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THE RELATION BETWEEN
MONETARY CHANGES AND PRICES:
SOME HISTORICAL EVIDENCE RECONSIDERED

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[James] Madison entertained an intelligent view of the causes affecting the value of paper money. "It depends on the credit of the State issuing it, and on the time of its redemption; and is no otherwise affected by the quantity than as the quantity may be supposed to endanger or postpone the redemption."

Albert Bolles (1896), p. 147

1. Introduction

Central to most thinking about monetary theory and monetary policy is a version of the "quantity theory of money." According to Lucas (1980, p. 1,005), "two central implications of the quantity theory of money ... (are) that a given change in the rate of change in the quantity of money induces (i) an equal change in the rate of price inflation; and (ii) an equal change in nominal rates of interest." Lucas then goes on to state (p. 1,005) that these propositions "possess a combination of theoretical coherence and empirical verification shared by no other propositions in monetary economics."

While Lucas does not state what this "empirical verification" consists of, it seems safe to conclude that it includes the findings of Friedman and Schwartz (1963, p. 676) that, since the Civil War, "changes in the behavior of the money stock have been closely associated with changes in economic activity, money income, and prices. The interrelation between monetary and economic change has been highly stable." It also likely includes the claim of Friedman (1960, p. 2) that, in the postwar period, "no country succeeded in stemming inflation without adopting measures directed at restraining the growth of the stock of money," as well as the conclusion of Schwartz (1973, p. 264) that, at least since the time of Alexander the Great, "long-run price changes consistently parallel monetary changes"

These conclusions, and Lucas' propositions, have been so firmly held by economists that they are often built into (rather than derived from) economic models. They also influence everyday thinking about the role of the Federal Reserve System, in that the central bank is charged (under this view) with preventing secular inflation, increases in interest rates, etc.

However, despite Lucas' assertions about "theoretical coherence and empirical verification," the quantity theoretic propositions described above have come under sharp theoretical and empirical scrutiny. On theoretical grounds, the asserted

affects of monetary changes on prices and inflation have been challenged by Wallace (1981) and by Sargent and Smith (1986,1987). In particular, those authors produced economic models in which the consequences of monetary changes, even for nominal magnitudes, depend crucially on how such changes are accomplished. Loosely speaking, the work of Wallace and Sargent–Smith directs economic observers to examine the consolidated balance sheet of the Treasury and the Federal Reserve System. Monetary changes that affect total liabilities on this consolidated balance sheet (without compensating changes in assets) will have the affects Lucas predicts. However, monetary changes that do not result in changes in this consolidated balance sheet can actually be irrelevant for prices and interest rates. To illustrate this point, Sargent and Smith (1987) provide an example of a "once and for all" change in the money stock that produces no changes in prices or interest rates.

The theoretical results of Wallace and Sargent–Smith have some quite dramatic implications for the conduct of monetary policy. (a) Open market operations accomplished with "fiscal policy held constant" (that is, that occur with the consolidated balance of the Treasury and the Federal Reserve System unaltered) have no effect on prices. (b) Government attempts to "manage" foreign exchange rates can be effective only if accompanied by fiscal actions that have redistributive consequences. (See Sargent–Smith 1986.)

Of course if these results of Wallace and Sargent–Smith lack "empirical verification," as Lucas implicitly suggests, then the results are rightly not of great interest to economic policymakers or monetary economists. However, at least on the surface, there appears to exist quite strong empirical support for the Wallace/Sargent–Smith propositions. For instance, Sargent (1982), Bomberger and Makinen (1983), Makinen (1984), Smith (1984,1985a,b), Wicker (1985), White (1986), and Imrohoroglu (1987) provide evidence of a large number of episodes in which very

large monetary changes occur (in some cases over quite long periods), and in which price levels and currency values are extremely stable. In most of these cases it is fairly apparent that the monetary changes were accomplished without significant effects on the consolidated balance sheet of the Treasury and the relevant central bank. These episodes thus provide a wide range of empirical support for the Wallace/Sargent–Smith position, and against Lucas' version of the quantity theory. That more such evidence will appear seems likely as well, since Redish (1985) suggests the existence of similar evidence for periods in early Canadian history, for instance.¹ Given the cumulation of this kind of evidence, and given its important implications for monetary economics, it seems appropriate to briefly review the findings of some of this literature, as well as some reactions to these findings.

Sargent (1982) examined the experiences of four economies as they emerged from hyperinflations. One of his findings was that each of these economies experienced extremely rapid growth in its money supply for some time after the price level had been stabilized. Post–hyperinflation Germany, for instance, saw its money supply increase by a factor of nearly four in the year following price stabilization. Sargent then argued that these monetary changes were accomplished without altering the net balance sheet positions of the relevant Treasury/Central bank. Thus these episodes support the propositions derived by Wallace and Sargent–Smith. Subsequently, Bomberger and Makinen (1983) and Makinen (1984) accumulated similar evidence based on the experiences of other countries emerging from hyperinflations.

The evidence presented by Sargent (1982) is not universally regarded as being inconsistent with the quantity theory, however. Under one interpretation the hyperinflations essentially "destroyed" the monetary systems of these economies, which were then simply "remonetizing" after the stabilizations. Another interpretation is that the "reforms" that accompanied price stabilization required some adjustment in the

expectations of agents. Changes in expectations over time increased the demand for money, preventing increases in the money supply from producing inflation.² Thus further presentation of evidence is called for.

Smith (1984,1985a,b) presented an array of evidence that was consistent with Sargent's. Moreover, much of Smith's evidence is not readily explained by appealing to "remonetizations" or changes in expectations. In particular, Smith observed that, in the British North American colonies, there were a wide range of episodes in which the money supply apparently changed dramatically over long periods. These changes were quite often not accompanied by any price level movements. For instance, from 1760–70, the colony of New York reduced its per capita currency supply by 86 percent. Available evidence indicates that the price level fell only 2 percent over the same period. This kind of experience was repeated over and over in different colonies and different time periods. In addition, Smith argued that these monetary changes were accomplished with only minor changes in the (consolidated) government balance sheet. Hence these observations were again consistent with the Wallace–Sargent–Smith propositions, and inconsistent with the quantity theory. Moreover, since no regime changes (or monetary reforms) had occurred, the counter–arguments that are available against Sargent's interpretation of events are not available in the colonial context.³

Limitations in the kind of data that are available for the colonial period have led to some questioning of Smith's (1984,1985a,b) findings, however. Specifically, the only data that are available on colonial money supplies are measures of the amount of paper money issued by each colony.⁴ Smith related this money supply measure to movements in colonial prices and exchange rates, finding that in many cases large money supply movements produced no changes in price levels or currency values. However, in addition to their own paper currencies, the colonies had stocks of specie (coins) that circulated within them. Since no data on colonial specie stocks exist,

Smith's money supply measures necessarily omitted this component of the money stock. This omission was, in fact, discussed by Smith (1984,1985a,b), who presented some arguments about why the inability to measure the quantity of specie was unlikely to be of concern in interpreting the colonial evidence. These arguments centered on indications that the specie stock was generally a fairly small component of the colonial money supply.

