Colonial North Carolina's Paper Money Regime, 1712-1774: Value Decomposition and Performance

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The North Carolina's assembly emitted its own paper money and maintained some amount in public circulation during its entire history as a separate colony. No systematic or statistical analysis of North Carolina's paper money regime exits in the literature. We correct that here. We model and estimate how the market value of this money was determined. We compare the quantity theory of money with an asset-pricing model to see which explains the observed market value of the paper money better. Finally, we explore counterfactual redemption architectures to show how redemption affected monetary performance in periods of value collapse.

In the Lower House of the North Carolina Assembly, Tuesday the 29th of November 1757:

Resolved, That the said several Sums be burnt at four o'clock this Afternoon at the House of Richard Cogdell and the following message be sent to the Council (Vizt)

Gentlemen of His Majestys Honble Council

The Treasurers of this Province having paid into the Committee of Accounts the Sum of £2540 in Treasurers notes £61.0.0 of which not emitted, and that Thos Barker Esqr Treasurer of the Northern District hath paid into the said Committee the sum of £1051.15.11½ for the sinking fund, and John Starkey Esqr hath paid into the said Committee the sum of £934.17.5½ for the same fund, and this House have resolved that the said sums be burnt at four o'clock this Afternoon at the House of Richard Cogdell in New Bern Therefore desire your Honours will Appoint a Committee of your Board to Join this House to see the same done accordingly. (Clark, Saunders, and Weeks [*CR* hereafter], v. 5, pp. 898-9)

Public burnings of paper money sound strange to modern ears; something hard to fathom. Yet such events were a regular and systematic occurrence in colonial America where provincial governments who initially issued the paper money would later collect it and have a public demonstration of destroying it. Provincial governments repeated this cycle of issuance,

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collection, and destruction over and over again. If nothing else, this observation should tell the reader that colonial paper money was fundamentally different from the paper monies they are familiar with today, as well as different from the banknote paper monies of the 19th century. The systematic burning of paper money is but one of several mysteries about colonial paper money that we will explain using the history of colonial North Carolina's paper money regime.

The British North American colonies were the first Western economies to emit sizable amounts of paper money—called *bills of credit*. Colonial legislatures had these bills printed and placed in their treasuries. They directly spent these bills on soldiers' pay, military provisions, salaries, and so on. They also loaned bills on interest to their citizens, who secured these loans by pledging their lands as collateral. These colony-specific, legislature-issued paper monies formed an important part of the circulating medium of exchange in many colonies (Brock, 1975; Grubb, 2016a; Newman, 2008). They were the only paper monies in circulation. No public or private incorporated banks issuing paper banknotes, redeemable on demand in specie, existed in colonial America (Hammond, 1991, pp. 3-67).

North Carolina was an early adopter of paper money, being the second of the southern colonies, after South Carolina, to emit paper money. It was the only colony to emit paper money from the beginning of its existence as a separate colony through the rest of the colonial period. Spanning from 1712 through 1774, North Carolina maintained one of the longest continuous paper money economies among the 13 colonies.

Despite this long history, North Carolina's paper money has been woefully understudied. Little is known about the magnitudes in circulation, how the various emissions of paper money performed, and what determined the value of the paper money in circulation. This has not stopped scholars from deriding colonial North Carolina's paper money as an archetype of what

was bad about colonial paper monies (Brock, 1975, pp. 112-3, 428-41; Bullock, 1900, pp. 129-74; Ernst, 1973, pp. 82-3, 206-7; Smith, 1985, pp. 1,188, 1,194-7). Exactly when and why it was bad, however, is poorly articulated and not coherently explained.

For example, Leslie V. Brock (1975, pp, 112-3) concluded that "The story of the North Carolina currency during this period [pre-1748] is a discouraging one. …North Carolina remained a barter economy. When the first bills were emitted there was no gold or silver in the colony to be displaced by them; nor was the barter currency supplanted by them. The result was that the bills were in a large measure superfluous, and in consequence fell in value." Brock (1975, p. 439) also noted that "The depreciation that the North Carolina bills of credit underwent during the decade of the fifties brought the colony under attack by British merchants."

We correct this inadequate history and lack of analysis by reconstructing yearly data over the entire history of colonial North Carolina's paper money regime on the face value of gross emissions, net emissions, redemptions and removals, and amounts in public circulation (provided in Appendix Table A). These data allow us to provide the first systematic analysis of what determined the market value of North Carolina's paper money over its entire history. Figure 1 shows the outcome of this data reconstruction exercise for the quantity of paper money in circulation measured in face value.

Much can be learned about the history of colonial North Carolina, as well as about paper money in colonial America, from colonial North Carolina's paper money regime. Several features of North Carolina's paper money regime allow for the study of aspects of paper money performance that cannot be easily studied in other colonies. Large movements in the value of North Carolina's paper money allow for a clearer view of the forces at work than what can be gleaned from relatively smaller variations in paper money values experienced in other colonies.

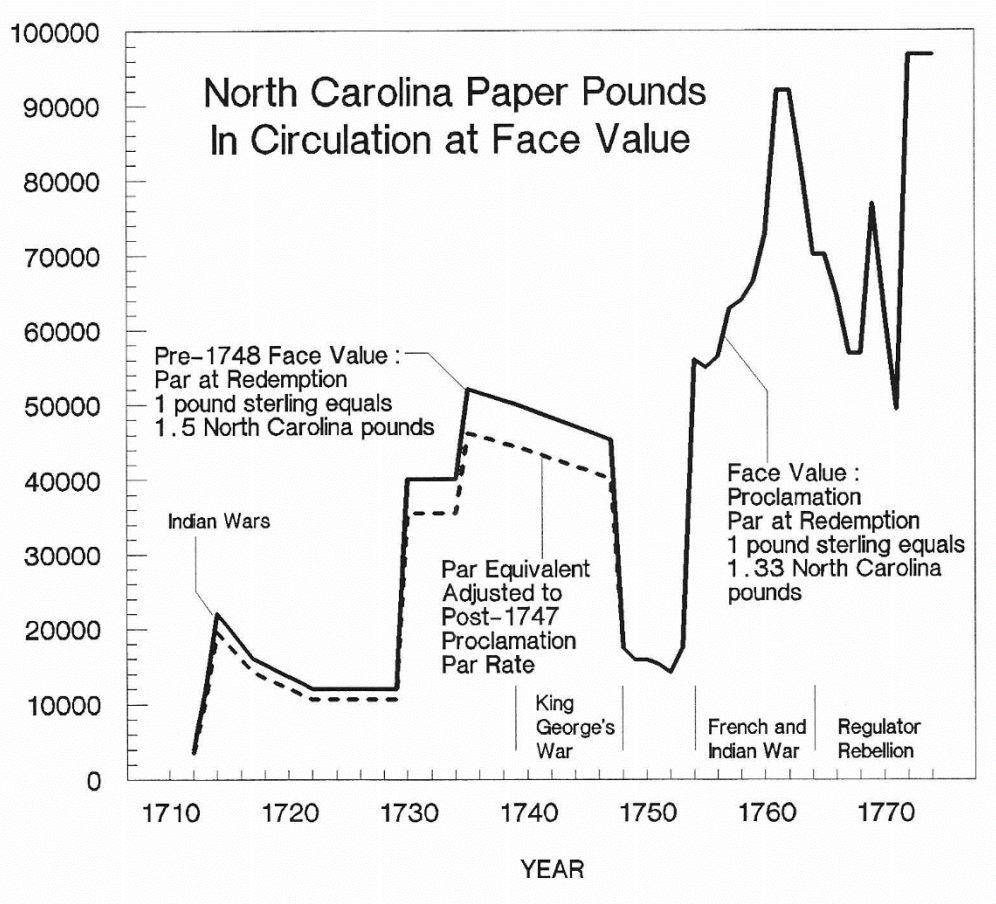

Figure 1. *Colonial North Carolina Paper Pounds in Circulation at Face Value, 1712-1774*

Source: Appendix Table A; Cutsail and Grubb (2018).

