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Working Paper

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CHOPE Working Paper, No. 2023-10

Provided in Cooperation with:

Center for the History of Political Economy at Duke University

Suggested Citation: Carret, Vincent (2023) : Do engineers believe in spontaneous order? The case of Jacques Rueff, CHOPE Working Paper, No. 2023-10, Duke University, Center for the History of Political Economy (CHOPE), Durham, NC

This Version is available at:

<https://hdl.handle.net/10419/283925>

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DO ENGINEERS BELIEVE IN
SPONTANEOUS ORDER? THE CASE OF
JACQUES RUEFF

BY VINCENT CARRET

CHOPE Working Paper No. 2023-10
December 2023



CENTER FOR THE
HISTORY OF POLITICAL ECONOMY
AT DUKE UNIVERSITY

Do Engineers Believe in Spontaneous Order? The Case of Jacques Rueff

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December 2023

Abstract

In the 1950s, Jacques Rueff's references to social order seem pretty clear: it is not a spontaneous phenomena. Although Rueff is generally seen as a liberal economist, this has prompted commentators to see in his approach something more artificial than Hayek's own ideas on social order. Hayek himself was befuddled by Rueff's reflections on social order and spontaneous emergence. This present paper seeks to explore what Rueff meant by spontaneity, by going back to the scientific context of the 1950s, when Rueff began to reframe his ideas on social order through the lens of cybernetics. Exploring Rueff's cybernetic moment enlightens us on the context in which he developed his thoughts on social order, and what liberalism was for the French economist.

Keywords: Jacques Rueff, cybernetics, spontaneous order, F. A. Hayek

JEL Codes: B20, B25, B31, B53

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Jacques Rueff and Friedrich Hayek were born three years apart at the end of the 19th century, and went through much of the same events of the 20th century. They were both enmeshed in the World Wars, both traveled the world, and both led successful careers as economists. One might think that the similarity ends here. Rueff, a French inspector of finances, had a long and successful career in civil service that limited his academic endeavors, while Hayek spent most of his career in universities. From the point of view of their economics, they might seem even more distant; Rueff was fascinated by equilibrium as a heuristic approach to social phenomena throughout his life, while Hayek moved away from equilibrium concepts to give an account of the process of economic discovery and coordination (Caldwell, 1988). They are also separated by two cultures, and two educations. Rueff, the civil servant, attended the École Polytechnique, the same school that was exposed by Hayek as the “source of scientific hubris,” the original broth of ideas on economic planning which were fashionable when they were both writing in the middle of the century (Hayek, 2010 [1942-1944]: 169ff.).

And yet, both authors were committed liberals, defending their creed even in the lonely depths of the depression (Rueff, 1934). They met in the same circles, the same colloquia, the same conferences, and they exchanged several dozen letters throughout their lives, most of them focused on the organization of early meetings of the Mont Pelerin Society. In the wake of renewed scholarship on liberalism and its twentieth century transformations, one wonders whether it was a strategic alliance in opposition to central planning that brought the two men together, or if there was something deeper to their connection. The literature on Rueff, Hayek, and the movement they were a part of, does not clarify this connection. They have been presented either as holding two positions incompatible with each other, or as both holding similar extreme views on the necessity of free markets, even when note is taken of their different

methodologies (Crozet, 2000). Some commentators have adopted a mixed approach, by arguing that Ludwig von Mises, Rueff, and Hayek shared the same attachment to free markets, but that Rueff was much more constructivist than the other two, and even guilty of the scientific approach that was denounced by Hayek (Chivvis, 2010: 10, 34, 182). One other way that has been adopted to resolve the puzzle of their relationship is to say that they did not in fact share the same outlook; in this perspective, they rubbed shoulders only as a matter of strategic alliance because they believed in the same ideology of free markets to fight the rising Keynesian tide (Daou, 2019: 575). Such an approach implies that the belief that a liberal society is superior to a planned society is just a belief, an ideology that does not rely on a serious inquiry.

One way to tackle this question is to look at a central theme throughout Hayek's work, the question of spontaneous order and its opposition to a planned or designed order (Hayek, 2022 [1973]: 56ff). As a former student of the *École Polytechnique*, Rueff is automatically suspect of a penchant for the planned order; such a suspicion seems confirmed by a few smoking guns. As noted by Chivvis (2006: 706; 2010: 182), one of Rueff's last books, *Les Dieux et les Rois*, led to an unusually long letter from Hayek who wanted to "remonstrate" him for writing that "a social order is never spontaneous" (Rueff, 1968a: 84). This was not the first time Rueff had done so: in 1955, during a conference on "State intervention," Rueff had already declared that "I would like to point out to you that order is never spontaneous" (Rueff, 1989: 361). This conference was cited by another commentator as evidence that Rueff and Hayek were in disagreement on this point (Lane, 1997: 430). Similarly, a recent paper labeled him a "liberal interventionist" who "argues for an artificial and constructivist approach to the social order" in opposition to Hayek's thought (Daou, 2019: 578). What should we think of Rueff's conception of social order? If he rejected the idea of a spontaneous order, was he embracing an artificial, constructivist view of

how society and the economy function? If so, how could he maintain such a cordial relationship with Hayek, whose work he prefaced (Rueff, 1969) and had translated for the French *Revue d'Économie Politique* (Hayek, 1966; 1977), at the same time that Hayek contributed a chapter to Rueff's festschrift entitled "Résultats de l'action des hommes, mais non de leurs desseins" (The Results of Human Action but not of Human Design)?

To answer these questions, we need to understand in his own terms what Rueff meant by a "spontaneous order." This means that it is necessary to take seriously his postwar work, such as *Les Dieux et les Rois*, and to understand it independently of what he wrote before, and what Hayek wrote on social order. This is not an easy exercise because Rueff was incredibly active during his life, both as a man of action and of reflection. Thus what is mostly remembered of Rueff's postwar era is his advocacy of the Gold Standard during the 1960s, and his influence on the Général de Gaulle when he was president (Chivvis, 2006; Steta, 2017), or the "Plan Rueff" which was put in place at the beginning of de Gaulle's presidency to "save the Franc" (Chélini, 2001). On the other hand, his 1946 book *L'ordre social*, with his 600 pages, is generally seen as a definitive exposition of his thought on the subject, or "the basis for most of his later work" (Chivvis, 2010: 104), and the later work is often ignored.

Trying to uncover the meaning of the concept of spontaneous order in Rueff's context is also hindered by the edition of his *oeuvres complètes* by disciples, with several volumes grouping thematically his writings. The reedition of some of his articles by followers (Bourricaud and Salin, 1989) and in a *festschrift* (Claassen and Rueff, 1967), add to the confusion, along with Rueff's own autobiography, sprinkled with some of his texts, and organized around the story he wanted to tell in the late 1970s (Rueff, 1977). All these publications mixing together his works from the 1920s to the 1970s have contributed to decontextualize the development of his thought

and to present the story of a somewhat isolated thinker who came up with ideas which only matured marginally from 1921 to 1977. Rueff himself liked to present this image, as having never changed his views on methodology since he presented his book *Des Sciences Physiques aux Sciences Morales* to Henri Bergson in the early 1920s (Rueff, 1922a; translated in Rueff [1929b]).

