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AMERICAN QUANTITY THEORISTS PRIOR TO IRVING FISHER'S *THE PURCHASING POWER OF MONEY*

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The aim of this paper is to analyze the state of the quantity theory in the United States prior to the publication of Irving Fisher's The Purchasing Power of Money *in 1911. We start by presenting the participants in the monetary debate. Next, we analyze the controversies regarding prices, purchasing power of money, and credit, prior to the Gold Standard Act of 1900, in particular the opposing views of Francis Amasa Walker and James Laurence Laughlin. We then go on to study of the restatement of the quantity theory at the beginning of the twentieth century, through the introduction of credit in the analysis and the statistical tests of the exchange equations. Finally, we study the problems and management of the gold standard, focusing on the elasticity of money supply, the characteristics of the gold exchange standard, and the contrast between the fixed price of gold and its fluctuating purchasing power. We show the improvement of the quantity theory and the new issues that emerged from the rich and original American monetary debate, prior to the publication in 1911 of Fisher's book.*

> The attempts by promoters of unsound money to make an improper use of the quantity theory—as in the first Bryan campaign—led many sound money men to the utter repudiation of the quantity theory. The consequence has been that, especially in America, the quantity theory needs to be reintroduced into general knowledge (Fisher 1911, p. viii).

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I. INTRODUCTON

In the period following the Civil War and before the publication of *The Purchasing Power of Money* (*PPM*) by Irving Fisher, American monetary debates concerned three main problems: first, the instability of the price level (the post-1896 rise in prices following the great deflation); second, the recurrent crises that occurred under the National Banking System (1863–1913) as well as the necessity of a banking reform; and third, the choice of the metallic standard (gold coin standard, bimetallism, gold exchange standard, etc.), which would work best with the development of the American credit system. Before the 1896 election, the Quantity Theory of Money (QTM) was used to support the political position in favor of the bimetallic system, against the demonetization of silver money, and to defend the silver mining interests of the West and the farmers of the Midwest.

In the American monetary debate, we find two groups of economists that Frederick R. Clow (1903) named the *Credit School* and the *Quantity School*, according to whether they supported or were against the QTM; we also find two generations.[1] The first generation was born in the 1830s, 1840s, and 1850s, and mainly consisted of Charles Dunbar (1830–1900), Simon Newcomb (1835–1909), Francis Amasa Walker (1840–1897), William G. Sumner (1840–1910), James Laurence Laughlin (1850–1933), Arthur Hadley (1856–1930), and Jeremiah Jenks (1856–1929). The second generation was comprised of authors born in the 1860s and 1870s, such as Charles Conant (1861–1915), David Kinley (1861–1944), Frank Albert Fetter (1863–1949), Irving Fisher (1867–1947), Wesley Clair Mitchell (1874–1948), Henry Parker Willis (1874–1937), and Edwin Walter Kemmerer (1875–1945).[2] The first generation was influenced by the nineteenth-century British monetary debate, in particular by David Ricardo, Thomas Tooke, John Stuart Mill, and Joseph Shield Nicholson, whereas the second generation was also influenced by the neoclassical school—mainly Stanley Jevons, Alfred Marshall, and Léon Walras—and by their American colleagues themselves.[3]

The first big debate in monetary economics in the US concerned the determining factors of the value of money and the consequences of the demonetization of silver. This started between Walker and Laughlin, before being taken up by their followers. Walker used the quantity theory of money to support his position in favor of free coinage of silver and the bimetallic system, whereas Laughlin disputed the quantity theory and was a sound money advocate and supporter of the gold standard. With the 1896 presidential election and the adoption of the Gold Standard Act in 1900, bimetallists lost the battle and sound money advocates won. The quantity theory was

[1]These economists taught in mainly three places: Boston (MIT, Yale [New Haven], Harvard), Chicago (Chicago University), and New York (Princeton, Columbia), which constitute a "triangle" of academic power. See Mehrling (1997, pp. 31–45), Dimand (2003), and Gomez Betancourt (2008 and 2010a).

[2]Most of the American economists of this generation contributed to the development of the American Economic Association in 1885 and used this institution to relay their ideas. See Tobin (1985, p. 28).

[3]There were also important statistical studies, which helped these American professors of economics to sustain their researches, such as Frank Taussig (1893), David Kinley (1905, 1910), John Pease Norton (1902), D. R. Dewey (1903), A. Piatt Andrew (1905, 1906), Warren Persons (1908), Oliver M. W. Sprague (1910), etc. Some of them benefited from close relations with people who worked in the Bureau of Labor, National Monetary Commission, or with the Comptroller of the Currency, which allowed them access to information for calculating the various indices. On Andrew, see Warren J. Samuels (1980).

weakened. A new generation of quantity theorists worked to re-establish the legitimacy of the theory inherited from Ricardo and improved by Jevons.[4] However, they had to achieve this goal within the American economic context.[5]

A second problem in the American monetary debate was the inelasticity of banknotes issuing and credit grants under the national banking system. Although this debate did not focus primarily on the quantity theory *per se*, quantity theorists such as Dunbar, Sprague, and Kemmerer advocated for, and participated in, banking reform. In this debate, one of the first to restate the QTM was Fisher, who published in 1897 "The Role of Capital in Economic Theory," in which he introduced an equation of exchange including credit. Then, in 1903, Kemmerer disputed Laughlin's theory of prices, expounded the quantity theory in relation to the theory of the market for goods, and performed an empirical test to verify the effectiveness of the QTM for the US in the long term.

