HENRY THORNTON: SEMINAL MONETARY THEORIST AND FATHER OF THE MODERN CENTRAL BANK

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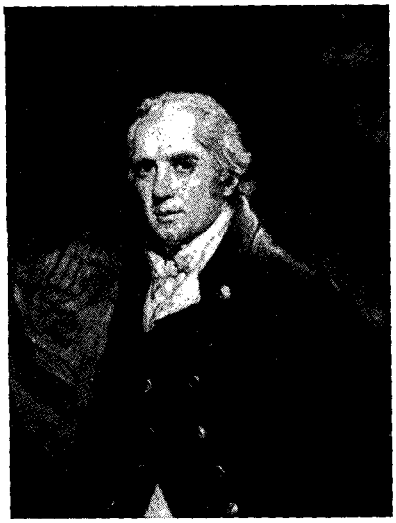
1. Introduction

In 1802, Henry Thornton published the book *An Enquiry into the Nature and Effects of the Paper Credit of Great Britain.*[1] On the basis of this work, Thornton deserves the title of "Father of Modern Central Banking." Thornton developed the idea of a central bank that could control the monetary base as a bookkeeping operation. Through control of the base, the central bank could control the money stock of the entire country. Finally, through control of the money stock, the central bank could control the price level. A key theme of *Paper Credit* is the importance of explicit acceptance by the central bank of its responsibility for determining the price level. Not until Keynes' *A Tract on Monetary Reform* is there again such a forceful statement of the concept of a modern central bank.



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In 1810, Thornton repeated these ideas in the *Bullion Report.* Although this report was written jointly by Horner, Huskisson, and Thornton, the analytical framework used is Thornton's. The *Bullion Report* is reviewed in the final sections of this article as a way of showing the use which Thornton made of the analytical apparatus he developed in *Paper Credit.*

Thornton analyzed the paper money standard that existed in Britain after suspension of the international gold standard in 1797. For this fiat money regime, Thornton constructed a general equilibrium model capable of explaining the relationship between the domestic price level and the exchange rate and capable of explaining movements in the exchange rate either as a real phenomenon or a monetary phenomenon. The chief operating variable of the Bank of England was the discount rate. Thornton developed an exposition of the quantity theory organized around the differing role of the interest rate in the supply and demand schedules for the money stock. As a condition for maintaining a stable monetary base and money stock, the supply schedule required the central bank to keep the discount rate in line with the economy's natural rate of interest either by rationing explicitly its discounts or by targeting a nominal variable like the exchange rate.

On the basis of the contributions in this book, Thornton deserves to be ranked among the foremost monetary theorists of all times. Only a small number of economists, however, are aware of his contributions. There are two reasons for this lack of recognition.

First, Thornton organized his economic analysis around the central proposition that with a noncommodity monetary standard based on the fiduciary issue of banks a central bank must assume explicit control over its own liabilities (the monetary base). This control is necessary in order to maintain the money stock and to maintain a well-defined price level. When the international gold standard became enshrined as monetary orthodoxy in the last half of the nineteenth century, the idea of a central bank

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This paper was written on the occasion of the 75th birthday of Milton Friedman, July 31, 1987.

[1] Page references are to the Hayek edition, which includes *Paper Credit,* two speeches Thornton made before Parliament in May 1811, and a biographical sketch of Thornton by Hayek. Pages are indicated by (H, page –). The page citations in the paper (C, page –) are to the Cannan edition of the *Bullion Report.*

exercising explicit control over the monetary base became only a theoretical curiosum. Under the international gold standard, the balance of payments, not the behavior of the central bank, was supposed to determine the monetary base and the nominal quantity of money. As a consequence, Thornton's work was ignored by neoclassical economists.[2]

The second reason for the obscurity of Thornton's work is Thornton's own style of exposition. The ideas in *Paper Credit* are exposited according to the chronological order in which Thornton dealt with particular problems of policy, rather than being exposited in a way designed to elucidate the underlying analytical framework. More important, this underlying framework is nowhere succinctly presented, but is submerged in a great mass of institutional detail. In his review of *Paper Credit* in the *Edinburgh Review*, Francis Horner (1802, p. 29) states: "But the various discussions are so unskilfully arranged that they throw no light on each other, and we can never seize a full view of the plan. . . ." Later economists reviewing the monetary debates at the beginning of the nineteenth century turned to David Ricardo. Ricardo's quantity theory framework was only a caricature compared to Thornton's, but the clarity and forcefulness with which Ricardo exposited his framework made him, rather than Thornton, the more accessible author.

Thornton's work is discussed in some of the classic works in economics. Viner (1924) discovered Thornton and discussed his contribution to the theory of international trade. Later, Viner (1937) also discussed Thornton in the context of the bullionist-antibullionist controversy. Hayek (1931) was interested in Thornton because of the latter's concept of a modern central bank that can control the monetary base and the money stock. In his introduction to the reprint of *Paper Credit*, Hayek carefully lists the seminal ideas of Thornton. Another such list is in Hutchison (1968). Mints (1945) reviews Thornton's criticisms of the real bills principle. Schumpeter (1954) insightfully notes the relationship between Thornton's and Wicksell's views of credit creation. [See also Humphrey (1985).] Despite these discussions, there remains a need for an overview of the analytical framework employed by Thornton. This essay is motivated by the belief that the major reason for the current lack of appreciation of Thornton is the absence from the literature of a comprehensive overview of the general equilibrium model of the economy developed by Thornton.

Section 2 presents some of the historical background to Thornton's work. Section 3 explains Thornton's goal of extending the quantity theory to include not only specie, but also money created through credit extension. Section 4 discusses Thornton's theory of money demand. As background to Thornton's theory of money supply, Section 5 discusses the natural rate hypothesis built into Thornton's theory of aggregate supply and demand. Section 6 discusses Thornton's theory of money supply. Section 7 presents Thornton's criticisms of the real bills view. Section 8 contains Thornton's discussion of the monetary consequences of the international adjustment mechanism. Section 9, which begins the discussion of the *Bullion Report*, reviews the antibullionist views of the Governors of the Bank of England who testified before the Bullion Committee. It also presents the rebuttal of these views by the bullionists. Section 10 contains the recommendations of the Bullion Committee about the appropriate policy for the Bank of England. Section 11 contains a summary of the article, and Section 12 discusses the relevance of issues raised by Thornton for modern central banks.

