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Alfred Marshall and the Quantity Theory of Money

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Alfred Marshall and the Quantity Theory of Money[1]

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Abstract

Marshall made at least four contributions to the classical quantity theory. He endowed it with his Cambridge cash-balance money-supply-and-demand framework to explain how the nominal money supply relative to real money demand determines the price level. He combined it with the assumption of purchasing power parity to explain (i) the international distribution of world money under metallic standards and fixed exchange rates, and (ii) exchange rate determination under floating rates and inconvertible paper currencies. He paired it with the idea of money wage and/or interest rate stickiness in the face of price level changes to explain how money-stock fluctuations produce corresponding business-cycle oscillations in output and employment. He applied it to alternative policy regimes and monetary standards to determine their respective capabilities of delivering price-level and macroeconomic stability. In his hands the theory proved to be a powerful and flexible analytical tool.

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Quantity theory, Cambridge cash balance approach, monetary neutrality and nonneutrality, direct causality, exogeneity, purchasing power parity, symmetallism, indexation, managed paper currency, price-level stability.

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Alfred Marshall and the Quantity Theory of Money

In his *Fabricating the Keynesian Revolution*, David Laidler (1999, 79-80n) notes that Alfred Marshall never claimed to be a quantity theorist. To Marshall the quantity theory meant Irving Fisher's rate of use or circulation velocity version in which velocity-augmented stocks of money per unit of real transactions determine price levels. While acknowledging that his own Cambridge cash balance approach yielded predictions similar to Fisher's version, Marshall always distinguished between the two and denied, at least implicitly, that his was a variant of the quantity theory. With all due respect to Marshall, however, an impartial observer must rule that he was a quantity theorist par excellence, his claims to the contrary notwithstanding. His writings reveal that he made heavy use of the theory, which he derived from earlier British economists. In his hands the theory became a powerful and subtle analytical tool.

Modern students know the quantity theory as the proposition that an exogenously given one-time change in the stock of money has no lasting effect on real variables, but leads ultimately to a proportionate change in the money price of goods. As we will see, Marshall would have accepted this proposition, although he also would have observed that it hardly does justice to the versatility and power of his particular theory of price-level determination. His theory, he would have claimed, was more flexible and nuanced than that defined above.

Money Supply and Demand Framework

Already in his early (1871) manuscript *Money,* as well as in his 1879 book *Economics of Industry* (coauthored with his wife), and in his later monetary writings, Marshall gave the quantity theory, as inherited from his classical predecessors, its distinctive Cambridge cash-balance formulation. In so doing, he accomplished two tasks. First, he expressed the theory rigorously in a microeconomic demand-and-supply framework, thus establishing the monetary theory of price-level determination as part of the general theory of value. Second, he adopted, coordinated, clarified, refined, extended, and qualified what quantity theorists Locke, Hume, Cantillon, Ricardo, Thornton, Wheatley, Jevons, and others had stated before him, namely the five core propositions absolutely essential to the theory. These referred to (1) equiproportionality of money and prices, (2) money-to-price causality, (3) long-run neutrality and short-run non-neutrality of money, (4) money-stock exogeneity, and (5) relative price/absolute price dichotomy attributing equilibrium relative price movements to real causes and absolute price movements to monetary causes, respectively.

Marshall articulated and amended these propositions with the aid of his money supply and demand framework**,** the main elements of which he inherited from Petty, Thornton, Ricardo, Senior, J. S. Mill, Bagehot, Giffen, Jevons, and other predecessors and contemporaries (Eshag 1963, 13-18). That framework states that in monetary

equilibrium when nominal money demand-and-supply equality ($M_d = M$) prevails, the price level is determined by the nominal stock of money per unit of real money demand, or $P = M/D$. Here P is the aggregate price of currently produced final goods and services, M is the nominal money stock defined by Marshall as metallic coin and banknotes freely convertible into the metal at a fixed price, and D is the public's demand for real, or price-deflated nominal, cash balances M/P -- this demand interpreted as a function of cashholder real resources, variously identified by Marshall as income and/or wealth. Employing the portfolio balance assumption that agents make their cash-holding decisions by weighting the advantages of keeping their resources in cash form against the costs of doing so, namely the benefits sacrificed by refraining from holding those resources in non-cash forms, Marshall (1923, 227-8; 1926, 267-8) in some of his later work tended to suppress the wealth variable and to express real money demand as the fraction K of real national income Y that the public wishes to hold in real balances, or $D(Y) = KY$.