The third issue was to manage the gold standard and to implement it in foreign countries connected to the United States that were once under a silver standard regime. The Laughlin School and the pro-gold standard quantity theorists were in agreement concerning the necessity of a fixed price for legal tender money, either gold coins or token and paper monies, but disagreed about the reasons and consequences of its fluctuating purchasing power. Both participated as 'money doctors' who established original gold standard systems, including the gold exchange standard in Manila in 1903 that, according to Fisher, inspired his compensated dollar plan.[6]

Even if certain authors[7] had already worked on the American quantity theorists before Fisher, there are some previous theoretical developments that remain unexplored. Our hypothesis is that all these developments fed Fisher's publication of his *PPM*. Our aim is to analyze the state of the quantity theory and debate prior to the publication of Irving Fisher's *PPM*. In the second section, we analyze the controversies about the value of money before the Gold Standard Act of 1900, in particular the position of Walker and Laughlin. In the third section, we expound Fisher's (1897) and Kemmerer's (1903a) contributions to the QTM. In the fourth section, we study the foundations of sound money, as well as the debate on the gold coin standard and the gold exchange standard in the US. We will conclude with remarks on the originality and richness of the American quantity theory debate prior to the publication of the *PPM* in 1911.

II. CONTROVERSIES REGARDING THE VALUE OF MONEY PRIOR TO THE GOLD STANDARD ACT OF 1900

The Quantity Theory and the Facts

At the end of the nineteenth century, the debate on the quantity theory of money in the United States principally opposed Walker to Laughlin and his students: Sarah McLean

[4]In particular, Gresham's law and index numbers, but also his study of the money market.
[5]See Tobin (1985).
[6]On compensated dollar see: de Boyer and Gomez Betancourt (2013).
[7]See Hegeland (1951), Schumpeter (1954), Patinkin (1956), Tobin (1985), Humphrey (1984, 1993), Laidler (1991), Dimand (2000, 2003), and Gomez Betancourt (2008).

Hardy, Mitchell, and Willis. The protagonists refer to Ricardo (1811, 1816, 1817), Mill (1843, 1848), and Nicholson (1888, 1893). Overall, they recognized the authority of Ricardo and the validity of his bullionist position.[8] In this respect, they are all quantity theorists. The question that opposed them was whether the quantity theory of money would be valid irrespective of the circumstances—the institutional, monetary, and banking context. More specifically, they wanted to know whether the quantity theory of money, which was pertinent in the case of inconvertible money during the Napoleonic wars, would also be relevant for explaining the general level of monetary prices in the United States since the Civil War, and in particular since the reinstatement of the convertibility of banknotes into gold. The Laughlin school denies that this is so: "Lastly, the quantity theory does not explain the facts. Myself once a believer in this Ricardian theory, I was in time led to question its truth because it gave no solution of practical problems of prices" (Laughlin, 1903, p. 326).

The political stakes were the impact of the demonetization of silver metal on the level of prices. Does the "crime of 1873"—the decision to stop minting silver coins—followed by the rejection of free minting of silver at the time that gold minting was reinstated in 1880, explain the great deflation in prices over the period 1873 to 1896? During this controversy, particularly active in 1894–95, on the eve of the 1896 presidential campaign, the quantity theorists explained the great deflation by the contraction of the money outstanding, consecutive to the demonetization of silver, and, logically, pleaded in favor of the reinstatement of the free minting of silver alongside that of gold. Laughlin (1903, p. 281) underlines that "wherever we find discussions in favor of bimetallism, there we shall find the quantity theory of money. In the United States the most ardent supporter both of bimetallism and the quantity theory of money was Francis A. Walker."[9]

According to Walker, who has considerable authority,[10] the quantity theory of money expresses a law of broad scope that cannot be called into question by circumstances that are specific to the USA during the last quarter of the nineteenth century.[11] It is general and valid since it lies within the framework of the universal law of exchange: "Since goods are sold for money and money is exchanged for goods, the advocate of that theory has a right, in the absence of any reason to the contrary, to take it for granted that the universal law of exchange governs here" (Walker 1895, p. 375). The value of money, like that of goods, Walker tells us, is determined by the interplay of

[8]With which they associate Henry Thornton. See Laughlin (1903, pp. 251–253). The latter, along with Walker (1879, p. 256; 1887, p. 436) credit Thornton with the most complete description of banking mechanisms; i.e., with the best banking theory. However, Willis (1896, p. 428) is more skeptical about Ricardo's attitude concerning irredeemable paper currency.

[9]Nicholson (1895, p. 143), quoted by Laughlin, makes the same observation: "Most people, for example, who in recent years have called attention to the appreciation of gold … have argued … that gold is hoarded by governments and banks, that silver has been demonetized, whilst on the other hand the volume of trade or the amount of exchanges to be effected has increased. This explanation really rests on the quantity theory in its simple form."

[10]First president of the American Economic Association from 1886 to 1892, and president of MIT 1881–1897.

[11]In this paper we do not discuss Walker's arguments in favor of bimetallism, which refer to the international adjustments of balance of payment between gold standard and silver standard countries. See Walker (1888, pp. 463–475; 1896).

supply and demand. For a given demand for money, when the supply of money diminishes, as is the case with the demonetization of silver, the value of money increases (monetary prices fall). The same thing happens when the demand for money increases for a given supply of money, or when the demand for money increases more quickly than the supply of money. Walker highlights this in response to an article by Hardy (1895). By referring to the methodology of John Stuart Mill (*Logic*, bk. vi, ch. ix, sec. I), Hardy criticizes Walker's exclusively deductive method of quantity theory, and objects to the necessity of an inductive method: "In order to … determine the degree of validity of the theory in question, there must be an appeal to facts.… Ricardo's statement of the quantity theory is abstract and hypothetical. But deduction is incomplete without inductive verification" (Hardy 1895, p. 151).[12] In so doing, she statistically demonstrates that there is absolutely no correlation between the general level of prices and the quantity of money for the period 1860 to 1891, and concludes that the quantity theory is invalid.

