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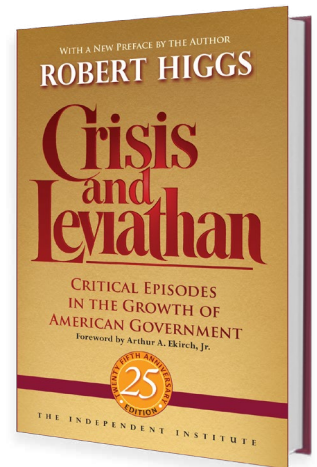
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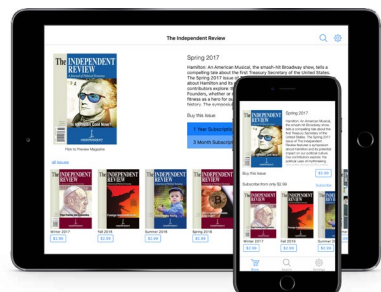
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# The Evolution of “Orthodoxy” in Economics

*From Adam Smith to  
Paul Samuelson*

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A. M. C. WATERMAN

The theory of economics does not furnish a body of settled conclusions immediately applicable to policy. It is a method rather than a doctrine, an apparatus of the mind, a technique of thinking, which helps its possessor to draw correct conclusions.

—John Maynard Keynes, introduction to *Supply and Demand*, vol. 1 of Cambridge Economic Handbooks (1922)

Some academic economists describe themselves or their work as “heterodox,” and much has been written about a large variety of putatively “heterodox” research programs and schools of thought (e.g., Foldvary 1996; Davis 2006; Lee 2008). What all these economists seem to have in common is a rejection of or departure from what they conceive of as “orthodoxy” in economics, to which much less attention has been paid. “Orthodoxy” is commonly identified with “mainstream” economics: the kind of economics that most professional economists do. The term *mainstream* was perhaps for the first time used by Richard Judy (1964) and was later popularized in the

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2001 edition of Paul Samuelson's textbook *Economics* (Samuelson and Nordhouse 2001).

There is indeed a sense in which it is instructive to regard "orthodoxy" as "mainstream": that which most practitioners have found works best for them. If, as John Maynard Keynes advised beginning students in 1922, economics is not a body of doctrine but a *method of thought*, then the orthodox way of doing economics is to employ that "method of thought" that seems to the majority of professionals most likely to maximize expected heuristic returns.

Every coherent "method of thought" rests upon assumptions, implicit or explicit. It is my purpose in this paper to identify the assumptions of "orthodoxy" by observing their evolution in economic analysis from Adam Smith's *Wealth of Nations* ([1776] 1976; hereafter *WN* in citations) to Samuelson's *Foundations of Economic Analysis* (1947). These assumptions are:

1. That "political economy," subsequently called "economics," is a positive, value-free science.
2. That all social phenomena are caused by and caused only by the purposeful actions of rational individuals.

"Orthodoxy" in economics I take to be a conversation among all who accept these assumptions, however much they may disagree about everything else. I am aware that others have propounded different and more restrictive definitions of *orthodoxy*. My own minimalist definition is simply a means of demarcating the boundary of that conversation that all who regard themselves as "heterodox" choose not to join. Orthodoxy so conceived is a very broad church and may include some who might be surprised at being designated as belonging to it.

As I understand these terms, it is impossible to claim that orthodoxy is the "correct" or even the "best" way of doing economics. And it is equally impossible to make these claims on behalf of any heterodoxy. It is important to note that many different *schools of thought*—for example classical, neoclassical, Keynesian, post-Keynesian, Austrian, Chicago, and so on—and also many *research programs*—such as public choice, law and economics, feminist, experimental, and so on—are seemingly "orthodox" according to this paper's taxonomy, although their respective proponents differ, often very strongly, with each other.

It need hardly be said that there is no correlation whatsoever between orthodoxy or heterodoxy in economics and any set of political beliefs and commitments.

## Adam Smith and the English School

Adam Smith defined "what is *properly* called Political Economy" as "a branch of the *science* of a statesman or legislator," an "*inquiry* into the nature and causes of the wealth of nations" (*WN*, IV.ix.38, IV.intro, my italics).<sup>1</sup>

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1. Citations to *Wealth of Nations* refer to book, chapter, and paragraph numbers, in that order.

“Political œconomy” was pioneered by Antoine de Montchrétien in 1615 as a recipe book for running France as a manorial fief of the House of Bourbon. But over the eighteenth century, it gradually came to be realized that the king’s ministers could never have or comprehend the information necessary to manage a large, complex modern economy like that of France or England (*WN*, IV.ix.51). Pierre de Boisguilbert (1646–1714), building on Jansenist theodicy but abstracting from theology, explained how general economic activity in France was an unintended consequence of self-regarding actions by a multitude of private individuals. It was impossible for le Roi Soleil to control the economy and unnecessary for him to try because competition maximized wealth at equilibrium. Boisguilbert was made to suffer for his subversive doctrines, but his work *Détail de la France* (1695) is now regarded as the origin of modern economics (Faccarello 1999). Boisguilbert’s ideas were transmitted and refined by a succession of French thinkers: Richard Cantillon (c. 1685–1734), François Quesnay (1694–1774) and his circle, and A. R. J. Turgot (1727–81). Adam Smith (1723–90) met Quesnay and Turgot in France and learned much from them. Turgot’s *Réflexions sur la formation et la distribution des richesses* (1766) contains much sophisticated analysis, and Pierre Samuel du Pont de Nemours (1739–1817) and others suggested that it was the source of “tout ce qu’il y a de vrai” in *Wealth of Nations* (Groenewegen 1968).

