

Correa Moylan Walsh beyond index numbers: from the “battle of the standards” to the science of money

Victor Cruz-e-Silva

Professor Adjunto do Instituto de Economia e Relações Internacionais da Universidade Federal de Uberlândia.
E-mail: victor.cruzesilva@ufu.br.

Felipe Almeida

Professor Associado do Departamento de Economia da Universidade Federal do Paraná.
E-mail: felipe.almeida@ufpr.br.

Resumo

O economista monetário norte-americano Correa Moylan Walsh tornou-se uma autoridade em economia especialmente por seu trabalho revolucionário sobre números índices. Apesar disso, muito pouco já foi escrito sobre sua vida e seu trabalho. Por esse motivo, este artigo possui uma finalidade dupla. Primeiro, busca-se lançar luz sobre Walsh enquanto um importante economista do início do século XX. Segundo, objetiva-se oferecer uma abordagem mais ampla à incursão de Walsh na economia monetária. O argumento desenvolvido no artigo estabelece que números índices não representam a camada mais importante do trabalho de Walsh—embora representem sua contribuição de maior impacto—mas são apenas um acessório à sua mais abrangente ciência da moeda. Argumenta-se que o trabalho de Walsh foi da controvérsia referente ao padrão monetário americano a uma ciência da moeda mais completa. Nesse processo, suas discussões sobre os diferentes tipos de valor e sobre o tipo de valor que a moeda deveria mensurar e armazenar assumem papel central. Portanto, seu livro mais famoso, *The Measurement of General Exchange-Value*, publicado em 1901, não deve ser lido como seu trabalho arquetípico. Alternativamente, o trabalho que representa melhor seus interesses intelectuais é *The Fundamental Problem in Monetary Science*, publicado em 1903. Esse argumento é corroborado por evidências de arquivo.

Palavras-chave: Correa Moylan Walsh; Números Índices; Valor de Troca; Ciência da Moeda.

Abstract

The American monetary economist Correa Moylan Walsh became an authority in economics especially because of his ground-breaking work on index numbers. Despite that, very little has been written about his life and work. For this reason, our aim in this paper is twofold. First, we want to shed some light on Walsh as an important early twentieth-century economist. Second, we intend to provide a wider account of Walsh’s incursion into monetary economics. Our argument is that index numbers were not the most important feature of Walsh’s work—though it represented his most lingering contribution—but only an accessory to his more comprehensive science of money. It is our contention that Walsh’s work went from the controversy regarding the American monetary standard to a more complete science of money. In this process, his discussions about the different kinds of value and about the kind of value that money should measure and store take on the central stage. Therefore, his most famous book, *The Measurement of General Exchange-Value*, published in 1901, should not be read as his archetypical work. Alternatively, the work that best represents both Walsh’s concerns and his encompassing motif is *The Fundamental Problem in Monetary Science*, published in 1903. This argument is corroborated by archival evidence.

Keywords: Correa Moylan Walsh; Index Numbers; Exchange-Value; Science of Money.

Códigos JEL: B31, B16.

Área ANPEC: Área 1 – História do Pensamento Econômico e Metodologia

Correa Moylan Walsh beyond index numbers: from the “battle of the standards” to the science of money

“And if we view economics as a science, in which a department is the science of money, it is intolerable to think that its most important technical term, of a concept which plays the same role as that of energy or force in physics, there still exists ambiguity which leads different minds to mean different things by the same word” (Walsh, 1903, p. 27).

1. INTRODUCTION

Correa Moylan Walsh strode among the greatest names of early twentieth-century economics. Directly or indirectly, especially as an index-number theorist, he shared the stage with individuals such as Irving Fisher, Wesley Clair Mitchell, Francis Ysidro Edgeworth, Warren Milton Persons, John Maynard Keynes, Arthur Cecil Pigou, George Udny Yule, and Arthur Lyon Bowley. Yet, very little has been written about his work.

Very little is in fact known about his life. Correa Moylan Walsh, the son of Joseph Correa Walsh (1813–?) and grandson of famous diplomat, journalist, writer, and lawyer Robert Walsh, Jr. (1784–1859), was born in Newburg, NY, in September 23, 1862, and died in March 10, 1936, in New York City. He received an A.B. from Harvard in 1884, after which he spent the rest of the 1880s studying abroad, at the universities of Paris, Berlin, Rome, and Oxford, returning to the US in 1890 (The New York Times, 1936). There is no record of his time in Europe, but all the records of his period at Harvard show that his interests lied in philosophy. His work was then focused in the classics, especially Greek and Latin (Harvard College, 1884, 1894). After his return from Europe, Walsh spent most of his years in Bellport, Long Island. He never got married, and was not survived by any members of his immediate family. Professionally, Walsh never had any recorded affiliation. His full-time activity was that of an intellectual “without a definite occupation” (Harvard College, 1909; The New York Times, 1936).

Walsh’s way into the annals of economics was paved chiefly by his work on index numbers, a subject that found its most exciting period in the early decades of the twentieth century and found in Walsh one of its most important contributors. His most significant work on the subject, a book entitled *The Measurement of General Exchange-Value*, was published in 1901, and was deemed a game-changer monograph by most of his contemporaries interested in index numbers (cf. Fisher, 1902, p. 112; 1922, p. xi; 1934, p. 56; Mitchell, 1921, p. 9).

To this day, nevertheless, the treatment given to Walsh’s rise as an index-number theorist—in the few mentions it receives—does not do justice to his oeuvre, as his 1901 book is read with no regard for his other publications. Balk (2008, p. 16–17), for instance, illustrates this well, depicting *The Measurement of General Exchange-Value* as a book written by an “unknown author” that appeared “out of the blue.” The reality, however, is that Walsh’s 1901 book was not his first—nor would it be his last—effort to discuss issues related to money and prices. He had already published a review of William Arthur Shaw’s compendium on the history of currency and a paper on the appreciating standard (Walsh, 1896, 1897),¹ and would yet publish other writings on the so-called science of money.

Accordingly, the goal of this paper is twofold. First, it aims at shedding some light on Walsh as an important early twentieth-century economist. Second, it intends to provide a wider account of Walsh’s allegedly unanticipated incursion into monetary economics. We claim that his work on index numbers is merely one layer—albeit an important one—within his more comprehensive approach to the science of money. More specifically, we argue that Walsh’s work on index numbers is nothing but an accessory feature in the path that led him from the “battle of the standards,” which refers to the nineteenth-century monometallism-bimetallism divide, to the science of money and his fundamental discussion regarding the different kinds of value in economics.

¹ To our knowledge, these are the first works Walsh ever published.

In this process, the “battle of the standards” deserves some special attention, because it served as Walsh’s gateway into economics. For Walsh, however, this important controversy barely scratched the surface of the fundamental problem in monetary science. As such, it is in the context of his search for definitive answers regarding *the* good monetary science that we locate his rise both as an index-number theorist and as a monetary scientist. In this lies the main contribution of this article. We postulate that *The Measurement of General Exchange-Value* should not be read as Walsh’s archetypical work—even though it is the one that gave him prominence in economics. Alternatively, the work that best represents both Walsh’s concerns and his encompassing motif is *The Fundamental Problem in Monetary Science*, published in 1903. We argue, therefore, that Walsh was not simply an index-number theorist, but a fully-fledged monetary scientist, bred into economics by the most pressing monetary questions of his time—an acknowledgment hitherto undocumented by the history of economics, which bypasses Walsh’s name among the monetary economists of his time (cf. Des Roches & Gomez-Betancourt, 2013; Laidler, 1991). This argument finds substance in archival evidence, which, though limited in extent, is illuminating in content.