Of the public's desired cash-balance ratio K, Marshall (1923, 38-40, 43-8) specified at least eight sets of variables determining it. These included (1) the marginal utility of holding money for the convenience and security it yields, (2) the corresponding marginal utility ("direct benefit") of holding one's resources in the form of goods rather than money, (3) expected rates of return to holding earning assets such as business plant and stock-exchange securities, (4) inflationary expectations regarding the prospective value ("credit") of the currency, (5) bank credit instruments in the form of banknotes and checking deposits that substitute for money in asset portfolios and the payments mechanism, (6) institutional factors such as business habits and practices, banking arrangements, methods of transportation, and techniques of production, (7) degree of confidence in the strength of the economy and the associated ease of meeting payment commitments, and (8) unforeseen shocks in the form of wars, rumors of war, crop failures and the like. Summarizing these determinants by the vector of variables Z, one can write Marshall's cash-balance fraction as $K = K(Z)$. Of the variables composing Z, items (1) and (8) enter with positive signs indicating that rises in their values exert upward pressure on K. Conversely, increases in the magnitudes of variables (2) through (7) tend to cause K to fall.

Equiproportionality

All the fundamental classical quantity theory propositions follow from Marshall's formulation. Regarding equiproportionality of money and prices, he (1926, 268) writes that "other things being equal," then "there is this direct relation between the volume of currency and the level of prices, that, if one is increased by ten per cent, the other also will be increased by ten per cent." The proviso "other things being equal," however, he regarded as "of overwhelming importance." He realized that proportionality holds only for the ceteris paribus thought experiment in which the price equation's other components, namely income and the K ratio (and its underlying determinants), provisionally are held fixed. In actual historical time, however, these components evolve secularly just as they interact with each other over the business cycle. In these cases, proportionality refers to the *partial* effect of money on prices. To this partial effect must

be added the parallel effects of coincidental changes in income and the *K* ratio. The sum of these separate effects shows the influence of all on the price level.

Thus if *M*, *Y*, and *K* evolve secularly at the percentage rates of change denoted by the lower case letters *m*, *y*, and *k*, respectively, then the price level *P* evolves at the percentage rate $p = m - k - y$. Of these separate elements, Marshall (1923, 19; 1926, 12, 54) thought that income growth and financial innovation, namely the development of credit arrangements and money substitutes – the last two items causing falls in the cash-balance ratio -- dominated money growth in determining the long-term path of the price level. Likewise, he (1926, 269) argued that over the course of the cycle, changing expectations of both the future value of the currency and the strength or weakness of real activity affect the cash-balance ratio and thus the price level even if the money stock remains unchanged.

Long-run Neutrality

Marshall was equally adamant on the neutrality of money other than during short-run adjustment periods. Regarding long-run neutrality, he argued that currency expansion or contraction has no permanent effect on real activity since the latter depends solely upon real factors such as production techniques; organization of business; the quantity and quality of labor, land, and capital; the social and political security of the citizenry; and the like (Eshag 1963, 72-3) The long-run independence of these real variables from money means that money cannot affect them or the levels of output and employment they determine. Money is neutral with respect to the volume of real activity in the long run.

Short-run Non-neutrality

Money and the quantity of bank-credit substitutes erected thereupon can, however, influence real activity temporarily. Indeed the classical, or Hume-Thornton-Cairnes-Jevons, proposition regarding the short-run non-neutrality of money posits that very point. Marshall (1887, 190-2) in his theory of the business cycle attributes such non-neutrality to sticky nominal wage and interest rates (see Laidler 1999, 79, 82). Because nominal wages are sluggish and slow to adjust, price-level changes transform them into cycle-amplifying variations in real wages. Likewise, price level changes transform sticky nominal interest rates into cycle-amplifying movements in real rates of interest (Marshall 1887, 191; 1923, 18; Laidler 1999, 82-3; Eshag 1963, 81).

