LUIZ CARLOS BRESSER-PEREIRA

The two methods and the hard core of economics

Abstract: *While methodological sciences have no object and are supposed to adopt a hypothetical-deductive method, substantive sciences, including economics, should use an empirical or historical-deductive method. The great classical economists and Keynes did that and were able to develop open models explaining how equally open economic systems work. Thus, the hard core of relevant economics is formed by the classical microeconomics and the classical theory of capitalist economic growth and by Keynesian macroeconomics. In contrast, neoclassical economists aiming to build a mathematical science wrongly adopted the hypothetical-deductive method and came to macroeconomic and growth models that do not have practical use in policymaking. The exception is Marshall's microeconomics, which does not provide a model of real economic systems but is useful to the analysis of markets.*

Key words: *historical-deductive method, hypothetical-deductive method, mathematical economics, new historical facts, open systems.*

A central theoretical problem facing economics and the other social sciences is the choice of the preferred method or approach of inquiry. Classical economists such as Adam Smith, Thomas Malthus, and Karl Marx used essentially a historical-deductive method: they tried to generalize out of their observation of the economic reality around them. David Ricardo developed highly deductive models, but the basic facts in which he based his reasoning, such as the higher rents received by the owners of the more productive lands, came from his observation of economic reality. The idea of adopting the hypothetical-deductive method occurred to Stuart Mill (1974), who suggested that with it—that is, with the adoption of the *homo economicus* as basic assumption—economics would be able to overcome its imprecise character. He did not make full

Luiz Carlos Bresser-Pereira is Emeritus Professor, Fundação Getulio Vargas, São Paulo, Brazil.

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use of the method, but since the 1870s, with the rise of the neoclassical school, that method began to be actively adopted. Yet, as Alfred Marshall was the dominant figure and a great economist, the formalization of economics and its alienation of reality did not happen immediately. The reduction of economics to mathematical models that the hypothetical-deductive approach permits would take place in the 1930s when a number of engineers and physicists came into the profession (Mirowski, 1991). John Maynard Keynes represented a reaction to the primacy of the hypothetic-deductive method in economics, and to its consequence, the tendency of "mathematization" of economics. Using essentially a historical-deductive method, Keynes changed the history of economic thought and of economic policymaking. Soon, however, after Kenneth Arrow and Gérard Debreu fully formalized the general equilibrium model, neoclassical economics returned to the hypothetical-deductive approach (Blaug, 2002), while the Solow model made growth economics consistent with general equilibrium. A little later, the assumption of the rational expectations by neoclassical macroeconomics also allowed for its consistency with general equilibrium.

A short period of enchantment with the logical consistency achieved followed, but, soon, the actual economic realities were imposed. The first sign of the crises confronting neoclassical economics came when central banks abandoned the monetary target policy. Today, it is clear that neoclassical macroeconomics and neoclassical theory of growth using the hypothetic-deductive method are unable to explain and predict the behavior of the social and institutional complex realities. Academic mainstream economics came to a crisis, the signs of which are many. As Blaug asserted, "modern economics is sick; economics has increasingly become an intellectual game played for its own sake and not for its consequences; economists have gradually converted the subject into a Social Mathematics in which analytical rigor as understood in mathematics is everything and empirical relevance (as understood in physics departments) is nothing" (ibid., p. 36). At an undergraduate level, textbooks continue to basically teach Keynesian macroeconomics, but most of the rational expectations macroeconomic theory taught at the graduate level have little practical utility. As a distinguished neoclassical macroeconomist, Mankiw (2006, p. 42), resuming his own experience in Washington, acknowledged that "scientific" macroeconomics is definitively not used by policymakers; what they do use is essentially Keynesian macroeconomics. In his words: "The sad truth is that the macroeconomic research of the past three decades has had only minor

impact on the practical analysis of monetary policy" (ibid., p. 42).[1] Yet it had practical relevance in the deregulation process of financial systems that led to the present and major 2007–8 banking crisis.

In this paper, I discuss economic methodology opposing these two methods, criticize on this ground neoclassical economics as it intends to analyze economic systems using the hypothetical-deductive method, and conclude that the core of modern economics is not formed by the general equilibrium model, the Solow model, and the neoclassical macroeconomic model, but by classical resource allocation, distribution and growth theory, and Keynesian macroeconomics. The latter open models are able to size up the economic system as they have a reasonable correspondence to reality and offer practical policies, but the former closed models fail in this task insofar as they adopt the hypothetical-deductive method that is appropriate to methodological sciences; in substantive sciences, such as economics, this method plays or should play only a subsidiary role.

Hypothetical-deductive and historical-deductive methods

In all sciences, it is presupposed to permanently combine induction and deduction. Yet, either one or the other approaches tend to be dominant. Many think that in economics, the fully scientific method is only the hypothetical-deductive one because it, alone, allows precise and quantifiable hypothesis. Insofar as the method starts from a principle—the *homo economicus* whose behavior is fully predictable—complemented with a few additional assumptions, this method allows a precise and mathematical theory. Differently, the historical-deductive method does not part from simple assumptions, but rather from the observation of a complex and changing reality. Both are deductive, but while one is hypothetic—starting from an assumption—the other is historical—starting from observed sequences of facts and keeping close to them during the deductive process.

[1] In his paper, Mankiw (2006) sees neoclassical macroeconomics based on rational choice as "scientific," while Keynesian economics would be a kind of "engineering." He remarks on the continuing application of Keynesian macroeconomics, and laments the lack of practicability of the neoclassical one; he claims his own clan, the new Keynesian school (actually a neoclassical school) to be a little more practical, but not much, and hopes that in the future, the gap between the "engineers" achievements and the "scientists" nonachievements will diminish. Blinder (1998), who also had experience in Washington, came to similar conclusions eight years before on the irrelevance of academic macroeconomics to central bankers.

In this paper, I begin from a different assumption. Starting from a basic classification of sciences, I distinguish "methodological sciences," such as mathematics, statistics, econometrics, and game theory, which do not have an object of study but are instrumental to reasoning, from "substantive sciences," which do have an object (Hempel, 1966). The latter are subdivided into natural sciences, such as physics and biology, and social sciences, such as economics and sociology. Methodological sciences are presupposed to adopt the hypothetic-deductive method, and their propositions and models have logical consistency as truth criterion, while substantive sciences are presupposed to use primarily the historical-deductive method, and their propositions and models have as truth criterion coherence with reality or, in pragmatic terms, predictive capacity—its capacity to orient action.[2] Given that economics is a substantive social science, the object of which is open and complex—economic systems—my claim is that economics is supposed to use primarily the historical-deductive method. Only secondarily should it resort to the hypothetical-deductive method, here understood as the reasoning process that starts from the assumption of economic rationality and derives theory from this basic assumption. The use of the hypothetic-deductive method is legitimate because all sciences are presupposed to develop their own heuristic concepts and models. Besides, if we understand economics as aiming to explain economic systems and to develop tools to understand markets, economics will have to use the hypothetic-deductive method to fulfill this second role. But the historical-deductive method must have precedence because the complexity and changing character of economic systems preclude the possibility of deriving relevant models just from a few assumptions.[3]

In our society, there is a kind of reverence to mathematics that makes scientists dealing with substantive objects to mirror mathematics, and develop closed models that are logically consistent, but with almost no relation to the object they are presupposed to analyze—in the case of economics, the economic system. René Descartes observed that mathematics is the only discipline that is endowed with evidence and certitude,

[2] Charles Peirce, founder of pragmatism, developed this pragmatic criterion. He is often viewed as a relativist. Actually, he is a pragmatic realist. He cannot be considered a relativist unless we have a broader understanding of relativism. See Hoover (1994) and Wiener (1958).

