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« *Faites ce que je dis, ne faites pas ce que je fais* » : Schumpeter, l'économétrie, les mathématiques et la macrodynamique

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“Do as I Say, Not as I Do”: Schumpeter on Econometrics, Mathematics, and Macrodynamics

Tristan Velardo*

During the interwar period in the United States, Joseph A. Schumpeter was a fervent advocate for incorporating mathematics, statistics, and econometrics into economics. He actively engaged in academic debates on emerging macroeconomic topics such as macrodynamics, economic instability, and the business cycle. This article examines Schumpeter’s significant contributions in promoting these analytical tools and subjects through various academic channels, including journals, learned societies, and courses. It also addresses the paradox that, despite his advocacy, Schumpeter did not extensively integrate these methods into his own work, most notably in his book *Business Cycles* (1939).

Keywords: Schumpeter (Joseph A.), economic instability, macroeconomics, econometrics, mathematics

« Faites ce que je dis, ne faites pas ce que je fais » : Schumpeter, l’économétrie, les mathématiques et la macrodynamique

Pendant l’entre-deux-guerres aux États-Unis, Joseph A. Schumpeter était un fervent défenseur de l’intégration des mathématiques, des statistiques et de l’économétrie dans l’économie. Il a participé activement aux débats universitaires sur les nouveaux thèmes macroéconomiques tels que la macrodynamique, l’instabilité économique et le cycle économique. Cet article examine les contributions significatives de Schumpeter à la promotion de ces outils analytiques et de ces sujets par le biais de divers canaux universitaires, notamment des revues, des sociétés savantes et des cours. Il aborde également le paradoxe selon lequel, malgré son plaidoyer, Schumpeter n’a

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que peu intégré ces méthodes dans ses propres travaux, notamment dans son livre *Business Cycles* (1939).

Mots-clé : Schumpeter (Joseph A.), instabilité économique, macroéconomie, économétrie, mathématiques

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Following his final emigration to the United States in 1932, Joseph A. Schumpeter understood he belongs to a period of transition (R. L. Allen, 1991; Swedberg, 1991; Stolper, 1994; McCraw, 2007). In a letter dated May 8, 1934, he articulated that “economics is in such an uncomfortable stage of transition from inexact philosophy to exact methods but there is at present hardly any professional opinion to go by” (Schumpeter, 2000, 261). In 1931, one year prior to his arrival in the United States, during a lecture at Osaka-Kobe University in Japan, Schumpeter depicted this transition in a *chiaroscuro* fashion:

we may regret the separation as taking away much of the splendor of early work, as taking away much of the breadth of outlook and narrowing the work and making it less aesthetically beautiful. The compensating advantage is that it adds to efficiency (Schumpeter, [1931] 1991, 284-285).

By 1933, he observed “that phase that could, until about ten years ago, be called the ‘modern’ phase of economics” (Schumpeter, [1933] 1991, 103). Schumpeter identified four advancements during this transitional period: (1) “the unprecedented wealth of statistical facts”; (2) “new results that grew out of working the old apparatus”; (3) “the development of dynamics”; and, (4) “the new relation between economic theory and statistical methods (Econometrics)” (Schumpeter, [1954] 2009, 1112). This article elucidates Schumpeter’s ambivalent role during this period of transition.

During his tenure in the United States (Hagemann, 2011; 2005; Scherer, 2000), Schumpeter was actively engaged in debates concerning emerging tools and themes within economics, including business cycles theories, the necessity for a dynamic framework, renewed monetary theory, and the application of statistics and mathematics (Assous and Carret, 2022; Bismans and Grossinho, 2021; Dal Pont Legrand and Hagemann, 2017; Morgan, 2012; 1990; Louçã, 2007; Epstein, 1987). In doing so, he significantly participated to the formative period of what may be termed “pre-Keynesian” macroeconomics.

Schumpeter was a tireless promoter of mathematics, statistics and econometrics. However, he did not fully integrate these techniques into his own work. This article investigates Schumpeter's role in promoting these new techniques (statistics, mathematics, econometrics) and new subjects (economic instability, business cycle theory) in the field of economics during the interwar period in the United States, juxtaposed with his own limited use of these techniques and engagement with these subjects. The article reconsiders and contextualizes this ambivalence, contrasting Schumpeter's important academic role in promoting new techniques with his modest analytical contributions to the emergence of econometrics and macroeconomics.

Academically, Schumpeter contributed to the development of econometrics, mathematics, and statistics through his involvement in research networks, academic journals, and the courses he taught at Harvard (Carret and Assous, 2024; Dal Pont Legrand, 2024). Analytically, however, his contributions were minor, if not disconnected from these emerging issues. His book *Business Cycles* (1939) epitomizes this dichotomy and can be encapsulated by the adage "do as I say, not as I do", as he minimally employed mathematics and econometrics, pursuing instead a broader ambition: to develop a general theory of capitalism (Velardo, 2024) able to account for its economic and institutional dimension. Schumpeter's business cycle theory serves as a theoretical device which purpose it to integrate altogether the economic but also institutional aspects of capitalism. This is a well-known aspect of his work (Dockès, [2017] 2019; McCraw, 2007; Ebner, 2006; Arena and Dangel-Hagnauer, 2002; Shionoya, 1997; Tichy, 1984; Perroux, [1951] 1965).

The article contributes to the reappraisal of the importance of the debates about business cycles, the dynamic apparatus for the mathematical modelling of economic instability during the interwar period (Chancellier, 2024; Assous and Carret, 2022; McDonald, 2022) and the importance of banks and finance in the resulting models (Ingrao and Sardonì, 2019), instead of reducing macroeconomics to the Keynesian moment (De Vroey, 2016). It emphasizes the importance of the debates about new tools such as mathematics and statistics.

Section 1 examines Schumpeter's active advocacy for the use of statistics, his promotion and dissemination of econometrics, and his analytical developments that avoided econometrics and struggled to incorporate statistics. Section 2 conducts a similar inquiry into mathematics, demonstrating how Schumpeter consistently promoted mathematics in economics while resisting its application to his own work.

