7

Political Economy of Economic Theory

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1 Introduction

Political economy deals with the economic arrangements needed for the material life of the polity *and* with the political arrangements supporting the working of the economy (see the chapters by Cardinale and Scazzieri in this *Handbook*). This feature of political economy is already manifest in its formative period, when the emergence of the modern state goes hand in hand with increasing awareness of the need to provide a systematic framework to discussions concerning the material life of the polity (Botero 1558; de Montchréstien 1889 [1615]; Mun 1664; Serra 1613).[1] At the same time, political economy became increasingly interested in the political conditions

[1]Istvan Hont emphasizes the intertwining of politics and economics at the core of Montchréstien's programme by recalling his belief that 'every society, in general, appears as consisting of government and commerce' (de Montchréstien 1889 [1615], p. 137, as quoted in Hont 2010, p. 137, my translation).

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making the material life of the polity viable ad improving (Steuart 1966 [1767]. Antonio Genovesi's definition of political economy as 'the political science of economics and commerce' (Genovesi 1767) pointedly emphasizes the interface between politics and economics, while shifting the object of economics from the sphere of practical reasoning to the scholarly analysis of relevant political arrangements.

It is in the course of this evolution that economic theory developed as a specialized branch of knowledge concerning the organization of interdependent production and consumption activities. Mid-eighteenth century works such as those by François Quesnay (1758, 1766), Antonio Genovesi (1767), James Steuart (1966 [1767]), and Adam Smith (1776) signaled a conceptual shift whereby the structural condition of interdependence within the material sphere became a central focus of attention and triggered seminal advances in understanding the process of formation of national wealth. The questions arising from this interdependence have been a distinctive feature of economic theory since its formative period, and are directly relevant to political economy in its twin attention to the material life of the polity and to the political requirements of the economy. The aim of this chapter is to address the political economy of economic theory by focusing on the three following related issues: (i) which economic arrangements economic theory suggests for organizing the material life of the polity?; (ii) which political arrangements economic theory considers to be essential for the working of a viable economy?; and (iii) are the economic and political arrangements under (i) and (ii) mutually consistent or not?

To address the three above questions, this section takes up a distinction between two different ways of representing the fundamental relationships of the economy (plutology versus catallactics) and builds on that distinction a classification scheme for economic theories. Section 2 discusses the implications of plutology and catallactics, respectively, for question (i) and examines whether the *economic arrangements* involved in the two types of economic theory are mutually consistent or not. Section 3 discusses the implications of plutology and catallactics for question (ii) and examines the *political arrangements* involved in the two types of theory with the aim of assessing whether they are mutually compatible or leading towards alternative organizations of the political sphere. Section 4 examines the interface between economic and political conditions as highlighted in plutology and catallactics respectively and investigates the role of this interface in explaining the role of economic theory with respect to *policy decisions*.

2 Plutology and Catallactics

Theories simplify the architecture of complexity by circumscribing the type and number of relevant units of analysis and by highlighting relationships assumed to be of greater causal significance (Simon 1962). Economic theories are means to reduce the complexity of economic systems allowing their description in terms of a manageable number of relationships. Different economic theories adopt different criteria of complexity reduction depending on which units of analysis, patterns of interdependence and causal relationships they highlight. The distinction between economic theories centred on the interdependencies between production units at intermediate levels of aggregation (such as industrial sectors) and economic theories centred on the coordination between individual actors within a system of interdependent markets highlights a cleavage between two fundamentally different ways of addressing complexity reduction in economic theory. Luigi Pasinetti describes that distinction by referring to theories focusing on commodities 'of the production type' in the former case and to theories focusing on commodities 'of the scarcity type' in the latter case (Pasinetti 1965, p. 576). He also emphasizes the role of learning, dynamics and structural change in theories of the former type and that of given resources and rational allocation of resources between alternative uses in theories of the latter type. Production-oriented theories are inherently dynamic as production involves 'the engagement and the application of human ingenuity to make and shape the products that people want. But since, by doing and experiencing, mankind learns, it is implicit in the very nature of carrying on a production activity that new and better methods will be discovered. Of course, to find new methods takes time, and takes time in a persistent way. The economist is faced here […] with a process of learning' (Pasinetti 2007, p. 253). On the other hand, exchange-oriented theories are considered to be inherently static as they start off 'with a situation in which a plurality of economic systems (or of individuals) is endowed with particular resources or products and tries to gain advantages through exchange …We may imagine a situation in which a plurality of economic systems has reached an internal equilibrium, but the systems do not trade among themselves, and then another situation in which the same economic systems, besides having reached an internal equilibrium, also trade with one another. It is easy to show that the passage from the first to the second situation - i.e. a *once-and-for-all* change from no trade to trade, to be maintained thereafter- normally brings about gains for all. What is involved is a problem of rationality, which may be expressed by a mathematical function to be maximized under certain con-

straints' (Pasinetti 2007, p. 253). What is most distinctive in Pasinetti's argument is his association of each type of theory with the conditions characterizing different phases of economic history. This is done by distinguishing between two different stages in the 'process of unprecedented increase in material wealth' (Pasinetti 2007, p. 251) that started off at the beginning of the early modern age and continued as a long-term tendency ever since. One is the 'phase of trade', the other the 'phase of industry' (Pasinetti 2007, pp. 251–252). The phase of trade 'is the first to break through' (Pasinetti 2007, p. 251) and is characterized by improvements in transportation techniques opening up 'new possibilities of trade' and leading to an increase in material wealth 'just by exchange, by a better spatial allocation of existing resources and products' (Pasinetti 2007, p. 252). The phase of industry was 'much slower to reveal itself' (Pasinetti 2007, p. 252), as its resilience presupposes improvements achieved with the phase of trade. The phase of industry, which is associated with 'a process of augmenting wealth through a material increase in the quantity and number of products' (Pasinetti 2007, p. 252), maintains a complementary relationship with trade, even if 'as a cause of further increases in wealth, [trade] is bound to subside' (Pasinetti 2007, p. 252). Indeed, '[i]ndustry […] is bound to remain a permanent cause of increase in wealth and to become preeminent as time goes on, owing to the very nature of its cumulative process' (Pasinetti 2007, p. 252). In Pasinetti's view, exchange-oriented and production-oriented theories are suitable focusing devices for the fundamental economic relationships in the phase of trade and in the phase of industry, respectively. However, this analytical complementarity breaks down with the conceptual shift associated with the marginalist revolution, as the latter led to a return to 'the pre-industrial age concept of wealth considered as a set of given endowments of scarce natural resources (a stock concept)' (Pasinetti 2007, p. 261). The stock concept of wealth is at the root of the reformulation of economic theory as a theory dealing with the efficient management of existing resources. This type of theory would have been 'capable of dealing with the problems of a simpler society' (ibidem), but ended up being out of tune with the features of economic systems that had entered the phase of industry and the associated cumulative process of structural change. In short, Pasinetti not only emphasizes the duality between exchange- and production-oriented theories, but also stresses the possible mismatch between theory and context and highlights that theory, if selected independently of context, may divert attention from the most fundamental characteristics of the economic system under consideration.

John Hicks outlines a partially overlapping distinction by using the term 'Plutology' to denote theories of the production type and the term 'Catallactics' to denote theories of the exchange type. Hicks starts his

reconstruction of 'revolutions' in economic theory highlighting that each type of economic theory embeds a selective concentration of attention:

> Our theories, regarded as tools of analysis, are blinkers in this sense. Or it may be politer to say that they are rays of light, which illuminate a part of the target, leaving the rest in darkness. As we use them, we avert our eyes from things which may be relevant, in order that we should see more clearly what we do see. It is entirely proper that we should do this, since otherwise we should see very little. But it is obvious that a theory which is to perform this function satisfactorily must be well chosen; otherwise it will illumine the wrong things. (Hicks 1975, p. 320)

Hicks emphasizes the heuristic role of theories in directing the economist's attention to one or another set of units of analysis and patterns of interdependence and thus to a specific causal mechanism in lieu of others. In this way, theory is not only an instrument for explaining evidence but also (and primarily) a way to *organize* evidence in view of looking 'more clearly' into certain aspects of it. This attitude to the role of economic theory suggests that 'a theory which illumines the right things at one time may illumine the wrong things at another' (Hicks 1975, p. 320) and that scientific revolutions in economics, in Thomas Kuhn's sense of shifts from one conceptual paradigm to another (Kuhn 1962, 1977; Thagard 1992), 'are not clear advances in the scientific sense' (Hicks 1975, p. 320). As a consequence, the trajectory of theoretical development in economics shows switches between different standpoints ('systems of thought') whereby the shift from 'system of thought' A to 'system of thought' B (Hicks) is not always such that 'B should be able to cope with [new facts with which A could not cope]' as well as 'with all those facts which were already coped with by A' (Hicks 1975, p. 319). In Hicks' view, the transition from classical to post-classical economic theory is a clear instance of this type of conceptual dynamics. The classical economists (from Quesnay and the other Physiocrats to Adam Smith and David Ricardo) identified the wealth of any given economic system with the flow of annual production in that system, and thought it necessary 'to identify the values which were needed for the weighing of the social product' (Hicks 1976, p. 211). To achieve that, they had to bring about 'the reduction of the heterogeneous commodities [composing the annual flow of production] to a common measure' (Hicks 1976, p. 211), thus making the latter 'so far homogeneous that it can be greater or less' (Hicks 1976, p. 210). The purpose, and the point of view, of the economists who triggered the Marginalist Revolution is different. For those economists 'instead of basing their economics on production and distribution, they based it on exchange […]. It was possible, they found, to construct a "vision" of economic

life out of the theory of exchange, as the classics had done out of the social produce' (Hicks 1976, p. 212). To account for the different theoretical standpoints of the classical and marginalist economists, Hicks suggests that two different names should be used, calling plutology the classical system of thought (from the Greek word 'ploutos' for wealth) and catallactics the marginalist system of thought (from the Greek word 'katalatto', for the action of exchanging). In Hicks' view, plutology and catallactics are only partially overlapping as either system of thought does not fully cope with all facts encompassed by the other. This explains why plutology and catallactics have remained distinct ways of looking at the economy, with either system of thought showing phases of strength or relapse, and a remarkable ability to achieve comebacks under changing historical conditions. For instance, even after the conceptual revolution associated with marginalism, 'there were occasions when it was necessary to think about the whole economy […] Partly as a result of the Keynesian revolution, but more (perhaps) because of statistical labours that were initially quite independent of it, the Social Product has now come right back into its old place. Modern economics […] is centred upon the Social Product, the Wealth of Nations, as it was in the days of Smith ad Ricardo, but as it was not in the time that came between' (Hicks 1975, p. 324, my emphasis).

