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MACROECONOMICS AS SYSTEMS THEORY

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Abstract

This essay is the penultimate draft of Chapter 1 of a book that carries the working title *Macroeconomics as Systems Theory: Emergence, Institutions, and Economic Process*. This book examines the material of macroeconomic theory by looking through a different analytical window from what most theorists use. The conventional analytical window shows a national economy as a collection of such aggregate variables as output, employment, investment, and a price level, and seeks to develop theoretical relationships among those variables. The macro level of an economy is accessed directly through the variables created through the national income and product accounts and similar series of aggregate data. In contrast, I treat the relation between micro and macro theories as a relation between the parts of something and the entirety of that thing. Hence, the analytical object to which macro theory pertains entails a higher order of complexity than that of micro theory. Where micro variables are aptly characterized as objects of choice, macro variables are not. To the contrary, macro variables are products of emergent interaction and spontaneous ordering. Furthermore, there is no position of “policymaker” who stands outside the macro system, for all economizing action occurs inside the economic system.

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Macroeconomics as Systems Theory

Macroeconomics theorizes about the entirety of an economic system, in contrast to microeconomics which theorizes about various parts of that system. That is certainly a reasonable distinction to make. It suggests the image of someone standing in a hot air balloon as it ascends from a town square. As the ascension continues, a wider field of vision appears; however, the clarity of individual objects on the ground is lost. An economic system in its entirety is obviously an object of great interest because its qualities and properties affect the lives of everyone who inhabit that social system. While it is easy to understand why economists would seek to theorize about economic systems in their entirety, a significant challenge accompanies that theoretical effort because no one can see that system in its entirety. Theorists cannot see the object about which they theorize, and yet they theorize about it all the same. This situation is not unusual. It is common. No physicist has seen a black hole or gravity, and yet physicists theorize about these objects. Mostly, those theoretical efforts are guided by a desire to explain such observable phenomena as the rising and falling of tides in relation to the moon's proximity. Economists face the same situation. They, too, observe particular phenomena and theorize about the underlying processes that seem to be able to explain those observations.

To be sure, economics, or social theory more generally, pertains to different types of objects than does physics, or the natural sciences generally. Humans are part of the natural world, so human actions are subject to natural processes. For instance, humans will die without receiving water or food at regular intervals. They will also die if exposed for prolonged periods to extreme temperatures. And even if experienced

temperatures are not that extreme, humans become distinctly uncomfortable when exposed to temperatures above 90 degrees Fahrenheit or below 50 degrees, and so seek to change their environment in response. Humans are biological creatures, so are subject to biological as well as physical laws. Indeed, it is possible to develop an economic theory around the imaginary actions of a Robinson Crusoe alone on his island. Such theories could be described as laws of a natural economy in recognition of Crusoe's struggle for survival within the natural world.

But we find Crusoe alone only in our imaginations. That aloneness, moreover, creates severe analytical problems because Crusoe cannot duplicate himself. Hence if you start with Crusoe you can never get to society. Yet all of our observations of humans, both historical and archeological, pertain to humans living in the groups that we designate variously as tribes or societies. This situation of humans existing in groups creates analytical challenges and opportunities that extend beyond any effort to reduce humans to adherence to physical and biological laws. Sure, as part of the natural world humans are subject to the laws of natural science. Their living together in societies, however, creates a further menu of analytical questions to address, and with that menu speaking to what Norbert Elias (1939 [1982]) describes as *The Civilizing Process*. This menu of questions takes us to the brink of the chasm that separates theorizing about micro or individual phenomena from theorizing about macro or social phenomena. Macroeconomics construed as systems theory pertains to some concept of society as a whole, in contrast to theorizing about the individual entities that constitute that society. Indeed, macroeconomics construed as systems theory has much in common with what Schumpeter (1954) described as economic sociology.

Any scheme of thought will start with intuitive hunches that are organized through the analytical tools and techniques that an author possesses. So far as I am aware, the first disjunction between micro-economics and macro-economics was articulated by the Swedish economist Erik Lindahl (1919) in an essay that was translated into English in Lindahl's (1939) collection titled *Studies in the Theory of Capital and Income*. For Lindahl, micro-economics referred to individual action while macro-economics referred to interaction among individuals within society. Micro thus pertains to the parts of an economic system while macro pertains to the entirety of the system. Lindahl wrote at the time when the development of national income accounting was just getting underway. It is easy to understand how in this setting macro variables came to be treated as aggregations over the activities of the economizing entities within a society.

But aggregation over individual entities is not the only way a macro theory can be developed. It might not even be the best way. An alternative approach to macro theory is through systems theory, where the micro-macro relationship is exemplified beautifully by Thomas Schelling (1978). Starting with Ludwig Bertalanffy (1968), the idea of systems theory as pertaining to the systematic study of parts-to-whole relationships started to develop, and with Donella Meadows (2008) providing a recent statement of the challenges of thinking in terms of systems of interacting agents. Any system can be described as containing components along with connections among those components. The performance of the system depends on both the properties of the components and the pattern of connection among the components. There are two distinct formats through which someone can theorize about systems of interacting components. One format arises when those components are treated as mechanical or robotic. The other

format pertains to systems where the components that constitute the system are creative or volitional. This difference between the types of system makes all the difference in the world for theorizing about economies in their entirety. Contemporary economic theory treats economies as mechanical, as illustrated by repeated references to “economic mechanisms” and similar notions. In contrast, this book is grounded on the presumption that economic systems contain creative and volitional agents.

The network architecture of systems

All systems, whether populated by mechanical or creative entities, have an architecture based on some pattern of connection among the entities that constitute the system. Within a graph-theoretic framework, the entities are commonly denoted as nodes and the connections denoted as edges. Figure 1.1 contrasts two forms of network architecture that will be used often in this book. Both networks contain 15 nodes. Those networks differ in their patterns of connection among the participants, and with a central presumption of network theory being that patterns of connection have significant analytical work to do.

Panel A illustrates a monocentric or hierarchical network. Panel A resembles the tables of organization that sometimes appear in textbooks on management and organization. Monocentric networks are governed by relationships of superior-to-subordinate; someone who occupies a higher node in that network holds superior rank to those who occupy lower nodes. Any such sketch is an abstraction from a reality that is more complex than the sketch depicts. The sketch Panel A displays invites the image of higher nodes issuing orders to lower nodes, and with those lower nodes responding

to those orders and subsequently being evaluated by those higher nodes. The relationship superior-subordinate flows in two directions, as all relationships do, with orders flowing downward and actions flowing upward. As usual with such abstractions, both truth and fiction inhabit Panel A. This book is not about organization theory, so no effort will be made to develop more complex depictions of the actual operation of organizations that have nominally hierarchical character, as any organization must.

Panel B sets forth a polycentric network to provide contrast with the monocentric network. One thing that is immediately apparent from Panel B is the absence of any obvious concept of higher and lower or superior and inferior. All nodes are created equal, as it were, or at least as they seem superficially to be. In both panels, all nodes are constructed to be the same size to avoid cluttering the graphics as well as to avoid dealing with possible analytical implications of relative size and significance of nodes. With respect to the pattern of connection among the nodes in Panel B, two points are worth mentioning. First, the graph is completely connected, which means that starting from any node you can travel to every other node without leaving the graph. There are no orphans as it were, or no Robinson Crusoes to recur to a common idiom of economic theory. Second, the density of connection varies among the nodes. Two of the 15 nodes are connected to only one node. Most of the nodes are connected to two other nodes. One node is connected to three other nodes, and with one node being connected to five other nodes.

A significant economic-theoretic question regarding the application of concepts from graph theory to economics concerns the scalability of graphs. If the network depicted by Panel A were to expand from 15 to 30 nodes, would a similar pattern of

connectivity remain as the graph expanded or would there be a tendency for some nodes to become increasingly popular relative to the other nodes? In the former case, a network is described as being scalable. With scalable networks, an expansion in the size of the network does not change network architecture to any significant extent. Sure, there will be differences among nodes in the number of their connections, but the distribution of connections among nodes will not change significantly with expansions in the size of the network. Connections, in other words, are formed randomly as new nodes enter the graph.