2. Historical Background[3]

Hayek notes that "Since the contributions of Cantillon, Galiani, and Hume in the middle of the eighteenth century little progress had been made in monetary science. . . . And the treatment of money in the *Wealth of Nations*, which dominated opinion on these matters in the last quarter of the century, contains comparatively little of theoretical interest" (H, 37).[4] Toward the end of the eighteenth century, however, significant changes in institutional arrangements prompted an interest in issues of monetary policy. The number of country banks increased rapidly, and the Bank of England became the sole issuer of bank notes in London. In 1797 in testimony before Parliament, Francis Baring, in characterizing the Bank of England, first used the expression bank of dernier resort (last resort). The financial panic of 1793 and the ensuing increased demand for Bank of England notes encouraged reflection on the special role of that bank in the banking system. The war with France, which began in 1793,

[2] The work of the classical economists was known to the neoclassical economists primarily through the writings of Ricardo and through J. S. Mill's *Principles of Political Economy*. Mill mentions Thornton only in the context of a discussion of the origin of bills of exchange.

[3] The first two paragraphs and the last paragraph of this section draw on Hayek's introduction to *Paper Credit*.

[4] Humphrey (1981), however, argues that this view must be qualified by recognizing Smith as advocating the view now known as the monetary approach to the balance of payments.

over time created a situation that forced Britain off the gold standard. Gold was sent out of England due to British financial support of its continental army and allies. Also, the return of France to the gold standard under Napoleon increased the demand for gold. Finally, in 1797, fear of a French invasion precipitated a run on the gold reserves of the Bank of England. This run led the Bank of England to suspend redemption of its notes in gold.

At first, the experiment with a noncommodity money standard went well. There was little inflation or depreciation of the pound on the foreign exchanges. Gold flowed into England and the Bank of England replenished its reserves. The situation deteriorated beginning in 1800, however. Borrowing by the British government from the Bank increased. Domestic prices began to rise and the pound depreciated on the foreign exchanges. Because Napoleonic Europe was on the gold standard, the pound price of gold bullion measured the foreign exchange value of the pound. In 1800, the pound price of bullion rose to a value ten percent in excess of the old mint price under convertibility. The rise in the market price of gold over the old mint price prompted criticism of the Bank of England for having suspended convertibility.

This historical chronology explains the organization of *Paper Credit*. Thornton deals first with the appropriate response of the Bank of England to an internal drain that produces a financial panic. He views this problem not just in terms of bank runs, but also in terms of an increase in the precautionary demand for money. Thornton elaborates a sophisticated theory of the demand for money that first explains the way in which credit creation leads to money creation in a fractional reserve system and then relates the velocity of the various components of money to the difference between the market rate of interest and the own rate on the various components. Thornton defends the suspension of cash payments by the Bank of England in 1797 as necessary in order to prevent a contraction of the money stock and the associated adverse consequences for real economic activity.

In the last part of his book, Thornton considers the key dispute between the bullionists and antibullionists. He considers the dispute over whether the depreciation of the pound on the foreign exchanges that began after 1800 was caused by an adverse movement in the commodity terms of trade or currency overissue by the Bank of England. In order to consider this dispute, Thornton constructs an analytical apparatus general enough to explain both nominal and real movements of the exchange rate. In showing how an increase in the money stock can lead to a rise in the price level and a fall in the nominal exchange rate, Thornton elucidates the interaction between the central bank's discount rate, the economy's natural rate of interest, money creation, and the foreign exchange value of the pound. This discussion also contains an elaboration of a natural rate hypothesis to reconcile the short-run nonneutrality of money with long-run neutrality. Thornton uses his analytical apparatus to advance his central theme "that the restriction of the paper of the Bank of England is the means both of maintaining its own value and of maintaining the value, as well as of limiting the quantity, of all the paper in the country" (H, 225).

In *Paper Credit*, the main practical concern of Thornton had been disruption of economic activity from deflation, produced from maintenance of the international gold standard at a time of bank runs or a deterioration in the terms of trade. In the decade after the publication of *Paper Credit*, events caused his main concern to shift to inflation due to overissue by central banks. In one of his speeches before Parliament in 1811, Thornton says, "Indeed, in all parts of Europe, Hamburgh, Amsterdam, and Paris excepted, the principle of a standard seemed to have been lost; a suspension of cash payments had every where taken place; and [the] paper had been issued to excess, and had also been depreciated" (H, 342). Thornton refers in particular to the experiences of Sweden, Austria, and Portugal, as well as the earlier experience of Russia. As a member of Parliament's Committee on the Irish Currency, Thornton had a firsthand view of the overissue of the Bank of Ireland, which had suspended cash payments at the same time as the Bank of England. In England, the market price of bullion remained fairly close to its old parity price from 1804 through 1808. Beginning in 1809, however, the pound price of foreign exchange and bullion rose about 30 percent above the old parity. In 1801, the depreciation had been limited to 10 percent.

In 1810, against a background of rising prices and a falling price of the pound in the foreign exchange markets, Francis Horner moved before Parliament that a Select Committee be "appointed to enquire into the Cause of the High Price of Gold Bullion, and to take into consideration the State of the Circulating Medium and of the Exchanges between Great Britain and Foreign Parts." The resulting Bullion Committee Report was drafted by Horner, Huskisson, and Thornton. Its major recommendation was

that Britain return to the gold standard in order "to enforce . . . a due Limitation of the Paper of the Bank of England, as well as of all the other Bank Paper of the Country. . . ." (C, Resolutions, 10) Thornton delivered two speeches, later issued as pamphlets, during the debate over the Bullion Committee Report. In these speeches, he repeats his model of credit and money stock determination, which turns on the difference between the Bank discount rate and the natural rate of interest. This time he supplemented his model with an explanation of the natural rate of interest as the sum of a real rate of interest and a liquidity premium dependent upon expected inflation.

3. Relationship between Credit Creation and Money Creation

Thornton extended the analytical apparatus of the quantity theory to money created through credit extension. In modern jargon, he extended the quantity theory to include not only outside money (the monetary base), but also inside money (the fiduciary issue of banks minus their reserves).

> Paper constitutes, it is true, an article on the credit side of the books of some men; but it forms an exactly equal item on the debit side of the books of others. It constitutes, therefore, on the whole, neither a debit or a credit. . . . The case of gold, on the other hand, differs from that of paper inasmuch as the possessor of gold takes credit for that which no man debits himself. (H, 79)

Thornton uses the term "paper credit" for inside money. The incentive for fiduciary issue, the issue of paper money, came from economizing on the real resource costs of a commodity money.

> When confidence rises to a certain height in a country, it occurs to some persons that profit may be obtained by issuing notes, which purport to be exchangeable for money; and which, through the known facility of thus exchanging them, may circulate in its stead; a part only of the money, of which the notes supply the place, being kept in store as a provision for the current payments. On the remainder interest is gained, and this interest constitutes the profit of the issuer. (H, 90)

Thornton was the first economist to assert that checking accounts formed part of the money stock.