Subsequent work by Bordo (1986), Bordo and Marcotte (1987), and Michener (1987) has called into question whether unobserved movements in the specie stock invalidate the evidence presented by Smith. Together these authors argue that specie was actually a large component of the colonial money supply. Moreover, they believe that movements in the stock of specie systematically counteracted movements in the stock of paper money, so that the movements in the money supply observed by Smith were completely illusory. Thus for instance, when Smith observed the stock of (paper) money fall by 86 percent in New York from 1760–70, Bordo, Bordo–Marcotte, and Michener believe that the total stock of money was actually unchanged. In particular, in their view, as the paper currency stock declined there were massive inflows of specie, essentially exactly offsetting the effects of the contraction in the stock of paper money. Moreover, they believe this was the case in each episode discussed by Smith.

As will be seen, Bordo, Bordo–Marcotte, and Michener do not provide evidence to support this position. Thus they must provide a further argument in order to make their position a plausible one. The second part of their criticism of Smith, then, is that Smith (and earlier historians of colonial monetary affairs) fundamentally misunderstood the monetary regime under which the colonies operated. Specifically, Smith presented the colonies as operating under a flexible exchange rate system in which colonial currencies circulated at market determined rates against other currencies (e.g., sterling). Bordo, Bordo–Marcotte, and Michener view the colonies as operating

under a fixed exchange rate system, in which colonial currencies bore a fixed value in terms of specie. Under this view, the colonies were small open economies operating under fixed exchange rates. According to standard quantity theoretic reasoning, then, the colonial money supplies were completely determined by the necessity of maintaining this fixed rate. When the colonies were attempting to change their money supplies by printing or withdrawing paper currency, their efforts were to no avail, then, and the paper currency measures used by Smith do not reflect actual changes in the total money supply.⁵

The purpose of this paper is to review where the colonial evidence stands in light of the Bordo, Bordo–Marcotte, and Michener critique. Thus the paper takes up three questions: (i) how important was specie as a component of the colonial money supply; (ii) were there specie flows that invalidate the evidence presented by Smith; and (iii) is it plausible to think of the colonies as operating under a fixed exchange rate regime? To summarize, the answers to these questions are as follows.

(i) It is not possible to know how much specie there was in the colonies. Many historians believe that there was very little, and that what specie was present in the colonies did not function as a medium of exchange. However, even taking an agnostic position on this issue, historical evidence suggests that there was not enough specie to invalidate Smith's conclusions.

(ii) In some of the most dramatic episodes discussed by Smith (1985a,b), all evidence suggests that the specie stock and the paper money supply moved together. Thus "offsetting specie flows" are not a possibility. In other cases it is possible to place bounds on the specie stock that indicate that offsetting specie flows were not feasible.

(iii) The literature reviewed above does not suggest a plausible mechanism by which a fixed exchange rate system could have been maintained.

The paper begins with a brief review of colonial monetary arrangements in Section 2. Sections 3 and 4 review the quantity theory and the propositions of

Wallace/Sargent–Smith. These sections discuss why the nature of the colonial exchange rate regime is at issue, and offer some comments on why the colonies present particularly interesting evidence regarding these different approaches to monetary theory and policy. Section 5 presents evidence on specie flows for three colonies discussed by Michener. Section 6 examines the colonial exchange rate regime, and argues that there is no reason to view the colonies as operating under fixed exchange rates. Section 7 concludes.

2. Overview of Monetary Arrangements

The term "money" applied to the colonies has been taken by various historians to include a large number of different objects. However, in the discussions of Smith (1984,1985a,b), Wicker (1985), Bordo, Bordo–Marcotte, and Michener, the term money can be taken to mean paper currency issued by the colonies themselves and specie.⁶ These components of the money supply are now discussed.

Each colony had its own unit of account; in the period under consideration "pounds" in the currency of the colony in question. Before the colonies printed (or minted) their own currencies these were simply abstract accounting units—almost no money existed denominated in these units. Once paper money was issued, it was denominated in the unit of account of the colony issuing it, and in fact, this paper money would be the only money denominated in this unit of account. Finally, for the colonies discussed here, it is reasonable to view each colony as being able to operate an independent monetary policy.

From the point of view of studying the empirical relevance of the Wallace/Sargent–Smith propositions, the colonies are ideal. This is because, under the way colonial monetary systems were intended to operate, all increases (decreases) in the colonial money supply were supposed to be accompanied by changes that preserved the

colony's (consolidated) balance sheet position. More specifically, in the colonies discussed here there were only two methods for increasing the stock of paper currency. (i) Currency could be printed in order to finance government deficits. When this was done the currency was used for direct purchases of goods and services. Moreover, at the same time the currency was issued, the government would levy specific future taxes. These taxes could be paid either in paper currency, or in specie accepted at a defined rate in lieu of paper currency. Such taxes provided a mechanism for retiring the currency issued. More importantly, if levied in sufficient amounts, these taxes provided a source of future revenues which would roughly maintain the colony's (consolidated) balance sheet position.⁷

The second mechanism for introducing currency was (ii) by printing the money and issuing it in the form of loans to private citizens. When loans were repaid the currency was to be retired. Moreover, these loans constituted an asset acquired by colonial governments, again preserving their net balance sheet positions. Methods used by the colonies to insure the security of these loans are discussed by Smith (1985a,b,1987). Thus all monetary issues were intended to be "backed" by actions preserving the net balance sheet positions of the colonial governments. In the colonies to be discussed below, existing evidence suggests that the governments were in fact quite scrupulous in attempting to offset monetary increases with either current asset acquisitions or increased future tax revenues (Smith 1985a).

In addition to paper currency, gold and silver coins circulated in the colonies. These mostly of Spanish and Portuguese origin, entering the British colonies through the trade with Spanish and Portuguese colonies. These coins were not denominated in the unit of account of any colony. Moreover, the scope for them to circulate was limited by the fact that much specie was in relatively large denominations, inhibiting its use in ordinary transactions. [See Hanson (1979,1980) and McCusker and Menard (1985, p. 339).]