The alternative to a scalable network is a scale-free network. The distribution of connections is not generated randomly as new nodes enter the graph. To the contrary, new nodes might have some preference for attaching to densely connected nodes. To the extent this is so, an expansion in the size of the graph, which is to say an expansion in the size of the market, will confer some advantage on densely connected nodes. This possibility might resemble a rich get richer setting, but we should also remember that graph theory is an abstraction that might not capture everything of relevance. For instance, an expansion in the number of connections via preferential attachment increases the managerial problems that the participants who operate inside that node must resolve. There are well-known limits on the ability of organizations to manage their affairs, some of which is subsumed under the concept of diseconomies of scale. If this situation obtains, there will be limits to preferential attachment that is obscured by simply assuming that new attachments follow some non-random process in mechanistic fashion.

A related consideration excluded from Figure 1.1 but which will be explored in later chapters concerns the properties of interaction between market-based entities that form under the principles and institutions of private ordering and political-based entities that form under the principles and institutions of public ordering. It is conventional to treat the two types of entity as indistinguishable, as distinct from their being merely similar. In the latter case, a system of political economy that contains both market-based and political-based entities will exhibit different properties along the lines that Wagner (2016) sets forth in describing democratically-established political enterprises as *peculiar* forms of business enterprise. They are enterprises, to be sure, in that they provide services that are both valued by some people and paid for by other people, only the valuers and the payers do not form identical sets. Looking ahead, later chapters will explain that standard questions regarding whether the recession of 2008 is a product of excessive or insufficient regulation is a category mistake that arises from inadequacies in our theory of macroeconomics and political economy. Those later chapters will explain that the so-called Great Recession is a systemic feature of the deeply entangled system of political economy that has emerged over the past century or so.

Prevailing treatments of the Great Recession entail a failure to articulate adequately the character of the economic system that generates the outcomes to which the theorists refer. Standard economic theory presumes that market action and collective action are wholly complementary, which is where aggregation takes you. Should people privately reduce their spending, the state representing people in their collective capacity can increase spending, thereby maintaining things as they were. The conceptual alternative that informs this book is that state and market are not wholly

complementary and, moreover, that changes in the mix of state and market activity entail underlying changes in the character of systems of political economy. In short, so-called crises are intelligible outcomes of systems of political economy. With respect to the Great Recession, credit markets are not privately ordered so the crisis cannot reasonably be described as illustrating market failure. For a privately ordered credit market, all credit transactions would reflect voluntary transactions between borrowers and lenders. This institutional presumption lies behind standard depictions of a loanable funds market where equilibrium is represented by equality between aggregate saving and aggregate investment. But this presumption does not characterize contemporary credit markets where to some considerable extent credit transactions are governed by requirements of public ordering. For instance, lenders are required to demonstrate that their portfolios of loans are politically balanced, which requires those portfolios to contain minimum shares for categories of borrower classified by race, gender, and geography. The result of such restrictions is to change the portfolio of loans lenders make. If under wholly private ordering, lenders would seek to construct portfolios that maximize their net worth, public ordering creates a form of tied sale where lenders must make some loans with negative expected value as a price of making other loans with positive expected value. It should hardly be surprising that this institutional arrangement can generate instances of so-called crisis as one of its performance characteristics. Nor should it be surprising that tacit presumptions emerge to the effect that some lenders are too large to be allowed to fail, for these lenders hold portfolios with an especially large volume of politically-directed loans.

DSGE: construing economies as mechanistic systems

Léon Walras (1874) set in motion the economic-theoretic tradition of treating economies as mechanistic systems. Walras conceptualized an economy as an equilibrated set of economic relationships. To be sure, Walras took his construction as being more of an analytical extremum or stalking horse than as a depiction of the ways of the world. All the same, Walras's formulation inspired a parade of refinements over the following century that resulted in formal proofs of necessary conditions that if they held an economy would be in a state of equilibrium. To be sure, no theorist has claimed that those necessary conditions pertain to economic reality. Most theorists have proceeded differently by arguing that a failure for those conditions to hold would potentially though not necessarily offer scope for political action to improve the performance of an economic system.

The Walrasian scheme of thought has morphed into what is now known as dynamic stochastic general equilibrium (DSGE). Similar to Walras, the economic system is still construed as a set of equilibrated relationships among economizing entities. Only now, those relationships are subject to exogenous shocks that disturb previous relationships which in turn call for readjustments. Thus, an economy is subject to the turbulence of continual change, only that change is exogenous, meaning it comes from outside the system, as against being a working property of an economic system. Absent exogenous shocks, the system is static both at the system level and with respect to the nodes that constitute that system. While economic theory speaks of individuals as making choices, the theory does not genuinely incorporate choice into its analytics. People act as they are programmed to act by the utility functions they are

presumed to possess and by the market-clearing prices they face. Within this analytical scheme, people are reduced to robotic status, as Ross Emmett (2006) sets forth in contrasting Frank Knight's approach to individual action with that of George Stigler and Gary Becker (1977).

Mechanistic systems can be relatively simple or exceedingly complex, but in either case it is interaction among the parts of the system that govern the system's performance. A building's heating system is relatively simple; the system of coding that sends missiles into space is so complex that no person can understand the entire code. All such systems entail expectations of what would constitute desired performance. Should actual performance fall short of expectations, the problem of mechanism design and repair arises, which speaks to diagnosing and repairing the source of poor performance. Economists mostly operate within the parameters appropriate for mechanical systems. Their DSGE theories, moreover, reduce what might have been a complex, creative system to simple mechanism. If an economy exists in a state of equilibrium, an economy that contains millions or even billions of agents can be analytically reduced to a single, representative agent. All agents are connected and governed by an equilibrium set of prices which means that, exogenous shocks aside, there is no scope for interaction among agents to do any useful analytical work.

This situation illustrates the Janus-headed character of our theoretical constructions. As a positive matter, theoretical constructions allow us to dig more deeply into our materials of interest to uncover phenomena that might have been hidden from view at more superficial levels of examination. But there is also a negative side to any theoretical construction, which is the hardening of analytical focus that it fosters. This

pertains to what is often called the problem of tractability. Some theories might allow easier or sharper answers to questions than other theories. While this situation offers good reason for pursuing such theories, that pursuit often impedes the development of alternative theories. One theory may well enable sharper answers to one set of questions than another theory, which supports opting for sharper answers. But a different theory might pose a menu of different questions that would never have been posed within the other theory, and that alternative menu might be able to address significant questions if only that theory was pursued. Theorizing about economic systems in their entirety can over some conceptual domains be helped by the closed form of equilibrium theorizing while over other conceptual domains an open-ended approach to theorizing about economic systems might yield useful insight. The proof of the digestibility of any theoretical offering lies always in the theorizing.

OEE: construing economies as creative and volitional systems

We can agree that a macro theory pertains to the whole of the economic activities within a society, in contrast to micro theories which pertain to parts of that whole. But how might we conceptualize that object when we can't even see it? This calls for what Joseph Schumpeter (1954) called a "pre-analytical cognitive vision" that a theorist subsequently sets forth. At this point we come to one of those forks in the theoretical road. The most commonly traveled branch of that fork stipulates the existence of a set of equilibrated relationships among the members of a society. Such theorists don't take this stipulation as a literal truth about society, but rather use it as an analytical point of departure for trying to render sensible their observations about

aggregate economic variables. This analytical vision began with Léon Walras's (1874) model of systemic equilibrium, and over the following century and a half has morphed into the DSGE model to transform Walras's initial vision into one that is both dynamic and stochastic. While the formality of the analysis has been elevated, the central conceptual presumption remains unchanged: the entirety of an economic system is modeled under the presumption that all parts of that system fit together to form a coherent pattern.

In contrast to the DSGE framework, this book seeks to incorporate some social-theoretic ideas about open-endedness, emergence, evolution, and complexity into a macro theory, an early effort at which was Wagner (2012) and a recent effort of which is Devereaux and Wagner (2019) in contrasting DSGE with OEE macro frameworks, and with OEE referring to open-ended and evolutionary. Some of these alternative ideas pertain to new ways of conceptualizing the social organization of economic activity. Others of them pertain to new ways of conceptualizing the operation of political processes. Taken together, both sets of ideas transform the distinct realms of discourse represented by micro and macro theory into a singular orientation for economic theory where micro and macro refer to different theoretical levels of analysis that nonetheless refer to the same analytical object—a society of economizing persons.