By addressing the question of order, and how Rueff changed his views on it during his career, we will contribute to recontextualize his thinking, and in the process answer Hayek's befuddlement at reading Rueff's disparagement of spontaneous orders. To do this will take us briefly to his original conception of economic order, in the era of the post-World War I hyperinflation. More importantly, it will take us through the epic transformation of order from the molecule to human societies, in Rueff's postwar writings. To establish whether there is here a mere continuity with his previous work, or a decisive break, it will prove useful to examine who his references become in this postwar era. It will then become apparent that Rueff offered in his postwar writings a completely renewed interpretation of order through the prism of cybernetics, and more precisely, the French interpretation of the cybernetic movement.

I. A conventional account of Rueff's thought on order

Rueff was born at the end of the 19th century, and enlisted in World War I from 1915 (Rueff, 1977: 17). He joined the *École Polytechnique* in September 1919, in the special promotion for officers who had been delayed in their studies, and it was there that he first encountered economics with in the classroom of Clément Colson (Rueff, 1977: 21). At the end of his two years at the school, he wrote his "discourse on methodology," *Des sciences physiques aux sciences morales*, in which he argued that the scientific method was well-suited for economic problems. Frobert (2010) explored the intellectual context of the 1920s to understand the sources

of Rueff's combination of an "intransigent economic liberalism with radical constructivism," showing what he owed both to Poincaré's conventionalism and to the 19th century project of a "social physics" in the elaboration of his early views.

Rueff applied these ideas to the study of exchange rates (Rueff, 1922b), inflation (Rueff, 1925b), German reparations (Rueff, 1929a), unemployment (Rueff, 1925a; 1931), and more generally, in his *Théorie des phénomènes monétaires*, to the study of monetary phenomena (Rueff, 1927). It is in particular his theory of unemployment that has retained the attention of the secondary literature, which tried to reconstruct and test his model (Prat, 2016), or to explore how deep the connection was with his previous writings (Daou, 2022).

During the 1920s-30s, Rueff referred frequently to an analogy between the molecules of a gas and the individual units of an economy, leading him to argue that "the laws of political economy are statistical laws ... comparable to the laws of gases, individuals playing in political economy the rôle of molecules in the kinetic theory [of gases]" (Rueff, 1929b: 104). From the point of view of the molecule, it took an effort of abstraction to envision that its chaotic movement was part of a coherent whole, as Rueff argued in his 1927 *Théorie des Phénomènes Monétaires*: "We are the molecules of an immense universe where, in a disordered agitation, innumerable individual activities develop. On our scale there is no economic phenomenon, but only elementary characteristics, unpredictable successions, and it would be as futile to hope to establish a political economy of the individual as a thermodynamics of the molecule" (Rueff, 1979b [1927]: 160). It is easy to see that this was not incompatible with the idea of a spontaneous order, and indeed Rueff referred frequently at this time to "spontaneous" adjustments (Rueff, 1929a: 1080) or even to the "spontaneous order of a true capitalist regime" (Rueff, 1933: 317).

This did not preclude an intervention on this mechanism, and already in his first published work, he maintained clearly that “[t]he assertion that there are immutable economic laws does not entail that we are their slaves. Weight exists, and yet airplanes move through the air. We will be able to draw from the knowledge of economic laws a whole art, politics itself, which will allow us to achieve such a goal that we have set ourselves” (Rueff, 1922b: 185). Rueff was not straying much from the French liberal tradition when he presented this social engineering of natural phenomena; his teacher at the École Polytechnique, Clément Colson, wrote in his Cours that “Political economy seeks to determine the laws that govern phenomena. [...] When these laws are known, men seek to take advantage of them to indirectly modify the effects which do not depend directly on their will, by acting on the causes which govern them, so as to give a more complete satisfaction to their needs” (Colson, 1924: 146).

It was this approach to the relationship between government and the economy that Rueff kept fighting for during the depression, when he argued that the only limits to government interventions were their compatibility with the price mechanism (Rueff, 1934: 34), or when he compared the price mechanism to the movement of celestial bodies: “the problem [of prices] is exactly the same as that of celestial mechanics, which we do not know how to solve as soon as there are more than four bodies together, while every night, in the sky, a myriad of stars and planets find without hesitation the path they have to follow” (Rueff, 1935: 401).

The problem of which state interventions were compatible with the price mechanism thus conceived took on a new urgency in the context of the Great Depression and the rise of totalitarianism, and it was the problem tackled by Rueff during the Colloque Lippman (Audier, 2012: 493). With *L'ordre social*, written during the war, Rueff tried to develop these ideas “under a common unifying theory of social order” (Chivvis, 2010: 104), in which he gave an important

place to property rights, and to the way in which they can become false rights because of state manipulations of the currency (Chivvis, 2010: 106ff.). With the introduction of property rights in his thinking, and a reflection on social rules, Rueff seemed to move towards a more institutionalist theory of the social order. This is the main interpretation of his work given by Crozet (2000: 638), Diemer (2010: 6ff.), or Daou (2019: 574). This is confirmed by Rueff himself, who became a judge at the Court of Justice of the European Coal and Steel Community (C.E.C.A.) in the 1950s, and argued that this experience changed his views on the spontaneity of market processes (Rueff, 1979a [1957]: 319)

The layman is surprised... that to establish a common market you need institutions. The village market, the one that takes place every week on the Place de l'Église, seems to spontaneously arise from the behavior of housewives, wanting to sell eggs to buy butter, or to sell butter to buy eggs. Only state interventions, prohibitions, quotas, exchange controls would have destroyed the spontaneous freedom of trade. The removal of obstacles would be enough to restore the market to its original purity. ... I have long professed, more or less consciously, this opinion. Four years of experience and reflection at the Court of Justice of the C.E.C.A. convinced me of its inaccuracy.

Rueff thus seems to have changed his view, and to reject after the war the idea that the market was a spontaneous order. Institutions were needed. Most commentators seize on this apparent change to argue that this constitutes a profound difference between Rueff and Hayek. For instance, Crozet (2000: 637-638) argues that although they had similar ideas on the role of prices and social rules, where Hayek saw their evolution as a process of natural selection, Rueff was more “positivist,” and inclined to think that “ordering a society means imposing on it a conscious plan” (Crozet, 2000: 637-638). The same idea is expounded by Daou (2019) who argues repeatedly that “Rueff’s liberal order is not spontaneous” (Daou, 2019: 576), because it “requires at least two government interventions—one to build it, and another to maintain it” (Daou, 2019: 579). Diemer (2010) argues that Rueff’s “social order” reminds the reader of Hayek’s “market

order,” except that “the social order is never spontaneous,” as Rueff wrote in *Les Dieux et les Rois* (Diemer, 2010: 6).