[3] Because the hypothetic-deductive and the empirical or historical-deductive method share the word "deductive," that word could be dispensed with. Yet I retain it in order to emphasize the importance of deduction in any knowledge process, and also, in the case of the historical-deductive method, to avoid confusing it with mere historical analysis, which would not aspire to deducing a theory.

and suggested that these criteria should be applied to all sciences. Immanuel Kant followed him in this matter. Although acknowledging that mathematics has no object apart from rational construction, and viewed it as science per se, in which a priori reasoning through precise deductive demonstrations is fully realized. But he recognized that physics—the substantive science that most successfully used the hypothetic-deductive method and neared the mathematical approach—could not have the precision of mathematics. Descartes and Kant established a mathematical ideal for the substantive sciences—natural and social—ignoring or underestimating the fact that, different from mathematics and logics, the substantive sciences have an object or substance that is complex and can be effectively analyzed only if it is empirically investigated, if induction and deduction are systematically combined. In the modern era, Carl Hempel—who viewed himself as representative not of logical positivism that defines the Vienna Circle but of logical empiricism—explicitly advocated that the hypothetical-deductive method should be applied to sciences with more than mere formal content. This would be true if we broaden our concept of the hypothetical-deductive method and consider that all models that start from an observation or real event would also be hypothetic-deductive. Actually, in this case, the basic method used is the historical-deductive method—observation comes first. The problem is not in rejecting the use of the hypothetical-deductive method in substantive sciences, but in attributing priority to it with respect to the empirical-deductive method. This is a mistake, as well as to use as main truth criterion logical consistency instead of adequacy to reality or predictability.

The problem of the two methods is not exclusive to economic theory. It also exists in philosophy and in political science. Although the philosophers who use primarily a hypothetical-deductive method tend to be idealists recognizing reality only represented in ideas, philosophers adopting primarily a historical-deductive method are realists. In political theory or political philosophy, following the historical tradition founded by Aristotle, the state or the political regime was seen as the result of historical evolution, as the outcome of a process of increasing division of labor and historical forms of domination—tribes, clans, cities, city-states, empires. With Thomas Hobbes, however, and the contractual theory, the state is logically deduced from the assumption of the previous existence of a state of nature where war between men was the sole reality, and from the decision of men, at a certain point, to establish a contract through which they renounced their original freedom in favor of a legal order imposed by the state. The assumptions had no correspondence in reality, but, adopting this theoretical strategy, contractualist philosophers were

able to logically deduce the state from the will of free individuals. The monarch's legitimacy ceased to be rooted in tradition and religion to arise from the social contract. Even if Hobbes, with his theory, intended to strengthen the power of the absolute monarch by changing the legitimacy basis of political power, he and his great enlightened successors only open the way to the modern concepts of people and citizenship, and to the reality of democratic regimes. Contractualism, albeit unrealistic, set up powerful normative bases for the future political development of nation-states and was a tool for the affirmation of civil and political rights. Yet it should be remarked that the hypothetical-deductive method just allowed for a very abstract and normative concept of state. For the actual analysis of political regimes or for the understanding of the several forms that the modern state assumed historically and geographically, the precedence of the historical-deductive method applies.

With the great mercantilist and classical economists, economics or political economy began as a historical-deductive social science. As early as in the 1830s, Mill, aiming to give to economics a precision similar to mathematics, proposed the adoption of the *homo economicus.* He knew that this objective was impossible, but in his 1836 methodological essay, he suggested that it is possible to come close to this objective with the help of that assumption and the corresponding hypothetical-deductive method.[4] In the 1870s, the history of economic thought experienced a major turn. The development of an alternative to the value theory of labor (that had proved unfriendly after Marx plus value theory)—the subjective or marginal utility value theory—created space for the dominance of the neoclassical or marginalist school. Economic theory, crowned by the general equilibrium model, soon became the most radical hypothetical-deductive of all substantive sciences.[5] This dominance was challenged by the Keynesian revolution, coming in a moment of crisis of an economic system that aimed at being purely market coordinated. Besides legitimizing a mixed-market state-coordinated economic system, for the first time Keynes and Michal Kalecki offered a full macroeconomic model of modern capitalist economies. Since the 1970s, however, mainstream economics was again attracted by the consistency and precision allowed by the use of a hypothetical-deductive method—and neoclassical

[4] Mill (1974). On Mill's economic methodology, see Hausman (1992).

[5] Yet this fault cannot be attributed to Léon Walras, who was effectively concerned with the real world. The rational equilibrium would come from a difficult process that he called *tatonements.* As Blaug (2002, p. 37) underlines, it was after the Arrow–Debreu model that economics became "purely formal"—purely hypothetical-deductive.

reasoning was restored in academic economics. After that, the problem that mainstream economics will face is, again, lack of explanatory and predictive power. In addition to becoming a set of abstract models, it becomes increasingly normative instead of positive, insofar as the hypothetical-deductive method in social science leads to this outcome. If we deduce something from the assumption of the rational economic agent, this means not only that the economic agent acts usually like that but also that it "should" act as such.

In the other social sciences, particularly in sociology and anthropology, the historical-deductive method remained dominant after Marx, Émile Durkheim, and Max Weber, but under attack. Weber, with his theory of action, opened the way to a moderate form of methodological individualism based on a posteriori search for rational explanations, but remained an essentially historical analyst (Weber, 1922, ch. 1). The same happened to the modernization school of sociology that has in Talcott Parsons its main representative. In the second half of the twentieth century, however, together with the neoclassical restoration, rational choice theory appeared in political science having as inspiration neoclassical microeconomics. As in the case of contractualist philosophical theories, it allowed for several interesting developments in the discussion of political institutions. Yet it radically presumes that political agents behave like economic agents trying to maximize their personal utility, and establishes a close analogy between market and politics.[6] This makes no sense in the political realm where actions do not have self-interest as sole criterion; where elected and nonelected civil servants are also supposed to be guided by public interest. When rational choice researchers are just concerned with finding a posteriori rational explanations for social and political phenomena that are analyzed historically, this approach may be fruitful, particularly in imparting precision and internal consistency to reasoning; after using the historical-deductive method to grasp the economic or the political system, the political scientist can complement its findings with the search of the underlying rational causes.[7] Yet in doing that, political scientists (more than economists) should take into account, as Elster (1997) suggests, that their concept of rationality should be broader, including public interest issues, because the laws ruling the market are not the same as those governing the forum. And they should also take into consideration the social

[6] Downs (1957) inaugurated this mistaken route.

[7] Przeworski's (1985) classical analysis of social democracy is a good example of this a posteriori approach.

or historical constraints imposed on agents by the structural, cultural, and institutional features of society, which are eminently historical.

The historical-deductive method may also be called empirical-deductive, which is the more appropriate denomination when we refer to natural sciences. The empirical-deductive method is principally analytical; the historical method is both analytical and dialectical. The analytical method is applicable to the methodological and the natural sciences, particularly to physics.[8] In the case of the social sciences, it is practically unavoidable to think not only historically but also in dialectical terms. In the social realm, causes and consequences are blurred, the consequence often feeding back to the assumed cause. Social reality is intrinsically historical because it is permanently changing, and is intrinsically contradictory because social systems are constituted by individual actors who, although socially conditioned or determined, are free and responsible to make choices that are often conflicting, because they are learning actors who change with experience, and because, in doing so, they permanently change the social structures and principally create culture and institutions that, in their turn, change individual preferences.

In social sciences, where empirical observation is crucial but justification is always relative, the logic of discovery plays a major role. That is why hermeneutics has become so relevant in our time. I do not go as far as some hermeneutic and postmodern thinkers who derive from the complexity and ambiguity of social and economic systems a relativist negation of the possibility of achieving truth, but I am equally critical of the intellectual arrogance present in the attempt by social scientists—particularly economists—to reduce this complexity and ambiguity to models deprived of reality content. Although economists readily admit the need for a positive or empirical method to study their respective subjects—and for that reason, I see econometrics as a powerful tool for achieving this objective—they paradoxically aspire for an absolutely precise model of reality. If such an ideal is not achievable in the natural sciences, even in physics, where the elements forming the systems under study have no freedom of choice, what can be said of the social sciences, where humans not only have such freedom but also can learn from history, build institutions, and modify their behavior accordingly?