Within this OEE vision, the macro whole emerges and changes through interaction among the entities that constitute the whole. The order of theoretical development runs from individual actions and interactions to the emergence of macro patterns. By contrast, the DSGE vision starts by postulating a macro pattern and then moves to stipulation of what individual actions would support that macro pattern. For a

macro economy to be in a state of equilibrium, it must be the case that no unexploited gains from trade exist among micro entities. This micro condition requires in turn deep-level congruity in desired actions among the members of a society. If the system is presumed to be in equilibrium, the individual members of that system must likewise be in personal equilibrium given the options they face.

We must remember that economic theory constitutes a coherent organon, or at least its practitioners aspire to that status. To be sure, that status has never been fully attained within the history of economic theory, for competing and contrasting visions have always been in play. But central tendencies have always existed within economic theory. In this respect, it has long been conventional for economists to posit the analytical construction of a utility maximizing individual. No one has ever seen such a creature. The point of the construction, however, is not to capture some existential quality of humanity but is simply to create an intellectual framework that allows a theorist to organize the observations that a chosen theoretical framework says are relevant for theoretical explanation. It is not that people have utility functions that they maximize. It is only that use of that model enables the theorist to bring order to the theory-constructed observations that he or she thinks are significant. This familiar model requires that people can list the options they face, rank them against their scale of values, and estimate the objective likelihood of each option. For a given list of options and prices, individual choice is thus stochastically determinate. For individual choice to be determinate, the entire system must be in a state of equilibrium, for otherwise individuals will be unable to maximize their assigned utility functions. Hence, the theoretical construction of a utility maximizing individual maps onto the analytical

construction of a society as being in stochastic general equilibrium. Neither of these constructions has ever been directly observed, but they have enabled theorists to weave numerous theoretical tales.

Order without equilibrium: what object for a macro-level theory?

A society as distinct from individual members of that society is the object at which a macro theory aims. Equilibrium theories posit that societies exist in states of equilibrium that are disturbed by exogenous shocks. These theories thus posit two primary properties of societies as analytical objects: (1) societies have orderliness or regularity and (2) societies entail turbulence of varying intensity. These two features comprise the primary stylized facts for a macro theory. To be sure, orderliness is an intelligible concept without invoking equilibrium. Indeed, orderliness without equilibrium is the central point of departure of the OEE approach to macro theory. The social world is intelligible to the inhabitants of a society, which means that they can navigate their way inside society. But the social world is also turbulent, which means that people often will find themselves having to adapt to unexpected situations they confront, as well as sometimes inserting actions into society that compel adaptations by other people.

To assume that a social system is orderly does not *ipso facto* require that it must be assumed to reside in a state of equilibrium where there exist no changes that are in the process of happening. This is so because the presumption of equilibrium pertains to a state of existence that stands outside time and so in no way refers to any process that operates through time (O'Driscoll and Rizzo 1985; Wagner 2010). Equilibrium theories are told in the passive voice where things just happen, but no one makes them happen

as a reflection of their pursuit of plans because there is no room for pursuing plans within an equilibrium theory, for pursuing plans requires action through time and yet equilibrium theory is constructed as if time has ended. To recur to an image Wagner (2007) sets forth, equilibrium theories treat societies as parades whose organizational qualities are established by a parade marshal. In contrast, non-equilibrium theories treat societies as crowds of pedestrians leaving a stadium after an event. Both parades and crowds are orderly in that a participant in either understands how to act successfully within those different social configurations. To be sure, turbulence is present within a crowd but not a parade, but societies have turbulence as one of their characteristics, which surely suggests that the image of a crowd is superior to that of a parade as the object whose characteristics are to be explained.

Equilibrium theories seek to explain the changes in a set of snapshots taken at distinct intervals by relating those changes to changes in some set of data taken as given, typically changes in technologies, prices, and incomes. In contrast, non-equilibrium theorizing seeks to explain processes of development that occur inside some interval of time, as these processes are set in motion by people forming and pursuing plans. Where spending is primitive data within an equilibrium theory, because plans vanish from sight, it is plans that comprise the primitive data that inform non-equilibrium theories, and with those theories being told in the active voice. For instance, technology doesn't just change, for it changes in consequence of people forming and pursuing plans. The social world that we all inhabit and experience doesn't just happen or isn't just there as data. To the contrary, it is an emergent product of people forming and pursuing their various plans of action. Prices, for that matter, are not data, that

likewise are products of interaction among plans and the requirements for resource inputs those plans entail.

Macroeconomics, the theory of the entirety of economic activity within a society, has construed its observations as aggregations over the economic activities of the individuals who constitute the society. Such a macro theory thus takes the variables of the NIPA accounts as comprising the relevant variables for macro theory. This leads to the conceptualization that macroeconomics is the study of the relationships among such broad economic aggregates as output, investment, consumption, and an index of prices. Within the DSGE framework, the NIPA accounts supply the aggregate magnitudes that are relevant for macro theorizing, meaning that these magnitudes capture the reality that is the object of macro theory. Macro theorists subsequently face the challenge of formulating models that explain observed patterns of relationships among those aggregate variables. Without NIPA and similarly constructed aggregate variables, there would be no macro variables for theorists to explain.

Yet societies would continue to exist, just as they did before the advent of national income accounting. And those societies would still be characterized as containing orderliness amid turbulence. In contrast to the DSGE vision, the OEE vision treats macroeconomics as the “study of the constitution or the generation of societal patterns of economic activity.” To some extent the NIPA accounts obviously pertain to societal patterns, but more is involved in the description and analysis of those patterns than the NIPA accounts allow. This alternative focus on societal patterns rather than aggregation recurs to Erik Lindahl’s (1919) distinction between micro-economics as pertaining to individual choice and macro-economics as pertaining to interactions

among individuals. Interaction will typically generate phenomena that are *not* products of individual action. Someone who observes several independent Robinson Crusoes on their different islands will not observe quarrels, trade, prices, or organizations. These things are activities that emerge only through *interaction* among people. This simple recognition, moreover, reminds us that any examination of societal patterns and properties will place in its analytical foreground the organizations and institutional arrangements that emerge through interaction, and with the resource allocations about which the NIPA accounts speak being relegated to the analytical background. The theoretical move from micro to macro is a move from the parts of something to the entirety of that thing, and so is an upward movement in the scale of complexity in the phenomena being examined. In contrast, contemporary macro theories entail similar phenomenal simplicity to micro theories. It is as if a macro theory were just a micro theory spoken of more loudly: where individual markets clear or don't, the same can be said of the market considered as an aggregate of markets.

Standard macro theorizing treats spending as the prime primitive variable, as reflected in the intimate connection between macro theory and the NIPA accounts. In contrast, the alternative conceptual framework this book sets forth treats entrepreneurial plans and not spending as providing the primitive variables for a macro-level theory. Spending, which can be observed, is derived from plans, which are unobservable save for how they manifest in spending. To make plans the primitive variable entails shifting the analytical focus away from resource allocation onto the institutional arrangements within which people within a society relate to one another. As will be examined in a later chapter, a key feature of those institutional arrangements concerns the relationship

between private ordering and public ordering of societal interaction. Changes in this private-public mix have significant macroeconomic implications.

An emergent reformulation of macro theory would represent a radically micro-centric approach to macro, in that it would abandon the centralized mindset (Resnick 1994) and recognize instead that orderliness within societies emerges through interaction among people as against being imposed by some ruler. The fundamental order of movement within a society, in other words, would be from the bottom to the top and not from the top to the bottom. One outcome of this emergent formulation would seem to be unification of micro and macro, as intermediated by meso-level considerations (Potts and Morrison 2007), in contrast to the present micro-macro disjunction. An emergent or ecological reformulation of micro-level theory would maintain the principle of rational individual conduct, only it would work with creative and not robotic individuals, thereby rendering individual action indeterminate to some extent. This is not to render individual action chaotic, for it is certainly not that. Rather it is to say that individual action entails margins of creativity and is not wholly static. This situation means in turn that creative action continually injects change into society, and with that change not being reasonably described as exogenous shocks but rather as outcomes of some social economic process. Rather than treating spending as captured by the NIPA accounts as the primitive data with which macro theories deal, the ecological formulation advanced in this book treats individual plans and their execution as causing spending, both its volume and its timing.