Smith’s definition of *political economy* captures the spirit of his French predecessors. For though intended to be useful for “the statesman or legislator,” political economy is or ought to be an heuristic enterprise that is in principle disinterested, open-ended, and scientific. Building on the work of Boisguilbert and his successors, that “inquiry” rests upon assumption (2): what we now call *methodological individualism*. Smith “threw over the old idea of an entity called the state or the nation existing outside the individuals who constitute its subjects or members” (Levy and Peart 2013, 372). All economic phenomena are taken to be the result of the purposeful actions of rational individuals. The assumption was lucidly stated by William Paley (1743–1805), Smith’s famous and influential English contemporary, whom John Maynard Keynes thought was “[p]erhaps . . . the first of the Cambridge economists” (qtd. in Waterman 1996, 419): “[A]ltho’ we speak of communities as sentient beings; altho’ we ascribe to them happiness and misery, desires, interests and passions, nothing really exists or feels but *individuals*” (Paley 1785, 587, italics in the original).

The method of inquiry that gradually evolved in the eighteenth and early nineteenth centuries is what we now call *economic analysis*. Individuals’ complex, multi-dimensional interactions are caricatured in simple verbal (and later mathematical) cartoons. These cartoons abstract from the whole of reality, save the two or three hypothetically causal nexi between individuals conjectured to produce the phenomenon to be observed. Induction from observation plays little or no part—save only to suggest plausible hypotheses *ex ante*. The method is chiefly deductive, given the behavioral assumptions underlying the hypotheses. Observation is focused on those few variables explicit in the hypotheses.

Why has Smith so important a part in a story that for most of its first century was a French enterprise? Because Turgot died in 1781; because the French Revolution (1789–99) disrupted political culture and intellectual life in France; because France was replaced by Britain as Top Nation after 1815 and the world had to learn English; because of Dugald Stewart’s influential Edinburgh lectures on political economy in 1800–1801 (Pryme 1870, vii; Corsi 1987); because of the *Edinburgh Review*, founded by Stewart’s students to propagate his ideas (Fontana 1985); because of the Political Economy Club, established in London in 1821 by Robert Malthus, David Ricardo, James Mill, Robert Torrens, and others, committed both to criticizing and refining Smith’s ideas and to propagating them among the governing classes, thus inaugurating the “English School” of political economy (Waterman 2008), of which present-day economics is the direct, lineal descendent; and, above all, because *Wealth of Nations* was immediately recognized and studied as a seminal contribution to political thought.

There is a great deal more to *Wealth of Nations* than economic analysis, which is confined largely to books I and II, but that analysis is foundational for all the rest.

Book I expounds what we should now call a microeconomic account of product and factor prices. These prices are determined by supply and “effectual demand.” In each period, a “market price” is established by competition among buyers and among sellers. “It is the interest of all those who employ their land, labour, or stock, in bringing any commodity to market, that the quantity should never exceed the effectual demand; and it is in the interest of all other people that it should never fall short of that demand” (*WN*, I.vii.12). At long-term equilibrium, market price will equal “natural price,” to which “the prices of all commodities are continually gravitating” (*WN*, I.vii.15). Natural *commodity* price is the cost of production and is determined by the natural prices of the factors required to produce it (*WN*, I.vii.4; Samuelson 1977). These paragraphs in *Wealth of Nations* constitute the primordial account of the existence, uniqueness, and stability of market equilibrium in economic analysis.

Natural *factor* prices are explained in chapters iii and iv of book II. They are determined in macrodynamic, steady-state<sup>2</sup> equilibrium of an aggregate (e.g., national) economy, when the rate of capital accumulation is equal to the rate of population growth induced by that accumulation. The natural wage is the steady-state wage, which determines the natural rate of profit as its inverse (Hollander 1973; Waterman 2009). Though population growth is biological and involuntary, “the demand for men, like that for any other commodity, necessarily regulates the production of men” (*WN*, I.viii.40); and everything else likewise is caused by the actions of individuals pursuing their private “interest”: in this case, masters adding to capital by their “parsimony” in each period so as to maximize income and workers bargaining for wages when capital

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2. In this article, I use the term *steady state* as in neoclassical growth theory: to denote a state of affairs in which all variables of time grow at the same, constant exponential rate, thereby preserving constant proportions between the *levels* of these variables (Stiglitz and Uzawa 1969, 6). This usage of *steady state* is not to be confused with the usage introduced by Herman Daly (1977) to mean stationarity, which is a special case of neoclassical steady state.

accumulation exceeds population growth and there is excess demand in the labor market (Waterman 2013).

Under “the obvious and simple system of natural liberty,” the price mechanism provides the incentives and disincentives to individuals, motivated by self-interest or “self-love,” to allocate productive resources “towards the employments most suitable to the interest of the society” (*WN*, I.ii.2–3, vii.6; IV.ix.51). If we may construe “the interest of the society” as those aggregate outcomes that benefit all or most of its members, these chapters perfectly illustrate the methodological individualism of Boisguilbert and those who followed him. And their rigorous focus on the causes and effects of individual decisions, in abstraction from anything else that might be happening, provides a classic example of economic analysis.