Walker's response (1895) is that we cannot judge the validity of the quantity theory of money without taking into account the demand for money: "According to that theory [the quantity theory] prices do not necessarily rise because the supply of money increases. Prices only rise when the supply of money increases relatively to the demand" (Walker 1895, p. 378). In fact, according to Walker, the fall in prices is the proof that the demand for money has increased more rapidly than the supply of money; a fact that Hardy could not grasp with her inductive method. Furthermore, beyond the methodological controversy,[13] we must elucidate the terms used by Walker as well as his theory because Hardy did not actually test this one. Indeed, not only does Hardy fail to include the demand for money in her test, but she also focuses on the quantity of money—even though the supply of money in Walker's theory is the quantity of money multiplied by its velocity.

Demand for and Supply of Money

According to Walker, following in John Stuart Mill's footsteps, "The value of money, like the value of anything else, is purely a question of demand and supply" (Walker 1888, p. 128). The demand for money is the counterpart of the supply of goods, and the supply of money is the counterpart of the demand for goods. In Walker's terminology, the demand for money is "the occasion for the use of money in effecting exchanges … [I]t is the amount of money-work to be done" (1888, p. 129), whereas the supply of money is "the money-force available to do the money-work required to be done" (p. 131). In order to clarify Walker's demand for, and supply of, money analysis, let us begin with the analysis of supply.

The supply of money "is composed of two factors—the amount of money and the rapidity of circulation" (Walker 1888, p. 131). The amount of money corresponds to

[12]She further explains: "The purpose of the present study is to put deductive law of the relation between the quantity of money and prices to a particular test, and to see how complete the correspondence between fact and theory may be. In this sense, therefore, it may be called inductive, though not inductive in the sense of taking an analysis of facts as a starting point for discovery" (Hardy 1895, p. 152).

[13]Mitchell (1896) argues in favor of Hardy, against Walker. The necessity of the inductive method was to become the core of the North American institutionalist school in the early twentieth century.

current money[14]; it corresponds to the legal tender money—gold coins, gold and silver certificates, token coins, and greenbacks—on the one hand, and to the national banknotes—which are not legal tender—on the other hand. Concerning this aggregate to define the amount of money, we should note that not only do Hardy and Walker agree about this aggregate, but also Mitchell (1896), Kemmerer (1903a), and Fisher (1911). Although Walker did not use any equation, if M stands for the amount of money and V for its rapidity of circulation, $M \cdot V$ can be formulated for the supply of money.

The demand for money is determined by the volume of goods to be exchanged against money, to the exclusion of goods to be bartered. In accordance with Mill's definition, the demand for money is a demand for money to be spent.[15] It increases with the quantity of goods offered for money. However, the "amount of money-work to be done" is not a nominal quantity, but a real one; i.e., the demand for money is the demand for a quantity of purchasing power. If Q stands for the volume of goods to be exchanged with money, and M^d for the nominal amount of money, which circulates the goods, and P for the price level, then the equation $\frac{1}{P} M^d = Q$ can be formulated with respect to the demand for money. Hence, according to Walker, for a given supply of money—i.e., given amounts of money and velocity of its circulation—if the quantity of goods to be exchanged for money increases, the demand for money also increases. Hence, the value of money increases and the price decreases:

> Not the less, however, as we said, is the demand for money a reality. Goods are offered for money; and, with a given supply, the more goods are so offered, the higher will be the value of money—that is, prices will fall. The fewer goods are offered, the higher will be the value of money—that is, prices will fall. (Walker 1888, p. 130)

In algebraic form, the equilibrium in the money-market condition may be formulated by $M^d = M \cdot V$; then, by substituting $M \cdot V$ for M^d in the definition of the demand for money, we obtain $\frac{1}{P} M \cdot V = Q$. For a given value of $M \cdot V$, any increase of Q involves an increase in $\frac{1}{P}$; i.e., a decrease in P. Writing the equation in this way shows us that—despite the fact that Walker's analysis is in accordance with Mill's *Principles*[16]—some inconsistency appears: the demand for money is a real quantity, whereas the supply of money is a nominal quantity; just as the equation $\frac{1}{P} M \cdot V = Q$ does not describe the equality between the demand for, and the supply of, money as these are defined by Walker. However, no author in the debate in question has shed light on this inconsistency, which illustrates the difficulty in the late nineteenth century to define a market for money. Kemmerer's (1903a) definitions of monetary demand and monetary supply will attempt to avoid this inconsistency.

Prices, Purchasing Power and Credit: Laughlin School's Criticism

Mitchell (1896) and Laughlin (1903) dispute Walker's quantity theory with two main arguments. First, while the quantity theory is accurate in the case of inconvertible

[14]For the current money in the US in this period, see de Boyer and Gomez Betancourt (2010).
[15]It is not a demand for money to be held as in Keynesian economics. See Gomez Betancourt (2010a).
[16]See Willis (1896, p. 432).

paper money, it is useless when there is free coinage, convertibility of legal tender money into coins, and a developed banking system that issues convertible banknotes by granting credit. Second, money prices are relative prices between goods and money, where both the value of goods and the value of money are at stake. Therefore, according to these two theorists, it is fallacious to focus on the money side without examining the goods side. The first argument deals with historical monetary context; the second, with price theory.