To fulfil this purpose, this paper is structured as follows. The next section presents the mentions to Walsh in the economics literature and indicates his wide array of interests. The third section touches upon the “battle of the standards” and discusses Walsh’s first incursion into monetary economics. The fourth section covers his game-changing approach to index numbers. After that, the paper goes on to evaluate Walsh’s more comprehensive approach to the science of money. Finally, some concluding remarks close this paper.

2. WALSH’S WIDE ARRAY OF INTELLECTUAL INTERESTS

Walsh is recognized mainly by his contributions to the field of index numbers. This was true in the early twentieth century and it remains true over one hundred years later. The laudatory tone adopted by Fisher—arguably the ultimate authority on index numbers—in relation to Walsh as an index-number theorist illustrates this well.² Fisher’s 1922 book, *The Making of Index Numbers*, “the fountainhead of almost all the best later work” on index numbers (Schumpeter, 1954, p. 1058), is dedicated to both Walsh and Edgeworth, and no individual is mentioned more frequently in the book than Walsh (thirty entries in the book’s index, followed by Mitchell and Persons, with twenty-two entries each). In that book’s preface, Fisher (1922, p. xi) recognizes that Walsh, in his groundbreaking 1901 book, *The Measurement of General Exchange-Value*, had independently reached Fisher’s so-called ideal formula for index numbers. Also, in a letter to Mitchell, Fisher put Walsh as one of his close advisors in the process of writing *The Making of Index Numbers* (Fisher to Mitchell, June 24, 1921, Wesley Mitchell Papers). Fisher considered Walsh to be “the first American who investigated the problem of index numbers in a truly scholarly fashion,” adding that “[h]is work published in 1901 has remained one of the most fundamental studies on the subject, and has helped greatly to build up the science of measuring the purchasing power of money” (Fisher, 1934, p. 56).

Furthermore, Fisher was not the only one to adopt a laudatory tone about Walsh’s work on index numbers. In fact, Walsh’s authority on this subject matter was also recognized by several of the great economists of his time. Mitchell discussed Walsh’s 1901 book in detail and stated that no other contributor to the theory of index numbers was more important than Walsh (Mitchell, 1921, p. 9). Similarly, Frisch (1936, p. 2) placed Walsh among the most important contributors to the field of index numbers. Edgeworth (1901, 1923a, 1923b, 1925a, 1925b) confronted Walsh in a series of aspects regarding index numbers, and, despite disagreeing with most of his views, acknowledged Walsh’s expertise on the topic. Finally, Keynes payed tribute to Walsh on two occasions. First, in a 1909 essay, Keynes discussed Walsh’s 1901 book at length, claiming to have been “greatly assisted in writing this essay by Mr Walsh’s *Measurement of General Exchange-Value*” (Keynes, 1983

² Fisher’s first reaction to Walsh’s *The Measurement of General Exchange-Value* was, however, of great skepticism both for Walsh’s universal method and for his exclusive interest in exchange-value (Fisher, 1902).

[1909], p. 50). Later, in *A Treatise on Money*, Keynes (1971 [1930], p. 72) opposed the American tradition of making index numbers, as found in Fisher, Mitchell, and Walsh, to that of the British, such as Jevons, Edgeworth, and Bowley, and explicitly favored Walsh in his dispute against Edgeworth.³

It does not come as a surprise, therefore, that the few mentions to Walsh's name in the history of economics literature touch upon his contributions to index numbers. Diewert (2013, p. 226, 228) links Fisher's deviation from Edgeworth's unweighted stochastic approach to Walsh's previous efforts. Alongside Dimand (1998, p. 128–129; 2019, p. 138, 152), he further places Fisher and Walsh as the early fathers of the test approach to index numbers. Dimand (1998, p. 132; 2019, p. 141) further recovers Walsh's participation in the 1920 conference of the *American Statistical Association*, in which Fisher presented an early outline of *The Making of Index Numbers*. A similar effort may be found in Cruz-e-Silva and Almeida (2020, p. 2, 12–13). Banzhaf (2004, p. 593) recalls the early precedent set by Walsh to understand a price index as a physical measurement of prices. Kendall (1969, p. 1) praises Walsh's 1901 book as an excellent and scholarly summary of index numbers. Balk (2008, p. 16–17, 22–23) claims that the appearance of Walsh's 1901 book was an unexpected event, and presents the frank animosity it prompted between Walsh and Edgeworth regarding index numbers. According to Aldrich (1992, p. 679), this animosity "rose to an epic level" in the 1920s. Schumpeter (1954, p. 1058), finally, relates the statistical discussions outlined by Walsh in his 1901 book to "a comprehensive theory of index numbers elaborated in his important book, *The Fundamental Problem in Monetary Science* (1903)." Schumpeter mentioned Walsh only once in his great *History of Economic Analysis*, precisely within his remarks on index numbers. None of these works, however, focused on Walsh and his work.

Despite this prevailing narrow account of his oeuvre, Walsh had a prolific trajectory as an intellectual and an author. His oeuvre is by no means restricted to work on index numbers. Throughout his life, Walsh published six papers, including the 1896 and 1897 ones mentioned above, and ten books, including *The Measurement of General Exchange-Value* and *The Fundamental Problem in Monetary Science*. The multifarious matters discussed in his publications ranged from monetary economics (Walsh, 1896, 1897, 1903, 1926), statistical methods applied to economics (Walsh, 1901, 1921a, 1921b, 1924), and mathematics (Walsh, 1932) to political science and sociology (Walsh, 1917a, 1917b, 1917c), intellectual history (1904, 1906, 1915), and religion (Walsh, 1910). Such pervasiveness of interests also translated into his involvement with several learned societies, which included the *American Economic Association* and the *Royal Economic Society*, the *American Statistical Association* and the *Royal Statistical Society*, the *American Mathematical Society*, the *American Academy of Political and Social Science*, and the *Society for Psychological Research* (Harvard College, 1909; Richardson, 1922; Walsh, 1921a).

Within this wide array of interests, the ones that formed the core of his most important works related to the new and rising social disciplines. Two classes of works, which Walsh apparently tried to keep as separate as possible, sprung within this core: one, more technical and economically-minded; the other, more sociological and politically-minded. The former rarely show any sign of his political predilections, whereas the latter seldom make use of the resources within his economics toolkit. In this regard, Walsh (1901, p. 8, emphasis in the original) understood economics as "the study of the *phenomena* of exchanges and the laws of their relations," within which the main theme is value (Walsh, 1926, p. 3). As such, for him, economists are "those who inquire what should be done for the improvement of material welfare" (Walsh, 1917a, p. 34).

Along these lines, Walsh's gateway into the discipline was the sound currency debate, which opposed monometallists, defenders of the gold standard (or sound currency), and bimetallicists, who defended the circulation of both gold and silver currencies (cf. Friedman, 1990a, 1990b). This

³ It is hard to defend Keynes' attempt to homogenize Fisher, Mitchell, and Walsh as an "American tradition of making index numbers." Mitchell's approach is very different from the one favored by the other two. An example of such a difference is that, unlike Keynes, Mitchell (1921, p. 67, 72) favored several of the arguments that Edgeworth would hold against Walsh, such as the issues related to weighting and the use of probabilities.

debate—the “battle of the standards,” as per Walsh (1903, p. 158)—was one of the most pressing issues during the golden age of monetary economics, which lasted from 1870 to 1914, according to Laidler (1991, p. 1), and coincided with the US transition from the Gilded Age to the Progressive Era (cf. Hofstadter, 1956; Leonard, 2016).⁴ In this period, monetary debates in the US concerned three main questions: the determination of the value of money and the demonetization of silver; the crises under the National Banking System and the need for a banking reform, and; the choice of the metallic standard (Des Roches & Gomez-Betancourt, 2013, p. 136–137). Walsh’s characterization as a monetary scientist arises mainly from his engagement in the third and, foremost, in the first of these trending debates. In fact, Walsh placed the question of the metallic standard as an appendage to the determination of the value of money. Nonetheless, the “battle of the standards,” the focus of Walsh’s first two publications, was his gateway into the science of money, and, as such, is especially relevant to understand his rise both as an index-number theorist and as a monetary scientist.