Les Dieux et les Rois is one of Rueff’s last book and it has been generally ignored, or treated as a more philosophical book, a follow-up to *L’ordre social* (Minart, 2016: Chapter 44). Chivvis (2010: 180-2) gives the most extensive discussion of this book. According to Chivvis, this book is concerned with “the nature of order in the universe,” where maintaining order “requires some ordering ‘mechanism’” which men can sometimes recreate in some restricted domain (Chivvis, 2010: 180-181). This short analysis lead Chivvis to discuss Hayek’s letter to Rueff, where he castigates him for writing that “a social order is never spontaneous.” Chivvis conjectured that this was either a semantic dispute or the result of Rueff’s ideas on the “fundamental role” of the state, and “Rueff’s own experience as a member of the French bureaucratic elite [which] precluded any such extreme laissez-faire” (Chivvis, 2010: 182).

As we have seen, the idea that Rueff opposed Hayek with a constructivist view of social order is echoed in many other works on Rueff’s liberalism, and one frequently encounters it in discussions with people interested in the subject. It is a deeply ingrained idea that the Napoleonic (or Colbert or de Gaulle or something else) centralized administration of the country and the obsession with engineering has bred generations of civil servants obsessed with the role of the state, and always willing to intervene in the economy to replace market mechanisms. Hayek contributed to spreading this notion, especially in his postwar writings on the origins of scientism (Hayek, 2010 [1942-1944]), and in *The Road to Serfdom*, where he lamented the abandonment of individual rights by the French, “of all people,” in favor of an unlimited power of ruling (Hayek, 2007 [1944]: 122). This present paper challenges this narrative in the case of Rueff, and there would be many more papers to be written to challenge it in the case of other French liberals.

Rueff's analysis of order in *Les Dieux et les Rois* had little to do with the "French bureaucratic elite" or with Laplacian scientism; it had even little to do with Rueff's previous writings. It was an interpretation based on the new cybernetic science that was sweeping the world, reaching all the way into France.

II. The cybernetic reinterpretation of order

What the preceding account misses of Rueff's evolution is how much it changed in the postwar. The single most important element in this transformation is the advent of cybernetics, one of the most sweeping scientific movements of the postwar period.

French cybernetics

Cybernetics conventionally begins with the publication of Norbert Wiener's book, *Cybernetics: Or Control and Communication in the Animal and the Machine*, whose most enduring power seems to have been the identification of transdisciplinary mechanisms which inspired scientists from the humanities to the natural sciences to apply its insights, with the most resounding successes felt in biology. The craze reached France quickly, with an article in the national newspaper *Le Monde* describing a dystopian future run by machines (Dubarle, 1948; see also Triclot, 2010).

In the early 1950s, some of the most preeminent French scientists became interested in the "science of governing, of what 'controls'" (de Broglie, 1989 [1954]: 212).² Louis de Broglie, one of the founders of quantum mechanics and the 1929 Nobel Prize winner, was himself having his own cybernetic moment since at least 1950 when he organized a series of meetings on cybernetics (de Broglie, 1951). In 1953, the Sorbonne invited him as part of a series of

² The Greek etymology of cybernetics does refer to governing, often ships or machines but sometimes men; French cyberneticists have a certain tendency to remind their readers that Ampère was the first to use the modern word in 1834 (e.g. Guilbaud, 1954: 6).

conferences on the new science, and de Broglie explained his views on the meaning and scope of cybernetics (de Broglie, 1989 [1954]). The proceedings were published in the journal *Structure et Évolution des Techniques* with the transcriptions of the speeches given by the mathematicians George Guilbaud and Louis Couffignal, the engineer Julien Loeb, and Alfred Fessard, a leading neuroscientist (see Le Roux (2011) on the journal which was created in 1948).

It was around the same time that Pierre Auger, another French physicist, presented his own reflections on the synthesis between physics, biology and humanity at the heart of cybernetics in his book *L'homme microscopique* (Auger, 1952).³ Social and human sciences were not far behind, with the publication by the philosopher Raymond Ruyer of *La cybernétique et l'origine de l'information* (Ruyer, 1954), read by the psychoanalyst Jacques Lacan and discussed in his seminar (Le Roux, 2018: 541). Still in 1953, Claude Lévi-Strauss secured a grant from MIT to set up an interdisciplinary seminar on cybernetics, where he promised to invite Auger, Guilbaud, Lacan and others (Geoghegan, 2011: 119). The list goes on, and the movement continues unabated for the better part of two decades. Worth mentioning for our purposes is the involvement of Jacques Monod, François Jacob and André Lwoff, the “three musketeers” of the Institut Pasteur, who received the Nobel Prize in physiology in 1965 for their work on cellular regulation. Monod’s Harvard lectures given in 1958 were transcribed to be published under the title “Enzymatic cybernetics,” although they never made it to the press (Le Roux, 2018: 424-6).

Rueff is not immune to this particular *esprit du temps*. His discussion of the social order during the 1940s fit in well with the preoccupation of cybernetics, and he discussed his own

³ Le Roux (2018: 575) notes that Auger does not refer explicitly to Wiener in his book, but Auger does introduce it by stating that he “did not preoccupy [himself] with citing the names of the numerous authors who have expounded similar or even identical ideas to those presented here” (Auger, 1952: 7-8). Auger is himself a well-known physicist, who influenced postwar higher education in France (Benest, 2022: 14), and who imported the ideas of cybernetics in his country (Ronan, 2018: esp. 574ff.).

ideas on order with his “friend” Auger (Rueff, 1977: 277). It is with him that he decides to organize in 1954 a small colloquium, where Monod, Lwoff, Auger and Fessard are in attendance, along with Raymond Aron and Pierre-Paul Grassé, a French zoologist who defended a neo-lamarckian theory of evolution (Loison, 2011). These discussions of the Parisian scientific intelligentsia, in which Rueff participated, were the starting point of a renewal in his conception of order. While he presents his publications on the subject as “the slow maturation of my ideas on the mechanisms generating structures” (Rueff, 1977: 278), there is a clear discontinuity with the advent of cybernetics, which changes his reference points and the meaning of some of the concepts he employs, especially that of spontaneous order.

The first published record of this change is the retranscription of his February 1955 speech given at the occasion of his association with the *Académie Royale des Sciences, des Lettres et des Beaux-Arts de Belgique*. Rueff’s talk, “Les sociétés humaines, ces belles choses artificielles...,” contains all the themes that he was to develop later in *Les Dieux et les Rois*. It is reminiscent of Rueff’s early work on methodology, because he begins by claiming that the distinction between nature and society is not founded in fact” (Rueff, 1955: 61), but it is important to note that the analogy is now not merely one of method, but based on the recognition that “social order ... does not differ from natural order, neither in its principle, nor ... in the techniques that establish it (Rueff, 1955: 64). With reference to Auger (1952) and de Broglie (1989 [1954]), Rueff expounds on the idea that order is brought by a mechanism which groups individual elements into societies, and brings to life an order so improbable that it would have never come about by mere chance. A good part of the talk is dedicated to describing this mechanism in human societies, which Rueff finds in Maurice Hauriou’s theory of the institution (Rueff, 1955: 66ff.); it should be noted that this reference to Hauriou’s quickly disappeared from Rueff’s writings, and was

replaced in *Les Dieux et les Rois* by his own work which showed how order came about in human societies.

