THE INDETERMINATION OF SENIOR (OR THE INDETERMINATION OF WAGNER) AND SCHMOLLER AS A SOCIAL ECONOMIST

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Março de 1993
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SYNOPSIS

The propositions of pure economics, whatever be their generality and their truth, do not authorize normative conclusions, but cannot be ignored. The latter, namely what ought not to be done, is derivable from socio-economics. The derivation is to be qualified by the specificities of the case.

I have called this the Indetermination of Senior; Wagner and Marshall were quite aware of it. The habit of ignoring it is the Ricardian Vice; Schmoller's fight may have been a reaction against the latter. The Methodenstreit was the first great paradigmatic conflict between pure and social economists.

JEL: B00 Methodology and History of Economic Thought. KEYWORDS: Realism, Applicability of Theories, Ricardian Vice, Socio-Economics, Methodenstreit.

"Professor of the Fundação Getúlio Vargas and the Universidade Federal do Rio de Janeiro. This paper was given at the "Conference on Schmoller and Wagner" held in Heilbronn, Germany, October 15-18, 1992, and will be included in the forthcoming book Essays in Honour of Gustav von Schmoller and Adolf Wagner (1917-1992). The author thanks, with no implication, James Mulholland for a quick revision of his English, the CAPES (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior) and IPEA (Instituto de Planejamento Econômico e Social) for financial support."
Mathematics is a general and logical capital good for the construction of empirical science. Pure empirical science (e.g. Growth Theory) is a logical but specific capital good for the construction of applied empirical science. The latter (e.g. Theory of Economic Development) is a dialogical and specific capital good for the improvement of the art of science. The complementarity among these distinct spheres of knowledge is obvious. It is however obscured by the economists' Ricardian Vice.

The Ricardian Vice was described and named -- after David Ricardo (1772-1823) -- by Schumpeter (1986, pp. 540, 1171):

They [Senior (1790-1864), Mill (1806-1873) and others] merely meant that questions of economic policies always involve so many noneconomic elements that they should not be dealt with on the basis of purely economic considerations... one could only wish that the economists of that (or any) period had never forgotten this piece of wisdom -- had never been guilty of the Ricardian Vice.

... what we have called above the Ricardian Vice, namely, the habit of piling a heavy load of practical conclusions upon a tenuous groundwork, which was unequal to it yet seemed in its simplicity not only attractive but also convincing.

The Vice is the habit of ignoring nothing less than a major indetermination of all sciences. I have termed it the Indetermination of Senior, even though for all reasons but precedence it should be called the Indetermination of Mill (Silveira 1990b, p. 9):

The propositions of pure economics, whatever be their generality and their truth, do not authorize normative conclusions, but cannot be ignored. The latter, namely what ought not to be done, is derivable from socio-economics. The derivation is to be qualified by the specificities of the case.

This paper is part of an investigation on prominent economists who have not forgotten "this piece of wisdom". Marshall (1842-1924) stands out in the English history of economics, as much as Wagner (1835-1917) does in the German side. Both of them have in Neville Keynes (1852-1949) the consolidation of their methodological view.

On the other hand, the Methodenspruch was the first great paradigmatic conflict between pure and socio-economists. And it seems legitimate to speculate that Schmoller's (1838-1917) fight might have been a reaction against the pure economists' Ricardian Vice.

So we have together the three great names. Section one summarizes the relevant aspects of my previous works. Section two covers Wagner and Marshall. Section three reviews Schumpeter's writings on Schmoller and the Methodenspruch. The paper has its skeleton in ten exhibits. They were constructed and ordered in a self-explanatory fashion, so that an initial glance at them allows a grasp of the whole argument.

2 - ANTECEDENTS

Three exhibits make up the skeleton of this section and exemplify the exposition. Exhibit I shows the Indetermination in the words of Senior and Mill. It is easily seen that I have updated and generalized Senior's assertion. The readily perceivable forward step was the replacement of his dichotomy, science and art of science, by the trichotomy which subdivides the former in pure and applied science.

Senior and Mill recognized the fact that art requires many "subservient Sciences". But both of them stopped short of defining applied science as the locus of positive combination or intertwinment of the relevant sciences. The
second quotation of Mill indicates what is needed for the art of science but cannot be found in the pure and applied scientific knowledge.

Science aims at the explanation of phenomena only in terms of the elements which are perceived as general and necessary for their occurrences. By definition, specific and occasional factors are ignored. The generalizations of theory abstract from specificities, however large the potential influence they may exert in the real world.

The confusion of "generality and necessity" with "importance" is an error, a general but unnecessary one, which leads to the Ricardian Vice. The awareness of the error is highest among the general practitioners of medicine who put matters in terms of an ethical precept: there are no diseases, there are patients. The specificities of each organism may be more important in many cases, and novelty may evolve from combinations of specificities with general features of the disease -- see Kuznets (1972, p. 320) on the unexpected results of the adaptation of technological innovations by a follower country.

The practitioner treats the patient in his wholeness, while the medical scientist studies the disease in its partiality. The study isolates the universal elements which characterize a disease. By definition then, the changing wholeness with which the phenomenon (the disease) occurs is lost. So, the applicability of science depends upon the recovery of a complete vision of the real case (of the patient), in all its individuality or parochialism.

Exhibit II is a general reference framework. The last column shows the distinction between science and its arts. The latter are exemplified by the works of three prominent professional economists who were deliberately chosen at the prehistory of economic science. The work of Sully (1560-1641) has a closer counterpart within the modern practice of economics. As minister of Henry IV, he conducted one of the outstanding fiscal policies of France, "he knew -- which is the criterion of greatness in a fiscal administrator -- how to make fiscal policy an element and tool of general economic policy... Nothing can be more obvious than that this man was entirely innocent of any theory whatever" (Schumpeter 1986, p. 169).

Sully was interested in the know-how. He was committed to practice. During an extraordinary dialogue with Henry, in 1603, Sully advocated freedom of trade in terms of what later became the conclusions of Ricardo's theory of comparative advantage. On the same occasion, however, he vehemently condemned freedom of consumption. This was not a contradiction, notwithstanding the verdict of the scientific mentality. One cannot demand doctrinaire coherence in practice.