> It is in substance the same thing whether a person deposits 100 pounds in money with the bank, taking no note, but obtaining a right to draw a draft on a banking account which is opened in his name, or whether he deposits the same 100 pounds and receives for it a bank note. (H, 134)

There were a few economists in the nineteenth century who viewed checking accounts as money, Torrens and Joplin, for example, and some economists in the banking school tradition. It was not until the 1920s, however, that economists working in the quantity theory tradition generally accepted these accounts as money. Unlike most other nineteenth century economists, Thornton was able to abstract from the legal distinctions distinguishing gold from fiduciary instruments embodying a claim to gold [Schumpeter (1954), 717]. He successfully integrated into his view of money all media of exchange based on credit creation.

In expanding the definition of money to instruments derived from credit extension, Thornton continually insists on the difference between the demand for money and the demand for credit.

> . . . it is by the amount not of the loans of the Bank of England, but of its paper . . . that we are to estimate the influence on the cost of commodities. (H, 271)

In applying the quantity theory to a monetary regime of paper money, Thornton begins with the distinction between relative prices and the price level. It is only with respect to the latter concept that the supply and demand analysis of the quantity theory is applicable.

> . . . the price at which the exchange (or sale) takes place depends on two facts; on the proportion between the supply of the particular commodity and the demand for it, which is one question; and on the proportion, also, between the state of the general supply of the general circulating medium and that of the demand for it, which is another. (H, 194)

4. The Demand for Money

According to Thornton, the demand for money includes both a transactions and a precautionary demand.

> The supply of bank notes which he chuses to reserve in his drawer is always estimated by the scale of his payments; or, to speak more correctly, by the probable amount of the fluctuations in his stock of notes, which fluctuations are proportionate, or nearly proportionate, to the scale of his payments. (H, 234-35)

> Now a high state of confidence contributes to make men provide less amply against contingencies. . . . When, on the contrary, a season of distrust arises, prudence suggests that the loss of interest arising from a detention of notes for a few additional days should not be regarded. (H, 96-97)

Thornton thought that increases in the precautionary demand for money acted to exacerbate financial panics. It is interesting to note in this respect that he criticizes the common notion of hoarding as an unsophisticated expression of the precautionary demand for money.

When a season of extraordinary alarm arises, and the money of the country in some measure disappears, the guineas, it is commonly said, are hoarded. In a certain degree this assertion may be literally true. But the scarcity of gold probably results chiefly from the circumstance of a considerable variety of persons, country bankers, shopkeepers, and others, augmenting, some in a smaller and some in a more ample measure, that supply which it had been customary to keep by them. . . . It is thus that a more slow circulation of guineas is occasioned; and the slower the circulation, the greater the quantity wanted in order to effect the same number of money payments. (H, 99-100)

Thornton argues that the demand for components of the money stock varies inversely with difference between the market rate of interest and the own rate on the particular component.

Bills, however, and especially those which are drawn for large sums, may be considered as in general circulating more slowly than either gold or bank notes. . . . Bank notes, though they yield an interest to the issuer, afford none to the man who detains them in his possession; they are to him as unproductive as guineas. The possessor of a bank note, therefore, makes haste to part with it. The possessor of a bill of exchange possesses, on the contrary, that which is always growing more valuable. . . . such part of the circulating medium as yields an interest to the holder will effect much fewer payments, in proportion to its amount, than the part which yields to the holder no interest. (H, 92 and 94)

5. Aggregate Supply and Demand

The Transitory Nonneutrality of Money Before discussing Thornton's money supply function, it is necessary to discuss his aggregate supply of output function. The long-run neutrality of money incorporated into this latter function endows Thornton's general model with a natural rate of interest. As discussed below, money supply is a function of the difference between the Bank rate and the natural rate.

In *Paper Credit*, Thornton emphasizes the economic disruption of deflation. A major theme in the book is a defense of the suspension of convertibility by the Bank of England in 1797. As noted in Section 8, Thornton believed that the terms of trade had changed adversely for Britain. Maintaining convertibility would, therefore, have required a deflation of the domestic British price level. Suspension of convertibility allowed the pound to depreciate on the foreign exchanges without this deflation. Thornton (H, 117-18 and 152) admonishes against deflation as a corrective to an adverse balance of trade.[5]

Thornton refers briefly to two reasons why a change in the money stock affects real economic activity. One reason is that wage rates do not respond to changes in prices perceived to be temporary.

The tendency, however, of a very great and sudden reduction of the accustomed number of bank notes is to create an *unusual* and *temporary* distress and a fall of price arising from that distress. But a fall arising from temporary distress will be attended probably with no correspondent fall in the rate of wages; for the fall of price, and the distress, will be understood to be temporary, and the rate of wages, we know, is not so variable as the price of goods. [Italics in original] (H, 119)

Thornton also suggests that individuals confound changes in relative prices with changes in the price level.

Probably no small part of that industry which is excited by new paper is produced through the very means of the enhancement of the cost of commodities. While paper is encreasing, and articles continue rising, mercantile speculations appear more than ordinarily profitable. The trader, for example, who sells his commodity in three months after he purchased it, obtains an extra gain, which is equal to such advance in the general price of things as the new paper has caused during the three months in question: he confounds this gain with the other profits of his commerce; and is induced, by the apparent success of his undertakings, to pursue them with more than the usual spirit. (H, 237-38)

. . . nations in general were usually insensible at first to the declension of the value of their circulating medium. They were accustomed to experience fluctuation of [their] exchange [rate], and they naturally referred, at first, even a serious depreciation of their paper, to the same commercial causes which they were in the habit of contemplating. . . . It was reasonable to suppose that men should generally mistake in this respect. We naturally imagine that the spot on which we ourselves stand is fixed and that the things around us move. The man who is in a boat seems to see the shore departing from him. . . . In consequence of a similar prejudice, we assume that the currency which is in all our hands, and with which we ourselves are, as it were, identified, is fixed, . . . whereas in truth, it is the currency of each nation that moves. (H, 340)

Forced Saving Thornton did believe that the seigniorage from money creation could redistribute income in such a way as to increase the capital stock and, thereby, to increase permanently the level of economic activity. He argues that ". . . borrowers, in consequence of that artificial state of things which is produced by the law against usury, obtain their loans too cheap" (H, 255) from the Bank of England.[6]

[5] An additional reason why Thornton favored suspension of the gold standard was that suspension allowed the export of gold coin. This export of gold coin mitigated the deterioration of the British terms of trade (H, 153).

[6] Thornton claims that only the Bank of England was effectively bound by the usury law. A borrower from a regular bank "bestowed the benefit of his running cash," that is, maintained compensating balances to raise the effective loan rate to the market clearing rate. A borrower in the money market "gave to a broker a small percentage on every bill," that is, paid points (H, 335).

The seigniorage from money creation goes to those able to borrow at a below market rate from the Bank. Income is redistributed to these individuals and away from holders of existing cash balances and wage earners whose wages are slow to adjust to inflation.