The relationship between theory and context is central in Alberto Quadrio Curzio and Roberto Scazzieri's reconstruction of the dynamics of economic theory in terms of the exchange–production duality (Quadrio Curzio and Scazzieri 1986). This reconstruction connects that duality with the historical dynamics of industrial economies by introducing a distinction between phases of industrial dynamics that highlight the role of the interdependencies within the industrial structure itself (structural apparatus) and phases that highlight the one-way relationship between productive infrastructure (produced and non-produced resources) and final consumption goods (transformation apparatus). One distinctive feature of Quadrio Curzio and Scazzieri's analysis is that the two above configurations of the productive system are not mutually exclusive but may coexist side by side. However, the structural apparatus and the transformation apparatus may alternatively take priority in the working of the economic system depending on the dynamic condition of the system: 'during periods of rapid growth, the inter-industry network gains priority, whereas in the periods of decline in growth, the apparatus of transformation comes to the fore. It could also be said that the transformational feature is typical of economies where the growth potential is being exhausted, of economies perhaps characterized by a high level of welfare, but in a 'climacteric' phase of

development. Conversely, the structural aspect is typical of more dynamic economies (although these latter might be under the pressure of particular scarcities)' (Quadrio Curzio and Scazzieri 1986, p. 380). Quadrio Curzio and Scazzieri suggest that the coexistence of the structural and transformation apparatus in most industrial economies, and their changing weights in different historical phases, provides a cue into the reasons for the rise to dominance of exchange- or production-oriented theories in different periods: 'the dynamics of political economy can be considered to be the result of an interaction between a dichotomy internal to the manner of thinking of economists (due mainly to a different understanding of productive phenomena), and an external dichotomy, based on the antagonism-coexistence between the fundamental apparatuses of transformation and structure)' (Quadrio Curzio and Scazzieri 1986, p. 403). The joint utilization of the two dichotomies suggests a heuristic to explain the relative weight of exchange- and production-oriented theories in different phases of system dynamics. Accelerated growth (even if under constraints concerning the availability of primary resources) highlights the interdependencies between components of the production structure and gives prominence to theories focusing opportunities and constraints within that structure, while growth deceleration or stagnation highlights the relationship between resources and final consumption, and tends to give prominence to theories focusing opportunities and constraints external to the production structure (Quadrio Curzio and Scazzieri 1986, pp. 403–4). For example, it is suggested that the continental blockade against the United Kingdom in the early nineteenth century might have triggered attention to the interindustry configuration of the economic system (the structural apparatus) under conditions of sustained capital accumulation and limited land availability. In the latter part of that century, the situation had changed. Economic growth had slowed down in some of the old industrial countries while deep structural changes were taking place in countries that had later entered the industrial phase. This situation brought different features of the production system into focus, highlighting the transformation apparatus and the structural apparatus, respectively. The decline of interest for objective interdependencies within production structure in the United Kingdom of Alfred Marshall (1890) and the contemporary attention given to those interdependencies in Germany or Russia may be seen as instances of the way in which context influences theory (Quadrio Curzio and Scazzieri 1986, pp. 389–394). Different contexts can make theory to respond differently to the task of selecting the mechanisms of greater causal significance for understanding the material life of the polity. The catallactics–plutology distinction identifies alternative structural

specifications of the economy and highlights that patterns of interdependence that are visible, say, under plutology are not always visible under catallactics, and vice versa. Each structural specification provides a distinct focus, which may or may not be consistent with the relevant historical context. As a result, 'there is, there can be, no theory which will do for us everything we want all the time' (Hicks 1975, p. 320). Three distinct issues arise in this connection. First, changes of context may require a change of theoretical focus. Second, a mismatch between theory and context is possible. Third, the context compatible with a given theoretical focus may reappear under different conditions along the dynamic trajectory followed by any given economic system. In the latter case, the recurrence of theoretical focus may be a consequence of the persistence of certain fundamental economic mechanisms over time.[2]

3 The Material Life of the Polity

Plutology and catallactics identify two distinct sets of conditions for the material life of the polity. Each set of conditions presupposes a distinct set of units of analysis and a distinct type of interdependencies between those units. Plutology starts with a focus on socio-economic groups and/or productive sectors and focuses on the proportionality conditions to be satisfied by the interdependencies between those groups and/or sectors in order to achieve a viable mechanism for the formation of national wealth. The central idea, common to the different formulations of plutology, is that a viable economic system must be capable of reintegrating the produced means of production needed to achieve the current levels of output. In other words, in a viable economy production cannot lead to depletion of productive capacity. To achieve this condition, the interdependencies between productive sectors (as well as between socio-economic groups) must be such that the output of each sector (group) is at least sufficient to provide what is needed for that sector (group) and for the sectors (groups)

[2]Recurrence of economic issues and contexts may be considered as 'the outcome of the working of the economic system's basic structure […] The nature of this recurrence is of the causal type, since it is the expression of objective properties of the system, quite independently of how often any event is repeated through time' (Baranzini and Scazzieri 1986, pp. 67–68). The recurrence of economic contexts may explain the recurrence of analytical foci in economic theory, as the 'recurring periods of vitality and lethargy' of each research line 'could be related with recurrence of certain phenomena in actual economic dynamics' (Baranzini and Scazzieri 1986, p. 68).

depending on its supply. When this condition is satisfied, the economy is in a *self-replacing state* (Sraffa 1960). The viability condition may be expressed in two different, but mutually compatible, ways depending on whether we consider the interdependencies between productive sectors or those between socio-economic groups. The earliest explicit formulation of the self-replacing condition is due to Quesnay (1758). In Quesnay's *Tableau économique* the self-replacing condition is expressed in terms of proportionality requirements for the production and expenses of the different and interdependent socio-economic groups that make up a national economy. As a result, the achievement (or not) of the viability condition depends not only on the mutual compatibility of the technology in use in the different productive sectors, but also on the compatibility of the income and expenditure flows that are generated within the economic system. Simonde de Sismondi took this approach one-step further by questioning whether the viability condition can be satisfied in an industrial economy characterized by increasing utilization of labour-displacing machinery (Sismondi 1819). The possibility of technological unemployment led Sismondi to argue that there would be increasing asymmetries between production and income flows, and increasing difficulties in maintaining income and expenditure flows at the levels needed for the economic system's viability (as defined above). Subsequent literature has seldom addressed again the viability of the economic system in terms of income and expenditure flows between socio-economic groups. However, Stanislav Strumilin explicitly considered the issue of the economic system's viability in terms of a 'complex social structure' (Strumilin 1963 [1927], p. 114). In particular, Strumilin pointed out that viable interdependencies between productive sectors should reflect 'the equilibrium state generated by these competing social forms, the specific weight of each one of them *within the common system,* and the distribution of these weights, as it may be detected during the time period under consideration' (Strumilin 1963 [1927], p. 114, our emphasis). The more recent work by Richard Stone on social accounting matrices (SAM) belongs to this analytical tradition, as it is motivated by the idea that 'a complete system of social accounts must be able to handle transactors in all their aspects: as producers, consumers and accumulators' (Stone 1962, p. 230). To achieve this, it is necessary 'to reduce the number and variety of transactors to manageable dimensions' and thus 'to classify them' (Stone, ibid.). However, Stone also maintains that 'it is impossible to find a single classification which will be equally suitable for each aspect' (Stone, ibid.) and suggests a pragmatic approach to the

study of social interdependencies, which makes the selection of relevant units to depend on the analytical and policy purpose in view.[3]

The study of the viability requirements for a system of interdependent product flows is a central feature of the plutology analytical tradition since the reformulations of Quesnay's *Tableau économique* by Karl Marx (1983 [1867]) and Mykhaylo Ivanovich Tugan Baranovsky (1913 [1894, 1900]). A distinctive feature of Marx's and Tugan Baranovsky's viability analysis is the consideration of intermediate product flows in a circular economy independently of income and expenditure flows between socio-economic groups (social classes). This approach allows Marx and Tugan Baranovsky to identify the internal consistency requirements for a circular economy to be in a self-replacing state (with or without capital accumulation), but leaves the consistency of income and expenditure flows outside the scope of 'technical' viability analysis. Differently from Quesnay's original formulation of viability as a *social condition*, Marx and Tugan Baranovsky address viability as a *technical requirement* for the system of intermediate product flows in an industrial economy. This point of view identifies proportionality conditions in the technical sphere but leaves open the issue of whether existing social structures would generate the income and expenditure flows consistent with technological viability. Both Marx's analysis of the long-term dynamics of a capitalist economy and Tugan Baranovsky's medium-term analysis of periodic industrial crises highlight the separation between technical and social viability conditions. At the same time, they contribute to clarifying the dual dimension of viability in the technological and social spheres. What becomes apparent with Marx's and Tugan Baranovsky's researches is that technical viability requirements are not sufficient to ensure that the economy is in a self-replacing state (under stationary or expanding conditions). For Marx, self-replacement presupposes the maintenance of a proportionality between the share of net product value going to the capitalists' class and the value of the overall social product that would be structurally compatible with the maintenance of capitalist economic conditions. For Tugan Baranovsky, self-replacement involves the maintenance of proportions between capital goods industries and consumer goods industries that would be compatible with the full utilization of the productive capacity generated from within the economic system. In either case, technical viability is a nec-

[3]Stone emphasizes that, in principle, one could introduce as many classifications of transactors as it is convenient for the purpose in view. However, a set of classification converters should guarantee the over-all consistency of the different classifications adopted (Stone 1962; see also Johansen 1985; Marangoni and Rossignoli 2014).

essary but not also a sufficient condition for the economic system to be in a self-replacing state.

The emphasis on technical viability conditions is a characteristic feature of the more recent literature on the material conditions for the existence of a coherent (self-replacing) set of interdependent production and consumption activities. Wassily Leontief's *Tableau* of the American economy is a seminal contribution to this analytical development (Leontief 1941). In Leontief, differently from Quesnay, the relevant interdependences are between industrial sectors rather than between socio-economic groups, and social structures (such as net product distribution between different categories of income receivers) appear as conditions *external* to the core set of interdependent industries. Piero Sraffa (1960) also follows this approach in his discussion of self-replacement conditions for the case of 'an extremely simple society which produces just enough to maintain itself' (Sraffa 1960, p. 3). A society satisfying this condition is considered to be 'in a self-replacing state', and any system capable to maintain itself from one production period to another can be transformed into a self-replacing one 'merely by changing the proportions' between its constituent industries (Sraffa 1960, p. 5n). On the other hand, '[s]ystems which are incapable of doing so under any proportions and show a deficit in the production of some commodities over their consumption even if none has a surplus do not represent viable economic systems' (Sraffa 1960, p. 5n). The standard means of representing the material structure of an economy supported by a core set of interdependent production and consumption/utilization activities is by means of a technology matrix such as $\boldsymbol{A}$, whose elements are the 'production coefficients' denoting the quantity of intermediate good i needed for the production of any unit of good j:

$$\boldsymbol{A} = \left[\mathrm{a}_{ij}\right]$$

The technology matrix describing the material structure of a simple two-sector economy in which all sectors depend on each other for the provision of necessary inputs will be as follows:

$$\boldsymbol{A}^* = \begin{matrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{matrix}$$

A self-replacing economy may or may not produce a net output over and above what is necessary for maintaining its productive capacity intact. The case of an economy capable of producing a positive (or semi-positive) net output vector (that is, a vector of net output in which at least some elements

are greater than 0) provides additional insights into the role of viability conditions. In particular, production technology determines which total outputs are needed to support the production of any given set of net outputs (outputs over and above what is needed for self-replacement), and which price ratios are consistent, under the self-replacement condition, with any given distribution of total value added between productive sectors (or groups of income receivers). The two conditions may be respectively expressed as follows (see also Pasinetti 1977a, Chapter 4):

$$\mathbf{q} = (\mathbf{I} - \mathbf{A})^{-1}\,\mathbf{n} \tag{1}$$

$$\mathbf{p} = (\mathbf{I} - \mathbf{A})^{-1}\,\mathbf{v} \tag{2}$$

In expression (1),[4,5] **q** is the vector of the total quantities produced in the system, **n** is the vector of net outputs produced in the same system, and $(\mathbf{I} - \mathbf{A})^{-1}$ is the so-called Leontief inverse allowing the computation of the total quantity requirements (expressed by vector **q**) needed to deliver the net output vector **n**.