The professional's language is advocacy. In his project, the professional advocates a solution, taking into account his local and temporal specificities, using his experience and whatever doctrines, sciences, theories or ideas prove themselves relevant. It is along these lines that Pasinetti defends Galanti (1727-1787) and the moral philosophers against the charges of theoretical contradictions raised by modern academicians (see Exhibit III).

Fernandez (1929) endeavors to demonstrate that similar charges against Machiavelli (1469-1527) are also baseless -- in the words of Buchanan (1985, p. 39), Machiavelli is the "ultimate father" of the theory of public choice. Machiavelli's project (passion) was the unification of Italy, and he took as exogenous the political regime. He developed precepts for the republican government, when at its service, and for the absolute monarchy, when this became a datum.

My experience in politics is perhaps more to the point. I temporarily became Technical Consultant to the Federal Senate, on the staff of Senator E. Suplicy, from September 1991 to January 1992. My work concentrated on the revision of Bill N. 80/1991, a minimum income program under the form of negative income tax, and its advocacy among senators and their consultants.

During the second phase, I asked academic economists, from all schools of thought, to write position papers about the program. They were published in newspapers and later collected in a book (Suplicy 1992) -- the Bill was
approved by the Senate in December 16, 1991. The idea was the obvious fact that a program gains credibility as it is shown to be defendable within distinct lines of thought. Not so obvious was the underlying premise that each school has its partiality or, in other words, its half-truth, no more.

Coherence is usually made viable by partiality. Anyway, coherence is the great virtue of the scientific activity. In fact, it is the tool for the construction of the worlds of science. But when the distinction between pure and applied science is needed, one has to recognize further that the language of the former tends to be reduced to logical coherence, while that of the latter necessarily embraces organic coherence or dialogic.

The motivation of the pure scientist, exemplified by Debreu, Pasinetti and Solow in Exhibit II, is the know-why. The aim is for theory in the hypothetical-deductive form. The commitment is to Occam’s Razor: logical consistency and fertility, multiple connection, simplicity, elegance, etc. The concepts are simplified in order to satisfy the Principle of Contradiction of logic.

Rigorously speaking, "frictionless movement" and "perfect competition" are constructs with no real world existence. As simplifications which permit the use of logic, they are entities of worlds of pure science. These pure entities may become so distant from their real counterparts that the specialist may even lose the perception of the applicability of his knowledge -- see Debreu in Exhibit III, reproduced from Silveira (1992, p.17).

The motivation of the applied scientist, exemplified by Simon, Kuznets and Ansoff in Exhibit II, is also the know-why, but a know-why which takes into account the know-how. The aim is still theory, but it has to be articulated in directly applicable form, i.e. intertwining the distinct sciences which are relevant for each art.

To integrate logically the knowledge of economics, political science and sociology which illuminates the art of economic development, or any of the short run policies, would be to construct a new pure science. It may or may not be a utopia in the future, this is not my point here. The fact is that such a theory does not exist today. And let me observe that history and ethics are the most important kinds of knowledge, as Knight says in Exhibit III.

In terms of interdisciplinary work, all that is possible is the dialogical intertwining of knowledge; Kuznets’ theory of economic development and Simon’s behavioral theory of the firm are good examples. I call dialogic what Heisenberg terms quantum logic, and Georgescu-Roegen denominates dialectic (see Exhibit III) -- it is neither desirable to evoke Marx and Hegel, nor necessary to use such a strong word; more simply, dialogic concepts do not have unitary meaning even in the world of ideas: they are not “discretely distinct” -- as Georgescu-Roegen (1967, pp. 21-31) demonstrates, all economic concepts fit into this category.

Let me emphasize that applied science differs from what is usually understood by applied economics, i.e. the set of more specialized, close to reality, fields within economics. It is then advisable to maintain this meaning for applied economics, and to call social economics, or socio-economics, the applied interdisciplinary science which illuminates all the economic and noneconomic systematic elements of the economic phenomena.

2 - WAGNER AND MARSHALL

Three exhibits compose the skeleton of this section and provide the foundations of my position. Exhibit IV evidences that Wagner was as conscious of the Indetermination as Senior himself. In particular, note his indication of the art of economics as the fifth chapter of science. The attention to specificities is shown in his “careful analysis of facts as they are”.

Wagner reduces what is general and necessary in human behavior to five determinant elements. The Economic Man is just the first among them. Notwithstanding its importance, this dimension of the human personality
variably combines with the other four. And the changing combinations distinguish individuals and peoples over time, space, and circumstances.

Note also that Wagner does not talk about all kinds of human behavior. He addresses himself to deliberate and industrious actions, leaving outside passionate and spontaneous behavior. Next, Wagner identifies two methods of doing science (belonging to pure and social economics respectively), and the errors of their specialists during the Methodenstreit.

The errors are usual today. Represented by the historian, the socio-economist’s error is the resistance to accept the Economic Man as one of the general (universal) and necessary dimensions of human behavior -- it would be correct, however, to understand that the other dimensions may neutralize the Economic Man, or reduce to negligible terms its influence, depending upon the circumstances, the sort of phenomenon, the culture, etc. The pure economist’s error is the refusal to perceive the other four dimensions -- this is a great step toward the Ricardian Vice.

The endemic character of the Vice demands more than a reference to the possible neutralization of the Economic Man. Suppose, for the sake of the argument, that the “law of economics” (the Economic Man) has the universality and necessity of the gravitational law. The latter does not prohibit the human being from flying: the professional engineer neutralizes the gravitational effect, notwithstanding its significance, using other effects in the design of his plane.

I do not see the need of saying more. An example in business, perhaps: take as “plane” the marketing techniques and observe the Economic Man (Ego, “Adult”) being neutralized by the Spontaneous Man (Id, “Child”); this “experiment” can be done by an effort of memory -- introspection --, by the observation of friends or, more formally, in marketing or psychology (Berne 1964) books -- some of these teach how to do it.

