that could become actors. For when productive interdependencies reach a certain degree of complexity, they can be represented in various ways, each of which may suggest different possible social aggregations that could count as relevant actors. Different actors could, in turn, understand their means-ends problem through different representations of interdependencies, which shape their understanding of the objectives they can pursue and the constraints they face.

The paper explores this interpretation of SEA. Section 2 reconstructs the system-level means-end problems that are typical of SEA. Section 3 proposes three analytical steps to open up SEA to the analysis of the opportunities and constraints offered by productive structure to a multiplicity of actors variously aggregated. Section 4 concludes by discussing

³ In this paper, the emphasis will be on productive structure as identified by models in SEA, rather than more general definitions of economic or social structure. This is in line with the aim of broadening the scope of SEA and provides a well-defined analytical framework within which the means-ends problems of systemic and other actors can be explored. Further work can extend this approach by adopting broader definitions of economic and social structure.

the bearing of the argument on positive analysis of structural change and normative analysis for systemic and other actors.

2 The means-ends dimension of structural economic analysis

The systemic-level means-ends problem is never far from the surface in structural economic analysis. Sometimes this is recognised explicitly, as it happens in studies of transitional dynamics. For example, according to Hicks, “[though] we cannot determine the actual path which the economy (even the model economy) will follow, we can say more about its optimum path, about the path which will best satisfy some social objective” (Hicks, 1965, p. 201).

Hicks’ understanding of the means-ends character of traverse analysis is developed by Lowe in his instrumental analysis, which is a systematic “*search for the economic means suitable for the attainment of any stipulated end*” (Lowe, 1976, pp. 11-12, emphasis original): “instrumental analysis takes as *given* not only the initial but also the *terminal* state – the latter being “known” through explicit stipulation of a macrogoal toward which the system is to move. The *unknowns* to be determined are (a) suitable *paths* over which the system can move toward the macrogoal, (b) *behavioural and motivational patterns* that set the system on such paths and keep it to them, and, possibly, (c) public controls suitable to elicit the appropriate motivations” (ibid., p. 12, emphasis original). Lowe applies these general principles to a framework that combines circular interdependencies with one-way relationships between original inputs and final consumption or investment goods, studying how exogenous shocks such as changes in the rate of change of labour supply, natural resources and technology make the system leave the initial state, and the conditions under which a desired final state can be reached.

The understanding of the relationship between systemic objectives and the economic means can be referred to structural analysis more broadly. For example, while not always explicitly framed as a means-ends problem at the systemic level, the idea of the ‘right proportions’, i.e. the organisation of human activity that is necessary for meeting systemic ends, can be detected widely in structural analysis. A typical aspect has to do with the conditions imposed by productive interdependencies. This is already apparent in Quesnay’s *Tableau économique*, where reproduction of the system requires appropriate stocks of means of production (the *avances*) at the beginning of the production period; but this in turn requires

consumption of the whole surplus by the unproductive class, which provides the productive class with the means to start production (the *avances* themselves).⁴ The viability requirements of a system of interdependent industries have been formalised in modern times, for example, through the Hawkins-Simon conditions (Hawkins and Simon, 1949), which can be read as putting forward a systemic viability condition, i.e. the possibility to reintegrate the inputs used in production and produce a non-negative surplus, and specifying conditions that make it possible, which have to do with the range of proportions between quantities produced by different industries.

Remaining within the framework of a system of interdependent industries, von Neumann's (1945-46) model of proportional growth can be read as identifying the constraint imposed by available technology and industrial interdependence on the pursuit of the systemic objective of maximum growth. In equilibrium, i.e. in the quasi-stationary state, industries grow at the same rate. As a result, the available technology and input-output interdependence between sectors determine the slowest-growing sector; hence, as it is proved that an equilibrium exists and is unique, they determine the overall growth rate (von Neumann, 1945–46; see also Champernowne, 1945–46; Chakravarty, 1989).