The assembly spent considerable time, energy, and legal space on structuring its paper money emissions, namely on how and when the money would be redeemed and removed from circulation, how it would be emitted out of the treasury, and so on. Some emissions paid interest, most did not. Some emissions were a legal tender, some were not. Some emissions were handwritten; other emissions were typeset on a printing press. Some emissions were loaned to citizens who pledged their lands as collateral; most were spent directly out of the treasury to pay military expenses, salaries, and other government debts. One emission was invalidated by a newly arrived governor well into its operation. Finally, while the assembly formally redeemed and destroyed most emissions, they recirculated a few emissions, and partially defaulted on

others. In this sense, there was a sequence of paper money regimes across subsequent emissions rather than a single regime over the entire colonial period. These variations allow us to tease out nuances in paper money performance not easily discerned in other colonies.

Colonial North Carolina's economic and political history is incomplete without a full explication of its paper money regimes and how they performed. Many of the political conflicts between the assembly (the Lower House) and the governor, as well as with the British Board of Trade, involved paper money. The participation of North Carolina in colonial wars and wars with indigenous Americans depended on paper money. Lastly, the internal economy and the size and timing of the tax burdens imposed were affected by paper money emissions. As such, future political, economic, and social histories of colonial North Carolina will be informed by, and must be consistent with, the paper money data and analysis provided here.

Prior to emitting paper money, North Carolina's media of exchange consisted of barter, often involving book credit transactions; personal bills of exchange and promissory notes; and foreign coins. The composition of this media is unknown, though coins were considered relatively scarce. Complaints by North Carolinians that there was not enough paper money or other monies to execute domestic transactions and pay local taxes were ubiquitous throughout the period. To make up for the scarcity of money, the assembly made rated commodities a legal tender and acceptable for paying taxes from 1712 to 1748 and again in 1754, 1764, and 1770 (Bullock, 1900, pp. 153, 157, 182; Brock, 1975, pp. 429-31; *CR*, v. 4, pp. 569-71; v. 25, p. 234). In periods, when rated commodities were not a legal tender, North Carolinians agitated to reinstate them as legal tender. Colonial North Carolina remained a relatively under monetized society throughout the period.

The following examples of money-scarcity statements are gleaned from the minutes of

the Lower House of the assembly. A report by the assembly in 1736 claimed that the 12,000$£_{NC}$ in bills in circulation in 1722 were "the only Currency or portable Medium of Trade subsisting in the Province" ($£_{NC}$ = North Carolina paper pounds). In 1731, the scarcity of specie was commented on in the assembly, with a claim that not 1/20th was available for what was needed just to pay the King's quit rents. In 1754, the Governor expressed that there was a "want of bullion and coin" in the province. He then advocated for a permanent fund of credit based on a land-bank loan emission of paper money. In 1757, the assembly received a petition for relief due to the "great want of currency" which included a request that more paper money be emitted. In 1764, 1765, and 1766, the assembly received motions and considered acts to allow taxes and judgments to be paid in rated commodities because of a want of currency. In 1767, the Governor said the colony was in distress for want of a circulating currency. In 1768, concern over the scarcity of money was mentioned in the assembly. The "great scarcity of money" was mentioned in the act authorizing emission #17 of paper money in December of 1768 (see Appendix Table A for emission numbers). In 1771, the assembly noted the lack of enough specie to serve as a circulating medium of exchange. Other scholars have commented on this general state of under monetization for executing domestic transactions in colonial North Carolina (Bullock, 1900, pp. 125-8, 143-4, 153, 161, 167-9; Brock, 1975, pp. 106-13, 429-31, 438-9, 443-5; *CR*, v. 3, p. 294; v. 4, p. 178; v. 5, pp. 234-5, 851; v. 6, pp. 1,274, 1,282; v. 7, pp. 61-88, 394, 572, 928; v. 9, p. 142; v. 23, p. 781; Ernst, 1973, pp. 199-206).

The paper proceeds as follows: first we present a value decomposition model for inside money. Second we apply that model by estimating the expected present value of the paper money as real barter assets and compare that with the observed market value of the paper money. We then run a horse race between the quantity of paper money in circulation and the expected

real asset present value of that money to see which better explains the market value of the paper money. Lastly, we explore counterfactual redemption architectures to understand monetary performance in periods of value collapse.

A Decomposition Model for Inside Monies

We apply the Grubb (2016a, 2016b, 2016c) decomposition approach to evaluate North Carolina's paper money performance. The observable market exchange value (*MEV*) of this money is decomposed into its component parts, see equation (1). *MEV* equals its expected real-asset present value (*APV* - *RD*), i.e. its value as just another non-money barter asset, plus its transaction premium (*TP*) that measures its pure "moneyness" value, i.e. its extra value as a transacting medium of exchange. Positive values for *TP* measure the willingness of the public to pay a premium above the bills' expected real-asset present value, because the bills served as a more convenient transacting medium than the next best barter alternative. The expected real-asset present value is further separated into its pure time-discounted component (*APV*), and its default risk component (*RD*). All components in equation (1) are calculated as a percentage of face value to be in a comparable metric.

(1) $MEV_t \equiv (APV - RD)_t + TP_t$

Legislatures controlled *APV* and *RD*. They controlled *APV* by choosing the redemption structure and they influenced *RD* by how they followed through on that redemption structure. *TP* was determined by the public through the structure of the economy in terms of how the public evaluated and used alternative media of exchange to execute domestic transactions.

Empirical measurement is the difficult part of applying this approach. While *MEV* can be measured using data on exchange rates to an outside money, *RD* and *TP* cannot be independently measured. In addition, measuring *APV* entails constructing a counterfactual value of the bills,

namely their value when not used as money and when no risk of default is expected. Constructing this counterfactual and disentangling it from *MEV* requires attention.

Fortunately, North Carolina's bills were structured as zero-coupon bonds, except for the emissions in 1712-1713 and 1756-1759 (emissions #1, #2, #9, #10, #11, #12, and #13) which were structured as interest-bearing bonds (Grubb, 2016a; Hutchinson and Rachal, 1962, v. 1, pp. 305-06; Labaree, 1967, v. 11, pp. 13-15; Smith, 1937, pp. 310-12). The bills had legally defined maturities, or loan due dates, when they were paid off, or paid in, at face value in specie equivalents to North Carolina's government. They could be redeemed at face value for tax payment obligations any time after initial emission. Given expected redemption time-paths for loans and tax obligations, payoff values, and an appropriate risk-free time-discount rate, the *APV* of these bills as risk-free non-money tradable bonds can be calculated independent of their *MEV*.

Moving the variables that can be independently measured to the left-hand side, and the variables that cannot be independently measured to the right-hand side, yields equation (2). In terms of proportions, the ratio APV_t/MEV_t shows how much of MEV_t is accounted for by APV_t with the residual share being accounted for by $(TP - RD)_t$. The gap between MEV_t and APV_t, measures the magnitude of $(TP - RD)_t$.

(2) $(MEV_t - APV_t) \equiv (TP - RD)_t$

Behaviorally, *TP* is likely a negative function of *RD*. Thus, as *RD* takes on positive values, *TP* is quickly driven to zero. An asset with a high default risk is unlikely to possess a transaction premium, i.e. be the preferred medium of exchange, relative to an asset with a low default risk. Thus, we assume that when $(TP - RD)_t > 0$, it is primarily due to $TP_t > 0$; and when $(TP - RD)_t < 0$, it is primarily due to $RD_t > 0$.

For scholars who see this as a radical departure from their monetary orthodoxy, you do

not have to believe in this approach for it to be a useful tool. This is not about monetary ideology. It is about predicting empirical patterns. If North Carolina citizens are assumed to act *as if* their paper money were zero-coupon bonds and are assumed to have acted *as if* they correctly forecasted the actual redemption path of these bonds, then the observed market value of their paper money is more accurately predicted and tracked than by using any other method or theory. While this approach can be viewed as just an empirical tool, if the success of that tool makes scholars more accepting about using this approach as a theoretical way to conceptualize money, that will open the door to additional far reaching insights that have applications beyond colonial American paper money.