Section 3 explores Schumpeter's involvement in the 1930s-1940s debates on economic instability, business cycles, and macrodynamics, and his difficulty in integrating these issues into his contributions. His major work, *Business Cycles* (1939), illustrates this ambivalence and represents his pursuit of a broader theoretical ambition.

1. Schumpeter's Uses and Misuses of Statistics and Econometrics

Schumpeter was a long-standing and enthusiastic advocate for the use of statistics in economics. During his studies at the University of Vienna (1901-1906), he attended seminars by two prominent statisticians, Theodor von Inama-Sternegg and Franz von Juraschek (Swedberg, 1991, 13, 23). Schumpeter published his first articles on statistics in *Statistische Monatschrift* (1905a; 1905b; 1905c). In 1908, when he applied to become a *Privatdozent* at the University of Vienna, he proposed classes on "Problems in Modern Statistics", among others, and his Habilitation lecture in 1909 was on "The Verification of Abstract Theorems by Means of Statistics" (Swedberg, 1991, 17-18). In his first book *Das Wesen und der Hauptinhalt der theoretischen Nationalökonomie* (1908), Schumpeter emphasized the necessity of using statistics as a tool for economic analysis, alongside economic theory, referring to it as "*rechnendes Verfahren*" ("calculating method"; Schumpeter, 1908, 607). In 1908, Schumpeter recognized the need for the integration of theory and statistics into economic analysis. Fritz Machlup even described this as an "econometric program ... presented more than twenty years before the foundation of the Econometric Society" (Machlup, 1951, 149).

Schumpeter's interest in statistics was renewed when he emigrated to the United States in 1932, at a time of transition for Harvard: "In the 1930's and 1940's the Harvard Economics Department was somewhat split between a sterile old-guard that lacked enthusiasm for foreign high-fallutin theorist newcomers not trained at Harvard" (Samuelson, 2015, 32). He and Ragnar Frisch participated in founding the Econometric Society in 1930 (Dimand, 2021; Louçã, 2015; McCraw, 2007, 196; Swedberg, 1991, 77; Epstein, 1987; Christ, 1983) where he served as vice-president in 1936, 1938 and 1939, then as president in 1940 and 1941, following on Ragnar Frisch repeated requests (Louçã, 2007, 35-36). Additionally, the first article in the journal *Econometrica* was authored by Schumpeter ([1933] 1991). He also served as an editor of the *Review of Economics and Statistics* (Harris, 1951, 1). Schumpeter was particularly enthusiastic about econometrics and the use of

statistics, actively participating in theoretical debates about the quantitative aspects of economics (Schumpeter, 1937). In his *History of Economic Analysis*, he states:

Our epoch has been particularly characterized by an increase of statistical information which was so great as to open up quite new possibilities for scientific research. In step with this increase of statistical material, there has been an equally important development of statistical methods (Schumpeter, [1954] 2009, 1106).

The Econometric Society was established “to promote studies that aim at a unification of the theoretical-quantitative and the empirical-quantitative approach to economic problems” (Frisch, 1933, 1). The Society promoted mathematical and statistical economics, focusing on the problem of economic instability through dynamic models (Assous and Carret, 2022; Morgan, 2012; 1990; Strøm, 1998; Epstein, 1987). Schumpeter’s significant role in the foundation and standing of the Econometric Society, as well as in the Cowles Commission, is well known (Bjerkholt, 2017; 2015; 1998; 1995; Louçã, 2007; Divisia, 1953). Schumpeter and Frisch co-authored a five-page memo establishing the guidelines for the Society’s future research program and the need for its own journal (Schumpeter and Frisch, 1931), which eventually became *Econometrica*.

Even though Schumpeter was a promoter of econometrics, he never used it in his own work, such as his book *Business Cycles*. Jan Tinbergen notes: “It is striking, therefore, that upon a careful study of his own largest publication since then – *Business Cycles* – one finds a mental attitude vis-à-vis econometric work which is not only rather critical, but to some extent alien to it” (Tinbergen, 1951, 59). Kenneth Arrow recalls Schumpeter’s attitude during a seminar on econometric methods in New York, attended by Jacob Marshak, Trygve Haavelmo, and Tjalling Koopmans: “Schumpeter, somehow ensconced more comfortably than the rest and treating the whole matter with the benevolent condescension of a lord among well-meaning and deserving but necessarily limited peasants” (Arrow, 1978, 71). Seymour Harris considers that “Schumpeter did not share or utilize effectively the most important advances of the last generation” including econometrics (Harris, 1951, 2). Harris makes a harsh judgment on Schumpeter’s misuses of econometrics:

To econometrics ... he paid lip service. His attitude toward mathematical economics and econometrics puzzled his friends. In many statements, he insisted that mathematics and econometrics were the path of the future. Yet, though he worked on his mathematics, he never put it to use in his

writings ... perhaps that he did not even understand the econometric models (Harris, 1951, 3).

On a conceptual level, Schumpeter uses the very definition of Ragnar Frisch (Morgan, 1990, 83; 86): “we are ... driven to include in our functions values of variables which belong to different points of time. Theorems which do this we call, in deference to Professor Frisch, *dynamics*” (Schumpeter, [1939] 2017a, 48). On a methodological level, Frisch tried to convince Schumpeter to express his theory of innovation within the method of econometrics but in vain (Assous and Carret, 2022, n157). Frisch also drew inspiration from Schumpeter for his theory of cycles (Bismans and Grossinho, 2021, 125–129; Thalberg, 1998).

In addition, although he was enthusiastic in the beginning, Schumpeter kept his distance from the Econometric Society and especially from the Cowles Commission. In a letter to Ragnar Frisch (December 3, 1932) Schumpeter explains:

It is, I confess, with some discomfort that I look on recent developments in our society [the Econometric Society]. It not only goes much too much in the direction of forecasting in its program, but it also seems to extend its ordinary membership beyond the limits compatible with standing (Schumpeter, 2000, 228).