Like all economists before and since, the “followers of Dr Smith” practicing “Political Economy, using the word in the sense of Ricardo and Malthus” (*Edinburgh Review* 1837, 77, 79), disagreed continually both with Adam Smith and with one another at their meetings in the Political Economy Club from the 1820s. But the “English School,” as they soon came to be known, were in complete agreement about what distinguished them from “the foreign school” of Sismondi, Cherbuliez, and Villeneuve-Bargemont (*Edinburgh Review*, October 1837, 77), the members of which rejected both of the assumptions I have identified. Jean-Baptiste Say (1767–1832) often visited London and was deemed an honorary Englishman from the start: the only foreign member elected to the club. What about Karl Marx (1818–83)?

Marx lived in London from 1848 and had thoroughly mastered the literature of Anglophone political economy by 1867. But volume 1 of *Das Kapital* did not appear in English until 1887, and he and his work were unknown to the Political Economy Club. Nevertheless, in the afterword to the second German edition of *Capital*, Marx explicitly identified his own work, “in method at least,” with that of “the English School” (1954, 1:26). In some respects, he was Adam Smith’s most faithful disciple, and today he is routinely included among the “classical” economists (e.g., in Hollander 2008, 2013).

As Adam Smith had recognized, political economy is a scientific enterprise to be distinguished from “the art of government,” to which it may contribute but may not determine. Methodological individualism was taken for granted, and economic analysis soon became central to the work. Malthus’s ([1798] 1966) “arithmetical ratio” was the germ of the aggregate production function in agriculture (Samuelson 1947, 296–99; Stigler 1952, 190; Samuelson 1978; Waterman 1992). Two years later Malthus (1800) extended Smith’s supply-and-demand theory by formulating the first demand function of price (Waterman 1998). The “arithmetical ratio” of food production together with the “geometrical ratio” of population growth implied diminishing returns, which had played no part in the analysis in *WN*; and diminishing returns led to the simultaneous discovery (Malthus 1815; West 1815; Ricardo 1815; Torrens 1815) of “Ricardian”—actually Malthusian—rent. Because a negatively

sloped demand curve<sup>3</sup> suggests diminishing *marginal utility* (adumbrated by Condillac in 1776 but ignored), and diminishing returns imply diminishing *marginal product*, the curiously so-called marginal revolution was up and running by 1815. (It was still not quite finished in England by 1899 [see Waterman 2008].)

Diminishing returns are a consequence of resource scarcity: in the Malthusian case of agricultural land, which was in very inelastic supply in England during the Napoleonic Wars. The *Essay on Population* thus inaugurated a gradual, century-long mutation of “political economy,” the science of wealth, into “economics,” the science of scarcity (Waterman 2001). Our discipline eventually came to be understood as “the science which studies human behaviour as a relationship between ends and scarce means which have alternative uses” (Robbins 1935, 16.) Analytical technique has come increasingly to be about “economizing” and to be based on maximization subject to constraint. As Malthus himself had already realized, “[M]any of the questions, both in morals and in politics, seem to be of the nature of the problems *de maximis* and *minimis* in fluxions” ([1814] 1986, 102).

Economic analysis based on methodological individualism was one of the two chief characteristics of “orthodoxy” in economics as received and transmitted by the English School. The other was the conception of political economy as a positive science, uncontaminated by its practitioners’ political, religious, or ethical commitments. What did that mean in the eighteenth-century world of Adam Smith and the nineteenth-century world of his English “followers”? According to Samuel Johnson (1709–84)—between whom and Smith there was no love lost—“Science” can signify “(1) Knowledge, (2) Certainty grounded on demonstration, (3) Art built on principles, (4) Any art or species of knowledge, (5) One of the seven Liberal Arts” (1755). But to members of the English School, at any rate, the views of Dugald Stewart (1753–1828), who had launched their enterprise in 1800–1801, were probably more influential.

Volume 2 of Stewart’s *Philosophy of the Human Mind* ([1814] 1854–60) was written, in part, to criticize naive or crude inductivism. A “chaos of insulated particulars” must be distinguished from “a knowledge of connected and well ascertained facts.” This can be had only by *theory*, for “without theory . . . experience is a blind and useless guide.” Indeed, there can be no “facts” without theory. The “general laws” of political economy resemble those of physics: hypotheses are suggested by preliminary observation; these hypotheses yield axioms of a deductive system; and conclusions deduced from those axioms are then tested empirically (322–31).

Stewart’s methodology was transmitted to the English School by his pupil and friend John William Ward (1781–1833), who moved to Oxford in 1799 and became a tutorial pupil of Edward Copleston, Richard Whately’s mentor (Corsi 1987). Because of political circumstances in Oxford in the 1830s, Whately’s *Introductory Lectures in*

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3. Malthus’s own demand function did not imply diminishing marginal utility, however, because it was constructed from a set of hypothetical individuals, each of whom would purchase only one unit at some particular price (Waterman 1998)

*Political Economy* (1831) had as one of their objects a clear-cut, epistemological demarcation of “religious” knowledge from “scientific” knowledge, seeking to defend the integrity of each (Waterman 1991). His exposition of the abstract, theoretical, ahistorical nature of economic science closely followed Dugald Stewart’s. All observation is theory laden, but theory may be true or false. This is where observation plays its part in scientific inquiry: for “if we really are convinced . . . of the falsity of any theory . . . we must needs believe that that theory is also at variance with observable phenomena.” We must therefore begin with theory and search for the “facts” that may confirm or disconfirm it. Each individual “has in his mind certain major premises—i.e. principles—relative to the subject in question; that observation of what actually presents itself to the senses, supplies minor-premises;—and that . . . ( . . . which is reported as a thing experienced) consists . . . of the conclusions drawn from the combination of these premises” (Whately 1831, 69; see also 239). The method of economic theory is analytical: “we are more likely to advance in knowledge, by treating one subject at a time.” “Human propensities” and the “general laws” that can be deduced from them enable us to model social processes as they would be if no “disturbing cause” were present (Whately 1831, 23, 228).