Figure 1.2 illustrates a tri-planar architecture where a meso level of corporate organizations intermediates between the micro and macro levels. The micro level

contains individuals and proprietary enterprises, all entities that can be construed reasonably well as acting entities. These micro entities in turn establish through interaction with one another a variety of corporate relationships on the meso level. These meso entities mostly must attract participation, save in part for the political entities denoted there. The point of formalizing a micro-meso relation is to create analytical space for the object we denote as society to be treated as a real and not a nominal entity. There is more to organized economic life than individuals and the systemic outcomes individuals generate through their interactions. Of analytical significance is surely the amalgamation of individuals into a variety of commercial, civic, and governmental organizations where they spend a major part of their waking lives. It is inside such organizations that opinions are formed and beliefs about reality formed, recognizing that so-called reality cannot be directly observed. The final part of Figure 1.2 illustrates the emergence of macro-level variables through a combination of statistics, beliefs, and ideologies.

Figure 1.2 about here

Those macro-level variables are not inert. To the contrary, they inject causal force into society, only the path by which such causal force enters society is complex and not simple. While it is reasonable to speak of the micro foundations of macro theory, it is also reasonable to speak of the macro foundations of micro theory, of which Georg Simmel's (1900) *Philosophy of Money* illustrates wonderfully and cogently. Simmel opened his book by asserting that not a word in that book is about economics. To be sure, Simmel's assertion raises a question about the object of economics, which shall be examined momentarily. Simmel's book was directed at the changing

beliefs within society as to the appropriateness of different social boundaries between buying services for money and supplying those services in kind. For instance, one could support an elderly parent in one's home or pay a nursing home to provide that care. Simmel's interest was in exploring the ever-changing boundaries regarding what kinds of activities conventional public opinion supports being organized through market transactions. From Simmel's formulation and from Figure 1.2, it is a relatively short step to see that macro theory of the OEE type merges readily into the territory Schumpeter (1954) characterized as economic sociology, though much in this respect also depends on how the subject matter of economic theory is defined.

In this respect, another of those forks in the analytical road concerns whether economic theory pertains to that subset of human activity concerned with the material conditions of life or whether it pertains to all conscious economizing action where people are construed as seeking to attain states of existence that they value more highly than what they presently experience. Those states almost invariably have material qualities, but they are not limited to material qualities. For instance, a person might choose to establish a business despite the prospects of failure not because that person estimated that doing this would increase his or her net worth but because that person didn't want to work under the direct supervision of someone else. A system of economic organization based on private ordering allows space for people to pursue their dreams and aspirations, no matter how idiosyncratic, provided only that they finance those dreams at their expense.

Equilibrium as personal mental map: observers vs. participants

The central claim of systems theory is that the performance properties of any system depend on both the elements that carry action and the pattern of connection among those elements. For human population systems, moreover, those performance properties also depend on the creative and moral imaginations of the participants in the system. Systems can thus change either as elements develop new repertoires of action or as new patterns of connection arise, in addition to exercises of creative or moral imagination. From the perspective of developing a macro-level theory where change emerges from within the system as against being treated as an exogenous shock, it is necessary to conceptualize that system in some non-equilibrium fashion. To do this requires, in turn, a conceptualization of the acting agents as creative and not robotic. The analytical challenge is to avoid the reduction of a set of agents to some equilibrated mass.

To accomplish this, it is necessary to distinguish between two distinct orientations: that of an observer and that of a participant. An observer stands apart from an action and theorizes about it. A participant carries the action and imagines how it might play out. Equilibrium theories advance explanations from the perspective of observers of actions. Non-equilibrium theories seek to make reality intelligible from the perspective of people creating and pursuing plans. This dichotomy maps into two distinct images of probability in relation to action. It is also worth noting that in their summary presentation of the work of the Bloomington school of institutional analysis, Aligica and Boettke (2009) include interviews with both Elinor and Vincent Ostrom. In her interview, Elinor Ostrom separates their work from that of most social theorists by

explaining that where most theorists seek to separate themselves from their objects of interest, the Ostroms sought to penetrate their objects of interest.

The expected utility framework that accompanies the DSGE model adopts the perspective of the observer. Someone observes a set of people who walk between their homes and their jobs. The observer embraces the challenge of giving a parsimonious explanation of what he or she observes. After a century of working with models of constrained optimization, it is easy to understand and appreciate the compelling power of expected utility theory. Indeed, it is hard to see whatever alternative form of *ex post* explanation could satisfy an economist who sought to explain the residues of past action that have been reduced to data. The *expected* part of expected utility theory appears to speak to beliefs about future possibilities (Shackle 1961, 1972), and yet data necessarily refer to past actions and not to future actions. Since past action is completed, as the data pertain to earlier trips between home and work, the mode of explanation must be deterministic. Adopting the posture of an observer forces the theorist to embrace a deterministic analytical framework.

The explanatory situation is different for a theory that seeks to render the world intelligible from the perspective of the people whose actions subsequently will generate the data that later are recorded. From the *ex post* perspective of an observer, expected utility theory is a parsimonious framework for ordering observations. But that *ex post* ordering is irrelevant to the choices of actions that participants make going forward into the future. Participants unavoidably face the *ex ante* situation of choosing a plan of action in advance of realizing the consequences of that action. An observer faces an *ex post* challenge, but for a participant the challenge has *ex ante* character. The

conjunction of equilibrium theory and rationality in expectation has eliminated the distinction between *ex ante* and *ex post* orientations toward economic phenomena. This elimination entails an egregious category mistake whereby the category of past action is merged with the category of future action, effectively destroying any uncertainty associated with the consequences of acting today to achieve future outcomes. This elimination, however, is an artifact of pursuing economic theory exclusively within the passive voice motif wherein equilibrium theory creates the illusion that tomorrow is just like today, save for an error term with zero mean. That error term, moreover, pertains to an entire ecology of actions, and not to individual actions. But it is individual actions where *ex ante* is alive that is the locus of action that leads to the emergence of subsequent macro-level experience.

It is with respect to *ex ante* considerations where theories of personal probability come into play, as illustrated by Savage (1954) and Shackle (1961, 1974). An actor forms a plan at T_1 based on some anticipation of an outcome or imagined range of outcomes at T_2 . Both the formation of a plan and the projection of possible outcomes entail acts of imagination for which recourse to data might have some informative value but without having determinative value. When faced with this setting, people may well differ in the intensity of the animal spirits that reside within them. Some people will allow other people to hire their services in exchange for an advance payment on the value yielded by their efforts, whereas others are willing to do the hiring and to live on any residual between the contracted payments they must make, and the income sale of the product generates (Knight 1921).

Individual action in forming and executing plans can be placed within the framework of personal probability theory. An actor decides upon a plan of action and sets it in motion. From the actor's perspective, that action is *ipso facto* reasonable or rational, because the alternative would entail claiming that people seek deliberately to fail at what they set about doing. There are many reasons why individual plans might not work out as their initiators hoped they would, but no one would propose to explain the failures of plans as an intentional act. Plans are based on beliefs about future outcomes, as well as about the actions of other people, most of them probably unknown to the actor, that either interfere with or support the actor's plan. A world in which many enterprises fail is an ordinary outcome of economizing action.

Personal probability, however, does not conform to the axioms of the frequency approach to probability that pertains to such settings as playing roulette or craps. For frequentist probability, there is a listable space of possible outcomes and associated probabilities of occurrence. Expected values are readily computable and the probability of the sum of possible outcomes is one. For personal probability, however, the sum of possible outcomes is not limited to one. An aggregation of personal probability could reveal expected outcomes to be impossibly large or small, depending on the state of animal spirits. Indeed, it is not clear what accuracy in expectation even means in this situation.