The first and second Wagnerian chapters comprise most of what is seen today as economic science. Both are approached from the two levels of abstraction, pure and social economics. The latter necessarily deals with the ethic of the economic agent, the ethic of the observed not that of the observer, “the sense of duty and the fear of conscience”, the fifth dimension of human behavior in Wagner’s analysis.

In a reduction to the logic of Wagner’s first economic behavior, neoclassical (pure) economics ignores the ethical dimension. Scientific rigor would then require the explicit postulation of “ethicless behavior”, just like the physicist’s antecedent clause of “frictionless movement” -- a figurative way of doing it is to postulate that the agent’s ethic is nothing but rhetoric; Brunner (1978, p. 663) does it, but from a different perspective.

The antecedent clause makes clear the indirect applicability of the theory. It is up to the socio-economic scientist to make, not the critique of the pure clause, but the dialogical incorporation of the ethical dimension in the agent’s behavior. This is exactly what the engineering scientist does in his dialogical models of “friction movement”.

Let me emphasize that this has nothing to do with the observer’s ethic, i.e. the value judgments of the socio-economic scientist. Today it is generally accepted that value judgments which consciously determine “what ought to be done” are outside the chapters of all sciences -- it is generally accepted but not always followed.

Science determining what ought to be done is technocracy, the modern version of theocracy. It is science replacing religion in opposition to democracy. This “technocratic vice” was still usual, and not viewed as a fault, during Wagner’s lifetime. When not duly qualified, the third and fourth Wagnerian chapters reveal today exactly this fault.

To qualify is to recognize that value judgments which consciously determine what ought to be done are exogenous to economic science. They are given by politicians in democracies, by despots in dictatorships, and by economists in technocracies.
Another important aspect of the question is included in the Indetermination of Senior: pure normative economics is pure Ricardian Vice. Duly qualified, normative socio-economics is what can be understood by the science chapter which informs normative economics. Given the value judgments, it makes sense to derive normative propositions for the real world only from the sphere of scientific abstraction which takes into account all the systematically relevant elements, the economic and the noneconomic ones. Rigorously speaking, however, normative economics belongs to the art chapter.

Exhibit V shows much of the Indetermination of Senior in the words of Marshall. What I offer as the most reduced, even if incomplete, form of the Indetermination deserves to be repeated: "Political Economy will answer scarcely any social question but scarcely any social question can receive answers independent of Political Economy".

The assertion was in his first lecture notes -- a special recognition is due to Grownwegen for its revelation, as well as for the editing of Marshall's first writing: "On the Method and History of Economics". Marshall was a confirmed socio-economist. The partiality of pure economics is clearly and firmly exposed. Let me formulate a hypothesis if I am allowed to postpone its corroboration: the charges of vacillation, (supposedly improper) mediating attempts, and indefiniteness raised against him have their origin in his extreme awareness of the Indetermination.

Notwithstanding, Wagner accuses Marshall of a possible addiction to the Ricardian Vice, as Exhibit VI reveals. Before going into that, however, Wagner identifies himself with Marshall in the question of method and scope of economics: Neville Keynes consolidates their way of thinking. Let me mention their point that the science can only be understood as the union of pure and social economics. The distinction is, however, essential for "the solution of practical and theoretical controversies".

It is of more fundamental importance to emphasize this aspect nowadays. The integrated vision of Exhibit II nullifies many controversies. That general reference framework is particularly good at dissolving an infinity of questions and misunderstandings.

Coming back to Exhibit VI, under the head of limitations of pure economics I quote Wagner in what I read as the great awareness of the Indetermination in the German economic tradition. It follows what looks like Wagner accusing Marshall of addiction to the Ricardian Vice, within the English tradition.

Despite the located character of the fault, the accusation is valid in a treatise which is supposed universal. But still, it seems advisable to further investigate the accusation and see whether the fault is systematic. It is true that nobody can expect, or suppose, that a man be able to surpass his time and location in more than a few questions. A stronger surprise was to see Mill accused of the Vice by Tolstoy (1876/1981, p. 366) -- in the same work, Tolstoy magnificently describes the discrimination of women in his society, and reveals the extension to which he was able to overcome it:

"In the politico-economic books, in Mill, for instance, which he studied first with immense ardor, hoping to find out at any moment an answer to the problems that preoccupied him, he found a number of laws that had been deduced from the state of European agriculture; but he couldn't see at all why these laws, inapplicable in Russia, were supposed to be universal".

(Let me thank Mauricio Fuks for this quotation.)

Exhibit VI follows with a significant acknowledgment of pure economics, and Wagner's and Marshall's positioning about mathematics. In retrospect, it is very easy to accuse their error. It is obvious that the importance of the mathematical method cannot be reduced to "illustration" and "precision". The construction of the pure neoclassical logic by mathematical economists was one of the outstanding achievements of economics in the century after Wagner and Marshall.

There is need for more, not less, mathematics in economics. There is
need for more, not less, mathematical economics for the advancement of socio-economics. It suffices to recall that the pure mathematical economists have not yet formulated the "rising aspirations" of the human being, as in Simon's Administrative Man; nor have they developed the simultaneous treatment of even two of the four egoistic dimensions of the Wagnerian industrious behavior.

I strongly support this thesis in spite of Debreu's doubts (1991, pp.5-6). But this presupposes acceptance of Wagner's and Marshall's correct statement in the same spot. In the terms here developed, pure mathematical economics "has no value on its own"; it is of indirect applicability "for the solution of our problems", and can do no more than illuminate socio-economics. To apply it directly is to succumb to the Ricardian Vice. The latter is a lack of scientific sense, which does not exists among physicists, whose diffusion was accelerated by the mathematical neoclassical economists.

3 - SCHUMPETER ON SCHMOLLER AND THE METHODENSTREIT

Four exhibits compose the framework of this section. In Exhibit VII I quote Schumpeter in support of both the pure economics in its logic and the socio-economics in its dialogic. There follows a brief characterization of the historical school as historism during the Methodenstreit.

I have been regarding the historical school as socio-economics. Obviously, the latter is not reducible to the former. The former embraces Simon's behavioral theory and Kuznets' development theory, as exemplified above. Another example is reproduced from Silveira (1992, p. 19) in Exhibit VIII. In its more recent version, Ansoff's theory of corporate strategy belongs to socio-economics.