A few months later, Rueff gave another speech, this time in Mexico, where he asserted for the first time that “order is never spontaneous. A natural society, a society left to itself, would not be an ordered society” (Rueff, 1989: 361). This seems to contradict directly his 1946 speech to the *Société Française de Philosophie*, where he argued that the state of nature was a “social order spontaneously established” (Rueff, 1967: 194). In fact, it seems to contradict a lot of what Rueff had written previously, and especially the way he used the word spontaneous to describe market adaptations without external interventions.⁴

It was a similar assertion in *Les Dieux et les Rois* which prompted Hayek’s letter. To understand what Rueff meant by spontaneous in this new context of the cybernetics revolution, it becomes necessary to study both Rueff’s writings on order, and the writings of those cybernetic scientists which he cites directly. In addition to the 1950s writings and the 1968 book, we will occasionally mention a debate on the book which was organized at the *Académie des sciences morales et politiques* in early May 1968, and published by the Academy under the title *La montée de l’ordre dans l’univers* (Rueff, 1968b). The structure of the book reflected his 1950s writings and extended Auger’s and other French cybernetic scientists’ writings in a synthesis of cybernetic order in the natural and human world. He made frequent reference to the 1954 colloquium with Auger, Fessard, Grassé, which were all present during the 1968 debate (Rueff, 1968b: 22, 80, 86). The gap between the first discussions of the 1950s and the publication of

⁴ See the references in *Présence de Jacques Rueff* (Bourricaud and Salin, 1989, esp. pp. 281, 341-342, 345). One of the editors of this book argues in his introduction that “Jacques Rueff, obviously joining other liberal authors, is convinced that there exists a spontaneous order resulting from the exercise of their responsibility by free individuals” (Salin in Bourricaud and Salin, 1989: 91-92). The editors chose to republish an extract of his autobiography under the title “Spontaneous order and liberalism,” and it is worth noting Salin’s proximity with the Austrian school.

Rueff's book in the late 1960s can be attributed to his activity in the common market both as a judge and as a promoter of further integration, and to his activities and writings about the international monetary order which took up a lot of his time. To some extent, it might also reflect a renewed interests in these themes after Monod, Jacob and Lwoff received the 1965 Nobel Prize; Jacob and Monod's writings became a new reference point for Rueff, especially in his literary extension of *Les Dieux et les Rois*, a short "Comédie-ballet" where Monod is one of the main characters (Rueff, 1974).

The cybernetic order

Les Dieux et les Rois is a dissection of the sources of order in nature and society, and the continuity between these different types of order. The basic concept of the book is that throughout the universe, order is observed as the association of individuals, whether they are atoms, molecules, humans or nations: in an interesting twist, Rueff argues that this gives to all sciences, including natural sciences, the character of "social sciences" (Rueff, 1968a: 8 and 314). There exists thus a hierarchy of reality into different levels of organization, "where individuals are societies for those [individuals] who precede them and societies are individuals for those [societies] which follow them" (Rueff, 1968a: 33 and 313). This hierarchical organization is the basis for the organization of complex orders, dependent on other orders of a lower level (Rueff, 1968a: 36). The rise of order which gave its title to the 1968 debate is thus not merely temporal, it is a rise from the simplest to the most complex organisms, both in natural and man-made orders (Rueff, 1968a: 94 and 216).

This fundamental opposition between individuals and society is also an opposition between the determinate and the indeterminate: individual behavior is never "rigorously determinate" (Rueff, 1968a: 43), and thus "the behavior of a given individual is opposite to the collective

phenomenon, the product of a very large number of independent individual activities, which, on the contrary, can be predicted with precision and obeys, all conditions being equal, rigorous laws” (Rueff, 1968a: 44). Rueff is consistent in *Les Dieux et les Rois* that individual behaviors are indeterminate, and the theme of indeterminacy was much discussed during the 1968 debate, with divergent views on the issue. Rueff’s point was that order can be studied at the level of a society, but not at the level of an individual. At the lowest physical level there is an indeterminacy as to the speed and location of particles (Rueff, 1968a: 45), at the level of an atom, radioactivity is the illustration of this indeterminacy, and at the level of a human being, suicide for instance is unpredictable, only statistically determinate at the level of a society (Rueff, 1968a: 44). It is this individual behavior which is spontaneous: “individual behavior - such as that of radioactive molecules - presents a bursting spontaneity which distinguishes it from the determined behavior observable in populations made up of a large number of individuals” (Rueff, 1968a: 155-156).

Thus in a human, as in a natural society, Rueff argues that one should not “overestimate the determination of human behaviors ... Certainly a free man can take into account his reasons for choice, but in the universe where he lives the same causes do not always produce the same effects” (Rueff, 1968b: 21-22; Rueff, 1968a: 310-311). It is precisely its indeterminate character that makes the “the individual ... the support of a behavior, which is a spontaneous outburst [*un jaillissement spontané*]” (Rueff, 1968a: 313). This indeterminate behavior is antipodal to order, which is the regularity of behavior observable at the scale of a society, the product of a (cybernetic) servo-mechanism that transforms the random, chaotic, spontaneous individual behavior into an ordered society: “it is the object of the servo-mechanisms called 'machines' to make such connections” (Rueff, 1968: 220).

Order, especially a complex order, is very improbable; it needs a mechanism, an instrument to arrange individual particles into a given structure that gives it the properties of a society. Citing Auger (1952), Rueff writes that the probability that an order emerges from the spontaneous, random behavior of individuals, that is to say by the simple effect of chance, is an inverse function of the number of individuals: “improbability is in fact equivalent to an impossibility ” (Auger cited by Rueff, 1968a: 89). Thus in the simplest sense, what is spontaneous is not a social order, it is a natural state where passions run free and disorder reigns, because it is the most probable state for the system.

If the creation of order from individuals is not spontaneous, but the product of “an arrangement of grains at an immediately lower level, carried out by suitable instruments” (Rueff, 1968a: 100), how did the machines come about? The question of the origins and finality of the machines found in nature, such as the enzymes described by Wiener as subjecting their substrate to a new ordered structure (Rueff, 1968a: 99), is central to Rueff’s new reflections. Did some Jupiterian deity put them into the world or did they evolve through natural selection? This is the question tackled by Rueff in the last part of *Les Dieux et les Rois*, and the central subject of *La création du monde*. It is also the main discontinuity with the Promethean order: when Prometheus stole Jupiter’s fire, and gave it to humans, he gave them the creative power that was so far the domain of the gods (Rueff, 1968a: 154). The Promethean order became all those machines built by humans to create new types of order, from automobiles to societies, and whose finality and source were now clear: they are man-made machines destined for human consumption, “its final object and supreme finality” (Rueff, 1968a: 220-221). This problem of finality, especially in the natural order that scientists observe, was also at the heart of the philosophical questioning of the cybernetic scientists. Were the machines reflecting a grand

design of a supreme being, as the finalists held, or merely the chance and necessity of natural selection and a long evolution, as Monod and others held?⁵

As for the Promethean order, whose main feature was the intentionality of its creation, where was this intentionality located? For Rueff, it was in the persons of the “kings,” those invested with a governing power. But these kings do not have an unlimited power to create new orders; as Rueff mentions several times, the king is faced with preexisting orders, which he “tends to modify to submit them to his thought, to bring them closer to the structures that this thought makes him desire” (Rueff, 1968: 261). This meant that order could not be created from nothing, and that human creators of order were not more free than the Gods (Rueff, 1968a: 217). Creating order could only rely on existing (and known) interactions between natural or man-made societies of a lower order; human creators thus find themselves “the feet in the biological mud, their heads turned toward the sky” (Rueff, 1968a: 218).