Behavioral economists typically claim that people suffer from several biases that undermine Pareto efficiency, as if anyone could observe Pareto efficiency as against inferring it from a particular model. One of those biases is a form of optimism where people overestimate their chance of success at some endeavor. A set of graduates

asked to declare whether they will have above- or below-average success at what they pursue will overwhelmingly assert above-average prospects. Does this pattern of belief reflect some state of imperfection, as many behavioral economists claim? Alternatively, it could reflect a working property of a social system where people are free to choose their aspirations and associated activities, as distinct from having them imposed on them by some agency. Among other things, such considerations suggest that an output gap has limited merit as a means of describing systemic outcomes, because the composition of any such gap also matters. In one setting people may be fully employed doing jobs they dislike and have even been drafted to perform. In another setting they may be pursuing with variable success activities they have chosen, and which give them great joy. The standard macro concept of an output gap has but incomplete value as an indicator regarding the performance of an economic system. The ability of that system to accommodate people in pursuing their dreams and plans is surely also a relevant systemic indicator that touches upon the analytical domain of economic theory.

Regarding the micro-macro dialectics of economic theory

All societies exhibit regularities, as do the individuals who comprise those societies. Those regularities comprise what can be described as stylized facts, and which can serve as objects of explanation for macro theories. In this respect, most macro theorists emphasize a narrow range of stylized facts regarding relationships among such aggregate variables as real and nominal wages, interest rates, and the like. Left aside from standard recitations of stylized facts are surely two facts of

overwhelming significance that should surely reside at the core of any macro-level theory.

One such fact is the observation that all societies seem to work in the sense of people feeding and housing themselves, reproducing themselves, and so on. Sure, the conditions under which people do this vary hugely across time and place. All the same, it is surely a significant stylized fact that all societies exhibit generally coordinated character without the presence of coordinating agent or officer. It was in recognition of this coordinated character without the presence of some coordinating agent that inspired the initial examination of social level coordination by the Spanish Jesuits associated with the University of Salamanca (Grice-Hutchinson 1978), and where the classical economists extended that recognition of self-organization. The other fact is that societies invariably entail turbulence, both within their borders and among societies. There is almost no such thing as a flat-line equilibrium detectable in history. It's even doubtful whether flat-line features can be truly detected in highly traditional societies. And they certainly are not detectable in modern societies. Turbulence along with coordination are stylized facts that pertain to all modern societies, and the challenge to economic theory is to explain both as ordinary working properties of systems of interaction among economizing agents.

Western thought since the ancient Greeks has embraced logical claims on behalf of the law of the excluded middle. This law is one of many instances of statements that seem to be intuitively obviously and yet are wrong, or at least are often wrong. Perhaps the best-known instance of an intuitively obvious statement that is wrong is the assertion, repeated for millennia, that the sun rises in the east and sets in the west. The

wrong-headedness of this intuitively obvious claim did not become apparent until after Earth was removed from the center of the solar system in the 16th century by Nicolas Copernicus. The language that speaks of the sun rotating around Earth remains in common use five centuries later.

The law of the excluded middle claims that a statement cannot be both true and false. This is a matter of logic that often is a sensible claim to make, but not always. The contrary principle of yin-and-yang pertains to a class of observations where what we observe reflects some tension between opposites. Riding a bicycle upright provides a common, everyday example. It is impossible truly to ride perpendicular to the pavement. The bike wobbles to the left and the right as the rider propels it down the road. A rider maintains a dialectical tension between leaning left and leaning right, with the result being a bike that is maintained in a generally upright position.

The law of the excluded middle implies that a society will be either fully or incompletely coordinated. Full coordination was the default presumption of the classical economists. Keynes sought to replace that presumption with one of incomplete coordination, with full coordination being a special or limiting case of a more general situation. This style of thought follows from embrace of the law of the excluded middle, for an economy cannot be both coordinated and uncoordinated. This logical statement, however, pertains only to models grounded on states of rest or equilibrium. It does not pertain to models grounded on processes of motion or development, where the process is driven forward through continual wrestling with a dialectical tension. Sailing a boat illustrates this dialectical tension. One can sail into a headwind, only one must do so by maneuvering the sail to reconcile the tension between opposing forces. Likewise, the

generation of coordination within social systems of economic interaction entails resolution between forces of maintenance and forces of creativity. There will be owners of existing plans who seek to propel their plans forward through time. There will also be creators of new plans who seek to give life to their plans, and with those plans upsetting in various ways previously existing plans. What results is an on-going process of some plans being created while others are abandoned, and with there being no reason other than analytical convenience to assume that magnitudes of the two types of plan-based disturbance add to zero.

Where the law of the excluded middle commends a distinction between micro and macro levels of analysis, under the presumption that societies must be either perfectly or imperfectly coordinated, the dialectical principle of yin-and-yang commends recognition that societies are in neither state but rather are continually in motion. In the alternative scheme this book explores, micro and macro variables are interdependent. The macro entirety can change only in consequence of micro-level changes; likewise, micro-level changes typically will influence macro-level variables. Either way, macro and micro levels of an economic system are incorporated into a single explanatory framework, as the orthodox interest in micro-foundations commends, but without that interest being neutered by the presumption that economic observations pertain to states of equilibrium. The presumption of systemic equilibrium renders all individual actions mutually consistent, which in turn enables reduction of an ecology of individual actions to action by a representative agent. To avoid that reduction and to provide space for the ecological orientation to do its work, it is necessary to avoid reducing economies to

states of equilibrium, as Wagner (2012) explains in characterizing a macro economy as an ecology of plans.

Figure 1.3 illustrates the unified treatment of micro and macro levels of analysis when a society is conceptualized as an ecology of interacting plans. The lower part of Figure 1.3 characterizes a society as a network of interacting enterprises. Some of those enterprises are denoted by circles; the remainder are denoted by triangles. These different denotations of the enterprises within a society will take on significance in later chapters because they distinguish between market-based and politically-based enterprises, which in turn has much analytical work to do in the alternative conceptualization of macro theory this book pursues. For now, though, that distinction can be suppressed. With the distinction between circles and triangles in Figure 1.3 suppressed, the lower part of Figure 1.3 illustrates networks of transactions among the entities that comprise an economic system. To be sure, this graphical portrait necessarily stands outside of time, which runs afoul of the presumption that enterprises are engaged in forming and executing plans through time. This portrait also suppresses recognition that there is continual birth and death within the ecology of enterprises, which injects turbulence into the ecology.

Figure 1.3 about here

While Figure 1.3 is incapable of illustrating action through time, it does help to portray the interdependent relationship between micro- and macro-levels of economic interaction. The upper level of Figure 1.3 is a projection from the level of action to the macro level of hypothesized societal consequences. For any pattern of micro interaction within the lower level, there will be some macro-level portrait that can be constructed.

Those macro-level portraits supervene on micro-level actions, meaning that macro-level portraits emerge through micro-level interaction. Any desire someone might have to change macro-level portraits can be brought about only through bringing about preceding changes in micro-level interactions. To say this, however, is not to assert some mono-causal relationship from micro to macro, for causation can also run from macro projections to micro actions. For instance, someone who thinks the combination of aging population and falling prices of gasoline will increase the demand for residential vehicles might make micro-level investments in such vehicles and in parks at which to dock them.

With macro-level properties supervening on micro-level interactions, analytical primacy shifts from a focus on resource allocations to a focus on the institutional relationships inside of which an ecology of plans forms and changes, for it is these institutional relationships that govern the macro-level properties. This is where the distinction between circles and triangles in Figure 1.3 will have significant analytical work to do later in the book. For now, though, just let it be noted that resources cannot possibly allocate themselves. Allocation is possible only through particular actions and patterns of interaction. Hence, a focus on resource allocation cannot address the generation of macro-level observations.

A macro economy as an ecology of plans

Wagner (2012) sets forth a framework for treating a macro economy as an ecology of plans wherein macro-level phenomena supervene on micro-level interaction, as Figure 1.3 illustrates. Within this scheme of thought, no action occurs on the macro

level, for the macro level denotes a congeries of statistics, projections, beliefs, and ideologies. The micro level is the only level at which action can occur. Among other things, this scheme of analysis means that there is no such thing as action on the entirety of a social system. Social systems change through individual actions and interactions, but it is meaningless to speak of acting on the society or economy in its entirety. Just as no one can truly apprehend the societal entirety other than in a purely formal manner (Hayek 1937), so is it impossible to speak meaningfully and substantively of acting to transform a social system as an entirety, as distinct from acting to change parts or precincts within the system. With respect to Figure 1.3, action can only occur on the ground or micro-level. How far and to what extent such action projects onto the macro level depends on how that action is received within the micro nexus, as well as on other actions that might arise within that nexus.