One central thesis of the quantity theory rests on the significance of seigniorage; that is, the difference that can exist between the value of coined money and the value of the metallic content of coined money. This difference, which is a source of revenue for the State, appears when there is no free coinage; i.e., when coinage is a monopoly of the State, then when the State determines the quantity of money. This kind of coined money is called "token money." The existence of this difference is proof that the value of token (coined) money is not determined by the value of its metallic content, but by another principle: its quantity. This general principle, inherited from Ricardo, is assumed to also be the case for paper money, whether it is convertible or not. "In monetary science, the true entrance to paper money is through seigniorage," writes Walker (1888, p. 152), adding that "this remark of Mr. Ricardo is true and very significant" when writing "The whole charge for paper money may be considered as seigniorage." According to Walker, this quantity principle is of a general character inasmuch as it remains valid for both inconvertible paper money and for convertible paper money. The difference between the two cases does not lie in the principle of the determination of the value of money—since it is determined by the law of supply of and demand for money in both cases —but in the determination of the supply of money. In the case of inconvertibility, the supply is limited by the State, whereas it is limited by "natural causes" in the case of convertibility: "The cost of production [of gold and silver] is only important as affecting supply" (Walker 1888, pp. 128–129).[17] It is through the channel of the quantity of gold supplied that the cost of production matters: "[T]he cost of production of gold only operates on general prices by increasing or diminishing the annual supply, and thus affecting the quantity in use" (Nicholson 1888, p. 70).[18]

The quantity theory, when the coinage of money is monopolized by State, would not be disputed by Laughlin, who was in charge of the monetary reform scheme for San Domingo in 1893–94, where, after adopting the gold standard, new silver token money was coined and maintained convertible at parity with gold through the "limitation of quantity" (Laughlin 1919, p. 227). But Laughlin and his pupils disagree that the quantity theory may be significant for convertible paper money in a free gold coinage regime. In this case, seigniorage disappears by way of arbitrage; i.e., the value of coins and of any kind of paper money convertible to coins is necessarily equal to the production cost of gold. Here, the convertibility rule predominates. If money prices change, this cannot be explained by any principle of limited quantities of money (coins or paper money), therefore by the demonetization of silver, but by changes in the costs of

[17]See also Walker (1879).

[18]In his "reply to Mr. Giffen," Nicholson (1889) writes that "the cost of production operates through the quantity of 'money'; if the cost rises, for example, less is produced annually" (Nicholson 1903, pp. 394–395).

production of gold and or of goods. This is in accordance with Thomas Tooke's *History of Prices* (Willis 1896, p. 429).[19]

According to Laughlin's school, the disagreement regarding the effect of convertibility leads to a questioning of the "price problem" or "price theory."[20] Indeed, for these theorists, the money price of goods is the ratio between the value of goods and the value of gold, each term being influenced by demand and supply. Supply is linked to the costs of production both for goods and for gold. Concerning the demand for goods, which is assumed to govern the level of prices, Laughlin's school refers to Mill,[21] and focuses on the purchasing power that the buyers have in hand. It underlines that the quantity of money is only a minor part of this purchasing power and that we have to include the goods that the buyers owe and can sell. Indeed, supply of goods does not only create a demand for money, it also creates a demand for goods. However, the authors do not have bartering foremost in their minds, but "normal credit"[22]; i.e., "real bills," not "fictitious bills."[23] According to Laughlin and his students, and contrary to Walker, credit is a component of purchasing power in the same way that current money is a component. However, if credit is part of the purchasing power of buyers, the outstanding amount of credit is allied with the monetary price level of the goods the buyers want to sell: "Normal credit is the coinage of goods, or property, into present means of payment (in terms of the standard, e.g., dollars of gold) in amount no greater than the value of the marketable goods, or property, owned by the borrower" (Laughlin 1903, p. 93). Hence, as long as credit is limited to normal credit, it cannot explain the price level; it "does not raise general prices" (1903, p. 98).[24] In short, monetary prices are relative prices between goods and gold that are determined by the law of demand and supply, which do not depend on the quantity of money or credit, but on (the utilities and) costs of production of goods, including gold for monetary and non-monetary uses.

Concerning the effect of credit on prices, it is necessary to distinguish two distinct approaches among the bimetallist quantity theorists. On the one hand, Walker (1879, p. 260), quoting Overstone and Nicholson, separates banking from the issue of paper money,[25] thus separating credit from money. Hence, the law of demand for and supply of money, does not apply with respect to credit; credit has no direct effect on prices. However, insofar as credit is a substitute for money, it has an indirect effect. An increase of credit involves a decrease in the demand for money, therefore involving a fall in the value of money; i.e., an increase in the price level. On the other hand, Nicholson, Elijah Helm (1894), and Willard Fisher (1895)[26] estimate that credit

[19]According to Skaggs (1995, p. 3), Laughlin is influenced by the Banking School, through Charles Dunbar and Henry Dunning Macleod.

[20]Willis (1896, p. 437), Mitchell (1896, p. 153), Laughlin (1903, ch. IX).

[21]"Mill's real contribution to the theory of prices was the idea of purchasing power as the real immediate regulator of prices" (Willis 1896, p. 433).

[22]Laughlin (1903, pp. 87–114; 1919, pp. 11–15, 81–85) distinguishes normal from abnormal credit.