A system-level means-ends problem is also central to Pasinetti's theory of structural dynamics, where non-proportional growth imposes constraints on the pursuit of (the chosen) collective objectives. Such objectives are in fact what defines the natural (i.e., pre-institutional) system, which is the one that meets the “necessary requirements for equilibrium growth” (Pasinetti, 1981, p. 25), which is in turn defined as “a situation in which there is full employment of the labour force and full utilisation of the existing productive capacity” (Pasinetti, 1981, pp. 48-49). Specifically, Pasinetti's natural system aims to find the *requirements* for an industrial system (i.e., one which produces commodities by means of commodities) to grow in equilibrium, i.e., to display full employment and utilization of productive capacity despite continuous disruption of single-period equilibrium due to exogenous changes in production techniques and consumer preferences. This requires “continuous re-proportioning of productive capacity, relative quantities – and therefore sectoral employment – and the relative production prices” (Garbellini and Wirkierman, 2014, p. 253). This “natural” trajectory of structural change, therefore, is not necessarily the one that will take place; rather, it is something that should be actively pursued. As Pasinetti

⁴ See Pasinetti's (2009) reflections on the role of Quesnay's conceptualisation of interdependencies for the development of economic analysis in general and structural economic analysis in particular. See also Coffman (2021) for a historical contextualisation of Pasinetti's reading of Quesnay and an English translation of the text.

shows, many other paths of structural change are possible, in that they are consistent with production and consumption coefficients, which nonetheless do not achieve the chosen systemic objectives. So, the natural system is itself a normative framework, based on a means-ends problem: the requirements, notably in terms of proportions and behaviour, that make certain collective objectives possible. The pursuit of such a trajectory introduces another means-ends framework, which operates at the institutional level of analysis. In fact, institutions are seen as means towards ends: as “instruments susceptible to be continually improved and changed, in relation to their suitability (or unsuitability) to ensure tendencies, or near-tendencies, towards agreed ends” (Pasinetti, 1981, p. 155). An example is the “Agency” tasked with targeting full employment in the face of changing technology and final demand (Pasinetti, 1981, p. 91).

Quadrio Curzio (1967, 1986; Quadrio Curzio and Pellizzari, 2009, 2018; see also Scazzieri et al., 2015) also addresses a problem of the means-ends type in the sense above, but with different systemic objectives (the pursuit of maximum growth) as well as different constraints: chiefly, the scale constraints imposed by the use of non-produced resources, such as land or non-renewable energy sources which, unlike the produced inputs on which von Neumann’s and Pasinetti’s models focus, may not be used at all desired scales. Because of scale constraints, it can happen that different technologies must be used in the economy, where a technology can be seen as a system of interdependent production processes each using given techniques. As a result, in this approach proportionality constraints have a dual character: they are involved in the proportions between processes involved in a single technology, but also between the two technologies. In fact, different technologies are interdependent, for example because investing the net output of one technology may be necessary for expanding the productive capacity of the other technology. Given that each technology uses non-produced inputs, there are scale constraints on its level of activity, and this requires reportioning production activities accordingly. Moreover, changes in distribution change the efficiency ranking of different techniques, and hence can lead to the choice to activate different techniques. This leads to alternating phases of increasing and decreasing returns depending on whether the effect of switching to less efficient technique dominates, or whether the possibility to use residuals, thus increasing the aggregate growth rates, turns out to be systemically more relevant. So, as in other strands of structural analysis, interdependencies are crucial for determining which paths are feasible and activated, and hence which maximum rate growth is reachable. More specifically, here we have a complex interaction between objective conditions given by techniques, scarcity, distribution and the

decisions of “macro” decision-makers, which generates continuous change in what systemic objective can be pursued.

3 Three steps towards broadening the scope of means-ends analysis in SEA

The SPE approach builds on the aforementioned understanding of ‘objective’ economic conditions as constraints on the pursuit of systemic objectives but it broadens the field of analysis. While admitting that the viewpoint and hence the means-ends problem of the systemic actor, such as a policy-maker acting on behalf of the system, is often a relevant one, this approach also considers the viewpoints and means-ends problems of different potential actors variously aggregated.

The argument is in three steps. First, each representation of productive structure highlights different social aggregations that might count as actors. Second, structure can be interpreted, from the viewpoint of different social actors, as imposing different constraints and offering different opportunities to those actors. Third, given the multiplicity of possible representations, we need to ask which ones prevail and hence which actors emerge and how they understand their interests.