Expression (1) shows that, given viable production technology **A**, we may choose a given net output vector, say $\mathbf{n}^*$, and compute via $(\mathbf{I} - \mathbf{A})^{-1}$ the total outputs that would deliver $\mathbf{n}^*$ after satisfying the self-replacement requirements for maintenance of productive capacity. Expression (2) shows that, given viable production technology **A**, we may choose a vector of (sectoral) value added quantities, such as $\mathbf{v}^*$, and then compute via $(\mathbf{I} - \mathbf{A})^{-1}$ the prices that would be consistent with $\mathbf{v}^*$ while satisfying the self-replacement requirements for maintaining productive capacity intact. The two expressions point to conditions constraining, respectively, the physical and the value structure of the economy without explicitly addressing the reasons why the net output vector and the value added vector should be taken as given. This approach reflects the distinction between technological and social interdependencies that characterizes the literature on the viability conditions of economic systems. At the same time, expressions (1) and (2) draw attention to the fact that exogenous changes in the level and/or composition of the net output vector **n**, or of the value added vector

[4]Expression (1) may be obtained from $\mathbf{q} - \mathbf{AQ} = \mathbf{n}$, from which we have $\mathbf{q}(\mathbf{I} - \mathbf{A}) = \mathbf{n}$, then $\mathbf{q} = (\mathbf{I} - \mathbf{A})^{-1}\,\mathbf{n}$.
[5]Expression (2) may be obtained from $\mathbf{p} - \mathbf{Ap} = \mathbf{v}$, from which we have $\mathbf{p}(\mathbf{I} - \mathbf{A}) = \mathbf{v}$, then $\mathbf{p} = (\mathbf{I} - \mathbf{A})^{-1}\,\mathbf{v}$.

v, would require/trigger a complex constellation of changes in the system of total physical quantities or in the system of prices respectively. These latter changes would make the attainment of target vectors **n*** and **v*** feasible. The argument rests on the possibility to separate technological and social constraints, so that for example we could address the technological feasibility of certain social objectives (as expressed by a target net output vector **n***) without explicitly examining the causal mechanism behind those social objectives. Alternatively, we could address the social feasibility of certain technological arrangements by asking, say, if a switch from technology **A** to technology **A*** would be consistent with the given distribution of value added between productive sectors or social groups as expressed by vector **v**.[6] In short, the distinction between technological and socio-institutional constraints allows a better understanding of the extent to which one set of constraints involves the other and of the extent to which constraints in one sphere leaves degrees of freedom in the other sphere.[7] On the other hand, the same distinction calls attention to the cases in which the intertwining of *different* constraints highlights the need to address *at the same time* the interdependencies in the technological and the social spheres.[8]

Differently from plutology, the original focus of catallactics was the coordination between individual actors in a system of interdependent markets. This approach developed side by side with plutology and was triggered by the latters's investigation into the interdependencies at the root of national wealth. However, the specific conditions governing those interdependencies when exchanges take place within the framework of a market economy gradually became a major focus of attention. Achille-Nicolas

[6]The switch from **A** to **A*** may or may not allow the maintenance of the *existing* value added vector.

[7]Luigi Pasinetti emphasizes the heuristic effectiveness of distinguishing between different layers of interdependence in the economic system by explicitly discussing what he calls 'a *separation theorem*' (Pasinetti 2007, p. 275), according to which 'we must make it possible to disengage those investigations that concern the foundational bases of economic relations—to be detected at a strictly essential level of basic economic analysis—from those investigations that must be carried out at the level of the actual economic institution, which at any time any economic system is landed with, or has chosen to adopt, or is trying to achieve' (Pasinetti 2007, p. 275). Expressions (1) and (2) above entail that it may be useful to examine structural constraints from the technological *or* the socio-institutional sphere depending on which interdependencies are relatively 'more invariant' and on which are the purposes of the analysis at hand (see Landesmann and Scazzieri (1990) for a discussion of the relative invariance criterion).

[8]In this connection, Alberto Quadrio Curzio emphasizes the role of non-produced resources (natural or technological scarcities) in combining material and socio-institutional constraints (and thus in highlighting the close relationship between the material structure of the polity and the political dimension of the economy) (Quadrio Curzio 1980, 1996; Quadrio Curzio and Pellizzari 1999, 2018).

Isnard, a French engineer-economist, strongly criticized Quesnay's *Tableau* and outlined in his *Traité des richesses* the first mathematical formulation of a general equilibrium system of market exchanges (Isnard 1781). This work expresses the interdependence between competitive market equilibrium prices through a system of simultaneous equations. Isnard's formulation of economic interdependencies as *market* interdependencies side-stepped a central point of Quesnay's scientific programme (which was *not* to confuse market exchanges with economic transactions at the structural level)[9] and started a new analytical tradition in which the allocative procedures of market exchanges become the central focus of attention. This switch is already apparent in Destutt de Tracy's belief that the economic system is 'purely and only a continuous series of exchanges' (Destutt de Tracy 1823, p. 68), and that 'this is the greatest praise one could express of society, for exchange is an admirable transaction, in which the two contractors are both always obtaining an advantage: as a result, society is an uninterrupted series of advantages that are continuously renovate for all its members' (Destutt de Tracy 1823, p. 68). Following this line of argument, Richard Whately, in his Oxford Lectures, criticized the use of the term 'political economy' and proposed 'catallactics' as a substitute for it: 'The name […] of Political Economy is most unfortunately chosen […]The name I should have preferred as the most descriptive, and on the whole least objectionable, is that of catallactics, or the 'Science of Exchanges'. Man might be defined, 'An animal that makes Exchanges' […] And it is in this point of view alone that Man is contemplated by Political Economy' (Whately 1847, pp. 3–6). This focus on exchange as the outcome of a transaction in which both contractors seek and obtain an advantage triggered research on the motives of human actions leading to exchange. Francesco Ferrara explicitly attempted a new definition of economic science based on a theory of deliberate choice. In his view, economic science ought to study 'voluntary acts, and this not all: they have to be acts by which Man is seeking means of improving his own existence' (Ferrara 1859, p. 82). This point of view led Ferrara to criticize classical political economy for its emphasis on 'material things rather than [on] actions' (Ferrara 1859, p. 81) and to *move beyond* exchange relationships

[9]Quesnay writes that 'the new science of economics does not confuse *Trade* with the profession of the Merchant, who buys in order to sell; by Trade it means the transaction between the original seller and the consumer; this type of transaction can be direct or indirect: in the former case, Trade or exchange is effected without any intermediary Agent, i.e. without the service of a Merchant' (Quesnay 1767, pp. 167–168). To make the point clearer, Quesnay adds that 'Trade consists of Production and Consumption, whereas Traffic consists only of purchase, transport and sale' (Quesnay 1767, pp. 176–177).

per se by maintaining that 'value in its most complex form, as exchange value, has all its constituent elements […] in the individual man, *independently of any exchange relation with other men*' (Ferrara 1854, p. 49; added emphasis). The relationship between ends and means within an instrumental rationality framework came to be seen as the central feature of catallactics, so that the latter gradually gave way to the view of economics as 'the study of the general principles of administration of resources, whether of an individual, a household, a business, or a State' (Wicksteed 1933 [1910], p. 17). There is a direct link between Wicksteed's conception of economics in its 'widest scope', that is as 'a study of the principles of administration of resources and selection between alternatives, conceived without any formal or conventional limitation' (Wicksteed 1933 [1910], p. 17) and Lionel Robbins' definition of economics ad 'the science which studies human behavior as a relationships between ends and scarce means which have alternative uses' (Robbins 1932, p. 15).[10] In fact, both Wicksteed's and Robbins's definitions of economics are consistent with the conception of economics as a science of instrumental rational action, that is, as a component of the general theory of human action: 'the economic or catallactic problems are embedded in a more general science, and can no longer be severed from this connection […] [E]conomics becomes a part, although the hitherto best elaborated part, of a more universal science, praxeology' (von Mises 1949 [1940], p. 3).

The switch from catallactics to a general theory of human action (praxeology) triggered the analysis of allocation criteria independently of specific configurations of exchange. Francis Ysidro Edgeworth's and Vilfredo Pareto's investigation of the properties of optimality conditions for bilateral exchange (Edgeworth 1881) and resource-constrained transformations (Pareto 2014 [1906]) opened the way to Bruno de Finetti's formal analysis of optimality conditions for the case of multiple-objective maximization (de Finetti 1937, 1952). De Finetti moves from the consideration of multiple objective functions, which he describes as 'partial objectives', and asks which conditions should be satisfied for the joint maximization of those functions under given limitational constraints. Formally, de Finetti introduces a 'global' objective function defined as linear convex combination of manifold partial objective functions:

$$F(u) = \lambda_1 F_1(u) + \lambda_2 F_2(u) + \cdots + \lambda_k F_k(u), \quad \text{subject to} \quad \sum \lambda_k = 1, k = 1, \ldots, n \tag{3}$$

[10]Robbins acknowledged his debt to Wicksteed's view of economics in his Introduction to Wicksteed's *Common Sense of Political Economy*, in which he wrote that Wicksteed's approach cast 'the whole corpus of economic science into an entirely new light—a light in which Economics is seen to be a discussion not of the nature of certain *kinds* of behaviour arbitrarily separated off from all others, but of a certain *aspect* of behaviour viewed as a whole' (Robbins 1933, p. xxii).

De Finetti envisages a solution criterion by which the attainment levels of any collection of $k - 1$ partial objectives are given, while the value of the *kth* objective is maximized. This operation is repeated for any combination of $(k - 1)$ partial objectives in order to obtain the set of all possible feasible combinations of achievement levels that allows maximization of all partial objectives taken one by one. A distinctive feature of the latter set is that no further improvement of attainment level for any partial objective is possible without compensatory losses for some other partial objective. De Finetti's algorithm generalizes Edgeworth's exchange postulate beyond the institutional setting of an exchange economy, and allows identification of the value judgements implicit in the multiple-objective maximization exercise. For the $\lambda_i s$ multipliers denote the different degrees of importance (the different weights) assigned to the partial objectives in the construction of the global objective $F(u)$. De Finetti's analysis of optimality conditions highlights both the compensation principles at work behind transfers from one optimal allocation to another and the central role of weights in moving from partial to global objective functions. Compensation principles presuppose trade-offs between different allocations based on limitationality constraints, while weighing criteria call attention to the fact that different allocation patterns can have hugely different consequences for any global objective function depending on how skewed the global objective is towards any one of its partial objectives (or collection thereof). The combined attention for compensation criteria and weighing systems highlights the potential of allocation theory in investigating the complex trade-offs involved when transferring resources from one use to another (as well as from one social group to another) under a given limitationality constraint. Maurice Allais's analysis of economic surplus and loss is an explicit attempt to address allocative trade-offs between different individuals or social groups and their relationship with the optimality conditions for the economic system as a whole: '[t]he search for a representative indicator for the efficiency of an economy […] boils down to a search for an indicator to represent its inefficiency. The main conditions which such an indicator must fulfil are that it be nil for any situation of maximum efficiency, that it be positive for any situation which is not of maximum efficiency, and that it decreases when one passes from a given situation to one where certain preference indexes are found to be raised without any corresponding decrease in the other preference indexes. Such an indicator, when associated with a given situation, can be considered as representative of the loss […] which the economy is undergoing in that situation' (Allais 1986,

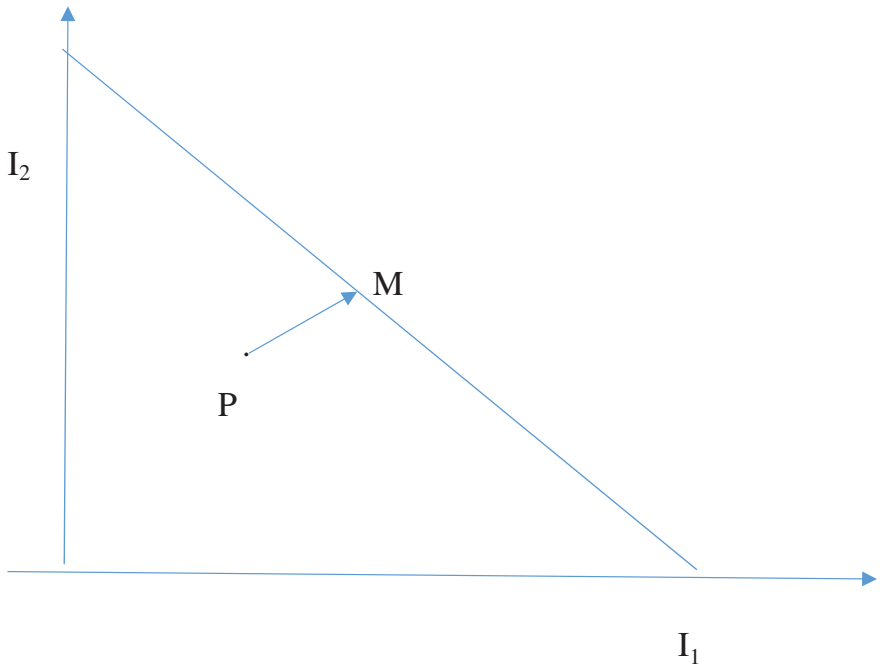

Fig. 1 Optimality frontier and distributional trade-offs

p. 137). Figure 1 represents the frontier of possible allocations that satisfy the de Finetti-Pareto optimality condition for multi-objective maximization:

