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From the search for natural laws to the discovery of contingent rules in economics

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Abstract: In this article, the author defends the idea that one of the positive results of modern economic analysis is the conviction that there is no natural law in economics. Thus, the most thorough scientific research which has tried to provide an analytical foundation for the mythical invisible hand, the "general equilibrium paradigm," has finally shown that such an equilibration process cannot be formally demonstrated. Hence, we can say that economists cannot demonstrate the existence of a law of "supply and demand" but, more simply, can assert that some causal but contingent relations may exist between price, supply and demand. According to this result, the critical approach of Kenneth John Arrow concludes with the necessity of social and moral rule (for the good functioning of the market). It is, thus, necessary to assume the contingent nature of economic rules, and the absence of natural law, and consequently, to modify economists' theoretical model.

Keywords: general equilibrium analysis, rules, scientific law

Introduction [1]

When the general equilibrium theory, the basis and founding paradigm of the analytical movement known as neoclassicism, was constructed, it took the natural sciences as its epistemological frame of reference. The archetype of scientific knowledge, in this view, is a statement of a natural law (for example the law of gravity). Natural law, then, for purposes of this discussion, may be defined as *a statement of systematic cause-and-effect relationships that are always and everywhere true*. It is expressed as a causal relationship, systematically stated and enabling one to predict infallibly the time it will take

a particular body of a given mass to travel a certain distance. That a law be systematic is the *sine qua non* of the reliability of the knowledge within it and of its predictive ability to pierce the veil of time. Systematically knowing which causes bring about which effects enables us to foretell the future and control it, which is the basic purpose of science in general and of economics in particular. When such a law operates, it describes a determinist order without contingency.

In economics, the object under study is the arrangement of the production and distribution of goods and services. Behind this object lies a problem: the limited nature of the factors of production is confronted with the infinite nature of individual wants. When you try to define this problem, it turns out to be always reducible to the question of how various actions are coordinated. Economic science, then, is basically a science of human action and its coordination. The laws involved in economics are always laws that describe the behaviour of human beings. Some authors may suppose this behaviour to be highly or totally overdetermined by the social structure that constrains individuals (e.g., within a certain form of mechanical Marxism or Keynesianism); yet other authors believe quite the opposite. For them, it is the expression of an agent's freely made calculation (within neo-classicism). Whatever the case, what the law must describe is the chain of individual actions leading to certain foreseeable consequences. Natural law in economics describes the behaviour of economic actors, the natural behaviour of human beings, and leaves no room for freedom to act differently. This article tries to show that the elusive quest to demonstrate that such a natural law of behaviour operates in economics fails. In economics, we can't suppose that individual behaviour is entirely determined. We try to argue for this thesis by exploring the neoclassical analysis of the so-called "market law."

Economists' search for laws has obviously taken several forms, depending on the era and the intellectual winds, and particularly depending on whether they are looking at the micro or macroeconomic level. Yet the law of supply and demand is undoubtedly one of the most representative laws of economics, and remains true today. Generally it is understood in two ways: (1) the mechanisms of supply and demand observable in a *single* market, with an assumption of *ceteris paribus*, studied in partial equilibrium, or (2) the general premise of simultaneous equality of supply and demand in all markets as determined by competitive forces, this being the premise adopted by the general equilibrium theory. Here we are focusing on the latter perspective. It is unquestionably the stronger,

epistemologically speaking, as the partial equilibrium theory is subject to numerous aporia, particularly the illusory nature of the *ceteris paribus* constraint; but more than that, it represents a real attempt to boost economics into the rank of the natural sciences as Walras intended (*op. cit.*). The law was conceived by Walras and his successors, as a microeconomic law, for the point was to deduce it from the study of the "free" behaviour of agents unbound by any social attachment. The law of supply and demand can therefore be understood as the description of the behaviour of agents trading in a market. It is a law in that this behaviour takes on a "necessary" form. The law described the changes over time in a price system moving towards a fixed point that provides equilibrium among all suppliers and demanders in every market under consideration. These price movements, however, are merely the consequence of the rational behaviour of agents dealing with imbalances in supply and demand. It is only because rationed demanders bid prices up and rationed suppliers bid them down that prices move towards equilibrium. The point of the law of supply and demand thus comes down to describing the behaviour of a set of individuals who, acting separately and autonomously, systematically and predictably correct any and all market imbalances. This law is restricted to the market. The market, though, is an abstract concept not referring to any physical place; and in this sense, it can potentially be extended into reality without limit. Finally, this law describes a movement, a process, and this process of equalizing supplies and demands occurs over time. This task needs to be clearly distinguished from statically identifying a possible equilibrium point between supply and demand. To formulate a law of supply and demand, then, one must manage to establish the existence of individuals' systematic behaviour changing over time in a specified market setting. Therefore, this law involves the economist's ability to conceive the time period for the exchange and view this time period as transparent and reversible, as time is for the physicist who places a moving object on a frictionless inclined plane. The physicist "knows" how much time this moving object will take to cover the distance of the plane. He also knows that this experiment may always and everywhere be replicated identically. This is what permits him to speak of a law and not of a merely accidental causality. And knowledge as strong as that described by the law of falling bodies is what the economist would like to have concerning the balancing of supply and demand. At the heart of the search for a law of supply and demand lies the ambition to represent individual action in a market in a way that is just as systematic as an apple falling from a tree.

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Our paper tries to demonstrate that, in attempting to formulate the law of supply and demand, economists have discovered the importance of contingent rules. This stems from the nature of human beings, which resists systematic prediction, in markets as anywhere else. Human action makes human time discontinuous and irreversible. This is why humans *need* some rules...but have the *choice* of rules. We will try to support and demonstrate this statement in three stages. First we present the Walrasian project, which aims to prove the existence of this famous "natural" law of supply and demand. Then we show the failure of the paradigm of the general equilibrium theory (GET) and the subsequent turning to neoclassical research. Lastly, we show that this step led to the (re)discovery of the necessity of rules: it's precisely because of the lack of natural law that human beings need to reach some agreement about contingent rules.

Searching for the natural law

The premises of classical economics

The trend of autonomizing the economy probably began when the mercantilists became aware that the economy included mechanisms independent of other political, social or religious spheres. The archetype of these mechanisms is the one that automatically relates growth in the money supply to the general price level. This empirical observation gave the mercantilists the suspicion that there must be a "political economy," or in other words, an economic sphere independent of the wishes of the sovereign. Price increases following an increased money supply are not, in fact, due to the action of the sovereign and worse still, the sovereign can do nothing to stop it. This causal relationship appears inexorable and inevitable; it looks quite like a genuine law that did not need stating, or in other words a "natural" law.