Before delving into each step, a note seems important. The actors discussed in what follows are collective actors because they are suggested by the models as relevant aggregations, and especially because it is typically collective actors’ actions that have effects that rise to the systemic level. However, means-ends problems are usually understood to be based on individual-level mechanisms, and indeed reference will be made to theories of individual action. This should not be understood as proposing ‘microfoundations’ as they are often intended, i.e. as aiming to explain political-economic phenomena as straightforwardly resulting from ‘a mass of similar individuals, operating as choosing actors, affected by a situation, taking new actions, and changing society via some aggregation or assembly’ (Jepperson and Meyer, 2011, p. 68), as is assumed for example in median-voter approaches (Downs, 1957; Wittman, 1973; Roemer, 2001). On this paper’s view, the influence of individual actors takes place though the actions they perform in the positions they occupy within political-economic groups and decision-making bodies. Hence, systemic outcomes are not the ‘effects produced by relatively unorganized people’ (Jepperson and Meyer, 2011, p. 68); rather, they result from actions within ‘more and more collective and complexly organized activities’ (ibid.) (see also Cardinale, 2019a).

3.1 First step: each representation of structure highlights different social aggregations

Each representation of productive interdependencies implicitly or explicitly highlights some social aggregations. For example, Quesnay's (1972 [1759]) *Tableau économique* defines social aggregations by the economic activities they perform (agriculture, manufacturing, landowning). In modern language, they would broadly correspond to what we call industries. The classical political economists and Marx built upon Quesnay's understanding of the circular flow, although the interindustry aspect was not always explicit, but the relevant social aggregations came to be classes defined by income type (wage, profit and rent) (Smith, 1976 [1776]; Ricardo, 1951a [1817]; Marx, 1983 [1867]).

It is interesting to note that the twentieth-century 'rediscovery' of the circular flow (Leontief, 1941, 1951, 1991 [1928]; von Neumann, 1945–46; Sraffa, 1960) brought together inter-industry interdependencies (now only considered in a material and technical sense, as flows of commodities) and 'classes' defined by income type, but only the latter (and not industries) came to be seen as potentially relevant social aggregations (Cardinale, 2018b). More generally, SEA models have been taken as providing schemes of interdependence and dynamics within which pre-defined social groups may conflict. In von Neumann's (1945–46) model, for example, there is a trade-off between the cost of subsistence of workers (who are not seen as a class receiving part of the surplus but as a mere cost of production) and the rate of profit, and this is the fundamental determinant of the maximum rate of growth of the system. The trade-off between profit and wage becomes an explicit possibility for conflict to receive a higher share of surplus in Sraffa (1960)'s standard system. A more complex set of possibilities for conflict is revealed by Quadrio Curzio's model of an economy that grows under constraints due to scarce resources (Quadrio Curzio, 1967, 1986; Quadrio Curzio and Pellizzari, 2009; see also Quadrio Curzio and Pellizzari, 2018; Scazzieri et al., 2015).

SEA models potentially offer a variety of possibilities for social aggregations that can constitute 'actors'. Take, for example, the circular flow models. They show industries as well as classes. But, depending on the assumptions made, it is more likely that either industries or classes are considered salient and hence are seen as the relevant political-economic actors (Cardinale, 2018b, 2018c). For example, in the open Leontief model, changes in the price system lead to changes in the distribution of value added across industries, which can then be distributed to income types within each industry. Hence, the salient aggregations might be

industries and income types within them, although nothing in the model prevents one from taking classes across industries as the relevant aggregations. In the Sraffa model, in contrast, although industries are visible, the assumption of uniform profit and wage rates across industries make capital and labour appear as homogenous pools across industries; they are therefore likely to be seen as the relevant aggregates.

Different social aggregations can emerge not only from different models of the circular flow, but also when a given system is represented by aggregating production processes into sectors in different ways. For example, Pasinetti (1973) has shown that a given production system can be represented through two models that are formally equivalent but highlight different features; that is, the inter-industry circular flow can also be represented as a set of vertically integrated sectors that display primary inputs and final goods but not intermediate goods. It can be shown that the latter representation can make salient various social aggregations: industries, classes based on income type, or vertically integrated sectors (Cardinale, 2018b, 2018c). And whilst vertically integrated sectors of the Pasinetti type aggregate processes that are directly or indirectly involved in producing a given output, processes can also be aggregated into vertically integrated sectors constructed on the basis of their use as inputs of given scarce resources or their use of techniques (Quadrio Curzio, 1986), or their exposure to export markets of final or intermediate goods, and so on (Cardinale and Landesmann, 2020).