3. THE “BATTLE OF THE STANDARDS” AND WALSH’S INITIATION IN THE SCIENCE OF MONEY

The issue concerning the American monetary standard dates back to 1792. In that year, by Alexander Hamilton’s recommendation, the US adopted a bimetallic standard, which allowed for the free coining of both gold and silver. The ratio between silver and gold was then established at 15 to 1. Soon after the Coinage Act of 1792, however, the market prices for gold and silver oscillated and this ratio went above 15 to 1. This led to the scenario foreseen by Gresham’s law, and silver, the cheap money, became the effective monetary standard in the US until 1834, when a new legislation altered the mint ratio to 16 to 1, which now lied above the market ratio. Again, the American bimetallic monetary system witnessed a monometallic standard in practice, as gold became the only metal minted until the 1870s—with the exception of the Civil War period, in which the greenbacks came into play. In that decade, following an international movement, the wish for a “sound currency” gained momentum in the US, and the return to a specie standard was put in motion. The goal was not only to put an end to the inconvertible greenbacks issued during the Civil War, but also to oust free coinage of silver (cf. Friedman, 1990a, 1990b; Friedman & Schwartz, 1963; Rockoff, 1990).

By 1879, metal convertibility was redeemed, bimetalism was cast aside, and gold became the single basis for the American new monometallic monetary system. From that moment until the end of the nineteenth century, the debate on the American specie standard never wavered. Politically, the issue reached its most momentous crossroad in 1896, with William Jennings Bryan’s Presidential campaign and his famous “Cross of Gold” speech. Nevertheless, the context within which the free-silver movement unfolded in the last decades of the nineteenth century was very different from that prevailing in the 1870s, both materially and intellectually (cf. Friedman, 1990a, 1990b; Friedman & Schwartz, 1963; Rockoff, 1990).

Materially, conditions were much less favorable to bimetalism in the 1890s—particularly at the 16 to 1 ratio advocated by Bryan (cf. Fisher, 1894; Friedman, 1990a, 1990b; Laughlin, 1895; Rockoff, 1990). As Friedman (1990b, p. 1177) puts it, “[b]y 1896 it was too late to undo the damage. Bryan was trying to close the barn door after the horse had been stolen.” Intellectually, the debate underlying this phase of the specie-standard divide was a rather heated one, and many of the most important American economists of the time played some role in it, such as James Laurence Laughlin and John Bates Clark (monometallists), and Francis Amasa Walker and Willard Fisher (bimetallists).⁵

Rockoff (1990, p. 753–754) offers a bird’s eye view of the main arguments presented by each side of the dispute. Basically, the advocates of the gold standard rejected bimetalism because oscillations of the ratio between gold and silver would generate an outflow of the dearest metal,

⁴ As a conservative, Walsh was very skeptical about many of the reforms proposed during the Progressive Era. “We greatly deceive ourselves if we think that every change we make is progress. It may be regression. Or rather, instead of progress upward, it may be progress downward – down the slope after leaving the level at the top” (Walsh, 1917a, p. 69).

⁵ Fisher, alternatively, proposed a different metallic standard: the compensated dollar (cf. Fisher, 1922 [1911]; Gomez-Betancourt & Des Roches, 2013).

leaving only the cheap metal in circulation. In this sense, in practice, there would not exist a bimetallic standard, and a scenario of alternating gold and silver standards would be put in motion. Bimetallists, contrarily, postulated that the adherence of a nation as big as the US to the bimetallic standard would force the world ratio to adapt to the US ratio, allowing for the simultaneous circulation of both gold and silver. In addition, and more importantly, bimetallists argued that a bimetallic standard would be accompanied by a greater stability both in the stock of money and in the price level, because shortages in the supply of one metal would be compensated by the supply of the other.⁶

This controversy marks the ethos within which Walsh rose as a monetary scientist. His first impressions on currency were laid down in the first two papers he ever published: *Shaw's history of currency* (Walsh, 1896), which reviews William Arthur Shaw's book *The History of Currency, 1252 to 1894*, and; *The Steadily Appreciating Standard* (Walsh, 1897), which examines John Bates Clark's establishment of "a new theory concerning the influence of changes in the value of money" (Walsh, 1897, p. 280). Since both Shaw's book and Clark's papers aimed at defending the gold standard to the detriment of the bimetallic standard (Walsh 1896, p. 431; 1897, p. 281), Walsh's papers also dug into the monometallism–bimetallism divide.

In these two papers, Walsh avoided laying down straightforward statements regarding the merits or demerits of bimetallism per se. He tried to act as an impartial, scientific mediator who should state facts, not opinions. As such, even though he recognized that bimetallism had had important shortcomings in the past, he showed no a priori resistance to the proposal for a new international bimetallic standard—a position that, in this regard, resembles Francis Amasa Walker's (cf. Friedman, 1990a, p. 95; Rockoff, 1990, p. 752; Walker, 1896, p. iv). Criticizing Shaw's historically-oriented argument against bimetallism, Walsh (1896, p. 454) claimed that:

[...] "the modern theory of bimetallism" is not disproved by "the failure of practice" of another kind of bimetallism. To make such a disproof, a supplementary argument would be needed, showing that the evils which beset the old bimetallism would still continue in the new, because the element in the old which begot them is still retained in the new.

He contended that the main problem of bimetallism up to 1896 was the prevalence of different legal gold-silver ratios across countries. The new theory of bimetallism defended a scheme in which an international, fixed, and permanent gold-silver ratio ought to be shared by all nations. This had never been tried before, and, as such, history had nothing to say about its effectiveness. Therefore, if anyone aimed at dismissing bimetallism, they could only do it theoretically, by showing that either the scheme would not fulfil its promises or that it was impracticable.

Such a theory was not straightforward, though. Already in 1897, Walsh contested John Bates Clark's theory concerning the impacts of changes in the value of money, in which Clark postulated that businesses would soon adapt to an appreciating or depreciating standard by an adjustment of the rate of interest. Walsh deemed crucial the scrutiny of Clark's theory because such an elaboration was meant as a contribution to the nature of the American monetary system. Arguing against Clark's approach, Walsh (1897, p. 280) appealed to Hume to recall the idea that "any but a stable standard of values causes injury." He closed his argument stating that "the conclusion would seem to be that we must either apply the multiple-standard system or do something (with risk of other ills) to prevent the appreciation, or suffer bad consequences" (Walsh, 1897, p. 295). In 1903, Walsh would yet revisit this "battle of the standards," showing, once again, a veiled sympathy toward bimetallism and highlighting the inconsistencies in the monometallist reasoning (Walsh, 1903, Part II: Chapters 5 and 6).