How important was specie as a component of the colonial money supply? Here opinions differ greatly. Ferguson, in his justly celebrated study The Power of the Purse says that

what coin existed in the colonies came mainly from trade with the Spanish and French West Indies. Its circulation was largely confined to merchants, and its stay was likely to be of short duration—it was a commodity for export rather than a medium of exchange (p. 4).

In expressing this view Ferguson could easily have been paraphrasing many contemporary authors. For instance, Benjamin Franklin⁸ referred to "silver; ... which is now become a merchandise, rising and falling like other commodities as there is a greater or less demand for it or as there is more or less plenty." Brock (1975, p. 166) quotes a committee of the South Carolina assembly to the same effect; that "gold and silver had 'for the most part been dealt for as a merchandise, and not as a currency in payments, or a medium of trade'." Moreover, with respect to the amount of specie available, "in ordinary times the supply of specie was at best meagre and uncertain, and was not infrequently wanting altogether." (Brock 1975, p. 532.)

Taking the opposite position is Michener,⁹ who says that "colonial (paper) currency passed in domestic transaction at a customary fixed rate with pieces of eight" (p. 258), and who believes that "over two thirds of the money supply must have been specie in New York and Pennsylvania in 1774" (p. 275). This estimate is not consistent with other existing estimates, however. The estimate in the historical literature of how much specie there was that most closely approximates Michener's is that of Weiss (1970, p. 779), who estimates specie to have constituted between 52 and 60 percent of the money supply in New York and Pennsylvania at this time. Estimates that appear to receive more support in the historical literature are Letwin's (1981) estimate that specie could have been no more than 40 percent of the money supply of Pennsylvania at

this time, or McCusker and Menard's (1985) estimate¹⁰ that about 25 percent of the colonial money supply was specie. Not only is Michener's estimate of the specie stock inconsistent with other estimates, but Michener makes no attempt to reconcile his estimates with historical assertions that there was a "minor amount of coin" only in Pennsylvania from 1770–75, for instance. (Bezanson, 1951, p. 10.)

The bottom line is that historians do not know, and quite likely will not ever know, how much specie there was in the colonies either in absolute amount, or relative to paper currency. The bulk of historical evidence suggests much less than half. Moreover, we know that many colonies were especially poor in specie. It is perhaps best to consider the case of each colony separately, as is done by Smith (1987). However, fortunately for the purposes of this study, it is not necessarily to take a stand on how much specie was available in the colonies as a whole, since the arguments presented below will not depend on this.

It remains, then, to discuss the "exchange rate regime" that prevailed in the colonies. This discussion is best deferred until after a description of the quantity theory and the Wallace/Sargent–Smith propositions, however. This will permit some discussion of why the nature of the colonial exchange rate regime is at issue.

3. The Quantity Theory

In its most basic form, the quantity theory simply asserts that "money times velocity equals nominal income." This statement can, in fact, be taken as a definition of (income) velocity, and as such has no empirical content. In order to give the quantity theory empirical content, it is necessary to provide further economic structure. For our purposes it is convenient to adopt Friedman's (1956) assertion that velocity (or money demand) is a stable function of real income, nominal interest rates, and possibly expected inflation. Under suitable side hypotheses about the response of real income

and real interest rates to "long-run" monetary changes, Friedman's assertions allow Lucas' propositions (above) to be deduced.¹¹ This will constitute the "quantity theory" here.

What does the quantity theory predict will happen as a result of a long-run change in the money supply (or money growth rates) then? Under the hypothesis of "long-run neutrality" of money, real income, and real interest rates will be unaffected. Other predicted changes depend on the exchange rate regime.

Consider a "small open economy," i.e., one whose actions have negligible effects on world prices. If this economy has flexible exchange rates vis-a-vis other currencies, its actions will not affect world prices. Hence its exchange rate will depreciate in proportion to the increase in the money supply, and its domestic price level will also rise proportionately.

On the other hand, consider a "small open economy" with fixed exchange rates. Under the quantity theory, the fixed exchange rate and world prices determine domestic prices and inflation. Since real income and interest rates are not affected by monetary changes, the hypothesis of stable money demand (or velocity) implies that the domestic money supply must be unaltered. Thus a change in one component of the money supply requires offsetting changes in other components, or in foreign holdings of domestic currency. In a setting like the colonies, "offsetting" specie flows would be a possibility.

Consider the colonies, then. Existing historical evidence suggests that "long-run" variations in per capita real income and in nominal interest rates were minor.¹² Then if the colonies had flexible exchange rates against other currencies, large monetary changes should have produced proportional changes in price levels under the quantity theory. If the colonies had fixed exchange rates, then large monetary changes should have produced large offsetting specie flows.¹³ Notice, then, that under the

quantity theory, long-run changes in the stock of paper currency issued must create either proportional long-run movements in prices and exchange rates, or offsetting specie flows. If they do neither then the quantity theory fails to explain these historical episodes (independently of the exchange rate regime).

4. Other Models

In contrast to the quantity theory, Wallace (1981) and Sargent-Smith (1986,1987) present models in which it is possible for long-run changes in the money supply to have no effect on the price level or exchange rates, even under a flexible exchange rate regime. Their reasoning parallels the reasoning that underlies the Modigliani-Miller theorem for corporate finance. In particular, Modigliani and Miller (1958) presented circumstances under which the following result holds: a corporation cannot affect its market value purely by rearranging its liabilities (say between debt and equity).

Wallace/Sargent-Smith present models in which the same reasoning applies to the government. More specifically, in their analyses pure reorganizations of the government balance sheet (i.e., the consolidated balance sheet of the Treasury and Central bank) do not affect the market value of government liabilities, including currency, and hence do not affect the price level. But, as this reasoning makes clear, only monetary changes that represent pure rearrangements of the (consolidated) government balance sheet will leave price levels (and other measures of currency values, such as exchange rates) unaffected.

The latter caveat is important. In general when central banks engage in open market operations they exchange noninterest bearing liabilities, like currency, for interest bearing liabilities like bonds. In the absence of any other actions on the government's part, such an exchange will alter "retained earnings" on the government's

portfolio, and hence not be a pure rearrangement of the government balance sheet. Thus an important part of the Wallace/Sargent–Smith analysis is that monetary changes accomplished through open market operations be accompanied by government "rebates" of "excess earnings" on the government portfolio. These "rebates" can take the form of tax reductions.¹⁴

In practice, open market operations are rarely accompanied by such rebates. Thus the Wallace/Sargent–Smith results will not apply. This is why randomly selected episodes will not shed light on whether these models are empirically relevant. However, the colonies are ideal for studying the Wallace/Sargent–Smith propositions, since colonial governments routinely "rebated" excess earnings generated by their portfolio changes via tax reductions (Smith 1987). Thus colonial evidence will bear on these propositions.