The foregoing reasoning suggests that the social aggregations suggested by SEA models can be understood as *potential* interest groups (Truman, 1951); that is, these aggregates would in principle have common interests as they would benefit from specific policies, but this does not mean that they necessarily become *actual* interest groups by pursuing such influence in practice, e.g. by setting up the necessary organisations and investing in obtaining political influence. Hence, the purpose of the analysis is to identify what aggregations are made possible by a given productive structure, and what interests they would have on the basis of their positions in that structure, irrespectively of whether they actually are aware of the possibility of such aggregation and whether they concretely put in place actions to pursue political influence.

3.2 Second step: structure can be interpreted, from the viewpoint of different actors, as imposing different constraints and offering different opportunities to those actors

Each of the representations of productive structure discussed above can be read as providing constraints and opportunities to the actors that the model suggests. This poses two problems. First, how, in specific situations, certain social aggregations come to be relevant and become ‘actors’, which can be intended here as becoming actual rather than potential interest groups in Truman’s (1951) sense. Second, how actors construct their action problem, i.e. how they represent the situation and the constraints and opportunities it affords, thereby pursuing what they define as their own interest. We will discuss the formulation of the action problem here, and move later to which aggregations are likely to be relevant in a given situation.

To consider some examples of action problems, let us take the open Leontief model. For the system as a whole or the systemic actor acting on its behalf, the opportunity is the formation of a surplus, irrespective of how it is distributed. The constraints have to do with respecting the conditions that make it possible to reintegrate inputs used in production and generate a surplus. The constraints could be illustrated with reference to the price or quantity system. In the former case, it can be shown that there is a range of prices compatible with viability, each of which is associated with a different value added for each industry (Steenge and van den Berg, 2001). If we take the quantity system, the constraint would be given by the range of proportions within which the system is viable and produces a surplus. This is specified by the Hawkins-Simon conditions (Hawkins and Simon, 1949), which show that there is a range of proportions under which the existing technology affords production of goods in excess of those used as inputs.

If, instead of the system, we take the viewpoint of a given industry, the objective of its ‘political’ action (in the sense of an interest group à la Truman, i.e. organise itself to influence policy and to pursue such influence) might be to pursue policies that guarantee a set of prices that increases its value added.⁵ The constraint is viability: prices must remain within the viability range, otherwise some industries will not be able to continue production and, through input-output interdependencies, the whole system will become unviable. This would jeopardise the objective of an industry’s pursuit of higher value added. If the objective is instead to expand output, for example because it implies higher employment and hence more weight in industrial relations or political influence, then the action problem might be framed through the quantity system: the objective of expanding output would face the systemic

⁵ As Pasinetti (1977, pp. 56, 61) notes, in the price system of an open Leontief model (Leontief, 1951) no assumption is made about how the value added accruing to a given industry is then distributed between income types within that industry. Pasinetti (1977, p. 73) goes on to argue that the price system in that model has found little practical application. From the viewpoint pursued in this paper, an important application is that the model shows the possibility for different potential actors and their means-ends problems (see also Cardinale, 2018b).

constraint to keep proportions within the viability range defined by the Hawkins-Simon conditions.

The consideration of viability conditions within the action problem of an actor can be called *systemic interest*, and it can be used to capture that actor's interest in preserving the viability of the system (Cardinale, 2015, 2017, 2018b, 2018c).⁶ Hence, this approach suggests that each actor should pursue its (direct) interests within a broader strategy that takes into account the need to keep the system viable. Otherwise, the pursuit of the (direct) interest could be jeopardised. Hence, systemic interest is the interest of each actor in keeping the economy viable, i.e., an indirect way of pursuing its own particular interest. More precisely, it is a constraint on the pursuit of that interest.

