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1. Introduction

Any discussion of the micro-macro link in heterodox economics entails two main questions. The first question is a general one, which is relevant for all social science, and asks for the correct or adequate treatment of aggregates and aggregation in social theory. Any answer to this general question incorporates a series of diverse philosophical viewpoints, including ontological claims (e.g. do social and economic aggregates exist?), epistemological questions (e.g. which role is played by aggregates in aggregation in the context of economic theory?) and methodological aspects (e.g. how to adequately model processes of aggregation?). Given that economics abounds in problems of aggregation – as in the case of market interaction, macroeconomic aggregates or interpersonal coordination and contracting – the aim to provide suitable theoretical tools to adequately address aggregates and aggregation is of special interest to economists of different convictions.

The second major question is more specific and asks for similarities and differences in the treatment of aggregates and aggregation among heterodox economists. From a traditional viewpoint one might question the idea that there is something like a consistent vision of the micro-macro link in heterodox economics, since different interpretations of the micro-macro link have been attributed to various heterodox strands of research: While some heterodox economists prioritize either micro- or macro-level analysis, others emphasize the necessity to focus the meso-level as a decisive intermediate layer of structural emergence between the more traditional approaches focusing on microeconomic or macroeconomic aspects.

¹ Forthcoming in revised version in the Handbook of Heterodox Economics (Routledge, 2016).

Against this backdrop this chapter provides an introduction to a heterodox approach to the micro-macro link in economics. In doing so, we first emphasize the analytical problems that may arise from popular misunderstandings about the relationship of individual and aggregate level and thereby illustrate why a thorough understanding of aggregation and aggregates in science is helpful to avoid the errors arising from these popular misunderstandings (section 2). In a second step we show that the different heterodox approaches to the micro-macro link in economics are not only consistent, but complementary to each other and allow for a concise treatment of the micro-macro link in economics based on a set of shared fundamental principles (section 3). Eventually, we embed the heterodox economic view on aggregation in a ‘systemist’ framework and show that heterodox economic theory and research practice can be substantiated and summarized by a more general, philosophical perspective on aggregates and aggregation in science (section 4). The final section offers some concluding thoughts.

2. Aggregates and aggregation in science: The role of compositional fallacies

Scientific endeavor often deals with the relation between aggregate entities, like a family, a nation or a firm, and their individual constituents – family members, citizens or employees. In disentangling this relationship between the “whole” and its “parts” errors may occur, which can be understood as compositional fallacies. Such compositional fallacies arise from either a wrong treatment of the aggregation process or a wrong treatment of aggregates and may lead to a deficient understanding of the whole as well as its parts. This section provides a general account of four typical compositional fallacies and their conceptual sources with the aim to develop a basic understanding of the type of problems usually associated with the micro-macro link in economics and the social sciences.

One typical error related to aggregation is to underestimate the role of relations across individuals. Aggregates are not only composed out of individual entities, but also contain a set of relations, which tie these individual nodes together and create a certain structure or organization. Taking relations into account is thereby crucial for acquiring an adequate understanding of the constitution of aggregate entities. A simple illustration for the importance of relations is that the difference between the words “dog” and “god” does not reside in their individual components (the letters d, o, and g) but in the way these are ordered, that is in their relations or structure.² Similarly, the behavior of some aggregate social system, like a family or a nation, strongly depends on its internal structure, that is, its relational setup. Most standard economic models ignore relational setups at all and simply posit that

² Nagel (1952) suggests a classic and more elaborate example based on comparing the ordered class of all natural numbers K with another class K^* , which is equal to the conjoined set of the ordered classes of even (K_e) and odd number (K_o) so that $K^*=\{K_e, K_o\}$. As in the example given above the microelements of the classes K and K^* are equal, while their relations differ.

the aggregate behavior is obtained by some simple procedure of summing up across individual entities. This postulate may hold true for very specific questions, for instance, when calculating the mean height or median income in a certain population. However, such aggregate statistical properties are mostly used to *describe* aggregate developments; their role in *explaining* aggregate behavior in social systems is severely limited, especially when aggregate behavior depends on how people mutually influence each other in the course of individual decision-making. In the latter case we have to avoid the *simplistic fallacy*, which ignores the relational setup and posits that aggregation is equivalent to an arithmetic procedure, but instead must take relations seriously.

The *simplistic fallacy* is thereby based on a deficient understanding of aggregation, which argues that the “whole” is no different from the “sum of its parts”. Such a view is in conflict with two very basic observations: first, aggregates may develop properties no individual part possesses (e.g. a firm’s success). Second, individuals may acquire some properties exactly because they are part of some whole (e.g. a country’s citizen). In both cases we find that “more is different” (Anderson 1972) as these newly acquired attributes can be conceived as *emergent properties*, i.e., some novel features arising exactly because an aggregate is constituted or sustained. In the case of “dog vs. god” the main difference resides in the meaning of these words, where “meaning” is again an emergent property. Moreover, we observe that the same parts give rise to different meanings, i.e., emergent properties, if we change their relative setup. These two observations are not only in conflict with the *simplistic fallacy*, but also raise doubt on the “hierarchical stipulation that macro-theories require a microeconomic foundation to obtain full validity” (Rothschild 1988, p. 14), which is often found in mainstream economic discourse.