Thus in the upswing when rising prices (fueled by credit expansion as banks accommodate business loan demands) are not matched by compensating rises in sticky nominal wage and interest rates, the resulting fall in the real, or price-deflated, values of those rates causes real profits to rise. Spurred by rising real profits, businessmen expand their operations. Output and employment rise. These same factors work in reverse in the downswing when the failure of sluggish money wage and interest rates to fall as fast as prices causes real rates to rise, real profits to fall, and real activity to slacken. In short, money- and credit-financed fluctuations in prices translate sticky wage and interest rates into cycle-intensifying variations in real rates, thus affecting real activity.

Money to Price Causality

As for unidirectional *M* to *P* causality in open trading economies, Marshall (1926, 51-2; 1923, 256) explains it by tracing the transmission mechanism through which an influx of gold through the balance of payment works in a fractional reserve banking system to drive up prices. His statement to the 1888-9 Gold and Silver Commission offered an early account (and still one of the best) of that mechanism. Drawing on work of Thornton, Mill, and especially Giffen, Marshall's account anticipates Knut Wicksell's famous 1898 theory of the cumulative process in virtually every detail.

Marshall (1926, 51-2; 1923, 256) starts his analysis by assuming a specie inflow occurs through the balance of payments. The recipients of the specie deposit it in their bank accounts. Bankers, desiring to hold a certain fraction of their note and deposit liabilities in the form of metallic reserves, find the extra specie raises their gold reserve above the level they wish to hold. The resulting pressure of excess reserves induces them to lower their loan rates of interest, which fall below businessmen's expected rate of profit on new capital investment. With the borrowing cost of capital less than capital's expected rate of return, investment becomes profitable. Consequently business demands for bank loans to finance such investment increase. Banks accommodate these loan demands by supplying additional checking deposits and notes, which in the fractional-reserve banking system constitute a multiple of the gold reserves backing them. Flush with such augmented purchasing power, businessmen increase their spending. The resulting excess demand for goods bids up prices.

At this point Marshall introduces a new element, inflationary expectations, into the mechanism. He (1926, 51-2) notes that throughout the expansionary process such expectations work to augment the upward pressure on prices emanating from note and deposit expansion alone. Initially aroused by the gold inflow, entrepreneurs' anticipations of future inflation are realized and intensified by the subsequent rise in prices. Factored into the real loan rate of interest when the sticky nominal rate is temporarily given and fixed, these expectations act to reduce the real loan rate below the anticipated real rate of profit on the use of the borrowed funds. This real rate/profit rate differential stimulates additional borrowing, additional lending, additional deposit creation, and additional aggregate demand leading to additional upward pressure on prices. Through these interest rate and expectational channels, causation runs from gold inflow *M* to general prices *P* as predicted by the quantity theory.

Marshall (1926, 51) then invokes stability analysis to assure that the extra gold actually gets into circulation so that money held by the non-bank public moves proportionally with, and so supports, the higher level of prices as required by the theory. He argues that as prices rise, people accustomed to holding a certain amount of real balances *M/P* will find those balances shrinking. To restore their real balances to the accustomed level, people convert demand deposits and notes into gold coin at the banks. The result is a drain on bank gold reserves that threatens to deplete them below the level banks desire to hold. To protect their reserves, banks raise their lending rates so that extra borrowing and spending are no longer profitable. In the new equilibrium, the extra

monetary gold held outside the banks just matches the higher prices such that real cash balances are exactly what they were before the gold inflow. At that point, money/price equiproportionality reigns and there is no loan rate/profit rate differential to induce expansionary borrowing and spending. Monetary equilibrium prevails.

In sum, with respect to open trading economies Marshall posits direct causality and rejects reverse causality. He argues that gold, far from flowing passively across countries to support given equilibrium price levels, distributes itself actively to correct disequilibrium ones. Suppose a gold discovery in a gold-producing nation increases the equilibrium world price level. Because the new gold has not yet been distributed worldwide, however, prices in non-gold-producing countries are below their equilibrium level. These too-low local prices will, by rendering their countries' goods cheap on world markets, generate trade-balance surpluses financed by monetary gold movements. The resulting gold influx will, in Marshall's account of the transmission mechanism described above, bid local prices up to their equilibrium level. In this way, open economies find their money stocks exogenously determined through the balance of payments and causality runs from money to prices.