> The proprietors of the new paper will become greater encouragers of industry than before; the owners of the old paper, being able to command less property, will have less power of employing labour. . . . (H, 237) It must be also admitted that, provided we assume an excessive issue of paper to lift up, as it may for a time, the cost of goods though not the price of labour, some augmentation of stock will be the consequence; for the labourer, according to this supposition, may be forced by his necessity to consume fewer articles. (H, 239)

Long-run Neutrality of Money Thornton makes clear, however, that the effects just described are of secondary importance. In the long run, the appropriate assumption is the neutrality of money with regard to real economic activity.

> There seems to be only two modes in which we can conceive the additional paper to be disposed of. It may be imagined either, first, to be used in transferring an encreased quantity of articles, which it must, in that case, be assumed that the new paper itself has tended to create; or, secondly, in transferring the same articles at a higher price. Let us examine the first of these cases. . . . When the Bank of England enlarges its paper, it augments, in the same degree, as we must here suppose, its loans to individuals. These favored individuals immediately conceive, and not without reason, that they have obtained an additional though borrowed capital, by which they can push their own particular manufacture. . . . it does not occur to them that the commerce or manufactures of other individuals can be at all reduced in consequence of this encrease of their own. But, first, it is obvious that the antecedently idle persons to whom we may suppose the new capital to give employ are limited in number; and that, therefore, if the encreased issue is indefinite, it will set to work labourers of whom a part will be drawn from other and, perhaps, no less useful occupations. (H, 235-36)

> There remains, therefore, no other mode of accounting for the uses to which the additional supply of it [Bank of England paper] can be turned than that of supposing it to be occupied in carrying on the sales of the same, or nearly the same, quantity of articles as before, at an advanced price, the cost of goods being made to bear the same, or nearly the same, proportion to their former cost, which the total quantity of paper at the one period bears to the total quantity at the other. (H, 241)

Aggregate Demand and the Interest Rate Thornton spends considerable time discussing the economy's aggregate supply function in order to establish both the transitory nonneutrality of money and the long-run neutrality of money with respect to real economic activity. He spends less time discussing the economy's aggregate demand function, apart from a general description of aggregate nominal demand as dependent upon the quantity of money (H, 117-18). There is, however, a section in one of his speeches before Parliament in 1811 in which he explains the relationship between investment demand and the real rate of interest. Thornton first explains the relationship between the real rate of interest and the market rate of interest and then notes that investment demand depends upon the former variable. [This discussion anticipated that of Irving Fisher. See Beranek, Humphrey, and Timberlake (1985).]

> It was material to observe that there had, since the beginning of the war, been a continual fall in the value of money. . . . which was, on the average, 2 or 3 per cent. per annum: it followed from hence that if, for example, a man borrowed of the Bank 1000 pounds in 1800 and paid it back in 1810 . . . he paid back that which had become worth less by 20 or 30 per cent. than it was worth when he first received it. He would have paid an interest of 50 pounds per annum for the use of this money; but if from this interest were deducted the 20 or 30 pounds per annum, which he had gained by the fall in the value of the money, he would find that he had borrowed at 2 or 3 per cent., and not at 5 per cent. as he had appeared to do. . . .
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> . . . during a fall in the price of money . . . [men] felt . . . the advantage of being borrowers. . . . on estimating the value of those commodities in which they had invested their borrowed money, they found that value to be continually increasing, so that there was an apparent profit over and above the natural and ordinary profit on mercantile transactions. This apparent profit was nominal, as to persons who traded on their own capital, but not nominal as to those who traded with borrowed money. . . . This extra profit was exactly so much additional advantage . . . and was so much additional temptation to borrow. Accordingly, in countries in which the currency was in a rapid course of depreciation, supposing that there were no usury laws, the current rate of interest was often . . . proportionably augmented. (H, 335-36)

6. The Supply of Money

A Central Bank Thornton developed the conception of a central bank after observing the financial panic of 1793. In particular, he noticed that to banks and to London merchants Bank of England notes were interchangeable with gold specie (H, 123). He argues that in the case of a bank run, the Bank of England should increase its notes in order to offset the reduction in bank reserves caused by gold outflows from the banking system.

> . . . the holder of a note of 1000 pounds . . . carries it to the Bank and demands 1000 pounds in gold. The Bank gives the gold; which gold . . . fills a void in the circulation of the country occasioned by the withdrawing of country bank notes in consequence of alarm, or serves as an

addition to the fund of country banks. . . . The Bank, therefore, having paid away this 1000 [pounds] in gold, and having received for it their own note for 1000 pounds must now re-issue this note, if they are resolved *to maintain the amount of their paper circulation.* How, then, is the Bank to issue it? The only means which the Bank, on its part, is able to take for the extension of its paper circulation is to enlarge its loans. [Italics in original] (H, 125)

In defending the Bank of England's decision in 1797 to suspend convertibility, Thornton argues that the increase in the Bank's loans that occurred at the time was due to a need to maintain the currency in the face of an internal drain. The increase did not cause the suspension through overissue. "The largeness of those loans was not the *cause* of the guineas going from them, as has been ordinarily supposed; it was the *effect*" [Italics in original] (H, 137).

Thornton discusses monetary base creation by the Bank of England in terms of the Bank's balance sheet (H, 136). He shows its balance sheet as comprising credits of bullion and total loans and debits of capital and deposits plus notes. In Thornton's words, "Every additional loan obtained by the Bank, if we suppose its gold to remain the same, implies an encreased issue of paper" (H, 227).

The Bank Rate—Natural Rate Model of the Money Supply Central to Thornton's theory of money stock determination is the concept of a natural rate of interest, that is, a rate of interest invariant in the long run to the behavior of the money stock. The following quotation asserts this idea as well as the absence of a liquidity effect on the rate of interest in the long run.

The reader, possibly, may think that an extension of bank loans, by furnishing additional capital, may reduce the profit on the use of it, and may thus lessen the temptation to borrow at five per cent. It has already been remarked in this Chapter that capital by which term *bona fide* property was intended cannot be suddenly and materially encreased by any emission of paper. That the rate of mercantile profit depends on the quantity of this *bona fide* capital and not on the amount of the nominal value which an encreased emission of paper may give to it is a circumstance which it will now be easy to point out.

I admit that a large extension of bank loans may give a temporary check to the eagerness of the general demand for them. It will cause paper to be for a time over abundant, and the price paid for the use of it, to fall.