MEV and APV Data Construction

To apply equation (2), two data sets are required. We compile the market exchange value (*MEV*) of North Carolina's bills between 1713 and 1774, and we calculate the counterfactual expected real-asset present value (*APV*) of North Carolina's bills as non-money low-risk bonds. We use the observed market exchange rates between North Carolina's bills and bills of exchange paying pounds sterling in London to construct *MEV*. These exchange rates are derived from merchant account books and statements by provincial government officials. They are expressed as the face value amount of North Carolina bills needed to buy, in North Carolina, a 1 pound sterling bill of exchange drawn on London (McCusker, 1978, pp. 218-9). The *APV* and exchange rate data are presented in Appendix Table A.

We adjust these exchange rates to account for the cost of getting a bill of exchange to London and getting it liquidated into specie usable in North Carolina. We estimate that cost to be approximately 7 percent (Grubb, 2016a, pp. 179, 202; 2016b, p. 1,222). Thus, the realized par exchange rate of a North Carolina bill is $1.395£_{NC} = 1£_{S}$ compared with the legal par exchange

rate of 1.5£$_{NC}$ = 1£$_{S}$ from 1712 to 1747, and 1.24£$_{NC}$ = 1£$_{S}$ compared with the legal par exchange rate of 1.3333£$_{NC}$ = 1£$_{S}$ from 1748 to 1774. *MEV* is calculated by dividing these adjusted numbers by the observed exchange rates. *MEV* measures the spot-market conversion in North Carolina of North Carolina paper pounds into a silver commodity outside money expressed as a percentage of the face value of North Carolina paper pounds. Given uncertainty over the exact transaction cost underlying the adjustment to the legal par rate, an *MEV* within a percentage point of that calculated is possible.

North Carolina's paper money had a bearer-bond quality that required an explicit redemption exercise to extinguish the principal expressed on the bill's face. North Carolina's citizens are assumed to act *as if* they understood their paper money to be interest-bearing bonds in 1712-1713 and 1756-1759, and zero-coupon bonds in other years, that required time-discounting to ascertain their present values (their *APVs*), and to know how to calculate these values (Labaree, 1967, v. 11, pp. 13-15; Smith, 1937, pp. 310-12). The public is also assumed to know the quantity of bills in circulation (M_t) and the amounts redeemed (RED_t) each year as shown in Appendix Table A.

At a given point in time, bills with different redemption dates would have different *APV*s. The evidence does not fully record what bills from which emissions were redeemed when. Given legal tender laws, bills from any emission currently outstanding could be used to pay any current taxes. For these reasons, we assume that the public responded only to the *expected* redemption of the *average* bill currently outstanding. Because the *MEV* data measure the current market value of the average bill in circulation, and does not distinguish between bills of different emissions, *APV* is calculated to measure the pure time-discounted present value of the average or representative bill currently outstanding so that *MEV* and *APV* are comparable measures.

Equation (3) shows how we calculate the expected *APV* of the average bill in circulation. The amount of North Carolina paper money outstanding in a given year is assumed to be redeemed by all bills actually redeemed in the immediately following years, until the year when that original amount is fully redeemed. These yearly redemption amounts are divided by the initial amount outstanding from the chosen year to assign a yearly weight to its contribution in the redemption process. The time discounts between the initial year and the redemption year are multiplied by the contribution-weights for their respective years. The time-discount-weight values for each year are summed to get the expected present value of a representative bill outstanding for that chosen year. The *APV* calculation is adjusted to account for the present value of the interest actually paid on emissions that were designated to pay an interest.

$$(3) \qquad APV_j = \sum_{t=j}^{N} (RED_t/M_j)e^{-rt}$$

Where r = the risk-free time-discount rate or opportunity cost of capital, M_j = the face value amount of North Carolina paper money outstanding in year j, RED_t = the face value amount of North Carolina bills redeemed and retired from circulation each year, with RED_N being the amount in the last year N that satisfies:

$$(4) \qquad \sum_{t=j}^{N} (RED_t/M_j) = 1.$$

No time-series of market-generated interest (discount) rates for any class of assets currently exists for colonial America. Therefore, we use the r considered normal by colonial contemporaries for assets with relatively low default expectations. This rate is used as a proxy for what in modern analysis is designated as the risk-free rate. The rate at which North Carolina loaned bills in 1729 was 6.25 percent. In 1764, Benjamin Franklin stated that the rate for

discounting well-funded legislature-issued zero-coupon bonds was 5 or 6 percent (Labaree, 1967, v. 11, pp. 13-15). The interest rate mentioned most often for the middle colonies in the second half of the eighteenth century was 6 percent (Grubb, 2016a, pp. 163-4). Earlier in the century, and perhaps during wars, the rate may have been slightly higher. Given uncertainty over the exact rate, an *r* of 6 and 8 percent is used, with 6 percent being our best guess.

Compositional Analysis of *MEV*

Figure 2 compares the levels of *MEV* and *APV* over time, when *APV* is discounted at 6 and 8 percent. *MEV* could easily be within a percentage point or two of that drawn due to measurement error. While 6 percent is our best-guess discount rate, uncertainty over that rate means that up to 8 percent could also be used. Considering the range of possible measurement errors in *MEV* and *APV*, the hypothesis that *MEV* is primarily and predominantly comprised of *APV* cannot be rejected given the data in Figure 2. Little (*TP* - *RD*) figures in to *MEV*. North Carolina's bills were not a fiat currency. They were predominantly barter assets. North Carolina's paper money traded below face value due to time-discounting, not depreciation. Most writers on colonial paper money have simply confused time-discounting for depreciation.

Using only the years with *MEV* data and the 6 percent discount rate, $APV > MEV$, leaving *RD* = 2.9 percent such that $APV - RD = MEV$. When using the 8 percent discount rate, *APV* accounts for 97 percent of *MEV*, leaving *TP* = 3 percent such that $APV + TP = MEV$. Discount rates between 6 and 8 percent lead to $APV \approx MEV$. On average, North Carolina's bills possessed little "moneyness" value. They were just barter assets, and sometimes risky barter assets.

Separating the period into pre- versus post-1748, namely pre- versus post-default and restructuring of par, alters the outcome slightly. Again, using only the years with *MEV* data over the period 1713-1747, and when discounted at 6 percent, $APV > MEV$, leaving *RD* = 4.3 percent,