The classicists view this law as of "natural" origin but do so while defining nature in a very specific way that in reality designates an artificial social system (Philipson, 1995). Smith thus explicitly connects the market process to the nature of human beings. The natural "propensity to truck, barter, and exchange one thing for another" (Smith, 1776, p. 15) is the foundation for representing the market as natural and, by extension, market mechanisms as causalities of a natural sort. Nevertheless, this nature is ambiguous for Smith. It is known that

the propensity to trade was for Smith very close to the disposition to sympathy that is the basis for his moral philosophy (Dupuy, 1992). Thus, Smith buries under naturalist references those considerations that draw on natural philosophy and on what we would today call the sociability of individuals (Mathiot, 1990). [3] This strictly human and social dimension inserts the classic view of the market and of capitalism into given institutional and social structures.

Ricardo, even more than Smith and with more theoretical explanations, presented the notion of artificiality in economic processes especially clearly. His theories of price gravitation and the equalization of profit rates, wages and rents both carry the same embedded socio-historical markings. In the Ricardian picture of the economy, which depicted "a pure production economy" (Pasinetti, 1974), the organization of production determines producer prices and these in turn determine market prices. The "natural price" around which market prices gravitate is, thus, actually an equilibrium price determined by the circumstances of production, themselves having their own historical, geographic and social characteristics. Smith (1976, Chap. 7), albeit confusedly, had already pointed out that this natural price depends on socio-historical conditions. Ricardo highlights this in the chapter he devotes to wages. His famous "subsistence wage" is also a socio-historical construct open to modification once economic growth exceeds demographic growth for a sufficiently long period. (This is, moreover, one of the reasons for his enthusiasm for the benefits of industrial economic growth and technological progress, as Henri Philipson's work (1995) makes clear.)

Thus, the market mechanism produces a consistent and predictable result, that of a precise system. Classical theory sets itself exactly this goal, of describing the mechanisms in a systematic form, but the laws that it presents are narrowly restricted to a particular organization of the economy. This socio-historical strait jacket into which market mechanisms are forced constitutes an obstacle in the search for general laws. Ricardo himself seems to be persuaded of this when he struggles manfully to demonstrate the determination of market prices using the value of labour they contain. His "93 percent" theory sounds like a failure. (The expression belongs to Stigler (1958).) Consequently, this conclusion shows how dependent such a determination is on the socio-historical context, and this can be the case for a "natural" law! In one way, it is this "guilty conscience" of

the classicists, anxious to argue from empirical data and limiting the scope of their analyses, that leads to the marginalists' epistemological break. Creating a truly "pure" scientific law basically requires breaking the lines of dependence woven by the classicists between market phenomena and the production sphere. This is what led the way to the theory of use value, which separates the determination of value from the production sphere and allows for a truly autonomous market system. It remained only to define it, describe it and demonstrate its virtues: this is the theoretical project led by the "marginalist revolution."

The Walrasian project

Walras, as part of the turn towards marginalism, uses the concept of use value to sever the links that subordinate the production sphere to the exchange sphere and to build a pure exchange economy. In this way he is able to make of the market a genuinely autonomous entity and free the movements of supply and demand from the social mooring that they had under the classicists. Indeed, with the use value principle, one has a tool making it possible to scientifically base the supply and demand curves on the rational choice of autonomous individuals, independent of any socio-historical context. It was on such a cleared field that the search for "scientific" laws of supply and demand took place.

We know that Walras built a precise and highly developed theoretical framework to demonstrate there was such a law. The framework can be presented from two perspectives, that of the market context and that of the rational individual. In a sense, the market framework can be boiled down to three main assumptions: pure and perfect competition, what has become known as the nomenclature assumption (Benetti and Cartelier, 1980), and the premise of initial endowments. The pure and perfect competition assumption is subsumed, in a way, in the notion of an individual price-taker, whether a consumer *or a producer*. The various assumptions about atomicity, free entry and exit, non-distortion, etc. are only there to ensure that no supplier or demander has the power to influence prices. It must further be supposed, once every individual is a price-taker, that information about the price of goods available for exchange is continually provided, which constitutes the perfect information assumption. This last point, however, is made explicit by the so-called nomenclature assumption. At the very start of the analysis, the tastes of individuals are fixed

and the list of available goods is assumed to be known by everyone, to an infinite degree. [4] This assumption entirely rules out an individual's questioning of the different possible purposes of trading. The final piece of information needed concerns individuals directly: what is the value of the goods and services they have before the exchange? In theory, this "initial endowment" is more or less the point of departure for the analysis, a minimal description of a certain distribution of initial wealth before the start-up of the economic process being analyzed.

The construction of this market framework assures us of the purity of the research subject, for no variable other than price movements can affect the agents' proposals to buy and sell. Yet the price movements are themselves nothing more than the outcome of the differences between overall supply and demand in each market. In the end, the pure choices of individuals are the sole variable tested, the price system being simply the means of accounting for them. Walras constructs a confrontation between each individual and the market, represented by the price system. The story of this confrontation comes down to a possible change in prices under the influence of a temporary disequilibrium between supply and demand.

In defining the problem, Walras borrows the very method used by physicists. After defining the subject of economics— scarcity— he constructs an experimental framework, the Walrasian market, which is an abstraction of market reality, in order to underline some basic and essential causalities and establish the existence of a natural law. Walras then borrows the approach described by Galileo in *Dialogue on the Two Chief World Systems*. He isolates and studies what Smith and Ricardo had noticed, without actually removing it from its socio-historical strait jacket (since they were interested in production): the notion of exchange between rational individuals. What Walras sought to demonstrate was that an overall movement must result from this widespread exchange process. This necessary and systematic process demonstrates a consistent condition describable by a law: that of supply and demand. This is neither a moral law, nor a civil law, but is just there, indicating a necessary, atemporal causality that is universally applicable. This is a very abstract natural law, founded on regularity, seen by Walras as being independent of time and historical events.