[23]According to Willis, both convertible and inconvertible notes "do not, of course, depend for their value upon the quantity issued, so long as that quantity is within the limits of solvency" (Willis 1896, p. 434). Concerning the link between solvency, bank liquidity and real bills, see de Boyer (2013).

[24]See also Willis (1896, pp. 441 and 447).

[25]Including national banknotes, which were backed by US bonds. See Gomez Betancourt (2010b).

[26]Quoted by Willis (1896, p. 440, fn. 6 and pp. 446–447).

instruments, like money, have a direct effect upon prices. However, they underline that outstanding credit is limited by the bank reserve in legal tender money. Therefore, any increase in the price level directly caused by an increase of credit is ultimately the consequence of a previous increase in the quantity of money.

III. CURRENT MONEY AND QUANTITY THEORY OF MONEY

Kemmerer's Contribution to the Theory of Monetary Prices

The first chapters of Kemmerer's 1903 thesis *Money and Credit Instruments in Their Relation to General Prices*, published in 1907, contains an exposition of the quantity theory that is linked to the determination of the prices of goods. It is developed in accordance with Böhm-Bawerk's subjective price theory (1889),[27] and, at the same time, it challenges the "fallacy of the criticism of the quantity theory expressed" by Laughlin (1903, 1905) and Mitchell (1896).[28] Kemmerer refers to Walker,[29] Newcomb (1886), Walras (1886), and Fisher (1897) in order to explain the determination of the price of horses ("of the same quality") in a money economy.

Kemmerer emphasizes that we must distinguish between the market price and individual prices; i.e., between the objective price and subjective prices. As a first step, he draws a diagram with two series of lines relating the quantity of sellers and buyers according to the price expressed in dollars, the money unit. Seller and buyers are arranged according to their (respective increasing) supply and (decreasing) demand prices for one horse. On the supply side, there is a first seller for $50, a second for $55, a third for $75, a fourth for $85, a fifth for $100, a sixth for $107.50 … an eighth for $130. On the demand side, there is a first buyer for $150, a second for $140, a third for $130, a fourth for $120, a fifth for $110, a sixth for $105 … a tenth for $75. Next, Kemmerer highlights the fact that each of theses prices—which are defined "in accordance with the familiar law of diminishing value" (Kemmerer 1907, p. 16) —is "purely subjective" (Kemmerer 1907, p. 4) ; an individual demand (supply) price, for example $100, means that the buyer [seller] "places a higher [lower] valuation upon the horse than he does upon" (Kemmerer 1907, p. 4) $100. He then underlines that each of these individual subjective prices "does not of itself lead to an exchange, nor make any demand upon the circulating medium." (Kemmerer 1907, p. 4) On the contrary, the market price is objective and creates a demand for money: "A market price, however, is the amount of money paid for a commodity, not the amount asked, offered, or promised" (Kemmerer 1909[30], p. 12, fn. 1).[31] The market price emerges from the bargaining

[27]Kemmerer was following Böhm-Bawerk's example of price determination in a horse market.

[28]See Kemmerer (1907, pp. 12 and 31) and Kemmerer (1903b).

[29]Although Kemmerer is a strong opponent of bimetallism, he writes (pp. 1–2) that the quantity theory of money has been "so ably defended in our own country by the late Francis A. Walker."

[30]In 1909 edition, Kemmerer substitued the exprexion "market price" for "economic price" in 1907 edition.

[31]According to Kemmerer, Laughlin "confuses subjective and objective or market price" in his statement that "The media of exchange come into play after the price-making process, and not as a part of the process. In the main, the media of exchange are a consequence, not a cause, of the influences determining prices" (Laughlin, 1905, quoted by Kemmerer [1907, p. 12, fn. 2]).

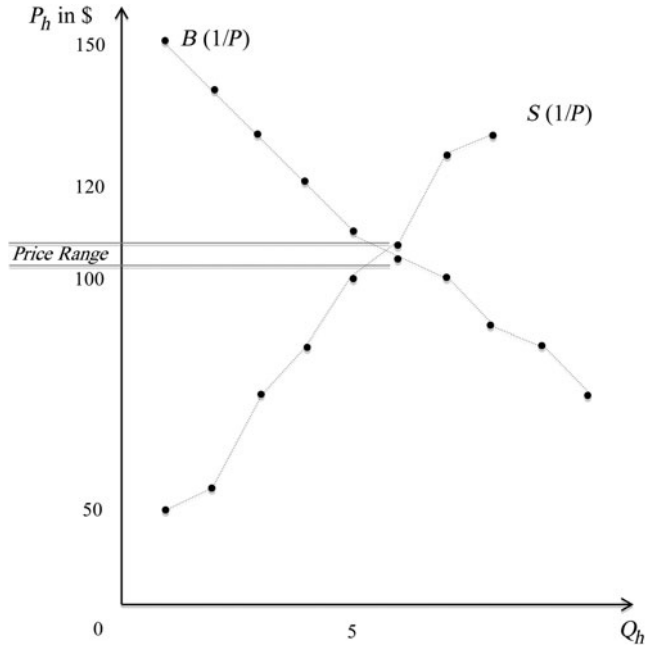

FIGURE 1. Market price of horses (P_h) and general price level (P).

process between buyers and sellers; it is the outcome of their subjective prices. In Kemmerer's example, it will be fixed between $105 ("the price limit of the highest excluded buyer") and $107.50 ("the price limit of the lowest excluded seller") so that five horses will be sold.