One main reason why such a “hierarchical stipulation” creates additional problems is that in economic contexts such emergent properties arise permanently – just think of innovation in market environments and the associated forces of “creative destruction” (Schumpeter 1942) and “path-dependency” (David 1985, Arthur, 1989) or the continuous evolution of social routines (Nelson and Winter 1982, Hodgson and Knudsen 2004) and consumer preferences (Veblen 1899, Witt 2001). In these contexts, where the relationship between individual action and aggregate outcomes is manifold and highly complex, the epistemological presupposition of a “hierarchical stipulation” of micro over macro acts as double barrier for understanding: first, assuming that aggregate properties *can* always be reduced to (current) micro-knowledge³ amounts to committing the *static fallacy*, which

³ The proposition that any aggregate property can be reduced is objectionable on two levels: First, one could argue that such an undertaking is often principally infeasible, because the relevant initial data is never completely known and the associated set of calculations might lack a clear, determinable solution. Sometimes it is asserted, that some specific higher level-activities like human consciousness (Chalmers 2006) or, more generally, conscious agents (Popper 1979, p. 292) bear no direct mechanistic relationships

underestimates the dynamics and complexity of social interaction and turns a blind eye on the unexpected. Second, the related methodological claim that aggregate properties *should* always be reduced to (current) micro-knowledge, amounts to committing the *dogmatic fallacy*, which restricts the study of higher-level mechanisms, which are viewed as mere residuals of individual behavior. Such a view suffers from a deficient understanding of aggregates, which posits that aggregates are ontologically negligible and, hence, can have no meaningful explanatory role.

While the *static fallacy* implicitly assumes the complete absence of unexplainable novelties at the aggregate level, taking into account the *dogmatic fallacy* is of vital importance if situations are complex. According to Herbert Simon (1962, p. 468) complexity is attained when “it is not a trivial matter to infer the properties of the whole” even when “the properties of the parts and the laws of their interaction” are given. In this context, Simon emphasized that such complex arrangements often require flexible and versatile approaches, while a sole focus on reduction would lead to overly narrow research strategies. Hence, Simon’s argument that “[i]n the face of complexity, an in-principle reductionist may be at the same time a pragmatic holist” (ibid. 468) implies that studying mechanisms at the level where they are located is a well-suited strategy to face complexity.⁴ In methodological contexts mainstream economists often emphasize the ultimate need for reductionist strategies (e.g. Robbins 1932, Lucas 1976, Kydland & Prescott 1977), while heterodox economists of different convictions argue for a multi-level perspective in economic theorizing (e.g. Dopfer et al. 2004, Elsner 2007, Lee 2011, King 2012).

At the heart of the *dogmatic fallacy* lies the conviction that aggregates can have no role in explanation, which amounts to a deficient understanding of aggregates in general. In contrast to this assertion stand arguments on top-down effects in economics and elsewhere, which have to be considered in explaining aggregate as well as individual phenomena. In the case of our “dog vs. god” example the command of the English language serves as an aggregate condition for assessing the example’s intention. Similarly, in the physical sciences, aggregate conditions (e.g. the mass of a star or temperature) often determine micro-level mechanisms and properties (e.g. the process of fusion within a star or the barometric pressure exhibited by gas). In economics we can think of the influence of social norms and regulation on business practices or the social mediation of consumption

with lower-level activities. Second, one could argue, that such an undertaking would be practically infeasible, since issues become too complicated given the limitation of our current empirical and theoretical knowledge (see: Simon 1962, or below footnote 4).

⁴ Pareto takes a similar approach to Simon in his *Manual of Political Economy*: “Clearly psychology is fundamental to political economy and all the social sciences in general. Perhaps a day will come when the laws of social science can be deduced from the principles of psychology, just as some day perhaps the principles of the composition of matters will give us all the laws of physics and chemistry by deduction, but we are still very far from that state of affairs, and we must take a different approach.” (Pareto [1927] 1971, p. 29)

preferences within a certain community. The importance of such top-down mechanisms in economics has long been emphasized by heterodox economists, some of whom would even claim to inverse the “hierarchical stipulation” inherent in mainstream economics and, conversely, demand a “macroeconomic foundation” for microeconomics (e.g. King 2012). Ignoring the possibility of these top-down mechanisms amounts to committing the *hierarchical fallacy*, which imposes an arbitrary limit with regard to the role of aggregates in social research.

Table 1 summarizes the conceptual and methodological pitfalls collected in this section and illustrates the relation between these four fallacies. While the standard mainstream economic quest for microfoundations implies committing all of these fallacies, some developments out of mainstream economics proponents of mainstream economics have indeed recognized the crucial role of interpersonal relations and, hence, are able to avoid the *simplistic fallacy* noted in Table 1 (see, for instance, Schelling 1978). In what follows we first deal with the question what kind of principles heterodox economists developed to deal with the question of aggregates and aggregation in economics in (section 3), before asking whether there exists a general philosophical foundations suitable to summarize heterodox practice (section 4).





| | Main error | Fallacious Routine | | Underlying Misconception |
|---------------------------------|--|--|--|---|
| The simplistic fallacy | Ignoring relations, i.e. underestimating the complexity of aggregation | Simply summing up individual properties |  | Wrong treatment of aggregation: “ <i>the whole is nothing more than the sum of its parts.</i> ” |
| The static fallacy | Ignoring the possibility of unexplainable novelties / irreducible properties | Any aggregate property can be reduced |  | |
| The dogmatic fallacy | Ignoring that higher-level mechanisms can be studied on their own | Always aim at providing bottom-up explanations |  | Treatment of aggregates: “ <i>wholes cannot be explanatory—they do not carry mechanisms.</i> ” |
| The hierarchical fallacy | Ignoring the possibility of downward causation | Never provide top-down explanations |  | |