Transformation there can be, and such transformation is continually underway. But all transformation begins at individual nodes within the ecology of plans and spreads into the ecology, depending on various factors to be considered momentarily. In Figure 1.3, the circles denote private entities and the triangles denote political entities. Political action can transform a social system, but so can private action. Whatever the source of transformative energy, it is injected at the micro-level of enterprise action, and with any macro-level properties being an emergent property of interaction among entities.

To illustrate the point, suppose a political entity, a legislature, enacts a prohibition on some product that presently is widely used within the society. The enactment of legislation will enter the society by instructing policing agencies to detect people who

use the product and instructing legal officers to prosecute those the police detect. The extent to which this legislation brings about societal transformation, as well as what kind of transformation it brings about, depends both on the responses taken by the relevant political entities and on the responses taken by the affected private entities. A process of societal transformation will have been set in motion, but it is not a transformation that corresponds to the comparative static image of social planning as typically portrayed in expositions of the applied theory of public policy.

To prohibit something that many people like to do will generally not be accepted passively by those who produce or consume the proscribed items. Yes, the effort at proscription will create discernable transformation at the societal level. But, no, that transformation will not conform to any before-and-after or with-and-without description where the proscribed items simply vanish. A legislatively articulated prohibition of alcohol or recreational drugs will not by itself stop people from doing what they like doing. Prohibition will increase the cost of doing business, leading to some decrease in supply and reduction in consumption. But it will also induce multiple changes in commercial organization and operation as people seek out alternative channels for fulfilling their desires without being detected and jailed.

Most generically, this means that the ordinary commercial model of a seller having a publicly announced place of business and buyers choosing or not to frequent that place will no longer be commercially viable in the presence of police officers now rewarded by arresting people frequenting those places. New forms of doing business will be created as entrepreneurs seek new ways for meeting consumer demands. Along various channels, procedures and methods for securing pre-approval of customers will

be developed, driving commerce underground. Prohibition likewise can offer second sources of income for political officials and police officers. To be sure, some members within the relevant class of persons will be more susceptible to securing second sources of income than others, and we may further expect to find the creation of further patterns of connection that seek to ascertain just who those people might be. Furthermore, the openness that characterizes commercial transactions will be transformed into generalized suspiciousness because prohibition creates a need for sellers to distinguish between genuine customers and spies who are working for their arrest. Yes, political initiative can promote societal transformation, but the character of any resulting transformation will be a complex matter that depends on the pattern of responses within the ecology of plans that constitute a society.

It is surely informative to compare drug prohibition with traffic regulation in this respect. Drug prohibition encounters much resistance from people who see nothing wrong with such usage, and who view prohibitors as infringing on the peaceful conduct of their lives. Prohibition would force drug consumers to choose patterns of consumption they value less highly because dominant members of society want to force them to consume differently. Political action in this case is pretty much straightforwardly redistributive, in that mostly it seeks to impose costs on some for the benefit of others. It is surely different with traffic control. Many might agree that speed limits often are too low, and yet there is surely wide recognition that traffic rules are not significantly redistributive and, instead, are instruments of general benefit in enabling people to operate relatively safely on congested roadways.

Plans vs. spending within a macro ecology

The bottom part of Figure 1.3 distinguishes between private and political entities within the ecology of plans that comprise a society, but it portrays connections in homogeneous fashion. This portrayal corresponds to the common analytical framework of macro theory where the prime variable of analytical interest is spending. When it comes to spending, political spending is identical with private spending. Within this analytical presupposition, a decrease in private spending can be offset by an increase in political spending, thus keeping aggregate spending unchanged, at least as a textbook exercise.

The situation changes once spending is recognized as deriving from enterprise plans, and with the types of connections among enterprises reflecting the differing imperatives that animate enterprises organized within private ordering and those organized within public ordering. The theory of economic calculation (Roberts 1971; Boettke 2001) can be spun as a comparative analysis of two pure social forms: liberalism or private ordering and collectivism or public ordering. The principle of economic rationality requires people to choose higher yield over lower yield uses. This could be done in a natural state such as would characterize a Robinson Crusoe alone on his island. In a social economy, however, rationality is a complex relationship among people and their activities and is not a simple relationship between Crusoe and nature. The theory of markets explains how prices summarize a lot of significant information that is useful in forming judgments about possible lines of economic activity. Prices can never be sufficient statistics for rational action, except in a stationary state where history has ended, and life repeats itself endlessly. Otherwise, which is to say always, prices

are valuable economizers on the effort devoted to deliberation, but effective economizing action still requires judgment in acting.

For instance, the owner of a park will face a variety of economizing choices in putting together an enterprise. The owner's capital will have to be allocated among land, buildings, equipment, and personnel. Each of these categories, moreover, entails many options. Land can vary in area, terrain, and location. Choices will have to be made about the types of equipment to install and the apportionment of the land among different uses. At the stage of enterprise planning, these various elements will be collapsed into projections of revenue and expense. While there is no guarantee that such projections will be accurate, the position of the enterprise owner as a residual claimant gives that owner strong incentive to be accurate because he or she will bear the losses from inaccurate judgments. Information about prices facilitates the making of commercial judgments, though such information is never a substitute for such judgment, as George Shackle (1972) explains with particular lucidity in describing the indispensable place of imagination and judgment in economic action.

Alternatively, suppose the social order is collectivist and not liberal. There is no private property and no market for ownership in enterprises. There might be production for use but there is no production for exchange. The problem of putting resources to use in generating output that people value is still present, only market prices are of no help in forming judgments. Such instruments as surveys and polls are still available. Using these instruments is equivalent, more or less, to reading tea leaves. As with real tea leaves, much depends on the discernment of the reader and on the importance of different judgments the reader makes. Playgrounds will still be established and will be

equipped in some fashion. Any expansion or contraction in the sizes of playgrounds, or changes in their equipment, will not occur through changes in market-generated valuations of those enterprises. All societies work in this respect, though liberal societies more fully than collectivist societies.

Actual societies are neither liberal nor collective, but rather feature entangled strands of both features (Wagner 2007, 2016). The question under examination in this chapter and book is how knowledge might be assembled within those precincts organized through political activity and interactions. If political precincts are independent of market precincts, a form of additive political economy results where economic calculation operates in market precincts while calculation is absent in political precincts. Within a framework of entangled political economy, however, there is commingling among the precincts and not separation. This situation casts a different light on the problem of calculation and the use of knowledge within societies.

Friedrich Hayek (1937, 1945) posed the problem of economic coordination as one of explaining how an orderly pattern of economic activity can arise when no person or agency has access to anything but a tiny part of the knowledge that would be necessary actually to construct that pattern. In those papers, Hayek took an orderly pattern to mean systemic equilibrium as expressed by the Walrasian framework. Later, he came to recognize that orderly patterns did not require a presumption of systemic equilibrium. With respect to Bertalanffy's (1968) distinction between creative and robotic systems, general equilibrium theory treats economic systems as robotic. Originally, Hayek embraced this point of analytical departure in thinking of arriving at the the Walrasian end-state as his analytical objective. Later, he came to realize that his

conceptualization rotated around recognition that societies were evolving and creative, even kaleidic. Wagner (2010) illustrates the distinction by comparing a parade and a crowd of pedestrians leaving a stadium after a game. Both social configurations are orderly, in that participants understand their environment and can operate effectively within it. The parade is reasonably reducible to an entity with point mass as a center of gravity. The moving crowd of pedestrians heading for their various destinations cannot be so reduced. Yet the crowd presents orderly though continually changing patterns to members of the crowd as they head toward their planned destinations. It is the orderliness of the pedestrian crowd and not that of the parade that was the societal configuration that Hayek (1935) thought required explanation, even though he stated the problem he sensed in terms of Walrasian equilibrium.