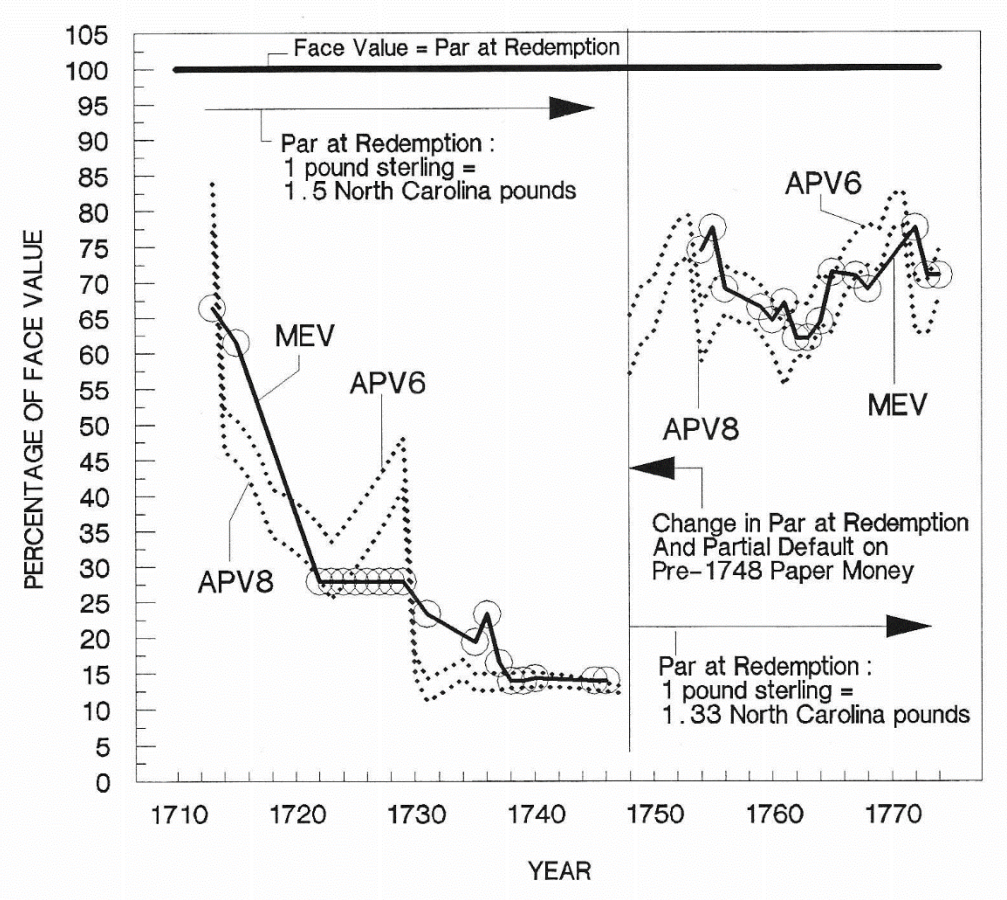

Figure 2. *North Carolina's MEV versus APV, 1712-1774*

Sources: Appendix Table A and the text.
Notes: Circles indicate exchange rate data for *MEV* with linear interpolated values connecting them. APV6 and APV8 are *APV* when discounted at 6 and 8 percent, respectively. See text for construction.

such that *APV* - *RD* = *MEV*. When discounted at 8 percent, *APV* accounts for 99.4 percent of *MEV*, leaving *TP* = 0.4 percent, such that *APV* + *TP* = *MEV*. However, over the period 1748-1774 when discounted at 6 percent, *APV* accounts for 99.8 of *MEV*, leaving *TP* = 0.2 percent, such that *APV* + *TP* = *MEV*. When discounted at 8 percent, *APV* accounts for 93.9 percent of *MEV*, leaving *TP* = 6.1 percent, such that *APV* + *TP* = *MEV*. Improvements in performance, namely reductions in *RD* and increases in *TP*, are modest. Almost all the gains in *MEV* performance between 1713-1747 and 1748-1774, namely getting the bills to circulate relatively closer to their face value, come from improved design and execution of redemption.

The years 1722 through 1729 are notably different, with *APV* > *MEV* by a relatively large magnitude. When discounted at 6 percent, *RD* = 12, and when discounted at 8 percent, *RD* = 4.1, such that *APV* - *RD* = *MEV*. These years of positive risk discounts correspond to when poll taxes were reduced from 15 to 5 shillings per year and no redemptions and removals of paper money from circulation were executed (Appendix Table A; Parker, 1928, p. 108). A forecasted lack of redemption mattered.

Statistical Properties

Table 1 reports the time series statistical properties of *MEV* and *APV*, using a 6 and an 8 percent discount rate for *APV*—designated *APV6* and *APV8*, respectively. *MEV* and *APV* are co-integrated. Thus, estimating *APV*'s effect on *MEV* is a valid exercise. APV_t has a statistically significant positive effect on MEV_t with a relatively large coefficient magnitude. Statistically, *APV* and *MEV* are closely associated. ΔMEV tracks ΔAPV through time.

The unbiased coefficient on $APV6_t$, namely uncorrected for serial correlation with no lags of the dependent variable, is 0.83, which is close to 1. This indicates a tight relationship between *MEV* and *APV6*, namely *APV6* accounts for 83 percent of *MEV*. The unbiased coefficient on $APV8_t$, is 0.89, namely *APV8* accounts for 89 percent of *MEV*. The constant terms in the regressions are (*TP* – *RD*), see equation (1). When *APV* is discounted at 6 percent, the unbiased coefficient on the constant term is a positive 4.6; when discounted at 8 percent it is 6.6. This indicates that over the entire sample *TP* > 0, and it accounts for 5 to 7 percent of *MEV*.

When corrected for serial correlation, the coefficients on *APV* remain statistically significant. However, when corrected for serial correlation, the constant term, (*TP* – *RD*), is no longer statistically significant. This raises doubts about how much confidence should be placed in the 5 to 7 percent of *MEV* the regressions ascribe to *TP*.

Table 1 *MEV's Statistical Relationship to APV, 1713-1774*

				Durbin's *Chi*^{2}	*N*	Adjusted R^2	*F*
MEV_t =	4.5509* + 0.8306($APV6_t$)*** + z_t			44.66***	62	0.83	299.58***
	(2.5901) (0.0480)						
	Co-integration test: $[z_t - z_{t-1}]$ = 0.1740 - 0.3429(z_{t-1})**				61	0.16	12.38***
	(0.9059) (0.0975)						
MEV_t =	-0.6314 + 0.2181($APV6_t$)*** + 0.7810(MEV_{t-1})*** + z_t			2.02	61	0.83	299.58***
	(0.8790) (0.0320) (0.0350)						
	Co-integration test: $[z_t - z_{t-1}]$ = -0.0230 - 0.8168(z_{t-1})***				60	0.40	40.18***
	(0.3884) (0.1289)						
MEV_t =	6.5586*** + 0.8927($APV8_t$)*** + z_t			42.28***	62	0.84	311.88***
	(2.4400) (0.0505)						
	Co-integration test: $[z_t - z_{t-1}]$ = 0.1847 - 0.3533(z_{t-1})***				61	0.17	12.95***
	(0.8979) (0.0982)						
MEV_t =	-0.1029 + 0.2454($APV8_t$)*** + 0.7706(MEV_{t-1})*** + z_t			0.64	61	0.98	1764.08***
	(0.8328) (0.0332) (0.0338)						
	Co-integration test: $[z_t - z_{t-1}]$ = -0.0257 - 0.8956(z_{t-1})***				60	0.44	47.24***
	(0.3779) (0.1303)						

Sources: Appendix Table A. See text for variable definitions and construction.
Notes: Data are annual. Interpolated values are used for missing *MEV* data. Standard errors are in parentheses under their respective coefficients. *APV6 =APV* when discounted at 6 percent. *APV8 =APV* when discounted at 8 percent. Dickey-Fuller critical values are used for the (t-1) independent variables, see Enders (1995, p. 419). Durbin's *Chi*^{2} is Durbin's Alternative Tests for autocorrelation testing whether the null hypothesis of no serial correlation can be rejected. OLS provides unbiased and consistently estimated coefficients, but biased-low standard errors when serial correlation is present. Adding lagged values of the dependent variable eliminates serial correlation for better assessment of standard error-statistical significance, but biases the coefficients on the other independent regressors (Achen, 2000; Maddala, 1977, pp. 147, 281-3; Pindyck and Rubinfeld, 1998, pp. 159, 235). Thus, the OLS regressions are used for coefficient accuracy and the regressions corrected for serial correlation are used to assess statistical significance.
*** Statistically significance above the 0.01 level.
** Statistically significance above the 0.05 level.
* Statistically significance above the 0.1 level.

These contributions are close to those derived from the raw data in Figure 2. The regressions report that overall *MEV > APV* by a small *TP* and to a relatively greater degree than that found in the raw data in Figure 2. The difference between the regression estimates and the analysis of the raw data in Figure 2 may be due to using interpolated values for missing *MEV* data in the regressions compared with only using observed *MEV* data in Figure 2.

The Quantity Theory of Money Applied to North Carolina's Paper Money

The quantity theory of money, at least a prominent version, takes the equation-of-exchange identity, $MV \equiv PY$, as expressed in growth rates, $\ln M + \ln V \equiv \ln P + \ln Y$, and by assuming that $\ln V$ and $\ln Y$ are long-run constants, transforms it into the quantity "theory" of money [$\ln P$ = some constant + $\ln M$]; where M = the money supply, V = the velocity of that money's circulation, P = prices in that money, and Y = traded real output (Bordo 1987; Fisher 1912). In words, the equation-of-exchange identity says that over a given time period the total amount of spending (MV) has to be identical to the total value purchased (PY). Growth rates in Y and V are thought to be severely constrained by real forces. Technological and resource constraints, i.e. the production possibility frontier, limit how much Y can grow. Transaction costs limit how much V can grow. Thus, large movements in M should show up as large movement in P in the same direction. When applying the quantity theory of money, M is measured in its nominal face value. M's real value is measured by its relation to P, namely as $M/P \equiv Y/V$. A critical assumption of the theory is that all trades are monetized. If enough domestic transactions are executed using barter structures, then the equation-of-exchange identity is broken along with the quantity theory of money's positive and tight relationship between money and prices.