Table 1: Compositional fallacies: An overview

3. A Heterodox perspective on the micro-macro link: Why the whole is more than the sum of its parts

One overarching theme in heterodox economic theorizing is the view that the consideration of social wholes is important for understanding of socio-economic processes and outcomes. This general perspective implies that wholes are more than a mere sum of their parts, since they exhibit non-trivial properties and carry effects of various sorts, which that cannot be conjectured from looking solely on their constituent parts. However, this idea has also been subject to different specific interpretations and applications within heterodox economics leading to a series of distinct vantage points on the role of aggregates and aggregation in economics. In this context this section reviews major insights of heterodox economics regarding the treatment of the micro-macro link in economic thought. In doing so it also illuminates some basic justifications for the heterodox claim, that aggregation is often a highly complex process. It deserves theoretical attention because social and economic aggregates may constitute novel objects or, at least, come with novel features, which may have specific real-world consequences.

3.1 The whole is more than the sum of its parts

One main implication of the idea that wholes do make a difference is to consider the spatial and temporal variance of social configurations in order to identify distinct realms of economic activity. Such distinctions may refer to historical differences (e.g. “medieval feudalism” vs. “20th century welfare state capitalism”), spatial variations (e.g. “core” and “periphery”) or distinct spheres of economic activities (e.g. “competitive market societies” vs. “subsistence communities”). These distinctions are deemed important since the course and effects of economic activity depend on their social and historical circumstances.

We already find such differentiations in classical political economy. Consider, for instance, John Stuart Mill’s distinction between the sphere of production and the sphere of distribution. For Mill the decisive difference between these two economic realms is that while the former is constrained by nature, the latter is shaped solely by men. Consequently, different laws and assumptions apply in these contexts:

“The laws and conditions of the Production of wealth partake of the character of physical truths. [...] It is not so with the Distribution of wealth. That is a matter of human institution solely. The things once there, mankind, individually or collectively, can do with them as they like.” (Mill 1848, II.1.1-2)

Men is clearly subject to environmental, historical and societal forces in this account, simply because nature, culture and society as well as the stage of historical developments largely define the

constraints and modes of economic activity. As a consequence heterodox economists argue that holistic factors, like culture or institutions, are important for explaining social phenomena and allow for top-down effects or downward causation within their economic theorizing.

In a bold, and possibly overarching, interpretation this view may be extended to the claim that social and economic conditions completely determine actions, fate and feelings of individuals. Such a view of socio-economic determinism is often associated with Marx' concept of *historical materialism*, although such an interpretation presumably does not do justice to the original Marxian account.⁵ In a more modest version such an approach is similar to the approach of a physicist, who studies the behavior of a single element (e.g. the behavior of a comet entering the solar system or the pressure in some gas-container in a lab) by taking a full account of the surrounding system (e.g. the composition of the solar system or the size of the container) to correctly anticipate the impact of the latter (Andersen et al. 2000). This more modest attitude is key for understanding a variety of heterodox ideas – from ecological economists' emphasis on absolute constraints (Georgescu-Roegen 1971) to Keynes personal statements on economic methodology:

„Economics is a science of thinking in terms of models joined to the art of choosing models which are relevant to the contemporary world. It is compelled to be this, because, unlike the typical natural science, the material to which it is applied is, in too many respects not homogeneous through time.“ (Keynes 1938, 296)

3.2 Relations matter

A second application of the general idea that social wholes make a difference focuses on the interrelatedness of individuals. Attention is devoted to the relations between individuals and the corresponding impact of other people's attitudes and behavior on an individual's economic thought and action.

Generally, such interactions among agents as well as between structure and agency are of prime interest to heterodox economists: the analysis of interactions and relations across individual agents and guides studies on preference formation in the context of social emulation (following Marx 1849 or Veblen 1899), the emergence of routines in organizations (Nelson & Winter 1982), question of social identity (Albertson Fineman 2005) or the evolution of cooperation (Axelrod 1984, Bowles and Gintis 2011). Such a perspective naturally takes relations seriously and allows for agents of different weight – different influence and power so to say – and thereby serves a guide for theorizing on self-

⁵ A more accurate account of the relation between structure and agency in Marx can be based on Marx' claim that „men make their own history, but they do not make it as they please; they do not make it under circumstances chosen by themselves, but under circumstances directly encountered, given and transmitted from the past“ (Marx 1852, p. 15).

reinforcing effects (Merton 1968) and path dependency (David 1985, Arthur 1989), wealth concentration, power structures and elites (Rothschild 1971) as well as other forms of cumulative advantage (Myrdal 1957). The idea that relations are important often attracts immediate attention to the concrete interactions taking place within an economy. One immediate implication of this reasoning is, for example, the conceptualization of an economy as a circular flow, where one person's expenditure adds to another person's income. This view considers monetary transactions as fundamental interactions constituting mutual interdependencies among single economic actors. The consequences of these interdependencies are a major theme in heterodox macroeconomics, especially in the context of Keynesian multipliers and the related debate on the suitability of fiscal policies.

Additionally this focus on the role of relations complements our argument, that social wholes play an important role, by answering the question of how exactly social wholes come into being. A key idea in this context is to avoid the *simplistic* fallacy by understanding social wholes as constituted by a set of individual nodes and their corresponding relational setup.

Thereby, social relations play a twofold role: First, they serve as a transmission bent for cultural norms, institutional conventions, established hierarchies or shared goals and aspirations within a social whole. Second, relations serve as means for understanding how individual action might influence social wholes and, hence, provide a lense for assessing social change and novelty.