The foregoing thought experiment is based on actors representing the system as an open Leontief model. But if we represent a structure of industrial interdependencies through a Sraffa system, although we can 'see' the industries, they are unlikely to count as 'actors', because the assumption of uniform profit and wage rates across industries prevents an industry from receiving more value added than another.⁷ Hence, this assumption is likely to lead to a different action problem, where the relevant actors are classes defined across industries, each of which will have the objective of obtaining a higher share of surplus.⁸ This is particularly evident in the standard system, where there is a trade-off between profit and wage. Interestingly, because distribution is independent of prices, the viability conditions imposed by the price system, which should act as constraints on each class's pursuit of a higher share of surplus (and hence as systemic interest), are unlikely to appear as salient to actors.⁹

⁶ For some examples of how the concept of systemic interest can help interpret the formation of interests in economic policies, see Cardinale and Coffman (2014), Cardinale and Landesmann (2017, 2020), Cardinale and Scazzieri (2020), Di Tommaso (2020), Di Tommaso *et al.* (2020), Ferrannini *et al.* (2021), Pereira and Steenge (2021), Tassinari (2021). See also Chiodi (2021) for some insights that a generalisation of Sraffa's notion of viability can provide for policy analysis.

⁷ See Cardinale (2018b) for a detailed analysis. On the possibility to open up Sraffa's framework to non-uniform profit rates and the importance this may have within the broader interpretation of Sraffa's contribution, see also Zambelli (2018) and Venkatachalam and Zambelli (2021).

⁸ Whilst the model shows the contribution of labour to each industry, labour is remunerated at the same rate across industries and it is therefore likely to appear as a uniform pool, irrespective of the industry in which it is employed. The same reasoning holds for capital. This suggests that the assumption of uniformity of wage and profit makes conflict between classes more salient than conflict between industries.

⁹ In other words, if actors represent the situation as a Sraffa standard system, their understanding is likely to be one where the relevant actors are workers and capitalists, their objective is to obtain a higher share of surplus, and there is no obvious viability constraint given by the price system because distribution is independent of prices. However, it can be argued that Sraffa's approach lends itself to a broader set of political-economic interpretations if strictly technical and institutional aspects are disentangled. For example, Scazzieri (2012) distinguishes between 'horizontal' and 'vertical' understandings of prices. The former "can be directly explained in terms of technology in use and income distribution" (Scazzieri, 2012, p. 1320), whereas the latter

We could extend this reasoning by examining the various possibilities to aggregate production processes into vertically integrated sectors, as discussed above, and reconstruct the objectives and constraints that would be associated with the action problem of different actors in each situation. The analysis can be further developed by considering systems of industrial interdependencies across countries, where viability has an industry-level dimension (the possibility to import necessary inputs and export excess product) as well as a macroeconomic dimension (industrial specialization may or may not be ensure the viability of external accounts and foreign debt positions) (Cardinale and Landesmann, 2017, 2020).

The variety of possible representations does not only concern the different models adopted; one can also think of it geographically, in terms of delimiting the relevant system. In fact, interdependencies can be detected at the regional, national, international or global level. Each system of interdependencies may be associated with a definition of systemic interest. Which form will prevail depends on the relative strength of productive interdependencies as well as on the representation of the system adopted by relevant actors. Acting upon that systemic interest will depend on additional conditions, having to do with the existence of institutional arrangements that make it possible to coordinate interests so that actors take systemic interest into account in their own action. Particular and systemic interests are likely to change over time. For example, as processes of development unfold, with the ensuing changes in inter-country trade relations and value chains, systemic interest could be recognised as concerning the preservation of interdependencies across broader areas. Conversely, it could be referred to narrower areas, either because interdependencies across larger areas become feebler (e.g. as a result of reshoring), or because of non-economic reasons such as political conflict, or because institutional mechanisms of coordination do not exist or are less reliable at wider scales, so that more local mechanisms are preferred (Cardinale and Landesmann, 2020).