Absolute Price/Relative Price Dichotomy

The remaining classical propositions follow directly from Marshall's analysis. Regarding the relative price/absolute price dichotomy – more an axiom than a result since it implies that real long-period equilibrium is unique in that it yields but one set of relative prices whatever the monetary arrangements -- he argues that real factors permanently determine relative prices and monetary factors determine absolute prices, both of which are therefore independent of each other in steady-state equilibrium. While accepting dichotomization, however, he did not necessarily accept, nor was he even cognizant of, its uniqueness implication. After all, it was Marshall who, avoiding the presumption of a unique, single equilibrium, introduced multiple equilibria into his partial analysis and into his pure theory of foreign trade. Furthermore there is evidence of a concern with path-dependent (hysteresis) mechanisms in his discussion of the process of economic development in Appendix H of the *Principles*. All of which renders conjectural the notion that he saw uniqueness as an essential or even a plausible property of steady-state equilibrium. Nevertheless, when it came to separating relative and absolute price determination into separate, watertight departments, he gave what David Laidler (1990, 48) calls his "unequivocal endorsement to the Classical dichotomy between the real and the monetary economy."

As a representative example of a relative price, Marshall cites the equilibrium real interest rate. Determined in the long run by the nonmonetary forces of productivity and thrift, or more precisely by the demand for and supply of real investible resources (Eshag 1963, 46), the real rate's movements, when matched in equilibrium with corresponding movements in loan rates so that bank credit and aggregate spending remain unchanged, cannot affect the price level. Nor can changes in the absolute price level caused by changes in the quantity of money alter the real equilibrium interest rate. "The supply of gold," Marshall (1926, 41) writes, "exercises no permanent influence over" it. Relative

and absolute prices are independent of each other in long-run equilibrium. Marshall admits but one possible exception to this rule: the real wage rate. A slight degree of long-run stickiness of nominal wages means that the absolute price level can permanently affect the real wage rate (Laidler 1991, 97).

Exogeneity

Finally, with respect to exogeneity of money, Marshall draws on page 282 of his *Money, Credit and Commerce* a money-supply-and-demand diagram that depicts the money supply of a closed economy as a vertical straight line. He notes that this line, as drawn, represents the money stock as an exogeneously given variable whose magnitude is independent of both the price level and money demand. This independence, of course, is required if causality is to run directly from M to P as the quantity theory predicts. For if the money supply is not independent of, but instead responds passively to, the price level and to money demand, one cannot claim that it is an active variable causing price-level change.

Earlier, in his 1871 manuscript *Money,* Marshall had already extended the exogeneity proposition to the long-run when the stock of metallic money, far from being a given constant, grows or shrinks as its value, or purchasing power over goods, exceeds or falls short of its marginal cost of production (see Laidler 1991, 54-5). Here fortuitous events such as new gold discoveries and technological progress in mining, both of which sink the cost of production of the metal below its value and so increase the profitability of producing more of it, lead to increases in the money stock. These increases -- exogenous inasmuch as the events initiating them are purely adventitious -- continue until the resulting rise in prices brings gold's value down to its marginal cost making additional output unprofitable. Marshall does, however, acknowledge one major case of endogeneity, namely shifts in money demand. By raising or lowering the price level, these shifts drive a wedge between the value and marginal cost of producing gold. The resulting profitability or unprofitability of mining causes the gold stock to expand or contract. In this important case, the key one cited by Marshall, money-stock changes indeed are demand determined.

External Value of Money

Not only did Marshall use the quantity theory to explain money's *internal* value, or purchasing power over domestically produced goods and services, he also used it to explain money's *external* value, or purchasing power over foreign currencies and, through them, over foreign goods and services as well. He (1926, 191-2) extended the quantity theory to the open economy by expounding what Gustav Cassel would later christen the purchasing power parity (PPP) theory of exchange rates. This theory, which Marshall took from Thornton, Wheatley, Ricardo, Senior, J. S. Mill, Goshen, Giffen, and others, says that the equilibrium exchange rate E, or domestic currency price of a unit of foreign currency, tends to equal the ratio of aggregate or general price levels P/P^* of the two countries, each price level denominated in terms of its country's respective currency. In short, Marshall's version of the theory stated symbolically is $E = P/P^*$ where the asterisk denotes a foreign country variable. As Marshall (1926, 170, 191) himself put it,

this exchange rate makes the value of money, or price of goods, measured in terms of a common currency at the rate of exchange everywhere the same, or $P = EP^*$.