Ansoff's theory is also a chapter of management science. Many chapters of the latter satisfy very well the definition of socio-economics 'a la Mill. Others belong to applied economics, like the ready applicable models of inventory control. The first version of Ansoff's theory itself may be thought of as fitting into applied economics -- it is an extension of the behavioral theory of the firm, but heavily based on the neoclassical theory, illuminating only the economic rationality of corporate strategy. But there were problems.

The phenomenon is complex to the point of requiring interdisciplinary modeling. Ansoff succumbed to the Ricardian Vice in his attempts to apply directly a semi-interdisciplinary theory. The successive failures led him to a restatement, to the construction of the socio-economic rationality of the phenomenon. His evolution shows the practical relevance of the Indetermination of Senior. And his process of learning by doing was so effective that most of the Indetermination can be read in his own words, in Exhibit VII.

In a way, Ansoff sees himself in the frontier between the academic and the professional. On the other hand, the economic historian is usually the nearest example of the academic. But economic history does not neatly fit into the scientific activity, at least from the viewpoint which reduces science to what is universal. Here, however, lies the reason why art must be included in the taxonomy of science.

I do not impose discrete distinction on the general reference framework of Exhibit II. If I did, I would be dealing with the logic of research, as Popper (1961) does. I work on the dialogic of scientific research. So, I maintain the nebulous frontier in attention to the vagueness with which the scientific work permits itself to be classified -- see how Schumpeter (1986, p. 753) deals with the periodization of history, in particular with his 1870-1914 period of economic analysis; by the way, all classifications of non-Newtonian phenomena necessarily display non-empty and non-discretely distinct frontiers (Georgeascu-Roegen 1967, pp. 21-31).

In the last instance, science's reason for being is its art. But a part of the latter still lies within the academic and scientific realms. The historian fits into this protuberance of science over the sphere of its art: the aim is to understand the phenomenon in its wholeness, and not the use of
science for the control of reality. Many "case studies" equally belong to socio-economic protuberances.

In the Methodenstreit, the historical school was not wrong in emphasizing the relevance of specificities for the understanding of the phenomenon, in the individuated wholeness of real occurrences. The error, the historicism, was the exclusive reliance on the historical method. Schmoller was the leader, and Exhibit IX introduces him in the words of Schumpeter. There is neither questioning of Schmoller's excellence in his specialization, nor of the propriety of his method. As Schumpeter says again in the first quotation of Exhibit IX, the problem was Schmoller's criticism of the hypothetical-deductive method, which is equally peculiar to pure economics, a distinct specialization.

Exhibit IX proceeds with Schmoller's perception of economic history. This justifies the classification of the field into art and socio-economics, or a socio-economic protuberance over the sphere of its art. No surprise here, but the following quotation may cause to wonder. To put together Mill and Schmoller, even after the latter's revised methodological position, does require the status reached by Schumpeter.

I understand the Methodenstreit as the first great paradigmatic conflict between pure and social economists. It is obvious. First, note the last paragraph of Exhibit IX, where Schumpeter restates, with Mill, that the economic method involves both deduction and induction, and regrets that the failure to accept this caused the dispute. He also refers to Mill's "scathing criticism" of the Ricardian Vice.

Second, Exhibit X starts by a similar regret. Wagner restates the advantage to science of qualitative differences of abilities, bents and methods, in short, the benefits of specialization. Wagner's criticism, however, is addressed to the socio-economist in his hegemonic aspiration of excluding the pure economist from the realm of science.

Third, Schumpeter then gives an explanation for the dispute, stopping short of describing it as a paradigmatic conflict. I am talking about an extension of Kuhn's evolutionary theory of science. The dissent between pure and applied scientists is of the same nature as that which occurs between two factions of pure scientists during revolutionary periods.

Pure and applied scientists have distinct educations and communities, different motivations, commitments and languages, as Exhibit II shows. In short, pure scientists have the Occam's Razor paradigm as opposed to the applicability paradigm of the applied scientists.

Both communities reveal scientific blindness (Kuhn 1971, pp. 37, 61). The practitioners of science do not lag behind with their professional blindness, which is also a fruit of education, but of job education. Regrets and pleas are not effective. Exhibit X proceeds with typical displays of the blindness, now in updated versions.

Solow is unconsciously revealing a scientific blindness in his criticism of the socio-economist Adam Smith. Moreover, there is indication of the Ricardian Vice, in a grave stage: Solow is able to derive normative propositions only from pure economics. Buchanan's theoretical contribution has been in the highest degree of abstraction in pure economics (the fact that it is cast in elementary mathematics is obviously irrelevant). The paragraph quoted, however, is typical of the socio-economist's blindness (Silveira 1990a).

A century after the Methodenstreit, the pure economist's hegemony shows an inversion of positions, no more. The conflict remained in different intensities and in distinct locations: institutionalists (almost typical socio-economists) versus neoclassicals, post-Keynesians (close to socio-economists) versus neoclassical Keynesians, and Uno Kozo and his Marxist theory of level of analysis (Morris-Suzuki 1991, pp. 116-21) -- a Society for the Advancement of Socio-Economics (SASE) grows in the USA, a hopeful development which seems to avoid the paradigmatic conflict (the aim is not the
criticism of the neoclassical school).

After Popper (1961), and in a period of the pure economist's hegemony, it sounds improper to talk about the inductive method. But Popper's most distinguished methodological contribution, which cannot be ignored, is in the field of pure science. And this contribution was almost always addressed to the field of inert matter. By the way, there are no hegemonic struggles between physicists (corresponding to pure economists in Exhibit II) and engineering scientists (socio-economists). But the same paradigmatic conflict exists, and is clearly revealed in the day-to-day activity of integrated schools.

It is perhaps possible to overcome the conflict in the field of economics, and to achieve the union advocated by Wagner. Again, regrets and pleas will not do it, despite all the potential synergic benefits. These appeals to "the sense of duty and the fear of conscience" (Wagner's fifth dimension of the personality, in Exhibit IV), but only if the problem is theoretically assimilated by the competitors. And epistemology is what matters here. Two other elements seem more significant in the short run.