If Hayek's underlying analytic motif were stated in equilibrium terms, it would be one of generated and not stipulated equilibrium, as this is illustrated in the papers collected in Epstein (2006). It's also central to Bruno Latour's (2005) claim that social theories are inadequate if they explain social phenomena by referring to other social phenomena because doing this leaves social phenomena unexplained. The relevant challenge for a social theory is to explain how social phenomena emerge out of interaction among non-social phenomena. Hayek's analytical call was to explain the emergence of orderly economic patterns of market prices out of preceding conditions that were disorderly or at least less-orderly. Within this analytical endeavor, prices are emergent phenomena and not phenomena that exist prior to market transactions. To explain coordination thus requires something beyond market prices. The emergence of observed patterns of economic activity cannot be explained by using prices exclusively

as data. To the contrary, such patterns emerge through economic interaction among market participants, and with market prices likewise being emergent products of that interaction. The quality of coordination is an empirical point of departure that elicits calls to explain how it emerges.

In contrast, the standard theoretical procedure today is to postulate the existence of equilibrium without trying to explain how equilibrium might emerge from some non-equilibrium point of departure. Indeed, when economists have looked into Hayek's formulation, as illustrated by Grossman and Stiglitz (1976, 1980), they have concluded that markets fail to generate sufficient knowledge to secure efficient coordination. This conclusion is reached by using a version of search theory. Within this framework, the efficiency character of market pricing depends on the amount of search people undertake in their capacities as output demanders and input suppliers. In this analytical schema, one person's search provides benefits for other people who are also able to gain from any resulting improvements in the state of coordination. Coordination is thus a public good, with market failure resulting because people free ride on the knowledge-creating efforts of other people.

This contemporary reinterpretation of the problem Hayek posed has pushed Hayek's problem out of sight, though it must be recognized that Hayek's original formulation could be read as embracing the Walrasian end-state as an analytical destination. For Grossman, Stiglitz, and other contributors to this literature, Hayek's problem is construed as claiming that market participants will engage in sufficient search activity to create and maintain a Pareto efficient state of market equilibrium. One person's effort to search for price information enables other people to free ride on those

search activities. As is customary with models of free riding, an inefficient supply of knowledge will be acquired, leading to a Pareto inefficient equilibrium. Hayek's hypothesis is thus disconfirmed within the purview of this body of literature.

But that hypothesis has not been truly refuted because it has not been truly addressed. The contemporary literature treats coordination as a *state* of existence. In contrast, Hayek treats coordination as a *process* that continues without end. To explain a process entails a different analytical challenge than to explain a state. A state pertains to some set of observations at some instant. One state might pertain to t_1 , another state might pertain to t_2 , and comparative statics seeks to reconcile both states with the different data that pertains to those states. A process pertains to interaction among participants over some interval of time. The object of explanation is the interval $|t_1 - t_2|$, with Hayek's claim being that the movement from t_1 to t_2 arises within processes where market participants experiment, explore, and otherwise acquire knowledge that they put to use, and with observed systemic properties emerging through societal interaction. Claims of Pareto efficiency are undefined in Hayek's emergent dynamic framework because Pareto efficiency pertains only to allegations of unexploited gains from trade at some instant. Within a continuing process of change, Pareto efficiency has no meaning.

It's observationally clear that market processes entail the creation and use of knowledge. Even if we conceptualize equilibrium at some instant, t_1 , we must employ some market process to generate some latter instant, t_2 . Leaving aside necessarily wholly speculative questions pertaining to Pareto efficiency, it's obvious that the movement from t_1 to t_2 entails the creation and use of knowledge. Rather than postulating data and positing that that data pertains to a state of equilibrium, Hayek

argues simply that the acquisition and use of what is commonly taken as data is actually an economic problem to be characterized and explained. The contemporary literature postulates some equilibrated societal situation and pronounces it as being inefficient within the terms of that postulation. That literature makes no effort to explain how that situation might have come about. Yet prices do not exist prior to transactions, regardless of how loudly economists offer pronouncements about *given* market prices. To the contrary, prices emerge through market transactions, and change through those transactions. If economic coordination is truly to be explained, that explanation cannot start from some stipulated set of equilibrium prices because the establishment of prices, and changes in those prices are parts of the on-going coordinative process.

It is, moreover, theoretically unsatisfactory to embrace a model of stipulated prices by claiming that most people take most prices as data most of the time. This observation is clearly an empirical regularity, but macro regularities of this type cannot serve as substitutes for theoretical explanation. Suppose, in Schelling-like fashion, a grid is populated with 100 agents. These agents comprise a society, which is instantiated as a set of movement rules that keep the agents within some proximity to one another. No agent allows more than five squares to intervene from the nearest neighbor. Also, at least two squares must remain from the nearest neighbor. Starting from some initial distribution of people over the relevant grid, suppose five of the agents move in some particular direction. The other agents will adapt to maintain the required spacing. The five innovating agents will then move again. At any instant, this society would seem to be in stasis, as the claim of stasis could not be rejected at the five percent level of significance. Yet by the construction of the model, the society is in

perpetual motion, and is led by the five outlying innovators along the lines of Malcolm Gladwell's (2008) analysis of outliers as prime carriers of successful change.

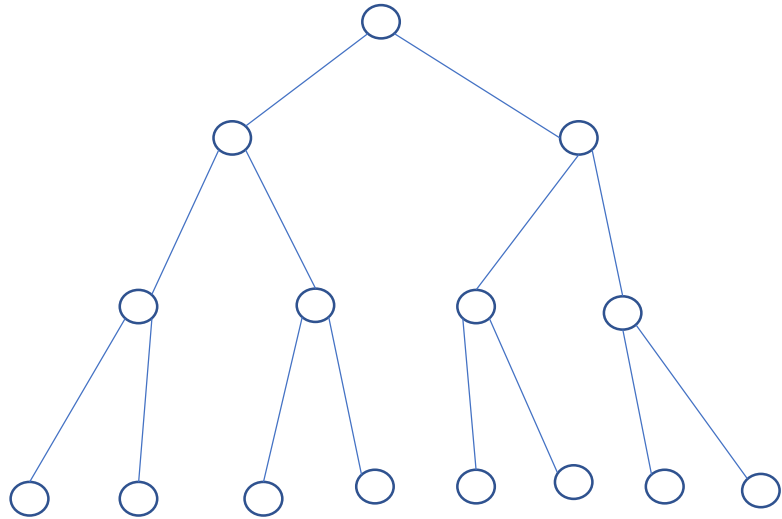
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A: monocentric network