This “discomfort” can be explained by two reasons: the first one concerns scientific debates among the econometricians about the applicability of mechanics to economics (Louçã, 2007, 115-118; 2001); the second reason is related to the epistemological divergences between Schumpeter’s positive stance and the interventionist tendencies among econometricians.

Schumpeter expressed reservations about econometrics’ analytical ability to grasp the causes of economic instability and business cycles:

The results of these new methods ... do not constitute an alternative theory to business cycle or the process of economic change in general. They describe repercussions and propagations without saying anything about the forces or causes that set them into motion. Whatever those causes, the way in which they operate and in which the system reacts to them is elucidated by the new methods. But they do not touch the question whether the force actually at work is correctly described by the principle of innovation or not (Schumpeter, [1937] 1991, 162-163).

As Schumpeter suggests in this passage, econometrics is not capable of theoretically grasping the causes or forces driving the dynamic of capitalism. According to Schumpeter’s own theoretical model, these must be found in innovation. In a way, Schumpeter sees econometrics

as unable to meet its own scientific agenda. In addition, Francisco Louçã has shown how econometricians were divided on the question of the applicability of mechanics to economics. Schumpeter disagreed with Frisch on this point and criticized the idea of transposing mechanics to economics. The group he which he belonged was gradually marginalized and ignored, accelerating Schumpeter's gradual move away from econometrics (Louçã, 2007, 115-118).

There is another reason for Schumpeter's reservation. Throughout his career, he developed a positivist conception of economics, rejecting on multiple occasion the normative aspects of the discipline (Schumpeter, [1954] 2009; [1949] 1991a; 1915). He coined this methodological and epistemological approach with the dichotomy between Vision and Analysis (Velardo, 2021; Kurtakko, 2014; Perlman, 2007; Shionoya, 2005a; Kesting, 2005; Aufrecht, 1958). He made a strong distinction between "political economy" which is "an exposition of a comprehensive set of economic policies that its author advocates on the strength of certain unifying (normative) principles" (Schumpeter, [1954] 2009, 36) and "economic analysis" which designates "the intellectual efforts that men have made in order to understand economic phenomena or, which comes to the same thing, the history of the analytic or scientific aspects of economic thought¹" (Schumpeter, [1954] 2009, 2). Therefore, he believed in "scientific progress" (Schumpeter, [1954] 2009, 37) and for that reason, he was a strong supporter of the use of mathematics and statistics as they constitute tools for improvement and progress within economics. Moreover, his position on State intervention was ambivalent. He was committed to his positivist stance: "I recommend no policy and propose no plan" (Schumpeter, [1939] 2017a, vi). In view of this, the interventionist tendencies within the Econometric Society and the Cowles Commission were alien to Schumpeter's positive approach. Even though his position on controlling the cycles is changing, and has been the subject of studies demonstrating his ambivalence (Dal Pont Legrand and Hagemann, 2017; Potier, 2015), Schumpeter was in favour of public intervention only in the specific cases of a "pathological" depression, but not as a general rule. He considered economic instability as a normal phenomenon of capitalism and not necessarily something to fight

¹ "Economic thought" is even wider and designates "the sum total of all the opinions and desires concerning economic subjects, especially concerning public policy bearing upon these subjects that, at any given time and place, float in the public mind" (Schumpeter, [1954] 2009, 36).

against (Assous and Carret, 2022, 156). Robert Heilbroner recalls Schumpeter declaring in class “with obvious enjoyment, that depressions, far from being unmitigated social evils, were actually in the nature of ‘a good cold douche’ for the economic system” (Heilbroner, 1967, 288). For all these reasons, Schumpeter was not aligned with the developments of the Econometric Society.

Moreover, Schumpeter did not master statistics. For this matter, the reception of *Business Cycles* is instructive. It was rather lukewarm, as its posterity. It was the subject of twelve critical reviews in academic journals and five in business magazines (Augello, 1990). Even though most of the reviews were full of praise (Di Pietri Tonelli, 1941, 942; Hermens, 1941, 264; Morgenstern, 1940b, 615; Sweezy, 1940, 134; Bousquet, 1940, 264; Innis, 1940, 96; Neisser, 1940, 206; Rosenberg, 1940, 96), the book was subject to many critics. Most of the reviews regretted its length, its ampoule style and its long pages devoted to economic history (Galbraith, 1977, 74; Stolper, 1951, 109; Innis, 1940, 96). In the reviews, commentators most often dwell on the real dimension and on the theory of innovation and the entrepreneur (Marschak, 1940, 889), and, of course, on the technical and industrial dimension of cycles (Innis, 1940; Rosenberg, 1940; Morgenstern, 1940a). Another reception of the work insists on *its practical and political aspects* (Morgenstern, 1940b; Lange, 1941), and on the practical interest of the book for economic practitioners: managers, directors, businessmen, in the conduct of their business (*Business Week*, 1939, 64; Potter et al., 1940, 241). Reservations were not so much about the theoretical apparatus, the continuity of which most commentators recognize with *Theory of Economic Development* (Hermens, 1941, 261; Kuznets, 1940, 257; Morgenstern, 1940a, 423; Innis, 1940, 90), but on statistics and economic history (Kuznets, 1940, 263; Morgenstern, 1940b; Bousquet, 1940; Neisser, 1940).