The role of social relations as a transmission bent features prominently in heterodox economic thought and can be traced back to Karl Marx, who speaks of individuals as an "ensemble of the social relations" (Marx & Engels 1845), Thorstein Veblen, emphasizing the social mediation of consumer preferences (Veblen 1899) or Karl Polanyi, who coined the term "embeddedness", used to describe that individual economic action is always embedded in a certain socio-historical context (Polanyi 1944) From a dynamic perspective this view can also be used to analyze questions of social mobility, where relational structures serve as a means for preserving social hierarchies as in Bowles and Gintis (1975) or Bourdieu (1998), who studied the role of educational systems for stratification in the USA and France.

The second major feature of social relations, which allows active agents to influence aggregate properties, also has a prominent role in heterodox thinking and is exemplified by conceptions such as Schumpeter's entrepreneur (Schumpeter 1934) and or Keynes' animal spirits (Keynes 1936), who both emphasize that some individual decisions are, while not conforming to the norms of rationality, of great impact for future developments. Against this backdrop it comes as no surprise that active

agency plays an important role in heterodox approaches to economic cooperation and trust, institutional design as well as path creation and path dependence (e.g Hirschmann 1970, Davis 2015).

This dual character of social relations, which allow for top-down as well as bottom-up effects and thereby captures the fact that individual agents and social structure are mutually interdependent was most explicitly taken up by Mark Granovetter, who refined the concept of embeddedness in his seminal paper on “Economic Action and Social Structure” (1985). Granovetter distinguished between an oversocialized and an undersocialized conception of individuals, where the latter is attributed to neoclassical and new institutional economics, while the former can be found in purely holistic approaches to social and economic analysis.

Both conceptions eventually posit an atomistic conception of individuals devoid of any relational embedding: For the over-socialized individuals, action has already been completely determined by social forces as a whole and quite independently of any specific relational setup, while under-socialized individuals do not have any significant relations to others. Granovetter sees the embeddedness perspective as a conceptual alternative, where

“[a]ctors do not behave or decide as atoms outside a social context, nor do they adhere slavishly to a script written for them by the particular intersection of social categories that they happen to occupy. Their attempts at purposive action are instead embedded in concrete, ongoing systems of social relations.” (Granovetter 1985, p. 487).

In this view issues of trust and sympathy affect all interpersonal relations, even in situations, where a relation is only initially constituted primarily as an economic relation of exchange. The economic implications of this reasoning are non-trivial: they concern industrial structure, trust levels and bargaining processes as well as the level of economic performance. A classic example is given by parts of the high-tech sector, which participated in building up spatial clusters of coordination and cooperation. These clusters are characterized by regular interactions among the involved suppliers, developers and customers, which leads a quasi-re-integration of different steps throughout the supply chain, although these steps are carried out by formally independent organizations. The longer such relations exist, the more do they “outgrow” the market and become insensitive against market signals such as “prices” (Elsner et. al. 2015).

But Granovetter stresses that social embeddedness is not only a source for trust, stability and cooperation, but also for exploitation, disorder and conflict. Hence, Granovetter’s approach does not allow for general predictions aside from the claim that “network structures matter”, since outcomes eventually depend on the overall network structure. Whether, for example, a system is vulnerable to particular interest groups, who work against general interests thereby depleting stability and trust,

depends on the concrete case at hand. Hence, the nature and effects of social systems almost always depend on their particular network structure (Strogatz 2001).

In standard economic accounts such structural properties largely remain implicit: for instance, most Walrasian General Equilibrium Models do not account for networks explicitly, but assume implicitly the system to be structured as a bipartite star network, as illustrated in figure 1(a). In this setup agents are not directly related to each other, but rather connected indirectly via a central auctioneer, who has direct relationships with all agents and, hence, resides in the network's center. A change of the network structure has non-trivial effects: an otherwise identical model economy characterized by a ring network (figure 1(b)) exhibits very different distributional consequences and price patterns than the star network, implicit in the conventional Arrow-Debreu economy (Albin & Foley 1992).

Real networks are, of course, neither rings nor stars: network science has made impressive progress the last decades and found that most empirical networks look in some ways similar to figure 1(c): there are few nodes with many connections, and many nodes with few connections. Furthermore, nodes are organized into different clusters.⁶ To explore the economic implications of this structure is an important avenue for future research.

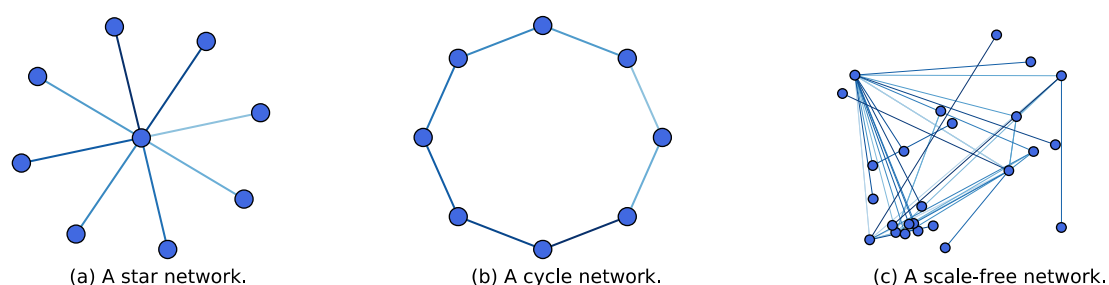


Figure 9.1. Three different social networks: 1(a) represents the theoretical Arrow-Debreu Economy with the Walrasian auctioneer in the center. 1(b) is a ring, capturing dense neighborhood structures. 1(c) shows a scale free network.