According to Marshall (1926, 191-2), PPP tends to hold for any pair of countries whether they are on the same or different metallic standards or on an inconvertible paper standard. In the case of metallic standards, any deviation from PPP that renders one (e.g. the home) country's goods cheaper ($P < EP^*$) and more competitive in world markets will create, via the consequent cheapness-induced rise in that country's exports and fall in its imports, a trade balance surplus and a compensating specie inflow. The resulting increase in monetary metal in the home country and its decrease in the foreign one will raise prices in the former and lower them in the latter until purchasing power parity is reestablished. In the case of inconvertible paper currencies, adjustment is achieved primarily through exchange rate changes rather than through specie flows and domestic prices. Exchange rate deviations from PPP that underprice one country's goods and overprice the other's will, on the market for foreign exchange, precipitate a deluge of the currency of the high-price country seeking conversion into the currency of the low-price one to make cheaper purchases there. The resulting surplus of the overvalued currency and shortage of the undervalued one quickly bids the exchange rate back to PPP equilibrium.

Quantity Theory Propositions Again

All the closed-economy quantity theory propositions and postulates apply to Marshall's open-economy analysis of the exchange rate. The quantity theory itself of course applies. For Marshall had already shown that the national price levels, whose ratio equals the equilibrium exchange rate, are themselves determined by national nominal money supplies and real money demands. In short, since $P = M/D$ and $P^* = M^*/D^*$, it follows that $E\ (= P/P^*) = (M/D)/(M^*/D^*)$. This condition then yields the proportionality postulate, which holds because with all else being equal, namely both money demands and the foreign money supply, the exchange rate E necessarily varies equiproportionally with the domestic money stock M.

The neutrality proposition likewise holds. It holds, Marshall pointed out, because equilibrium exchange rate changes are matched by corresponding price level changes so as to keep the common currency price of goods everywhere the same. This being the case, equilibrium exchange rate changes exert no effect on real variables like exports, imports, the trade balance, and the terms of trade. Indeed Marshall (1926, 192-5) used the neutrality proposition to refute British complaints that the depreciation of India's silver rupee relative to the gold pound in the 1870s and 1880s would give India's exporters a lasting competitive advantage over their British counterparts.

True, Marshall (1926, 192-5) admitted that the rupee's depreciation, if not offset immediately by higher inflation in India than in England, would give Indian exporters a temporary price advantage (or "bounty"). With the undervalued rupee rendering the price of Indian goods cheaper than English ones in world markets, however, the effect would be to stimulate India's exports, curtail her imports, and improve her trade balance. In this way transitory departures from PPP do indeed affect real variables.

Acknowledging this point, Marshall advanced the open economy equivalent of the proposition of the short-run non-neutrality of money. But he then stressed that the resulting export surplus would be paid for by a corresponding silver inflow that would bid up India's prices until no advantage remained. Short-run non-neutrality gives way to long-run neutrality as the quantity theory predicts.

Of course, Marshall realized that non-neutrality, though temporary, could last for a protracted length of time. As an example of such prolonged non-neutrality, Marshall (1923, 316-17) cited a capital flight from Russia induced by foreign investor apprehension of political instability there. Since the resulting Russian capital account deficit necessitates a corresponding current account (or trade) surplus to keep that country's overall balance of payments in balance, a prolonged ruble exchange rate depreciation from its PPP equilibrium must occur to provide the "bounty" to net exports that generates the surplus. Even so, the non-neutrality, which in this case arises from political distrust and the consequent withdrawal of capital rather from monetary disturbance, ends with the termination of the capital outflow and the corresponding restoration of the exchange rate to its PPP equilibrium. Neutrality, though delayed, eventually prevails.