Whereas such discussions on the metallic standard guided Walsh's first considerations on the monetary system, he would soon make it clear that he considered it to be nothing more than an accessory to the real problem at stake. For him, it was not sufficient to state which specie standard—gold, silver, or a combination of both—was the most appropriate one. This was merely a discussion

⁶ For a more comprehensive discussion on the arguments presented by each side of the controversy, see Friedman (1990a), Laidler (1991, Chapters 2 and 3), and Des Roches and Gomez-Betancourt (2013).

about a means to achieve an end, that is, greater stability in the value of money. Walsh (1903, p. 2, emphasis in the original), distinctively, posed the following question: “*What kind of value is it that money measures and stores and should possess in a stable manner?*” This is the fundamental problem in monetary science.” Hence, the definition of the most stable bullion standard was not enough. It was necessary to deal with a prior and much more important issue—the fundamental problem in monetary science: the establishment of an ironclad definition regarding *which kind of value* should be the reference for the stabilization of the monetary standard. Only then should economists endeavor in discussions regarding the monetary standard per se.

4. WALSH’S RISE AS A MONETARY AUTHORITY: INDEX NUMBERS AS AN ACCESSORY

Walsh’s rise as an authority in currency and index numbers must be read parsimoniously. The concentration of his aforementioned Harvard studies in philosophy and the classics took place at a time when professional economics was taking its first steps. American intellectuals—especially those who had studied in a colonial era college such as Harvard or Yale—were turning off their “expected scholarly path of the classics, theology, and philosophy to study the new social disciplines created to put reform in action—economics, politics, sociology, and public administration” (Leonard, 2016, p. 11; cf. Chapter 3). In this process, Walsh turned his attention to monetary questions, a path taken by many of his contemporaries as well (cf. Des Roches & Gomez-Betancourt, 2013). Within his new agenda, Walsh published his *magnum opus* already in 1901: *The Measurement of General Exchange-Value*. This was his first publication after the 1890s papers. We understand this book as his *magnum opus* because of its lingering impact on the profession and because it was a game-changing book, as its reviews make clear. For Gaines (1902, p. 127), “[t]his is the most exhaustive work ever brought out on the theory of index numbers, embodies a vast deal of labor and acute logic, and will be a mine of information to future investigators.” Fisher (1902, p. 112) believed that the book would “doubtless remain for many years as the standard and most exhaustive treatise on the subject with which it deals.” Edgeworth (1901, p. 404), furthermore, opened his paper on the book claiming that: “[t]he capacity of taking boundless trouble, which is a characteristic of solid talent, distinguishes the work of Mr. Walsh. Whether he searches the writings of other or elaborates his original ideas, the thorough student and close thinker is manifest on every page.”⁷

Walsh’s book is a comprehensive and exhaustive discussion about value and the most appropriate instruments for its measurement. He recognized—but did not elaborate upon—four different kinds of economic value: cost-value, esteem-value, use-value, and exchange-value. For him, different kinds of value had to be measured in different ways, which seldom conformed to more than one kind of value (Walsh, 1901, p. 32). In *The Measurement of General Exchange-Value*, his concern lied primarily on exchange-value and on the appropriate way to measure its stability. Walsh (1901, p. 7) defined exchange-value as follows:

Exchange-value is a relative quality in material things. A material thing has exchange-value, as it has weight, only because of other material things to which it relates in a particular way. This is its exchanging for them, or its ability to exchange for them. Gravity is the power in a thing by which it attracts other things toward itself and is attracted toward other things by a similar power in them. Exchange-value is the power in a thing by which it procures for its owner other things, which procure it for their owners by a similar power in them. As we cannot conceive the gravity of one thing alone, without reference to other things, we cannot conceive of the exchange-value of one thing alone, without reference to other things.

⁷ As a matter of fact, as per the reviewers of his books, originality and independence of thought thereafter became a trademark of Walsh’s works—whether related to economics and statistics or related to history and sociology (cf. Carver, 1919, p. 715; Greene, 1916, p. 576; Padan, 1901, p. 610; Schiller, 1918, p. 98; Simiand, 1901, p. 561). Furthermore, the comprehensiveness of his literacy is attested by the great number of works, published either in English, French, Italian, German, or Spanish, mentioned in his bibliographies.

Accordingly, at a given time and place, there is an exchange-value of one thing in all other things, including the one thing itself. This is the thing's *general exchange-value* (Walsh, 1901, p. 12). Walsh (1901, Chapter I) then introduces several (fifty-eight) propositions in order to highlight the association between the exchange-values of different things. These propositions were meant to assist in the design of the appropriate method for the measurement of exchange-values. Money here plays a paramount role, because it serves as the “common denominator” for all other things. In his words (Walsh, 1901, p. 20–21),

By means of prices, money acts as a perfectly satisfactory measure of the exchange-values of other things in the same place at the same time. Now money alone is brought into direct relationship with every other exchangeable thing, the relations between these others being intermediated through their relations to money. [...] Consequently it is primarily only the general exchange-value of money in all other things collectively that we are concerned with measuring; for after measuring it and finding its constancy or variation at different times, or in different places, we can measure the constancy or variation of any other thing in general exchange-value by its known constancy or variation in relation to money.

For that reason, Walsh delves into an elaborate—and often exhaustive, as per his reviewers—quest for indicating the most appropriate approach to the measurement of general exchange-value through the variations in the exchange-value of money. In the book's third chapter, he discusses several theoretical questions regarding such a measurement, such as the standards in simple mensuration and the distinctiveness of the mensuration of general exchange-value (Walsh, 1901, Chapter III). In the following chapters, Walsh (1901, Chapters IV–XI) moves on to more technical disquisitions, such as weighting, periods and base periods, the common measurement errors, and the most appropriate kind of average to be used. In an effort that would later be resumed by Fisher (1922), Walsh (1901, Chapter XII) also proposes a “universal formula for the constancy or variation of the general level of prices” (Walsh, 1901, p. 381), which is—as would be Fisher's—a geometric mean between existing formulas. In the final chapter, Walsh (1901, Chapter XIV) further indicates that knowing the constancy or variation of the exchange-value of money is of paramount importance for the good functioning of the economy. Also, he postulates that, should money fail to achieve stability in exchange-value naturally, this goal ought to be pursued artificially.

This is the gist of Walsh's most influential work, the one that gave him the status of authority on index numbers. However, despite the relevance and elaborateness of *The Measurement of General Exchange-Value*, it is our contention that, considering Walsh's intellectual production as a whole, this book was an accessory to the more important and far-reaching monetary discussions he laid down in *The Fundamental Problem in Monetary Science*. Whereas Walsh's aim in his 1901 book was to discuss the appropriate methods for measuring general exchange-value, *The Fundamental Problem in Monetary Science* aimed at a more primitive purpose: to defend *why* we should strive for money stable in exchange-value in the first place—and not in some other kind of value.

Such a relationship was attested by Walsh himself, in a letter sent to Fisher, in 1934. While complaining that Fisher had not mentioned, in the pre-print of *Stable Money: A History of the Movement*, the fourteenth chapter of *The Measurement of General Exchange-Value* as a reference defending stabilization, Walsh wrote:

That work [*The Measurement of General Exchange-Value*] was written with the avowed purpose of helping to prepare for the (future) introduction of money kept stable in exchange-value. [...] In that work I left the question between the various kinds of value open, but I immediately followed it up in my second book on *The Fundamental Problem in Monetary Science*, where I argued for stability of money in exchange-value – that is, for the stabilization of prices (Walsh to Fisher, September 1, 1934, Irving Fisher Papers).⁸

⁸ Fisher's archives at Yale preserve only one letter sent by Walsh, along with Fisher's reply. The content of these letters indicates that their correspondence exceeded these two pieces.