Hence, different relational structures may provide a possible explanation for the fact we have established in the preceding subsection, that social wholes are not equivalent to the sum of their parts. But can we make reasonable predictions about the meso or macro level of the economy, given a precise description of the micro components as well as their relations? Notwithstanding the

⁶ Many statistics are available for the description of complex networks, and one should definitely be more precise than the space of this book chapter allows. See Newman (2003) for a nice introduction considering most recent advances in the literature.

obvious merits of such an approach, the next section explains why a general affirmative answer to this question cannot be provided.

3.3. There is real novelty

Intertwined with this claim on the importance of incorporating relations into social and economic analysis, which focuses on taking the complexity of social structures seriously, is the notion that novel objects or properties (i.e. features of some object) constantly arise in the course of social interaction. This specific aspect of social wholes – the fact they are carriers and transmitters of genuine novelty – is at the heart of this subsection.

Economic systems regularly produce novel features that are not predictable from past data. The emergence of novelty can be most intuitively illustrated for the case of innovation, which was a key element in the work of Joseph A. Schumpeter. Schumpeter distinguished between five types of innovation (Schumpeter 2011[1934], p. 66): An innovation could be the development of a new good, the introduction of products of higher quality or alternative methods of production. The fourth type of innovation is the creation a new market by assessing new supply and demand capacities (e.g. through international trade). The fifth and last type of innovation is an introduction of a new kind of organization exemplified by the emergence of a diverse set of economic organizations reaching from workers cooperatives to fast-food stores and private banking facilities.

All these kinds of innovations represent or bring forth novelties that have not been existent in an economic system before. They may carry new mechanisms that fundamentally change to functioning of the economic system as a whole: for example, the advent of globalization not only came with cheaper import goods, but also introduced a new mechanism – the race for national competitiveness – which puts different countries in a competition for serving the interests of powerful transnational corporations. The invention of digital computers, to give another example, led to new markets, new types of goods, and even new life styles that continue to influence our society via novel mechanisms in various ways. While innovations can often be understood as a creative recombination of already existing ideas, neither the exact way of recombination nor its consequences for society are a priori predictable

This fact motivated heterodox economists to further elaborate on the micro-macro link to gain a deeper understanding of this non-predictability. One main pillar in this context is development of arguments on fundamental uncertainty in economic action, which focuses on the role of crucial decisions in investment and business, whose effects are very hard or impossible to anticipate. These

circumstances gives scope to alternative economic motives like individual vision and passion (as in Schumpeter's entrepreneur) or idiosyncratic attitudes to risk-taking (as with Keynes' animal spirits).

Another venue of work in this context aims for a refined conception of "meso" in economic analysis (Dopfer et al. 2004, Arthur 2015, Elsner & Schwardt 2014). Proponents argue for a "micro-meso-macro" framework as a substitute for the conventional micro-macro dichotomy. In such a framework the economic agents represent the micro level of the economy. These agents are heterogeneous with regard to the rules they carry. Rules are the fundamental object of investigation in their framework. A rule, and all its actualizations constitute a meso unit, which is seen as a key element of evolutionary economic investigation. The macro level then represents the structure between the different meso units ("the surface structure") and the relationship between the different ideas, which underpin the more specific rules ("the deep structure"). The interaction of rules is thereby of prime interest, since it is understood as a main driver of economic change. Assume, for instance, that creditors and debtors in a given economy mutually adapt their credit-rules to each other and that creditors are influenced by past crisis, which they tend to forget over time. In such a setup the decreasing risk-aversion of creditors would be mirrored by debtors leading to an increase of credit supply and credit demand at the same time creating potentially unsustainable levels of debt. Hence, we can reach the classic Minskyan result that "stability breeds instability" (Minsky 1986) by a simple model of rule convergence on credit markets.

The obvious advantage of such an analytical frame is that it allows focusing on economic change and thus to understand the source of the unpredictability of real novelty within the economy: One more specific expression of this rather general claim is provided by the theory on path dependence, originating from the seminal papers of David (1985) and Arthur (1989) dealing with technological lock-in. Generically, we can disentangle path dependent processes into three different phases (Sydow et al 2009; Dobusch & Kapeller 2013):

The first phase, path creation, characterizes a situation of contingency. Events happening at this stage are usually "outside the ex-ante knowledge of the observer" (Arthur, 1989). They are nevertheless important, because these small events characterize the initial conditions for the second phase, where an ergodic dynamic process, characterized by positive feedback effects and subsequent, causally linked events, leads to the dominance of one particular standard. The positive feedback may stem from different forms of network effects, based on increasing returns, preferential attachment, learning and coordination effects, complementarity requirement or the convergence of expectations. The last phase, the resulting lock-in, then reflects the resilience of the dominating standard against change. Thus, while it is almost impossible to predict the diffusion process ex ante, it only becomes

possibly to identify the dominant technology after one has entered the second phase of the path dependent process.