It seems clear, however, on the principles already stated, that when the augmented quantity of paper shall have been for some time stationary, and shall have produced its full effect in raising the price of goods, the temptation to borrow at five per cent. will be exactly the same as before; for the existing paper will then bear only the same proportion to the existing quantity of goods, when sold at the existing prices, which the former paper bore to the former quantity of goods, when sold at former prices: the power of purchasing will, therefore, be the same; the terms of lending and borrowing must be presumed to be the same. (H, 255-56)

According to Thornton, money creation depends upon the difference between the Bank of England discount rate and the economy's natural rate of interest:

It may possibly be thought that a liberal extension of loans would soon satisfy all demands and that the true point at which the encrease of the paper of the Bank ought to stop would be discovered by the unwillingness of the merchants to continue borrowing. In order to ascertain how far the desire of obtaining loans at the Bank may be expected at any time to be carried, we must enquire into the subject of the quantum of profit likely to be derived from borrowing there under the existing circumstances. This is to be judged of by considering two points: the amount first of interest to be paid on the sum borrowed; and secondly on the mercantile or other gain to be obtained by the employment of the borrowed capital. . . . We may, therefore, consider this question as turning principally on a comparison of the rate of interest taken at the Bank with the current rate of mercantile profit. (H, 253-54)

In a discussion of an episode of overissue by the Bank of France, Thornton provides a statement of the condition of monetary equilibrium as equality between the Bank rate and the natural rate.[7]

The French government having occasion in 1805 for some advances on the security of what they call their anticipations . . . proceeded to discount at the Bank as many securities as were sufficient to supply their occasions. . . . The consequence of this transaction was an

[7] In constructing this framework, Thornton needed to work out the interrelationships between the markets for capital, credit, and the money stock and the simultaneous determination of the rate of interest among these markets. Money stock creation permitted a transitory divergence between the market rate on bank loans and the natural rate on real capital. The originality of Thornton's framework can be seen through a comparison to the state of interest rate theory at the time of the publication of *Paper Credit.* Schumpeter (1954, 720) notes the dominance of Adam Smith's view that the market rate of interest was merely a reflection of the rate of return yielded by the capital stock. There was no mechanism for the money stock to influence the market rate.

Thornton's model became the basis for the loanable funds model of interest rate determination used by neoclassical economists. It seems likely that his model was transmitted to the neoclassical economists by J. S. Mill in his *Principles* text. See, for example, the discussion in Mill (1865, 645-47). The version employed by the neoclassical economists, however, lacked the forcefulness of Thornton's model because it dropped the idea of a central bank with the ability to expand the monetary base. At the center of Thornton's model was the concept of a modern central bank, that is, a bank capable of controlling the monetary base through bookkeeping operations. As noted in the introduction, this concept was not again developed in a significant fashion until Keynes.

augmentation of the paper of the Bank of Paris; a drain of their cash followed; the diligences were found to be carrying off silver into the departments. . . . The circulating medium of the metropolis had now plainly become excessive. . . . the French over-issue arose from an attempt to turn certain securities into cash at a rate of interest lower than that which was the natural one. . . . (H, 337 and 339)

In assessing the usefulness of the quantity theory framework, the central issue is the direction of causation between the money stock and the price level. "The reader possibly may think that, in treating of this subject, I have been mistaking the effect for the cause, an encreased issue of paper being, in his estimation, merely a consequence which follows a rise in the price of goods, and not the circumstance which produces it" (H, 197-98). In Thornton's analytical framework, where the money stock is endogenously determined, the money stock and the price level are simultaneously determined. The analytical usefulness of the quantity theory then becomes an issue of identification. If differences exist in the determinants of the supply and demand functions for nominal money, then the equation of exchange, which provides for a compartmentalization of factors affecting the supply and the demand for money, is a useful device in understanding the determination of the price level.

In Thornton's framework, nominal money supply depends upon the difference between the market rate (the loan rate of the banking system) and the natural rate. Money demand, in contrast, depends upon the level of the market rate. Given the Bank discount rate, which determines the market rate, real shocks produce different movements in money supply and demand.

The example Thornton uses to illustrate this point involves an exogenous decision by foreign investors to repatriate temporarily capital from Britain. As a result of their actions, the demand for public debt falls and the accompanying depreciation of the real exchange rate stimulates exports. At the given Bank discount rate, credit demands at banks increase and the money supply increases (H, 257). Nothing has happened, however, to increase real money demand, which depends upon real variables like the interest rate and real income that are ultimately independent of the money stock. In consequence, the different changes in nominal money supply and nominal money demand produced by a real shock must ultimately be reconciled by a change in the price level.

Control of Country Bank Circulation Thornton completes his model of money stock determination by showing that the note circulation of the country banks rested on the base of the note circulation of the Bank of England.[8] He applies Hume's price-specie-flow mechanism to England considered as two regions (London and the country) with fixed exchange rates (between Bank of England notes and country bank notes). Given a fixed Bank of England note circulation, country banks could not overissue their notes without producing a balance of payments deficit that would drain their reserves in gold and Bank of England notes.[9]

. . . let it be admitted, for a moment, that a country bank has issued a very extraordinary quantity of notes. We must assume these to be employed by the holders of them in making purchases in the place in which alone the country bank paper passes, namely, in the surrounding district. The effect of such purchases . . . must be a great local rise in the price of articles. But to suppose a great and merely local rise is to suppose that which can never happen or which, at least, cannot long continue to exist; for every purchaser will discover that he can buy commodities elsewhere at a cheaper rate; and he will not fail to procure them in the quarter in which they are cheap, and to transport them to the spot in which they are dear for the sake of the profit on the transaction. . . . he will, therefore, require to have his country bank note turned into a Bank of England note. (H, 208-9)

7. The Responsibility of the Bank of England to Limit Bank Liabilities

In arguing that the Bank of England controlled the note issue of the banking system and that the Bank should recognize an explicit responsibility for this control, Thornton was challenging adherents of the real bills view. This view derives its intuitive appeal from the association of money creation with credit creation in a fractional reserve system. A real bill was an IOU given to a seller of goods by a middleman who purchased the goods for resale at a later date. In order to receive immediate payment, the original seller of the goods would take the IOU, the trade bill, and discount it at a bank, that is, sell it at a discount from the face value that reflected the

[8] When Thornton wrote, the only bank whose notes circulated in London was the Bank of England. Outside of London, the notes of the country banks circulated. The country banks held Bank of England notes and gold as reserves.