Walsh's extensive discussion on index numbers in his 1901 book, therefore, was an appendage to his larger purpose of spelling out more profound monetary considerations. He did this especially in *The Fundamental Problem in Monetary Science*,⁹ but also later, in a booklet named *The Four Kinds of Economic Value*, published in 1926.¹⁰

5. THE INDEX-NUMBER THEORIST AT THE SERVICE OF THE MONETARY SCIENTIST

Both in *The Fundamental Problem in Monetary Science* and in *The Four Kinds of Economic Value*, discussions about the theory of value and the stability of prices took on the central stage. In fact, especially in *The Fundamental Problem in Monetary Science*, which represents Walsh's painstaking effort to establish a comprehensive approach to the science of money, his credentials as a *monetary scientist* become clear-cut. A *scientist*, because he considered that economics had "the misfortune of being a moral science, in which self-interest and desire have influence upon the intellect to befog and to distort the perception of truth." He assumed, nonetheless, that "impartial theorizing of disinterested science might bear down and override the fallacies and sophisms of self-interest" (Walsh, 1903, p. 371). Accordingly, Walsh believed that consensus around solid principles was a necessary condition for economics both to evolve as a scientific discipline and to inform policy: "[i]f economics is really to be a science, it must command unanimity of opinion among its adherents, as well as do physics and chemistry and other established sciences" (Walsh, 1903, p. 372). And a *monetary scientist*, because he deemed economics to be too wide a field for anyone to work in the whole discipline. Specialization was, therefore, a necessary feature within the discipline, and, as a consequence, Walsh chose to concentrate his efforts in the issues that related to the science of money (Walsh, 1903, p. 372).

As a monetary scientist, Walsh (1903, p. 28) believed that keeping money stable "is the most fundamental precept which political economy can give to government for its regulation of the monetary system." Accordingly, he deemed that "for the science of money to teach what is good money, it must teach which kind of value it is that money measures and stores" (Walsh, 1903, p. 370). This is precisely the objective he attempted to achieve in *The Fundamental Problem in Monetary Science*, and, later, in *The Four Kinds of Economic Value*. For that reason, the science of money, as a department of economics, simply could not have "value," the discipline's most important technical term, understood ambiguously by economists (Walsh, 1903, p. 27). For Walsh, economists' statements in relation to value were often plain and clear, but seldom consistent with the true nature of value (Walsh, 1903, p. 218). Such ambiguity, the original sin of economics, to which not even Adam Smith and David Ricardo escaped,¹¹ was present in the discipline since its early days as an autonomous field. It represented a fundamental mistake, fatal to the discipline's development (Walsh, 1903, p. 60, 166). As per Walsh, value should have its multiple kinds recognized in order to eliminate the several connotations ascribed to the term "value" alone.

Walsh distinguishes between four kinds of economic value. "Use-value is a thing's power to serve our ends [its total utility]. Esteem-value is its power to make us desire to possess it [its final utility]. Cost-value is its power to impose upon us effort to acquire it [its cost of production]. Exchange-value is its power to procure other things in its place" (Walsh, 1926, p. 15), or, alternatively, "the purchasing power of one thing over another thing or over things in general" (Walsh,

⁹ A similar relationship surfaces when we compare two of Irving Fisher's most important books: *The Making of Index Numbers* (1922) and *The Purchasing Power of Money* (1911), respectively.

¹⁰ It is not clear why Walsh chose to publish *The Four Kinds of Economic Value*. This book does not advance in any direction the argument he had laid down in *The Fundamental Problem in Monetary Science*, which was a much more comprehensive work. All the 1926 book does is offer, in some respects, more clearly stated ideas and concepts. We will rely on these clearer definitions whenever necessary.

¹¹ Walsh dedicated an entire chapter of *The Fundamental Problem in Monetary Science* to the identification of the missteps of Smith and Ricardo in their conception of value (Walsh, 1903, Part II: Chapter II). In *The Four Kinds of Economic Value*, he dedicated a chapter only to Ricardo (Walsh, 1926, Chapter XVII).

1903, p. 6). He relates the problem of defining which of these values money measures and stores with the material progress of mankind. On long periods of stagnation, money could be stable in all four kinds of value, with no conflict whatsoever. With progress, which had never been as rapid as in the hundred and fifty years prior to the publication of *The Fundamental Problem in Monetary Science*, the divergence between the kinds of value becomes more flagrant, money stability in multiple values comes to be paradoxical, and the fundamental problem in monetary science emerges. This is the case because the four values vary differently. This progress is also what had demanded of economics a more scientific mentality. The facts associated with the science of money, thus, could only be appropriately approached if measured and theorized in a rigorous and strict manner (Walsh, 1903, p. 284–286; 1926, Chapter IX, p. 123–124).

In *The Fundamental Problem in Monetary Science*, Walsh (1903, p. 303) claims that it was not his purpose to carry out the argument on behalf of any of the standards. However, carrying out the argument for the stability of money in one of the standards is precisely what he does. Among the four kinds of value identified, Walsh regards exchange-value as the most important kind of value to the science of money, because money is primarily a medium of exchange that interests people mainly for its capacity to be exchanged for other goods (Walsh, 1903, p. 257; 1926, p. 16, 49). So, exchange-value is the very essence of money (Walsh, 1926, p. 18), and the theories of value “are mostly found to be at bottom theories attempting to explain why at any given time and place commodities exchange for one another in certain amounts, that is, why their exchange-values are such as they are” (Walsh, 1903, p. 17). For him, therefore, the relative values that money measures throughout time and space are exchange-values (Walsh, 1903, p. 304).

This does not mean that the others kinds of value should be ignored or have their relevance in economics diminished. Different kinds of value serve different purposes and have definite roles that are not to be overlooked (Walsh, 1903, p. 294; 1926, p. 132). Walsh recognizes, for instance, that the marginalist revolution had proposed a theory of value as esteem-value that represents the “foundation of the modern science of economics” (Walsh, 1903, p. 183). As a matter of fact, he indicates that the exchange-value of a commodity exists only as a consequence of its use-value and esteem-value, because people exchange commodities with each other only insofar as they both deem the commodities useful and esteem the commodities differently (Walsh, 1926, p. 21). Alternatively, Walsh’s theoretical elaboration simply stipulates that exchange-value should be the reference for the science of money in its pursuit of a stable monetary standard.

In this regard, Walsh himself displays a utilitarian dimension in his reasoning, inasmuch as he judges and compares the stability of money in exchange-value with the stability of money in cost-value or esteem-value in relation to their results. For him, stability of money in exchange-value offers better results than its rivals in terms both of distribution of wealth between the different classes of society and of production of wealth by and for society (Walsh, 1903, Part IV: Chapter IV). This is the case insofar as money stable in exchange-value does not discriminate in favor of either debtors or creditors, while money stable in either esteem-value or cost-value does discriminate in favor of creditors, a class identified by Walsh as composed mainly by idle lenders. The latter case would encourage people to retire from active enterprise, retarding industrial progress; the former case, on the other hand, would leave to the workers their gains, encouraging, therefore, laboriousness and the consequent material progress of society (Walsh, 1903, Part IV: Chapter IV; 1926, p. 136–137). Also, stability in exchange-value could—but not necessarily would—be accompanied by a widespread rise in use-value—total utility—and a fall in both esteem-value—final utility—and cost-value. These movements mean that society, demanding less labor from its workers than before, has achieved a higher level of material abundance, something desired by all—whereas stability in any of the other three values would indicate the absence of material improvement (Walsh, 1903, Part IV: Chapter IV; 1926, Chapter X). As such, the conclusion that money should be stable in exchange-value is reached by Walsh (1903, p. 365) from the perspective of the general principle of utility, that is, as the alternative that generates “the greatest happiness of the greatest number.”