Some methodological developments can be found in Chapter 1 and in Chapter 2 of *Business Cycles*, where Schumpeter details his conception of statistics. Overall, Schumpeter defends the use of theory against empiricism (Swedberg, 1991, 129). “Raw facts are, as such, a meaningless jumble” (Schumpeter, [1939] 2017a, 30). So, he argued, we need an analytical framework to understand a phenomenon: “we must now try, with a view to acquiring a more powerful apparatus of analysis, ... to increase our stock of facts and to improve upon our statistical methods” (Schumpeter, [1939] 2017a, 30). In *Business Cycles*, as in previous works, Schumpeter rejects the opposition between facts (history and statistics) and theory. For Schumpeter, statistics are a set of “tools of analysis” (Schumpeter, [1939] 2017a, 31) that help to co-construct

economic analysis for a better understanding of the phenomenon of capitalism. Statistics “induce the theoretical work and determine its pattern” (Schumpeter, [1939] 2017a, 32). Theory and statistics are in a “mutual peaceful penetration” (Schumpeter, [1939] 2017a, v). Theory must thus be construct with the help of data. Statistics constitutes a tool in order to improve economic theory and to build “a way of ordering reality” (Swedberg, 1991, 129). Statistics is, according to Schumpeter, one of the techniques that define economic analysis with theory and history (Schumpeter, [1954] 2009, 10-12).

But these methodological considerations go unheeded in *Business Cycles*. First of all, commentators criticized Schumpeter for its lack of rigorous data construction: “The failure to follow articulate methods of time series analysis reduces the statistical methods to a mere recording of impressions of charts, impressions with which it is often difficult to agree” (Kuznets, 1940, 269). The book was mostly criticized for “an unduly narrow view of statistics” (Kendall, 1941, 179). For example, before 1914, Schumpeter had no monthly data but only annual data, so he did not have the necessary material to draw up the 40 months Kitchin cycles. Yet, he detailed Kitchin cycles supposedly lasting 40 months (Kuznets, 1940). In addition, and more harshly, Kuznets criticizes Schumpeter for sometimes misinterpreting charts to “force” data into his analytical framework of the Kondratieff cycles: “The insufficiency of the crude statistical procedures followed in the treatise to provide a basis for establishing cycle types of so elusive a character as the Kondratieffs” (Kuznets, 1940, 269). Tinbergen also saw “a somewhat primitive chartreading” (Harris, 1951, 59). Indeed, Schumpeter carried out detailed and tedious monographs of each Kondratieff in the industrial, agricultural, banking, price level, trade, sectors. He established a list of 41 statistical variables to be observed, including the profits of firms, the purchasing power of households, bank interest rates, the price of steel, the production of gold, or even beer sales, marriage rates, advertising (Schumpeter, [1939] 2017a, 15-17). As Mary Morgan puts it, “[Schumpeter’s] two-volume study of the business cycle contained no statistical analysis to speak of, but developed a complex theory of the interactions of these different cycles” (Morgan, 1990, note 43). Finally, Schumpeter failed to demonstrate the link between entrepreneurial activity and the cyclical nature of the capitalist economy, and was criticized by commentators for the monocausal nature of his analytical framework. In other words, Schumpeter assumed precisely what he needed to demonstrate: “The association between the distribution of

entrepreneurial ability and the cyclical character of economic activity needs further proof" (Kuznets, 1940, 270).

Indeed, Schumpeter never put into practice nor illustrated what it means for statistics to be a tool to construct analysis: "statistical and historical facts have ... much more important roles to play in the building of our knowledge of a phenomenon than to verify a theory drawn from other sources" (Schumpeter, [1939] 2017a, 32). Taking a closer look, it seems that Schumpeter used statistics to corroborate his theoretical framework, which is broadly unchanged since *Theorie der wirtschaftlichen Entwicklung* (1911), rather than as a tool for the co-construction of economic theory. The data appear, most of the time, as *illustrations* of its theoretical framework, or as *verifications* of his theory (Neisser, 1940, 205). The choice of charts, tools and data can be interpreted as *ad hoc* to confirm Schumpeter bias and to match his theory of entrepreneur and innovation. Since Schumpeter failed to convince on his use of statistics as a "tool" to co-construct theory, most commentators considered that Schumpeter used data as *verification* of his theory (Marschak, 1940, 893) and criticized him for his excessive insistence on the phenomenon of innovation as a sole cause for business cycles (Rothbarth, 1942, 226). Schumpeter was primarily interested in the construction of a wide and abstract theory of capitalism, very different from the statistical approach of the econometricians. As such, this theoretical ambition was also very different from the empirical approach of Wesley C. Mitchell (Burke, 1961). Schumpeter's ambivalence about statistics and econometrics is not an isolated case and can also be seen in his treatment of mathematics.

2. Schumpeter's Evolution on Mathematics

Like for statistics, Schumpeter was an early promoter of mathematics in economics. As a student at the University of Vienna, he took classes in mathematics on his own initiative, since mathematics was not part of the economics curriculum (Swedberg, 1991, 13). One of his very first article titled "*Über die mathematische Methode der theoretischen Ökonomie*" promoted the use of mathematics (Schumpeter, 1906) and advocated for "exact economics", a science underpinned by mathematics and statistics (Schneider, 1951). In his first book *Das Wesen und der Hauptinhalt der theoretischen Nationalökonomie* (1908), Schumpeter already considered mathematics as a crucial tool: "We think if one wants to deal with theory, one has to do it as exactly as possible and that our way of

thinking will totally absorb the thinking of higher-order mathematics” (Schumpeter, [1908] 2010, 16).

Mathematics is, for Schumpeter, an “equipment” or a “technique” at the disposal of economists to a better understanding of the new problems of economics. In a text written for a conference given in 1931 in Japan, after a stay in the United States, Schumpeter reviews the “necessary equipment” to be acquired by a fully trained economist:

It would be a mistake, however, to think that by the ‘necessary equipment’ I mean, as far as economic theory goes, simply some knowledge of higher mathematics. It is true that I think such knowledge highly useful even now, and that a you man must expect to live into a future when it will not be easy to be a competent economist without it (Schumpeter, [1931] 1982, 1058-1059).

Mathematics appears to be a necessary technique for mastering economics, hence the urgent need to teach it in universities: “I would indeed urge any student of economics, especially if his main interest lies in theory, to acquire some minimum of experience in mathematics” (Schumpeter, [1931] 1982, 1059). This is the view he defends in a letter of March 9, 1933: “Every economist ought to have those fundamental concepts of mathematical economics which are necessary ... in order to move with some freedom on the higher altitudes of theory” (Schumpeter, 2000, 237).