I acknowledge that the claims I make in this paper are bold—that, if they are true, they allow for a different understanding of economics and economic schools. But they do not come from the void. There is an old

[8] It is less applicable to biology, where causal relations are often replaced by functional ones.

tradition of economists using explicitly the historical method. Keynesian economics remains a bastion of this form of thinking and researching, although not all Keynesian economists realize that. More recently, economic methodologists such as Mäki (1992; 2002) with his "method of isolation in economics," and Lawson (1997; 2003) with his "ontological realism," have been working on a realist approach to economic theory that guards relation to what I am proposing here. On the other hand, ideas opposing social explanations to individualist explanations, or open to closed systems (Chick, 2004; Dow, 1996), are directly related to my views.

The object of economics: economic systems

Economics is a substantive science that has as object *economic systems,* their stabilization, growth, and distribution properties. The objective is to understand and explain such systems, to predict their developments, so that economic agents can either adjust themselves to them, or influence them through economic policy. The study of the history of economic thought shows that all major economic schools aim to arrive at the understanding of the economic systems. Given that, the proper method to economics is an empirical method, more specifically, a historical-deductive method. This does not mean that economists should not also use the hypothetical-deductive method, but that they should reserve it to the elaboration of the concepts and tools that they use to understand market-coordinated economic systems. The historical-deductive method is "historical" because it starts from the observation of empirical reality and tries to generalize out of it; it is "abductive" because it develops hypotheses based on a few observations; it is "deductive" because it involves a series of deductions; and, finally, it is inductive because it checks the hypotheses whenever possible with econometric tools that are intrinsically inductive. The objective is to achieve a general vision of the economic system; to formulate historical models that relate observed regularities and tendencies in such a way as to form a theory.[9] The alternative

[9] Abduction is a concept proposed by Peirce (1878), who saw logical reasoning as composed not only of induction and deduction but also of abduction. Abduction, which Peirce also called the "method of hypothesis," is the process of inferring a hypothesis by proceeding from one or a few facts—facts that will be more interesting insofar as they are surprising to the researcher. Thus, as Hands observes, "abduction is the stuff of all insight . . . it is a relatively loose notion of inference" (2001, p. 224). Abduction is part of the logic of discovery. As Yu says, "for Peirce, progress in science depends on the observation of the right facts by minds furnished with appropriate ideas. Definitely, the intuitive judgment made by an intellectual is different from that made by a high school student" (2005, p. 7).

is to believe that economics is a theory of choice, or a box of tools to understand market systems, but in this case, it ceases to be a substantive science to become a methodological one; it ceases to be the science of production and distribution to become a mere collection of tools to be used in the analysis of the economic systems about which our sciences says nothing. Such an alternative fails to include the central objective of economic analysis: to provide a theory that explains how economic systems are relatively stable although permanently changing, how they allocate resources and distribute income, and how they grow. Economic systems are social or historical systems based on work, coordinated by the market and other institutions, and oriented to the production of wealth. Economic systems do not exist per se, they are social systems viewed under the economic standpoint. Each social science studies the social systems under a particular perspective, but the object of study is the same. That is why institutions, particularly political institutions, are also so important in economics. Classical or political economists had no doubts that their object was the economic system, and were aware of the limitations that such a definition imposed to their research. Neoclassical economists changed this view gradually. Because their basic model of economic system—the general equilibrium model—was radically abstract, it had little use in explaining concrete economic realities. As a trade-off, however, the hypothetical-deductive method proved useful in the construction of a series of concepts and partial models that are present in microeconomics.[10]

Economics does not aim to study all kinds of economic systems, but the modern ones—the capitalist systems—that are based on two major economic institutions—markets and money. Both are socially constructed institutions that allow for the exchange of goods and the corresponding division of labor and determine the allocation of resources and the distribution of income. In every country, markets and money are regulated by the state, and internationally by organizations such as the World Trade Organization (WTO). As they are socially built, economic systems have objectives that are related to the political objectives of society. Reflecting the political objectives that modern societies gradually defined, the underlying principle or logic of modern economic systems is not only survival or stability but also the well-being of its individual components, and environmental sustainability. Economics is supposed to explain,

[10] I refer, for example, to the demand and supply curves, the marginal concepts, the elasticity concepts, the short- and long-term concepts, and so forth—in sum, to all the tools present in microeconomics. Models defining market failures also fall into this category.

first, how actual systems allocate scarce resources; second, how they remain relatively stable through the economic cycle; third, how they grow; and, fourth, how they distribute the generated income. Classical and neoclassical microeconomics offered the core answers to the first problem; Keynesian macroeconomics to the second; classical political economy to the third and fourth. Yet, although classical and Keynesian economics offered answers on how actual economic systems work, neoclassical economics did not. Its central model—the general equilibrium model—is a market model without money and other institutions that are essential to a minimally comprehensive picture of the whole. The theory of how economic systems grow through time was developed by the classical economists, particularly Smith and Marx.[11] Both understood that the object of economics—or of "political economy," as they called the discipline in their time—was the capitalist system. They were interested in understanding the logic behind the way capitalist economies allocated resources, which both identified as the labor theory of value and prices, and in understanding how they grew: Smith attributed to the division of labor and to capital accumulation, and Marx to the same capital accumulation and to technological progress. The first general theory of how real economic systems effectively operate in the short run was formulated by Keynes. He was concerned with understanding the actual economic system, but from the short-term perspective of stability and full employment rather than from growth. In between, the neoclassical or marginalist school attempted to build a microeconomic alternative to the classical and to what would be the Keynesian theory, but was only able to achieve an extremely abstract view of a market system that, although having heuristic qualities, has little connection with actual capitalist economic systems.

If we exclude from microeconomics the marginal utility theory of value and the general equilibrium model—two models that aspire to describe reality and, thus, form the core of neoclassical thinking—microeconomics will be a methodological science such as game theory and econometrics are. This follows from the argument I adopt here. If neoclassical economics failed to explain and predict economic systems using a method not fitted to substantive sciences, it must be discarded. But if this school was able to develop tools to analyze markets and assist economic decision making, there is no reason for not using its positive aspects. Limited to

[11] This naturally does not prevent certain Marxists from developing fully hypothetical-deductive methods. These are mere deviations, as neoclassical economics is a deviation from Smith's economics.

this tool role, neoclassical microeconomics remained relevant. And, as it already happens with other methodological sciences such as econometrics or game theory, it will not be asked to be realist. Economics has to be realist, has to explain and predict the behavior of economic systems; tools are just supposed to be consistent and useful.

The historical-deductive method and the new historical fact approach

To study complex and changing economic systems, the appropriate scientific method is the historical-deductive. It is historical because it is based on the observation of historical economic reality, where each event is unique, but has sufficient relations with other economic events so that it is possible to look for regularities or at least tendencies. Regularities will not necessarily be found. Actually, not all scientific explanation calls for them. There are no "regularities" in the "big bang," or in the Industrial Revolution; in economics, some objects of study are frequent, others are not, and others take place only once.[12] Each social or economic event is unique, a regularity materializing only when certain events that share basic similarities tend to repeat over a period of time. In some cases, we cannot speak of regularity but of "accumulativity": even when such events lack regularity, their emergence may be the outcome of the accumulation of several interrelated factors permitting the detection of a tendency.[13] When regularities materialize, they appear as historical events related to the conventions or institutions that give meaning to them and constrain their regularity.[14] Thus, contrary to the economist who sees economics as a "natural science," this historical approach requires that the researcher includes in the social and economic reality which is the object of his or her explanatory models conventions, routines, or institutions, as Nelson and Winter (1982) and Simon (1996) so well argued, because such reality is not natural but man-made—it is an artifact.