In Walsh’s (1903, p. 296) approach, stability of money in exchange-value presupposes one commodity being stable in its purchasing power over other commodities by means of their variations

toward one another, regardless of the causes of their variations. Unlike use-value, esteem-value, and cost-value, the general exchange-values cannot *all* fall simultaneously, because exchange-value is necessarily interrelative—that is, a commodity’s exchange-value is relative to the exchange-values of all other things and any movement upward must necessarily be counterbalanced by at least one movement downward (Walsh, 1926, p. 25, 107–108).

Walsh (1903, p. 11–13; 1926, p. 128) contrasts this commodity standard—or price standard—with the labor standard, represented especially by cost-value and esteem-value. The commodity standard makes reference to the value of money being contrasted with commodities, while the labor standard contrasts the value of money with labor; the commodity standard urges money to be stable in exchange-value, while the labor standard preaches that money should be stable either in cost-value or in esteem-value. As per Walsh (1903, p. 310), money is not comparable with labor, because it is not labor. Alternatively, money is a material item, like commodities, and, as such, is comparable with commodities alone. In other words, he claims that “[a]n exchange is a mutual transfer of two objects. Labor cannot be transferred, but only the result of labor” (Walsh, 1926, p. 7).

Walsh recognizes that the commodity standard is not a perfect standard of exchange-value, especially because it is not possible to account for an article’s variation in exchange-value in every other article (Walsh, 1903, p. 277; 1926, p. 60–61). Nonetheless, it is Walsh’s contention that the other standards present much more debilitating faults. Here he divides the labor standard into a wages standard (of esteem-value) and a cost standard (of cost-value). Walsh’s dismissal of the wages standard relates to the unworkability of several other earnings beyond wages, such as profits, which reduces what should be an earnings standard to a wages standard. Walsh also inputs to the wages standard an additional difficulty generated by the zero wage of the unemployed, which must be accounted for—and has no correspondence in the commodity standard (Walsh, 1903, p. 279–280). Alternatively, against the cost standard, often treated as a standard of production cost, Walsh (1903, p. 280–281) holds that “people in general are not so much interested in the cost of production of an article as they are in its cost of acquisition.”

Furthermore, as per Walsh’s classification (1903, Part III: Chapter III), the commodity standard presupposes exchange-value as a relative measure, to the extent that any variation in the value of money is immediately indicated by a change in the price level in the other direction. In this regard, any general change in the price level can be explained by a relative change in the scarcity of money in contrast with the scarcity of commodities. This idea dictates that in order to keep money stable in ‘value,’ as desired by all, the average level of prices ought to be kept constant (Walsh, 1903, p. 220; 1926, p. 117). He defined such a perception as the “quantity theory of the value of money”, or, simply, the general demand-and-supply theory of value applied to money (Walsh, 1903, p. 252). It is not a coincidence, therefore, that his diagnosis would find echo in Fisher’s most important monetary treatise, *The Purchasing Power of Money*, in which Fisher (1922 [1911], p. 225), quoting Walsh, indicates that exchange-value—as measured by prices—is in fact the reference for monetary stability.

In Walsh’s scheme, therefore, the commodity standard prevails, and money ought to be stable in the prices of commodities, that is, it is the purchasing power of money that should be the benchmark for monetary stability. From this perspective, once again, prices have a special place both theoretically and in practice, and, not by accident, Walsh (1903, p. 222) classifies the commodity standard as price standard as well. For him, the *raison d’être* of prices is the measurement of particular exchange-values (Walsh, 1901, p. 29; 1926, p. 105–106, 110), which he understands as the exchange-value of a commodity in relation to some particular other item (Walsh, 1903, p. 114). As far as money is concerned, “the variations of prices are the reciprocals of the variations of the particular exchange-values of money” (Walsh, 1926, p. 61). Therefore, money informs, in the form of prices, the variation of the particular exchange-value of all other commodities in relation to money itself (Walsh, 1926, p. 60–61). That means that, even though the commodity-standard is an imperfect standard of exchange-value, money offers the necessary data—prices—for the measurement of the variation of its general exchange-value—which is approximately a synthesis of the many existing particular exchange-values

of money. As a consequence, economists, as impartial onlookers, should concentrate their analyses on the exchange-value of money (Walsh, 1926, p. 44, 116). More specifically,

[...] it is only the particular exchange-values of things in money that are always identical, in magnitude, with prices, by definition; and it is only these particular exchange-values of things in money that can accompany their esteem-values (and cost-values) as they fall all together, or on the whole. Then the particular exchange-values of money in the things, the reciprocals of the prices, all rise together, or on the average, which means that the general exchange-value of money rises. In other words, the general exchange-value of money rises if prices accompany the falling esteem-values (or cost-values) of things. If money is to remain stable in general exchange-value, the average of prices must remain stable, some prices rising and others falling as esteem-values vary among themselves in their general fall (Walsh, 1926, p. 110).

Ergo, according to Walsh, even though the different kinds of value must be recognized, it is exchange-value that answers for the kind of value that money measures and stores, and, as such, it is at the stability of exchange-value that we should aim when we discuss the stability of money and the most appropriate monetary standard. In his words:

It is evident that to say the “value” of money is measured or estimated by, and varies inversely with, the general level of prices, or that a general fall of prices is, or constitutes, appreciation of money, and similarly of a rise and of depreciation, and the like, can rightly refer only to the *exchange-value* of money, in its proper sense with reference to commodities alone, or at most with extension to include the so-called price, or wages, of labor (Walsh, 1903, p. 218, emphasis in the original).

Walsh (Part II: Chapter VII) claims that, because of the original sin of the founding fathers of economics, this realization survived barely on the outskirts of the discipline for nearly one hundred years, in the works of such individuals as Joseph Lowe, George Poulett Scrope, Henry James, Patrick James Stirling, and the bimetallists Louis Wolowski, “the founder of the modern theory of bimetallism,” Henri Cernuschi, “the champion of international bimetallism,” and Samuel Dana Horton, “who introduced bimetallic theory in America” (Walsh, 1903, p. 189–190).

In this regard, Walsh (1903, p. 133), revisiting his previous disagreement with the monometallists, charges the advocates of the single gold standard, like Laughlin, as those particularly prone to present inconsistent views regarding the concept of value. According to Walsh, such an inconsistency was due to the monometallists’ attempt to deny both the appreciation of gold and the depreciation of silver occurred in the late nineteenth-century—an attempt doomed to failure, had they recognized exchange-value as the single reference for the stability of the monetary standard.¹² Monometallists chose to attribute the fall of prices to changes in the production cost of commodities, arguing that the value of gold itself remained unchanged. This proposition, for Walsh, was absurd, inasmuch as the very fall of prices evidenced the rise in the purchasing power of gold. So, monometallists often mixed the idea of a commodity standard with the idea of a labor standard (Walsh, 1903, p. 133–146, 297–298; 1926, p. 130–131). A similar confusion may be also found among the bimetallists. However, such a misstep was much less widespread within the latter group than within the former, because almost all bimetallists privileged the commodity standard, with money stable in exchange-value (Walsh, 1903, p. 146, 189, 223, 226, 299).¹³ Walsh (1903, p. 191, emphasis added), then, goes as far as to input a causal relationship between the adherence to bimetallism and the defense of exchange-value as the benchmark for the stability of money:

¹² As per Friedman and Schwartz (1963: Chapters 3 and 4), the US suffered from a secular decline in prices from 1879 to 1897, after which prices rose. Walsh (1926, p. 130) identifies this decline of prices ranging from 1873 to 1896. For him, the downward turn in prices is what triggered the “battle of the standards” (Walsh, 1903, p. 158).