Line I_1I_2 represents the alternative combinations of attainment levels for the separate objective functions of individuals (or groups) 1 and 2 consistently with the given limitationality constraints and the de Finetti-Pareto optimality condition. Any global objective function $F(I_1, I_2)$ would attain a maximum by fixing the attainment level of either I_1 or I_2 and finding the corresponding attainment level for the objective function of the other individual or group. The global objective function $F(I_1, I_2)$ can be seen as a linear convex combination of the partial objective functions I_1 and I_2:

$$F(I_1, I_2) = \sum \lambda_1 F_1(I_1) + \lambda_2 F_2(I_2) \tag{4}$$

For given values of weights λ_1, λ_2, any increase/decrease of either I_1 or I_2 entails a corresponding decrease/increase of the attainment level for the other objective. A change of weights λ_1, λ_2 modifies the impact of any distributional change on the value of the global objective function. As a result, the same distributional change may have different consequences depending

on which weighing system we are considering. For example, a society assigning equal weights to the objectives of different groups (say, 'rich' and 'poor') would be indifferent to whether a distributional change makes the 'poor' group better off or worse off. On the other hand, a society assigning different weights to different groups would react differently to distributional changes depending on which weights are assigned to which groups.

The above argument draws attention to a complex intertwining of means and objectives and has manifold consequences for the way to assess the material life of the polity. First, any given allocation of resources between social groups may contribute differently to any global objective function depending on the distribution of weights associated with different social groups. Second, the maximum value of any global (social) objective function may be compatible with different allocations between groups if society is prepared to modify their respective weights accordingly. Third, a concern for the relative positions of groups may lead to the entrenchment of sub-optimal patterns of allocation even if all groups would be better off by moving to an allocation on the optimum frontier.

To conclude, plutology and catallactics highlight two distinct sets of conditions for the material life of the polity: viability conditions in the former case, efficiency conditions in the latter case. Either set of conditions can be identified independently of the other. For *viability conditions* denote a property of the economy as a set of interdependent production processes if the latter is to be in a self-replacing state. On the other hand, *efficiency conditions* denote a property of the economy as a collection of resources directly or indirectly fulfilling human needs. An economic system may be viable without being efficient in the de Finetti-Pareto sense (for example, a system can be in a self-replacing state even if it may be possible to shift to a technology requiring less inputs per unit of output). Moreover, an economic system may be efficient without being in a self-replacing state (for example, a system may be unable to introduce improvements without compensatory losses even if it requires non-reproducible resources and is thus unable to replace its own means of production). In spite of the distinction between viability conditions and efficiency conditions, there may be cases in which both conditions highlight relevant features of the economy under consideration. For example, the physical and distributive trade-offs revealed by viability conditions (1) and (2) may be different from the allocation trade-offs revealed by the efficiency condition, and the policies dealing with those trade-offs may be correspondingly different. The material life of the polity involves both viability and efficiency issues, and different political arrangements may be required for the two sets of issues.

4 The Political Life of the Economy

The economy is a sphere of interdependent practices mutually constrained by the explicit or implicit acceptance of a common condition (which may be the maintenance of the field as such). This view of the economy encompasses both the practices of actors following independent objectives but mutually constrained by existing customs and rules, as well as the practices of actors who are explicitly coordinating with each other in view of a common objective.[11] Economic theory provides different perspectives on the economy depending on whether it emphasizes viability over efficiency, or vice versa. The viability approach highlights proportionality conditions for the self-replacing state. It also addresses the proportionality conditions for the economic system to achieve systemic objectives such as a given growth rate or a given level of overall employment. Political conditions are instrumental to the achievement of a self-replacing state, and of any additional objective in terms of growth or employment. On the other hand, the allocation approach highlights optimality conditions for the economy to be on the maximum efficiency frontier. It also addresses the shifts in relative allocation of resources that may take place when a sub-optimal economy moves towards that frontier. Political conditions are instrumental to the achievement (or maintenance) of optimal allocation, and are directly concerned with the mutually compensating gains and losses that are involved in shifting from one optimal allocation to another.

Viability conditions are central to the political arrangements addressed in Quesnay's economic writings (Quesnay 1766, 1767). Both unproductive expenses by the landed social groups and the advocacy of a single tax raised on agricultural net product (*impôt unique*) reflect Quesnay's concern for the

[11]This distinction recalls Max Weber's duality between 'economic system' (*Wirtschaft*), defined as 'an autocephalous system of economic action' (Weber 1947 [1922], p. 158, and 'economic organization' (*Wirtschaftsbetrieb*), defined as 'a continuously organized system of economic action' (Weber 1947 [1922], p. 158). The continued existence of the *Wirtschaft* presupposes the viability of mutual constraints independently of any explicit sharing of objectives between economic actors. On the other end, no *Wirtschaftsbetrieb* may exist without the sharing of certain objectives between the relevant actors (so that their actions can be considered as 'tasks' relative to the fulfilment of those objectives). Michael Oakeshott draws a complementary distinction between two different views of human association, which he calls 'human association' and 'enterprise association' or, following Roman private law, *societas* and *universitas* respectively. The former (*societas*) is defined by membership of a field in which possible (acceptable) actions are 'neither definitive principles of conduct nor explicit injunctions addressed to assignable agents commanding or prohibiting substantive actions or utterances' (Oakeshott 1975, p. 128). The latter (*universitas*) is defined by membership of a field in which actions (as tasks) must follow 'definitive principles of conduct' in the instrumental pursuit of a shared objective.

necessary proportionality between the sectors of a self-replacing economy. Unproductive consumption, even if not directly needed for commodity production, is necessary to ensure the reproducibility of the circular flow from one agricultural cycle to another, while *impôt unique* makes it possible to levy taxation directly on surplus produce over means of production, and thus allows the State to provide its needs without endangering self-replacement. In this view, *laissez faire* (free trade) allows unencumbered expenditure flows between agriculture, industry and the landed groups consistently with the proportionality requirements of self-replacement (obstacles to free trade being seen as directly encroaching on the viability of the economy). Adam Smith (1776) and David Ricardo (1951 [1817]) address the relationship between triggers of change (increasing and decreasing returns) and viability conditions along a structural dynamics trajectory. Smith highlights the relationship between viability and the economy's growth potential when division of labour is the principal mechanism driving structural change. In this case, maximum growth can be achieved by shifting accumulation of capital from agriculture to industry, and eventually from industry to 'carrying trade', along a trajectory describing the 'natural progress of opulence' (Smith 1776). In this case, two complementary requirements drive structural change: (i) the single-period condition for self-replacement and (ii) the multi-period condition for expanding productive capacity in the productive sectors in which productivity gains are most likely as the overall scale of production increases. A distinctive feature of Smith's analysis is the existence of upper bounds on increasing returns within any given technological regime, and the consequent stage-structure of structural dynamics along the maximum path of expansion. For this reason, net product accumulation should switch from agriculture to industry as soon as the limited potential for agricultural improvement is exhausted, and then from industry to carrying trade whenever the potential for manufacturing increasing returns is slackening. This approach highlights the relationship between single-period and multi-period viability: (i) single-period viability makes self-replacement possible but does not guarantee maximum growth at any given time while (ii) multi-period viability guarantees economic expansion at the maximum rate consistently with fulfilment of the self-replacement condition. Smith's natural dynamics highlights the growth potential of increasing returns while at the same time ensuring that the economic system is structurally able to replace used up means of production. This explains the sequence characterizing Smith's dynamics: the manufacturing stage does not start before agricultural improvements have fully worked themselves out, and the carrying-trade stage does not start before the

formation of a manufacturing base. In short, the increasing returns-economic growth nexus presupposes fulfilment of the self-replacement condition at any stage of natural dynamics, and determines the tempo of economic expansion. The political implications of Smith's natural dynamics are far reaching. In particular, natural dynamics suggests that systemic coherence may require a specific sequencing of the stages of economic growth, and that for this to be possible the relative weight of agricultural, industrial and commercial interests should be such as to allow the economic system to follow that particular sequence. Ricardo investigates a different aspect of the relationship between viability and growth by considering the dynamic trajectory of an economic system subject to natural resource constraints and decreasing returns from the use of capital and labour. This analytical exercise is carried out by assuming an exogenously given population growth and changes of technology in use due to the need to overcome scarcity bottlenecks (Ricardo 1951 [1817]). It is possible to cast the central features of Ricardo's contribution in more general terms by considering the dynamic trajectory of a multi-sectoral, resource-constrained economy achieving maximum growth under the viability condition (Quadrio Curzio 1986, 1990; Quadrio Curzio and Pellizzari 1999, 2018). This formulation highlights the existence of upper bounds on the maximum growth that the economy can achieve at any given time due to the need of using less and less productive technologies (that is, technologies requiring increasing inputs per unit of output) as the upper limits on activity levels of the more productive technologies are reached. This sequence involves that it is not always possible to invest the net outputs delivered by the most efficient techniques in expanding the productive capacity of the less efficient techniques (due to mismatches between the input requirements of different techniques). This situation brings about the formation of residuals, which might however become usable again if further technical changes reduce the mismatch between the input requirement structures of 'new' and 'old' techniques (Quadrio Curzio 1986). In this case, structural bottlenecks generate both upper thresholds, above which it is no longer possible to use the most efficient techniques so that less efficient techniques need to be introduced (decreasing returns) *and* lower thresholds above which input residuals become usable again, thus triggering a spurt in the economy's maximum growth rate. This type of analysis highlights the role of structural differentiation and structural fits (or mismatches) in determining the character of dynamic trajectories. Structural differentiation is a direct source of differential incomes (rents) and these incomes acquire a central position in determining the maximum possible growth of the economy at any given time.

In particular, the internal differentiation of productive structures generates productivity differentials. These differentials are the source of 'structural rents' that may or may not translate into ordinary rent incomes depending on the appropriation arrangements governing the distribution of production. The relationship between net products and structural rents is of central importance in assessing the way in which the material configuration of the economy interacts with political arrangements in triggering *one path or another* of economic dynamics. Structural rents signal technological differentiation and highlight the existence of a share of net product generated within a particular subsystem of the economy. They may advance or retard the maximum growth rate of the economy depending on the way they are distributed and used to expand productive capacity (Quadrio Curzio and Pellizzari 2018; Scazzieri, Baranzini and Rotondi 2015).