[9] The nominal exchange rate between country bank notes and Bank of England notes equals the product of the real exchange rate between the commodities of the country and the London area and the ratio of the price levels between these two areas. With the nominal exchange rate between these two kinds of notes fixed, and given the real exchange rate, the Bank of England determined the price level in the country by setting the price level in the London area through the control of its note circulation. Given the price level in the country, the note issue of country banks was determined.

interest rate. He would receive a bank note, an IOU from the bank promising to pay gold or legal tender on demand. When the middleman resold the goods to the ultimate purchasers, he would pay off the IOU note, and the total quantity of bank notes would return to its original level. Bank notes arising from these transactions were then viewed as self-liquidating. From the real bills perspective, bank notes arising from the discounting of real bills are instruments of credit extension. Their quantity is limited by the real credit demands of the commercial sector. Thornton summarized this view as follows:

> The encrease of Bank of England paper . . . is the effect and not the cause of an advanced price of commodities. To enlarge the Bank of England notes merely in proportion as safe and real bills are offered in return for them is only to exchange one species of paper for another, namely, Bank of England notes for bills, which, though not so current or so safe as Bank notes, are sufficiently worthy of credit. It is, therefore, simply to afford a guarantee to the transactions of the merchant and thus to render that accommodation to commerce which it belongs to the Bank to give. (H, 230-31)

Real bills proponents argued furthermore that, if currency were overissued, it would not remain in circulation, but rather would be used to pay off loans. [See Humphrey (1982) on the real bills principle.]

Thornton uses his Bank-rate natural-rate model of money stock determination to refute the real bills view "that the Bank paper has a natural tendency sufficiently to limit itself" (H, 232). In his model, the central bank must target some nominal variable like the exchange rate in order to ensure equality between the Bank rate and the natural rate and thus to provide for a well-defined money stock and price level. He provides his most succinct criticism of the real bills view in a criticism of John Law. Thornton argues that the real bills assumption that an excess supply of currency will produce a reduction in the quantity of currency through a liquidation of bank loans fails to understand the price level as a monetary phenomenon. An excess supply of currency can create its own demand through a rise in the price level.

> He [Law] forgot that there might be no bounds to the demand for paper; that the increasing quantity would contribute to the rise of commodities; and the rise of commodities require, and seem to justify, a still further increase. (H, 342)

In parts of *Paper Credit*, Thornton argues that because a variety of factors could cause shifts in velocity, there would be no simple relationship between the money stock and the price level. In order that his discussion not be misconstrued, however, he also emphasizes that variability in the public's demand for money in no way reduces the responsibility of the Bank of England to provide for an explicit limitation on the quantity of money in order to preserve a well-defined price level.

> But although there is so great difficulty in estimating the precise influence on the cost of articles, or on the market price of bullion, which each alternation in the quantity of Bank of England notes may produce, there is no reason, on that account, to doubt the general truth of the proposition . . . that the restriction of the paper of the Bank of England is the means both of maintaining its own value, and of maintaining the value, as well as of limiting the quantity, of all the paper in the country. (H, 225)

8. The International Adjustment Mechanism

Assuming the operation of the international gold standard, Thornton extends the price-specie-flow mechanism, which as exposited by Hume had dealt only with exogenous changes in the money stock, to deal with real disturbances and the consequent monetary repercussions. [See Viner (1924) and (1937).] Thornton also presents the first discussion of the operation of floating exchanges rates in the context of the relationship between the internal and external value of the pound.

International Gold Standard Thornton begins his exposition with an explanation of the self-equilibrating character of the balance of payments. The condition of flow equilibrium in the trade sector is derived from the need for stock equilibrium in the market for money and securities.

> It may be laid down as a general truth that the commercial exports and imports of a state . . . naturally proportion themselves . . . and that the balance of trade . . . cannot continue for a very long time to be either highly favorable or highly unfavorable to a country. For that balance must be paid in bullion or else must constitute a debt. To suppose a very great balance to be paid, year after year, in bullion is to assume such a diminution of bullion in one country, and such an accumulation of it in another, as are not easily imagined. . . . To suppose large and successive balances to be formed into a debt is to assume an accumulation of debt which is almost equally incredible. (H, 141-42)

Thornton also derives aggregate balance in the foreign trade sector from the budget constraints of individuals [Perlman (1986)].

> There is in the mass of the people, of all countries, a disposition to adapt their individual expenditure to their income. Importations . . . are limited by the ability of the individuals of that country to pay for them out of their income. . . . And this equality between private expendi-

tures and private incomes tends ultimately to produce equality between the commercial exports and imports. (H, 142-43)

Under the assumption of fixed exchange rates, Thornton examines the effects of foreign remittances to subsidize continental governments fighting Napoleon and of bad harvests on the British balance of payments. Although not clearly stated, his argument is that the resulting balance of payments deficit will cause the domestic price level to fall and the foreign price level to rise. The deterioration in the real terms of trade, that is, the rise in the price of foreign commodities in terms of domestic commodities, will eliminate the deficit (H, 145).

Thornton criticizes the antibullionist position that "The evil of an unfavorable foreign exchange, and of a consequent high price of gold, arises from an unfavorable balance of trade and from that cause only" (H, 230-31). That is, Thornton criticizes the antibullionist position that exchange rate movements were due solely to the behavior of excess demand and supply in the foreign trade sector. Thornton argues that excess demand in the trade sector and excess supply in the market for the quantity of money are reflections of each other. In the case of real sector shocks, like poor harvests, the direction of causation runs from excess demand in the trade sector to excess supply in the market for money.

I conceive, therefore, that this excess [of paper], if it arises on the occasion of an unfavorable balance of trade, and at a time when there has been no extraordinary emission of notes, may fairly be considered as an excess created by that unfavourable balance. (H, 151)

In the case of excess issue of the currency, a monetary shock, the direction of causation runs from excess supply in the market for the quantity of money to excess demand in the trade sector.

"the coming and going of gold" does not . . . "depend wholly on the balance of trade." It depends on the quantity of the circulating medium issued; or it depends, as I will allow, on the balance of trade, if that balance is admitted to depend on the quantity of circulating medium issued. (H, 248)

Fluctuating Exchange Rates Thornton presents the purchasing power parity doctrine according to which fluctuating exchange rates will vary in order to maintain constant the terms of trade when domestic price levels change.

. . . as goods are rendered dear in Great Britain . . . our exports will be diminished; unless we assume . . . that some compensation in the exchange is given to the foreigner. . . . our imports also will encrease. . . . these two effects . . . will follow provided that we suppose, what is not supposable, namely, that, at the time when the price of goods is greatly raised in Great Britain, the course of [the] exchange suffers no alteration. . . . The fall in the selling price abroad of bills payable here will operate as an advantage to the foreign buyer of our commodities in the computation of the exchangeable value of that circulating medium of his own country with which he discharges the debt in Britain contracted by his purchase. It will thus obviate the dearness of our articles: it will serve as compensation to the foreigner for the loss which he would otherwise sustain by buying in our market. (H, 198-99)

Thornton argues that a floating exchange rate would maintain equality between exports and imports, although account had to be made for desired capital flows (H, 246-47).