¹³ This does not mean that *no* monometallist recognized exchange-value as the benchmark for money stability. It simply indicates that, for Walsh, the rule among bimetallists was the defense of stability in exchange-value, while the rule among monometallists was to privilege some other kind of value. Some monometallists indicated by Walsh (1903, p. 196–200) as advocates of the stability of money in exchange-value are Arthur Latham Perry, Simon Newcomb, and Karl Knies.

In general it may be said of these [bimetallist] leaders, and also of most of their followers, that they present the appearance of being bimetallists *because* they hold this doctrine about the need of stability of money in exchange-value; while even the best of their militant opponents, so far as they combat this doctrine, give the impression of holding that money should be stable in some other kind of value (they are not particular as to which), *because* they are advocates of the gold standard or of the status quo.

Walsh, as such, goes from the battle of the standards to the science of money and back again. His indirect—though quite clear—predilection for bimetallism, therefore, relates to his defense of money stable in exchange-value. This is the case because, for Walsh, the issue regarding the most appropriate monetary standard—that is, the definition of the specie standard capable of holding prices more stable—is something that could only be tackled once the more primitive discussions regarding the meanings both of “value” and of “stability of money” were settled.

Therefore, for Walsh, the problem at stake, that is, the kind of value that money should measure and store in a stable manner—the fundamental problem in monetary science—was a theoretical problem of untold influence in practical applications (Walsh, 1903, p. 26). As far as he was concerned, it was absurd for individuals who had “never tried seriously to measure the variations of the general exchange-value of money, or to work out the theory of the method for making such measurement, to affirm that the measurement of general exchange-value is impossible” (Walsh, 1903, p. 300). The task undertaken by Walsh in *The Measurement of General of Exchange-Value*—a book that, not by chance, contains the term “exchange-value” in its title—is precisely that of working out the theory of the method for making the measurement of general exchange-value. In fact, as he claimed in his 1934 letter to Fisher, this book was conceived as an introduction to his defense of money stable in exchange-value, an idea he defended especially in *The Fundamental Problem in Monetary Science*, his most sophisticated work in the science of money, but also in *The Four Kinds of Economic Value*. As a matter of fact, this is the work that offers, perhaps, the best summary of his attitude toward the science of money. This summary is present in Walsh’s (1926, p. 138) closing statement to *The Four Kinds of Economic Value*, which reads as follows:

It is perhaps not so much a piece of good luck that the measurement of exchange-value [through index numbers] is now the easiest, as it is a result of the endeavors to make it so, themselves inspired by the belief that this is the kind of value in which money ought to be stable. At all events, the proper purpose of measuring the exchange-value of money is to prepare the way for somehow rendering money stable in this value. But first of all, this value must be cleared of confusion with the other kinds of value.

6. CONCLUDING REMARKS

Walsh’s last significant scholarly contributions came in the 1920s, by means of his presence in the debates regarding Fisher’s ideal formula for index numbers (Walsh, 1921a, 1921b, 1924) and *The Four Kinds of Economic Value* (Walsh, 1926). He would yet publish a last booklet in 1932, attempting to solve Fermat’s Last Theorem using an approach he called the method of recurrence (Walsh, 1932). This essentially mathematical work, however, did not carry any further contributions to the prevailing state of the art in either economics or statistics.

Walsh did not exert an influence on American economics even remotely comparable to Fisher’s. Nonetheless, his discussions on monetary economics resemble and predate Fisher’s in many respects, as both of them published a general book on monetary economics (Walsh in 1903, Fisher in 1911) and a compendium on index numbers (Walsh in 1901, Fisher in 1922). We can only speculate about the reasons behind Walsh’s relatively reduced relevance, but it seems reasonable to assume that the lack of a conventional academic career—as opposed to Fisher, who was a very pervasive figure in American economics—hindered his potential radius of influence. Still, Walsh was a force to be reckoned with in the American monetary debates of the early-twentieth century.

We do not question that *The Measurement of General Exchange-Value* was Walsh's *magnum opus*. This is the book that brought him to the center of the debates and gave him the status of authority on monetary issues. Nevertheless, we cannot lose sight that the book discusses a statistical instrument at the service of his monetary theory. The same is true for Fisher, whose interest in index numbers arose from the problem of measuring the purchasing power of money (Boumans, 2001, p. 323; 2005, p. 158; Dimand, 2019, p. 136–137). It is not a coincidence, therefore, that both Fisher and Walsh, as they strived for scientific purity, saw the measurement of variations in the exchange-value, or purchasing power of money, as the unique purpose of index numbers (cf. Cruz-e-Silva & Almeida, 2020, p. 8–9; Yule, 1921, p. 626).

Accordingly, whereas *The Measurement of General Exchange-Value* is Walsh's *magnum opus*, his archetypical work is *The Fundamental Problem in Monetary Science*. Walsh was not only an index-number theorist, but a fully-fledged monetary scientist. Regarding him simply as an index-number theorist is a reductionism that is no closer to the truth than the classification of Adam Smith as a free-trade theorist, of Thomas Malthus as a demographer, or of Irving Fisher as an index-number theorist as well. In all these cases, just like in Walsh's, the fundamental contributions made by these authors to these fields are part of a much wider whole.

ARCHIVES

Irving Fisher Papers. Manuscripts and Archives. Collection MS 212. Yale University Library, New Haven, United States.

The New York Times. "Correa Moylan Walsh: Writer on Economics and Sociology Studied in Europe." 1936. March 12, 1936, p. 21.

Wesley Mitchell Papers. Columbia University Libraries. Columbia University, New York, United States.

REFERENCES

Aldrich, John. 1992. "Probability and Depreciation: A History of the Stochastic Approach to Index Numbers." *History of Political Economy* 24 (3): 657–687.

Balk, Bert. 2008. *Price and Quantity Index Numbers: Models for Measuring Aggregate Change and Difference*. Cambridge: Cambridge University Press.

Banzhaf, H. Spencer. 2004. "The Form and Function of Price Indexes: A Historical Accounting." *History of Political Economy* 36 (4): 589–616.

Boumans, Marcel. 2001. "Fisher's Instrumental Approach to Index Numbers." *History of Political Economy* 33 (5): 313–344.

_____. 2005. *How Economists Model the World into Numbers*. London, New York: Routledge.

Carver, Thomas. 1919. "Walsh's The Climax of Civilization: Socialism; Feminism." *The Quarterly Journal of Economics* 33 (4): 714–716.

Cruz-e-Silva, Victor, and Felipe Almeida. 2020. "The Making of Index Numbers in the Early 1920s: A Closer Look at the Fisher-Mitchell Debate." *History of Economics Society Virtual Conference*, p. 1–26.

Des Roches, Jérôme, and Rebeca Gomez-Betancourt. 2013. "American Quantity Theorists Prior to Irving Fisher's *The Purchasing Power of Money*." *Journal of the History of Economic Thought* 35 (2): 135–152

Diewert, Erwin. 2013. "Irving Fisher and Index Number Theory." *Journal of the History of Economic Thought* 35 (2): 199–232.