Direct money-to-price (and exchange rate) causality likewise prevails. It prevails in metallic regimes where specie flows through the balance of payments bring national price ratios into line with the equilibrium exchange rate as defined by the ratio of the official mint prices of the metals (plus and minus cost of specie carriage) in the two countries (Marshall 1923, 317-18). And in inconvertible paper regimes, supplies of each currency seeking conversion into the other on the market for foreign exchange bid the exchange rate into equality with the ratio of the price levels (Marshall 1923, 315-16). Causation runs from M and M^* to P/P^* and E as the quantity theory requires.

As for the absolute price/relative price dichotomy, Marshall's PPP theory displays it with a vengeance. Except for the case of political distrust and capital flight mentioned above, Marshall essentially treats the nominal exchange rate as an absolute price determined in the monetary sector by national currency supplies and demands. With respect to the *real* exchange rate (or terms of trade or real relative price of imports measured by the quantity of exports sacrificed to obtain them), however, Marshall's PPP equation implicitly assigns it a fixed equilibrium value of unity and then ignores it. (To be sure, actual departures of the exchange rate from its PPP equilibrium produce corresponding terms-of-trade deviations from unity. But these deviations are self-correcting via their effects on specie flows, price levels, and/or exchange rates. They vanish with the restoration of PPP equilibrium.) The equilibrium unitary terms of trade, of course, suggest a one-good world (equivalently, one where different goods are such close substitutes for each other that they can be treated essentially as a single good), or at least a world in which all countries produce and consume the same set of traded goods. Evidently Marshall regarded the latter assumption as a serviceable first approximation and useful common point of departure to use in quantity theoretic accounts of nominal exchange rate determination.

True, elsewhere, in his account of the pure theory of foreign trade, Marshall (1923, 330-60) has real forces operating through his reciprocal demand, or offer curve, apparatus determine the equilibrium terms of trade. That equilibrium, he explains, can undergo changes when real structural forces shift the offer curves. Even so, his PPP equation ignores such changes and their potential effects on the nominal exchange rate. The equation's unitary terms of trade assumption rules them out. In the same way, the equilibrium terms of trade, or real exchange rate, remains untouched by, and independent of, monetary influences in his analysis. For Marshall, equilibrium nominal and real exchange rate changes are mutually exclusive phenomena. They are part and parcel of the classical tendency to partition the economy in the long run into real and monetary sectors.

Advocate of Price Stability

The preceding has argued that Marshall was a quantity theorist who underscored and indeed enriched the theory's postulates. But there is an easier way to prove, or confirm, Marshall's credentials as a quantity theorist. That way is to examine his policy views. Here one can employ a simple litmus test: An economist essentially is a quantity theorist if he believes either that the monetary authority can and should stabilize the price level through control, direct or indirect, of the money stock, or failing this, that schemes can be devised to prevent price-level movements from affecting real activity. Marshall passes this test with flying colors.

Marshall (1887, 190-2) advocated price-level stability on the grounds that deflation and inflation are injurious to the real economy. Deflation is harmful because in the face of sticky nominal wage, interest, and other costs, it raises the real value of those items, diminishes real profits, and destroys the incentive to hire and produce. "The fall of profits resulting from low prices might throw production…out of gear, our factories might stand idle" (Marshall 1926, 75). And rising prices are harmful not only because they transform sluggish money wages into lower real wages of labor (the group already closest to the poverty line), but also because they make it easy for incompetent people to enter business and encourage careless and lax behavior on the part of lenders.

Policy Reform Rankings

Marshall's desire for price level stability influenced his ranking of alternative monetary arrangements according to their ability to attain that goal. Worst of all was the monometallic gold standard. The annual flow output of the metal was but a tiny fraction of the existing stock. This meant that the stock supply of monetary gold in the closed world economy adjusted too slowly to changes in the demand for it. Prices fluctuated as a result.

Not much better was bimetallism (Marshall 1887, 193-6). It offered one small advantage: Provided gold and silver both remained in circulation, the value of money would vary with the mean values of the two metals instead of with the more variable value of one of them alone. But bimetallism suffered from one overriding defect: The fixed mint gold price of silver easily could overvalue one of the metals and drive it from

circulation. When that happened, Gresham's Law would cause bimetallism to degenerate into monometallism with all its disadvantages.