When Schumpeter arrived at Harvard, mathematics was not part of the training of economic students. In the 1930s and 1940s, mathematical economics was far from its hegemonic position on the discipline in the United States (Orozco Espinel, 2020). The period is characterized by three features: “the absence of materials for training economics students in mathematical methods, students’ very modest level of proficiency, and the simultaneously rising importance of mathematical methods in the discipline” (Orozco Espinel, 2020, 18). Schumpeter was perfectly aware of these three elements and of the mathematization of the discipline. Indeed, during the interwar period, “the popularity of mathematical methods was rising in the discipline” but, on the other hand, “the community of mathematical economists was small and isolated from the rest of the discipline” (Orozco Espinel, 2020, 40). Schumpeter’s enthusiasm for mathematics is to be put into perspective with his dissatisfaction with teaching methods and how economics is taught at universities. The reason for his dissatisfaction is due, first of all, to the low level of his students in mathematics, which he still deplored in 1946: “Long observation of the mathematical difficulties of my students has given me a deep-rooted conviction that their

mystification results almost invariably from a lack of precise understanding of the very rudiments of the subject" (Schumpeter and Crum, 1946, vii). This opinion is fairly widespread among academics at the time (Morton, 1946, 607; R. G. D. Allen, 1946, 297). In the Harvard economics department, Schumpeter was an active promoter of mathematics and he was considered the "*patron* of mathematical economists" (Samuelson, 1951, 100). Mason and Lamont (1982, 422) also argue that "[Schumpeter] was a strong defender of econometrics and the mathematical development of economic theory. Holding these views, he was shocked at the absence of mathematical economics at Harvard". Therefore, he campaigned vehemently for the teaching of mathematics. With Leonard Crum and E. B. Wilson, he put together a "Committee on Instruction in Mathematical Economics" that promoted courses in mathematics at the doctoral level in economics (Swedberg, 1991, 116). During the academic year 1910-1911, Frank Taussig gave the first course in mathematical economics in Harvard: "It was also the last course in mathematical economics or econometrics given at Harvard until 1933 when Schumpeter gave a half-course entitled 'Introduction to the Mathematical Treatment of Economic Theory'" (Mason and Lamont, 1982, 404-405). Schumpeter's 1933 half-course aimed at "acquaint[ing] such students as may wish it with the elements of the mathematical technique necessary to understand the simpler contributions to the mathematical theory of economics" (Collier, 2018). Schumpeter reintroduced thus the teaching of mathematical economics in Harvard after twenty-two years of absence. And yet, very soon, and since "Schumpeter was not a well-trained mathematician" (Mason and Lamont, 1982, 422), the course was transferred to Wassily Leontief in 1935 (Collier, 2016).

Another reason for Schumpeter's dissatisfaction with economic teaching is related to his understanding of the normative character of economics. Universities and students were too involved in politics, Schumpeter thought; for instance, in a letter dated April 22, 1937, he complained about "the invasion of politics into everything" (Schumpeter, 2000, 299). Consequently, mathematics also represented a means to depoliticize universities and to preserve the positive dimension of economics. Mathematics is seen as a guarantee of scientific integrity, and of detachment from politics (which is "the fundamental evil our science suffers from"; Schumpeter, [1931] 1982, 1058): "science must be learned and trained in, just as any other, and that you cannot put forward any views about it or its problems before you have mastered its techniques" (Schumpeter, [1931] 1982, 1058). Basic

training in mathematics represents thus a means to this scientific training. This commitment is entirely consistent with his positivist approach to economics.

Thus, Schumpeter was aware that one of the major challenges of the period lied precisely in the mathematization of economics and in the gradual transformation of political economy into 'modern' science. The manifestation of this commitment was the publication in 1946 of a book with William L. Crum, titled *Rudimentary Mathematics for Economists and Statisticians* (1946). This was a revised and extended version of a Supplement to the *Quarterly Journal of Economics*, written by Crum alone (1938). Schumpeter added a few chapters, notably on Taylor series, homogeneous production functions, Lagrange multipliers, the concept of the integral, and the treatment of higher-order differential equations. The aim of the book was "to present rudimentary ideas and operations essential to any effective mathematical reasoning by economists and statisticians" (Schumpeter and Crum, 1946, vii). The book, aimed at students, wished to provide them with the mathematical tools necessary for a good understanding of economic theories. The authors yearned for mathematizing the teaching of economics: they "surely express the sincere wish of many colleagues in venturing to hope a later generation of economists will be so well prepared in mathematics that occasion for a book of this sort may disappear" (Schumpeter and Crum, 1946, vii).

Their colleagues' reception of the book is instructive. The book was the subject of eight critical reviews, including six in academic journals and two short reviews in the magazine of the Society of American Military Engineers, *The Military Engineer* (FK, 1949; *The Military Engineer*, 1949). These reviews were divided and mixed. The book was hailed above all as a symptom of the growing importance of mathematics teaching in the economics curriculum (Bowman, 1946, 927; Morton, 1946, 607). Some praised the "pedagogical skill" (Morton, 1946, 606) and how it would be "useful to economists or students of economics" (Bowman, 1946, 925-926). However, most of the reviews agreed that the book could not replace an in-depth mathematics course (R. G. D. Allen, 1946, 297; Carter, 1946, 630; Bowman, 1946, 927). The book was indeed too "rudimentary": "The treatment is in some cases so brief that it would confuse the student further without affording him any guide for action" (Carter, 1946, 630). Crum and Schumpeter's book was notably considered inferior to other books already available on the same subject (Tintner, 1946, 608), such as R. G. D. Allen, *Mathematical Analysis for Economists* (1938) and D. C. Jones and G. W. Daniels,

Elements of Mathematics for Students of Economics and Statistics (1926). The harshest criticism came from Lawrence R. Klein, of the Cowles Commission, for whom

Any book which serves to stimulate students' interest in the mathematical approach to problems of economic analysis is useful but ... this volume by Professors Crum and Schumpeter is one of the less desirable (Klein, 1947, 392).