Perhaps it would assuage Hayek to learn at this point that the mystery of the orders wanted by men are only “partially known” (Rueff, 1968: 260), and that in striving to create this order, the king might be unsuccessful. To be successful, it needs to understand and master the art of governing, that is, of mastering the servo-mechanisms that the economists and other social scientists seek to uncover (Rueff, 1968: 314). By mastering them, he will dispose of “the power to make the society such that he wants it to be, and not such as what it would have been if its individual components had acted according to their own nature” (Rueff, 1968: 262).

Cybernetics led Rueff to transform the meaning of spontaneous by introducing a distinction between the indeterminate, spontaneous individual and the determinate, ordered society. Through

⁵ For Monod’s writings, see his post-Nobel interview in *Le Monde* (1965) cited by Rueff in *Les Dieux et les Rois*, and his more extensive discussion in *Le Hasard et la Nécessité*, which forms an important part of Rueff’s *La Création du Monde*, where Monod’s character defends natural selection.

the mediating role of a servo-mechanism, an improbable order is established at all levels of societies, and in fact each order can build on a preceding order. This is why Rueff could write that social order was not spontaneous: it was not the product of indeterminate behavior that would magically arrange individuals in an improbable order, but the result of a mechanism transforming disorder into order. An examination of the writings of the French cybernetic scientists shows that they shared this view of order and that they spoke similarly of spontaneity.

Rueff does not hide that there are entire parts of his analysis which are derived, if not reproduced, from the books of de Broglie, Auger and Ducrocq. For instance, the word “asservissements” and its derivatives, used repeatedly by Rueff, was coined by these authors to designate “the hierarchical relationship between coupled systems,” and is the source of the prefix “servo” more common in the English language according to Guilbaud (cited in Johnson, 2015: 65). Rueff refers to “the notion of *asservissement* familiar to specialists in machine construction and even more so to cyberneticians,” but he seeks to generalize it to refer to “any process that influences or modifies individual behavior, subjecting it to the disciplines that generate a social order” (Rueff, 1968: 62-63). The questioning of the sources of natural order, which structures especially *La création du monde* (Rueff, 1974), is an explicit discussion of the debate between those seeking transcendental explanations and those advocating for a natural selection with a chance component; the characters of the drama are the scientists themselves, in particular Monod.

Digging deeper, we can find more affinities between the French cybernetic scientists’ description of the new science and Rueff’s characterization of order. De Broglie’s Sorbonne conference presents cybernetics as the science of order, and he expounds the idea that order is an improbable phenomena, which necessarily derives from an ordering mechanism (de Broglie,

1989 [1954]: 216). This ordering mechanism acts against the general tendency towards chaos, the phenomena of entropy (de Broglie, 1989 [1954]: 226); in this way, cybernetic mechanisms act in the opposite way, in particular by using information to transform chaos into order. De Broglie illustrates this idea with the reevaluation of the problem presented by Maxwell's demon: if a small being, at the molecular scale, was placed at a small door in between two gasses in equilibrium, he could let some molecules go one way but not the other, thus "diminishing spontaneously the entropy of the gas," against all laws of thermodynamics (de Broglie, 1989 [1954]: 218). "Spontaneous" is here used in the same meaning as Rueff, as something unexplained and unexplainable; de Broglie is taking this example to show that in fact, the demon could not have ordered the molecules without consuming some negentropy in the form of information about the speed and position of molecules. The demon acts as a machine transforming a certain form of information into order, the whole theme of the cybernetic revolution.

The main theme that is emphasized by de Broglie and others is the idea that even if entropy is increasing, it can be slowed down by catalysts and other organic or inorganic machines which transform disorder into order. Such a conception is at the heart of Ducrocq's book *The origins of life*, which Rueff acknowledged that he paraphrased heavily, or even reproduced word for word when he talked about the Jupiterian order (Rueff, 1968: 134). According to Ducrocq, what is needed for order to emerge is both the presence of organic or inorganic machines, and of an external source of (disordered) energy that could be transformed into order by the machines:

all plants, all animals, take up raw materials from their 'inorganic' environment and use them 'cleverly' to make good their own wear and tear and also to make replicas of themselves—to reproduce. This all takes place by a machinery which implies order and plan. The higher forms of life, apparently, possess this creative faculty in the highest

degree, using it to fashion order from disorder, both inside themselves and outside (Ducrocq, 1957: 2)

In fact, humans possess this ability to such a degree that the story of mankind “culminates in the systematic organisation of the world” according to the same principles of fashioning order from disorder (Ducrocq, 1957: 2). Ducrocq had indeed the insight that Rueff expounded in his book, and the “rise of order” is one from the most simple organisms to the most complex, “Since order calls for a particular set-up of the elements, it cannot arise except as a result of previous order” (Ducrocq, 1957: 3). This rise is temporal only to the extent that it is a long term evolution from the simplest organisms, where “the likelihood of a very small number of elements getting arranged in an orderly set-up is not at all inconsiderable,” to the most complex organisms which cannot be ordered by chance (spontaneously) because the probability of finding by chance such an order is infinitesimal.

Ducrocq also enlightens us on the meaning which some of these scientists still attached to the idea of spontaneity. In this context, it harked back to a former debate on “spontaneous generation,” which had been settled by Pasteur a hundred years ago. At the end of his chapter on “Cybernetics and Biocybernetics,” Ducrocq discusses the conditions making the synthesis of life possible, to impress upon the reader that his theory of the emergence of life has nothing to do with the theories of spontaneous generation that were rejected definitely by Pasteur’s experiments (Ducrocq, 1957: 126ff.).⁶ Ducrocq’s cybernetic was not a revival of spontaneous generation theories, in fact he argued that “the protagonists of spontaneous generation make us smile as much as ever by their naïveté in ever imagining that so complex a thing as living matter could be born by magic” (Ducrocq, 1957: 127). It could not be born “by magic” precisely because life is a reflection of a particular ordering of molecules and atoms, and that this ordering

⁶ Pasteur had shown by renewing an older experiment that bacterias would not develop in an insulated medium (Farley, 1972).

is highly improbable, so improbable in fact that it could never arrive by mere chance, or spontaneously: “the chances of seeing life appear from an assemblage of atoms are of the same order ... as to expect an atomic bomb, exploding on a metalliferous mine, to transform the ores straight away into an electric power-plant. The probability of such things happening is in fact as near nothing as the chance of thus transforming an assemblage of atoms into a living creature” (Ducrocq, 1957: 127).