In economics, such as in any other science, it is necessary to observe the economic facts—particularly the new ones—connect them with the other social and political facts, and develop new explanatory and predictive hypotheses; in a second stage, to develop models that are as simple

[12] I owe this observation about regularities to Ramón Garcia Fernández.

[13] I owe this observation on the accumulativity of events to Marcos Ribeiro Ferrari.

[14] We know the importance that Keynes attached to conventions. Since the 1980s, institutions became a must in social sciences. Economists and other social scientists realized that it was impossible to understand society and the economy without considering formal and informal laws.

as possible; and, finally, to go back to reality and look for empirical justification. Formalization is a mere expedient to facilitate—never to complicate—the communication of the model.[15] In the process of developing a theory, first the economist, looking at the economic realities around him or her, will have an intuition. Second, the economist will submit his or her original intuition to the knowledge he or she already possesses of the economic processes using the tools and models at his or her disposal. But, if the researcher's vision involves real novelty, he or she will soon realize that new concepts and additional tools will have to be developed to support the new theory (Meek, 1967; Schumpeter, 1949). In the first moment, the economist will abduct from the observation of reality a tentative hypothesis; but soon he or she will have to resort to deductive reasoning; and, finally, he or she will have to inductively come back to the facts to check econometrically whether they confirm the theory; econometrics is essentially an inductive exercise. His or her objective will be to understand a real economic system as a whole. This economic system may be the Brazilian macroeconomic system, the European monetary system, or the Chinese growth system. The essential is to understand the logic or the underlying principles that organize this system, to understand how its several elements are interconnected and vary one with another; and also to be able to predict its tendencies, and how the system will change if certain policies or some more permanent institutions are introduced. In this process, abduction, deduction, and induction will be intrinsically complementary methods of inference: each is impossible without the other. Yet, while the hypothetical-deductive method corresponds to logical time, the historical-deductive deals with historical time.[16]

Using primarily the historical-deductive method, the researcher knows that induction does not lead to definitive truths, but he or she is content with the open models he or she obtains. Economic facts or economic relations take place in historical time, are permanently changing, and, so, generalizations, which must be made to develop a theory, are supposed to be modest and provisional. Complex realities—economic

[15] The assumption that formalization is an indispensable condition of economic thought is adopted even by neoclassical economists who do not limit themselves to doing normal science. This is the case with Krugman (1999), for instance, who did not hesitate to state that the true scientific work of inserting externalities in the theory of economic development through the *big-push* model—one of the central models of the theory of economic development—was not performed by Rosenstein-Rodan (1943), who created it, but by Murphy et al. (1989), who formalized it.

[16] I owe this observation to Alain Herscovici.

systems—require open models.[17] Their complexity is much wider than the general equilibrium model presumes. The potential variables are so numerous that many of them, although relevant, cannot be formally included in the model. On the other hand, acknowledging the contradictions existing in reality, models are supposed to be partially undetermined. Great economists used principally the historical method, but combined in different degrees with the hypothetical one. Sometimes they realized that this practice leads to contradictions, but they were great enough—and this was typically so with Marx, Joseph Schumpeter, and Keynes—to live with their contradictions instead of attempting to formulate comprehensive and absolutely consistent theories.[18]

Once the economist has developed a model out of his or her empirical observations and of econometric research, he or she will try to reduce the degree of intrinsic uncertainty of such a model through the search for rational microfoundations. This search gives consistency to the model. This heuristic strategy is somehow similar to the methodological distinction made by Weber (1922, ch. 1) between understanding and explanation. The social scientist should try first to understand social and economic phenomena, find their regularities and their distinctive features, adopting an essentially historical analysis that leads him or her to propose some stylized facts and their logical connections. Afterward, however, or even at the same time, he or she should explain the cause and effect relations that were empirically found with rational motivations. In this case, the researcher should not be deducing the theoretical relations a priori, but a posteriori, finding the rational motives behind.[19]

[17] This view of economic methodology was particularly developed by and Chick (2004) and Dow (1996). Dow defines an open system as a system in which "not all the constituent variables and structural relationships are known or knowable, and thus the boundaries of the system are not known or knowable" (ibid., p. 14).

[18] Consider, for example, Schumpeter, who loved to say that the general equilibrium model was the highest achievement of economic theory, but based his own theory of innovation and the entrepreneur on the critique of the circular flow—a simplification of that model.

[19] Habermas studies this methodological approach proposed by Weber and remembers that Weber begins his 1922 book stating that "sociology is a science which attempts the interpretive understanding of social action in order thereby to arrive at a causal explanation of its course and effects" (quoted in Habermas, 1988, p. 19). And Habermas summarizes Weber's methodological vision stating that "Weber analyzed particularly the articulation between explanation and understanding. . . . The general theories make it possible to deduce hypotheses related to the empirical regularities. Those hypothetical laws have an explanatory function. Unlike natural processes, however, the regularities of social action have the characteristic of being understandable. Social actions belong to the class of intentional actions, which we grasp by reconstructing their meaning" (ibid., p. 19).

It is important not to confuse the historical method described in the previous paragraphs with the German historicist school of Gustav Schmoller and Max Weber. It is true that the historicists did not reject theory, but they saw narrow limits for the development of theoretical models—limits that later on Keynesian and Kaleckian macroeconomics broadened considerably.[20] However, there are significant similarities between the historical-deductive method advanced here and the historical method adopted by Weber (1906, p. 72). Studying economic laws, Weber did not define "laws" in the narrow sense used by natural sciences, but as "*adequate* causal relationships." The aim of political economy is "the knowledge of the historical phenomena in their concreteness . . . the most general laws, because they are most devoid of content, are also the least valuable" (ibid., p. 72). It is also necessary not to confound the historical-deductive method with the search for a theory of economic change as proposed by Nelson and Winter (1982). The central criticism that these distinguished economists have of neoclassical economics is that it does not account for processes of economic change. They therefore propose to replace it with an evolutionary theory—an important offspring of historical-deductive schools of economics. My own criticism of neoclassical economic theory—the one that I am developing in this paper—is not that it is static, nor, as we will see, that the *homo economicus* assumption is not realist, but, starting from the assumption of rational self-interest behavior, that it uses primarily a method that is appropriate to methodological rather than to the substantive sciences; that attempts, from a few initial conditions, to deduce models supposed to explain complex and changing economic realities.

The starting point in the historical-deductive method in economics is the assumption of powerful but imperfect markets. When markets are perfect, they are timeless, and there is nothing new to analyze, and no policy needs to be proposed. Using the historical-deductive method and a variation of it that I call the "method of new historical facts," the researcher will start from the assumption that the existing knowledge about a given economic reality was reasonably satisfactory up to the moment that new historical facts—technological progress, institutional change, major political events, wars—changed it. Changed in what direction, to what degree? The use of the new historical facts approach will help us to respond to these

[20] I do not believe that Schumpeter (1959, p. 80) was unfair toward Schmoller when he states that he used a conceptual apparatus but "theorized weakly." According to Schefold's observation, "Schmoller's main work, the *Grundrisse,* remained rather traditional in its theoretical part—the treatment of value and price was not too far away from mainstream neoclassical economics" (1987, p. 257).

questions. The identification of the new fact or facts will be instrumental to the development of a new explanatory model of the economic system under scrutiny. The researcher will not need to start from the beginning, but just add to his or her model the new facts that changed reality. In this way, he or she will not be able to understand the process of economic change itself, but to understand how the economic system moved from one historical moment to another, and to identify the peculiar characteristics of the new historical phase or the new historical or economic reality. The detection of the new fact may refer to an event that is not exactly new: it already existed for some time, but had not yet been perceived. When a researcher discovers it, this fact becomes a new fact insofar as it requires the modification of the existing explanatory models. In the realm of the social sciences, the new fact gives birth to the problem to be solved at scientific and practical levels. Understood in these terms, the method of new historical fact is related to abduction—or the "method of hypothesis"—that begins from the researcher observing a surprising event that will elicit his or her imagination and lead to the formulation of the hypothesis. And, as already happens with abduction, is not a method pertaining to the logic of justification realm but to the logic of discovery.