According to Klein, the book missed its target, because it was both too succinct for a student or colleague already familiar with mathematical economics, and too complex and expeditious for the student completely new to mathematics. Indeed, the book's structure "is very unusual and confusing" (Klein, 1947, 392) and there were major shortcomings such as "difference equations" (Klein, 1947, 393). Above all, "most of the modern problems that mathematical economists are attacking are conspicuously absent from the book" (Klein, 1947, 393).

The most recurrent criticism, and undoubtedly the most interesting for our purposes, was that the book, contrary to its title, was not at all aimed at statisticians and appeared to be useless for statisticians or econometricians (R. G. D. Allen, 1938, 297; Carter, 1946, 630; Morton, 1946, 606; Tintner, 1946, 609; Klein, 1947, 393). In the book, mathematics was illustrated with economic applications. But the examples and illustrations were "artificial" and not derived from "results of recent empirical econometric research" (Tintner, 1946, 609) such as the works of Henry Schultz, Paul Douglas, Joel Dean, and so on. In a nutshell, the book was criticized for being too succinct and "rudimentary", of little use to students of economics and statistics, and above all, for its lack of connection with empirical works and econometrics. Schumpeter himself referred to this book as "from creeping to crawling" (Goodwin, 1983, 5).

Like for econometrics (Section 1), Schumpeter did not use mathematics in his own work. According to Richard Swedberg, most of Schumpeter's colleagues and students considered that "Schumpeter's ideas could not be formulated in mathematical terms and were therefore of limited value" (Swedberg, 1991, 175). Schumpeter himself advocated the primacy of theory over mathematics, which only provides an "auxiliary equipment":

By that part of the scientific equipment of the economist, which refers to training in theory, I do *not* simply mean mathematics. On the contrary, mathematics are only an auxiliary, although a very important one. It is theory itself, that the future economist has got to train himself in, the art of

constructing and using concepts and theorems and of gripping our facts with them (Schumpeter, [1931] 1982, 1059).

Frisch recalls that “[Schumpeter] knew mathematics not only to the point of understanding that it is a fundamental tool in our science. He knew it also to the point of understanding that it is only a tool and that it must be subordinated to the general intuitional and philosophical interpretation” (Frisch, 1951, 10). Schumpeter gave, in short, the priority to theory over mathematics. Schumpeter’s mastery of mathematics is a matter of debate, and possibly one reason why he did not use mathematics in his own works. Richard Goodwin, for instance, recalled that “he never, for some reason or other, managed to practise what he preached: he never succeeded in using mathematics with any facility” (Goodwin, 1983, 5). Abram Bergson, a former student of Schumpeter recalls:

Schumpeter was not really at home in mathematical economics. ... He was inspired by his conviction that this is the way economics would become a science – by the increased use of mathematics – and the must be a champion for it. But nevertheless he was not an adept practitioner (Bergson in Swedberg, 1991, 117).

Francisco Louçã (2007, 77) also agrees with Goodwin and Bergson. Ragnar Frisch is less severe regarding Schumpeter’s mastering of mathematics, but, still, he confirms his limited skills: “Schumpeter was able to understand and use mathematics for his purposes. He was remarkably able to utilize theorems developed by others who were more advanced in mathematical technicalities than he was himself” (Frisch, 1951, 10).

At the very end of his life, Schumpeter’s conception of mathematics seems to have shifted. He took his distance with mathematics and his approach became more historical and closer to institutional economics (Schumpeter, [1950] 1991). In 1949, Schumpeter attended a conference on business cycles organised by the National Bureau of Economic Research (NBER), where he delivered an address entitled: “The Historical Approach to the Analysis of Business Cycles” (Schumpeter, [1949] 1991b). He defended the view that mathematical models had been relatively sterile and advocated for empirical and historical research on business cycles: “economic life is a unique process that goes on in historical time and in a disturbed environment. For this and other reasons there is an argument for historical or institutional study in almost any department of economics” (Schumpeter, [1949] 1991b, 322). Richard Goodwin recalled: “it came as a great shock to me to find that

in the very last paper he ever wrote ... he said the future of research lay in the study of the records of the great business enterprises – no mention of econometric model building and testing!” (Goodwin, 1983, 8). Schumpeter defended “the historical approach to business-cycle research” through “detailed historical case studies” (Schumpeter, [1949] 1991b, 325) and “a large collection of industrial and locational monographs” in order to better understand “the incessant historical change” (Schumpeter, [1949] 1991b, 328). Nineteen years after he co-founded the Econometric Society, Schumpeter considered that econometric models should be subordinated to economic history:

The role of [an] econometric model (which includes the statistical element) is to implement the results of historical analysis of the phenomenon and to render the indispensable service of describing the mechanics of aggregates. But the econometric models do more than this—they ‘explain’ situations which in turn ‘explain’ or help to ‘explain’ impulses (Schumpeter, [1949] 1991b, 327).

This point of view is consistent with Schumpeter’s developments in *History of Economic Analysis* (1954). In his last book, mathematics is not one of the “techniques” Schumpeter assigns to economic analysis: history, statistics and theory (Schumpeter, [1954] 2009, 10-18). Indeed, in a footnote, Schumpeter states: “these requirements can be easily fulfilled by every graduate student who has had a tolerably good undergraduate training in history *or* mathematics” (Schumpeter, [1954] 2009, 12, Schumpeter’s emphasis). The absence of mathematics from this list of the techniques of economic analysis has been already noted (Machlup, 1951), as his late emphasis on history as an appropriate method (Louçã, 2007, 238); jointly with Schumpeter’s earlier role in promoting mathematics, this illustrates the ambivalence of his positions towards mathematics. This is notably apparent in his book *Business Cycles*, which seems closer to a historical approach than to a formal macroeconomic one (it constitutes “a passionate defense of the historical approach to cycles as representing the crucial features of the dynamics of capitalism”; Louçã, 2001, 25).