To get to this point, Walras excluded a factor that was, however, traditionally central to market exchanges (not to mention the matter of production): any direct contact between individuals. Indeed, each individual is only in contact with the price system, acting as a transmitter between this individual and the rest of the world, which has no other tangible existence beyond these price movements. The problem to be solved— i.e. the presumed infinite desire (the non-satiety assumption) of a finite number of individuals for a finite number of commodities— can therefore take the extremely simplified overall form of a system of differential equations expressing the supplies in and demands on each market expressed by each individual in terms of prices.

There remain just three questions. Is this system sound? Is the solution unique? And, on a different level than the statistical and mathematical, what process connects disequilibrium to its gradual elimination— in other words, how do equilibrium prices come about?

To the first question Walras will reply too quickly in the affirmative. The real demonstration of its existence will have to await Zeuthen (1932) and then, above all, Arrow and Debreu (1954). At that point, only the existence of a system of equilibrium prices had been attested. This system, moreover, had several things going for it, as seen in the two theorems of well-being (Arrow, 1951), which proved its desirability. In some ways, then, the efficiency of the market process already observed by Smith was confirmed by Walras-Arrow-Debreu— provided that we come to understand how the system, starting from disequilibrium, converges towards *this* equilibrium price. This is what stability theory is all about.

Stability theory, the name of a deliberate reference to the vocabulary of physical mechanics, thus designates what one might call the theory of movement in the Walrasian general equilibrium framework. The demonstration of the existence of equilibrium is in fact merely a "simple" formal correlation of equilibrium conditions to the assumptions about individuals and pure, perfect competition. However, within this demonstration, "nothing moves." Stability theory, by contrast, is a theory of movement in that it tries to understand how the quantities supplied and demanded change in relation to price movements. This question of movement is truly the heart of the matter, which the classicists called the "theory of gravitation" and which is the subject of the "law of supply and demand." The law of supply and demand is, in fact, only another way to

refer to the systematic adjustment of the supplies and demands of all individuals in every market, through the movement of prices.

The answer Walras gave to this question is both well-known and a source of divergent interpretations. Stability theory, known to economists as the *tatonnement* or trial-and-error process, in Walras' writings takes the non-analytical form of the description of a particular institution, the auctioneer who (1) calls out prices, (2) calculates the difference between supply and demand and recalculates it based on observed price changes, (3) sees to it that there is a single transaction price for a given good, and (4) makes sure that there is no out-of-equilibrium exchange. The theoreticians who followed Walras could not rest till they had minimized this so-called "convenient fiction" of the auctioneer who supposedly "mimicked" the reality of a price-adjusted system (Arrow and Hahn, 1971). If Berthoud (1988) is to be believed, this ran counter to Walras himself, who conceived of the auctioneer as a liberating institution, like Hobbes' Leviathan. Thus, with respect to the classical framework, Walras "added" an institution. What exactly does the addition of this institution mean: that the existence of a law of supply and demand only follows, according to Walras, the construction of this liberating institution, that is, the auctioneer? [5] Here we have a significant break in the quest for a natural law. Hence, Walras' law can no longer be seen as a "natural" one... since it presupposes the construction of some very precise institution. It is no longer the product of a form of nature but rather of an intentional construction explicitly designed by Walras. We will come back to this. Let us note for the moment that, regardless, Walras' theory does not take the form of a logical analysis but of a weakly supported conviction. This conviction is what those who continued Walras' work vainly try to support on rational grounds.

The failure of stability theory and its consequences

Failure of the Walrasian program

The modern theoreticians of general equilibrium will fill in this gap and show logically that the tatonnement process does in fact converge, without expressing an opinion on the institutional nature of the Walrasian theory, which they take up without further comment. Arrow and Hahn (1971) thus employ the tatonnement principle by supposing that all this happens "as if" there were an

auctioneer, while making clear that of course there is no such thing in reality. How can we account for this lack of concern with such a peculiar aspect of Walras' theory? Undoubtedly, there are two, ultimately very different, explanations.

In the first place, those who continue Walras' work do not conceive of the tatonnement process with the auctioneer as the end-point of their thinking about price formation but instead as a first phase, to be developed later. One might say that they are initially attempting to solve Walras' problem, which seems like a good starting point for thinking about price formation, before attempting to go further. Therefore, it does not seem very important to them to highlight the institutional nature of the Walrasian solution, since it is only a phase. Finally, one might venture that they do not take Walras seriously when he supposes that there must be an institution for equilibrium prices to form.

The second reason why modernists do not feel compelled to pronounce on the way Walras represents equilibrium price formation is that they quickly perceive that tatonnement, as simple as it appears, does not "necessarily" lead towards equilibrium. Arrow soon reached this conclusion. The stability theorem that he published with Block in 1959 is a confession of failure. Stability in this theorem hinges on the "gross substitutability" assumption concerning commodities and so breaks the consistency desired by Walras in these starting assumptions, whose purpose was solely to isolate the relationship between price movement and supply and demand behaviour. Making an unrealistic and *ad hoc* assumption about the nature of commodities is a way of pointing out the existence of an objection. This objection was, moreover, affirmed by Debreu, Mantel and Sonnenschein in a series of articles in 1972 and 1973. These authors discover the discontinuity between the form taken by individual net demand functions and aggregate net demand functions: there is in reality an infinite set of net demand functions that are compatible with the microeconomic assumptions of the Walras-Arrow-Debreu model. In concrete terms, this outcome means that assumptions made about the behaviour of agents do not allow us to say anything at all about the change in net demands starting from a disequilibrium situation. The Walras convergence process is, therefore, doomed to remain unproved. It is not impossible to believe in it, since no theorem has come along to demonstrate its non-convergence, but it is not possible to give a satisfactory demonstration of it with the tools forged by Walras. The law of supply and demand is, thus, not provable within the framework that Walras had set up for this very purpose. One

may subscribe to the belief that imbalances in a market are naturally corrected, but it is going too far to call this hypothetical disequilibrium corrective mechanism a "law".