Hence, path-dependency theory focuses on the mechanisms underlying the introduction of novelties and the creation and persistence of social standards of different forms (like social norms, organizational rules, behavioral practices or technological requirements, etc.). In doing so it provides a theoretical rationale for the emergence of novelties and explicates the difficulties in predicting such novelties. At the same time path-dependency theory is silent on the effects brought forth by such novelties, which often represent controversial questions in heterodox economics. A prime example is given by the effect of the adoption and diffusion of innovations at the level of employment: while some innovations indeed function as labor-saving devices (as in the standard Keynesian approach) others may increase employment due the creation of additional demand induced by novel products or improvements in product-quality and versatility (as in the Schumpeterian approach; see, for instance, Witt 2001). Which effect eventually dominates in the face of general technological progress or a specific innovation is, hence, a question, which can be hardly answered *ex ante*.

These arguments imply that *ex ante* predictions are often difficult or impossible, since the emergence and effects of novelties can hardly be fully anticipated. Nevertheless, the relevant trajectory can of course be explained *ex post*: We understand well how a specific successful innovation diffused into society and how it affects their members. But it is often impossible to predict this exact trajectory before its origination.

3.4 Aggregation and welfare

Finally, our forth perspective on social wholes and their role in economic theorizing is more peculiar to economics and relates to the normative question of economic welfare in the context of aggregation. In 1714 Mandeville (1962[1714]) advanced, most famously, the view that “private vice” in the form egocentric instrumental rationality will lead to “public benefits”, that is the maximization of social welfare. This view is deeply inscribed in modern mainstream economics, especially in welfare economics and its two fundamental theorems. While many heterodox economists surely would accept, that the Mandeville-case is indeed a *possible* state of affairs (when unintended consequences of intended actions have positive effects), they also tend to critically examine the conditions required for the Mandeville-case to prevail and often find a negative result, i.e. unintended consequences leading to a worse final outcome. Classical examples in this context include rationality traps – “if I can improve my view in the theater by standing up, will there also be a collective improvement if everyone follows this rationale?” – or references to the “tragedy of the

commons” (Hardin 1968); a term that refers to the unsustainable usage of a common good in the absence of a suitable mode of social coordination (Ostrom 1990). More formally, such cases can be expressed in the form of a n-person prisoner’s dilemma, which illustrates the core property of rationality traps and tragedies of the commons, namely that *myopic individually rational actions will lead to the worst possible aggregate outcome*. This relationship is the main reason why some heterodox economists consider a prisoner’s dilemma as one archetype for heterodox economic modeling (Elsner et al. 2015). Since the welfare aspects of social organization are a general topos of heterodox economic theorizing, we find variants of this argument in several heterodox traditions: ecological economists emphasis on collective good problems (e.g. climate change), Marxian perspectives on power and conflict and evolutionary as well as institutional economists focus’ on the role of social norms, institutions and law in resolving social dilemmata. In a similar vein (post-)Keynesian economists emphasize that macroeconomic entities, i.e. collective actors, are directly subjected to such coordination and collective good problems and, hence, cannot and should not be understood in analogy to microeconomic agents, like firms or households. For instance, a government facing a significant increase in private and foreign savings has to behave expansionary – that is, take up debt – to avoid an economic downturn. Hence, the fact that the debt-to-GPD ratio of Japan is astonishingly high (> 200%) indirectly reflects the behavior of its firms and citizens and is not necessarily an indicator for bad governance with a preference for reckless spending (Koo 2009).

4. Systemism as a general framework

4.1 Systemism and heterodoxy

While the concept of systemism might seem new, one can be assured that the practice of systemism is far from something completely novel. We introduce the concept of systemism to provide a full-fledged philosophical concept, which incorporates the basic heterodox arguments on the micro-macro link in economics, but is also applicable to problems in other branches of scientific endeavor, like the natural sciences. The development of systemism owes mainly to the works of Mario Bunge, philosopher and polymath, who aimed to transgress the traditional dichotomy between individualism and holism, which he perceived as an outdated hindrance to social research as well as epistemological debate.

In his diverse assessments on systemism, Bunge cites a variety of examples for what he conceives as a “systemist” social research. Interestingly, within these passages the names of heterodox economists come in definitely non-random abundance: Among others Bunge mentions “the greatest economist

of the 20th century” John Maynard Keynes and Wassily Leontief (Bunge 2004, p. 187), Max Weber⁷, Joseph A. Schumpeter, Thorstein B. Veblen or K. William Kapp (Bunge 1999, p. 92-93). This observation is good news: although Bunge rejects much of current social science, it is important to recognize that he portrays some of the archetypes of today’s heterodox economics as contributors of significant insights. More recent examples for heterodox approaches compatible to a systemist perspective are supplied by an understanding of economics as the study of the social provisioning process (Jo 2011) or the postulate of evolutionary economists to focus on the meso-level of economic activity (e.g. Dopfer et al. 2004, Elsner et al. 2014). In sum, these observations suggest that heterodox economic approaches serve as natural candidates for illustrating a systemist approach to social and economic issues and, conversely, systemism serves as a natural candidate for epistemologically substantiating heterodox economic research.

4.2 Systemism: key ideas and concepts

Bunge’s systemism is built upon the fundamental twin concept of systems and mechanisms, where the latter are situated within or between the former. Thereby any object or entity in systemist analysis is considered either a system itself or as a component of a system (Bunge 1996).