The viability requirements for self-replacement intertwine with the political and institutional conditions under which those requirements must be satisfied. Karl Marx (1983 [1867]) and John Maynard Keynes (1936) consider two different aspects of that relationship, while Luigi Pasinetti (1977b) investigates it in terms of a vertically integrated representation of a self-replacing economy. Marx focuses on the 'social equilibrium' requirements for self-replacement in a capitalist economy characterized by a given configuration of relative power between social classes. The ratio between the value of the economy's net product, or surplus (s), and the value of the workers' necessary consumption, or variable capital (v), expresses the relative position of capitalists and workers under given historical conditions (both magnitudes are measured in terms of the corresponding quantities of directly and indirectly embodied labour). If we take this ratio (*rate of surplus value*, or *rate of exploitation*) to be given from outside the circular flow, it follows that either production technology or income distribution should adjust in order to maintain the given configuration of relative positions between social classes. A situation in which v is fixed from the technological and social point of view (subsistence wages) is one in which a given s/v ratio can be maintained by changes of production technology (that is, by changes that modify the viability condition for self-replacement). On the other hand, a situation in which v is flexible (for instance because one fraction of workers' remuneration reflects contingent arrangements independently of technological constraints) is one in which changes in income distribution might be sufficient to maintain a given s/v ratio. In the latter case, there will be no need to adjust production technology in order to maintain given relative positions between social classes. Keynes draws attention to a different aspect of the

relationship between self-replacement and social equilibrium by considering the way in which a scale constraint external to the circular flow, such as the level of aggregate employment, brings about production and expenditure flows compatible with it. Keynes's analysis is not explicitly concerned with the viability condition for self-replacement, even if the crisscross causal mechanism determining sectoral employment responses to a given exogenous increase of expenditure reflects the same network of interdependencies that also find expression in the viability condition. However, Keynes foregrounds the macroeconomic consistency between employment targets and expenditure without explicitly addressing the issue of the intersectoral consistency of the expenditure and production flows that are thereby generated. In fact, the multiplier mechanism at the root of Keynes's analysis highlights the sequential causality governing the propagation of exogenous variations in expenditure (see also Kahn 1931) but overlooks the mutual consistency requirements of production flows in a self-replacing state. This means that, in principle, we might have a sequence of expenditure and employment impulses that is consistent with a full employment target even if, at no stage of the sequence, the economy is in a self-replacing state (nor can it be reduced to such a state). Pasinetti investigates the relationship between macroeconomic employment and structural viability conditions by means of his vertically integrated representation of sectoral interdependencies. In his formulation, it is possible to partition any given circular economy into a set of vertically integrated sectors (or subsystems) such that any given subsystem includes one element of the system's net output vector and the whole set of physical and labour inputs that are directly and indirectly needed to produce that particular net output component (Pasinetti 1977b). In a subsequent formulation, Pasinetti constructs vertically hyper-integrated sectors, in which each sector also includes the physical and labour inputs needed for the corresponding net output component to grow at a given rate (Pasinetti 1988). The vertical integration, and vertical hyper-integration, of sectoral magnitudes highlights two complementary aspects of the relationship between the viability of the economy's internal structure and the consistency of this structure with macroeconomic or systemic objectives (such as full employment or full capacity utilization). One aspect of this relationship concerns the physical quantities produced in the economy, the other aspect concerns the values at which these quantities should exchange with one another in view of systemic constraints:

$$S^{(i)} = \mathbf{H}\mathbf{Y}_i \equiv h_i \mathrm{Y}_i, \quad i = 1, 2, \ldots, m \tag{5a}$$

$$L^{(i)} = \mathbf{v}\mathbf{Y}_i \equiv v_i Y_i, \quad i = 1, 2, \ldots, m \tag{5b}$$

$$\mathbf{p} = \mathbf{v}w + \mathbf{H}p \tag{6}$$

Expressions (5a) and (5b) denote, respectively, the vertically integrated stocks of produced inputs (vertically integrated productive capacity) and vertically integrated labour inputs needed to produce each unit of commodity as an element of the net output vector.[12] Expression (6) denotes the relationship of the price of each commodity to the value of the vertically integrated labour and capital inputs entering the production of one unit of that commodity with the given technology in use. The generalization to vertically hyper-integrated sectors allows expressing the relationship of a net output vector growing at a given rate, say g^*, to the corresponding quantities of labour and capital inputs. It also allows expressing the relationship of the price of each commodity to the value of vertically integrated labour and capital inputs needed to produce one unit of that commodity, inclusive of the unit mark-up needed to allow *expansion* of productive capacity in the corresponding vertically hyper-integrated sector. This formulation highlights the link between the viability requirements of any given production economy (the requirements for this economy to be in a self-replacing state) and the 'external' (macroeconomic) targets or constraints that any given economy is trying to achieve or is subject to.[13] Political objectives may find expression in those targets and constraints. Their pursuit may or may not be consistent with the viability requirements of a given technology in use depending on whether conditions (5a, 5b) and (6) are satisfied. This property highlights a possible conflict between specific political objectives and the systemic coherence expressed by the viability condition for self-replacement.

[12]Pasinetti calls 'each coefficient v_i … *the vertically integrated labour coefficient* for commodity i ($i = 1, 2, \ldots, m$)' (Pasinetti 1977b, p. 20), whereas 'each column vector h_i … expresses in a consolidated way the series of heterogeneous physical quantities of commodities 1, 2, …, m, which are directly and indirectly required as stocks in the whole economic system, in order to obtain one physical unit of commodity I as final good ($i = 1, 2, \ldots, m$). This is another particular composite commodity, which we shall call *a unit of vertically integrated productive capacity* for commodity i ($i = 1, 2, \ldots, m$)' (Pasinetti 1977b, pp. 20–21).

[13]Pasinetti expresses this link contrasting 'the point of view of the circularity of the production process' and 'the point of view of final demand': '[t]he point of view of the circularity of the production process is evinced by the construction of the hyper-subsystems (which now acquire completeness by inclusion of the relations concerning the expansion of the means of production, besides those concerning their replacement). The point of view of final demand is evinced in an even sharper way. Even in a growing economic system, consumption appears at one extreme of the production process and labour appears at the other extreme, and the two are immediately and directly put into relation with each other. The complex circular (expanding) production process, which is in between, is taken for granted, as it is closed onto itself and merely fulfils an intermediate and ancillary function' (Pasinetti 1988, p. 133). The duality between 'the point of view of circularity' and 'the point of view of final demand' has interesting implications for the analysis of the relationship between the economy and the polity, which are discussed in Cardinale (2018).

Interdependent processes are not always synchronized. For example, production processes may be of different time lengths and yet they may require each other's products as intermediate inputs. Under these conditions, ad hoc coordinating devices are necessary so that mutual input requirements can be met in spite of temporal asymmetries (Scazzieri 2017). This property highlights an additional feature of viability, which is primarily associated with the stage-structure of production activity. John Hicks addresses this issue in his treatment of the dynamic viability condition for a successful transition from one technical structure to another (a successful traverse) (Hicks 1973). In his treatment, capital-using production processes include a construction phase in which productive equipment is built, and a utilization phase in which final products are delivered. Lack of material synchronisation over time requires ad hoc coordination providing what may be described as *structural liquidity* (Cardinale and Scazzieri 2016). Both material and monetary debt-credit relations may be adequate to provide this type of liquidity but, in the latter case, monetary policy needs to be tailored to accommodate the specific conditions arising from lack of synchronization of interdependent but asymmetrical processes (Amendola and Gaffard 1998). Conditions in which the provision of structural liquidity may be necessary highlight a possible tradeoff between the proportionality requirements and the scale requirements for viability (Cardinale and Scazzieri 2016). The former are needed for self-replacement in the single period, while the latter ensure the coordination of processes of different time-lengths. A system scale ensuring time coordination may be incompatible with self-replacement, or self-replacement may be incompatible with time coordination. This situation highlights a potential conflict between viability and coordination, and thus a potential conflict between the social groups supporting one or the other approach to economic system's coherence.

The allocation approach to the political conditions for the effective working of the economy starts from different premises. As we have seen, a strand of writings in the age of classical political economy highlights the features of the economy as a collection of exchanges (Isnard, Destutt de Tracy, Whately). Destutt de Tracy explicitly acknowledges the constitutive role of exchange in the formation of human society. His argument is developed in a sequence of steps. Fist, human society is considered as a collection of agents 'who are capable of feelings and of acts of will as we are, whenever they are in contact and *in an established relation with other agents of their kind*, who are similar to them, and with whom they can have full intercourse' (Destutt

de Tracy 1823, p. 65; author's emphasis). Second, the economic condition of society is seen to be relative 'to our own most immediate needs and to the means we have to provide them' (Destutt de Tracy 1823, p. 68). Finally, Destutt de Tracy considers exchange as an essential element of the social condition itself. For he describes the 'formal or tacit' convention of not harming each another as 'a real exchange', seeing as 'everybody gives up a certain manner of using one's own power, and receives back the same sacrifice from everybody else' (Destutt de Tracy 1823, p. 69). This argument involves that 'commerce is the whole society' (Destutt de Tracy 1823, p. 78; author's emphasis) and suggests a definite political agenda in support of exchange relationships: 'the true utility of society is to make possible among ourselves a multitude of [exchange] arrangements' (Destutt de Tracy 1823, p. 71).

The emphasis on exchange as a *political condition* (exchange as a condition for the making of covenants and thus for the existence of the body politic) highlights the emergence of an interface between the economic dimension of the polity and the political dimension of the economy. This interface is based on the belief that *both* the economy and the polity are instances of a 'society of exchange' (Lowe 2010 [1935]), Chapter IV). In this view, the catallactic (market) features of the economy are intertwined with emphasis on 'civil liberty, private property rights, free decision of the individual as to his bargaining' (Lowe 2010 [1935]), p. 58). This provides the template for a *laissez faire* economy that is at the same time a *market polity* (a polity in which the covenant between citizens is based on the same contractual principles governing an economy of markets). Economists and economic writers such as Frédéric Bastiat (1845, 1850), Charles Dunoyer (1846), Francesco Ferrara (1859) and Richard Cobden (1867) highlight the complementarity between market economy and market polity. They started a line of thinking that stretches to twentieth-century contributions such as those by Friedrich von Hayek (1948, 1960), Ludwig von Mises (1949 [1940]), James Buchanan and Gordon Tullock (1962), James Buchanan (1977), and more recently by Douglass North (1990), Douglass C. North, John Joseph Wallis and Barry R. Weingast (2009), Daron Acemoglu and James Robinson (2006, 2012).[14]

[14]The beginnings of this intellectual tradition are steeped in classical political economy, and particularly in the contributions by Smith and Ricardo. However, the emphasis on exchange as the fundamental analytical template for economic theory distinguishes this approach from classical theory (Scazzieri 2008; Todd 2015), while the committed advocacy of free trade policies also distinguishes most contributions in this tradition from the more nuanced approach to free trade of the Classical Economists (Grampp 1960).

Exchange situations make allocation principles clearly visible, but the fundamentals of rational allocation are also manifest independently of exchange (see Sect. 3). This feature of allocation theory makes it a useful instrument in investigating the allocation criteria characterizing different institutional arrangements, and in comparing the relative efficiency of those arrangements. The de Finetti-Pareto optimum principle highlights the distinction between general optimality conditions and specific allocation mechanisms, and draws attention to the possible application of allocation theory to contexts different from that of market exchanges. Thus, it has been possible to investigate the political-institutional prerequisites for the allocative efficiency of different institutional arrangements, and to highlight which context is needed for any given institutional mechanism to meet optimality conditions. The discussion on the compensation transfers needed to move from one optimum allocation to another under market economy conditions (Arrow 1951; Hicks 1939a; Kaldor 1939; Scitovsky 1941), and the debates on the feasibility of efficient allocation of resources under planned economy conditions (Barone 1908; Dobb 1933; von Hayek 1935, 1940; Lange and Taylor 1938) highlight the implicit 'separation criterion' at work in allocation theory, and the possibility to use allocation principles as means to evaluate and compare alternative institutional arrangements. At the same time, the distinction between general optimality conditions and the specific allocation (distribution) mechanisms characterizing different economic regimes highlights that different political arrangements may be required in order to meet the same optimality principles in different contexts. This feature of allocation theory opens the theory to application in manifold institutional contexts. De Finetti is possibly the most outspoken advocate of the use of optimum principles in a multi-objective maximization setting. First, he highlights that one should 'translate in precise form the goals initially expressed in a more or less vague and indeterminate form, […] assess their internal coherence, and […] suggest, if necessary, how to modify or change them' (de Finetti 1973, p. 15). Then, one should 'delineate forms of social organisation meant to lead to the desired situations, by investigating and comparing their attitude to function in a simple and effective way, and with a tendency to stability' (de Finetti 1973, p. 15). This procedure involves two distinct but interconnected tasks. Task 1 requires the assessment of the *mutual consistence of goals*. In terms of the achievement of any collection of social objectives, this requires disentangling the plurality of objectives in order to assess to which degree the different objectives are mutually

compatible and to which degree satisfactory attainment of one objective may require accepting an *incomplete* attainment of other objectives.[15] This task entails attaching weights to the different partial objectives, and different societies may attach different weights to different objectives. For example, equality of opportunities may conflict with the protection of disadvantaged individuals or social groups; the maximization of opportunities (and of the freedom of choice associated with it) my conflict with the minimization of uncertainty. Or, distributional equality may conflict with savings and accumulation requirements. Task 2 requires the identification of *effective and workable mechanisms* capable of leading to the desired outcomes. For instance, full employment may require attainment of a certain level of aggregate demand as well as certain changes in the sectoral composition of the economy (with the relative expansion of certain sectors and the relative contraction of other sectors). In other circumstances, a satisfactory expansion of the gross domestic product may require to overcome resource bottlenecks or technological bottlenecks that would otherwise hamper the attainment of that objective, or the attainment of full employment without triggering inflationary pressure may require an institutional mechanism in which strong welfare policies effectively compensate the income losses that might be associated with wage moderation.[16]