Dimand, Robert. 1998. "The quest for an ideal index: Irving Fisher and *The Making of Index Numbers*." In Malcolm Rutherford, ed., *The economic mind in America: essays in the history of American economics*. London and New York: Routledge, 1998, pp. 128–144.

_____. 2019. *Irving Fisher*. Cham: Palgrave Macmillan.

Edgeworth, Francis Ysidro. 1901. "Mr. Walsh on the Measurement of General Exchange Value." *The Economic Journal* 11 (43): 404–416.

_____. 1923a. "Mr. Correa Walsh on the Calculation of Index-Numbers." *Journal of the Royal Statistical Society* 86 (4): 570–590.

_____. 1923b. "The Doctrine of Index-Numbers According to Mr. Correa Walsh." *The Economic Journal* 33 (131): 343–351.

_____. 1925a. "The Element of Probability in Index Numbers." *Journal of the Royal Statistical Society* 88 (4): 557–575.

_____. 1925b. "The Plurality of Index-Numbers." *The Economic Journal* 35 (139): 379–388.

Fisher, Irving. 1894. "The Mechanics of Bimetallism." *The Economic Journal* 4 (15): 527–537.

_____. 1902. "Review: *The Measurement of General Exchange-Value*. By Correa M. Walsh." *The Yale Review* (11): 109–112.

_____. 1922. *The Making of Index Numbers: A Study of their Varieties, Tests, and Reliability*. Boston and New York: Houghton Mifflin Company.

_____. 1922 [1911]. *The Purchasing Power of Money*. New York: The Macmillan Company.

_____. 1934. *Stable Money: a History of the Movement*. New York: Adelphi Company.

Friedman, Milton. 1990a. "Bimetallism Revisited." *Journal of Economic Perspectives* 4 (4): 85–104.

_____. 1990b. "The Crime of 1873." *Journal of Political Economy* 98 (6): 1159–1194.

Friedman, Milton, and Anna Schwartz. 1963. *A Monetary History of the United States, 1867-1960*. Princeton: Princeton University Press.

Frisch, Ragnar. 1936. "Annual Survey of General Economic Theory: The Problem of Index Numbers." *Econometrica* 4 (1): 1–38.

Gaines, J. M. 1902. "Review: Correa Moylan Walsh, *The Measurement of General Exchange Value*." *Bulletin of the American Mathematical Society* 9 (2): 127–128.

- Gomez-Betancourt, Rebeca, and Jérôme Des Roches. 2013. "Origins and developments of Irving Fisher's compensated dollar plan." *European Journal of the History of Economic Thought* 20 (2): 261–283.
- Greene, E. B. 1916. "The Political Science of John Adams by Correa Moylan Walsh." *The Mississippi Valley Historical Review* 2 (4): 575–576.
- Harvard College. 1884. *Class of 1884*. Cambridge: Harvard University Press.
- _____. 1894. *Class of 1884: Decennial report of the Secretary*. Cambridge: Harvard University Press.
- _____. 1909. *Class of 1884: Twenty-fifth anniversary report of the secretary*. Cambridge: Harvard University Press.
- Hofstadter, Richard. 1956. *The age of reform: from Bryce to F.D.R.* New York: Alfred A. Knopf.
- Kendall, Maurice. 1969. "Studies in the History of Probability and Statistics, XXI. The Early History of Index Numbers." *Review of the International Statistical Institute* 37 (1): 1–12.
- Keynes, John Maynard. 1971 [1930]. "A Treatise on Money." In Elizabeth Johnson, Daniel Moggridge, and Austin Robinson, eds., *The Collected Writings of John Maynard Keynes*, Vol. 5. Cambridge: Cambridge University Press.
- _____. 1983 [1909]. "Index Numbers." In Elizabeth Johnson, Daniel Moggridge, and Austin Robinson, eds., *The Collected Writings of John Maynard Keynes*, Vol. 11. Cambridge: Cambridge University Press, pp. 49–173.
- Laidler, David. 1991. *The Golden Age of the Quantity Theory of Money*. New York: Harvester Wheatsheaf.
- Laughlin, James Laurence. 1895. *The History of Bimetallism in the United States*. New York: D. Appleton and Company.
- Leonard, Thomas. 2016. *Illiberal Reformers: Race, Eugenics and American Economics in the Progressive Era*. Princeton: Princeton University Press.
- Mitchell, Wesley Clair. 1921. *Bureau of Labor Statistics Bulletin 284: Index Numbers of Wholesale Prices in the United States and Foreign Countries*. Washington: Government Printing Office.
- Padan, R. S. 1901. "Review: The Measurement of General Exchange-Value by Correa Moylan Walsh." *Journal of Political Economy* 9 (4): 608–610.
- Richardson, Roland. 1922. "The October Meeting of the American Mathematical Society." *Bulletin of the American Mathematical Society* 28 (3): 89–94.
- Rockoff, Hugh. 1990. "The 'Wizard of Oz' As a Monetary Allegory." *Journal of Political Economy* 98 (4): 739–760.
- Schiller, Ferdinand Canning. 1918. "Review of Correa Moylan Walsh, *The Climax of Civilization; Socialism; and Feminism*." *Eugenics Review* 10 (2): 97–101.

- Schumpeter, Joseph. 1954. *History of Economic Analysis*. New York: Oxford University Press.
- Simiand, F. 1903. "Review." *L'Année Sociologique* 7: 559–569.
- Walker, Francis Amasa. 1896. *International Bimetallism*. New York: Henry Holt and Company.
- Walsh, Correa Moylan. 1896. "Shaw's History of Currency." *Quarterly Journal of Economics* 10 (4): 431–454.
- _____. 1897. "The Steadily Appreciating Standard." *Quarterly Journal of Economics* 11 (3): 280–295.
- _____. 1901. *The Measurement of General Exchange-Value*. New York: The Macmillan Company.
- _____. 1903. *The Fundamental Problem in Monetary Science*. New York: The Macmillan Company.
- _____. 1904. "Kant's Transcendental Idealism and Empirical Realism." *Mind* 13 (49): 54–71.
- _____. 1906. "Franklin and Plato." *The Open Court: A Monthly Magazine* 20 (3): 129–133.
- _____. 1910. *The Doctrine of Creation*. London: T. Fisher Unwin.
- _____. 1915. *The Political Science of John Adams: A Study in the Theory of Mixed Government and the Bicameral System*. New York: G. P. Putnam's Sons.
- _____. 1917a. *The Climax of Civilization*. New York: Sturgis & Walton Company.
- _____. 1917b. *Socialism*. New York: Sturgis & Walton Company.
- _____. 1917c. *Feminism*. New York: Sturgis & Walton Company.
- _____. 1921a. "The Best Form of Index Number: Discussion." *Quarterly Publications of the American Statistical Association* 17 (133): 537–544.
- _____. 1921b. *The Problem of Estimation: A Seventeenth-Century Controversy and Its Bearing on Modern Statistical Questions, Especially Index-Numbers*. London: P.S. King & Son Ltd.
- _____. 1924. "Professor Edgeworth's View on Index-Numbers." *Quarterly Journal of Economics* 38 (3): 500–519.
- _____. 1926. *The Four Kinds of Economic Value*. Cambridge: Harvard University Press.
- _____. 1932. *An Attempted Proof of Fermat's Last Theorem by A New Method*. New York: G. E. Stechert & Co.
- Yule, George Udny. 1921. "Review." *Journal of the Royal Statistical Society* 84 (4): 625–626.