The method used by the classical economists to analyze the capitalist revolution or the emergence of market-coordinated economies, as well as the method that Keynes originally employed to explain cyclical fluctuations and establish the foundations of macroeconomics, started from the observation of new historical facts, which involved ruptures or discontinuities that required the acknowledgment of new regularities, and implied the definition of new concepts and the analysis of the logical connections between the relevant economic variables. Smith acknowledged the beginning of the industrial revolution, and changed the focus of economic analysis from trade to production; Marx understood that the capitalist revolution was the tectonic new historical fact that was changing the world and made an unsurpassed analysis of the capitalist mode of production; Keynes built the first full economic theory based on the historical-deductive method writing the *General Theory* after World War I, the Versailles Treaty, the hyperinflation in Germany and Central Europe, and the great depression that had changed the world economy. It was only after observing the new regularities and tendencies that were emerging and after developing the new concepts that those great economists were able to link the variables and build their models. The contribution of Keynes in this matter is particularly relevant because, with the *General Theory,* he showed that, using the historical-deductive method, it was possible to formulate an abstract and formal model that

was, at the same time, near to economic reality, practical in orienting policy, and simple and general enough to constitute a definitive contribution to economic theory.

Validation of the hypotheses developed according to the historical-deductive method will depend on research—usually econometric research. Econometric tools are limited to the verification of some specific characteristics of a much broader problem, and often their results are disappointing as the causes and consequences are not clearly distinguished, or insofar as relevant variables were not considered. For each economic problem, usually econometric evidence is found to justify opposite theories. Yet none of these limitations should prevent us from using econometric tools. On the contrary, if the historical-deductive method is presupposed to start from the observation of reality, such observation can be powered by econometrics. When historical series of data are involved, the researcher must either start from assumptions about such historical discontinuities in order to make sense, or identify the occurrence of such discontinuities with the use of econometric methods.[21] In any circumstance, once both the new historical fact and the discontinuity have been identified, the subsequent econometric analysis will have to take them into close consideration.

Besides econometric tests, it is important to check the model in terms of its practical use in predicting outcomes and in formulating economic policy. In theoretical terms, there is no better validation for an economic theory than the possibility of deriving reliable predictions from it. In pragmatic terms, a theory is validated when it is possible to deduce economic policies that prove to be effective. In Brazil, for instance, the Plano Real, which in 1994, ended the high and chronic inflation, was based on the inertial theory of inflation that some Brazilian economists had previously developed. The success of the Plano Real in neutralizing inflation was a validation of the theory.

The hypothetical-deductive method

The hypothetical-deductive method used by neoclassical theory is essentially aprioristic. It assumes that economic agents maximize their utility, and from this simple assumption, combined with others such as stable preferences, decreasing returns, perfect information, and so forth, they deduce logically and mathematically the whole model. Its own internal

[21] We should not overlook the fact that, in some cases, a continuous change may eventually also imply a discontinuity.

assumption is that it is enough to have the initial conditions defined to know what the consequences will be. According to Prigogine (1997), this form of methodological determinism is timeless, implying perfect or logical causality. Economic variables are determined by initial conditions. Nonpredicted irregularities arising from the actual historical processes are ignored: there is no "path dependence."[22]

Using this method, neoclassical economists, first, deduced the microeconomic model, second, extended it to economic growth with the Solow model, and, third, came to the neoclassical macroeconomic model (the new classical model of Robert Lucas), where the macroeconomic model also becomes fully closed and perfectly consistent with its other two branches.[23] With that, neoclassical economics offers a "complete" or "encompassing" economic theory—micro and macro, static and dynamic, but a theory with little application. The general equilibrium model helps to understand how a market system allocates resources, but it is so abstract that it fails to have predictive power. The Solow model was born from a critique of the Harrod–Domar model; its major achievement was not really to show that technological progress is key to economic growth, because this was a central argument of the classical school, but to present a model of growth consistent with general equilibrium. The claim that the large "residuum" found in the regressions of growth equations measures the contribution of technology to economic growth is debatable; the claim made by econometrists trying to relate growth with the x or y variable that they are "using the Solow model" as the theory behind is just rhetoric: actually, they are just testing the simple hypotheses contained in their econometric tests; the conclusion derived from it that "technology is more important than capital accumulation in explaining growth" is just nonsense: both are fundamental, and so much intertwined that it is impossible to separate one from the other. The new classical macroeconomic model gained some currency after it was presented because it achieved at the macro level what the Solow model had achieved at the growth level—consistency. Yet, soon became evident its incapacity to explain and predict macroeconomic performance, and central bankers and economic analysts abandoned it together with its associated monetary targeting policy.[24]

[22] See Prigogine's ideas applied to economics in Ferrari (2003).

[23] I am understanding that the real business cycle model is just an adaptation of the new classical model.

[24] The danger involved in what Schumpeter called the "Ricardian vice" is present here.

This poor performance of neoclassical economics in explaining and predicting economic systems is associated to the role it gave to the *homo economicus*. Yet when we study economic behavior, although other motivations may be relevant, the rational or self-interest assumption reasonably applies. Why, then, is it the *homo economicus* assumption that causes the failure of neoclassical economics? Not because this assumption is false, but because it is impossible to deduce the economic system from such simple assumption; because complex and changing realities cannot be deduced just from initial conditions. The deductive models derived from such an assumption necessarily fail to encompass the reality present in economic systems. Actually, neoclassical three-core models (general equilibrium, Solow and Lucas models) are committed to logical consistency, not with correspondence to reality. The numerous and persistent contradictions or anomalies do not lead to the rejection of the models; the protective belt that envelops the core theory is absolute because it is not based on the correspondence and on the predictability criteria, but on its logical coherence. All anomalies, such as monopoly power, externalities, path dependency, information asymmetry, and moral hazard, are elegantly defined, and viewed only as disturbing factors or market failures of a model that is internally consistent. Institutions, even money, were just excluded from the core neoclassical mode. Money is seen as "neutral"—that is, not having consequence on the real variables. When institutions were finally acknowledged, they were also abstractly "deduced" from the concept of transaction costs, instead of being understood as historical realities permanently evolving through time as societies regulate social behavior.

Economists with a strong internal demand for consistency and precision, and who feel particularly attracted by mathematics, often become fascinated when introduced to a theory that is able to be clear, encompassing, and mathematically precise to the extent that it is derived hypothetical-deductively. In this way, they believe that economics becomes fully a formal and so, "scientific," as if science and formalization were the same thing. Mill's belief that it would be possible to verify the economic theory developed according to the hypothetical-deductive method continues to haunt economics in the face of complex and changing economic realities. Today, this is the main reason for the growing irrelevance of the "scientific," rational expectations macroeconomics taught at the graduate level in the universities. Adopting the hypothetical-deductive method and its crowning model—general equilibrium—economists attempt to analyze real economic systems. They start from it, and then, step by step, relax the corresponding assumptions up to the point where they would approach

the real world. This procedure, however, involves a long, tiresome, and unnatural path. Economists who try to adopt it soon realize that this is a hazardous path: they risk ending up without any model. Thus, they fall back into some kind of general equilibrium that says nothing on the real economic system under study except that markets are excellent but incomplete institutional mechanisms to allocate resources. Or they limit themselves to making specific econometric studies that may provide relevant information but are no substitutes for the macro analysis of the economic system.