Allocation principles highlight trade-offs but do not provide an immediate way to deal with trade-offs. They draw attention to what can be 'technically' achieved without anybody's loss (by moving from a sub-optimal to an optimal allocation of resources) and to what can only be achieved by some individual or social group at somebody else's loss (by moving from one optimal allocation to another). At the core of allocation analysis is a set of assumptions (or data) concerning the elements of the economy that must be considered as given when asking which resource transfers are feasible and under which conditions. This entails that the content of the allocation problem changes fundamentally depending on which features of the economy we consider as given. For example, a transfer of resources from group *A* to

[15]In technical terms, this would require a maximisation exercise, but 'the function to be maximised [should] synthesize all the partial objective functions previously considered, making them compatible with each other in the way considered to be the best' (de Finetti 1973, p. 30).

[16]James Meade emphasized the complementarity of incomes and welfare policy as a necessary condition for a non-inflationary full employment policy: 'the successful introduction of institutions for achieving the necessary flexibility of rates of wages and of other forms of earnings [are] by far the most difficult economic problem which they have to face. [T]heir introduction would have been impossible if they had not been accompanied by effective measures to ensure that workers had, in addition to their earnings from work, a secure fixed income from some other source' (Meade 1993, p. 90).

group *B* may require a corresponding loss for *A* when technology and institutions are given but may be feasible without any such loss if there is a corresponding change to a more effective technology, and similarly for a resource transfer from *B* to *A*. This analytical framework highlights the complex hierarchy of constraints and opportunities that characterizes allocation processes. Opportunities are different depending on which specific constraint is binding, so that shifting the binding condition from one constraint to another opens up a set of opportunities while closing off others. This view draws attention to the role of constitutional arrangements as means to entrench a particular constellation of constraints and opportunities, and of political conflicts and compromises as means to establish a particular allocation from among the allocations consistent with binding constraints.

Allocation theory highlights a plurality of situations in which constitutional and/or political conditions determine *which* allocation mechanism is at work, *how* that mechanism can deliver a particular allocation, and *which adjustments* are needed to make the outcome of a particular allocation mechanism consistent with optimality conditions.[17] For example, political conditions at a fundamental ('constitutional') level may determine whether the relevant allocation mechanism is, say, a competitive market economy or a command economy. In this connection, economic theory highlights the feasibility conditions of the respective allocation mechanisms if these mechanisms have to meet 'technical' requirements for the mutual fitting of economic actions. Instances are investigations into the Walrasian equilibrium of a competitive economy of markets (Walras 1874–77; Hicks 1939b, 1946; Allais 1943; Arrow and Debreu 1954; Debreu 1956a, b), and research into

[17]Leonid Hurwicz defines an *allocation mechanism* as the mechanism that 'specifies rules according to which, given the information available to him at a given time, a participant send messages to other' (Hurwicz 1977, p, 20). In his view, '[b]oth market phenomena and command systems can be fitted into this schema. Thus in the Walrasian tâtonnement process the language consists of prices and quantities demanded or supplied by the various agents. If the model contains an "auctioneer", his response function calls for price changes proportional to aggregate excess demand, while the response functions of others require them to convey their excess demands given the prices called out by the auctioneer. In an extreme version of a "pure command" system, the dialogue starts with the peripheral agents sending to the center messages describing their respective components of the environment (e.g. their resource holdings and production functions), whereupon the center, after suitable data processing and calculations, sends to the peripheral agents the order for actions. In this command system the outcome is clear: to carry out the orders received. In the Walrasian tâtonnememt process, the matter is a bit more complicated. One must wait until equilibrium is somehow established—i.e. everyone is repeating his previous message. Then the outcome rule is to carry out exchanges according to the equilibrium bids made' (Hurwicz 1977, pp. 20–21).

the characteristics and feasibility of coordination in a centrally planned economy (Barone 1908; von Mises 1920; Marschak 1924, 1959; von Hayek 1935, 1940; Lange and Taylor 1938; Kantorovich 1965; Kornai and Lipták 1965; Malinvaud 1967. Either line of investigation is concerned with the internal coherence of the allocation mechanism and *not* with the assessment of its specific allocation outcomes. Political considerations do not directly enter this type of analysis, even if the actual existence of a particular allocation mechanism may reflect a particular constellation of relative positions of individuals and/or social groups in the polity. Once a given allocation mechanism is in place, the issue arises of the way in which a specific social and political context may determine the initial resource endowments of individual and/or social groups, and thus the outcome of the allocation process under the allocation mechanism under consideration. A possible way of addressing this problem is by dropping the assumption of given distributional parameters and of considering the allocation mechanism as a two-stage procedure (Hurwicz 1977, p. 22). In this case, stage one specifically deals with the setting of initial resource endowments and stage two determines the allocation outcomes. Here distributional (and political) issues take central stage, in the sense that initial endowments may be assigned to individuals and/or social groups in such a way that a predetermined distribution can be achieved through the working of a given allocation mechanism (Hurwicz 1977; Pazner and Schmeidler 1978; Shapley and Shubik 1967; Dasgupta 1980). Alternatively, the initial resource endowments of individuals and/or groups may be considered as given, and political objectives may intervene *after* the allocation outcome is known. In this case, compensatory measures may be necessary to achieve an ex post adjustment of allocation outcomes if the latter is not acceptable from the social or political point of view (for instance, if allocation outcomes are too skewed against certain social groups). Compensation may consist of resource transfers between individuals or groups (Chipman and Moore 1968; Hicks 1939a, b, 1975; Kaldor 1939; Samuelson 1950; Scitovsky 1941; Sen 2002, 2009). It may also require the introduction of 'hybrid' allocation mechanisms, such as those combining features of market and command economy (Arrow 1974, 1983 [1969]; Meade 1948, 1986). In short, allocation theory highlights a plurality of conditions under which the working of any given allocation mechanism gives scope to political conflicts and compromises. First, any allocation mechanism presupposes a political settlement (the settlement bringing into operation that mechanism in lieu of others). Second, certain allocation mechanisms draw attention to the possibility of implementing political objectives through the working of the allocation mechanism itself

(as in the case of endogenous endowments described above). Third, the allocation mechanism may pinpoint the scope of politically triggered compensatory measures once allocation outcomes are known.

To conclude, both viability requirements and allocation mechanisms highlight constraints and possibilities for the political life of the economy. However, viability and allocation concentrate attention on different features of the relationship between the economy and the polity. Viability highlights systemic requirements for the feasibility of interdependent economic activities. This type of investigation highlights the political conditions necessary to the implementation of viability requirements, as well as the scope for the achievement of political objectives given the conditions for viability. Allocation analysis takes the fulfilment of viability conditions as given and concentrates attention on the political cleavages and alliances that may arise when distributing given endowments among individuals and/or groups, or when assessing the *relative* advantages of individuals and/or groups along trajectories from sub-optimal to optimal states of the economy.

5 Political Economy Between Theory and Context

Viability and allocation highlight two different approaches to the economy as a political space. Viability conditions point to the existence of systemic constraints (what I have called the proportionality requirements for the material life of the polity) and may be suggestive of an 'active' policy domain. For in this space, political actors are often considered to be capable of identifying the relevant proportionality conditions, and to be empowered to act towards their fulfilment. Viability analysis could also provide a benchmark for assessing to which extent different policy objectives are compatible with the proportionality requirements of any given set of interdependencies between sectors and/or social groups. In this way, this type of analysis may also be instrumental to the discovery of conflicts of interest between sectors and/or between groups that might otherwise remain concealed within the web of interdependencies. Allocation analysis takes a different view. For it presupposes economic actors capable of responding in an appropriate way to the incentives of a given allocation mechanism, as well as political actors capable of *bringing into existence* that particular mechanism. This framework presupposes a political space in which conflicts and/or compromises may arise in the determination of the allocation mechanism, in the introduction of the political objectives

constraining the working of that mechanism, and in the adoption of possible compensatory measures. However, conflicts and/or compromises do not directly show up in the working of the allocation mechanism itself.

Both the conditions for systemic viability and the conditions for systemic efficiency provide useful heuristics for the identification of which constellations of sectoral or group interests are compatible with either set of conditions. Viability and efficiency conditions are also instrumental in identifying which sets of policies are feasible in view of the given constellation of interests in society.[18]

The economy as a political space has a twofold character depending on whether the relationship between the economy and the polity is seen from the viability or the allocation point of view (see above). In addition, both viability and allocation conditions are inherently flexible and open to a variety of formulations, depending on which conditions are considered to be fixed and which conditions are viewed as variable and open to context. The relationship between theory and policy is one in which one can most clearly see the implications of the duality between viability and allocation approaches, and the open ended character of either approach. This is one important reason why arguments developed, respectively, within the viability or the allocation framework may support the same policy, and why either framework may sometimes provide support for opposite policies. For example, the allocative view of taxation may support a tax policy aimed at correction of the outcomes of a specific allocation mechanism, as with Arthur Cecil Pigou's view of tax incentives to support increasing returns sectors and tax disincentives to divert resources away from decreasing returns sectors (Pigou 1912, 1920). On the other hand, the allocation approach may also support a tax policy aimed at triggering *within* the existing allocation mechanism a social-welfare increasing allocation outcome, as with James Mirrlees's optimal tax argument supporting a zero marginal income tax rate for the highest income individual or group (Mirrlees 1971). Similarly, viability theory may support, respectively, free trade or protection depending on whether the attention is focused on the mutual advantages of trade at any given distribution of resources and productive capacities (Ricardo 1951 [1817]), *or* on the means of acquiring those productive capacities before the opening

[18]In this connection, Gunnar Myrdal emphasizes the role of economics as 'economic technology', by which he meant a tool for the 'analysis of the field of social interests' (Myrdal 1953, p. 199).

of trade relationships (List 1904 [1841]).[19] The policy-openness of the viability approach reflects the emphasis of this approach on interdependence and hierarchy between industrial sectors, which justifies free trade or protection depending on whether the industrial structures of trading partners are considered to be given or subject to policy decisions. A similar openness to different policy options is manifest in the allocation approach, as this approach may support free trade as an efficiency-enhancing measure (Ohlin 1933), but may also justify limits to free trade as means to cope with the existence of strong asymmetries in the distribution of initial endowments between trading partners (Samuelson 2004).