A: polycentric network

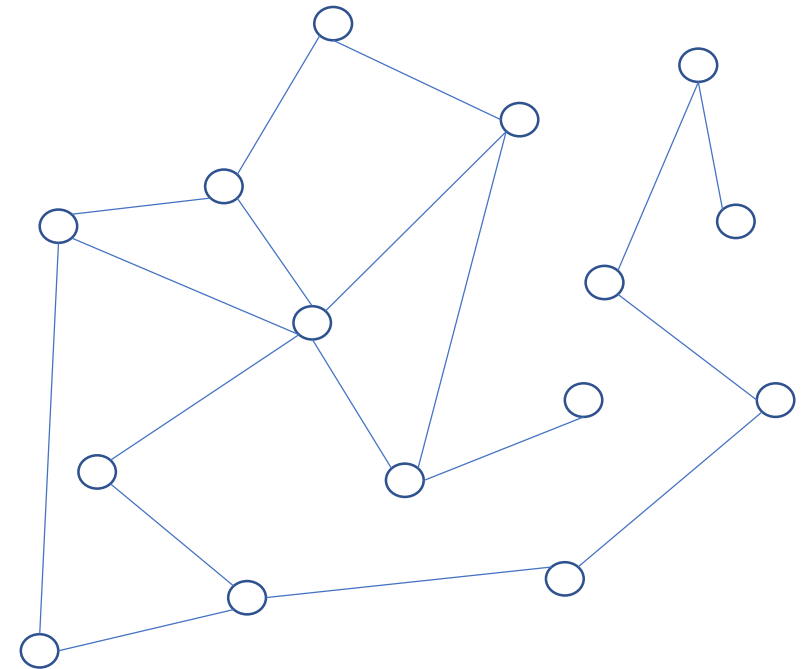


Figure 1.1: Contrasting Monocentric and Polycentric Networks

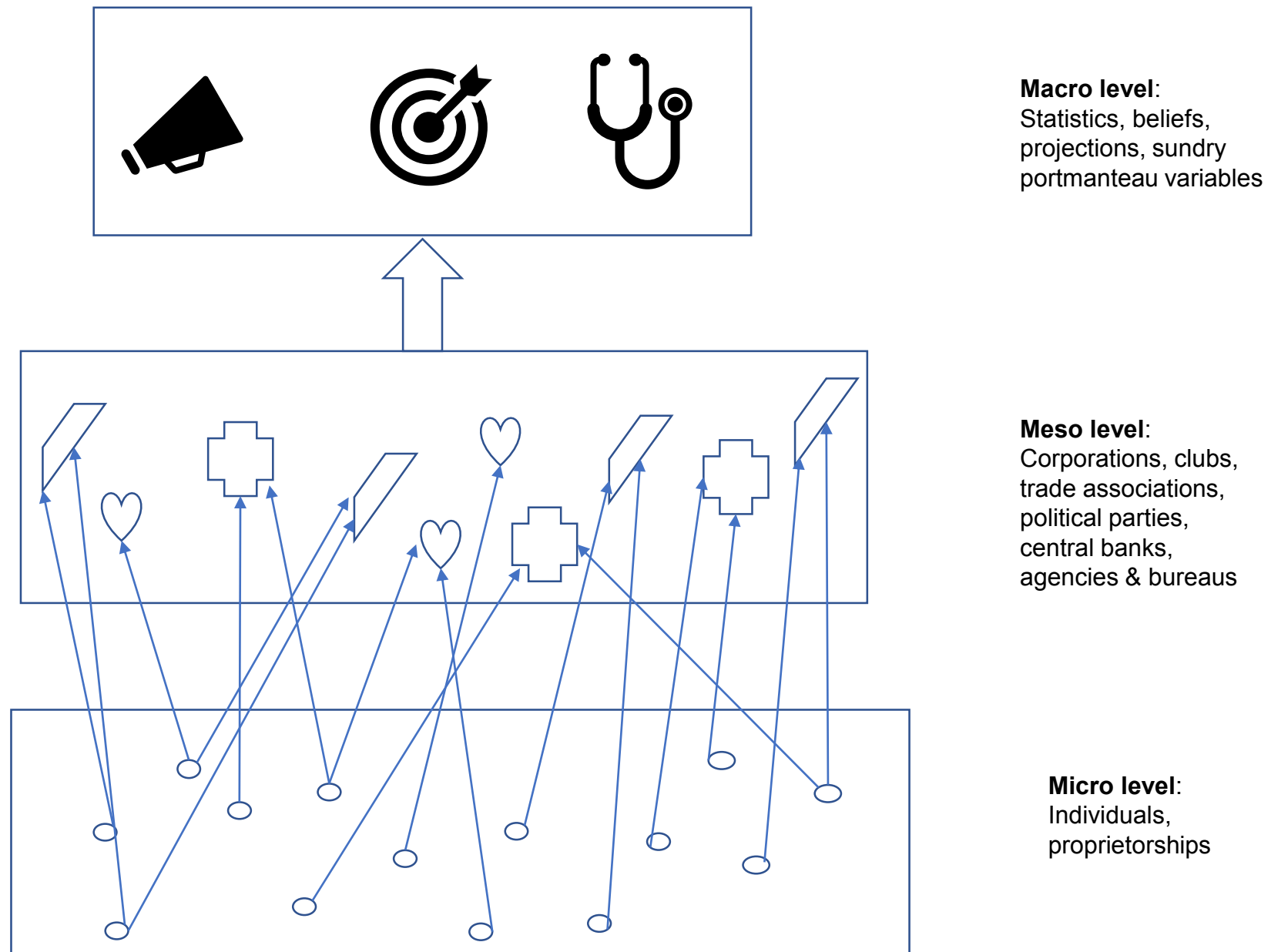


Figure 1.2: A Tri-Planar Societal Architecture: Micro, Meso, Macro
Moral: think globally but act locally (for global action is impossible)

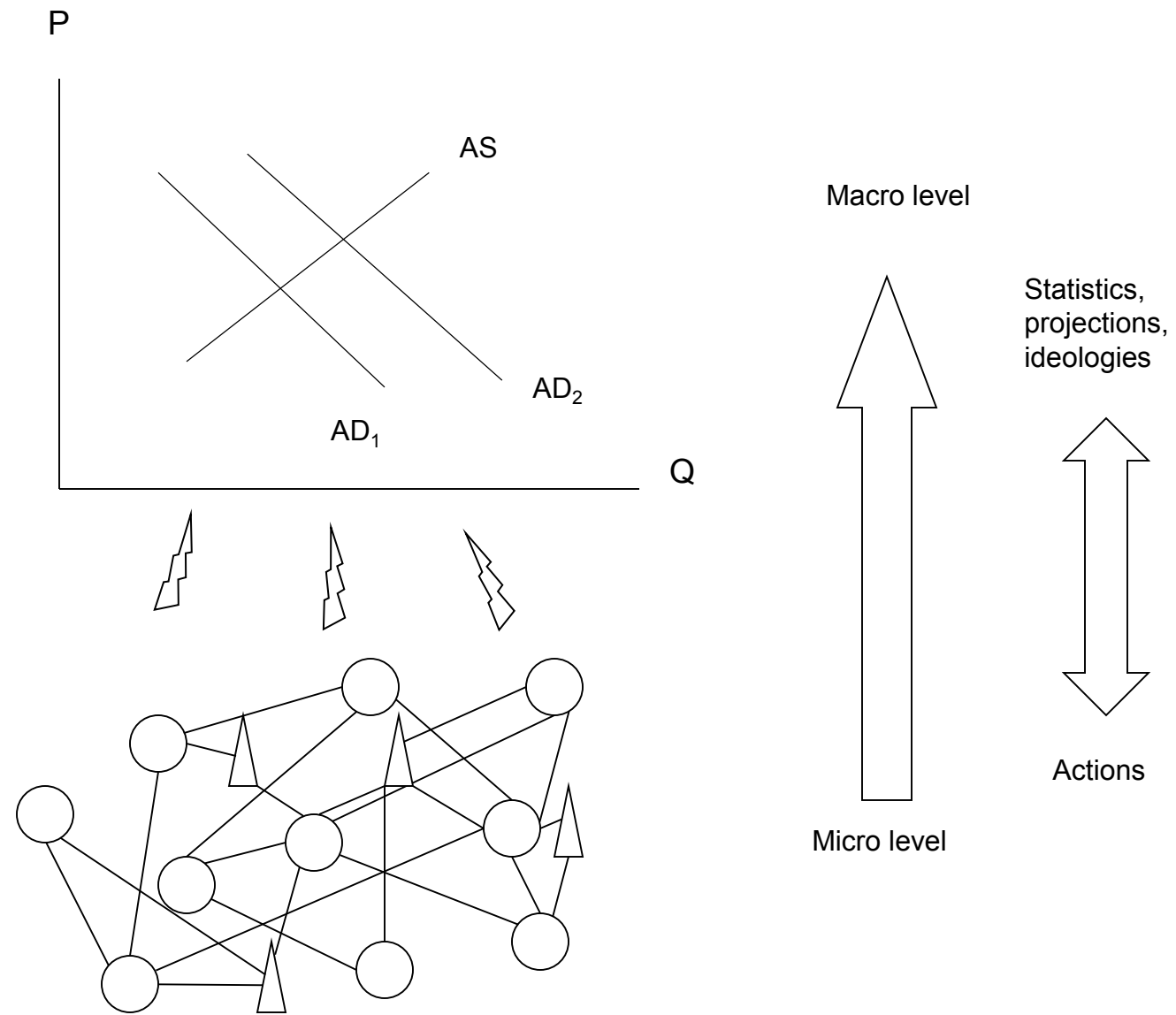


Figure 1.3: Emergence of Aggregate Variables within an Ecology of Plans