To have results that are easily compared with applications to other colonies, we use the econometric specifications in West (1978, p. 4), namely $\ln P_t = a + b\ln M_t$, including regressions with one- and two-year lags of M to capture any delayed transmission effects, where M = the paper money supply, P = prices, and $a = (\ln V - \ln Y)$. See similar specifications in Farley Grubb (2004, p. 349; 2018) and Peter Rousseau (2007, p. 267). Given sizable movements in M, *b* should be relatively large, much closer to 1 than to 0 for the quantity theory of money to be a useful theory for explaining the value and performance of M. The magnitude of *b*, and whether it

is unbiased and consistently estimated, is the key concern.

We also report regressions where P is replaced with *MEV* for easy comparison with the results in Tables 1 and 3. Because *MEV* is constructed at the inverse of the exchange rate, in quantity-theoretic terms it should be negatively related to ΔM. An increase in M should cause the paper money to depreciate, namely suffer a reduction in value relative to its face value.

Currently, not enough local commodity price data exists to construct a colonial North Carolina price index. Therefore, we use the price, in North Carolina pounds, of sterling bills of exchange drawn on London to create purchasing power parity (PPP) consistent price measures. PPP implies that $EX_{(£NC\ to\ £S)} = P_{NC}/P_{UK}$, namely the exchange rate (EX) of North Carolina's paper money to pounds sterling ($£_S$ = pound sterling) must equal the ratio of prices in North Carolina expressed in North Carolina's paper money (P_{NC}) to prices in England expressed in pounds sterling (P_{UK}). Taking the natural log of both sides and rearranging terms yields $\ln P_{NC} = \ln EX_{(£NC\ to\ £S)} + \ln P_{UK}$. Data on $EX_{(£NC\ to\ £S)}$ are taken from Appendix Table A, and data on P_{UK} are taken from Elizabeth Schumpeter (1938, p. 35). PPP has been shown to hold for all colonies where colony-specific commodity price indices exist between that colony and England and between that colony and all other colonies with commodity price indices, namely for Massachusetts, New York, Pennsylvania, Maryland, Virginia, South Carolina, Montreal, and Quebec (Grubb, 2003, p. 1,786; 2005, p. 1,346; 2010, pp. 132-5). If PPP holds for these colonies, then it is reasonable to assume that it holds for North Carolina when using the same data sources.

Table 2 reports the results from estimating $\ln P_{NCt} = a + b\ln M_t$ and from estimating $MEV_t = a + b\ln M_t$ using the data on M and *MEV* from Appendix Table A and P_{NC} as constructed above. The unbiased and consistently estimated coefficients on M, those uncorrected for serial correlation with no lags of the dependent variable, show perverse results. As the growth rate of

Table 2 *Testing the Quantity Theory of "Paper" Money*

Dependent Variable		Constant	$\ln M_t$	$\ln M_{t-1}$	$\ln M_{t-2}$	$\ln P_{NCt-1}$	MEV_{t-1}	Durbin's χ^2	N	R^2	F
$\ln P_{NCt}$	=	8.586***	-0.256**					742.61***	62	0.07	5.83**
		(1.110)	(0.106)								
$\ln P_{NCt}$	=	-0.001	0.009			0.984***		19.70***	61	0.96	662.31***
		(0.357)	(0.025)			(0.029)					
$\ln P_{NCt}$	=	8.651***	-0.558**	0.298				629.12***	61	0.10	4.16**
		(1.143)	(0.268)	(0.268)							
$\ln P_{NCt}$	=	-0.050	-0.099*	0.115**		0.979***		20.10***	61	0.96	465.84***
		(0.349)	(0.059)	(0.058)		(0.028)					
$\ln P_{NCt}$	=	8.555***	-0.494*	-0.015	0.259			884.50***	60	0.09	3.03**
		(1.187)	(0.277)	(0.383)	(0.270)						
$\ln P_{NCt}$	=	-0.112	-0.110*	0.154*	-0.024	0.985***		18.47***	60	0.96	340.12***
		(0.360)	(0.060)	(0.082)	(0.058)	(0.029)					
MEV_t	=	-57.616	9.763**					668.82***	62	0.08	6.20**
		(41.030)	(3.920)								
MEV_t	=	0.745	-0.013				0.988***	26.22***	61	0.97	893.76***
		(8.066)	(0.799)				(0.025)				
MEV_t	=	-65.013	16.626*	-6.226				782.52***	61	0.09	3.98**
		(42.414)	(9.954)	(9.949)							
MEV_t	=	0.991	0.290	-0.326			0.987***	26.27***	61	0.97	585.88***
		(8.259)	(1.943)	(1.903)			(0.025)				
MEV_t	=	-68.500	14.036	0.160	-3.502			1078.50***	60	0.08	2.72**
		(44.176)	(10.313)	(14.250)	(10.052)						
MEV_t	=	-0.044	0.632	-2.992	2.413		0.993***	20.88***	60	0.97	434.08***
		(8.544)	(1.982)	(2.698)	(1.908)		(0.026)				

Sources: Appendix Table A.
Notes: See the notes to Table 1. See text for P_{NC} construction.

M increases, the growth rate of P_{NC} decreases and the paper money appreciates. This outcome is the opposite of what the quantity theory predicts. Reducing serial correlation renders some coefficients statistically insignificant. At best, no relationship between M and P_{NC} or between M and *MEV* exists. The quantity theory of money does not tell us much about the value and performance of colonial North Carolina's paper money.

The classical quantity of money assumes that lnV and lnY are long-run constants. The coefficient for the constant terms in the P_{NC} regressions, those uncorrected for serial correlation with no lags of the dependent variable, provide unbiased and consistent estimates of the difference in these long-run constants, namely [lnV – lnY]. In all three P_{NC} regressions the constant term is positive and relatively large. Reducing serial correlation, however, renders these constant terms statistically insignificant. Setting aside statistical insignificance, the large positive constant terms in the P_{NC} regressions indicates that lnV > lnY in terms of their long-run growth rates. For V to grow at a faster rate on average than Y indicates that domestic transactions were becoming increasingly monetized with paper money.

The relative magnitude of these constant terms, however, creates an accounting problem for the quantity theory of money, but one that is nevertheless informative. The long-run growth of colonial Y per capita per year for the relevant period is thought to be between 0 and 0.6 percent (Egnal, 1998, p. 43; Mancall and Weiss, 1999, pp. 18, 36; McCusker and Menard, 1985, pp. 53-58). Thus, the long-run yearly growth rate in Y is approximately the same as the long-run yearly growth rate of the population. The yearly white population growth rate for colonial North Carolina in the relevant period was 13 percent (derived from Carter, *et al*, 2006, v. 5, p. 652). Using this number for lnY and setting [lnV – lnY] equal to the constant terms in the P_{NC} regressions in Table 2 yields impossibly high values for lnV. This observation is consistent with the equation-of-exchange identity not holding in colonial North Carolina because substantial domestic transactions were executed using barter structures in an under monetized economy.

The results in Table 2, namely the perverse relationship between M and P_{NC} and between M and *MEV*, that long-run lnV is greater than long-run lnY, and the impossibly high implied values for lnV, all point to an under monetized local economy where increases in M primarily

displaced barter transactions and barter transactions typically filled the gap left from decreases in M. If P_{NC} is being determined primarily in trades taking place without the use of M in an economy with little technological or productivity changes, then P_{NC} this year should be strongly determined by P_{NC} last year. This outcome can be seen by comparing the uncorrected with the corrected P_{NC} regressions for serial correlation reported in Table 2. Adding lagged values of P_{NC} as independent variables, thus reducing serial correlation, substantially improves the regression fit in terms of R^2 and F-statistic measures. Adding lagged values of P_{NC} biases the coefficients on the other independent regressors (Achen, 2000; Maddala, 1977, p. 147; Pindyck and Rubinfeld, 1998, p. 235). Lagged P_{NC} absorbs some of influence M had on prices. Prices this year are primarily determined by prices last year. This finding is consist with prices being determined by the constancy in the barter portion of the economy.