3. An Illustration: Schumpeter’s Studies of Macrodynamics and Economic Instability

The problem of economic instability constituted a major issue for economic analysis during the interwar and postwar period (Chancellier, 2024; Assous and Carret, 2022, vii). During the same period, “the reconciliation of competitive market equilibrium and business cycles in a

monetary economy became a major theoretical issue, which the most creative economists of the time addressed as an urgent and unsolved question" (Ingrao and Sardoni, 2019, 6). Schumpeter himself considered that business cycle theories as "the most modern of the specialists' theories" (Schumpeter, [1931] 1991, 297). The profusion of works in business cycles during this period (Assous, Dal-Pont Legrand and Hagemann, 2016) include those of Schumpeter, of course, but also of Wesley C. Mitchell (1913) Friedrich Hayek ([1929] 1966), Roy F. Harrod (1936), Michal Kalecki (1935; 1939), John R. Hicks (1939), Jan Tinbergen (1939), and Nicholas Kaldor (1940).

In this phase, statistics, mathematics, and the issue of business cycles coexisted. Schumpeter was particularly enthusiastic by the perspectives opened by what he called "macrodynamics". In 1931, he recognized "how much very good work is being done in the northern states of Europe, in Holland especially, Norway, Sweden, and Denmark, especially by the younger men" (Schumpeter, [1931] 1991, 292). He particularly appreciated the contributions of Jan Tinbergen (Schumpeter, [1954] 2009, 1128), but also the work of the Harvard Committee and the NBER under the responsibility of Wesley C. Mitchell (Schumpeter, [1954] 2009, 1129-1135): "Schemata of this kind are first steps toward a more perfect dynamic theory and must therefore be listed as pioneer ventures of first-order importance" (Schumpeter, [1954] 2009, 1135).

Alvin Hansen also argues that "macroeconomics began with monetary and business-cycle theory" (Hansen, 1951, 79) and that "Schumpeter was one of five Continental economists [with Tugan-Baranowsky, Wicksell, Spiethoff, and Aftalion] whose work on business cycles laid the foundation for modern macroeconomics" (Hansen, 1951, 79). Hansen considers that Schumpeter's contribution to emerging macroeconomics consisted in highlighting how "a dynamic society is constantly being drawn away from neighbourhoods of equilibrium by reason of the pioneering activities of daring innovators whose lightning successes entice a swarm of imitators into a wild outpouring of new investment activity" (Hansen, 1951, 80).

It is correct indeed that Schumpeter made early contributions to the study of the instability of capitalism – first in *Theorie der wirtschaftlichen Entwicklung* (Schumpeter, 1911), then in a 1928 article titled "The Instability of Capitalism" (Schumpeter, [1928] 1991). But Schumpeter's major contribution to the study of business cycles and of "macrodynamics" in the interwar period is his book *Business Cycles* (1939). Among Schumpeter's books, it is though probably the least read

one: “It is doubtful if Schumpeter’s *Business Cycles* would merit rescue from the limbo of ‘out of print’” (Fels, 1964, x). Rendigs Fels’s judgment is harsh, but representative of the posterity of Schumpeter’s “least successful works” (McCraw, 2007, 251), a “rarely visited monument” (Dockès, [2017] 2019, 811). However, Schumpeter considered this book as his *magnum opus*, with which he intended to make his “comeback as an economist theorist” (Swedberg, 1991, 127). He thought of *Business Cycles* as an opportunity to develop his theory of cycles, sketched in the second edition of *Theorie der wirtschaftlichen Entwicklung* (1926) and developed in a series of articles in the 1920s and 1930s ([1927] 1991; [1935] 1991).² *Business Cycles* is illustrative of Schumpeter’s difficulty in applying statistics, econometrics, and mathematics to his own analytical endeavours. Indeed, on the one hand, Schumpeter tried to address the typical objects of emerging macroeconomics in the interwar period, but on the other hand, he failed to apply the “tools” and “equipment” he had been ardently defending for several decades: statistics, econometrics and mathematics.

Why didn’t Schumpeter integrate econometrics and mathematics into his work, particularly in *Business Cycles*? Because he had his “own tale to tell” (Schumpeter, [1939] 2017a, vi). In other words, Schumpeter’s ambition was much broader than a mere theory of business cycles: he aimed at developing a general theory of capitalism, adopting both an economic and institutional perspective within an integrated framework (Velardo, 2024). Schumpeter’s business cycle theory appears as a way of accounting for the capitalist process as a whole. Therefore, Schumpeter’s approach is more in line with Marx’s than with the interwar economists studying business cycles by means of statistics, mathematics, and econometrics (Dal Pont Legrand, 2024, 168). Tinbergen perceived how much Schumpeter’s ambition was very different from that of econometricians: “evidently Schumpeter ‘lived another life’ than most econometricists” (Tinbergen, 1951, 61). Robert Solow, in a 2016 documentary about Schumpeter, recalls that “as a student, I expected [*Business Cycles*] to be an important book. ... But it was simply out of tune with the way economics was going” (Solow in Siebert and Hoepf, 2016). According to Wolfgang Stolper, the book was simply not read (Stolper, 1951, 109).

Several contemporaries at the time (Sweezy, 1940; Marschak, 1940; Hermens, 1941; Rothbarth, 1942) recognized this totalizing character of

² Schumpeter’s theory of cycles is well known. See e.g., Tichy (1984), Festré (2002), Hagemann (2003), and Dannequin (2020; 2022).

the book and the need to integrate Schumpeter's business cycle theory into a broader whole. Schumpeter confirms the idea in a letter to Paul T. Homan, dated April 2, 1938, during the preparatory phase for writing the book:

For if one thinks of business cycles as the typical form of capitalistic evolution and if one looks upon those long time movements, which are sometimes called industrial revolutions, as one species of cycles, it is but natural to link up with the cyclical phenomenon practically the whole of the economics and sociology of capitalist society (Schumpeter, 2000, 307).