3.3 Third step: which representations, out of those which are possible, will prevail in a given context?

“may be explained in terms of dated quantities of labour and a system of weights” (ibid.), where weights may or may not reflect a wage-profit mark-up criterion whereby older quantities of labour are assigned a bigger weight. Hence, the two understanding of prices “belong to two different levels of explanation. In particular, the standard formulation of horizontal prices presupposes a specific institutional set-up (i.e. a wage-profit economy with mark-up pricing), whereas vertical prices allow the identification of a causal mechanism independent of any specific institutional set-up. However, the way that mechanism is instantiated in specific contexts depends on a particular system of weights, which in turn reflects particular institutions” (ibid.). Disentangling these levels of explanation could help conceive of alternative systems of weights, which could be associated with different potential actors and action problems.

The variety of representations of structure, of potential social aggregations and their action problems, as discussed above, requires understanding which aggregations will count as the relevant actors in the situation under analysis, and which representation of the system each actor thus defined will rely upon to frame its constraints and opportunities and hence its particular and systemic interests. Following the reasoning above, a given firm could see itself as part of an industry or a vertically integrated sector. In turn, it could be a vertically integrated sector constructed on the basis of final demand or the use of a certain scarce resource or a specific infrastructure. The representation of the system will have an effect on the visualisation of that firm's particular and systemic interests, and thereby its actions.

This is moreover a dynamic problem: as a result of structural change, to what extent will representations and interests be restructured? It is likely that, as a result of interests being organised along established lines for a long time, actors might come to take for granted the existing aggregations. For example, industry associations may represent firms by type of output or by size, and trade unions could represent workers by industry, where other forms of aggregation could not only be possible, but potentially even more relevant in specific contexts and in the face of specific structural changes. For example, firms could be aggregated by export orientation or by reliance on specific inputs or infrastructure, and workers by skill level (Cardinale and Landesmann, 2020). Another important aspect may have to do with the models of the economy that are formally or informally (and more or less consciously) adopted by practitioners in the 'epistemic communities' that form around policy-making, advocacy and lobbying at different policy levels and in different contexts. This could lead to a relatively unquestioning adoption of representations of the system and established ways of representing relevant social aggregates, even when structural change might make different representations and aggregations more relevant (Cardinale and Landesmann, 2020). In terms of the foregoing discussion, for example, adoption of overly aggregated macroeconomic models can conceal the possibility of conflicts of interest between industries. Similarly, the 'received' yet common assumption of uniformity of the profit and wage rates across industries is unlikely to afford an understanding of possible conflicts between capitalists and between workers, despite the facts that such conflicts could, in some situations, be more relevant than those between all capitalists on one side and all workers on the other side. As a result of structural change, moreover, different conflicts between firms could be relevant at different moments, such as between firms that support or oppose major infrastructure projects or foreign policies.

The question of the extent to which the representation of structure, positions therein and interests are problematized, as opposed to unquestioningly ‘received’, is an instance of a more general problem: how the structure within which actors act influences their understanding of their own interests. The problem in fact goes to the core of a fundamental gulf in economic analysis (Cardinale and Scazzieri, 2018). On the one hand, there are approaches that focus on constraints while leaving implicit, or described by simple rules, how actors build their action problem and act upon it; this is typical of SEA. On the other hand, there are approaches that study means-ends reasoning while taking objectives and constraints as given; this is typical of rational-action theories.

How to bring together means-ends action and structural influence has been the object of much discussion in social theory. A highly influential approach, formulated by Giddens (1984) amongst others and often explicitly invoked or implicitly adopted across the social sciences, relies on the idea that structure constrains actions (i.e., it makes some actions impossible) but also enables them (i.e., it makes some actions possible) (Cardinale, 2018a, 2019a, 2019b). This view has three limitations that are particularly important for our purposes. First, it does not account for how structure orients actions, i.e., how it makes actors more likely to pursue some actions out of those which are possible. Second, the view simply reintroduces the actors of rational choice theory but within a more limited space, i.e., the space of action that is enabled by structure: within that space, it remains unclear if and how structure influences actions. Therefore, this view does not close the gulf between means-ends action and structural constraints that characterises economic analysis. The reason is that embeddedness is merely understood in synchronic terms, that is, as embeddedness in current structure. The idea is that structure shapes actors’ means and (possibly) ends, but does not significantly influence the actors themselves, i.e., it does not affect their cognitive and action set-up. Finally, because this approach explains what actions are possible (those which are enabled by structure) but not if some are more likely than others, it does not offer analytical tools to ‘close the system’, i.e. to think about why some representations and interests might emerge in a given situation out of those which are possible.