Asset Pricing versus the Quantity of Paper Money: A Horse Race to Determine *MEV*

Table 3 runs a horse-race between asset-pricing and the quantity theory of money to see which contributes the most to determining the observed market value of North Carolina's paper money. The same regressions as in Table 1 are run with the exception that the bills in circulation (M_t) from Appendix Table A are added as independent variables. The unbiased coefficients on *APV6* and *APV8*, namely uncorrected for serial correlation with no lags of the dependent variable, account for 81 and 87 percent of *MEV*, respectively. These are almost identical to the results in Table 1. Adding the quantity of paper money to the specification does not dilute the fact that *MEV* is primarily and overwhelming determined by *APV*. The coefficients on *APV6* and *APV8* remain statistically significant even after correcting for serial correlation. This result can be considered a manifestation of Ricardian equivalence (Barro, 1974; Abel, 1987).

The coefficients on M are positive and statistically significant, remaining so even after

Table 3 *A Horse-Race between Real Asset Value and the Quantity of Paper Money, 1713-1774*

		Durbin's *Chi*^{2}	*N*	Adjusted R^2	*F*
MEV_t	$= -66.5201^{***} + 6.8965(\ln M_t)^{***} + 0.8107(APV6_t)^{***} + z_t$	61.14^{***}	62	0.88	215.15^{***}
	(15.0992) (1.4492) (0.04135)				
MEV_t	$= -16.0887^{**} + 1.5314(\ln M_t)^{**} + 0.2459(APV6_t)^{***} + 0.7382(MEV_{t-1})^{***} + z_t$	1.24	61	0.98	1190.61^{***}
	(6.1686) (0.6054) (0.0326) (0.0375)				
MEV_t	$= -53.1691^{***} + 5.8193(\ln M_t)^{***} + 0.8680(APV8_t)^{***} + z_t$	63.04^{***}	62	0.87	199.73^{***}
	(15.5934) (1.5041) (0.0460)				
MEV_t	$= -11.4000^{*} + 1.1260(\ln M_t)^{*} + 0.2618(APV8_t)^{***} + 0.7440(MEV_{t-1})^{***} + z_t$	0.51	61	0.98	1233.83^{***}
	(5.8614) (0.5786) (0.0335) (0.0357)				

Sources: Appendix Table A. See text for variable definitions and construction.
Notes: See the notes to Table 1, and Appendix Tables A and B.

correcting for serial correlation. This is a perverse result for the quantity theory of money. Remember that *MEV* is the percentage of face value. Thus, in quantity theoretic terms, an increase in the growth rate of M should cause paper money to depreciate, thus causing *MEV* to fall. For the quantity theory of money to hold in its typical way, M should be negatively related to *MEV*. But the regressions show that M is positively related to *MEV*. As the rate of growth in paper money increases, the value of paper money appreciates (is driven closer to face value).

Controlling for *APV*, namely controlling for rational bond pricing, putting more M into circulation adds value to the bills beyond their *APV*. This outcome is the same as finding a positive *TP* in Table 1. Except here that positive *TP* is related to more M being put in circulation. As M becomes more familiar and ubiquitous, it takes on more "moneyness" value, i.e. an increased *TP*. Citizens gain faith that the next trader they bargain with will expect M to be similarly convenient for transacting future local trades, and so will continue to pay a convenience or transaction premium above M's expected *APV*. In an under-monetized economy where M is displacing barter for executing domestic transactions, this enhanced faith in continued superior convenience caused by increasing familiarity overcame any quantity-of-money pressures to increase prices or depreciate the bills.

Counterfactual Redemption Executions and Resulting Performance Paths

The analysis in Figure 2 and Tables 1 and 3 shows that the value of North Carolina paper money (*MEV*) is predominantly determined by its time-discounted real asset present value (*APV*). *APV* is determined by how the assembly designed and executed the redemption of its various paper money emissions. The collapse in value of North Carolina's paper money from 1715 to 1747, therefore, is primarily due to a failure to implement reasonable redemption structures. Emission #4 was a pure currency swap and so is not relevant to redemption issues. After emission #6, a constant, though relatively low, redemption of bills was maintained. Thus, it was the failure to execute an adequate redemption structure for the net new portions of emissions #3 and #5 that was the source of value collapse from 1715 to 1747.

From 1718 through 1722, North Carolina was redeeming and removing from public circulation an average of 800$£_{NC}$ emission #3 bills a year. After 1722, the assembly reduced taxes and stopped redeeming and removing paper money from public circulation. Paper money received as taxes was spent back into circulation by the assembly. In 1731, the new governor declared emission #5 invalid and stopped the collection of emission #5 loan principal payments that were to be removed from circulation. These two actions undermined the entire North Carolina paper money system pre-1748, led to its collapse in value from 1715 to 1747, and eventually to a partial default on all pre-1748 bills in 1748, see Appendix Table A and Figure 2.

Counterfactual redemption execution structures are imposed on emissions #3 and #5 to illustrate the above outcome and show how North Carolina's paper money would have performed between 1715 and 1747 with the execution of a more typical redemption architecture. We impose the least counterfactual redemption intrusion possible to illustrate this outcome. For emission #3, we assume that the assembly simply maintained the same level of yearly bill

redemption it had executed pre-1724 into the post-1723 years until all emission #3 bills were redeemed. That amounts to maintaining the pre-1723 redemption taxes that removed 800£$_{NC}$ emission #3 bills a year on average into the period from 1723 through 1737.

For emission #5, we assume the new governor did not declare that emission invalid in 1731 and that the loan principal repayment and removal from circulation continued to be executed as designed from 1731 through 1744, see Appendix Table B. For calculation purposes, we also assume that the redemption of emission #6 bills estimated to be approximately 500£$_{NC}$ a year on average from 1735 through 1748 continued at that yearly level until all emission #6 bills were redeemed and removed from public circulation. These counterfactual redemption structures and the resulting amount of bills remaining in public circulation are presented in Appendix Table B. Only the net new emissions from Appendix Table A matter. The currency swap portions of emissions are irrelevant to this analysis and so are excluded.

Appendix Table B also reports the counterfactual asset present value of the bills, their *APV*s when discounted at 6 and at 8 percent. They are calculated in the same manner as the actual *APV*s in Appendix Table A using equations (3) and (4). These counterfactual *APV*s are presented in Figure 3 where they are superimposed onto the actual data from Figure 2. Figure 3 shows that, with these redemption corrections to emissions #3 and #5, the performance of North Carolina's paper money would have been reasonably stable throughout its entire history. Because $MEV \approx APV$, the counterfactual *APV* series implies a similar counterfactual *MEV* series. The counterfactual outcome in Figure 3 indicates that North Carolina's $MEV \approx APV$ series would have fluctuated around an approximately constant 70 percent of face value throughout its history.