To neoclassical economists, the legitimacy of their science is related to its formalization, which, in its turn, depends on the adoption of a deductive method. What I am identifying as the abusive use of mathematics, they see as the proof of their scientific endeavor. It is only when one adopts a radical methodological individualism, and derives all models from one basic microfoundation—agents' rationality—that it is possible to fully reduce economics to mathematics. Debreu's claim that "deductive reasoning about social phenomena invited the use of mathematics . . . for two of its central concepts, commodities and prices, are quantified in a unique manner as soon as the units of measurement are chosen" (Mirowski, 1991, p. 145) only partly explains the use of mathematics in economics. Mirowski, who quoted Debreu, rejects the abuse of mathematics in economics by correctly criticizing the implicit "notion that commodities exhibit a natural isomorphism to a real Euclidean vector space" (ibid., p. 145) and stresses that the mathematization of economics should be limited because "symmetries and invariances existing in market activities" (ibid., p. 153) should be explained "through the instrumentality of social institutions" (ibid., p. 155). Yet Debreu and his critic fail to realize that the central reason for the mathematization of economics does not lie in the nature of commodities but in the nature of the chosen method—the hypothetical-deductive method. Once the economist decides to derive logically the whole economic analysis from the assumption of the *homo economicus,* coupled with a few other assumptions such as the law of diminishing returns, the analysis can be fully reduced to mathematics.

The main critique

Neoclassical economics is usually distinguished from the classical economics by the substitution of the labor value theory for the marginal utility value or for its "marginalist" character. This classification criterion is valid, but according to the approach of this paper, the essential distinction is methodological. The classical school used principally a

historical-deductive method, while the neoclassical one, a hypothetical-deductive method. Even though economists know that economic agents do not always act rationally to maximize their utility, in spite of the fact that Herbert Simon's concept of bounded rationality is well demonstrated, notwithstanding all the recent experimental research demonstrating empirically that their behavior does not follow the rational logic that neoclassical economics assign to economic agents, neoclassical economics does not reject the *homo economicus* assumption because their whole theoretical structure depends on the rationality of agents.[25] This is the assumption that allows them to build their central model. When this rationality is empirically rejected, their hypothetical-deductive method turns useless. Ambiguous and contradictory agents or bounded rationality do not allow for the deduction of theories.

My central critique to neoclassical economics, however, is not on the rationality of economic agents, but on the use that was made of this assumption. What I am proposing is not to replace the *homo economicus* with a more realistic individual, but to assign to it a more modest role—to explain a posteriori the rationality of models derived from the observation of reality—while using principally the historical-deductive method. My critique is on the radical deductive character of neoclassical economics, on its attempt to achieve models from a few initial conditions, and also on the substitution of the consistency for correspondence and predictability criteria. Because economics is a substantive science, reasoning about it must start from the observation of historical facts, not from an abstract model of man. The economist is supposed to generalize models out of these historical observations. The search for rational motives is not abandoned, but it will come to explain what was observed, to understand why the observed economic behaviors are rational, or, at least, reasonable.

Neoclassical economists partially realize that. This is the reason they co-opt ideas and models that do not have microfoundations. This is why some analysts say that mainstream economics is not neoclassical anymore. In fact, when self-declared neoclassical economists must make objective economic analyses and offer policies, they often turn pragmatic and forget the neoclassical principles. Thus, differently from what happens with simple and open classical and Keynesian economic models, the complex

[25] Simon (1957) showed that economic rationality is "bounded," and that economic agents are able to achieve "satisficing" outcomes rather than maximum ones. This is consistent with Keynes's microeconomics behind the *General Theory,* which is already a microeconomics of choice rather than of maximization.

and formalized neoclassical models are of little use for policymakers and analysts. They are either excessively general when attempting to be scientific and predict behavior using the hypothetical-deductive method, or change from this method to normative realm, and oppose "rules to discretion" or assert the obvious importance of credibility.

Despite the failure of neoclassical economics to size up actual economic systems, mainstream or conventional orthodox economics continues neoclassical because it uses an essentially hypothetical-deductive method.[26] But it is not just neoclassical anymore. The anomalies were so many, and contributions from other fields, such as evolutionary economics, neo-Schumpeterian economics, experimental economics, economic psychology, game theory, or applied econometrics, were so significant that, despite being inconsistent with neoclassical thinking, they were incorporated in the mainstream as Keynesian ideas had previously been. That is why analysts are today suggesting that the mainstream is not neoclassical anymore insofar as it is becoming increasingly distant from the main tenets of such an economic doctrine—namely, rationality, egoism, and equilibrium (Colander et al., 2004; Lawson, 2006). It is true that conventional economics goes through permanent change, and that their brighter and more pragmatic adherents strive to adapt it to reality. In most cases, instead of discussing their theoretical foundations, they just develop their analyses and research independently of the neoclassical core. In other words, competent practitioners are realistic enough to use models that lack the microfoundations that neoclassical economics require. In macroeconomics, for example, the Taylor rule, which today is widely used, is just a smart rule of thumb that emerged from the observation of the effective behavior of central bankers. Nothing is further from a true neoclassical hypothetical-deductive method based on microfoundations, but this did not hinder neoclassical economists from adding to it rational expectations to make the rule consistent with their general model. Another example is the introduction of game theory in microeconomics textbooks. This was a major improvement, but game theory is really an alternative, not a complement, to neoclassical optimatization; game theory is part of the general theory of decisions; it involves choice; optimization supposes just one route, the optimum one. It is a methodological science, a theory of strategic decision making

[26] This does not mean that neoclassical economists did not offer positive contributions. Yet probably the more relevant of all—Milton Friedman's adaptive expectations theory—was only possible insofar as Friedman adopted a historical or empirical-deductive approach, and looked for microfoundations a posteriori, not a priori as is done when thinking is dominantly hypothetical-deductive.

under uncertainty, while, in pure neoclassical theory, there is no space for decision making: the agents always maximize, always choose the optimal alternative. Yet it was significantly incorporated to microeconomic books, hinting that, if we liberate neoclassical microeconomics from its substantive components (utility value theory and general equilibrium), we will also have methodological science facilitating explanation and decision making in market systems.

Why do we not determine the microfoundations of macroeconomics—the holy grail for neoclassical economists—in such a way as to have only one encompassing economic model? When one adopts primarily the historical-deductive method, such search turns irrelevant. Microfoundations are only relevant for economic theories using the hypothetical-deductive method. For a historical-deductive approach, microfoundations, or, more precisely, rational motives, may and should be searched, but a posteriori—to explain what was observed, not to define how reality is or should be. Its three branches—classical microeconomics, macroeconomics, and development macroeconomics—are already unified insofar as they deal with the same economic system, and are reasonably consistent among them. As in the case of neoclassical, classical microeconomics is here understood as the theory of prices and resource allocation, or the theory predicting prices and quantities. The difference from neoclassical microeconomics is not Marshall's remarkable formal analysis of markets and his partial equilibrium model, but the subjective theory of value and of the general equilibrium model. Three branches involve major deductive efforts, but as they are the outcome of the historical-deductive method, its open models are permanently adapted to a changing reality.

Bresser-Pereira and Lima (1996) offered an answer similar to this one as they asserted that micro- and macroeconomics are not reducible one to the other because they use different methods.[27] In this paper, I am taking one step ahead in the argument. Economics is already reasonably unified insofar as its three branches use the same historical-deductive method and their objective is to understand contemporary capitalist economic systems. I say "reasonably unified" because this unification is necessarily

[27] I initially developed this idea in a paper that, however, ended up only as a sketch (Bresser-Pereira and Lima, 1996). In addition to expanding the discussion of the two methods, in the present paper, I adopt more appropriate terms by substituting "historical-deductive" for "historical-inductive," and "hypothetical-deductive" for "logical-deductive." I eliminate only a tautological element that impaired the previous terminology; I also make it clear that the historical method to which I refer is deductive, as is every theory-building process.

loose given the complexity of the subject, and the different historical methods that the researchers use.