The political economy of economic theory suggests a close look *both* at cases in which the same theory recommends opposite policies and at cases in which the same policy is supported by different theories. In either set of circumstances, the *causal mechanism* leading from theory to policy allows to overcome the apparent indeterminacy of the relationship between theory and policy and gives reasons for the policy that any given theory may suggest under specific circumstances. For example, tax policy may address production as a welfare-enhancing activity either in terms of the way in which production processes are organized in different industrial sectors (Pigou) or in terms of the unequal distribution of skills in the economy (Mirrlees). The emphasis by Pigou and Mirrlees on different aspects of production activity leads to different causal mechanisms and explains the differences between their respective policy proposals: a tax and subsidy policy based on the distinction between 'marginal social net product' and 'marginal private net product' for Pigou (1929 [1920], p. 174); an 'approximately linear income-tax schedule' for Mirrlees (1971, p. 208), who maintains that 'complete equality of social marginal utilities ceases to be desirable, for the tax system that would bring about that result would completely discourage unpleasant work' (Mirrlees 1971, p. 175). Similarly, viability theory may support either free trade (Ricardo) or protection (List) depending on the different causal mechanisms at play when we take a static or a dynamic view of comparative advantage in production. For with static comparative advantage (Ricardo) the opening of trade reflects the existing distribution of productive capacities between trading partners, while with dynamic comparative advantage (List) the accumulation of productive capacities may precede the opening of

[19]Lionel Robbins emphasizes that any close and unqualified connection between classical political economy and free trade is historically unjustified. In particular, he highlights that according to the Classical Economists 'the good society is to be regarded as an artifact' (Robbins 1952, p. 55). He also notes that 'the system of economic freedom [can only work] if a conscious effort is made to create the highly artificial environment which is necessary if it is to function properly (Robbins 1952, p. 56).

trade, so that protection may become a prerequisite for the determination of the 'manufacturing power' of the economy under consideration (List 1904 [1841], p. 162).[20] In short, a given theoretical framework may be consistent with a plurality of causal mechanisms and policy frameworks. This highlights the context-dependence of theoretically grounded policy advice, but also emphasizes the central role of theory in identifying which causal factors make policy intervention effective in each particular context.

References

Acemoglu, D., and J.A. Robinson. 2006. *Economic Origins of Dictatorship and Democracy*. Cambridge: Cambridge University Press.

Acemoglu, D., and J.A. Robinson. 2012. *Why Nations Fail: The Origins of Power, Prosperity and Poverty*. New York: Crown Business; London: Profile Books.

Allais, M. 1943. *Traité d'economie pure*. Paris: Imprimerie nationale.

Allais, M. 1986. The Concepts of Surplus and Loss and the Reformulation of the Theories of Stable General Economic Equilibrium and Maximum Efficiency. In *Foundations of Economics: Structures of Inquiry and Economic Theory*, ed. M. Baranzini and R. Scazzieri, 135–174. Oxford and New York: Basil Blackwell.

Amendola, M., and J.-L. Gaffard. 1998. *Out of Equilibrium*. Oxford: Clarendon Press.

Arrow, K.J. 1951. *Social Choice and Individual Values.* New York: Wiley; London: Chapman and Hall.

Arrow, K.J. 1974. *The Limits of Organization*. New York: Norton.

Arrow, K.J. 1983 [1969]. The Organization of Economic Activity: Issues Pertinent to the Choice of Market Versus Non-market Allocations. In *Collected Papers of Kenneth J. Arrow, Vol. 2: General Equilibrium*, ed. K.J. Arrow, 133–155. Cambridge, MA: Belknap Press.

Arrow, K.J., and G. Debreu. 1954. Existence of an Equilibrium for a Competitive Economy. *Econometrica* 22 (July): 265–290.

Baranzini, M., and R. Scazzieri. 1986. Knowledge in Economics: A Framework. *In Foundations of Economics: Structures of Inquiry and Economic Theory*, ed. M. Baranzini and R. Scazzieri, 1–87. Oxford and New York: Basil Blackwell.

[20]The distinction between the 'static and dynamic aspects of the principle of comparative cost advantages' has been emphasized by Luigi Pasinetti (1993, p. 161). According to Pasinetti, 'there certainly are comparative cost advantages which derive from the climatic and natural characteristics of each particular country. But there are other comparative cost advantages which may be *acquired* through learning methods' (Pasinetti 1993, p. 162). The argument in the text suggests that the same analytical framework may support free trade or protection depending on whether static or dynamic comparative advantages are considered.

Barone, E. 1908. Il ministro della produzione nello stato collettivista. *Giornale degli Economisti e Rivista di Statistica*, ser. II, 37: 267–293, 391–414.

Bastiat, F. 1845. *Cobden et la Ligue, ou l'agitation anglaise pour la liberté du commerce*. Paris: Guillaumin.

Bastiat, F. 1850. *Harmonies économiques*. Meline Cans: Bruxelles.

Botero, G. 1558. *Delle cause della grandezza delle città libri III*. Rome: appresso Giovanni Martinelli (First English edn.: *A Treatise Concerning the Causes of the Magnificencie and Greatness of Cities: Divided into Three Books*, by Sig. Giovanni Botero in the Italian tongue; now done into English by Robert Peterson, London, printed by T.P. for Richard Ockould and Henry Tomes, 1606).

Buchanan, J. 1977. *Freedom in Constitutional Contract*. College Station: Texas A&M University Press.

Buchanan, J., and G. Tullock. 1962. *The Calculus of Consent: Logical Foundations of Constitutional Democracy.* Ann Arbor: University of Michigan Press.

Cardinale, I. 2018. Classical Political Economy. In *Palgrave Handbook of Political Economy*, ed. I. Cardinale and R. Scazzieri. London: Palgrave Macmillan.

Cardinale, I., and R. Scazzieri. 2016. Structural Liquidity: The Money-Industry Nexus. *Structural Change and Economic Dynamics* 39: 46–53.

Chipman, J., and J. Moore. 1968. The Compensation Principle in Welfare Economics. In *Papers in Quantitative Economics*, vol. 2, ed. A.M. Zarley, 1–77. Lawrence, KS: The University of Kansas Press.

Cobden, R. 1867. *The Political Writings of Richard Cobden*. London: Ridgway; New York: Appleton.

Dasgupta, P.S. 1980. Decentralization and Rights. *Economica* 47 (1): 107–124.

Debreu, G. 1956a. *The Theory of Value*. New York: Wiley.

Debreu, G. 1956b. Market Equilibrium. *Proceedings of the National Academy of Sciences* 42 (November): 876–878.

de Finetti, B. 1937. 'Problemi di "optimum" vincolato' [Problems of constrained "optimum"]. *Giornale dell'Istituto Italiano degli Attuari*, 8: 112–126 (English translation as 'Problems of Constrained "Optimum"', in L. Pasinetti (ed.), *Italian Economic Papers*, III, Bologna and Oxford, Il Mulino and Oxford University Press, 1998, 261–277).

de Finetti, B. 1952. Sulla preferibilità [On Preferability]. *Giornale degli economisti e annali di economia* 11: 685–709.

de Finetti, B. 1973. L'utopia come presupposto necessario per ogni impostazione significativa della scienza economica. In *Requisiti per un sistema economico accettabile in relazione alle esigenze della collettività*, ed. B. de Finetti, 13–87. Angeli: Milano.

de Montchréstien, A. 1889 [1615]. *Traicté de l'œconomie politique*. Paris: Plon and Nourrit et cie.

Destutt de Tracy, A.L.C. 1823. *Traité d'économie politique*. Paris: Bouguet et Lévi.

Dobb, M. 1933. Economic Theory and the Problems of a Socialist Economy. *The Economic Journal* 43 (172): 588–598.

Dunoyer, C. 1846. *De la liberté du travail ou simple exposé des conditions dans lesquelles les forces humaines s'exercent avec le plus de puissance*. Meline, Cans et Compagnie: Bruxelles.

Edgeworth, F.Y. 1881. *Mathematical Psychics. An Essay on the Application of Mathematics to the Moral Sciences*. London: Charles Kegan Paul.

Ferrara, F. 1854. Introduzione. In *Biblioteca dell'Economista*, ser. I, vol. V, Turin, UTET, v-lxiv.

Ferrara, F. 1859. Introduzione. In *Biblioteca dell'Economista*, ser. II, vol. VII, Turin, UTET, v–cxxv.

Genovesi, A. 1767. *Delle lezioni di commercio o sia di economia civile, da leggersi nella Cattedra Intieriana, dell'Ab. Antonio Genovesi Regio Cattedratico*. Napoli: nella Stamperia Simoniana.

Grampp, W.D. 1960. *The Manchester School of Economics.* Stanford: Stanford University Press; London: Oxford University Press.

Hicks, J. 1939a. The Foundations of Welfare Economics. *The Economic Journal* 49 (196): 696–712.

Hicks, J. 1939b. *Value and Capital: An Inquiry into Some Fundamental Principles of Economic Theory*. Oxford: Clarendon Press.

Hicks, J. 1946. *Value and Capital. An Inquiry into Some Fundamental Principles of Economic Theory*, 2nd ed. Oxford: Clarendon Press.

Hicks, J. 1973. *Capital and Time: A Neo-Austrian Theory*. Oxford: Clarendon Press.

Hicks, R. 1975. The Scope and Status of Welfare Economics. *Oxford Economic Papers*, new series, 27 (3, November): 307–326.

Hicks, J. 1976. "Revolutions" in Economics. In *Method and Appraisal in Economics*, ed. S.J. Latsis, 207–218. Cambridge: Cambridge University Press.

Hont, I. 2010. *Jealousy of Trade: International Competition and the Nation-State in Historical Perspective*. Cambridge, MA and London, England: The Belknap Press of Harvard University Press.

Hurwicz, L. 1977. The Design of Resource Allocation Mechanisms. In *Studies in Resource Allocation Processes*, ed. K.J. Arrow and L. Hurwicz, 3–37. Cambridge: Cambridge University Press.

Isnard, A.-N. 1781. *Traité des richesses, contenant l'analyse de l'usage des richesses en général et de leurs valeurs*. A Londres, et se vende a Lausanne en Suisse: chez François Grasset & Comp.

Johansen, L. 1985. Richard Stone's Contributions to Economics. *The Scandinavian Journal of Economics* 87 (1): 4–32.

Kahn, R.F. 1931. The Relation of Home Investment to Unemployment. *The Economic Journal* 41 (June): 173–198.

Kaldor, N. 1939. Welfare Propositions in Economics and Interpersonal Comparisons of Utility. *The Economic Journal* 49 (September): 549–552.

Kantorovich, L.V. 1965. *The Best Use of Economic Resources*, English edn. ed. G. Morton. Translated from the Russian by P.F. Knightsfield. Oxford and New York: Pergamon Press.