A system is composed by a set of nodes or components (its *composition*) with a particular relational setup (a system’s *structure* or *organization*) situated within a certain *environment*. The interrelatedness of agents not only contributes to the constitution of a specific system, but gives rise to variety of “ontological novelties”, i.e. some features that the whole possess, but its components lack (*global properties*, like a nation’s culture or a firm’s success) or some features components acquire exactly because they are part of some system (*relational properties*, like being a creditor or an employee; see Bunge 1996). The concept of a system can therefore be applied on several levels: a family is a system consisting of different members with particular relations to each other. At the same time it is a part of a community system where it has several relations to other components of the community. The resulting levels of the system take the form of a hierarchy of sub- and super-systems, which serves as a basic ontological framework. Such a hierarchical understanding of reality has been insinuated by several heterodox approaches, in particular in the work of Herbert Simon, who gave an evolutionary explanation for the predominance of hierarchy in the complex systems of reality (Simon 1962).

The second fundamental ingredient to systemism are mechanisms: they are essential because systemist theory aims for mechanism-based (or *mechanismic*) explanations of phenomena (Bunge

⁷ With regard to Max Weber, Bunge notes that while Weber did preach individualism, he practiced systemism (Bunge 2000, p. 149; see also Albert (2005) for a similar argument).

1997). Mechanisms now work within or across social systems and their working lead to continuous changes and stabilization of a given system, which is why we conceive of them “as a process (or sequence of states, or pathway) in a concrete system, natural or social” (Bunge 2004, p. 186). Thereby three rough types of mechanisms can be distinguished: first, within-level mechanisms operate within social systems, but address only one ontological layer (e.g. a reduction in hourly income may induce a household to increase working hours). Second, bridging mechanisms also work within a certain social system and can take the form of agency-structure relations (i.e. a bottom-up mechanism or upward causation) or structure-agency relations (i.e. top-down mechanisms or downward causation as discussed in section 3.1). The former provide a theoretical alternative for the aggregation of individual behavior going beyond a mere “summing up” of individual properties, by employing theoretical mechanisms for means of aggregation (e.g. by looking at network structures or other dynamic concepts such as path dependency, where aggregate results depend on the direction of positive feedback effects, or bandwagon effects, where final outcomes depend on the sequence of individual moves). Finally, there are mechanisms operating between a system and its environment (i.e. overlapping and surrounding systems), like imitation of technologies or competition among firms.

This focus on concrete mechanisms distinguishes systemist epistemology from the standard covering-law model as it is still common in mainstream theory: In contrast to mechanism-based explanations, these explanations explain observed facts by classifying them as members of a more general class of phenomena. Bunge suggests to refine such a mode of explanation: to explain the death of a person with their property of being human, and the fact that all humans eventually die, is not very insightful; rather we should try to identify the concrete mechanisms that have led to the state of affairs to eventually arrive at more general theories (Bunge 1997, p. 425).⁸

It is important to stress that Bunge does not conceive mechanisms as metaphysical ideas invented by the researcher, but as law-like relationships within or between systems.

Based on these considerations we can now try to integrate heterodox economic arguments and the systemic framework. But before providing some illustrative examples in the next section, we summarize the above said by providing an outline of the essential building blocks of a systemist model (Bunge 2004, p. 188):

1. An adequate description of the parts of the system, i.e. its nodes.

⁸ Note that Bunge (1997) uses this argument not only to question the conventional covering-law model, but also to criticize other concepts, like hermeneutics or Occam’s razor, which neglect the main task to bring forth new and testable hypotheses.

2. An account of the structure of the system, i.e. the edges among the system components (the source for emergent properties and mechanisms).
3. A description of the environment of the system and how the system interacts with its environment.
4. An elaboration on the relevant mechanisms, i.e. the characteristic processes, of a system. This, of course, includes upward and downward mechanisms acting between the different ontological levels.

Note that systemism is not a theory, but rather an epistemological heuristic, suitable for guiding questions of research design and data interpretation, that is, “a viewpoint, or a strategy for designing research projects whose aim is to discover some of the features of systems of a particular kind” (Bunge 2004, p. 191). Considering this notion, we claim that systemism is a rather well-suited philosophical framework to structure heterodox theorizing on the micro-macro link as outlined in section 3. The next section shows how existing work can be structured in this light, and how future work can profit from applying and exploiting this basic heuristic.

4.3 Heterodox economics in a systemist framework

Bunge’s concept of systemism does not only provide a suitable philosophical framework for heterodox theorizing on the micro-macro link, but also offers an intuitive way to express and conceptualize theoretical considerations of micro-macro interactions. The following examples illustrate this aspect from a practical perspective.

The first illustration relates to the famous “paradox of thrift” according to which people tend to increase their precautionary savings (an action taken on the micro level) in times of uncertain economic prospects (a macroeconomic condition). This decision entails a decrease in their consumption spending, which then yields or intensifies an economic downturn. This new macro-condition again increases economic uncertainty that makes people to increase their savings compared to their consumption spending. The diagram in figure 2 illustrates this reasoning in a systemist framework.

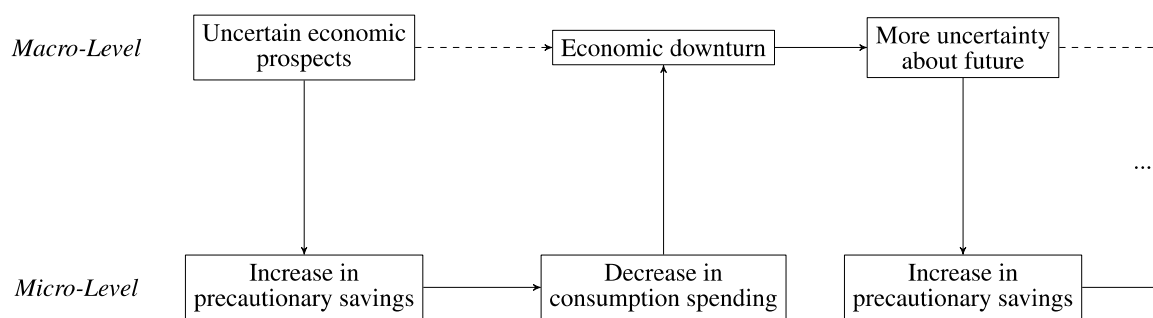


Figure 9.2: The 'paradox of thrift' in a systemist framework.