The core of economics

The conclusion that arises from the discussion in the previous sections is that the real core of economics is not formed by the neoclassical triad (general equilibrium, Solow's growth model, and new classical macroeconomic model), but by the contributions of the classical and the Keynesian schools—the two schools of economic thought that use primarily the historical-deductive method. The classical school contributed with its microeconomic or price and distribution theory,[28] and with its growth theory based on capital accumulation and technical progress; the Keynesian school, with macroeconomics. In the past, the contributions of the German historical school, of the American institutionalist school, and of the development economics school (in which I include the Latin American structuralist school), and, presently, of evolutionary and institutional economics, are part of this core. Classical economics developed a microeconomics that explained prices and market allocation of resources, and, principally, a long-term analysis of the capitalist system, its inherently unstable but dynamic character. Smith and Marx were key figures in this school. Keynesian economics offered a short-term and operational form of analyzing capitalist monetary systems. In the 1970s, Keynesian economics lost dominance in the academy and in graduate teaching to neoclassical macroeconomics. It did not lose dominance "because the Philips curve did not fit," but for ideological reasons (the neoliberal wave that then started up had neoclassical economics as its academic tool) combined with pseudoscientific reasons—the possibility of reducing neoclassical economics to full mathematical formalization (something impossible when the model is historically derived as in the case of Keynesian macroeconomics). But Keynesian economics continued to be practiced everywhere by analysts and policymakers insofar as its analytical and policy attributes provide predictability and orient effective policy.

Thus, the real core of relevant economics—of the science that is effectively adopted by economists in analyzing economic systems and proposing policy—is classical microeconomics and growth economics

[28] To which I offered an alternative analysis, making the profit rate constant in the long term, and the wage rate, the residuum, growing with the increase of productivity and the type of technical progress (Bresser-Pereira, 1986).

and Keynesian macroeconomics. To this core, it is legitimate to add the contributions of the neoclassical school to microeconomics, particularly Marshall's genial contribution to the understanding of markets, excluding the subjective or marginal utility theory of value (which obviously is not necessary to explain the demand curve); in this matter, the labor theory of value is endowed of higher explicative power. We also have to exclude from the core of economics the general equilibrium model not only because it is competitive with Marshall's much more useful partial equilibrium model, but principally because it conveys the false idea of market perfection and efficiency that does not facilitate economic thinking on actual economic systems but hinders it. Proceeding in this way, we are left with a large number of specific models developed by neoclassical economists (or economists with a neoclassical formation) defining market failures—many of them shrewd and insightful models that led their authors to deserve prizes and recognition.[29] In this case, however, we should remember that these economists were successful in developing their ad hoc models starting from the empirical observation of the market failure. These contributions are part of the box of tools complementing the historical-deductive analysis of economic systems.

An alternative is to view neoclassical microeconomics, again stripped of the utility theory of value and of the general equilibrium model, as the core of a *second* economic theory—a theory of choice or of decision making in markets. In this case, microeconomics would be a methodological science. It would be either an autonomous methodological science, or a part of a broader science, the general theory of decision making, from which the game theory would be the other main part. In both cases, it could be called "choice microeconomics" or "decision microeconomics." This alternative (as well as the option of viewing this intellectual domain as a complementary part of classical microeconomics) is a logical conclusion of the distinction between substantive and methodological sciences and the claim that only the latter are supposed to use primarily the hypothetical-deductive method. Given these premises, I came to this logical conclusion that is somehow confirmed by the fact that economists usually see their science not only as the analysis and the explanation of economic systems but also as a "basket of tools." This was, for example, the classical definition of economics given by Lionel Robbins (1932)—a theory of choice. It was also confirmed by the fact that, since the 1970s, game theory was added to the textbooks in microeconomics. This view

[29] I think, for instance, in models such as George Akerlof's "market for lemons."

was already well discussed by Jürgen Von Kempski and principally by Gerard Gäfgen:

> Von Kempski's interpretation of pure economics with the aid of a schema of action under pure maxims can already be seen as an attempt to interpret economic theory in terms of the logic of decision." Gäfgen has presented an analysis of the logic of the economic significance of rational actions that, following the mathematical game theory developed by von Neumann and Morgenstern, systematically incorporates economic theory into a general theory of strategic action. (Habermas, 1988, pp. 50–51)

Instead of describing actual behavior of economic agents in the context of an economic system, Gäfgen understood that "the calculus is concerned only with strategic action that leads from one situation, consisting of the acting subject and his relevant environment, to a new situation, through the application of a defined maxim of decision and a system of values" (ibid., p. 51). Yet as Habermas underlines, this kind of scientific procedure is not consistent with empirical-deductive sciences whose hypotheses are supposed to be tested:

> [Von Kempski] ignores that the question whether one can equate normative-analytic and empirical-analytic sciences of social action [or hypothetical-deductive and historical-deductive sciences in my terminology]. Sciences whose theories incorporate basic assumptions concerning idealized action proceed normative-analytically. These assumptions about action under pure maxims do not have the character of conditional, thus empirically verifiable hypotheses; their validity is hypothetically unconditional, and, thus, they establish the meaning of the possible validity of normative analytic knowledge. (ibid., p. 51)

According to this alternative, the core of economics continues to be classical and Keynesian economics insofar as they are the outcome of empirical-deductive analysis and formulate falseable hypotheses—hypotheses to be tested—but we add to the list of methodological sciences associated with economics (econometrics and game theory), choice microeconomics.

Conclusion

Summing up, my central claim in this paper is that, being a substantive social science aiming to explain and predict complex economic systems, economics should use primarily the historical-deductive method, not the hypothetical-deductive one that is appropriate to methodological sciences. Substantive sciences have in its truth criterion the adequacy

of the theories to reality, or their predictive capacity to orient action—a criterion that may only be reasonably satisfied if the researcher starts from the observation of reality, develops his or her theory, and comes back to reality to check the model. In contrast, in methodological sciences, the truth criterion is just logical consistency.

Economic science works, therefore, with two methods, but, as a social science, its primary method is historical-deductive. Its major achievements were made by classical and Keynesian economists who used principally the historical-deductive method, but a major neoclassical economist, Marshall, made a lasting contribution to economics developing the microeconomic model; he used primarily the hypothetical-deductive method but never lost contact with the economic reality he was studying. Today, the core of economics is formed by classical microeconomics, Keynesian macroeconomics, and classical–Keynesian development economics. Classical microeconomics is essentially the theory of resource allocation and the theory of distribution based on the labor value theory instead of the marginal utility theory. It may and should be completed by the major tool contributions made by neoclassical microeconomics. Keynesian macroeconomics is here understood as including all macroeconomic schools that think historically. Development economics deals with economic growth combining the supply side of economic growth—that is, capital accumulation, technical progress, education, and institutions—with its demand side—again capital accumulation, short-term macroeconomic policies aiming to full employment, and export-led growth based on a competitive exchange rate. Given its emphasis in demand and in the macroeconomic prices (the profit rate, the wage rate, the exchange rate, and the interest rate), it may also be called development macroeconomics.

The hypothetical-deductive method is attractive to economists *because it allows for precise predictions and, so, for the full math*-ematization of models. In this way, economics mirrors the "queen of sciences"—mathematics. Yet, as a trade-off, the models thus developed are unable to explain economic systems. The failure of neoclassical economics is particularly clear in relation to macroeconomics. The neoclassical macroeconomic models are seldom used by analysts and policymakers not only because their assumptions are excessively simple, but principally because they are the outcome of a hypothetical-deductive method that allows for fully consistent and abstract models with little relation to reality. When some mainstream models, particularly macroeconomic models, become more realistic, such as the ones using the Taylor rule, this is a sure sign that they are becoming historical-deductive.