First, the Economic Man: in the Wagnerian analytic style, "one's own industrial advantage" is more at stake now. The "Report of the Commission on Graduate Education in Economics" (Krueger et al 1991) displays signs of a significant crisis in the market for new pure economics doctorates. The Commission itself terms the new colleagues "idiot savants", because of their inability to relate theory and practice.

The Commission did not conclude that the nonacademic and the applied schools' demands are for socio-economists, but the indications are clearly there. Comprising more than fifty percent of total demand, this segment of the market tends to be occupied by the applied or social economists graduated from the applied schools.

The second short-run element is perhaps identifiable with Wagner's third dimension of industrious behavior. Once the community understands that the "idiot savants" are just addicts to the Ricardian Vice, growing exponentially because of the curriculum, the "sense of honor and the fear of disgrace" may additionally become the crucial determinant.

CONCLUSION

It seems appropriate to conclude with a synopsis of the evolution of this research, presenting some of the problems and solutions which led me to the Indetermination of Senior. First, in a study about Wagner, Marshall and, particularly, Schmoller, I have resorted to Schumpeter so much that I cannot fail to acknowledge in my own practice that history matters. Second, problems and temporary solutions are the form of generating knowledge (Popper 1978, pp. 13-15), and the form says much about its plausibility (Simon 1968, p. 458).

An initial problem was the sensation of knowing nothing after completion of three courses: engineering (1963), industrial administration (MS/1968) and economics (PhD/1971). I attended good schools and studied hard. So, the sensation was a problem whose solution only occurred to me in 1992, when forced to write an academic memoir. Good schools teach good theories, leaving aside specificities; the sensation tends to occur if there is no knowledge of the latter, or no epistemological explanation of the problem to the student.

As faculty member of an integrated school in the field of inert matter, Instituto Tecnologico da Aeronautica (1964/1966 and 1971/1974), and graduate student of another in the social field, Carnegie-Mellon University (1966/1971), I had a common problem: what were pure and applied scientists doing together, if they disagreed so much? I deeply felt the paradigmatic dissent -- let me specify a bit of the C-MU case: my admiration for professors Allan H. Meltzer (my adviser), Herbert A. Simon (I developed the habit of reading his papers to recover myself from the dull required readings) and H. Igor Ansoff was almost unbounded.
I just could not accept the labels (Schumpeter indicates some in Exhibit X) which used to be affixed to the different kinds of research done by these professors (my feelings are well expressed by Wagner in Exhibit X, even though at the time I could not phrase them well). When I finally discovered Kuhn (1971) -- in the late 1970s --, I read it anxiously in the expectation of confirming the temporary solution that I had reached by myself.

Before that, an effort had contributed to the organization of my thoughts. It was a criticism, that I ended up writing (Silveira 1974a), of the first Brazilian "Basic Plan for the Development of Science and Technology". I found out that the plan gave no consideration to pure science and was biased toward art in the little attention given to applied science.

After some other considerations, I concluded that the plan would damage the universities; the latter were erroneously being presented as the prime beneficiaries. The general reference framework of Exhibit II had its embryonic version in that paper. I was, at the time, far ahead in my study of Toynbee (1962). Although unfinished, this work changed my world vision. My aim was modest. I was trying to assimilate some sense of historical perspective, an effort only taken up again five years ago with Toynbee (1976).

My doctoral thesis was an econometric work on Brazilian inflation (Silveira 1973a/b, 1974b). It happened that in 1973 the cost of living indexes, among others, were ostensibly falsified. From the academic viewpoint, the problem was the comprehension of the nature of economic data. I only reached a solution with Morgenstern (1963) in the late 1970s (Silveira 1984a/b).

Meanwhile, I changed to theoretical work. I understood it as a lack of integrity to continue working in econometrics, using data that was potentially falsified to an unknown extent. But the observation of economists in government gave way to another major problem: they were not acting in accordance with the theories they themselves used to advocate. The problem became crucial when I also got into the art of economics, as consultant to the private sector.

The solution was growing in the sense of the pettiness of economics, particularly on the occasions in which the little that I knew about history and management science showed itself more useful in the art of economics. I was looking for a solution in the philosophy of science when I read Georgescu-Roegen (1967).

I hopefully turned to economic philosophy instead of abandoning economics -- I was beginning to associate a sense of charlatanism to economics, which I no longer was seeing as a science. After Georgescu-Roegen, a sketch of the solution came to my mind in the form of the Indetermination of Senior. Georgescu-Roegen introduced me to Heisenberg (1963) and Knight (1936).

In the process of reconstructing the Indetermination, I then lacked a definition of socio-economics to replace applied economics in Exhibit II, and I had to explain the raison d'être of pure economics. The former was well formulated in Silveira (1986), but the latter had to wait for my readings of Knight (1960) and Schumpeter (1986). The latter introduced me to Mill (1877) and Senior (1938).

This was a long process of scientific revolution, notwithstanding its individual character. The anomalies were met in practice, particularly in the following up of economic policies and the state of the economy. But I did not move from my neoclassical-monetaryarist position to another school of thought. This would be the usual outcome. My move was toward the criticism of all schools, followed later by the acceptance of them all as temporary half-truths.

In the last instance, it was the need to understand economic policy, the short-run chapter in particular, which led me into economic philosophy. The Indetermination of Senior emerged as the solution to a problem in the art of economics. So, I think that I offer a testimony of the importance of methodology and the history of economic thought in practice.
EXHIBIT I - MILL AND SENIOR

Art of Science (professional or nonacademic economist) - Mill (1877, p. 155):

No one who attempts to lay down propositions for the guidance of mankind, however perfect his scientific acquirements, can dispense with a practical knowledge of the actual modes in which the affairs of the world are carried on, and an extensive personal experience of the actual ideas, feelings, and intellectual and moral tendencies of his own country and of his own age.

Applied Science (applied or socio-economist) - Mill (1877, p. 152):

Each art presupposes, not one science, but science in general; or, at least, many distinct sciences.