An example for a more recent heterodox application in a systemist vein is provided by Bowles & Park (2005), who use the Veblenian concept of social emulation to explain the allegedly counterintuitive relationship between rising inequality and increasing working hours (Figure 3). Due to social emulation of preferences a higher level of income inequality induces an increase in consumption aspirations across households. In order to live up to these aspirations a (sizeable) subset of these households increase their working effort, which leads to an increase average working hours. A possible extension of this argument would say the this increase in the supply of labor reduces the bargaining power of workers and, hence, leads to lower wages, which further increasing income inequality leading to a path-dependent downward spiral.

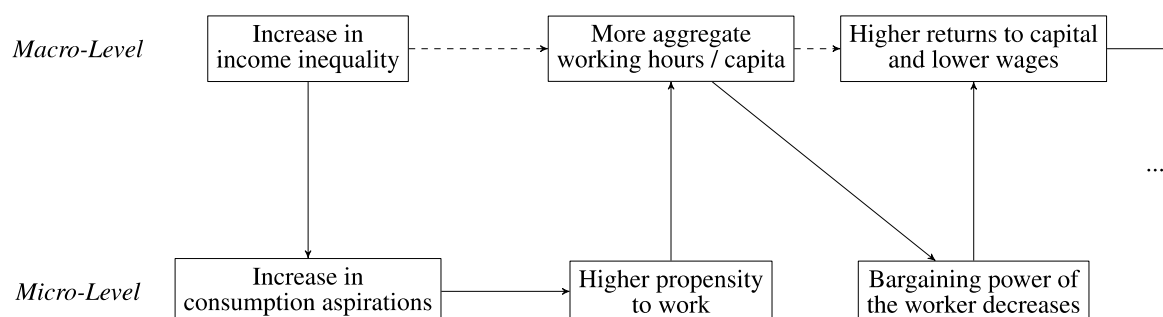


Figure 9.3: Income inequality, labor supply and economic development in a systemist framework drawing on Bowles and Park (2005).

Our final example, which considers the emergence and evolution of social conventions, is based on Hodgson & Knudson (2002), who discuss an agent-based simulation, where drivers are forced to decide whether to drive on the left or on the right side of a street.

They study the conditions under which conditions a stable convention emerges and how it affects individual decision-making. While their major finding is that habit-formation is a probable vantage point for the emergence of conventions, the illustration in figure 4 extends the underlying argument

by illustrating the emergence of conventions in a systemist framework considering both, bottom-up as well as top-down effects.

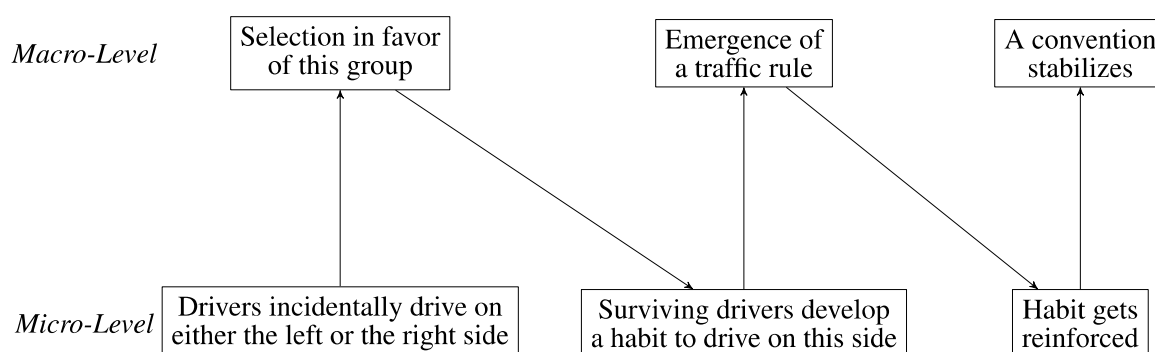


Figure 9.4: The evolution of a traffic convention based on Hodgson & Knudson (2002) in a systemist framework.

These examples show that systemism offers is far away from a methodological straight-jacket. Quite on the contrary, the schematic approach utilized in these examples aims at illustrating how this approach can be employed to facilitate conceptual thinking and the crafting of ontologically sensible theoretical frameworks on the basis of a solid epistemological foundation.

5. Conclusion

The complex relationship between different ontological levels has received considerable attention in heterodox theorizing. This has led to the development of a number of important independent contributions to the role of aggregates and the issue of aggregation in social research, which often allowed heterodox economists to circumvent the typical fallacies of aggregation identified in this chapter.

These important contributions, however, often start from very different vantage points leading to a diversity of more specific and refined arguments on the micro-macro link in heterodox economics. In this chapter we aimed to show the central pillars of these different heterodox conceptions of the micro-macro link are not only complementary, but can also be subsumed under a common philosophical umbrella labeled 'systemism.' Given the complexity of the reciprocal relationship between higher and lower ontological levels in the economy, and the number of yet unresolved questions, we argue that the concept of systemism will proof useful for further research on this essential issue.

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