This failure, apparent for over thirty years, has led theoreticians of general equilibrium to adopt various strategies. What do we find if we study those chosen by three of the greatest of this group, namely Arrow, Debreu and Hahn? Debreu soon understood that a stability theory was illusory and so became convinced that the job was finished with the demonstration of equilibrium. This is understandable for a mathematician but it hardly resolves the economist's quest for the law of supply and demand. For many years Franck Hahn continued, especially with Negishi, to research non-Walrasian stability processes, i.e. those other than tatonnement processes, based particularly on the existence of out-of-equilibrium exchanges (Hahn, 1980, and Hahn and Negishi, 1962). As might be suspected, the complexity increases once you question all or part of the auctioneer's functions, and this path led to no significant results, apart from new evidence of the complexity of price formation. Arrow, in a way, acknowledged the failure of Walras' strategy and sought to improve the representation of the market process, so as to come to an understanding of the price formation mechanism. This is the strategy we will explore in the next section, for in the end it will support Walras' intuition that there can be no law without a "centralizing and coercive" institution.

Arrow's critical approach

Arrow's research strategy took a distinctive turn that one can date from his 1973 speech to the AEA (Arrow, 1974). There Arrow outlined a research program that turned out to be what we today call the new microeconomics. In his speech, Arrow pointed out that certain empirical facts contradict the general equilibrium theory, in particular the persistence and even the growth of worldwide inequalities and the existence of massive unemployment. As he saw it, these facts have to lead the theoretician to define what is lacking in the theory. He then identified a crucial shortcoming: the poor accounting for uncertainty. This observation, prophetic as it was, actually heralded a profound shift in approach, in that it indicated a new way of conceiving of the issue of price formation. The question of uncertainty can, in fact, only arise once one relaxes the assumptions underlying the general equilibrium theory of perfect confidence

and knowledge on the part of agents with regard to the quality and availability of the goods exchanged. By raising this question, Arrow steps outside the Walrasian framework. Yet Arrow went even further, since he indicated that uncertainty is a determining phenomenon in the price formation process. He thus resolutely dropped the perspective of general equilibrium— likely spurred on by the "negative" results of Debreu, Mantel and Sonnenschein (1973)— and suggested that henceforward he intended to understand how prices are formed within a bilateral negotiation and no longer within a tatonnement process. In this way he was pleading, implicitly, for the development of a different representation of the process, and of the market.

In Arrow's view, price formation is constantly contingent on the uncertainty that threatens the expected behaviour of markets. More specifically, he identifies two types of uncertainty: temporal uncertainty and uncertainty about the quality of goods exchanged. Exchange, he reminds us, is always contingent on a doubt about the good being exchanged: when will the commodity be delivered? What will be the actual quality of this commodity? These two questions are certainly not new; and it has been known as long as there have been markets that to accept a commitment to buy or sell a specific commodity, one must have certain guarantees as to the nature of the good exchanged. The novelty, once again, is only apparent within the GET research program. In the Walras-Arrow-Debreu universe, a commodity has two main features: it is dated and it is perfectly described. The features of the good being exchanged and its delivery date are therefore known with certainty. [6] Thus, the purchase or sale is made with full awareness of the facts. It is just this point, Arrow tells us, that is troublesome. When one tries to understand in concrete terms how an exchange occurs, one sees, in fact, that it never occurs with full awareness of the facts, but it is based instead on partial information about quality and the likelihood that the commodity being exchanged will actually be delivered. Most of the time, the agreement in the exchange is hampered by this uncertainty concerning the possibility the good may have features deemed inadequate by an individual (e.g., technological obsolescence or the insufficient educational level of a service provider) or that are unobservable and will only appear after the exchange (e.g., a hidden defect or gross incompetence). These problems only intensify, Arrow points out, if the transaction occurs over a long, if not uncertain, period when contingent goods are involved. For this reason, forward markets or contingent markets are not seen so much and when they are, they do not operate anonymously; each of the two contracting parties tries to put together

information about the other and the commodity exchanged (obvious instances being consumer literature or investigations by insurers and banks). This uncertainty may keep some exchanges from taking place and limit the number of future or contingent contracts. Now, through a contagion effect from the interdependence of markets, the prevention of a certain number of exchanges, even only a few, blocks the entire system. The uncertainty that inheres in market exchanges thus requires some sort of assurance to bolster the confidence of participants. In Arrow's view, it is the role of institutions and of common standards, rules and values to remove this uncertainty. For this reason, "nonmarket controls, whether internalized as moral principles or externally imposed, are to some extent essential for efficiency." (Arrow, 1968, p. 105)

Essential rules

This critical sequence, briefly summarized, is important in that it takes us right to the point that Walras tried to avoid: the moment agents meet. Behind the complex terms "adverse selection," "moral hazard," and "information asymmetries," Arrow actually rediscovered a much simpler problem: the relationship with the other person whom, to make an exchange, one must trust. As he distanced himself from the Walrasian framework, which made it possible to imagine a price formation process in which each person was "rid of everyone else" (Berthoud, 1988), Arrow rediscovered the relationship to the other person that develops deep within the market and poses a problem for a normal *homo economicus*. This calculating individual, having only logical faculties, is not equipped to deal with others. Others, for *homo economicus*, mean nothing except as potential instruments for his own satisfaction— like the rest of his environment for that matter. We might imagine that *homines economici* find it rather hard amongst themselves to come to any agreement, as they possess no ethical faculties at all! What posed no problem in the material, Walras-Arrow-Debreu universe now becomes a terrible handicap, to the point of blocking any hope for exchange. This is why Arrow sees the importance to the market of rules, institutional in the broad sense, which govern the entire exchange and enable individuals to grant each other a minimum of trust. To take the classic example of the medical market, one of Arrow's earliest areas of investigation (Arrow, 1963), the exchange can take place not because patients trust particular doctors but because they trust the system of institutional, legal or professional rules that govern the work of every physician. Arrow points out

to us, in a way, that we overcome our lack of trust in the other person by trusting the rules that guide his or her behaviour and make it predictable: "The failure of the market to insure against uncertainties has created many social institutions in which the usual assumptions of the market are to some extent contradicted. The medical profession is only one example, though in many respects an extreme one." (Arrow, 1963, p. 41)

The failure of the Walrasian program with regard to price formation consequently led to a re-examination of the forces behind price formation, which highlighted the very thing Walras tried to avoid: the relationship with another person and the related ethical imperatives. Put another way, the inability to demonstrate the existence of a law of supply and demand in a Walrasian framework led an influential theoretician like Arrow to develop a new model of the market process and to discover, thereby, the central role occupied by the institutions governing the exchange. This discovery, of course, does not amount to much outside the specific perspective of the general equilibrium theory. Many others before Arrow had understood the importance of market organization rules. But Arrow was the first to rediscover this necessity from a scientific slant aimed at discovering the existence of an economic law. The objection will undoubtedly be raised, and rightly so, that in reality Arrow only supported and confirmed Walras' insight. Indeed, the latter had posited from the outset that there could be no price formation without the aid of a dominant institution, which in his view was personified by the auctioneer. But what Walras initially suggested was confirmed by Arrow's research: there was no law of supply and demand without shared rules and institutions to put trust into the exchange. The time in which prices are formed is human time and therefore time needing to be socially structured, time which is not naturally the linear and reversible time of physics but the irreversible and contingent time of history. The economist's time, Arrow ultimately says, is not the same as the physicist's— not once you have left the Walrasian framework of exchange without direct human contact. So we leave this framework behind, precisely because it turns out to be hard to understand the first thing about how prices are formed if you don't let individuals meet.