An alternative approach, which would overcome these limitations and help address this paper’s question of how productive structure influences actors’ understanding of their interests, would be to theorise the mutual influence of means-ends action and structural constraints, rather than juxtaposing them. A key step is to bring together the synchronic embeddedness in structure discussed above with a diachronic one. Doing so would require two types of structure: positioning within productive structure, as discussed so far in the

paper, and the structures of cognition and action of the actors involved—what Bourdieu (1990) calls *habitus*. Habitus is a repertoire, a system of dispositions to appropriately represent, and act in, a situation. It is formed by acting in positions over time and thereby developing the ability to act appropriately in those positions. One could thereby develop a view on which action has elements of purposiveness as it is based on means-ends reasoning, but is also oriented towards some possibilities over others because of the dispositions of the habitus (Cardinale, 2018a, 2019a, 2019b). In sum, some outcomes are more likely than others, and this is due to something that goes beyond the preference of actors and the availability of means: it is also due to a pre-reflective orientation towards some possibilities over others, over and beyond what enters the reflective means-ends reasoning.

The foregoing view does not merely juxtapose action and structure, but theorises how structure changes the cognitive set-up of actors, imprinting dispositions that orient action. In order to fully understand the mutual influence as well as relative autonomy of action and structure, the time dimension is key. Over time, structure imprints a system of disposition on actors (the habitus). Actions taken on the basis of habitus and means-ends reasoning in turn shape outcomes and can modify structure. Hence, structure and actors constitute each other *over time*. However, *at any given moment*, actors have scope for agency; their action is not fully determined by their habitus and position within structure. This view takes actors seriously as it acknowledges that they face action problems that cannot be reduced to the conventional decision problems of rational choice theory; even less can they be described by simple behavioural rules, as is typically done in SEA. Moreover, action is not merely dictated by the means and ends offered by the situation, but requires interpretation through the categories developed over time by acting within productive structure.

The theory envisioned above could provide the groundwork to explain how actors come to represent the productive structure in which they are positioned, allowing for the varying extents to which actors have autonomy in conceiving of new aggregations in the face of structural change. Representations of structure are in turn likely to make salient some understandings of interests out of those which are possible. This approach would thus provide the conceptual resources to think about how to ‘close the system’, i.e. how specific representation, aggregations and interests are likely to emerge in a given context out of those which are possible. The key is that different representations and outcomes have different

likelihood, which derives from inertia in productive structure¹⁰ as well as in cognitive structure.

4 Implications and conclusion

The paper has shown a route to extend the framework of SEA so that it can address not only the systemic conditions for the pursuit of systemic objectives, but also how those conditions provide constraints and opportunities for the pursuit of a variety of particular objectives on the part of different actors. The focus has been on actors whose actions have implications that rise to the systemic level and therefore have to take into account systemic constraints. This framework has wide-ranging implications for SEA and for political-economic analysis more broadly.

First, there are normative implications for actors other than the systemic actor. We have taken the viewpoint of actors within productive structure: how they represent the system and understand the constraints imposed and opportunities afforded by structure. This depends on the representation of structure and their positions therein, as well as their habitus developed through actors' history of positioning within structure, which makes salient some visualisations of interest out of those which are possible. A crucial set of constraints that emerges is given by the systemic conditions studied by SEA, which, within the means-ends problem of actors, appear as a systemic interest. More specifically, each situation offers a variety of possible systemic constraints on the pursuit of particular interests, depending on positions within structure and interpretations thereof. Whether a shared understanding of systemic interest emerges in a given situation, and if so how it is defined, depends on productive structure but also on how the relevant actors represent it, for different representations highlight different viability conditions.