Thornton constructed the analytical apparatus of *Paper Credit* in order to deal with the bullionist-antibullionist debate over the cause of the depreciation of the pound on the foreign exchanges. This debate turned on whether the depreciation of the foreign exchange value of the pound following Britain's suspension of the gold standard was a real or a monetary phenomenon. Under convertibility, the Mint had coined one ounce of gold into 3 pounds 17 shillings 10½ pence. In 1801, the pound price of gold rose above this former mint price. Bullionists argued that the excess of the market price over the mint price of bullion was due to the Bank of England's excess issue of its notes. That is, an increase in the money stock had led to a rise in the price level and also to a rise in the price of the specific commodity, gold bullion. Because Napoleonic Europe was on a gold standard, the pound price of gold bullion was the British exchange rate. Thornton believed that the rise in the price of gold bullion reflected a deterioration in Britain's real terms of trade. What is of enduring interest, however, is not Thornton's specific position in this debate, but rather his development of an analytical framework general enough to explain changes in the exchange rate as either a real or a monetary phenomenon.

Thornton's argument in support of his position that the depreciation of the pound was a real phenomenon possesses two parts. The first part is the presumed absence of monetary disturbances. At the time Thornton lived, the idea of an index number had not been invented, and there were no indexes for the price level. In the absence of evidence on the behavior of the price level, Thornton's argument for the absence of monetary disturbances turns on the other variables in the equation of exchange: 1) the money stock, 2) velocity, and 3) real transactions. 1) In support of their position, the bullionists pointed to an increase in Bank note issue between 1797 and

1801. Thornton disputes this position by arguing that the increase in Bank notes from 1795 to 1801 just offset the reduction in the circulation of gold guineas following the Restriction (H, 214). These guineas had been exported when gold coin ceased to circulate. That is, according to Thornton, the monetary base had remained unchanged. 2) Thornton does admit that the velocity of money had increased due to technological change in the payments industry, especially in the form of clearing houses to facilitate check clearing among banks (H, 101 and 222). 3) Thornton then claims, however, that the growth in British trade abroad that accompanied the continental wars had increased real transactions in Britain by enough to offset the effect on prices of the rise in velocity (H, 221-23).

The second part of Thornton's argument is that, while monetary disturbances appeared to be absent, there were obvious real disturbances that could have affected the real exchange rate, especially, the occurrence of two successive poor harvests that had increased British imports of food (H, 225). Finally, Thornton points out that the transitory nature of the shocks affecting the terms of trade would in time allow for resolution of the dispute over the cause of the depreciation of the pound on the foreign exchanges. If the depreciation were real, then the transitory nature of these real shocks would imply the reversal of the pound's depreciation (H, 221).

9. The Bullion Committee Report

Early in 1809, the gold bullion price of the pound fell sharply in Britain. Under convertibility, the Mint had made 123¼ grains of gold interchangeable with one pound sterling. In 1809, only 107 grains of gold were required to buy a pound. On February 1, 1810, Francis Horner, in the House of Commons, moved to form The Select Committee on the High Price of Bullion. Its report, issued on June 8, 1810, accuses the Bank of England of depreciating the value of the pound on the foreign exchanges through overissue of its notes.

The Antibullionist Arguments With Napoleonic Europe on the gold standard, the pound price of gold bullion measured the exchange rate between Britain and Europe. The antibullionists argued that the rise in the price of bullion reflected a deterioration of the balance of payments. They carried their argument further by contending that the real bills policy precluded the possibility that the note issue of the Bank of England could affect the exchange rate. With a real bills policy, it was argued, an excess supply of Bank notes could not arise.

> The Bank Directors . . . professed themselves to be most thoroughly convinced that there can be no possible excess in the issue of Bank of England paper, so long . . . as the discount of mercantile Bills is confined to paper of undoubted solidity, arising out of real commercial transactions, and payable at short and fixed periods. (C, 46)

> Mr. Whitmore, the late Governor of the Bank, expressly states, "The Bank never forces a Note in circulation, and there will not remain a Note in circulation more than the immediate wants of the public. . . . The Bank Notes would revert to us if there was a redundancy in circulation, as no one would pay interest for a Bank Note that he did not want to make use of. (C, 47)

According to the antibullionists, because there could be no excess supply of money, there could be no relationship between the note issue of the Bank and the value of the pound on the foreign exchanges. Mr. Pearse, Governor of the Bank of England, testified:

> In considering this subject with reference to the manner in which Bank notes are issued, resulting from the applications made for discounts to supply the necessary want of Bank notes, by which their issue in amount is so controlled that it can never amount to an excess, I cannot see how the amount of Bank notes issued can operate upon the price of Bullion, or the state of the Exchanges. (C, 33)

The Bullionist Rebuttal The Bullion Committee noted first that exchange rate movements can have a real, as well as a nominal, component (C, 22, 24, and 26). Its members also recognized the reasonableness of the position that the real terms of trade had depreciated. Its members, however, did not recognize the validity of the antibullionist argument that the real bills principle of the Bank of England precluded the emergence of an excess supply of money that could depreciate the value of the pound in the foreign exchange market. The Bullion Committee argued that the Bank Directors did not understand how suspension of the gold standard removed the institutional mechanism for determining the nominal quantity of money. The real bills principle did not provide for an appropriate check on the money stock because it determined the note circulation on the basis of credit demands.

> So long as the paper of the Bank was convertible into specie at the will of the holder, it was enough, both for the safety of the Bank and for the public interest in what regarded its circulating medium, that the Directors attended only to the character and quality of the Bills discounted, as real ones and payable at fixed and short periods. . . . It was hardly to be expected of the Directors of the Bank that they should be fully aware of the consequences that might result from their pursuing, after the suspension of cash payments, the same system which they had found a safe one before. (C, 48-49)

. . . while the convertibility into specie no longer exists as a check to an over issue of paper, the Bank Directors have not perceived that the removal of that check rendered it possible that such an excess might be issued by the discount of perfectly good bills. . . . That this doctrine is a very fallacious one, Your Committee cannot entertain a doubt. The fallacy upon which it is founded lies in not distinguishing between an advance of capital to Merchants and an additional supply of currency to the general mass of circulating medium. (C, 50)

Finally, the Bullion Committee argued that, given the usury law existing in Great Britain, only explicit rationing of use of the discount window, not the real bills principle, would limit the money stock (C, 57).

In the absence of an index of the price level, the Bullion Committee argued indirectly that the external depreciation of the pound was caused to a significant degree by overissue of Bank notes. In particular, the Committee argued that both the money stock and the velocity of money had increased. Its estimates of the money stock showed a significant increase beginning in 1809 (C, 62ff.). The Committee members used two arguments to show that the velocity of money had increased. First, they argued that velocity depends positively upon the state of confidence in private credit and that this confidence was high. Second, Committee members argued that technological innovation in the payments industry, in particular, the spread of checks and of clearing houses, had increased velocity.