The single largest cause of the collapsing value of North Carolina's paper money between 1715 and 1747, and partial default on pre-1748 bills in 1748, was Governor George

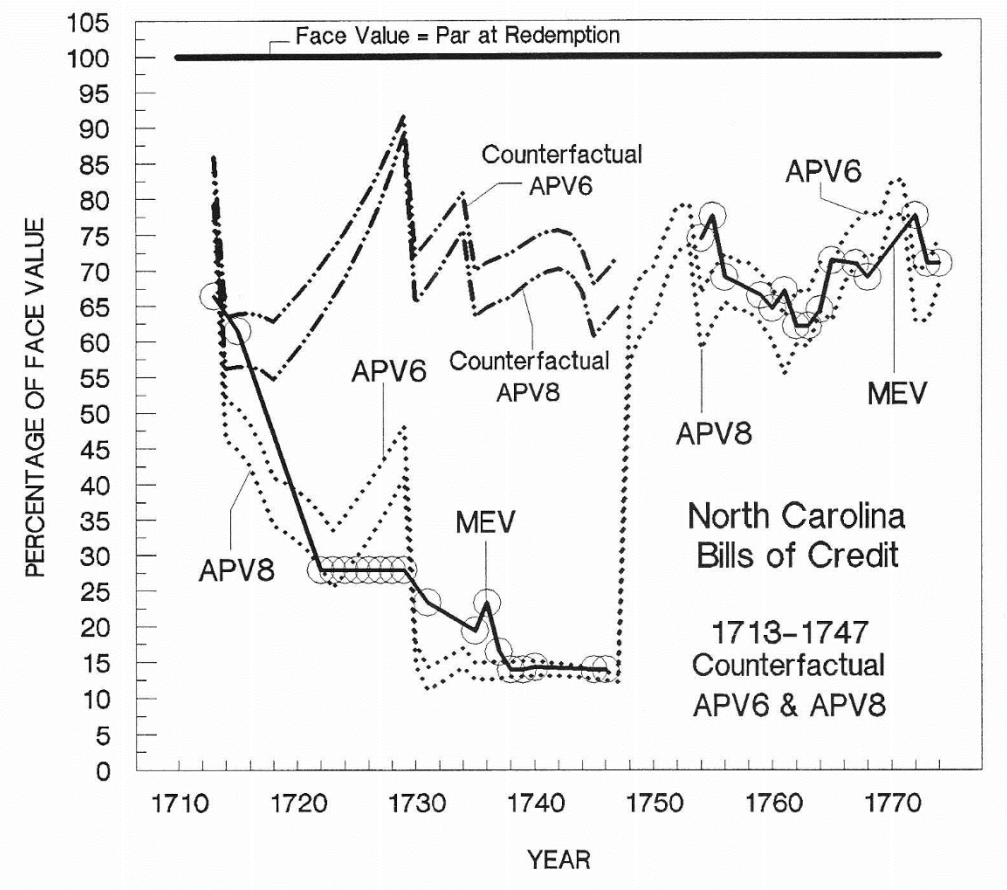

Figure 3. *Counterfactual APVs for 1713-1747*

Sources: Appendix Table A and B.
Notes: See the notes to Appendix Table A and B, and Figure 2. See the text for construction details.

Burrington's invalidation of emission #5 in 1731 (*CR*, v. 3, pp. 145-6, 151, 154, 175, 266-9, 271, 308-9, 486-7, 571; v. 4, p. 179). Emission #5 was relatively large—more than double the combined net new emissions of #3 and #6—and had a relatively large yearly amount redeemed, along with a much shorter redemption time span, than those for emissions #3 and #6. As such, emission #5 had an outsized effect on the path of *APV* in this period.

Therefore, the finger can be pointed squarely at the British—the King and his advisors as channeled through their instructions to their chosen governors—for North Carolina's collapsing paper money regime in this era (*CR*, v. 3, pp. 90-118; *Journal of the Commissioners*, 1969, v. 6, p. 55; Labaree, 1967, v. 1, pp. 218-9, 229-31). The British government disliked colonial paper

money because they expected it to perform poorly. Their actions, however, were the prime reason behind its poor performance in North Carolina. As such, they directly caused the fulfilment of their own expectations.

George Burrington was the first Royal Governor of North Carolina. He received his commission on April 29, 1730, and arrived in North Carolina where he was shortly thereafter sworn in as governor in Edenton on February 25, 1731. He had earlier attended a meeting of the Lord Commissioners for Trade and Plantations (the Board of Trade) in London on July 23, 1729 where colonial bills of credit were discussed. In that meeting, the topic of whether bills were necessary at all, and then, if yes, what sums and what foundations would best preserve their credit, was brought up (*Journal of the Commissioners*, 1969, v. 6, p. 55).

The Commissioners issued Burrington's instructions on December 14, 1730. In those instructions, he was told not to give assent to any law emitting bills of credit that did not have a clause "…declaring that the same shall not take effect until the said Act shall have been approved & confirmed by us…" commonly called a suspending clause (*CR*, v. 3, p. 95; Labaree, 1967, v. 1, pp. 218-9). While emission #5 was passed on November 27, 1729 by the assembly, Burrington regarded it as falling under his instructions, even though it pre-dated his commission, his instructions, and his arrival, because North Carolina had been purchased by the Crown in 1729. Given that emission #5's act did not have a suspending clause, and had not yet been approved and confirmed by the Board of Trade, Burrington felt he had cause, given his instructions, to declare it invalid and suspend its operation. He did this shortly after his arrival in late February 1731, even though emission #5 had already been in operation for over a year.

The contribution of the redemption structure of emission #3 to the poor performance of North Carolina's paper money was directly the fault of the North Carolina assembly. While that

contribution was less than the contribution made by the redemption structure of emission #5, it is more conceptually complex and has important behavioral ramifications for the redemption of emissions after 1747. In 1723, with 12,000£$_{NC}$ emission #3 bills still in circulation, the assembly stopped removing and destroying bills received as tax payments, approximately 800£$_{NC}$ per year, and instead re-spent the bills back into circulation as the bills were received. This action kept 12,000£$_{NC}$ in circulation into the foreseeable future, see Appendix Table A.

Why the assembly did this is unclear. It can be seen, however, as an experiment to test the equivalence of a repetitive bond currency with an on-going fiat currency. Consider scenario 1: In year one, the assembly prints a 1£$_{NC}$ zero-coupon bearer-bond and uses it to buy war materials from me in year one. The bond will be redeemed in year two in exchange for tax payment obligations due in year two. The bond is destroyed after redemption. In year two, the assembly prints a new 1£$_{NC}$ zero-coupon bearer-bond and uses it to buy more war materials from me in year two. That bond will be redeemed in year three in exchange for tax payment obligations due in year three. The bond is destroyed after redemption. Repeat this process each year and the result is that a 1£$_{NC}$ bill stays in circulation, abet a different bill each year but still a 1£$_{NC}$ bill continues in circulation each year.

Now consider scenario 2: In year one, the assembly prints a 1£$_{NC}$ bill and uses it to buy war materials from me in year one with the 1£$_{NC}$ bill being paid back to the government to cover tax obligations in year two. In year two, the assembly takes the 1£$_{NC}$ bill it just received in tax payments and uses it to buy more war material from me in year two with that 1£$_{NC}$ bill now being paid back to the government to cover tax obligations in year three. Repeat this process each year and the result is that a 1£$_{NC}$ bill stays in circulation, this time it's the same bill each year rather than a different bill each year but still a 1£$_{NC}$ bill continues in circulation each year.

How are these two scenarios different? On the surface they appear identical in that they yield the same amount of paper money in circulation. In scenario 2 the government even saves the cost of destroying old and printing new bills each year by just reusing the initial bill created in year one. Yet the value of North Carolina paper money collapsed under scenario 2 as instituted after 1722 but, using the counterfactual reconstruction, would not have collapsed if scenario 1 was used. Why? The key to understanding the different effects the two scenarios have on the value of paper money in circulation is to note that there are more bills in circulation in any given year than there are tax obligations in that year that can be paid in those bills.

Under scenario 1, citizens have clear information regarding the path of government spending decisions, tax impositions, and what tax obligations anchor the value of the bills they possess. An explicit bond currency can only be spent by the government once. If the government wants to purchase more from its citizens, it has to explicitly pass new legislation to create new bond currency. The citizens see some of the bonds redeemed each year through tax obligations and physically destroyed. Thus, citizens know that the particular spending and tax obligations legislated are being completed and know when they will come to an end. All the bonds created, every single one, will be eventually redeemed at face value. As such, the paper money has a predictable value-anchor connected to specifically known tax obligations. Other citizens will trade using these bonds, because they can predict a given bond's expected present value given the value-anchor created by the tax obligations. The government provides citizens with a credible way to predict the future path of government spending and tax extraction, as well as provides clear legislative control over this process through their representatives in the assembly.