Hence, the market price is a money price, which emerges from a bargaining process in which money matters, because the subjective prices involve money. The reason lies in the definition of the subjective money price of any commodity as the "subjective valuation placed upon (the horse) divided by the subjective exchange valuation placed upon the money unit" (Kemmerer 1907, pp. 7–8). However, the subjective valuation of money depends on its "purchasing power over other commodities" (Kemmerer 1907, p. 4, fn. 1). This is the reason why we indicate on the graph the general price level next to the supply of and demand for goods curves; an increase (decrease) of the price level shifts the two curves at the top (bottom), thus increasing (decreasing) the market price of horses.

So, Kemmerer's methodology is radically different from Laughlin's. According to Kemmerer, because market prices of commodities are money prices, the theory of prices cannot be developed without a theory of the purchasing power of money. It is a pity that Patinkin (1956) did not comment on this contribution from Kemmerer, which sheds light on the following passage from Fisher's book (1911, pp. 174–175):

> Those who place such implicit reliance on the competency of supply and demand to fix prices, irrespective of the quantity of money, deposits, velocity, and trade, will have their confidence rudely shaken if they will follow the reasoning as to

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> price causation of separate articles. They will find that there are always just one too few equations to determine the unknown quantities involved. The equation of exchange is needed in each case to supplement the equations of supply and demand.[32]

In Kemmerer's book, the prices of goods are not accounting prices according to Patinkin's (1956) and Debreu's (1959) definitions: they are money prices. Although in Fisher's thesis (1892), prices of goods are accounting prices, they appear to be money prices in Fisher (1911), following Kemmerer.

Monetary Demand, Credit and Price Formula

The sale of five horses at approximately \$106 creates a monetary demand of \$530. If there are n different goods, Q_i is the quantity of the good i to be exchanged, and P_i is its monetary price, the sum of the sales creates the monetary demand:

$$\text{Monetary demand}: \sum_{i=1}^{n} P_i \cdot Q_i \left(P_i, P\right) \equiv P \cdot Q$$

Next, Kemmerer formulates the condition of equilibrium between monetary demand and monetary supply:

$$P \cdot Q = M \cdot V$$

which gives the price formula:

$$P = \frac{M \cdot V}{Q}$$

Without this price formula, prices cannot be determined. Indeed, each of the n equilibrium equations for n goods has two unknowns: the monetary price P_i of the good in question and the price level P. Therefore, we have n+1 unknowns for n equations. Without the price formula, one equation is missing.

However, this formula—which is valid in a hypothetical society, in which the sole medium of exchange is money[33]—could not be tested because it does not represent the actual business world of that time, in which exchanges were performed largely through credit instruments. Kemmerer's objective is to test a price formula that remains valid within the real economy, which includes two means of circulation: current money, and deposits (or circulating credit). He drew his inspiration from Newcomb (1886, pp. 322–328), Hadley (1896, p. 197) and Fisher (1897, p. 517), who introduced an exchange equation for a real economy with credit.

According to Fisher (1897, p. 516), Kemmerer (1903a, pp. 50–51), and Kinley (1905, p. 86) there are three commodities: goods, money, and credit. There are also six possible types of exchange, three for each commodity and vice versa—goods against

[32]Note that Fisher (1911) refers to Fisher (1892) but not to Kemmerer (1907, 1909) on this topic. Fisher refers to Kemmerer (1905, 1907, 1909), but for his contributions to statistical studies and gold exchange standard. On his side, although Kemmerer (1903a, 1907) quotes Fisher (1894, 1897), he does not quote Fisher (1892).

[33]This method was severely criticized by Foville (1896) and Conant (1904). See Kemmerer (1907, pp. 9–10 and 19–28).

goods (barter), money against money, or credit against credit—and three between each commodity—money against credit (studied by the banking theory), goods against money, and goods against credit. These last two types of exchange are the ones with which modern quantity theorists are concerned. Fisher (1897) was the first to mathematically formulate the equation in the form we still use today.[34] We retain the nomenclature of the *PPM* and we obtain $P = \frac{M \cdot V + M' \cdot V'}{Q}$.

In other words, the level of prices (P) depends on five variables: the volume of money in circulation (M), its velocity of circulation (V), the volume of bank deposits subject to check (M'), its velocity (V'), and the volume of trade (Q). This was the equation that Kemmerer (1903a) tested in order to empirically verify the validity of the QTM.[35]

Kemmerer's test results allowed him to conclude that the QTM is verified for the full period (1879 to 1901),[36] except for some unusual years where there was business distrust[37]; that is, a difference between the direct level of prices of the economy and the indirect or calculated price with the price formula.[38] According to Kemmerer, business confidence can modify the relationship between the quantity of money and the quantity of bank reserves. Business confidence has a positive effect on the circulation of checks (M') and a negative mathematical effect on bank reserves. Consequently, if business confidence increases, the circulation of checks increases more rapidly than the circulation of money (M) and the amount of bank reserves decreases. If, on the contrary, business confidence decreases, "cash payments become more frequent, and a much larger reserve is required to support an even smaller credit structure" (Kemmerer 1903a, p. 57).

One of the reasons for Fisher (1897) and Kemmerer (1903a) to separate the various components of the monetary supply (coin, paper money, demand deposits) on the quantity theory was because each one has its own rapidity of circulation. Nevertheless, the velocities of circulation of money and deposits were assumed to be constants in Kemmerer's test, whereas in reality these are variables.