Whately’s former pupil and lifelong friend N. W. Senior both preceded and followed him in the Drummond Chair of Political Economy at Oxford. Senior’s treatment of methodology closely followed the Stewart–Whately line. Political economy is a “science,” not an “art” and (as against J. S. Mill) “a positive, not an hypothetical science” (Senior 1852). Senior concluded from this definition, perhaps too hastily, that the economist must abstain—qua economist—from political judgments. The economist’s analytical conclusions, being strictly positive and abstracted from ethical considerations, “do not authorize him in adding a single syllable of advice” (Senior 1836, 130). However, although Senior’s opinion, strongly seconded by John Cairnes (1857), was accepted in principle by almost all of the English School, it was usually honored in the breach. For though it has been suggested, with some plausibility, that the Political Economy Club was “the hub of a scientific community” (O’Brien 2004, 12–13), its original purpose was decidedly political, not to say propagandist: “to watch carefully the proceedings of the Press, and to ascertain if any doctrines hostile to sound views on Political Economy have been propagated[,], . . . to refute such erroneous doctrines, and counteract their influence[,], . . . and to limit the influence of hurtful publications” (Political Economy Club 1921, 375). Political economy may be “scientific,” to be sure. But these “scientists” believed they could use their expert knowledge in public-policy debate to criticize “hurtful publications” and to recommend “sound views.” They were not the last to do so.

## Neoclassical Economics

The English School was alive and well in the first decade of the twentieth century (Waterman 2008). Its most important production, J. S. Mill’s *Principles of Political*



*Economy*, first published in 1848, continued to be the principal textbook in political economy—and source of examination questions—until the 1930s at many universities throughout the English-speaking world. Theoretical innovations of fundamental importance had been made by Johann Heinrich von Thünen (1826), Antoine-Augustin Cournot (1838), and Hermann Heinrich Gossen (1854), but they were unknown to or ignored by the insular and complacent English authors—until Stanley Jevons discovered and acknowledged their contributions in relation to his own much later work (1879, xxvii–xl). Alfred Marshall’s brief recognition of Thünen and Cournot appeared in the preface to *Principles of Economics* ([1890] 1920), immediately followed by a warning against the “lengthy translations of economic doctrines into mathematics” (363). His own mathematics, by no means inconsiderable, were locked out of sight in an appendix.

It might have been supposed that American economists would have associated themselves with the English School, but with one or two exceptions they were heterodox until the end of the nineteenth century.<sup>4</sup>

The innovations of the European pioneers, followed in the 1870s by Carl Menger and Léon Walras, though greatly enlarging the range and technical power of economic analysis, did nothing to disturb the assumptions of what became orthodoxy.

Gossen’s (1854) exposition of marginal utility theory, rediscovered by Jevons (1879), made explicit and systematized ideas found earlier in writings by Condillac, Daniel Bernoulli, W. F. Lloyd, and Senior. In all such, and in Gossen’s neoclassical successors (Jevons, Menger, and Walras), the so-called subjective theory of value begins with the assumption of a rational individual making choices to satisfy preferences in the face of scarcity. Cournot’s rigorous, mathematical theory of monopoly and duopoly implicitly locates decision making in entrepreneurs, and his supply-and-demand curves are based on traders’ behavior. In Thünen’s mathematical model of agricultural land use, which—though far more sophisticated—bears a family resemblance to the “Canonical Classical Model” of the English School (Samuelson 1978, [1983] 2015, 195,

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4. In the early nineteenth century, authors such as Francis Wayland (1837) had assimilated Malthus and Ricardo, and as late as 1888 Amasa Walker regarded Jevons and Marshall as “an extension of the English School” (Goodwin 1972, 562). But throughout much of the century, protectionist sentiment in the United States was at variance with the ideology of Free Trade promoted—or at any rate justified—by the English School. Toward the end of that century, there was “an estrangement from British scholarly life” created by a “growing attachment to German thought” (Goodwin 1972, 563).

The American Economic Association was originally formed in 1885 by Richard T. Ely, secretary of the Christian Social Union, to promote the liberal-Protestant “social gospel”—very different in spirit and substance from the aristocratic Whiggery of the Political Economy Club. Ely had been a doctoral student of the German historicist Knies; his two cofounders of the American Economic Association, E. R. A. Seligman and Henry C. Adams, who had also studied in Germany, were committed to the extreme historicism of Schmoller and a rejection of the English School. Like these other historicists, Ely favored a nationally planned economy and believed that the state should favor the “white, Nordic races” above all others.

Like Ely, Seligman, and Adams, John Bates Clark had studied at Heidelberg with Knies and accepted historicism. But in the mid-1880s Clark abandoned both historicism and Christian Socialism and became a defender of capitalism and the benefits of competitive markets. His works *Philosophy of Wealth* (1886) and *Capital and Its Earnings* (1888) inaugurated neoclassicism in American economics.