Abstract Science (abstract or pure economist) - Senior (1938, p. 3):

But his [Political Economist] conclusions, whatever be their generality and their truth, do not authorize him in adding a single syllable of advice... The business of a Political Economist is... to state general principles, which is fatal to neglect, but neither advisable, nor perhaps practicable, to use as the sole, or even the principal, guides in the actual conduct of affairs... To decide in each case how far those conclusions are to be acted upon, belongs to the art of government, an art to which Political Economy is only one of many subservient Sciences.

EXHIBIT II - TAXONOMY OF KNOWLEDGE: GENERAL REFERENCE FRAMEWORK

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EXHIBIT III - GENERAL REFERENCE FRAMEWORK: A DIVISION OF SCIENTIFIC LABOR

ABSTRACT OR PURE SCIENCE (physics, pure economics)
Debreu (1984, p. 46):
Yet a scientist knows that his motivations are often weakly related to the distant consequences of his work. The logic rigor, the generality, and the simplicity of his theories satisfy deep personal intellectual needs, and he frequently seeks them for their own sake.

APPLIED SCIENCE (engineering science, socio-economics)
Ohlin (1972, p. 299) on Kuznets:
Kuznets, of course, makes use of models which demonstrate the connections between strategic elements in the economic system, but he shows a very limited sympathy for abstract and generalizing models... He chooses and defines concepts which correspond as closely as possible to what can be observed... Within the framework of these models, regard is also paid to institutional and non-economic factors -- for example, changes in population growth, in technology, in industrial structure and in market forms.

Kuznets (1961, p. 119):
In the social sciences field, in particular, the foremost aim of ordered [and tested] knowledge is to enrich the direct experience of current generations with those of the past, and to widen the horizon of experience of a given nation by the experience of others.

Simon (1979, p. 289):
But the important thing about the search and satisficing theory is that it showed how choice could actually be made with reasonable amounts of calculation, and using very incomplete information, without the need of performing the impossible -- of carrying out this optimizing procedure.

Knight (1960, p. 111):
Now to say a little more about the unreality of pure economic theory... All the sciences of man and society are involved if one presses the question [of social action, public choice, policy decision] further and further back -- particularly history, and possibly even more specially, ethics.

Georgescu-Roegen (1967, pp. 23-4):
we must accept that in certain instances at least, B is both A and non A is the case... Though they are not discretely distinct, dialectical concepts are nevertheless distinct. The difference is this. A penumbra separates a dialectical concept from its opposite.

Heisenberg (1963, p. 156-7):
In classical logic it is assumed that, if a statement has any meaning at all, either the statement or the negation of the statement must be correct... tertium non datur, a third possibility does not exist. In quantum theory this law tertium non datur is to be modified... Classical logic would then be contained as a kind of limiting case in quantum logic...

ART OF SCIENCE (professional engineering and professional economics)
Pasinetti (1986, pp. 411, 414):
They [the moral philosophers] were not aiming at proposing theories. They were trying to state standards of ethical behavior and -- given this purpose -- it was not contradictory for them to try to set out, not one, but many separate arguments, provided that they all helped, in various cases and occasions, to achieve the final effect. Far from considering these various arguments as contradiction with one another, they regard them as enriching their discussions.

carried away by our modern theories -- we tend to see contradictions among the various principles he [Galiani] has so remarkably anticipated.
Our industrial action... is determined by a variety of motives... The different motives can be reduced, I believe, to five... Each presents itself in two aspects. The four egoistic motives are: (1) one's own industrial advantage and the fear of want for one's self; (2) the fear of punishment and the hope of approval, perhaps of reward; (3) the sense of honor and the fear of disgrace; (4) the impulse to activity and to the exercise of power, and the fear of the results of inactivity. The non-egoistic motive is the sense of duty and the fear of conscience...

The universal element, common to all humanity, is merely the fact that these motives are able to determine our action, and do determine it; and, again, that different combinations of motives and different degrees of strength in them can and do occur. The element that varies in the history of a given population, varies with different individuals, and varies in the same individual under different circumstances, is that the combination of motives change, that the individual motives change in relative strength; and, therefore, our industrial action varies (p. 117).

These, then, are the two methods: on the one hand, deduction from psychological motives, -- first and foremost, deduction from the motive of individual advantage, then from the other motives; on the other hand, induction from history, from statistics, and from the less exact and less certain, yet indispensable, process of common observation and experience. With both methods we are to approach the various problems of political economy, and to solve them so far as we can (p. 124).

In considering the modifications of industrial self-interest in different individuals, different peoples, at different times, its various combinations with other motives, they [the historical economists] forget that there is, after all, a universal element of humanity in this selfishness. The purely deductive economists commit the less mistake of neglecting the modifications of self-interest, and its various combinations with other motives, -- the less mistake, yet still a great and calamitous mistake (pp. 118-9).

These five problems, -- to ascertain and describe economic phenomena; to explain their cause; to judge of their social merit; to set up an aim for economic progress; to point out the way for reaching this aim, -- these, then, are the single parts of the great general problem of political economy... Only the fifth, where we have to deal with the practical questions of an art, can be clearly distinguished from the rest. I should be in favor of retaining the first four for the general or theoretic part of a system of 'social economy' (p. 128).

The proper course of action in any specific case can only be determined on the basis of a careful analysis of facts as they are, and, so far as possible, in the light of comparisons with the industrial laws and habits of other peoples and other times (p. 127).
EXHIBIT V - THE INDETERMINATION OF SENIOR OR THE INDETERMINATION OF MARSHALL.

GROENEWEGEN (1990) ON MARSHALL (c. 1870):

Marshall (in Groenewegen, pp. 5-6):

Our knowledge of economical doctrines and of economical phenomena must go together and the economical and all other social and political phenomena of a period are inextricably interwoven with another. It is not necessary to inquire into the relative importance of a knowledge of economical phenomena and of others; any more that we need enquire as to the relative importance of the heart and the lungs as compared with other vital organs all of which are necessary to a man's existence. If any part of the social phenomena of an age be ignored we have not history; though we may have materials which may aid the historian. Of course the question may be raised -- is a disease of the heart or of the lungs more prejudicial. But even to this no general and direct answer can be returned: we must consider the special circumstances of the case.