Spontaneity, the indeterminate way of the individual to behave in the world, was for Rueff “not the unusual product of some abstruse theory, but the door through which freedom entered the world” (Rueff, 1968a: 156). But it could not be the basis for order, because the spontaneous interaction of individuals will more likely settle into disorder, the most probable state of the system according to the law of entropy (Rueff, 1968a: 88). There is an important change in the way Rueff talks about order between the 1940s and the 1950s. As he remarked in his 1946 speech cited earlier, in a natural state, a spontaneous order based on force would be established. This was in line with his previous writings, where spontaneous referred to automatic adaptations. When the cybernetic moment began, Rueff’s reference to spontaneity took on a new meaning that is uncovered through the exploration of the cybernetic revolution.

III. Spontaneity and conscious action in the social order

It is a mistake to try to understand the ideas on social order that we have just presented through the lens of Rueff’s previous work. It is also a mistake to interpret them through the lens of Hayek’s spontaneous order, or through his criticism of scientism and positivism. In *Les Dieux et les Rois*, Rueff does not mention Hayek nor does he spend much time on his previous work. *L’ordre social*, the massive book that Rueff wrote during the war, is a mere footnote in *Les Dieux et les Rois*, Rueff barely mentioning a paragraph of the third edition when he discusses property

rights (Rueff, 1968: 234). He is in fact giving a new interpretation of order through a specific lens, the French version of cybernetics.

We are now better equipped to understand Hayek's reception of Rueff's assertion that "social order is never spontaneous." Some commentators viewed this as evidence that they held incompatible views on the role of government in our societies. There is little evidence that this is in fact the case. Both Rueff and Hayek thought a government was necessary to alleviate hardships, to create a legal framework of property rights and courts enforcing them, to protect those property rights and the contracts ensuring peaceful exchanges through marketplaces. Both viewed the price mechanism as the fundamental regulator and source of order in economic life. They were both inspired by cybernetics, but they seem to have taken this inspiration in two different ways. Hayek took it in the direction of developing what he saw as the great contribution of classical liberals since Adam Smith, the study of "those unintended patterns and regularities which we find to exist in human society and which it is the task of social theory to explain" (Hayek, 1967: 97).⁷ His own explanation of the adoption of the institutions allowing a spontaneous order has been the subject of many debates from which we will steer clear (Vanberg, 1986; Sugden, 1989; Caldwell, 2004: 352-367).

Rueff was also swept by the cybernetics wave that was taking hold over the Western world in the 1950s. But he took it in a wholly different direction, one that was very much inspired by the concepts of his scientific colleagues, and by the debate on the role of natural selection in the development of those organic machines that seemed to make up the whole living world. When Rueff asserted that "a social order is never spontaneous," throwing Hayek to his dictionaries, he was not referring to a division between natural and human orders which he viewed both as

⁷ The essay from which this quote is taken was translated in French and published in Rueff's *festschrift* in Claassen (1967).

societies made up of individuals. Natural and man-made orders differed not through their mechanisms—in both cases, the servomechanism at the heart of cybernetics is the root of order—but through the source, the intentionality of order. But neither could be spontaneous: spontaneity referred to the indeterminacy of the individual-particle, and the chance encounters of particles could never in a billion years have produced the improbable orders that were observable everywhere, in nature as in human societies. In a sense, Rueff opposed spontaneity to order itself.

Some of the participants in the debate organized by the *Académie des sciences morales et politiques* on his book in May 1968 did not miss the opportunity of pointing out that order did not seem to be currently on the rise. And who knows how many readers of *Le Monde* actually read the summary of the debate published on page twenty-three of the national newspaper, just above the crossword puzzle, when the first page read: “The violent clashes of the *Quartier Latin* sometimes took on the appearance of a street fight” and “Attack of the Viet Cong.”⁸

But it should be noted that Rueff’s targets in the book were not so much the students and workers demonstrating in Paris, or the communists fighting in Southeastern Asia. His opposition was very much French, and also read the works of the cybernetic scientists. They were the partisans of the French “Plan,” the object of as much contemporaneous and historiographical debates as Hayek’s spontaneous order. Without entering into these debates, we can note that Rueff had two occasions during the 1960s to debate the Plan with two of its foremost proponents: first, the minister of finances who came in front of the *Académie des sciences morales et politiques* in 1963 to defend the fourth plan; second, Pierre Massé, the former *Commissaire au plan*, who came to discuss with the same *Académie* the “place of conscious action in economic development” in 1967.

⁸ *Le Monde* of May 8, 1968. Consulted online, December 20, 2023. The articles on the *Académie*’s debate of Rueff’s book were penned by the literary journalist Josanne Duranteau (1968).

Valéry Giscard d'Estaing, then minister of finances, defended French planning against a rather unconvinced audience in the *Académie*, replete with “old unrepentant liberals” such as Émile Mireaux (Mireaux in Giscard d'Estaing, 1963: 17). Giscard d'Estaing argued that planning was meant to “influence spontaneous tendencies [in the economy] by means of constraints accepted by the public opinion” (Giscard d'Estaing, 1963: 4). Would Rueff not agree with such an aim? In fact he did agree that “the French-style Plan is necessary and timely,” if only because, as the minister reminded his audience, a third of the GDP was controlled by the government, such that it was “not conceivable that investment decisions in the public sector are taken outside of a Plan” (Rueff in Giscard d'Estaing, 1963: 12). But he did not see the Plan as a way to favor economic expansion, and underlined that other countries did not need such plans to see a steady growth of their economies, in particular Germany.

Four years later, when Massé came in front of the *Académie*, it was not only as former *Commissaire au Plan*, but also as the recent author of a book on French planning *Le Plan ou l'anti-hasard* (Massé, 1965). He began his talk by citing not only Norbert Wiener, but also Pierre Auger, and developed his vision of planning by arguing that the many revisions of the Plan were “reactions to events ... of a cybernetic character” (Massé, 1967: 9). The Plan was in fact a vast “market study” aimed at taking into account market interdependencies to make the future less uncertain by elaborating a common objective for the different constituent parts of the economy (Massé, 1967: 6). In his questions to Massé, Rueff drew again international comparisons, and elaborated on his earlier remarks to Giscard d'Estaing about the necessity to plan for the public sector, and the limits of this planning: “all human action, simply because it is human, is conscious and, therefore, planned; the key is to know by whom” (Rueff in Massé, 1967: 13). Hayek held the exact same position, which he expressed for instance in his criticism of Leontief

a few years later: “It is almost unbelievable that at this date an honest seeker after truth should innocently become the victim of the equivocal use of the word planning and believe that the discussion about economic planning refers to the question of whether people should plan their affairs and not to the question of who should plan their affairs” (Hayek, 1976: 5).⁹

Rueff took up these themes in *Les Dieux et les Rois*, where he argued similarly that “an economic order is necessarily planned. The only question is to know at which level and by whom it is planned” (Rueff, 1968: 253). There is not one mechanism that can produce order for Rueff. In a totalitarian regime, the central authority gives each individual its role and instructions, and therefore shapes the structure of the economy and creates order, even if it is “diabolical” (Rueff, 1968b: 86). The important point is to find those mechanisms that allow for the most robust order to be maintained: “Prometheus was led to seek techniques of social pacification that were less detrimental to individual freedom and more suitable for governing large societies than blind submission to the authority of the leader, whether he was god, king or father of a family” (Rueff, 1968a: 234). And Rueff certainly did not see in the central direction of all behaviors a policy able to use resources optimally, because of “the growing complexity of economic structures [which] renders increasingly difficult the policies trying to satisfy this requirement [of optimal use]” (Rueff, 1968: 254).