In order to think about the economy, to formulate the hypotheses that explain its functioning, and to propose the economic policies necessary for socially accepted objectives (stability, growth, distribution), the economist, whose problems are today essentially related to macroeconomics and economic development, should observe the reality, verify how the phenomena occur and are repeated or show tendencies, and from this analytical process, which is initially abductive but soon turns deductive and inductive, will infer his or her model or his or her explanation. The skeptical objection that no inductive inference is justified—David Hume's well-known "induction problem"—although interesting, cannot be accepted—not only because it is against common sense, against the evidence that knowledge results mostly from inductive inferences, but also because, as Foster (2002) argues, inductive inference is justifiable whenever it represents the "best explanation" for the problem under examination. Therefore, the economist, in these two great areas, adopts the classic form of scientific research in the natural sciences: he or she examines reality and searches for regularities. But he or she does so in a much more modest way. He or she uses mainly induction, but naturally also deduction. The job of the researcher is essentially to generalize from the study of reality, which, for the social sciences, is always a historical reality. Market and money—the two main elements in economic systems—are themselves institutions, and thus historical realities.

Economics is an ever-changing discipline insofar as the economic systems are always changing. The fundamental research tool is the historical-deductive method, and a variety of it—the "new historical fact method." The economist begins with the observation of economic reality, assumes that the knowledge previously accumulated is reasonably valid, and looks for new facts, for new regularities and tendencies that are emerging historically. Out of this observation, of the historical new facts observed, of his or her own experience, and out of the economic tools available, the economist will try to develop his or her own model of the system or complete the existing ones. The researcher knows that his or her model is intrinsically provisory as the reality that is under study is historically changing.

REFERENCES

Blaug, M. "Ugly Currents in Economics." In U. Mäki (ed.), *Fact and Fiction in Economics.* Cambridge: Cambridge University Press, 2002, pp. 35–56.

Blinder, A.S. *Central Banks in Theory and Practice.* Cambridge, MA: MIT Press, 1998.

Bresser-Pereira, L.C. *Lucro, Acumulação e Crise* [Profit, Accumulation and Crisis]. São Paulo: Editora Brasiliense, 1986.

———. "Growth and Distribution: A Revised Classical Model." Paper presented at the conference "Economic Growth and Distribution: On the Nature and Causes of Wealth and Nations," Lucca, Italy, June 16–18, 2004 (available at www.bresserpereira org.br).

Bresser-Pereira, L.C., and Lima, G.T. "The Irreducibility of Macro to Microeconomics: A Methodological Approach." *Brazilian Journal of Political Economy,* 1996, *16* (2), 15–39.

Chick, V. "On Open Systems." *Brazilian Journal of Political Economy,* January 2004, *24* (1), 3–16.

Colander, D.; Holt, R.P.; and Rosser, J.B., Jr. "The Changing Face of Mainstream Economics." *Review of Political Economy,* 2004, *16* (4), 485–500.

Dow, S.C. *The Methodology of Macroeconomic Thought.* Cheltenham, UK: Edward Elgar, 1996.

Downs, A. *An Economic Theory of Democracy.* New York: Harper & Brothers, 1957.

Elster, J. "The Market and the Forum: Three Varieties of Political Theory." In J. Bohman and W. Rehg (eds.), *Essays on Reason and Politics: Deliberative Democracy.* Cambridge, MA: MIT Press, 1997, pp. 3–33.

Ferrari, M.A.R. "Sobre metodologia e economia: prelúdio para um corte teórico" [On Economic Methodology: A Prelude to a Theoretical Approach]. Paper Presented at the National Conference on Political Economy, Florianópolis, Brazil, June 19–20, 2003.

Foster, J. "Induction, Explanation and Natural Necessity." In M. Huemer (ed.), *Epistemology: Contemporary Readings.* London: Routledge, 2002, pp. 87–101.

Habermas, J. *On the Logic of the Social Sciences.* Cambridge, MA: MIT Press, 1988 [Originally published in German, 1967].

Hands, D.W. *Reflections Without Rules: Economic Methodology and Contemporary Science Theory.* Cambridge: Cambridge University Press, 2001.

Hausman, Daniel M. *The Inexact and Separate Science of Economics.* Cambridge: Cambridge University Press, 1992.

Hempel, C.G. *Philosophy of Natural Sciences.* Englewood Cliffs, NJ: Prentice Hall, 1966.

Hoover, K.D. "Pragmatism, Pragmaticism and Economic Method." In R.E. Backhouse (ed.), *Contemporary Issues in Economic Methodology.* London: Routledge, 1994, pp. 286–315.

Krugman, P. *Development, Geography, and Economic Theory.* Cambridge, MA: MIT Press, 1999.

Lawson, T. *Economics and Reality.* London: Routledge, 1997.

———. *Reorienting Economics.* London: Routledge, 2003.

———. "The Nature of Heterodox Economics." *Cambridge Journal of Economics,* 2006, *30* (4), 483–505.

Mäki, U. "On the Method of Isolation in Economics." *Poznán Studies in the Philosophy of Sciences and the Humanities,* 1992, *26* (special issue), 319–354.

———. "Some Nonreasons for Nonrealism About Economics." In U. Mäki (ed.), *Fact and Fiction in Economics.* Cambridge: Cambridge University Press, 2002, pp. 90–106.

Mankiw, N.G. "The Macroeconomist as Scientist and Engineer." *Journal of Economic Perspectives,* 2006, *20* (4), 29–46.

Meek, R.L. *Economics and Ideology.* London: Chapman and Hall, 1967.

Mill, J.S. "Da definição de economia política e do método de investigação próprio a ela" [On the Definition of the Political Economy and on the Method of Investigation Proper to It]. In *Bentham and Stuart Mill.* São Paulo: Abril Cultural, 1974, pp. 291–315. [Originally published in *Essays on Some Unsettled Questions of Political Economy,* London: Longmans, Green, Reader, and Dyer, 1836.]

Mirowski, P. "The When, the How and the Why of Mathematical Expression in the History of Economic Analysis." *Journal of Economic Perspectives,* 1991, *5* (1), 145–157.

Murphy, K.M.; Shleifer, A.; and Vishny, R.W. "Industrialization and the Big Push." *Journal of Political Economy,* 1989, *97* (5), 1003–1026.

Nelson, R.R., and Winter, S.G. *An Evolutionary Theory of Economic Change.* Cambridge: Harvard University Press, 1982.

Peirce, C.S. "Deduction, Induction, and Hypothesis." *Popular Science Monthly,* August 1878, *13,* 470–482.

Prigogine, I. *The End of Certainty.* New York: Free Press, 1997.

Przeworski, A. *Capitalism and Social Democracy.* Cambridge: Cambridge University Press, 1985.

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

Rosenstein-Rodan, P. "Problems of Industrialization in Eastern Europe and South-Eastern Europe." *Economic Journal,* June 1943, *53,* 202–211.

Schefold, B. "Schmoller, Gustav von (1838–1917)." In J. Eatwell, M. Milgate, and P. Newman (eds.), *The New Palgrave—A Dictionary of Economics,* vol. 4. London: Macmillan, 1987, pp. 256–258.

Schumpeter, J.A. *History of Economic Analysis.* Oxford: Oxford University Press, 1959.

———. "Science and Ideology." *American Economic Review*, March 1949, *39,* 345–359. [Reprinted in D.M. Hausman (ed.), *The Philosophy of Economics: An Anthology.* Cambridge: Cambridge University Press, 1994, pp. 224–238.]

Simon, H.A. *Models of Man.* New York: Wiley, 1957.

———. *The Science of the Artificial.* Cambridge, MA: MIT Press, 1996.

Weber, M. *Economy and Society.* Tübingen, Germany: Mohr Verlag, 1922.

———. "Objectivity and Understanding in Economics." In D.M. Hausman (ed.), *The Philosophy of Economics: An Anthology.* Cambridge: Cambridge University Press, 1994. [Originally published in German in 1906.]

Wiener, P.P. "Introduction." In P.P. Wiener (ed.), *Charles Peirce: Selected Writings.* New York: Dover Publications, 1958, pp. vii–xxii.

Yu, C.H. "Abduction, Deduction and Induction." *Creative-Wisdom.com*, July 2005 (available at www.creative-wisdom.com/teaching/WBI/abduction5.pdf).