On the basis of this discovery, Arrow highlights the role of collective rules and shared values. Yet he never clearly stresses the fact that this discovery basically killed any hope of formulating a "natural" law of supply and demand. Hence, this problem might be swept under the rug.

Contingent rules or necessary rules?

Two possible options

Given the problem discovered by Arrow, two attitudes are possible: either you forge ahead to show which rules are *necessary* to the market process, or else you say that rules do not apply automatically but only *contingently*, which is essentially to say, as a subject of politico-ethical discussion between the agents. [7]

Lewis (1969) makes the two-fold proposition that while *some* conventions must necessarily exist, it matters little *which* particular convention actually applies. This is the case in the game of "pure coordination" (Schelling (1960)). Lewis's simple argument is excellent pedagogy and makes us understand that it can be necessary that a rule exist without a particular rule being necessary. This is even a characteristic of situations that "call for" a common rule. Agents' accommodation to this rule is made necessary precisely because of the fact that, individually and collectively, they have a choice among several possible courses of action. In strictly logical terms, such a rule must be necessary and contingent. But the world of logic is not the world of social sciences, in which the issue is precisely the choice of a particular rule. This question can take two quite different forms: which rule is the right one to choose *or* which rule will individuals choose (including under the influence of external constraints)?

These two approaches, the *normative-constructivist* approach and the *positive* one, rather constitute two types of questioning based on the idea that "the rule is necessary."

Imposing organization rules: the constructivist approach

The normative approach descends directly from Hobbes (1651), who founded the constructivist and normative position by demonstrating why the existence of a *Leviathan* is "necessary." In his analysis, Hobbes defends the necessity of a particular type of organization or institution. In this he relies on a logical proof of the superiority of this institutional solution in terms of "efficiency." Without having mentioned it heretofore, he considers the efficiency imperative the foremost criterion governing the choice of rules. The *Leviathan* becomes essential, by social contract, because it makes it possible to escape the state of nature and its brief, miserable existence, and in a way to "maximize" individuals' life spans.

In economics, the neo-institutionalist trend of "transaction costs" economics is the heir to this constructivist and normative conception of institutions. The leader of this movement, Oliver Williamson (1975, and 1985), lays claim to two traditions, the neoclassical (through Coase) and the institutionalist (through Commons) and strives in his two major works to prove "scientifically" the superiority of capitalist organizations founded on hierarchical relationships and shareholder power. In so doing, Williamson places himself squarely in a logical line with the work of Kenneth Arrow, whose ideas he applies to the uncertainty inherent in relations between *homines economici* (Williamson, 1987). Forsaking the "hypothetico-deductive" perspective of Walras, Williamson claims to base his analysis on *man as he is* and thus adopts an "anthropological" justification of capitalist wage relationships. Essentially reworking the problems indicated by Arrow, he emphasizes that uncertain, cognitively limited and opportunistic individuals cannot create among themselves the long-term relationships necessary to production. They are flawed: their cognition is not consistent with their behaviour. Indeed, to understand the world, they would need to exchange in the long-term but their deeply asocial nature does not allow it. Hence, if they are to get along, have a common language and produce wealth together, they "must" place themselves under the authority of an organization run by those whose own fortune is at stake in that organization, i.e. the stockholders. This "necessity" of the shareholder-capitalist structure is the direct consequence of individuals' flaws. Given their opportunism and cognitive limits, the organization has to inform, supervise and punish in order to maximize collective efficiency. One can easily spot in this logical justification of the contract made between the wage earner and the owner of capital assets an almost word-for-word reprise of the justification Hobbes proposes for the monarchy: the necessity of a particular coercive institution arising from the "natural" characteristics of the agents. In this rhetoric, man is still and always will be "a wolf to other men." It is worth noting that Williamson, though he is the most influential of neo-institutionalist theoreticians, is not alone. Whether it is seen through history (North, 1977, 1984, and 1994) or in game theory (Schotter, 1981), the logic is the same: there exists a set of institutions— capitalist institutions— that turn out to be better from an efficiency point of view and thus "necessary."

What can we make of this neo-institutionalist strategy with its social organization chart? It seems to us to call for two observations. First, this strategy highlights the very peculiar status that the notion of law can have in

economics. It is no longer, in fact, a matter (as Smith may have thought or as the theoreticians of general equilibrium may have pretended to think) of identifying a form of systematic, natural behaviour in humans that can be described in the form of a law. From the neo-institutionalist viewpoint, the systematic aspect of behaviour is the product of coercive institutions, artificially designed to cloak our defective nature.

This first institutionalist strategy built on the remains of the general equilibrium theory ratifies the absence of "natural laws" in economics. If there is, finally, something systematic about economics, it is not because we have constructed organization rules to model individual behaviour and make it predictable and efficient. Well-ruled behaviour comes from rules. Granted, these rules are thought of as necessary. But there is nothing natural about this necessity. It is based on a sort of bullying that amounts to setting up the collective efficiency imperative as an unquestionable social priority. It leaves behind, though perhaps not obviously, the positive space of aiming to describe predictable, regular behaviour in the form of a behavioural law— the law of supply and demand— to enter the normative realm of social prescription. This posture, furthermore, is weakened by two limits. The first stems from the absence of a positive theory of the emergence of institutions. Since the institution is here thought of as cloaking agents' flaws, it cannot derive from their voluntary behaviour. So we have to suppose the existence of a *deus ex machina* constructing society's collective structures. The second stems from the absence of rigorous logical proof of the superiority of the institutions so conceived. Everyone can certainly appreciate the productive efficiency of capitalism, but this empirical observation does not constitute logical proof. We are really talking here about socio-political persuasion tending to legitimize the existing social and economic structures, more than of scientific work meant to work out statements of laws. Thus, this early approach to factor in rules, which takes the form of prescribing coercive rules in the name of a collective efficiency imperative, in no way attains the objective of discovering and articulating natural laws in economics. Yet there remains one other strategy: taking seriously the *de facto* indeterminacy of social rules.