Somewhat better was Marshall's novel concept of symmetallism (Marshall 1887, 204-7). It abolished gold coin in favor of a money supply consisting wholly of banknotes convertible into gold and silver ingots joined together in fixed physical proportions. Unlike bimetallism, in which the gold price of silver is set at the mint, symmetallism would not degenerate into monometallism. Instead, the market would determine the relative price of the two metals so that both could remain in the reserve base. Another advantage of symmetallism was that it abolished coin, which meant that gold and silver could be withdrawn from circulation where they were no longer needed and placed in the country's metallic reserve. With this enlarged buffer-stock reserve, the country could weather external gold-and-silver drains and the resulting crises without being forced into violent, deflationary contractions of the banknote money supply.

Marshall's (1887, 188-199) next-best regime – preferred by him over symmetalism because it involved no change in the makeup of the existing monetary system and stock of currency (Eshag 1963, 118) -- was the Wheatley-Lowe-Scrope-Jevons notion of indexation, or tabular standard of value, in which the nominal values of wage, interest, and rent contracts are automatically adjusted one-for-one with movements in the price level. By removing lags, or time delays, of changes in nominal costs behind product price changes -- lags that cause profits, actual and anticipated, to wax and wane -- indexation would eliminate the source (fluctuating profit expectations) of the speculative activity that destabilizes prices. Most of all, indexation would, through the contemporaneous adjustment of money wage and interest rates to price level changes, prevent any remaining price instability from affecting real wages and interest rates and so smooth the business cycle. In these ways, indexation either stabilizes prices or keeps their movements from influencing real activity.

Best of all price stabilizers, Marshall (1887, 206-7n) thought, were managed paper currencies, inconvertible as well as convertible. Their supplies could readily be adjusted to match corresponding changes in the demand for them, thereby stabilizing their value (Marshall 1923, 50). The monetary authority would expand the stock of inconvertible paper through open market purchases of government securities when prices were below target and contract the stock through open market sales when prices were above target. Such operations on the currency volume would restore prices to target. In the case of managed convertible currency, the authority would regulate its quantity through variations in the official nominal prices of gold and silver consistent with the ratio of those prices being determined in the market. The authority would raise the official prices of the metals when the general price level was above target and lower them when general prices were below target. The result would be to raise and lower, respectively, the nominal value of the country's metallic reserves and so the quantity of notes and deposits that could be issued on the basis of those reserves. In this way, the second scheme, like the first, would stabilize prices through variations in the money stock. In short, by countering price-destabilizing changes in metals' purchasing power

over goods with offsetting variations in the metallic content of the currency, the second scheme would achieve the same end as the first.

Having ranked managed paper currencies highest in terms of their capacity to stabilize prices, Marshall stopped short of advocating them. He failed to recommend their adoption not because he doubted their technical feasibility as a stabilizing standard. Rather he feared they might give too much discretionary power to the policymakers. Further, he believed that managed currencies, being national in scope and origin, would impede the development of a truly international currency that he thought would best facilitate world commerce.

Conclusion

Marshall took the classical quantity theory, endowed it with his Cambridge cash-balance money-supply-and-demand framework, and used it to explain how the nominal money supply relative to real money demand determines the price level and value of money. Demonstrating the theory's versatility, he then combined it with the assumption of purchasing power parity to explain the international distribution of world money under metallic standards and fixed exchange rates. Likewise he used the theory to explain exchange rate determination under floating rates and inconvertible paper currencies. In each case, he drew heavily from the work of earlier British authors.

Further exhibiting the flexibility of the theory, he paired it with the idea of money wage and/or interest rate stickiness in the face of price level changes to explain how fluctuations in the money stock produce corresponding movements in real wage and interest rates, and, through them, oscillations of output and employment. That is, he used it to explain the trade cycle. He also applied the theory to alternative policy regimes or monetary standards to determine their respective capabilities of delivering price-level and macroeconomic stability. With respect to the quantity theory (as with so much else in economics) the adage "it's all in Marshall if you'll only take the trouble to dig it out" surely holds.

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