Between Kemmerer's thesis in 1903 and Fisher's book in 1911, the debate on the quantity theory persisted in the US. Warren M. Persons (1908) criticized Kemmerer's

[34]Before Irving Fisher (1897), some English (John Briscoe, Henry Lloyd, Samuel Turner, and Sir John Lubbock), German (Claus Kroncke, Joseph Lang, K. Rau, and W. Roscher), Italian (P. Frisi, L. Cagnazzi, and M. Pantaleoni), French (E. Levasseur and L. Walras), and American (Newcomb, Hadley) writers had already introduced quantity equations to express the relationship between money and prices. See Schumpeter (1954), Humphrey (1984), and Laidler (1991).

[35]Kemmerer searched for the statistical data to allow him to create an index for each of the five variables in the equation: M, V, M', V', and Q. We find most of Kemmerer's 1907 results in Chapter 12 of Fisher (1911).

[36]In his PhD thesis (1903a), Kemmerer studied the period 1879 to 1901, then, with the first publication of his book (1907), he studied the period 1879 to 1904, and, finally, in the 1909 edition, the period 1879 to 1908.

[37]See Humphrey (1993, p. 14): "E. W. Kemmerer's 1907 attempt to verify the Thornton-Marshall hypothesis that velocity varies directly with the state of business confidence. Not the least of Kemmerer's achievements was his construction, from data on business failure rates and the dollar liabilities of failed firms, of an index of business distrust. Movements of the index, he thought, accounted for corresponding movements in velocity." See also Gomez Betancourt (2010a).

[38]J. M. Keynes (1911, p. 379) showed admiration for the American statistics: "For the calculation … statistics seem to exist (to which there is nothing corresponding in England)."

(1907) test and results. According to him, Kemmerer's calculations were poor and his test was wrong; hence, we cannot consider that the QTM is valid. Although Kemmerer did not respond to Persons' attack, Fisher defended him in 1911. Fisher thought it was necessary to go deeper into the analysis of the velocity of circulation than Pierre des Essars' (1895), Kinley's (1904, 1905, 1910), and Kemmerer's studies, in order to advance the understanding of this notion. In 1909, Fisher proposed a method for estimating the velocity of circulation of money, which was to appear again in the appendix of chapter 12 of the *PPM*. This culminated in a discussion about the definition and measure of M'. In Kemmerer's tests, M' was a variable from the clearing houses, although Fisher was to substitute this variable with the outstanding deposits. Kinley (1910) provided new estimations for checks transactions, which allowed Fisher to improve his QT test in 1911.

IV. ELASTICITY OF MONETARY SUPPLY, OF CREDIT, AND MANAGING GOLD STANDARD REGIMES

Unlike the American quantity theorists of the last quarter of the nineteenth century, who wanted the free minting of silver to be reinstated, those of the early 1900s were partisans of the gold standard. Following Laughlin, who advocated sound money, they were in favor of both the free and charge-free minting of gold metal only, at fixed price, and of the convertibility of "paper money" into gold, whether it was the greenbacks issued by the Treasury or the National banknotes issued by the banks. Beyond the fundamental disagreement concerning the pertinence of the quantity theory, there are several points of convergence between the new generation of quantity theorists[39] and Laughlin's school. First, there is the participation in diplomatic missions to establish the gold standard, with silver token money, in the countries that had entered the orbit of the USA under the Monroe Doctrine, whether they were independent like Santo Domingo (Laughlin) or colonies like the Philippines (Conant, Jenks, Kemmerer). Second, concerning the USA, the authors concur in their explanation of the depreciation of greenbacks issued during the civil war,[40] owing to the risk that these would not be reimbursed by the Union, but also in the analysis of the strengths and weaknesses of the National Banking System,[41] or concerning the necessity of there being an exact equivalency between the character and the amount that is borrowed and that which is reimbursed, in any loan agreement. These authors agree on the necessity of a fixed price of "legal tender"—an objective that could not be attained in a bimetallic standard regime, at a time when the price of silver metal collapsed on world markets. Finally, we should mention that, even if their respective analyses of the phenomenon opposes them, the two groups of authors agree in recognizing the fact that while the price of legal tender is fixed, its purchasing power is not. The writings of Dunbar (1904), Laughlin (1903), Conant (1909), Kemmerer (1904, 1905, 1906), Sprague (1910), and Taussig (1911, 1917) are worth consulting with respect to these issues.

[39]The American quantity theorists, contemporaries to Irving Fisher, never constituted a unified school of thought.
[40]See Walker (1888).
[41]See de Boyer and Gomez Betancourt (2010).

The price formula allows the new generation of quantity theorists to improve their analysis. While Laughlin explains the fall in the price level during the last quarter of the nineteenth century by the respective evolutions in the costs of production of goods and of gold, the new quantity theorists refer to the respective evolutions of monetary demand and monetary supply, which they are able to quantify. In this case, the fall in prices at the end of the century can be explained by a supply of money that increased less rapidly than the demand for money.

The new quantity theory took into account the costs of gold production, as well as all the variables of the price formula. Any variation in the volume of the transactions, affecting monetary demand that is not accompanied by a proportional variation of outstanding amounts of money (M) and credit instruments (M'), translates by a variation in the general level of prices. The extent of the latter also depends on potential changes in the velocities of circulation (V and V'). Therefore, the quantity theory is valid on the condition that "all things are equal." These conditions include the stability of legal tender, that of price expectations as well as the state of business confidence. Moreover, beyond the explanation of the price level by the proportional increase of M and M', the new quantity theory focuses on the flexibility of the supply of money (M) and of credit (M'), along with growth. The flexibility of the supply of money reflects, on one hand, the mechanisms of free minting in gold coin standard and controlled minting in gold exchange standard, and, on the other hand, along with the flexibility of credit, reflects the organization of the banking system.[42] For the purposes of this article, we are restricting ourselves to an analysis of the two different regimes of the gold standard managed by the USA at the start of the twentieth century.