Finally, in contrast to the situation under the quantity theory, the Wallace/Sargent–Smith results can be stated without reference to the prevailing exchange rate regime (Sargent–Smith 1986). Thus their analyses predict that colonial monetary changes will produce no effects on price levels, exchange rates, or specie flows, independently of the colonial exchange rate regime.

5. Monetary Changes, Prices, and Specie Flows: The Evidence

Three episodes are now examined in which large changes in the amount of paper money in circulation occurred. These changes were apparently accomplished without significant effects on the balance sheets of the relevant colonial governments. Thus the Wallace/Sargent–Smith propositions suggest that no significant changes should have been observed in prices or exchange rates. Since this is what occurred, colonial evidence supports this view. For the events described to be consistent with the quantity theory, however, it is necessary for movements in the stock of paper currency

to have been "offset" by changes in other components of the money supply (specie). Moreover, this would have to be the case independently of the prevailing exchange rate regime. Available evidence about movements in the stock of specie for these colonies is now reviewed. A systematic review of the evidence concerning specie flows during other periods and in other colonies appears in Smith (1987).

A. Virginia (1755–70)¹⁵

Virginia first introduced paper currency in 1754. From 1755–60, the per capita stock of paper currency in Virginia rose 749 percent. While no price index is available for colonial Virginia, McCusker's (1978) sterling exchange rate series shows a currency depreciation of only 9 percent.¹⁶ If the stock of paper currency provides a reasonable estimate of movements in the total money supply, this is a sharp empirical refutation of the quantity theory.¹⁷

From 1760–70, the per capita paper currency stock of Virginia contracted by 98 percent. This massive monetary reduction was accompanied by only a 16 percent appreciation of Virginia currency against sterling, again refuting quantity theoretic predictions.

Virginia is the only case where Michener¹⁸ claims to present evidence of offsetting specie flows, suggesting that the data just discussed misrepresent Virginia's monetary situation. Michener's "evidence" consists of "the report of Andrew Burnaby, an English traveller who visited Virginia in the fall of 1759 Burnaby noted that the 'the use of paper currency in this colony has entirely banished from it gold and silver' ..." (p. 208).

Does this change the picture of Virginia's monetary situation? Clearly not. Even assuming that "Burnaby's report" can be taken at face value, we have to ask whether it represents evidence of specie flows that "offset" the changes known to have occurred in the paper currency supply. The historical literature provides us with an

estimate of how much specie there was in Virginia by the beginning of 1756: "less than £20,000" (Ernst 1973, p. 48, Ernst 1987). In 1757 alone, Virginia issued £180,000 in paper currency. Thus even if Burnaby was right, only a small fraction of the change in the paper currency stock could have been "offset" by specie flows. To summarize, it is possible that a focus on movements in the stock of paper money overestimates monetary movements in Virginia [which was admitted by Smith (1985a)]. However, specie flows cannot change the basic picture of a very large increase in the money supply.

Michener is silent on the topic of specie inflows during 1760–70, which he must believe occurred in large amounts. Again the evidence suggests otherwise, since existing literature indicates an acute shortage of money in Virginia throughout the latter part of the decade (Evans 1962).

B. New York (1755–70)

From 1755–60, the per capita paper currency stock of New York rose 89 percent. During this period the price level in New York rose 20 percent, and the exchange rate against sterling fell by only 7 percent.

From 1760–70, these events were reversed. During this decade the per capita paper currency stock was reduced by 86 percent. The price level fell by only 2 percent, however, and the sterling exchange rate remained virtually unchanged. Again, these events are consistent with the quantity theory only if there were offsetting changes in the stock of specie.

It appears, however, that to the contrary there were massive inflows of specie while the paper currency supply was increasing, and that there were massive outflows of specie while the paper currency stock was declining. To see this, consider the following. From 1755–60, New York increased its paper currency stock by about £485,000. During the same period New York received Parliamentary grants from England with a value in

colonial currency of £195,000 (not all of which was specie). But this only scratches the surface of specie inflows.

Valuable as the parliamentary grants were in providing specie and exchange, they were in New York's case small in comparison to the sums of specie brought into the colony's (sic) ... as a result of the fact that large numbers of his majesty's forces were located in the colony (at this time). (Brock 1975, p. 348.)

Thus, as summarized by Brock (p. 350), "there were sizable importations of specie into New York," both from England and from other colonies. Finally, according to Brock (p. 351), there were significant inflows of specie from the West Indies. Thus we know that there were not offsetting specie outflows during this period, and in fact in all likelihood, a focus on paper currency movements understates the extent of the monetary expansion that occurred in New York during these years.

From 1762–70 it is also known that there were massive specie outflows. By the end of 1763 the merchant John Watts wrote "we have nothing remaining but paper currency." (Brock, p. 352–3.) This situation continued, with Ernst (1973, p. 259) describing "the critical shortage of coin" in New York throughout 1768. Since we know that there was a great deal of specie in New York in the early 1760s, specie outflows must have been large indeed during this period of massive contraction in the paper currency stock.

Thus in the case of New York we know that there were no "offsetting" changes in the specie stock, and in fact it is quite likely that specie flows magnified changes in the money supply.

C. Pennsylvania (1755–70)

Of all the colonies and time periods considered by Smith (1984,1985a,b), Pennsylvania from 1755–60 provides the best candidate for specie flows that offset

movements in the paper currency supply. This is not surprising, in some sense, since Pennsylvania was probably the most "specie-rich" of the colonies. It is interesting, then, to consider the case of Pennsylvania at this time, as such a consideration permits an illustration of what heroic assumptions are required to generate offsetting specie flows in the most "specie-rich" of the colonies, and in a colony which had a not unusual (by the standards of other colonies at this time) increase in its paper currency stock. It will be seen, however, that even if these heroic assumptions are accepted, offsetting specie flows are not a possibility for 1760–70.

From 1755–60, the per capita paper currency supply of Pennsylvania increased by 277 percent. Nevertheless, Pennsylvania currency appreciated against sterling, and the price level (in Philadelphia) rose only 17 percent.

As was the case in the other colonies considered, the years 1760–70 saw a major monetary contraction. In this decade the per capita paper currency stock was reduced by 68 percent. This reduction was accompanied by a price level decline (in Philadelphia) of only 3 percent and Pennsylvania currency appreciated only 3 percent against sterling.