10. The Committee's Conclusions

The Bullion Committee concluded that the depreciation of the pound on the foreign exchanges was primarily due to overissue by the Bank of England. Its members argued that during the suspension of the gold standard the behavior of the foreign exchange rate should serve as a criterion for setting the quantity of money. The Committee also drew the more fundamental conclusion that Parliament should put in place some institutional arrangement for providing a limitation on the nominal quantity of money (C, 45 and 49).

The Bullion Committee rejected a discretionary approach to monetary policy. It argued that discretionary adjustment of the money stock to changes in the public's demand for money was insurmountably difficult.

The suspension of Cash payments has had the effect of committing into the hands of the Directors of the Bank of England, to be exercised by their sole discretion, the important charge of supplying the Country with that quantity of circulating medium which is exactly proportioned to the wants and occasions of the Public. In the judgment of the Committee, that is a trust, which it is unreasonable to expect that the Directors of the Bank of England should ever be able to discharge. The most detailed knowledge of the actual trade of the Country, combined with the profound science in all the principles of Money and Circulation, would not enable any man or set of men to adjust, and keep always adjusted, the right proportion of circulating medium in a country to the wants of trade. . . . If the natural system of currency and circulation be abandoned, and a discretionary issue of paper money substituted in its stead, it is vain to think that any rules can be advised for the exact exercise of such a discretion. (C, 52-53)

The Bullion Committee recommended the return to the international gold standard. This standard dictates a country's domestic price level. The quantity of gold a country demands at the given price level is then provided through the balance of payments.

When the currency consists entirely of the precious metals, or of paper convertible at will into the precious metals, the natural process of commerce, by establishing Exchanges among all the different countries of the world, adjusts, in every particular country, the proportion of the circulating medium to its actual occasions, according to that supply of the precious metals which the mines furnish to the general market of the world. (C, 52-53)

The Bullion Committee also defined for the gold standard the different response of a central bank appropriate to an internal drain and an external drain.

It appears to Your Committee that the experience of the Bank of England in the years 1793 and 1797, contrasted with the facts which have been stated in the present Report, suggests a distinction most important to be kept in view between that demand upon the Bank for Gold for the supply of the domestic channels of circulation, sometimes a very great and sudden one, which is occasioned by a temporary failure of confidence, and that drain upon the Bank for Gold which grows out of an unfavourable state of the Foreign Exchanges. The former, while the Bank maintains its high credit, seems likely to be best relieved by a judicious increase of accommodation to the Country: the latter . . . ought to suggest to the Directors a question whether their issues may not be already too abundant. (C, 60)

11. Summary

In order to address the policy issue of the cause of the depreciation of the pound on the foreign exchanges, Thornton created an enduring analytical framework. The framework is of a general equilibrium nature and demonstrates the relationship between the internal and external value of money under fixed and floating exchange rates. The framework is capable of distinguishing real from monetary phenomena. In particular, Thornton could use it to consider changes in the exchange rate that were both real and monetary in origin. Thornton's framework contains an aggregate supply function that allowed

for the transitory nonneutrality of money and for the long-run neutrality of money. In his later speeches, Thornton also sketched out an aggregate demand function dependent upon the real rate of interest. Thornton's model is a natural rate model, that is, real variables are unaffected by the systematic actions of monetary policy. (An exception, of a second-order of magnitude, is made for the distributional effects due to the seigniorage from money creation.)

Thornton created a quantity theory framework that could incorporate paper money, the fiduciary issue of a fractional-reserve banking system. He had a sophisticated theory of the demand for real money that made the velocity of the components of the money stock vary with the difference between the market rate of interest and the own rate on the particular component. The supply of nominal money depends upon the difference between the market rate and the natural rate of interest. Because the interest rate enters in differently in the supply and demand schedules for nominal money, real sector shocks affect these schedules differently. Because the real variables that affect real money demand are only transitorily related to the nominal money stock, the price level must adjust to equilibrate shifts in the supply and demand schedules for nominal money.

Thornton developed the idea of a modern central bank that exercises control over all the liabilities of commercial banks. Monetary base creation by the Bank of England makes possible the transitory divergence between the natural and market rate of interest that leads to money creation. A recurrent theme in Thornton's work is the responsibility of the Bank of England to provide for explicit limitation of the monetary base in order to ensure a well-defined money stock and price level. During times of financial panic and bank runs, this responsibility requires the Bank of England to expand the monetary base in order to maintain the money stock. Thornton summarizes his policy prescriptions in the following passage:

> To limit the total amount of paper issued, and to resort for this purpose, whenever the temptation to borrow is strong, to some effectual principle of restriction; in no case, however, materially to diminish the sum in circulation, but to let it vibrate only within certain limits; to afford a slow and cautious extension of it, as the general trade of the kingdom enlarges itself; to allow of some special, though temporary, encrease in the event of any extraordinary alarm or difficulty, as the best means of preventing a great demand at home for guineas; and to lean to the side of diminution, in the case of gold going abroad, and of the general exchanges continuing long unfavorable; this seems to be the true policy of the directors of an institution circumstanced like that of the Bank of England. To suffer either the solicitations of merchants, or the wishes of government, to determine the measure of the bank issues, is unquestionably to adopt a very false principle of conduct. (H, 259)

12. Concluding Comment

The major theme in Henry Thornton's *An Enquiry into the Nature and Effects of the Paper Credit of Great Britain* is the central bank's responsibility for determining the money stock and the price level. The major theme of the *Bullion Report* is that this responsibility should be made explicit and that the mechanism chosen for determining the price level should not be a matter of ongoing discretion.[10]

The ideas of Henry Thornton continue to challenge the monetary policymaker today. Although it is now recognized that the Federal Reserve System bears the responsibility for the behavior of the price level, the procedure for determining it over time is not explicitly enunciated. The basic issue is what kind of anchor the monetary authority should provide for nominal values. Should this anchor remain fast in the sand so that the wind of real sector and monetary shocks moves the ship of nominal economic values around permanent moorings such as price level stability? Alternatively, should this anchor drag across the sand so that the wind of real sector and monetary shocks moves the ship of nominal values randomly away from any given location?

To repeat, two basic approaches to determining the price level over time are possible. One approach would precommit to a long-run path for the price level and consistently provide for some constraint on each period's decision making in order to assure that over time the price level moves around the given long-run path. The other approach, which is the current one, allows the price level to evolve on an ongoing basis through the accumulation of discretionary decisions made each period so that the price level wanders over time without any fixed point of return. Although close to two hundred years old, Thornton's work continues to challenge the modern policymaker to defend the institutional procedures chosen to anchor the nominal values of the economic system.

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[10] These two themes are repeated, respectively, in Black (1986) and Black (1987). On the latter issue, see Broaddus and Goodfriend (1984).

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