The gold coin standard is the gold standard regime in force within the USA. The Mint receives the gold and mints coins free of charge, at $20.67 per once. The result is that there is flexibility of the supply of money via two channels: the production of gold, and the balance of payments. The first channel results from the fact that the fall in the general price level provokes a fall in the cost of production of gold, which contrasts with the stability of its price at the Mint. This results in an increase in gold production, then its minting. The second channel results from the fact that the general fall in the price level has a favorable effect on the balance of trade, thus on the exchange rate of the dollar. If the rise in the exchange rate attains the gold import point, the gold is imported, then sent to the Mint.[43] These two channels provide flexibility for the supply of coins, which is, however, imperfect. First, it takes time; second, it is constrained by the decreasing returns in the production of gold[44] and the impact of capital movements on the balance of payments.[45] This limit to the flexibility of the supply of money under the gold coin standard regime contributes to the instability of

[42]See Gomez Betancourt (2010b).

[43]All the US authors of this era think that Ricardo and his heirs developed the gold points mechanism. In fact, it was not until the work of Taussig (1917) and his students that it became known that this theory had been developed by Thornton, and that it had been rejected by Ricardo in favor of Hume's price-specie flow mechanism. Cf. Viner (1923), de Boyer (2007), and Sember (2010).

[44]However, owing to the decreasing output in the extraction of precious metals, the new production ceased before the general level of prices had reached its initial level.

[45]The flexibility of the importation of gold due to capital movements was glaringly obvious during the NBS crises. See Sprague (1910).

the money's purchasing power. Under the gold coin standard regime, the price of gold is fixed, but its value is not; hence, the purchasing power of money is variable.

Owing to the adoption of the gold standard by the great powers, the latter were led to manage and organize the transition towards the gold standard of the countries within their fold that were using the silver standard. In this respect, it is important to note the influence of English debates regarding the Indian monetary question on the American economists—clearly, Marshall's ideas on token money,[46] but also, and especially, Alexander Martin Lindsay (1844–1906). The reform of the Indian gold standard proposed by Lindsay influenced the Conant–Jenks–Kemmerer mission to the Philippines, which resulted in the establishment of the first real gold exchange standard in history.[47] Kemmerer's articles (1904, 1905) set out its principle: alongside the controlled minting by the government of a token money—the silver peso, defined by a gold weight worth $0.50 US—which constituted the legal tender, a Gold Standard Fund was created. This fund was financed by a loan in dollars granted by New York banks and guaranteed by the American Treasury. The Gold Standard Fund intervened on the exchange market as soon as the exchange rates of the peso departed from the official rate of the silver peso of an amount equal to the costs of transfer of gold between Manila and New York. When the exchange rate of the silver peso fell to the gold export point, the fund bought pesos and sold dollars; conversely, it bought dollars and sold pesos when the exchange rate of the silver peso attained the gold import point. This innovation in the management of the gold standard supposes a perfect mastery of the gold points mechanism. It teaches us that a country can succeed in fixing the price of gold in legal tender that does not contain gold.[48]

From a Ricardian perspective, this means that the buying and selling of silver pesos on the exchange market provides the quantity mechanism that aligns the purchasing power of the silver peso to that of the US dollar. This does not necessarily mean that the latter is stable; while the prices of gold in dollars and in pesos are fixed, the purchasing power of gold varies in Manila and in New York.

The flexibility—even an imperfect flexibility—of the supply of money in the gold coin standard and in the gold exchange standard is organized and managed in the USA in such a way that it ensures the stability of the price of gold, to the detriment of the stability of its purchasing power. Fisher (1911), who would treat this question as the central problematic of his book, stated that the gold exchange standard inspired him for his compensated dollar plan, which consisted of abandoning the fixed price of gold in order to stabilize its value; i.e., its purchasing power.

V. CONCLUSION

Fisher's publication in 1911 of *The Purchasing Power of Money* certainly did not take place in a theoretical desert. At the end of the nineteenth century, the quantity theory was panned by Laughlin and his students, yet it experienced a revival in the early

[46]Kemmerer (1907, p. 33, fn. 4) quotes Marshall (1897): "Since the mints were closed, the currency of India has consisted of government notes printed on silver."

[47]Lindsay is quoted by Kemmerer (1905) and by Gomez Betancourt (2008 and 2009).

[48]This is different from the convertibility of a token money in a gold standard regime.

1900s. While Walker had been criticized for not having succeeded in accounting for the facts, the works of Kemmerer and Kinley reconcile these facts with an enriched quantity theory that integrated credit. While Laughlin criticized Walker for his theory of prices—which examined only the monetary side of prices—and proposed an opposing theory that focused on the real aspects of prices, the works of Fisher and Kemmerer integrate the quantity theory to the theory of goods market. The new quantity theory rejects bimetallism and highlights the interdependency of all the variables present in the equation, as well as the factors of confidence and anticipations at work. Furthermore, it deals with questions relating to the flexibility of the supply of legal tender according to the various gold standard regimes, as well as the flexibility of credit. Finally, even though they are mistaken concerning the Ricardian tradition on the subject of the gold points mechanism, our American authors master this mechanism and understand that a fixed price for gold does not signify the stability of its purchasing power.

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