The situation with respect to potential changes in the stock of specie can only be guessed at. One obvious problem is that we have no clear idea of how much specie was available at the beginning of the period. This is easy to see in that Brock (p. 386) says that "by 1753 complaints of the scarcity of currency (which Brock takes to include specie) were being received by the assembly," and in the same sentence says that "the receiver of the quit rents reported ... that 'full four fifths' of the money received by him was gold and silver" Without saying why, Brock takes four-fifths as a working figure, and Michener (p. 282) apparently follows Brock in this. It is interesting to consider the consequences of doing so.

Since Pennsylvania had £82,500 paper currency in circulation at this time, if specie was 80 percent of the money supply, this implies a specie stock of £330,000.

From 1753–60 Pennsylvania increased its paper currency in circulation by £403,700. Interpolating population figures suggests a 25 percent increase in the population. Following Michener's lead, take the population increase to represent the increase in the demand for money. Then, at an unchanged price level, Pennsylvania could have accommodated (under the quantity theory) a money supply of £515,500. This implies a net specie outflow of about £300,000. Thus offsetting specie flows are a logical possibility, if one accepts Brock's estimate that 80 percent of the money supply was specie in 1753. (For future reference this would have left Pennsylvania with £30,000 in specie in 1760.) An even larger gross outflow of specie would have been required to accomplish this, however, since we know that Pennsylvania experienced an "influx of specie ... during the early years of the (French and Indian) War." (Brock, p. 387.) Even Michener (p. 280) presents evidence of specie inflows into Pennsylvania from other colonies during these years, and Michener also argues (p. 283) that during 1758–60, "Pennsylvania's earnings of foreign exchange (were) exceptionally high." Thus while offsetting specie flows are a possibility (under Brock's estimate), they require enormous gross outflows of specie.

Moreover, as seen above, the estimate that 80 percent of Pennsylvania's money supply was specie 1753 is very large, even relative to Michener's "two-thirds" estimate.¹⁹ Replacing Brock's 80 percent with Michener's 67 percent estimate leaves Pennsylvania with a specie stock of only £165,000 in 1753. By my calculations, even if Pennsylvania was devoid of specie by 1760, its per capita money supply would have increased under this scenario by over 57 percent from 1755–60. This is more than triple the percentage increase experienced in the price level. Finally, one could repeat these calculations using more conventional estimates of the specie component of the money supply. Letwin's (1981) upper bound on this figure was 40 percent. Replacing Brock's 80 percent estimate with 40 percent gives Pennsylvania a specie stock of about £55,000

in 1753. Thus offsetting specie flows are a logical possibility only if one accepts an immense figure for the specie component of the money supply.

Suppose one takes an agnostic stand on this issue, and admits that there are possible scenarios under which changes in the Pennsylvania currency stock (from 1755–60) were offset by specie flows. What was the situation from 1760–70? During this period of immense reductions in the per capita paper currency stock, it is probable that there were net outflows of specie. Even Michener (p. 284) indicates that Pennsylvania exported specie during the early 1760s, and that "local supplies of specie were greatly reduced." (Recall that even under Brock's estimate, Pennsylvania would have had only about £30,000 specie in 1760 if offsetting specie outflows had occurred. How these specie shipments were accomplished if there had been offsetting specie flows during 1755–60 is an interesting unanswered question.) Moreover, outflows of specie continued from 1763–66.

By the beginning of 1766 the amount of paper in circulation ran close to £290,000 out of the total of £330,000 outstanding at the end of the war. Coin supplies apparently diminished far more rapidly. (Ernst 1973, p. 102.)

And, while Michener claims (p. 285) that "Pennsylvania imported substantial amounts of specie" in 1766 and 1767, "by late 1767 and through the next year numerous newspaper articles appeared citing the great scarcity of money." (Ernst 1973, p. 107.) Thus such imports could not have been too substantial. And even Michener (p. 285) says that "merchant letters suggest that the specie inflow was halted or reversed in 1768." Thus it is clear that there were not significant inflows of specie during this decade, and that quite likely there were net outflows of specie.²⁰

What does the Pennsylvania evidence indicate, then? If there were offsetting specie outflows from 1755–60, there must have been almost no specie in Pennsylvania

by 1760. Since specie flows could not have been very important from 1760–70, movements in the stock of paper currency present a completely accurate picture of the monetary situation in Pennsylvania during this decade. Then a 68 percent reduction in the money supply occurred in the face of almost constant prices and currency values. On the other hand, if there were not offsetting specie flows from 1755–60, the quantity theory cannot explain the relative price stability of this period. Thus in either case we observe overwhelming evidence against the quantity theory in colonial data.

To summarize, then, the evidence as it currently exists indicates that movements in the money supply (as measured by the stock of paper currency) cannot generally have been "offset" by specie flows. Further evidence on this point is reviewed by Smith (1987). Why, then, did Bordo, Bordo and Marcotte, and Michener believe that offsetting specie flows should have (or did) occur?²¹ This belief was apparently dictated by their view that the colonies operated under a fixed exchange rate regime. As seen above, this view (in conjunction with the quantity theory) would direct them to expect such specie flows. Of course that these flows did not occur indicates that the quantity theory is inconsistent with colonial evidence. However, it is also possible to ask whether it would be reasonable to think of the colonies as operating under a fixed exchange rate regime in the first place? This question is now addressed.

6. The Colonial Exchange Rate Regime

In studying the colonial exchange rate regime, it is important to distinguish between what historians call "the par of exchange" and "the commercial exchange rate." It will be recalled from above that, even before many colonies issued paper currency, these colonies had local units of account called pounds. This unit of account was defined by setting a value, in colonial pounds, for a Spanish piece of eight. This legislated value defined the par of exchange.

The par of exchange was not an exchange rate, however. To emphasize, colonial governments neither intended nor expected that this legislated rate would obtain in private transactions, nor did the governments attempt to enforce or maintain the par of exchange as an exchange rate. This point will be discussed in more detail below.

The exchange rate that prevailed in individual transactions is referred to as the commercial rate of exchange. This rate is logically distinct from the par of exchange; as put by McCusker (1978, p. 21), "par was only a benchmark; the commercial rate of exchange fluctuated around par" What determined the commercial rate of exchange? Again relying on McCusker's (1978, p. 23) description, "the final and most important influence on the commercial rate of exchange was the state of the market for bills of exchange. Here, of course, the laws of supply and demand were at work" Did the commercial rate actually differ from the par of exchange? According to Governor Lewis Morris of New Jersey, "the colonies on the continent very much differ in (the) proportion (that) their currency bears to sterling, and each colony daily alters."²² This is clearly the description of a flexible exchange rate regime.