Keynes, J.M. 1936. *The General Theory of Employment, Interest and Money*. London: Macmillan.
Kornai, J., and T. Lipták. 1965. Two-Level Planning. *Econometrica* 33: 141–169.
Kuhn, T.S. 1962. *The Structure of Scientific Revolutions*. Chicago: University of Chicago Press.
Kuhn, T.S. 1977. *The Essential Tension: Selected Studies in Scientific Tradition and Change*. Chicago: University of Chicago Press.
Landesmann, M., and R. Scazzieri. 1990. Specification of Structure and Economic Dynamics. In *The Economic Theory of Structure and Change*, ed. M. Baranzini and R. Scazzieri, 95–121. Cambridge: Cambridge University Press.
Lange, O., and F.M. Taylor. 1938. *On the Economic Theory of Socialism*, ed. B.E. Lippincott. Minneapolis, MN: University of Minnesota Press.
Leontief, W. 1941. *The Structure of the American Economy*. New York: Oxford University Press.
List, F. 1904 [1841]. *The National System of Political Economy*, trans. Sampson S. Lloyd, new edn. with an introduction by J. Shield Nicholson. London: Longmans and Green and Co.
Lowe, A. 2010 [1935]. *Economics and Sociology. A Plea for Co-operation in the Social Sciences*. London and New York: Routledge.
Malinvaud, E. 1967. Decentralized Procedures for Planning. In *Activity Analysis in the Theory of Growth and Planning*, ed. M.O.L. Bacharach and E. Malinvaud, 170–208. London: Macmillan.
Marangoni, G., and D. Rossignoli. 2014. Richard Stone's Contributions to Input–Output Analysis. Available at SSRN: http://ssrn.com/abstract=2749621.
Marschak, J. 1924. Wirtschaftsrechnung und Gemeinwirtschaft. *Archiv für Sozialwissenschaft und Sozialpolitik* 51: 501–520.
Marschak, J. 1959. Centralization and Decentralization in Economic Organizations. *Econometrica* 27: 399–430.
Marshall, A. 1890. *Principles of Economics*. London and New York: Macmillan.
Marx, K. 1983 [1867]. *Capital: A Critique of Political Economy*: London: Lawrence and Wishart.
Meade, J. 1948. *Planning and the Price Mechanism: The Liberal-Socialist Solution*. London: George Allen & Unwin.
Meade, J. 1986. *Alternative Systems of Business Organization and of Workers' Remuneration*. London: George Allen & Unwin.
Meade, J. 1993. Can We Learn a "Third Way" from the Agathotopians? In *Liberty, Equality and Efficiency*, ed. J. Meade, 85–99. London: Macmillan.
Mirrlees, J.A. 1971. An Exploration in the Theory of Optimum Income Taxation. *Review of Economic Studies* 38: 175–208.
Mun, T. 1664. *England's Treasure by Forraign Trade, or the Ballance of Our Forraign Trade is the Rule of Our Treasure*. London, printed by J.G. for Thomas Clark, and are to be sold at his Shop at the South entrance of the Royal Exchange.

Myrdal, G. 1953. *The Political Element in the Development of Economic Theory*. London: Routledge.

North, D.C. 1990. *Institutions, Institutional Change and Economic Performance*. Cambridge: Cambridge University Press.

North, D.C., J.J. Wallis, and B.R. Weingast. 2009. *Violence and Social Orders: A Conceptual Framework for Interpreting Recorded Human History*. New York: Cambridge University Press.

Oakeshott, M. 1975. *On Human Conduct*. Oxford: Clarendon Press.

Ohlin, B. 1933. *Interregional and International Trade*. Cambridge, MA: Harvard University Press.

Pareto, V. 2014 [1906]. *Manual of Political Economy: A Critical and Variorum Edition*, ed. A. Montesano, A. Zanni, L. Bruni, J.S. Chipman, and M. McLure. Oxford: Oxford University Press.

Pasinetti, L.L. 1965. A New Theoretical Approach to the Problems of Economic Growth. In *Econometric Approach to Development Planning*, 571–696. Amsterdam: North Holland.

Pasinetti, L.L. 1977a. *Lectures on the Theory of Joint Production*. London: Macmillan; New York: Columbia University Press.

Pasinetti, L.L. 1977b. The Notion of Vertical Integration in Economic Analysis. In *Essays on the Theory of Joint Production*, ed. L. Pasinetti, 16–43. London and Basingstoke: Macmillan (Originally published in *Metroeconomica*, 1973, 1–29).

Pasinetti, L.L. 1988. Growing Sub-systems, Vertically Hyper-Integrated Sectors and the Labour Theory of Value. *Cambridge Journal of Economics* 12: 125–134.

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

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

Pazner, E.A., and D. Schmeidler. 1978. Decentralization, Income Distribution and the Role of Money in Socialist Economies. *Economic Inquiry* 16 (2, April): 257–264.

Pigou, A.C. 1912. *Wealth and Welfare*. London: Macmillan.

Pigou, A.C. 1929 [1920]. *The Economics of Welfare*. London: Macmillan.

Quadrio Curzio, A. 1980. Rent, Income Distribution and Orders of Efficiency and Rentability. In *Essays on the Theory of Joint Production*, ed. L.L. Pasinetti, 219–240. London: Macmillan.

Quadrio Curzio, A. 1986. Technological Scarcity: An Essay on Production and Structural Change. In *Foundations of Economics. Structures of Inquiry and Economic Theory*, ed. M. Baranzini and R. Scazzieri, 311–338. Oxford and New York: Basil Blackwell.

Quadrio Curzio, A. 1990. Rent, Distribution and Economic Structure. A Collection of Essays, *Dynamis,* Quaderni IDSE, n.1, Consiglio Nazionale delle Ricerche-CNR.

Quadrio Curzio, A. 1996. Production and Efficiency with Global Technologies. In *Production and Economic Dynamics*, ed. M. Landesmann and R. Scazzieri, 105–126. Cambridge: Cambridge University Press.

Quadrio Curzio, A., and F. Pellizzari. 1999. *Rent, Resources, Technology*. Berlin: Springer.

Quadrio Curzio, A., and F. Pellizzari. 2018. Political Economy of Resources. In *Palgrave Handbook of Political Economy*, ed. I. Cardinale and R. Scazzieri. London: Palgrave Macmillan.

Quadrio Curzio, A., and R. Scazzieri. 1986. The Exchange-Production Duality and the Dynamics of Economic Knowledge. In *Foundations of Economics: Structures of Inquiry and Economic Theory*, ed. M. Baranzini and R. Scazzieri, 377–407. Oxford and New York: Basil Blackwell.

Quesnay, F. 1758. *Tableau économique*. Versailles.

Quesnay, F. 1766. Analyse de la formule arithmétique du Tableau Economique de la distribution des dépenses annuelles d'une nation agricole. *Journal de l'agriculture, du commerce & des finances,* tome II, 3ème partie (June), 11–41.

Quesnay, F. 1767. Lettre de M. Alpha, Maître ès-Arts, à l'Auteur des Ephémérides sur le langage de la Science économique. *Ephémérides du citoyen* 10 (2): 163–217.

Ricardo, D. 1951 [1817]. *On the Principles of Political Economy and Taxation*. Vol. I of *The Works and Correspondence of David Ricardo*, P. Sraffa ed. with the collaboration of M.H. Dobb. Cambridge: Cambridge University Press.

Robbins, L. 1932. *An Essay on the Nature and Significance of Economic Science*. London: Macmillan.

Robbins, L. 1933. Introduction. In *The Common Sense of Political Economy, and Selected Papers and Reviews on Economic Theory*, ed. P.H. Wicksteed. London: Routledge.

Robbins, L. 1952. *The Theory of Economic Policy in English Classical Political Economy*. London: Macmillan.

Samuelson, P.A. 1950. Evaluation of Real National Income. *Oxford Economic Papers* 2 (1): 1–29.

Samuelson, P.A. 2004. Where Ricardo and Mill Rebut and Confirm Arguments of Mainstream Economists Supporting Globalization. *Journal of Economic Perspectives* 18 (3, Summer): 135–146.

Scazzieri, R. 2008. The Diffusion of Economic Ideas and the Formation of the Market Tradition: Explorations in the Political Economy of the 19th Century. In *The Migration of Ideas*, ed. R. Scazzieri and R. Simili, 73–97. Sagamore Beach, MA: Watson Publishing International, Science History Publications/USA.

Scazzieri, R. 2017. Liquidity Architectures and Production Arrangements: A Conceptual Scheme. In *Political Economy of the Eurozone*, ed. I. Cardinale, D. Coffman, and R. Scazzieri, 155–182. Cambridge: Cambridge University Press.

Scazzieri, R., M. Baranzini, and C. Rotondi. 2015. Resources, Scarcities and Rents: Technological Interdependence and the Dynamics of Socio-economic Structures.

In *Resources, Production and Structural Dynamics,* ed. M. Baranzini, C. Rotondi, and R. Scazzieri, 427–484. Cambridge: Cambridge University Press.

Scitovsky, T. 1941. A Note on Welfare Propositions in Economics. *The Review of Economic Studies* 9 (1): 77–88.

Sen, A.K. 2002. *Rationality and Freedom*. Cambridge, MA and London: The Belknap Press of Harvard University Press.

Sen, A.K. 2009. *The Idea of Justice*. Cambridge, MA: The Belknap Press of Harvard University Press.

Serra, A. 1613. *Breve trattato delle cause che possono far abbondare li regni d'oro e argento dove non sono miniere, con applicazione al Regno di Napoli*. Naples: Scoriggio (English edn.: *A Short Treatise on the Wealth and Poverty of Nations*; edited and with an introduction by Sophus A. Reinert; translated by Jonathan Hunt, London and New York, Anthem Press, 2011).

Shapley, L.S., and M. Shubik. 1967. Ownership and the Production Function. *The Quarterly Journal of Economics* 81: 88–111.

Simon, H.A. 1962. Architecture of Complexity. *Proceedings of the American Philosophical Society* 106 (6): 467–482.

Sismondi, J.-C.-L. 1819. *Nouveaux principes d'économie politique, ou de la richesse dans ses rapports avec la population*. Paris: Delaunay.

Smith, A. 1776. *An Inquiry into the Nature and Causes of the Wealth of Nations*. London: W. Strahan and T. Cadell.

Sraffa, P. 1960. *Production of Commodities by Means of Commodities*. Cambridge: Cambridge University Press.

Steuart, J. 1966 [1767]. *An Inquiry into the Principles of Political Oeconomy*. Edinburgh and London: Oliver and Boyd for the Scottish Economic Society.

Stone R. 1962. Multiple Classifications in Social Accounting. Paper presented at the ISI Conference, Paris, 1961, *Bulletin de l'Institut International de Statistique* 39: 215–233.

Strumilin, S. 1963 [1927]. 'Sur les méthodes d'établissement d'une balance de l'économie nationale et notamment du revenue capital'. *Etudes économiques*, n. 145.

Thagard, P. 1992. *Conceptual Revolutions*. Princeton, NJ: Princeton University Press.

Todd, D. 2015. *Free Trade and Its Enemies in France, 1814–1851*. Cambridge: Cambridge University Press.

Tugan Baranovsky, M.I. 1913 [1894]. *Crises industrielles en Angleterre*, translated from the 2nd revised and augmented Russian edn. by Joseph Schapiro, Paris, Giard et Brière (1st Russian edn. 1894; 2nd Russian edn. 1900).

von Hayek, F.A. (ed.). 1935. *Collectivist Economic Planning*. Critical Studies on the Possibilities of Socialism, by N.G. Pierson, L. von Mises, G. Halm, and Enrico Barone. London: Routledge and Charles Kegan Paul.

von Hayek, F.A. 1940. Socialist Calculation: The Competitive 'Solution'. *Economica* 7 (26, May): 125–149.

von Hayek, F.A. 1948. *Individualism and Economic Order*. Chicago: University of Chicago Press.
von Hayek, F.A. 1960. *The Constitution of Liberty*. London: Routledge and Charles Kegan Paul.
von Mises, L. 1920. Die Wirtschaftsrechnung im sozialistischen Gemeinwesen. *Archiv für Sozialwissenschaft und Sozialpolitik* 47 (1): 86–121 (English translation by S. Alder as 'Economic Calculation in the Socialist Commonwealth', in F.A. Hayek, ed., *Collectivist Economic Planning; Critical Studies on the Possibilities of Socialism*, by N.G. Pierson, L. von Mises, G. Halm, and Enrico Barone, London, Routledge and Kegan Paul, 87–130; new translation by H. Anderson. Available at SSRN: http://ssrn.com/abstract=2039501).
von Mises, L. 1949 [1940]. *Human Action: A Treatise on Economics* [1940]. London, Edinburgh, and Glasgow: William Hodge.
Walras, L. 1874–77. *Eléments d'économie politique pure*. Lausanne: Corbaz.
Weber, M. 1947 [1922]. *The Theory of Social and Economic Organization*, translated by A.M. Henderson and Talcott Parsons; edited with an introduction by Talcott Parsons. New York: Oxford University Press.
Whately, R. 1847. *Introductory Lectures on Political Economy*, delivered at Oxford in Easter Term, 1831, 3rd ed. revised and enlarged, London, Parker.
Wicksteed, P.H. 1933 [1910]. *The Common Sense of Political Economy*. London: Routledge.