Assuming the contingent nature of rules . . . and giving up on laws

The second option available consists of a certain amount of indeterminacy in social and economic rules. This is based on a twin observation: on the one hand,

one accepts that with the failure of GET, the dream of an economy *naturally* ordered by the market exchange is a chimera; on the other hand, one accepts the "contingent" aspect of rules, by ceasing to prescribe particular rules or to organize the economy according to the efficiency imperative. This second observation is fed by Arrow's critique but creates a break with the neo-institutionalist movement in that it declines to prescribe the overarching rules.

In a way, this theoretical approach leads one to cease identifying economic laws that may derive from the natural behaviour of agents. It supposes that the existence of order follows from the establishment of organization rules and that these collective rules are temporary, historically dated . . . and themselves contingent. Therefore, it simply stops trying to discover in economics some mechanistic regularity subject to descriptive laws following the model of physics.

This posture does not at all mean denying that regularity may exist in individual or collective behaviour. Within a particular system of contingent rules, there are forms of constraints and dependencies between market participants that make it possible to predict their behaviour. Thus, in the capitalist system, characterized as a "monetary production economy," Keynes was able to identify a form of macro-economic constraint on the basis of which the economist can discern systematic chains of cause and effect. But the validity of mechanisms so discerned is low and limited in space and time. So Ricardo's famous "law of diminishing returns" is only true within an agrarian economy, as Sraffa observed. Likewise, Keynes' observation affirming an inverse correlation between income and the propensity to consume is only true in a certain form of capitalism (and today has proved false, if the overconsumption of US and of well-off American households is any indication). The Marxist law of the tendency of the rate of profit to fall was only true at one time, before the organization of a workers' movement (in part motivated by Marx's very analysis) that wound up obtaining a large redistribution of productivity gains.

This theoretical approach, finally, involves supposing that in economics the existence of a mechanistic regularity finds itself contingent on the continued presence in time and space of a given institutional structure by which it is circumscribed. Strictly speaking there are no laws that would be in any form at all as generalizable as the laws that emerge from the natural sciences. There are regularities that pertain to a system of contingent rules. The issue then is to be

aware of how much we do or do not know about the continuity of these rules and how they change over time. It is this knowledge which will determine the degree of validity, generality and robustness of the "system laws" we identify.

On this point, the central question seems to us to be the following: how much freedom do agents have to change the rules? To answer this, the economist's tools, forged to discover laws and systematic chains of cause and effect, seem inadequate indeed. At the microeconomic level, it appears futile to try to understand anything whatsoever about institutional forces by focusing solely on individuals using only their instrumental rationality— this being one of the results of previous research, presented in Postel (2003). At the macroeconomic level, one is obliged to note that economists often can only argue from given rules, without measuring how the phenomenon under study helps to change the rules of the game. This inadequacy of the economist's tools in helping us to understand the forces behind institutions is not necessarily a serious problem. We might say that this issue, on which economists focus, is beyond their competence. This may be an opportunity for a form of job-sharing between economics and the other social sciences. To the other social sciences goes the work of understanding and representing the social and economic context, while to the economists goes the logical analysis of the causal relationships that are woven within this framework.

This position supposes, however, that the two activities (analyzing the rules laid down and exploring the institutional dynamics) can be completely separated. In other words, it assumes that one can ignore the impact of individuals on social rules. So to this question, one has to answer: agents have so little freedom to change the rules that it can be ignored. Only in this way can one suppose that forces behind institutions are not affected by actions that occur within them and, at the other extreme, that individuals act without being aware of their ability to change the rules of the game. At the very least, since such a position hardly appears tenable, one needs to wager that this simplifying assumption allows us to move forward without too many errors in understanding the phenomena we study.

This assumption is undoubtedly valid when the institutional regime studied is "stable." However, in periods of reconfiguration such as the present moment (and they are undoubtedly the most common), this assumption seems to us fallacious. Hence, the inadequacy of the economist's tools we mentioned poses a problem. He

or she must also take an interest in institutional dynamics, or at the very least, in the interaction between these dynamics and the behaviour of economic agents. This conviction opens up a new, institutionalist line of research including, for example, the French institutionalist theories of regulation (Boyer (1986, 1990); Boyer and Saillart (2002)) and conventions (Boltanski and Thevenot (2006), Favereau and Lazega (2002), and Dequech (2007, 2008).

This line of research is very close to the epistemological position of critical realism (Archer, Bhaskar, Collier, Lawson, and Norrie, 1998; and Lawson, 1997, and 2003). The critical realism research program stresses that "social structures do not exist independently of the agents' conceptions of what they are doing in their activity" (Bhaskar, 1979, p.38). This epistemological perspective insists on three points (1) the distinction between social structures and the agent are necessary to analyse the interrelation between those two levels which are co-determining the action; (2) social structures are not immutable but are continuously changing; and (3) "in social life only relations endure" (Bhaskar, 1989, p.41). These three points form the basis of the "Explanatory Methodology" of the critical realism school. From this perspective, rules and conventions are the fundamental links between agency and structure, and they have to be analysed from a historical perspective. "Social forms are necessary conditions for intentional acts, their pre-existence establishes their autonomy as possible object of scientific investigations" (Bhaskar, 1989, p. 25)...But they are contingent and they are changing because of the action of the agent. "The social ontology of realism tries to empower us to analyse the processes by which structure and agency shape and re-shape one another over time." (Archer, 1998, p.203)

Thus, taking the contingent nature of social and economic rules into account leads the critical institutionalist to recognize the peculiarity of the economic process as compared to a natural process. The contingency of collective rules is only the final effect of a more profound cause of the economist's "failure," which is human freedom. It is, in fact, because people have the freedom to construct the institutions they wish that economists cannot manage to identify universal scientific laws that are always and everywhere true. The institutionalists are rediscovering that economists are always dealing with the contingent nature of human action and that this, when it comes to predictability, limits what they can claim to do. This epistemological position has two consequences: (1) we have to rediscover the substantive definition of economics (in line with Polanyi, and contrary to Robbins's definition) [8] and (2) we have to rethink the traditional

conception of substantial and instrumental rationality in order to identify that the behaviour of economic actors depends *on* the social rules, not only as constraints, but equally as *resources and goals* of individual behaviour. Rules can't be analysed correctly from the narrow conception of the rational economic man as a computer just able to choose the lowest cost action...because this traditional economic analysis is supposed to render the social realm of rules abstract. These are avenues for a new kind of research in economics.