Bordo (1986), Bordo–Marcotte (1987), and Michener (1987) do not accept this characterization of the exchange rate regime, however. I will now attempt to sketch my understanding of their views, and my evaluation of their position. This is easiest in the case of Bordo and Bordo–Marcotte. Bordo and Marcotte state that (p. 312–3) "South Carolina ... fixed the exchange rate between its currency and the British pound sterling at 7:1." At this point it is clear, however, that Bordo and Bordo–Marcotte have simply confused the par of exchange with the commercial rate of exchange.

To emphasize that colonial governments did not enforce the par of exchange as a commercial rate of exchange, it is sufficient to view the attitude of colonial courts

and legislatures toward what Bordo and Marcotte view as a fixed rate. For instance, in 1755 the Virginia House of Burgesses amended an earlier act in order "to allow courts of execution to settle all executions for sterling debts in local currency ... at a 'just' rate of exchange. A just rate was taken to be the actual rate (i.e., not the par of exchange) at the time of court judgment." (Ernst 1973, p. 54.) Or as put by Gipson (1961, p. 23) "local courts should have the authority to ascertain the difference in exchange between sterling and current money." That there was such a difference is amply indicated by the fact that "a significant margin could exist between the rate set by the provincial court and the commercial rate at the time a debtor finally settled his account." (Sosin 1964, p. 178.) To summarize, notice that the legislature directed the courts not to enforce the par of exchange in settlements. Similar court attitudes in New York, Pennsylvania, and North Carolina are discussed by Smith (1987). Finally, to indicate that legislatures never intended the par of exchange to be an exchange rate, we can examine the attitude of the Virginia House of Burgesses. "No laws, they declared, could guard against the fluctuating rate of exchange." (Sosin 1964, p. 180.)

Michener's position is more difficult to describe, since he in effect takes two positions. Michener begins (p. 238) by saying "Curtis Nettles (sic)(1934) discussed the rating of foreign coins, the arrangement I believe effectively fixed the par of exchange" This is correct by definition, but as we have seen, the par of exchange and the commercial rate of exchange were not the same thing. Michener (p. 258) goes on to argue "that exchange rates in many colonies fluctuated within specie points about a fixed par of exchange." However, Michener (as will be seen) later abandons the position that this par of exchange was the one fixed by colonial governments.

Unlike Bordo/Bordo–Marcotte, Michener recognizes that interpreting the colonies as operating under fixed exchange rates raises several problems. In particular, a standard textbook definition of a fixed exchange rate system would be something like the following:²³

A fixed exchange rate regime is one in which the central bank declares a central or par value at which it will act to maintain its currency. It also usually involves the central bank declaring what is known as an intervention band. That is, in declaring a fixed exchange rate, the central bank announces that if the exchange rate rises above the par value by more than a certain percentage amount, then it will intervene in the foreign exchange market to prevent the rate from moving any further away from the par value. Likewise, if the rate falls below the par value by a certain percentage amount, the central bank declares that it will intervene to prevent the rate from falling any further.

In order to maintain a fixed exchange rate, a central bank stands ready to use its stock of foreign exchange reserves to raise or lower the quantity of money outstanding so as to maintain its price relative to the price of some other money.

One obvious problem with interpreting the colonies as operating under fixed exchange rates is that there was no central bank, or other entity, that stood ready to maintain any fixed rate in this manner.

Michener recognizes this difficulty but attempts to avoid it, saying (p. 263) "how this (fixed exchange rate) was enforced is an interesting question but somewhat beyond the scope of this paper." Michener does hazard some guesses, however. "The modern institutional arrangement is to have a government institution ... which holds reserves of foreign exchange and stands ready to exchange domestic currency for foreign exchange at the par of exchange it wishes to defend. The simple answer may be that colonial Treasurers' offices performed this function in colonial times" (p. 263). Michener then describes some claims by one colonial Treasurer to this effect.

We know that this depiction is inaccurate, however. According to Nettels (1934, p. 262)

Acts of issue (of money) generally promised that the holders of the colony's bills (paper money) might at any time exchange them for any stock in the colonial treasury. But since the treasuries ordinarily did not have any stock of either specie or goods of approved value, this promise probably had no effect in maintaining the specie value of the bills.

Thus another device is called for.

Seemingly anticipating this argument, Michener offers a second possibility regarding how a fixed rate of exchange could have been maintained. In particular, he believes (p. 264) "that the leading merchants of the colony defended the fixed par." To be more specific, Michener asserts (p. 264) that "the principal merchants of a colony would actually confer, decide on what ought to be current money (i.e., the exchange rate), and then attempt to persuade others to follow their lead."

This somewhat surprising assertion would seem to require more of a supporting argument than Michener provides, however.²⁴ First, there is no attempt to describe which merchants fixed the rate of exchange, nor is there an attempt to show that merchants as a group had coincident interests vis-a-vis currency values.²⁵ Finally, there is no convincing argument provided that it could logically have been feasible for merchants to maintain a fixed exchange rate in the manner described above.

On the latter point, Michener does make some attempt at a defense. He believes that the institutional arrangement he describes "effectively made currency and specie perfect substitutes at the customary valuation." Being perfect substitutes, the exchange rate between these objects would have been indeterminate,²⁶ with merchants free to choose any value they preferred. To summarize Michener's position, then, "pieces of eight and bills of credit (paper money) were used interchangeably as a medium of exchange. Colonial currency passed in domestic transactions at a customary fixed rate with pieces of eight, a rate generally recognized by both the courts and the government, who gave the custom legal sanction." (Michener p. 258.) And, of course, these "customary rates" were set by merchants.

This description of events contains three historical inaccuracies. (i) As seen above, no legal sanction was given to any fixed rates. (ii) The notion that specie and paper currency were perfect substitutes, or "circulated interchangeably" is false.²⁷ (iii)

We know that, as a general statement about the colonies, the notion that merchants fixed rates is unsupportable. For instance, history tells us that in 1768 the New York "Chamber of Commerce appointed a committee to establish the value in New York currency of the major coins in circulation" (McCusker 1978, p. 156.) This would hardly have been necessary if the merchants making up the Chamber of Commerce had either been setting an exchange rate, or "following the lead" of other merchants.²⁸ Thus Michener's chain of reasoning regarding the exchange rate system of the colonies contains three inaccurate components. There is no reason then, on the basis of the arguments given by Bordo, Bordo and Marcotte, or Michener, to overturn McCusker's (1978) (and others') description of the colonies as having had a flexible exchange rate system.