Groenewegen (p. xvii):

For Marshall, this is not just a declaration of the historical relativity of economic ideas, and the limitations this places on their future application, a view he very strongly endorsed. It also refers to that limitation in scope of political economy of never having the capacity to provide the sole answer for a particular problem, despite its relevant, if not essential, contribution for its solution.

Marshall (in Groenewegen, p. xiv):

Political Economy will answer scarcely any social question but scarcely any social question can receive answers independent of Political Economy.

Marshall (in Groenewegen, p. 4):

Of course we may treat Political Economy as a deductive and purely abstract science. That is, we may take certain arbitrary assumptions and deduce from them laws of value. Such enquires have their utility; but if we seek to know political economy because we want help in our attempts to understand Social Philosophy, this personal element becomes as important in reading a book on political economy as in reading one on any other branch of Social or Ethical Philosophy.
EXHIBIT VI - WAGNER (1891) ON MARSHALL'S PRINCIPLES OF ECONOMICS:

(The Scope and Method of Economics)
I can give the assurance that numerous German colleagues join me in adopting that mediating attitude in regard to scope and method of political economy which is taken, for example, in the recent excellent book of [Neville] Keynes, on The Scope and Method of Political Economy... For myself, I agree with Keynes almost throughout, and therefore can testify to my hearty appreciation of the great value of Marshall's volume; for in the matter of method and scope Marshall also takes this mediating attitude (p. 321). Not 'practical' political economy alone, such as the younger German historical school is disposed to content itself with, nor theoretical political economy alone, such as is usually offered in England, but the two together form political economy as a science (p. 327).

(The Need of Distinguishing Pure and Social Economics)
The second book [of Marshall's Principles of Economics] considers some 'fundamental notions'... My main criticism... is that in the whole series of concepts we must distinguish between the purely economic point of view -- the logical or abstract point of view -- and the historical and legal point of view. I think such a distinction of fundamental importance for the solution of practical and theoretical controversies (pp. 330-1).

(Limitations of Pure Economics)
It is true that most of us in Germany... point to the need of induction side by side with deduction; that we warn against hasty generalization, against exclusive reasoning on the basis of economic self-interest; that in practical problems we have no faith in any absolute solutions, and insist upon the principle of relativity (p. 320). Barring a few incidental remarks, Marshall says nothing of the organization of industry, or of law and the legal foundations of society... Like most English economists, Marshall treats private industry, and that organization of industry which rests on private property, as matters of course, given by 'nature', so to speak; treating the institution of property as something absolute or purely economic, and not as something which has developed by historic growth... As Professor Marshall treats it, political economy is still limited to the investigation of production, exchange, and distribution under the system of private industry and of free competition (p. 333).

(Limitations of Socio-Economics)
In the fifth book, the equilibrium of demand and supply is considered... I agree with Marshall almost everywhere... His treatment is a telling example of what can be achieved by his method of speculative deduction -- the adequate solution of problems which, partly from their very nature, and partly because of the unmanageable mass of the inductive material, cannot be solved by the method of the historical and statistical induction (pp. 336-7).

(Mathematical Economics)
Marshall's theoretical discussion follows, as a rule, the lines of the mathematical treatment of Cournot and others... I would not deny that this mode of treating the subject has its justification, nor that there are advantages in the use of diagrams and of the formulae of differential calculus. But I do not believe that this mode of treating the subject has an independent value of its own for solving our problems. Indeed, Marshall himself admits as much. He has used diagrams and formulae only for purposes of illustration and for greater precision of statement (p. 327).
as regards the method of 'isolating' economic phenomena or motives, or of 
abstracting from noneconomic ones, not only the practice of the 'classics'
but even their methodological rationalization of it was free from serious
error... Of course this statement must be understood to refer to the
principles of isolation and abstraction per se as the 'classics' applied
them for the purpose of carving out the domain of purely economic
research... But I do not maintain that individual 'classic' writers, when
reasoning within that domain, always 'isolated' relevant factors and
'abstracted' from others faultlessly (pp. 537-8)...

we must not overlook that, though such [monographic historical] research
plus a co-ordinating study of its results will never produce articulate
theorems, they may produce, in a mind appropriately conditioned, something
else that is much more valuable. They may exude a subtle message, convey an
intimate understanding of social or of specifically economic processes, a
sense of historical perspective or, if you prefer, of the organic coherence
of things, which is extremely difficult, perhaps impossible, to formulate
(p. 812-3).

The basic and distinctive article of the historical school’s methodological
faith was that the organon of scientific economics should mainly -- at
first it was held that it should exclusively -- consist in the results of,
and in generalizations from, historical monographs... By means of this
[historical] technique, which was all the scientific equipment he needed,
he should dive into the ocean of economic history in order to investigate
particular patterns or processes in all their live details, local and
temporal, the flavor of which he should learn to relish. And the only kind
of general knowledge that is attainable in the social sciences would then
slowly grow out of this work (pp. 807-8).
EXHIBIT VIII - NEOCLASSICAL THEORY OF THE FIRM (Pure Economics) and the
THEORY OF CORPORATE STRATEGY (Socio-Economics)

Ansoff's Ricardian Vice, by Ansoff himself (1980, pp. 5-6):

Corporate Strategy (published in 1965) is a prescriptive logical analysis
of how business firms should think through their adaptation to the
environment... many practical applications of prescriptions similar to mine
have come to grief, the spread of strategic planning has been slow, and it
is only now, ten years later, that the practice of genuine strategic
planning is emerging.

The Indetermination of Senior or the Indetermination of Ansoff (1980, 1987):

Strategic planning is focused on business, economic and technological
variables. Strategic management broadens the focus to include
psychological, sociological and political variables (1987, p. 265).

Both experience and literature on psychology show that individuals will
resist change when it makes them insecure... Political science literature,
as well as common observations, shows that groups: coalesce and act as
power centers within the rest of the organization... Both sociological
literature and practical experience show that: groups of managers who share
common tasks and preoccupations develop, over a period of time,
commonalities of behavior and outlook... [and] a consensus, which
sociologists call a model of reality, on which behaviors produce desirable
results and which do not (1987, pp. 241-2)...