More importantly, it was not adapted to the current liberation of the human person; planning was a regression to an older servo-mechanism, that based on authority, which characterized previous societies and transformed men into machines, “robbing them from the liberty of thinking and acting, which are the fundamental attributes of the human person” (Rueff, 1968:

⁹ On this debate between Hayek and Leontief, see Caldwell (2016). In this same paper, Hayek referred to the French debate on indicative planning of the 1960s, of which Rueff and Massé were playing in 1967 a local battle (Hayek, 1976: 10).

229). Stifling the spontaneous liberty of the individual not only maintained them into a state of slavery, it prevented their participation into the Promethean creation (Rueff, 1968: 276). By liberating the individual from the mechanism of authority, Prometheus opened the possibility of a peaceful exchange through markets, and the shaping of the economic structure through the decentralized decisions of individuals who “plan their actions such that they respond as best as possible to his desires” (Rueff, 1968: 280). The finality of a market order is not for Rueff to satisfy the desires of a planning authority, it is to satisfy the decentralized desires of all the market participants.

Rueff’s declarations on liberalism as a method of government or on the importance of certain concrete institutions such as a gold standard have obscured the importance he attached to the human person, and to its liberation from constraint. He was not alone in opening this line of questioning at this time, as this tormented many of the cybernetic scientists with which he conversed in France. The role played by religious references, and particularly in the religious crises that was reflected in these debates is also certainly important; beyond the title of the 1968 book, many references to Saint Thomas, Ecclesiastes and other more anthropological research are sprinkled throughout the book.

The present paper sought to improve the debate on Rueff’s position *vis-à-vis* the spontaneous order, which I believe has been largely misinterpreted. Once Rueff’s spontaneous order is placed in the context of the cybernetic revolution that was discussed in France, it appears in a much more different light, one that I find more informative on Rueff’s own reflections about the sources of order in human and natural societies, and the ways in which his liberalism evolved. To my knowledge, existing studies of the reception of cybernetics in France have completely ignored Rueff, as well as many other French economists who found like him a fruitful line of

inquiry in the new science. Given the prominence of some of these economists in the economic administration of the country, it would be interesting to learn more about the ways in which this influence manifested.

References

- Audier, Serge. 2012. *Le colloque Walter Lippmann: aux origines du "néo-libéralisme."* Lormont: le Bord de l'eau.
- Auger, Pierre. 1952. *L'homme Microscopique, Essai de Monadologie*. Paris: Flammarion.
- Benest, Serge. 2022. "The Politics of Funding: The Rockefeller Foundation and French Economics, 1945–1955." *Journal of the History of Economic Thought*: 1–21.
- Bourricaud, François, Pascal Salin, and Jacques Rueff. 1989. *Présence de Jacques Rueff*. Paris: Plon.
- Caldwell, Bruce. 1988. "Hayek's Transformation." *History of Political Economy* 20(4): 513–41.
- . 2004. *Hayek's Challenge: An Intellectual Biography of F.A. Hayek*. Chicago: University of Chicago Press.
- . 2016. "Hayek's Nobel." In *Revisiting Hayek's Political Economy*, Advances in Austrian Economics, Emerald Group Publishing Limited, 1–19.
- Chélini, Michel-Pierre. 2001. "Le plan de stabilisation Pinay-Rueff, 1958." *Revue d'histoire moderne & contemporaine* 48–4(4): 102–23.
- Chivvis, Christopher S. 2006. "Charles de Gaulle, Jacques Rueff and French International Monetary Policy under Bretton Woods." *Journal of Contemporary History* 41(4): 701–20.
- . 2010. *The Monetary Conservative: Jacques Rueff and Twentieth-Century Free Market Thought*. DeKalb: Northern Illinois University Press.
- Claassen, Emil Maria. 1967. *Les Fondements philosophiques des systèmes économiques: texte de Jacques Rueff et essais rédigés en son honneur, 23 août 1966*. Paris: Payot.
- Colson, Clément. 1924. 1 *Cours d'économie politique : professé à l'École nationale des ponts et chaussées*. Édition définitive et considérablement augmentée. Paris: F. Alcan.
- Crozet, Yves. 2000. "Jacques Rueff et les institutions : un rendez-vous manqué ?" In *Les traditions économiques françaises: 1848-1939*, eds. Pierre Dockès, Ludovic Frobert, and Gérard Klotz. Paris: CNRS, 635–48.
- Daou, Marie. 2019. "Jacques Rueff and the Liberal Social Order: A Liberal Interventionist." *Journal of the History of Economic Thought* 41(4): 573–91.

- . 2022. “La théorie du chômage de Jacques Rueff. Traitement statistique et méthodologie scientifique.” *Cahiers d’économie politique* 80(1): 35–60.
- de Broglie, Louis. 1951. *La cybernétique, théorie du signal et de l’information*. Paris: Éditions de la Revue d’Optique Théorique et Instrumentale.
- . 1989 [1954]. “Sens Philosophique et Portée Pratique de La Cybernétique.” *Revue Internationale de Systémique* 3(2): 209–31.
- Diemer, Arnaud. 2010. “La Place Des Institutions Dans Le Courant Néo-Libéral Français : De Jacques Rueff et Louis Rougier à Maurice Allais.”
- Dubarle, P. 1948. “Vers la machine à gouverner” *Le Monde (1944-2000)*: 3.
- Ducrocq, Albert. 1957. *The Origins of Life*. London: Elek Books.
- Duranteau, Josane. 1968a. “Le débat s’est poursuivi sur les thèses du livre de M. Jacques Rueff «les Dieux et les Rois.” *Le Monde (1944-2000)*: 23.
- . 1968b. “Un débat animé par M. Jacques Rueff: la montée de l’ordre dans l’univers.” *Le Monde (1944-2000)*: 22.
- Farley, John. 1972. “The Spontaneous Generation Controversy (1700-1860): The Origin of Parasitic Worms.” *Journal of the History of Biology* 5(1): 95–125.
- Fessard, Alfred. 1989. “Points de Contact Entre Neurophysiologie et Cybernétique.” *Revue Internationale de Systémique* 3(1): 87–103.
- Frobert, Ludovic. 2010. “Conventionalism and Liberalism in Jacques Rueff’s Early Works (1922 to 1929).” *The European Journal of the History of Economic Thought* 17(3): 439–70.
- Geoghegan, Bernard Dionysius. 2011. “From Information Theory to French Theory: Jakobson, Lévi-Strauss, and the Cybernetic Apparatus.” *Critical Inquiry* 38(1): 96–126.
- Giscard d’Estaing, Valéry. 1963. “Le Quatrième Plan de Développement Économique et Social.” *Revue des Travaux de l’Académie des sciences morales et politiques et comptes rendus de ses séances* (Deuxième Semestre): 1–24.
- Guilbaud, Georges-Théodule (1912-2008) Auteur du texte. 1954. *La Cybernétique*. Paris: Presses Universitaires de France.
- Hayek, F. A. 1966. “Was Der Goldwährung Geschehen Ist. Ein Bericht Aus Dem Jahre 1932 Mit Zwei Ergänzungen.” *Revue d’économie politique* 76(6): 1092–1117.
- . 1967. *Studies in Philosophy, Politics and Economics*. [Chicago] : University of Chicago Press.
- . 1976. “The New Confusion about ‘Planning.’” *The Morgan Guarantee Survey* (January): 4–13.
- . 1977. “Le Socialisme et La Science.” *La Nouvelle Revue des Deux Mondes*: 3–9.