196), the decisions are made by profit-maximizing farmers and by rent-maximizing landlords like himself.

In every theoretical innovation in the second half of the nineteenth century, methodological individualism is explicit. Even Francis Ysidro Edgeworth’s *community indifference curves*, which might appear to subvert that principle, could be obtained, he assumed, “by combining *properly* the utility curve for all the individuals” (Creedy 2008, 745, my italics). J. B. Clark seems to have assumed that the stock of “social capital” required for his *aggregate production function* could be obtained simply by adding the market value of each firm’s capital (1899, chap. 24). It was finally realized, however, during the “Two Cambridges” capital controversy in the 1960s that aggregate production functions “cannot be shown to follow from proper [general equilibrium] theory and in general [are] therefore open to severe logical objections” (Hahn 1972, 8; see also Samuelson 1966).<sup>5</sup>

Everyone took for granted the supposition that economics is a scientific enterprise, though Marshall thought that “the science is still almost in its infancy” (1890, 4). Jevons, whose credentials as a natural scientist were considerable, produced an exhaustive treatise titled *The Principles of Science* (1874) in which he reiterated the Stewart–Whately doctrine of “Facts known only by Theory” in examples from physics and astronomy (book 4, 185–89); dealt with statistical data and probabilistic inference; and illustrated “Quantities indicated by Theory and verified by Measurement” (book 4, 194–96). In his strictly economic writing, he argued that “the deductive science of economics must be verified and rendered useful by the purely empirical science of statistics” (1879, 22).

But it was in the work of Carl Menger (1840–1921) that orthodox methodology was first explicitly defended from the criticism of those who rejected the orthodox view and took political economy to be an inductive and historical enterprise. In England, those views had been held and propounded by Richard Jones (1790–1855) and William Whewell (1794–1866), but notwithstanding the immense scientific prestige of the latter, their methodological objections to “Ricardian” (i.e., deductive) economics seem to have been largely ignored by the English School. Jevons acknowledged Jones and Whewell and did allow that “historical investigation is of great importance in Social Science. But, instead of converting our present science of economics into an historical science, utterly destroying it in the process, I would perfect and develop what we already possess, and at the same time erect a new branch of social science on an historical foundation” (1879, 20).

But the German Historical School, which flourished in the last third of the nineteenth century and was based on heuristic assumptions similar to those of Jones and Whewell, was dominant among German-speaking economists, who were fiercely

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5. Ross Emmett has suggested to me that this understanding was “finally realized” much earlier by Frank Knight (1936), which explains why the Chicago School was never drawn into the “Two Cambridges” controversy.

nationalistic and who rejected peaceful coexistence with English “Ricardians” (Grimmer-Solem 2003). Hence, when Menger published *Untersuchungen* in 1883, which expounded marginalism in value theory and criticized historicism, he was bitterly attacked by Gustav von Schmoller and other historicists, and he and his followers were derided as the “Austrian School”—a name that stuck. Though Menger was far from “Ricardian” (i.e., cost determined) in his value theory, his methodology was that of the English School, and he responded with *The Fallacies of Historicism in German Political Economy* (1884). So was launched the notorious “*Methodenstreit*.”

This sustained literary warfare appears to have been the cause of John Neville Keynes’s ([1890] 1917) celebrated and now canonical intervention, which answered the objections of Schmoller and the historicists, elucidated the methodology of the English School and the continental marginalists, and vindicated the mathematical methods of analysis of Jevons and his predecessors.

According to Keynes, the German School (Karl Knies, Wilhelm Roscher, Gustav von Schmoller, et al.) regarded political economy as “ethical, realistic and inductive.” Its business was to “treat of what ought to be as well as of what is.” It sought to consider humans and their institutions as they actually are, and it claimed to be an inductive study of statistics and other historical data. Schmoller “would practically identify political economy and economic history” (J. N. Keynes [1890],) 1917, 27).

While maintaining that neither deductive nor inductive methods can provide normative information, J. N. Keynes sought peace, as Jevons had, by conceding that “historical investigation is of great importance in Social Science” (Jevons 1879, 20). “The historical method,” Keynes stated, “is, therefore, rightly included amongst the methods to which the economist ought to have recourse. Nevertheless economics is not to be considered, as some maintain, an essentially historical science” ([1890] 1917, 314). Against the imperialistic claims of Schmoller and “extreme “*historismus*” Keynes took an eirenic stand “on the necessity for scientific division of labour. . . . [T]here is work of more than one kind to be done” ([1890] 1917, 325). The “work” Keynes proposed to consider was that of political economy conceived as “*a positive, abstract and deductive science*” ([1890] 1917, 9, italics in original).

Economics is not a “normative” inquiry but a “positive” science: it can give no information about what *ought* to be, only about what *is*. It is “abstract and deductive,” “hypothetical,” and based on the assumption of “self-interest” (J. N. Keynes [1890] 1917, chap. 1, sec. 2). However, the “deductive method” has three stages: “a preliminary [inductive] investigation of the forces actually in operation leading to hypothesis; only then a deduction of ‘results’ from the hypothesis; and finally testing ‘the applicability’ of the ‘results’ by appeals to “the concrete realities that are open to direct observation” (chap. 7, sec. 1). Though Keynes strongly confirmed the tradition of the English School in regarding political economy as abstracting from ethical considerations, and though the three-stage method he described is consistent with previous authors’ treatment, he ignored or was unaware of the Stewart–Whately epistemology,

and in his treatment of “facts” appeared not to notice that there can be no “facts” without theory.