Seen from the point of view of a strategy analyst, resistance is a
manifestation of the 'irrationality' of an organization, a refusal to
recognize new dimensions of reality, to reason logically, and to carry out
the consequences of logical deductions. But seen from the viewpoint of a
behavioral or political scientist, resistance is a natural manifestation of
different rationalities, according to which groups and individuals interact
with one another (1987, p. 238).

Our concern in this book is with the behavior of complex organizations in
turbulent environments... Most available theoretical insights are partial,
refracted through the optic of a particular theoretical discipline from
which they are derived, be it economics, psychology, sociology, political
science, or general system theory... The major aim [of this book] is to
bridge the gap between theory and practice by providing an explanatory
science... In natural sciences such explanations go under the name of
applied theory -- an intermediate level of knowledge between pure science
and engineering... The theory is multi-disciplinary in the sense that it
seeks an optic appropriate to the problem and not to a particular
scientific discipline. There are two paths to such an optic. One is to
attempt an integration of the available disciplinary insights into a
coherent whole. The other is to work back from the 'real world' problem,
abstract the features which appear critical to explanation of behavior, and
then selectively borrow from theoretical insights which may be available
(1980, pp. 1-3).
EXHIBIT IX - SCHMOLLER AS A SOCIO-ECONOMIST.

SCHUMPETER (1986) ON SCHMOLLER:

(Schmoller on Pure Economics)

Schmoller always protested against an 'isolating' analysis of economic phenomena -- he and his followers spoke of a 'method of isolation' -- and held that we lose their essence as soon as we isolate them. This view, of course, was simply the consequence of his resolve to feed economics exclusively on historical monographs. For their materials as well as their results are obviously refractory to any attempt at isolating -- in most cases, in fact, they become meaningless if isolated (p. 812).

(Schmoller on Socio-Economics)

This is the scientific meaning of the label that Schmoller affixed to his school. He did not call it historical simply, but historico-ethical... the school professed to study all the facets of an economic phenomenon; hence all the facets of economic behavior and not merely the economic logic of it; hence the whole of human motivations as historically displayed, the specifically economic ones not more than the rest for which the term 'ethical' was made to serve, presumably because it seems to stress hyperindividual components (p. 812).

(Schmoller and Mill):

I am tempted to sum up by saying: think of J. S. Mill's treatise; imagine another that bestows as much emphasis and competence on the institutional aspects as Mill bestowed upon theory in the traditional sense, and reduce correspondingly the space and thought allotted to the latter; and you have Schmoller's Grundriss, barring of course politico-philosophical backgrounds, which do not concern us here (pp. 813-4).

The standard method of economics was what he [Mill] called the Concrete Deductive Method supplemented by the Inverse Deductive or Historical Method for research into historical changes of the social set-up as a whole. Had this been properly appreciated, the pointless later squabble of economists over induction versus deduction would have been avoided. The 'purely theoretical' set of problems was taken account of by his 'abstract or geometrical' method, the misuse of which for direct application to practical problems he made the target of scathing criticism. 10

This adjective is I think justified, though Mill's invariable courtesy, in some cases reinforced by filial respect, made him tone down his wording. It will read surprisingly but can be strictly proved that the methodological doctrine that Mill preached does not differ at all from the position eventually (though not at first) adopted by Schmoller (p. 452).
EXHIBIT X - PARADIGMATIC CONFLICT, SCIENTIFIC OR PROFESSIONAL BLINDNESS

Wagner (1886, pp. 114-5):
Nothing is, in my opinion, more harmful for the true advance of knowledge than that a given tendency in it, which happens to fit the abilities, the turn of mind, the training of individual scholars, which may indeed be fruitful and necessary, is carried so far as to demand for itself an exclusive control, and to pretend that in it is the true science... Ought it to be so hard, and, above all, for men of science, to admit that there may be not only different degrees of ability, but different kinds of ability, and, therefore, differences of inclination, of tendency, of use of method? And, moreover, to grasp the immense advantage of such differences in a many-sided cultivation of the field of knowledge?... Each tendency has its strength and weakness, its merits and defects.

Schumpeter (pp. 814-5):
The quarrel was about precedence and relative importance and might have been settled by allowing every type of work to find the place to which its weight entitled it. The reasons why, for a time, neither part felt able to adopt this standpoint are important enough for the sociology and history of science -- of any science -- to require explicit statement. The first thing to be observed about all controversies between scientific parties is the large amount of mutual misunderstanding that enters into them... Secondly, the situation is made worse by the fact that methodological clashes often are clashes of temperaments and of intellectual bents... there are types of minds that take delight in all the colors of historical processes and of individual cultural patterns. There are other types that prefer a neat theorem to everything else... Moreover, every decent workman loves his work. And this alone, for some of us, implies dislike for other 'methods' in a perfectly irrational and impulsive way. Third, we must never forget that genuine schools are sociological realities -- living beings. They have their structure -- relations between leaders and followers -- their flags, their battle cries, their moods, their all-too-human interests... They will try to appropriate labels that are considered honorific -- in our case, both parties laid claim to such epithets as 'empiric', 'realistic', 'modern', 'exact' -- and to affix derogatory labels -- 'speculative', 'futile', 'subordinate' -- to the work of the enemy.

Colander and many critics would have us go back to earlier days when philosophy and other social sciences were intertwined. He even argues that we should go back to the vague generalizations of Adam Smith. I yield to a dozen people or so in my admiration for Adam Smith, which is not unbounded. I do not regard The Wealth of Nations as a theory; I do not regard it as anything with policy implications... I need something more precise -- something less amorphous, less vague...

As it is practiced in the 1980s, economics is a 'science' without ultimate purpose or meaning... In a very real sense, the economists of the 1980s are illiterate in the basic principles of their own discipline... Their interest lies in the pure intellectual properties of the models with which they work, and they seem to get their kicks from the discovery of proofs of propositions relevant only for their own fantasy lands... I do deplore the waste that such investment of human capital reflects.

Professional Economist - A well-known proverb:
"Those who can, do; those who cannot, teach".
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