Conclusion

The search by economists for a scientific type of law presupposes that there are systematic causal relationships in economic interactions that might be formulated as general laws. The market has appeared to economists as the place where such a systematic nature could be seen, through the movements of supply and demand. The search for a law of supply and demand thus became, within the framework of the neoclassical general equilibrium theory, economists' top objective, keeping alive their hope of discovering the existence of a scientific law formally comparable to the laws of physical mechanics. They sought a law which ought to have made it possible to describe and predict the free behaviour of individuals in the market and to articulate, based on this behaviour, the required equalization of the quantities supplied and demanded.

This paper has described the history of this search and its failure. Even when they confine their analysis to the market and reason abstractly within a pure exchange economy, economists in the end come up against the necessity that social rules precede the collective order. The history of this attempt and this failure to state a general law of supply and demand— the economists' quadratic equation— definitively confirms that in economics the only laws are those that participants choose in a defined space and for an indeterminate and often short period of time. The regularities that the economist may describe are those circumscribed by contingent institutional systems. This observation leaves economists with two possible approaches: to try to discover what the rules and institutions which *necessarily* must guide the economic process are or to accept this contingency and try to understand better how these rules evolve.

Our conviction is that, from an epistemological viewpoint, only the second approach is entirely legitimate for an economist. That being the case, since no rule is always and everywhere valid, the appropriate approach seems to be to try

to improve our understanding of institutional dynamics. Yet to recognize the legitimacy, among other things, of this radically institutionalist line of research, one first has to accept that one can do economics rigorously without copying the physicist and without "seeking natural and universal laws." It is now time that this point at least be granted and that economists thereby free themselves from the epistemological model of the so-called hard sciences and accept that their knowledge is part of the human and social sciences, and so of a different epistemological model.

Endnotes

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[2] Given the pure theory of economics, it must precede applied economics, and this pure theory of economics is a science which resembles the physico-mathematical science in every respect." (Walras, 1874, p. 29)

[3] Thus when Smith terms as "natural" the propensity to trade, it is to differentiate human nature from animal nature: "It is common to all men, and to be found in no other race of animals" (Smith, op cit, p. 15). This human "nature" specifically stands apart from the natural order.

[4] This description includes a physical description, such as: "The descriptions are so precise that further refinements cannot yield imaginable allocations which increase the satisfaction of the agents" (Geanakoplos, 1985, p. 116). After Hicks (1939), the spatial (place of delivery) and temporal (time of delivery) dimensions are included. Debreu (1959) includes the uncertain case by adding the notion of delivery conditional on a contingent event.

[5] Space permits only a crude presentation of this debate on the exact status of the Walrasian auctioneer, which is very nicely presented by Dockes (1996, pp. 45-52), who comes down rather in favour of the neo-classical interpretation.

[6] To relax somewhat the assumption of a perfectly transparent future. Debreu (1959), following Arrow (1953), subsequently included "uncertainty" by adding as an extra dimension the conditional nature of goods, evidenced by the fact that

actual delivery of the good on an agreed date is contingent on the occurrence of a given event, i.e. on a precise state of the world from among the many imaginable conditions. This extension to the uncertain case does not really change anything, Debreu tells us, when one considers, following Savage (1954), that the intertemporal maximization of the hoped-for utility is collinear with the maximization of the utility in the certain case, notwithstanding the existence of a subjective probability distribution, untested by reality, for the states of the world.

[7] To give this opposition its full meaning, we need to point out that a rule can be at once *contingent* and *necessary*. This relative paradox has been nicely stated by the logician David Lewis in his book on analytic philosophy *Conventions* (Lewis, 1969).

[8] This position is developed in (Postel and Sobel, 2008). The authors defend the definition of Polanyi (1957, 1977) against the definition of Robbins (1935).

References

Arendt, Hannah (1958), *The Human Condition,* Chicago: Chicago University Press

Arrow, Kenneth J. (1951), 'An extension of the basic theorem of classical welfare economics', in Neyman, J. (ed.), *Proceedings of the Second Berkeley Symposium on Mathematical Statistics and Probability*, Berkeley, Calif.: University of California Press, pp. 507-532

Arrow, Kenneth J. (1953), 'Le rôle des valeurs boursières dans la répartition la meilleure des risques', *Econométrie*, Paris, CNRS: 41-48

Arrow, Kenneth J. (1963), 'Uncertainty and the welfare economics of medical care', *American Economic Review* 53: 941-973. Republished in Arrow, K. (ed.) (1985), *The Collected Papers*, vol. 6, The Belknap Press of Harvard University Press, pp. 15-50

Arrow, Kenneth J. (1968),'The economics of moral hazard: further comment', *American Economic Review*, 58: 537-539. Republished in Arrow, K. (ed.) (1985). *The Collected Papers*, vol. 4, The Belknap Press of Harvard University Press, pp. 103-105

Arrow, Kenneth J. (1973),'Information and economic behaviour', *Lecture to the Federation of Swedish Industries*. Republished in Arrow, K. (ed.) (1985), *The Collected Papers*, vol. 4, The Belknap Press of Harvard University Press, pp. 136-152

Arrow, Kenneth J. (1974), 'Limited knowledge and economic analysis', *American Economic Review* 64 (4): 153-166. Republished in Arrow, K. (ed.) (1985), *The Collected Papers*, vol. 4, The Belknap Press of Harvard University Press, pp. 153-166

Arrow, Kenneth. J. and Franck Hahn (1971), *General Competitive Equilibrium*, San Francisco: Holden Day; Edinburgh: Oliver and Boyd

Benetti, Carlo and Jean Cartelier (1980), *Marchands, Salariat et Capitalistes*, Paris: Maspéro

Berthoud, Arnaud (1988), 'Economie politique et morale chez Walras', *OEconomia*, série PE de la revue *Economie et Société* 22, 3: 65-93