Following Jevons (whose *Theory of Political Economy* “may rightly be regarded as one of the most suggestive and valuable contributions to the science that have ever been made” (J. N. Keynes [1890] 1917, 92), Keynes agreed that political economy is “essentially mathematical in character” ([1890] 1917, 252). There are “economic truths of fundamental importance” that can be expounded only in mathematical form, as in Cournot’s studies of the equilibrium of duopoly and Jevons’s “theory of utility and its applications.” In general, “it would be difficult to exaggerate the gain that has resulted from the application of mathematical ideas to the central problems of economic theory” ([1890] 1917, 267).

The fundamental continuity of “neoclassical” economics with that of the English School is sometimes obscured by some profound differences of analysis. “Classical” economics was rooted in the Quesnay–Smith macrodynamic conception of a “national” economy and based on the concept of a “surplus” of production over total factor cost (with the assumption of fixed land) as well as on the concomitant distinction between “productive” and “unproductive” labor. Thünen (1826) was the first to generalize diminishing returns to any or all factors, which, when production takes place with constant returns to scale (CRS), implies product exhaustion (Samuelson [1983] 2015). The “surplus” is redundant and misleading, and income distribution is explained. Product exhaustion with normal profit in long-period equilibrium implies the stationary state; hence, neoclassical economics became “timeless” or static. And the requirement of CRS rules out increasing returns to scale, which for Adam Smith and Marx were the essence of an industrializing economy (Waterman 2004, 232–33, 2014).

An imaginary, timeless economy, with CRS at the industry level and the possibility of general equilibrium, affords boundless opportunity for mathematical analysis. Jevons, Walras, and others studied the general interdependence of all prices and outputs. The study of marginal utility led to welfare theory, which in Pareto’s hands culminated in the central theorem of neoclassical economics: Walrasian general equilibrium in a world of strictly private goods and perfectly competitive markets is a welfare optimum in that no individual can be made better off without worsening the condition of someone else *as he himself perceives it* (Waterman 2004, 233–35).

Like Knut Wicksell, Enrico Barone, and most other neoclassical economists of that day (excepting the Austrians), Vilfredo Pareto (1896) was a socialist and saw that the new analytical tools could be used to study the allocation of resources in a socialist state to achieve the maximum of well-being for its citizens. Fred M. Taylor (1929) considered “the guidance of production in the socialist state” in his presidential address to the American Economic Association. In a series of influential publications from 1929 to 1937, Taylor, Oskar Lange, and A. P. Lerner expounded the orthodox, neoclassical economic theory of socialism (Hoff [1938] 1949, 392–94). Lerner (1934, 1944) set

out for the first time the complete set of marginal conditions of Walrasian general equilibrium.

Neoclassical economics was brought to what may be its final perfection by Kenneth J. Arrow and Gerard Debreu (1954), who specified the complete set of assumptions necessary for the existence of general equilibrium. Since that time, many economic theorists have turned their attention to new fields.

Postneoclassical economics has refined our understanding of methodological individualism. From Boisguilbert to Neville Keynes, it was assumed that the rational individuals, whose actions produce the economic phenomena we study are always self-regarding: motivated solely by “self-love” or self-interest. This assumption is still appropriate in the study of market phenomena.

But since the 1970s, as some economists have turned their attention to nonmarket phenomena, it has become clear that rational human beings are often consistently motivated by other considerations. Gary Becker (1992), for example, recognized that altruism is often the best *explanans* in economics of the family. Two economists with differing political commitments (Folbre 2001; Morse 2001), writing in ignorance of the other’s project, produced very similar analyses of the economics of the family upon the assumption that individual members are motivated by love, obligation, and reciprocity (Waterman 2003).

In light of many such investigations, we must construe “methodological individualism” simply as the assumption that all social phenomena are caused by and caused only by the purposeful actions of rational individuals, when “rational” means having transitive preferences and mutually consistent goals.

## Maynard Keynes and Paul Samuelson

Economic thought and economic analysis in the second half of the twentieth century were shaped largely by John Maynard Keynes (1883–1946) and Paul Samuelson (1915–2009). What was the relation of their work to the orthodoxy of the English School and its neoclassical successors?

Keynes seems to have had no disagreement with his father and his father’s close friend Alfred Marshall about the putatively “scientific” nature of economics. But in the 1930s he turned his back on neoclassical explanations of unemployment based on Say’s Law and explicitly revived Malthus’s discredited theory of “general gluts” (Kates 1998). “Keynesian economics,” as introduced in *The General Theory of Employment, Interest, and Money* (J. M. Keynes 1936), is “macroeconomics,” constructed with postulated functional relations between aggregates such as total national saving and investment. Is this consistent with methodological individualism?

In *Wealth of Nations*, implicit aggregates such as “the revenue and stock of every country,” “the demand for those who live by wages,” “the increase of stock,” “the annual produce of the land and labour of a country,” “parsimony” as “the immediate cause of the increase in capital,” and so on (I.viii, II.iii–iv) are taken to result from the

sum of self-interested actions of individual masters and wealth owners. There seems little reason to doubt that the Keynesian aggregates—schedules of the “propensity to consume,” the “marginal efficiency of capital,” and of “liquidity preference”—were conceived by Keynes in much the same way.