7. Conclusions

To summarize the arguments given above, there is no reason to alter the standard historical perception of the colonies as operating under a flexible exchange rate system. There is also no reason to think that specie flows occurred in ways that would make colonial history consistent with the predictions of the quantity theory of money. Moreover, colonial data provides far more evidence than that cited above against the quantity theory. (See e.g., Smith 1987.) Since in the colonies considered monetary changes were accomplished without significant alterations in net government balance sheet positions, this data is supportive of the propositions derived by Wallace (1981) and Sargent-Smith (1986,1987), however. In light of the similar evidence cumulating from other places and periods (Sargent 1982, Bomberger and Makinen 1983, Makinen 1984, White 1986, and Imrohoroglu 1987), it is necessary to entertain seriously the possibility that the effects of monetary changes depend as much on how they are accomplished as on their magnitude.

Notes

(1) Notice that all of this evidence is historical in nature. This is because the Wallace/Sargent–Smith models predict different economic behavior from that which Lucas predicts only when monetary changes occur that are not accompanied by changes in the consolidated balance sheet of the Treasury and the central bank. This rules out the use of postwar time series data to discriminate between the competing hypotheses.

This is not to say that there is no modern evidence on this issue, however. Miller (1983) presents evidence that, since the mid–1960s, changes in the net liability position of the Treasury–Federal Reserve System, rather than the money supply alone, has been the relevant "variable" from the point of view of price level changes.

It might also be mentioned that there is much more historical evidence against Lucas' propositions than that cited in the text. See e.g., the discussion of historical French experience in Riley and McCusker (1983).

(2) The latter argument is acknowledged by Sargent (1982, footnote 18).

(3) See also Wicker (1985) for a similar interpretation of these events. Calomiris (1988) discusses the lack of support for the quantity theory in these historical episodes, and presents an explanation for its failure in terms of monetary/fiscal interactions. These interactions are not the ones emphasized by Smith (1984,1985a,b), or by Wallace (1981) and Sargent–Smith (1987), however. Finally, White (1986) suggests strong parallels between parts of French and Spanish history and the American colonial experience.

(4) Colonial monetary institutions and some components of the colonial money supply are discussed in the next section.

(5) Surprisingly, given that this is their description of events, Bordo–Marcotte and Michener make no attempt to discuss why colonial governments continually attempted to manipulate their money supplies. Nor do they explain why the quantity of paper money emitted was such a contentious subject in many colonies.

(6) For a discussion of other candidates for inclusion in the "money supply" see Smith (1987). Smith also discusses why the absence of data on these candidates is not of great concern for the purposes of the present paper.

(7) A related line of reasoning [which is pursued by Wicker (1985)] is as follows. This method of creating currency converts all decisions about government finance into decisions purely about the timing of taxation. Hence the arguments raised initially by Barro (1974) are relevant.

(8) Quoted by Bullock (1900), p. 54–55.

(9) Bordo and Bordo–Marcotte apparently accept Michener's views on the subject.

(10) There are admittedly problems encountered by McCusker and Menard in arriving at this estimate, which are discussed by Michener (p. 278–9). There are, however, numerous problems in constructing any such estimate. Consider for instance, Michener's estimate, arrived at by using Alice Hanson Jones' (1980) studies of colonial probate records for 1774. There are a large number of problems with using these records for the purposes to which Michener puts them. First, by definition probate records represent the financial holdings of older (and wealthier) individuals than the population as a whole. Second, Jones examined probate records only for the year 1774, while it is known that "values reported by probate inventories, particularly financial assets and liabilities, fluctuated violently in response to the changing fortunes of the export sector." (McCusker and Menard 1985, p. 264.) Third, "while designed to generate an unbiased wealth estimate for probated decedents, the (Jones) sample is small ... and the standard error large; one wonders if the numbers are sufficient to support the elaborate weighting and adjustment needed to generate figures for the living population." (McCusker and Menard 1985, p. 265.) The latter problem is highlighted by Michener's admission (p. 275) that only 38 percent of sampled probate

inventories report any holdings of cash, which illustrates the potential for substantial "standard errors." For further elaboration on the points above see McCusker and Menard, p. 264–5. Parenthetically, Weiss (1970) also uses Jones' probate studies to arrive at his figures.

Michener (p. 280) also cites Brock (1975, p. 447) and Bullock (1900, p. 176–7) as providing evidence that specie was plentiful in the colonies. My reading of Bullock is that he actually asserted the contrary. A reading of p. 446 and 447 in Brock indicates that the specie stock of South Carolina expanded in concert with a major expansion in the paper currency stock. This cannot provide support for Michener's position.

(11) More elegant derivations of quantity theoretic propositions like that of Lucas (1982) could equally well have been examined.

(12) See Smith (1987) for a discussion of this evidence.

(13) Since colonial currencies did not circulate outside the colonies, and since the colonies had no banks—and hence no bank created money—the only candidate for compensating changes in the money supply is specie.

(14) An example of some confusion caused by a failure to understand that the Wallace/Sargent–Smith analysis requires essentially only that these rebates occur is the discussion in Michener (p. 245–53). Michener criticizes Smith (Smith 1984, 1985a, b) for applying the analysis just outlined to the colonies. His criticism takes the form of arguing that the colonies did not always retire currency as scheduled, and hence that the analysis does not apply to the colonies. Such a criticism is clearly misplaced. An examination of Sargent and Smith (1987) will indicate that the timing of government transactions plays no role in their argument. Manipulation of taxes and other payments to the government in such a way as to hold earnings on the government portfolio "constant" is the important element in their results.

(15) The quick sketch of events below is fleshed out in Smith (1985a,1987).

(16) Bordo–Marcotte and Michener correctly point out that McCusker's exchange rate series does not present true "spot" exchange rates. McCusker actually presents the price of "sterling bills of exchange," which were claims to future payment of specie. It is unclear to me from reading these authors whether they intend this point to be a criticism of the use of McCusker's series for the purposes in the text. It should be noted, however, that the kind of data McCusker presents is routinely used as if it provided "spot" exchange rates. See e.g., Bezanson et. al (1935), p. 7. Michener (p. 275) also employs McCusker's series in this way.

(17) Since Virginia had only introduced paper currency in 1754, this was a new regime. Hence appeals to "monetizations" and changes in expectations might be appropriate here. However such appeals would have little basis in the two colonies discussed below.