- . 2007 [1944]. *The Road to Serfdom: Text and Documents*. ed. Bruce Caldwell. Chicago: University of Chicago Press.
- . 2010 [1942-1944]. *Studies on the Abuse and Decline of Reason: Text and Documents*. ed. Bruce Caldwell. Chicago: University of Chicago Press.
- . 2022 [1973]. *Law, Legislation, and Liberty*. ed. Jeremy Shearmur. Chicago: University of Chicago Press.
- Johnson, Christopher. 2015. “‘French’ Cybernetics.” *French Studies* 69(1): 60–78.
- Lane, Georges. 1997. “Jacques Rueff, un libéral perdu parmi les planistes.” In *Aux sources du modèle libéral français*, ed. Alain Madelin. Paris: Perrin, 411–35.
- Le Roux, Ronan. 2011. “Pierre Ducassé et la revue Structure et Évolution des Techniques (1948-1964).” *Documents pour l’histoire des techniques. Nouvelle série* (20): 119–34.
- . 2018. *Une histoire de la cybernétique en France: 1948-1975*. Paris: Classiques Garnier.
- Loison, Laurent. 2011. “French Roots of French Neo-Lamarckisms, 1879-1985.” *Journal of the History of Biology* 44(4): 713–44.
- Massé, Pierre. 1967. “La Place de l’action Consciente Dans Le Développement Économique.” *Revue des Travaux de l’Académie des sciences morales et politiques et comptes rendus de ses séances* (Premier Semester): 1–15.
- Minart, Gérard. 2016. *Jacques Rueff: un libéral français*. Paris: Odile Jacob.
- Prat, Georges. 2016. “Rueff, Allais, et Le Chômage d’équilibre.” *Revue d’économie politique* 126(6): 1105–47.
- Rueff, Jacques. 1922a. *Des Sciences Physiques Aux Sciences Morales*. Paris: Alcan.
- . 1922b. “Le Change, Phénomène Naturel.” *Revue générale des sciences pures et appliquées* 64: 646–52; 680–87.
- . 1925a. “Les variations du chômage en Angleterre.” *Revue politique et parlementaire* 32(4): 425–37.
- . 1925b. “Sur une théorie de l’inflation.” *Journal de la société française de statistique* 66: 83–108.
- . 1927. *Théorie des phénomènes monétaires : statique*. Paris: Payot.
- . 1929a. “Les Idées de M. Keynes Sur Le Problème Des Transferts.” *Revue d’économie politique* 43(4): 1067–81.
- . 1929b. *From the Physical to the Social Sciences*. Baltimore: The Johns Hopkins Press.
- . 1931. “L’assurance Chômage, Cause Du Chômage Permanent.” *Revue d’économie politique* 45(2): 211–51.

- . 1933. “L’enseignement de M. Colson.” *Revue politique et parlementaire* (157): 312–18.
- . 1934. “Pourquoi, Malgré Tout, Je Reste Libéral.” *Bulletin du centre polytechnicien d’études économiques* (14–15): 30–34.
- . 1935. “La Crise Du Capitalisme. Communication et Discussion.” *Compte rendu des séances de l’Académie des sciences morales et politiques* (novembre-décembre): 393–444.
- . 1945. *L’ordre social*. Paris, France: Librairie du Recueil Sirey.
- . 1955. “Les sociétés humaines, ces belles choses artificielles...” *Bulletin de la Classe des Lettres et des Sciences Morales et Politiques 5e Serie*(Tome XLI): 61–79.
- . 1968a. *Les Dieux et Les Rois*. Paris: Hachette.
- . 1968b. *La montée de l’ordre dans l’univers: débat animé dans les séances des 29 avril et 6 mai 1968*. Paris: Palais de l’Institut.
- . 1969. “Laudatio: Un Message Pour Le Siècle.” In *Roads to Freedom: Essays in Honour of Friedrich A. von Hayek*;; London : Routledge & K. Paul, 1–3.
- . 1974. *La Création Du Monde : Comédie-Ballet En 5 Journées / Jacques Rueff...*
- . 1977. *Œuvres complètes I. De l’aube au crépuscule : autobiographie de l’auteur*. eds. Emil Maria Claassen and Georges Lane. Paris: Plon.
- . 1979a. “Chapter XX: Institutions et Marché Commun dans le Traité de la Communauté Européenne du Charbon et de l’Acier.” In *Œuvres complètes III. Politique économique*, eds. Emil Maria Claassen and Georges Lane. Paris, France: Plon, 317–29.
- . 1979b. 1 *Œuvres complètes II. Théorie monétaire*. eds. Emil Maria Claassen and Georges Lane. Paris: Plon.
- . 1989 [1955]. “L’intervention de l’État.” In *Présence de Jacques Rueff*, Hors collection, eds. François Bourricaud and Pascal Salin. Paris: Plon, 359–74.
- Ruyer, Raymond. 1954. *La cybernétique et l’origine de l’information*. Paris: Flammarion.
- Steta, Annick. 2017. “Jacques Rueff, l’économiste qui murmurait à l’oreille du Général De Gaulle.” *Revue des Deux Mondes* (Avril): 59–64.
- Sugden, Robert. 1989. “Spontaneous Order.” *The Journal of Economic Perspectives* 3(4): 85–97.
- Triclot, Mathieu. 2010. “La machine à gouverner : une dystopie à la naissance de l’informatique.” In *Alphil*, 197.
- Vanberg, Viktor. 1986. “Spontaneous Market Order and Social Rules: A Critical Examination of F. A. Hayek’s Theory of Cultural Evolution.” *Economics & Philosophy* 2(1): 75–100.
- Wiener, Norbert. 2019. *Cybernetics or Control and Communication in the Animal and the Machine*. MIT Press.