In a nutshell, Schumpeter's business cycle theory is not a mere business cycle theory, but "an integral part of his system and ... also its crowning achievement" (Perroux, [1935] 2002, 131). Schumpeter pursued his own theoretical ambition of extending the theory of economic evolution to a reasoned history (*histoire raisonnée*) of capitalism. With *Business Cycles*, Schumpeter was pursuing a long-lasting theoretical ambition, whose origin is deeply rooted in the 19th-century political economy: analysing capitalism as an institutional phenomenon, without reducing it to an economic system. In a letter to Mitchell, during the writing of the book in 1937, Schumpeter admitted: "What I am primarily interested in is the second group of fluctuations which I believe owe their existence to a process I can fully explain and roughly trace through the whole stretch of economic history that lies within the institutional framework of capitalist society" (Schumpeter, 2000, 301). Schumpeter kept a persistent interest in sociology and economic sociology, disciplines he regarded as fundamentally concerned with the study of institutions (Schumpeter, [1954] 2009, 18-19; Velardo, 2021). This interest persisted throughout his tenure at Harvard University, where he engaged actively in sociology seminars, notably collaborating with prominent sociologists such as Talcott Parsons (Cot, 2011; Dal Pont Legrand, 2024, 173).

Schumpeter's understanding of economic instability is therefore broader than an econometric understanding of the cycle: in Schumpeter's analysis, the business cycle represents as a portion of the economic and institutional history of capitalism. Schumpeter's focus on institutions entails also what he calls "social atmosphere" (attitudes, values, morals). For instance, while studying the third Kondratieff, Schumpeter describes how capitalism changes the class structure, with the emergence of a "New Middle Class", whose improved living standards and lifestyle affect their beliefs, values, and attitudes – including, for instance, a certain hostility towards the big bourgeoisie and the industrial bourgeoisie (Schumpeter, [1939] 2017b, 698). This

anticipated *Capitalism, Socialism, and Democracy's* central thesis, according to which the developments of capitalism caused a dissolution of the institutions that supported it and a "mentality" conducive to the decline of capitalism (Schumpeter, [1942] 2008, 61). The emergence of a middle class and a general anti-capitalist attitude is also accompanied by a rationalization and individualization of attitudes and values: "Their attitude is more distant, less personal, more rationalized. ... Moreover, the loosening of the family tie—a typical feature of the culture of capitalism—removes or weakens what, no doubt, was the center of the motivation of the businessman of old" (Schumpeter, [1939] 2017b, 699). The "social atmosphere" of the neo-mercantilist Kondratieff is therefore one of growing hostility towards capitalism itself. Hostility that is characterized by social legislation, protectionist policies that Schumpeter develops at length in Volume 2 of *Business Cycles* and that he sums up as an "attempt to handle the essentially intracapitalistic problems of this period by anticapitalistic methods" (Schumpeter, [1939] 2017b, 702).

Schumpeter's approach in *Business Cycles* is thus closer to a historical monograph, accounting for institutional and political history of capitalism, in the manner of the German historical school (Swedberg, 1989; Shionoya, 2005b; 2005c), than to an econometric study, as Schumpeter's contemporaries such as Tinbergen clearly saw. The book is thus the most marked witness to Schumpeter's paradox of promoting a technique without ever applying it to one's own analytical developments.

Conclusion

This article has documented that Schumpeter's stance toward mathematics, statistics, and econometrics can be encapsulated by the adage "do as I say, not as I do". Throughout his academic career, Schumpeter actively promoted the use of statistics, mathematics, and econometrics within economics; yet, his own personal contributions to the analytical advancement of these fields remain minor and, in many cases, irrelevant. Schumpeter was an early proponent of incorporating statistics and mathematics into economics, as illustrated by his initial articles and work in Vienna during the 1900s. However, he refrained from applying these tools to his own theoretical and analytical endeavours. During the interwar period and following his move to Harvard, Schumpeter maintained this ambivalent stance. He played a pivotal role in promoting mathematics in economics, reinstating its teaching in

Harvard economics curriculum, actively participating in academic networks that supported mathematical approaches, and contributing to the dissemination of mathematical methods. Additionally, Schumpeter was an ardent advocate of statistics and the nascent field of econometrics. His involvement extended beyond moral support: he actively participated to establishing econometrics as a field within economics, through his engagement with the Econometric Society and its journal *Econometrica* – culminating in his presidency of the Society (1940-1941). Despite this activities, Schumpeter did not integrate econometrics into his own work, and his theoretical approach remained distinct from the econometric methods, as reflected in the reception of his work by econometricians like Tinbergen. Moreover, some of his contemporaries, such as Kuznets, regarded Schumpeter's approach to mathematics and statistics as rudimentary, and, ultimately, unhelpful, raising questions about his true proficiency in these areas.

As a proponent of a positive approach to economics, Schumpeter was in favour of the development of analytical tools such as statistics, mathematics and econometrics. However, he also nurtured the ambition for economics to embrace economic phenomena and capitalism as a whole. Schumpeter's theoretical ambition can be understood as inherited from 19th-century political economy and oriented towards a comprehensive framework for understanding capitalism as an economic, institutional, and cultural phenomenon. His theory of cycles thus offered a general framework for interpreting economic instability as economic, institutional, and cultural upheavals, more in the spirit of a historical monograph than of an econometric study. This perspective likely explains his late emphasis, in *History of Economic Analysis* (1954), on history as a technique of economic analysis. This concern led Schumpeter to include in his understanding of capitalism the analysis of the historical dynamics of institutions and their coevolution with economic structure, as well as the study of change in the cultural elements of capitalism. This historical and institutionalist approach has little in common with econometrics and mathematics. Thus, although his contemporaries considered Schumpeter's work to be "outdated", today we are forced to acknowledge its visionary character: since the 2010s, we have seen a revival of interest in the study of cultural (Mokyr, 2017; McCloskey, 2016) and institutional elements of capitalism (Acemoglu and Robinson, 2019; 2012) which invites us to re-read Schumpeter's integrated approach to capitalism.

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