Bouveresse, Jacques (1987), *La Force de la Règle*, Paris: Les Editions de Minuit

Boyer, Robert (1986), 'Regulation', in J. Eatwell, M. Milgate, P. Newman (eds.), The New Palgrave: A Dictionary of Economics, Basingstoke: The MacMillan Press : 254-260

Boyer, Robert (1990), *The Regulation School*, Columbia University Press

Boyer, Robert, Saillard Y. (eds) (2002), *Regulation Theory: The State of the Art*, London: Routledge

Cordonnier, Laurent (1997), *Coopération et Réciprocité*, Paris : PUF

Dequech, David (2007-8), 'Neoclassical, orthodox, mainstream, and heterodox economics', *Journal of Post Keynesian Economics* 30(2): 137-160

Dequech, D. (2008), 'Logics of justification and logics of action', *Journal of Economic Issues* 42, 2 (June): 527-536

Dockes, Pierre (1996), *La société n'est pas un pique-nique, Léon Walras et l'économie sociale*, Paris : Economica

Dupuy, Jean Pierre (1992), *Introduction aux sciences sociales*, Paris: Ellipse

Favereau O., Lazega E. (2002) 'Introduction', in Favereau O., Lazega E. (eds), *Conventions and Structures in Economic Organisation*, Cheltenham (UK): Edward Elgar, pp.1-28

Geanakoplos, John (1985), 'Arrow-Debreu model of general equilibrium', in Eatwell and al. (eds), *The New Palgrave: A Dictionary of Economics*, vol. 1, Basingstoke: The MacMillan Press, pp. 116-124

Guerrien, Bernard (1990), *La Théorie Néoclassique. Bilan et perspectives des modèles d'équilibre général*. Paris: Economica

Hahn, Franck and Thomas Negishi (1962), 'A theorem on non-tâtonnement stability', *Econometrica* 30, 3: 463-469

Hahn, Franck (1962), 'On the stability of pure exchange equilibrium', *International Economic Review* 3, 2: 206-213

Hahn, Franck (1980), 'Stability', in Kenneth Arrow and Michael Intriligator (eds.), *The Handbook of Mathematical Economics*, vol. 2, Amsterdam: North Holland, pp. 745-793

Hume, David (1740), *Treatise in Human Nature*, Oxford University Press

Hobbes, Thomas (1651), *Leviathan*, reprinted in C.B. Macpherson (ed.) (1968), Pelican Classics, Penguin Books

Krecke, Elisabeth (2003), 'Economic analysis and legal pragmatism', *International Review of Law and Economics* 23: 421-437

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

Lawson, T. (2003), *Reorienting Economics*, London: Routledge

Lawson, T. (2005), 'The nature of heterodox economics', *Cambridge Journal of Economics* 30(4): 483-505

Lewis, David K. (1969), *Convention. A Philosophical Study*, Cambridge (MA): Harvard University Press

Mathiot, Jean, (1990), *Adam Smith, Philosophie et Economie*. Paris: PUF

North, Douglass Cecil (1977), 'Markets and other allocation systems in history: the challenge of Karl Polanyi', *Journal of European Economic History* 6, 3: 703-716

North, Douglass Cecil (1984), 'Government and the cost of exchange', *Journal of Economic History* 44: 255-264

North, Douglass Cecil (1994), 'Economic performance through time: Nobel Lecture', *American Economic Review* 84, 3 (June): 359-368

Pasinetti, Luigi (1974), *Growth and Income Distribution: Essays in Economic Theory*, Cambridge University Press

Philipson, Henri (1995), *L'Economie contre la Nature,* Lille: Ester

Postel, Nicolas (2003), *Les règles dans la pensée économique contemporaine*, Paris: CNRS Editions

Postel, Nicolas, Richard Sobel (2001), 'L'impensé de l'hétérodoxie économique française', *Les Temps Modernes* 615/616 (Sept./Oct.): 321-346

Postel, Nicolas, Richard Sobel (2008), 'Economie et rationalité: apports et limites de l'approche polanyienne', *Cahiers d'Economie Politique* 1, 54 (June): 121-148

Postel, Nicolas, Richard Sobel (2009), 'Institutionalism as the way of unification of the heterodox theories', *Journal of Philosophical Economics* III, 1: 47-77

Quine, Williard V.O. (1936), 'Truth by convention', in O.H. Lee (ed.), *Philosophical Essays for A.N. Whitehead*, New York: Longmans: 90–124

Quine, Williard V.O. (1951), 'Two dogmas of empiricism', *Philosophical Review* 60: 20-43

Savage, Leonard (1954), *The Foundations of Statistics*, New York: Willey

Schelling, Thomas C. (1960 (1980)), *The Strategy of Conflict*, Cambridge Mass.: Harvard University Pres

Schotter, Andrew (1981), *The Economic Theory of Social Institutions*, Cambridge: Cambridge University Press

Smith, Adam (1976), *An Inquiry into the Nature and Causes of the Wealth of Nations*, reprinted by Edwin Cannan (ed). (1904), London: Methuen and Co., Ltd.

Sonnenschein, H. (1973), 'Do Walras's identity and continuity characterize the class of community excess domain function?', *Journal of Economic Theory* 6, 4 (August): 345-354

Sonnenschein, H. (1972), 'Market excess demand functions', *Econometrica* 40, 3 (May): 549-563

Stigler, G. (1958), 'Ricardo and the 93% labor theory of value', *American Economic Review* 48, 3 (Jun.): 357-367

Van de Velde, Franck (2005), *Monnaie, chômage et capitalisme*, Lille : Septentrion

Walras, Léon (1874), *Eléments d'économie politique pure*, reprinted in Mouchot (ed), (1988), *Œuvres économiques complètes de Léon Walras*, vol. 8, Paris: Economica

Williamson, Oliver E. (1975), *Market and Hierarchies. Analysis and Antitrust Implications*, New York: The Free Press

Williamson, Oliver E. (1985), *The Economic Institutions of Capitalism*, New York: The Free Press

Williamson, Oliver E. (1987), 'Kenneth Arrow and the new institutional economics', in Feiwell G. (ed.), *Issues in Contemporary Microeconomics and Welfare*, London: Macmillan Press, pp. 584-599

Zeuthen, F. (1932), 'Das Prinzip der Knappheit, technische Kombination und ökonomische Qualität', *Zeitschrift für Nationalökonomie* 4: 1-24

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