Second, there are normative implications for the systemic actor. Recognising the variety of actors who face action problems, as opposed to follow simple rules, implies that the policy-maker must take into account the action problems of other actors. The upshot is that the pursuit of any systemic objective has to take into account material as well as

¹⁰ A fundamental principle of SEA, identified by Landesmann and Scazzieri's (1990) as 'relative structural invariance', is that "different components of an economic [system] may change at different speeds, so that, under certain conditions, some of those components are invariant while other components may change at variable speeds" (Scazzieri, 2021, section 2.1).

political-economic conditions. For example, when pursuing the transition from a given state of productive interdependencies to another, the policy-maker should identify the material conditions imposed by productive structure, such as the need for productive capacity to be installed at the appropriate times and in the appropriate proportions in different industries. In addition, the policy-maker must consider the political-economic conditions that make the transition possible, which can be conceptualised in terms of particular and systemic interests as construed by the actors involved. Such conditions suggest that not all transitions that are feasible from the material perspective will also be compatible with existing interests, and the latter cannot be assumed at the outset as they depend on how actors construe their action problems.

The extent to which actors' particular interests and ensuing actions matter for the systemic actor depends on contextual factors. SEA postulates a systemic actor who pursues objectives on behalf of the system while assuming that other actors will act on the basis of known rules. But not all contexts will be satisfactorily described by such assumptions. For example, in some contexts there might not be a systemic actor. The preservation of systemic viability would therefore depend on decentralised actions, and specifically on actors understanding viability conditions and taking them into account, in the form of systemic interest, when pursuing their own particular interests. In other contexts, a systemic actor might exist but the extent to which it can set boundaries to private actions, or 'enlist' them in pursuing collective objectives or in satisfying systemic constraints, could vary. The systemic actor will therefore have to consider how other actors construe their action problems, as discussed above. By jointly addressing the action problems of systemic and other actors, as suggested in this paper, it becomes possible to study a variety of contexts in terms of the relative importance of such actors.

The third set of implications concerns positive analysis of structural change. On the approach explored in this paper, dynamics is not straightforwardly determined by the position of industries or classes within a scheme of productive interdependencies. In fact, it can be shown that theories of structural dynamics do not typically identify actual paths of change but potential ones, because a given productive structure does not determine actors' interests and actions but makes a range of actions possible (Cardinale and Scazzieri, 2019). Therefore, structural change is open-ended. The formation of interests and actions within structure makes it possible to 'close the system', i.e. to understand which path of structural change a system will undertake out of those which existing productive structure makes possible. Structural change will modify relevant aggregations and viability conditions, which in turn

are likely to be reflected in changes in interests; however, as it was discussed above, any such influence would take place through actors' interpretation of structure. This approach therefore provides the foundations for an endogenous explanation of the formation and change of productive structure, viability conditions and interests (Cardinale and Landesmann, 2020).¹¹ On the one hand, this approach can inform as well as complement empirical studies of structural change of the political-economic kind. In fact, 'closing the system' requires bringing together structural analysis, which reveals possible paths of structural change, and historical and institutional analysis, which shows how such open-endedness is closed in different contexts. On the other hand, this approach shows that observed outcomes are not the only possibilities that could in principle ensue from existing structure. In fact, depending on the representation of structure that an actor (particular or systemic) implicitly or explicitly adopts at a given moment, some particular and systemic interests might appear salient to the actor instead of others. Moreover, this approach considers that different actors are likely to adopt different representations of the system, from which different particular but also systemic interests ensue.

The opening up of the means-ends framework of SEA provides the groundwork for addressing the fundamental object of the field of political economy (Cardinale and Scazzieri, 2018): how the material sphere creates opportunities for, and imposes constraints on, the pursuit of a plurality of objectives within a polity. Such ends can be collective or particular, and pursued by actors variously aggregated. In this paper, aggregations have been seen as deriving from productive structure and objectives have been assumed to be of an economic nature. For example, collective objectives such as reproducibility of inputs, maximum growth or full employment, and particular objectives such as receiving a higher share of value added. The opening up of the means-ends framework suggested in this paper can be taken even further by exploring how the economic sphere also provides constraints on and opportunities for the pursuit of non-economic objectives, such as different views about society or positions within power hierarchies in the same polity or vis-à-vis other polities, and on the part of actors based on aggregations different from purely economic ones.

¹¹ A different approach to the endogenous formation of political-economic actors is provided by Baranzini's (1991) theory of wealth distribution and accumulation, where different assumptions about motives and saving behaviour on the part of social groups can lead to the emergence, transformation or even disappearance of such groups (see also Baranzini and Mirante, 2013).

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