J. M. Keynes’s colleague and friend Frank Ramsay (1928) had worked out a highly sophisticated “mathematical theory of saving” based on the assumption of a rational individual maximizing utility over time, which Keynes—also a mathematician—published in the *Economic Journal*, of which he was editor (Attanasio 2015). Keynes’s “propensity to consume” function was the complement of his aggregate-saving function, which he kept as simple as possible by abstracting from Ramsay’s analysis of intertemporal optimization (which is now the starting point of most attempts to provide “microfoundations” for macroeconomic theory). Keynes’s investment-demand function was derived from the “marginal efficiency of capital,” based on entrepreneurs’ expectations of the income stream from a capital asset over its lifetime. Demand for money in *General Theory* (1936) was the sum of two components: the standard, Marshallian account of “transactions” (and “precautionary”) demand as in his earlier work (J. M. Keynes 1923), together with a new conception, the schedule of “liquidity preference.” The latter summarized the behavior of rational participants in the securities market, such as Keynes himself, whose demand for the perfectly liquid asset, money, depends on their expectations of future securities prices. Given the assumed exogeneity of the money supply, it would appear that all the components of Keynes’s complete model—as rationalized by J. R. Hicks (1937) and others—are based on assumptions about the self-regarding actions of individuals.

Hicks (1939) answered the question whether it is theoretically correct to aggregate all goods into a “national income”—whether to do so is consistent with methodological individualism (see also Samuelson 1947, 142–43). Because Keynes located his analysis in the Marshallian short period, in which we can assume that all prices remain constant—and therefore in which all adjustments to disequilibrium are Marshallian quantity adjustments only—all *relative* prices remain constant, and therefore aggregation is logically admissible. Macroeconomics is vindicated, at least in a fix-price world.

Notwithstanding Keynes’s immense and continuing influence upon economic thought, Paul Samuelson’s biographer identifies Samuelson as the “founder of modern economics” (Backhouse 2017). Whether that claim be any more than tautology (“modern economics is what Samuelson founded”), it is certainly the case that Samuelson was the first to specify the necessary conditions for treating economics as a “science” in any but a merely rhetorical sense. In terms of this paper’s argument, therefore, Samuelson’s seminal treatise *Foundations of Economic Analysis* (1947) completes our understanding of “orthodoxy” in economics.

*Foundations* was a revised and expanded version of Samuelson’s Harvard doctoral thesis, submitted in 1940 and based on a series of articles published while he was a member of the Society of Fellows from 1937. An influential member of that society, the

eminent physicist Percy Bridgman, was an advocate of “operationalism” in science: questions are meaningless if it is not possible to find operations by which the answers can be obtained. Bridgman’s methods had been adopted by the logical positivists at Harvard, and Backhouse suggests a connection with the logical positivism of the Vienna Circle (2017, 200–201). Logical positivists held that a proposition is meaningful only if its truth-value is empirically *verifiable*. Yet Karl Popper (1935, 1959) showed that verification in this sense is impossible. We can only *falsify* hypotheses empirically. Samuelson was much engaged in this conversation, and, though not knowing Popper’s work at that time, he came to adopt, perhaps quite independently, a quasi-Popperian understanding of science that explicated Bridgman’s conception of the “meaningful.” It was this understanding that unified *Foundations* conceptually and provided its *raison d’être*.

Among the circle of brilliant young economists then at Harvard was a graduate student from Radcliffe, Marion Crawford (d. 1978), an intimate friend of Paul Samuelson, whom she married in 1938. When Paul was writing the articles in 1937 on which his thesis was based, she completely mastered the conceptual and mathematical problems they addressed and gave him much help. When the thesis was published as *Foundations* (1947), Paul wrote, “Without her collaboration the book would literally not have been written . . . nor can the quaint modern custom of excluding the value of a wife’s services from the national income condone her exclusion from the title page” (vii). Though the publishers did indeed exclude her name from the title page, Marion Crawford Samuelson was joint author of *Foundations* and is therefore jointly to be praised or blamed for completing the development of “orthodoxy” in economics.

Samuelson defined a *meaningful theorem* as “a hypothesis about empirical data which could conceivably be refuted, if only under ideal conditions” (1947, 4). He would “attempt to show that there do exist meaningful theorems in diverse fields of economic affairs,” proceeding from “two types of very general hypotheses”: conditions of equilibrium are “equivalent to the *maximization* . . . of some magnitude,” and equilibrium is dynamically *stable* (1947, 4–5, my italics). Part 1 of *Foundations* shows how these hypotheses may imply “qualitative restrictions on slopes, curvatures, etc., of our equilibrium equations *so as to be able to derive definite qualitative restrictions upon the response of our system to changes in certain parameters*” (1947, 20, my italics). “Comparative statics” theoretical analysis, therefore, can make predictions about the direction of the response of observable magnitudes to a once-and-for-all parametric change: predictions that could in principle be falsified. One hundred seventy years of loose talk about the “scientific” nature of political economy/economics was finally justified. Dugald Stewart, Whately, Jevons, Neville Keynes, and others had clearly understood the necessity of testing the conclusions of deductive reasoning “by appeals to the concrete realities that are open to direct observation” (J. N. Keynes [1890] 1917, 217). Samuelson showed us how that might be done.