(18) Bordo and Bordo–Marcotte do not claim to provide any direct evidence of specie flows, apparently being content to accept Michener's arguments.

(19) Since economic conditions are unlikely to have been much different in 1774 from what they were in 1753 (at least with respect to per capita real income and nominal interest rates), under the quantity theory the level of real balances per capita should have been roughly similar in these two years. If one believes specie was about two-thirds of the money supply in 1774, then it must also have been about two-thirds of the money supply in 1753 in order to conform to such a prediction.

(20) This conclusion is in complete accord with the conclusions of all other historical studies of this period. For instance, Walton and Shepherd (1979), studying the period 1768–72, said of the colonies in general: "only if balance-of-payments surpluses consistently had been earned would the colonies have accumulated an adequate supply of circulating coin. We are justified in assuming that

balance-of-payments surpluses did not occur, since no such supply did accumulate" (p. 104-5).

(21) Michener (p. 280) asserts that there is evidence in Seventeenth Century literature that specie flows of the appropriate type did actually occur. The literature he cites consists of Smith (1776, p. 323) and Hume (1955, p. 108). I read this literature as simply asserting the absence of significant amounts of specie in the colonies. This cannot be supportive of Michener's position, which of course requires the colonies to have had an ample stock of specie.

(22) Quoted by McCusker (1978), p. 116. Incidentally, McCusker's description of the colonial monetary system is completely standard. The reader interested in confirming this can consult Ernst (1973, p. 15): "The rate of exchange (in the colonies) is (was) a price determined by the play of market forces." Ernst (p. 15) goes on to present examples where specie commanded a premium relative to paper currency "despite the laws rating paper and coin as equal" (i.e., despite the fixed par of exchange). The reader can also consult Ferguson's (1953, p. 18) classic piece: when "sterling bills (of exchange) became scarce and expensive ... specie and bills of exchange rose in value relative to paper money." See also Hammond (1957, p. 10): "The bills of credit of colonial governments (might) ... either be kept equal in value to specie or not." Other references include Lester (1938, p. 325), Weiss (1970, p. 775), and Bullock (1900, p. 78). Soltow's (1958) piece is also extremely valuable. It describes the meeting of an organized foreign exchange market in Williamsburg. In this market "when the supply of cash was ... scarce ... the exchange rate declined. If there was more money than (sterling) bills (of exchange), the price of sterling rose." (Soltow 1958, p. 478.)

(23) The statement quoted is from Parkin (1982), p. 537.

(24) A modern analogy to this method for maintaining a fixed exchange rate would be the following. Canadian merchants would confer, decide what the exchange

rate "ought to be," and would attempt to persuade others to follow their lead. In doing so they would fix the U.S./Canadian exchange rate.

Parenthetically, there are a number of historical reports of failed attempts by groups of merchants to manipulate exchange rates. See Smith (1987), footnote 35.

(25) We know that as a matter of historical fact they did not. See e.g., Ernst (1982).

(26) See, e.g., Kareken and Wallace (1981).

(27) For instance, Ernst (1965, p. 45) presents evidence that "exchange rates between specie and sterling often deviated from the figures cited for paper and sterling." Thus these were not "used interchangeably." Also of interest is McCusker's (1976, p. 97) statement: "A paper bill of credit, with a distinct, explicit value in colonial currency, was naturally to be preferred over any given coin, the value of which in colonial currency was uncertain, or at least debatable."

In short, specie and paper money were not perfect substitutes from the point of view of the colonists. For further details on this point, the reader is referred to McCusker (1976). Finally, since specie and paper currency were not perfect substitutes, Michener needs to show that it was feasible for merchants to maintain an exchange rate. He does not attempt to do so.

(28) The Chamber of Commerce was quite explicit that its action was necessary because paper currency and specie were not circulating at the par of exchange. This fact is also apparent in the report of the above mentioned committee. On these points see Stephens (1971), p. 52, 56, 316-7.

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Table 1
New York

Date	Note Issue Outstanding (£) ^a	Note Issue per 1,000 Population ^b
1755	179,076	1848
1756	230,773	
1757	219,281	
1758	307,198	
1759	481,186	
1760	410,387	3503
1761	366,158	
1762	330,807	
1763	287,163	
1764	243,885	
1765	166,502	
1766	131,502	
1767	109,799	
1768	87,348	
1769	82,858	
1770	81,591	501

	Price Level ^c	Exchange Rate ^d
1755	66	180.13
1756	66	182.65
1757	65	178.40
1758	70	172.60
1759	79	168.39
1760	79	167.20
1761	77	181.41
1762	87	189.76
1763	79	186.73
1764	74	184.85
1765	72	182.80
1766	73	177.18
1767	77	178.96
1768	74	179.87
1769	77	172.47
1770	77	165.90

^aSource: Brock (1975), Table XVI, November figures.

^bSource: Brock (1975) and U.S. Bureau of the Census (1976), series Z1-19.

^cSource: Warren, Pearson, and Stoker (1932), p. 215-16.

^dSource: McCusker (1978), p. 164-5. (£N.Y. per £100 sterling.)

Table 2
Pennsylvania

Date	Note Issue (£) ^a	Per capita note issue (£ per 1,000 people) ^b	Exchange rate ^c	Price Index (PA £) ^d
1750	84,500	707	170.60	113.0
1751	84,000	-	169.86	112.8
1752	83,500	-	166.85	111.9
1753	82,500	-	167.49	109.9
1754	81,500	-	168.35	109.1
1755	96,000	702	168.79	107.3
1756	147,510	-	172.57	109.6
1757	262,466	-	166.07	107.1
1758	329,774	-	159.00	109.6
1759	433,562	-	153.52	125.0
1760	486,199	2,646.7	158.61	125.7
1761	438,104	-	172.71	121.2
1762	349,053	-	176.26	133.4
1763	286,312	-	173.00	136.4
1764	328,058	-	172.86	119.4
1765	302,400	-	169.90	118.4
1766	278,736	-	162.96	124.7
1767	263,860	-	166.02	123.7
1768	234,450	-	166.62	119.7
1769	230,496	-	157.56	115.9
1770	204,468	851.7	153.92	121.6

^aSource: Lester (1938, p. 353) for 1750-55, Brock (1975, Table XIX) for 1756-70.

^bSource: Weiss (1970, p. 779) for 1725-55, Brock and U.S. Bureau of the Census (1976), Series Z1-19 for 1760-70.

^cSource: McCusker (1978, 184-6); PA £ per £100 sterling.

^dSource: Bezanson, Gray, and Hussey (1935,433).