Despite his seemingly radical novelty, Samuelson—like Alfred Marshall and Adam Smith before him—was deeply conscious of continuity with the political economy/economics enterprise and of his own work as summing up and building upon the

achievements of his predecessors. In *Foundations*, he cited or referenced the work of nearly forty of his more famous forerunners over the previous two centuries, ranging from Barone, Bastiat, Bentham, Böhm-Bawerk, and Bortkiewicz to Adam Smith, Thünen, Veblen, Viner, Walras, Wicksell, and Allyn Young, and including such relatively unexpected authors as Engels, Paley, and Sidgwick. And he was later to say that “within every classical economist there is to be discerned a modern economist trying to be born” (1978, 1415).

Economics has not stood still in the seventy-two years since *Foundations* appeared. Its method has been enriched by game theory; linear, nonlinear, and dynamic programming; input–output analysis; dynamic optimization; public-choice theory; rational expectations; and information theory. Its scientific pretensions have been sustained by ever more sophisticated econometric methods for testing refutable hypotheses as well as by experimental economics and behavioral economics. Its scope has been enlarged by “economics” of sport, of education, of religion, of the family, of education, and of many other areas, including even the “economics of sin” (Cameron 2002).

But its shape is still recognizably Samuelsonian: the mathematical formulation and econometric testing of meaningful theorems, formulated on the assumption that observable economic phenomena are caused by the purposeful actions of rational, goal-directed individuals. One of the two latest Nobel laureates in economics explicitly acknowledged Samuelson’s “responsibility” “for the introduction of mathematics into economics”<sup>6</sup> and formulated his own approach to the economic problem of climate change as “a constrained non-linear dynamic optimization model with an infinite horizon” (Nordhaus 2019, 1995): perhaps the most spectacular vindication yet of Malthus’s profound insight respecting “many of the questions, both in morals and in politics.”

## Afterwords

In economics as in theology, doctrinal controversy is often plagued by misunderstanding: of one’s opponents’ beliefs and ideas and also of one’s own. The following is an attempt to forestall such misunderstanding in the case of this exposition.

1. “Orthodox” does not mean “correct.” As Maynard Keynes reminds us, economics is “a method rather than a doctrine.” A *doctrine* can be “correct” or “incorrect,” but a *method* can be neither: it can be only serviceable or unserviceable. In such enterprises as science, religion, and golf, “orthodox” seems to mean “the way the most successful practitioners do it.” It is always possible and often happens that an original and gifted practitioner will defy current orthodoxy and win conspicuous success. What counts as “orthodox” will then be modified if others follow suit.

2. Orthodoxy in economics includes the belief that economics is a “science.” This implies the necessity of empirical tests and a real possibility of measurement. Deirdre McCloskey and others (e.g., McCloskey and Ziliak 2008) have challenged the scientific pretensions of economics insofar as economics relies on useless tests of statistical

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6. Samuelson himself knew better. See his tribute to Thünen (Samuelson [1983] 2015).



significance. The important thing to understand here is not whether economics *is* or can be a science, only whether economists *believe* that it is or ought to be a science.

3. Assumptions are not beliefs. None of us would wish to live in a world populated entirely by Samuelsonian utility maximizers, nor do we believe that such a world exists. But the imaginary world of our models allows us to formulate hypotheses about the real world, which we can then attempt to falsify. If our hypothesis survives the attempt, it does not mean that the assumptions on which it is based are “true.” They are part of the “hard core” of our research program against which we must not direct our “negative heuristic” (Lakatos 1970, 133, *passim*). Therefore, observed anomalies cannot falsify our hypotheses. As Joseph Schumpeter told Samuelson at Harvard, “You never . . . kill a theory by a fact; you kill a theory by a better theory” (qtd. in Backhouse 2017, 144).

4. There is no correlation between orthodoxy and political beliefs. Those who imagine that there is a correlation muddle the *is-ought* disjunction on which science is based: though economics is strictly positive, politics are inescapably normative. In fact, every possible political belief can be found among the economists we should now recognize as “orthodox.” Adam Smith and most of the Political Economy Club were Whigs; David Hume was a “speculative” Tory, and Edward Copleston a political one; James Mill and J. R. McCulloch were radical reformers; J. S. Mill the “classical liberal” par excellence; Marx a revolutionary Communist; most neoclassical economists in the early twentieth century were socialists; J. M. Keynes sat in the House of Lords as a Liberal; Hayek was libertarian; Samuelson regarded himself as a left-of-center “progressive” (but was denigrated in the United States as a “Communist” after the publication of his pro-Keynesian textbook in 1948).

5. Orthodoxy is a conversation. T. S. Eliot once wrote that “[i]t is not the business of clerics [i.e., intellectuals] to agree with each other; they are driven to each other’s company by their common dissimilarity from everybody else, and by the fact that they find each other the most profitable people to disagree with” (qtd. in Kojecky 1971, 244). Economists of the English School found it profitable to disagree with one another, but they did not find it profitable to disagree with hostile critics of their enterprise, such as the Lake Poets, because the latter chose not to acquire the viewpoint and vocabulary of the new, political-economy conversation (Waterman 2008). “Orthodox” economists today find it profitable to disagree with one another and do so continually. They do not find it profitable to disagree with those who reject the assumption that social phenomena are caused by the purposeful actions of individuals and the supposition that economics is a positive science.

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