Under scenario 2, the government has a seemingly constant yearly claim on a citizen's resources into the indefinite future. More bills are in circulation each year than tax payments. If

bills taxed in are just re-spent by the government, then a citizen will not know if a particular bill will ever be needed to satisfy tax obligations. Thus, the value-anchor to the bill is lost. If a particular bill might never be used to pay a tax obligation, who would want it or what would they be willing to pay to have it? The transition from a bond currency in an explicit emission-redemption structure to a fiat-like revolving and continuously-circulating currency is more difficult than the superficial equivalence portrayed in the two scenarios.

The North Carolina's assembly acted as if they learned this difference. Later emissions would not only follow explicit emission-redemption bond-like structures, but the assembly added two important explicit public demonstrations to their bond currency regimes. The first was regular and explicit public burnings of redeemed bills. The second was with how they treated emission #14 in 1759. Emission #14 was comprised of bills from prior emissions that had already been redeemed but not yet burned. The assembly would re-spend these previously redeemed bills in a way similar to how they had treated emission #3 bills after 1722. For emission #14, however, they explicitly altered the re-issued bills by writing on them so that these bills could be distinguished from the prior redeemed bills and so that the re-issued bills' new redemption date could be determined. The public knew emission #14 bills had all been formally redeemed before and that the bills were now a new spending by the government that had a new formal and explicit redemption date. The assembly maintained a clear emission-redemption bond structure for emission #14 (*CR*, v. 6, pp. 197-9, 1,310; v. 25, pp. 394-5).

After 1748, in the minutes of the Lower House of the assembly, after being informed by the treasurers of the amount of bills redeemed, the assembly would set the day, time, and location for a public burning of the redeemed bills. The following are a few examples. On October 17, 1749, the speaker of the Lower House, having been informed of a new amount of

redeemed bills, resolved "…that the same be burnt, at four o'clock this evening in the Public Street, in the presence of the Members of his Majesty's Honourable Council and General Assembly…" On April 10, 1750, the Lower House, having been informed of a new amount of redeemed bills, resolved that "…the same be burnt this Evening, at the House of Peter Calia, near the Church." On October 21, 1756, the Lower House, having been informed of a new amount of redeemed bills, resolved to have "…the said Sums burnt at 4 o'clock this Afternoon at the House of Richard Magraw." On December 22, 1758, the Lower House, having been informed of a new amount of redeemed bills, resolved "…to see the several sums burnt at the house of Robert Wallace in Edenton at 5 o'clock this Evening…" On January 9, 1760, the Lower House having been informed of a new amount of redeemed bills resolved to "…see the several sums burnt at the House of John Campbell in Wilmington at one o'clock this day…" On May 27, 1760, the Lower House having been informed of a new amount of redeemed bills resolved "…to see the said notes burnt at the House of Richard Cogdell in New Bern at 7 o'clock this evening…" And so on, see (*CR*, v. 4, pp. 1,022, 1,341; v. 5, pp. 74, 210, 556, 727, 898, 1,088; v. 6, pp. 197, 435, 505, 693, 826, 950, 1,208, 1,283; v. 7, pp. 393, 649; v. 8, p. 453; v. 9, pp. 511, 550). Public demonstrations that the assembly was executing a bond currency with an explicit emission-redemption structure, as opposed to a fiat-like revolving-circulation currency, mattered.

Summary of Major Findings

Colonial North Carolina's bills of credit were not a fiat currency. The paper money is best characterized as zero-coupon bonds and interest bearing bonds. If citizens thought of their paper money as bonds and correctly forecast their actual redemption path, then the expected real asset present value of the bonds closely tracks the observed market value of the bonds. The quantity of paper bills in circulation was largely irrelevant to their value. The actual redemption

path of the bonds was what mattered to value determination. As such, these bonds (bills) were primarily real barter assets. At best, they had only a small transactions premium or "moneyness" value added in. Citizens were only willing to pay a small premium above the bills real asset present value to acquire bills, because the bills were a more convenient local medium of exchange compared with the next best barter alternative. This small transaction premium was enough to make the bills the preferred medium of exchange for executing domestic transactions. Finally, the bills traded below face value due to time-discounting and not depreciation. Previous scholars have simply confused depreciation for time-discounting.

The collapse in bill value pre-1748 was primarily caused by British interference with the execution of the assembly's paper money acts. In addition, the assembly learned in this period, through experimentation, that they could not maintain the market value of the bills if they moved to treat the bills less like bonds and more like a re-circulating fiat currency. In the absence of British interference and the assembly's brief experimentation with fiat-like currency, the market value of North Carolina's paper money pre-1748 would have been comparable in level and stability with the paper money emitted after 1747.

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Appendix Table A *Data for North Carolina's Paper Money Regime, 1712-1774*

Year	EM #	Face Value Newly Authorized £NC	Face Value of Net New Emissions £NC	RED_t Face Value Amounts Redeemed & Destroyed £NC	M_t Face Value Amounts in Circulation £NC	Exchange Rate: 1£S Bill of Exchange Drawn on London = X£NC	Asset Present Value Discounts at 6 and 8 Percent as a Percentage of Face Value *APV6* %	*APV8* %
1712	#1	4,000	4,000	0	4,000			
1713	#2	8,000	8,000	0	12,000	2.10	83.82	77.05
1714	#3	24,000	12,000	2,000	22,000		51.96	46.21
1715				2,000	20,000	2.27	50.54	44.77
1716				2,000	18,000		48.43	42.52
1717				2,000	16,000		45.35	38.50
1718				800	15,200		40.86	34.15
1719				800	14,400		40.12	33.25
1720				800	13,600		39.05	32.00
1721				800	12,800		37.66	30.35
1722	#4	12,000	0	800	12,000	5.00	35.85	28.14
1723				0	12,000	5.00	33.53	25.31
1724				0	12,000	5.00	35.62	27.43
1725				0	12,000	5.00	37.82	29.71
1726				0	12,000	5.00	40.14	32.17
1727				0	12,000	5.00	42.63	34.85
1728				0	12,000	5.00	45.26	37.76
1729				0	12,000	5.00	48.06	40.90
1730	#5	40,000	30,000	2,000	40,000		17.50	14.61
1731				0	40,000	6.25	14.21	11.17
1732				0	40,000		15.10	12.09
1733				0	40,000		16.03	13.10
1734				0	40,000		17.03	14.20
1735	#6	52,500	12,500	500	52,000	7.10	14.87	12.46
1736				500	51,500	6.00	14.93	12.56
1737				500	51,000	8.50	14.98	12.71
1738				500	50,500	10.00	15.02	12.98
1739				500	50,000	10.00	15.08	12.98
1740				604	49,396	9.77	15.12	13.13
1741				605	48,791		14.89	13.06
1742				604	48,187		14.75	13.01
1743				605	47,582		14.53	12.90
1744				604	46,978		14.27	12.77
1745				605	46,373	10.00	13.96	12.64
1746				604	45,769	10.00	13.61	12.42
1747				605	45,164		13.26	12.24
1748a				604	44,560			
1748b	#7	21,350	11,409	0	17,350		65.24	56.97
1749				1,532	15,818		69.26	61.18
1750				0	15,818		70.40	62.86
1751				558	15,260		74.75	68.09
1752				1,091	14,169		78.38	72.48
1753			4,000	761	17,408		79.24	73.48
1754	#8	40,000	39,000	1,568	54,840	1.67	66.65	58.78
1755				1,028	53,812	1.60	69.83	62.40
1756	#9	3,400	4,339	1,881	56,270	1.80	72.26	65.40
1757	#10-11	14,806	10,991	4,466	62,795		71.15	64.30

1758	#12	7,000	7,000	5,905	63,890		70.86	64.01
1759	#13-14	9,500	8,995	6,438	66,447	1.87	69.46	62.35
1760	#15	12,000	12,000	5,853	72,594	1.92	67.36	59.83
1761	#16	20,000	20,000	622	91,972	1.85	63.33	55.26
1762				10,011	81,961	2.00	66.99	59.51
1763				0	81,961	2.00	66.84	59.10
1764				11,943	70,018	1.93	70.98	64.03
1765				0	70,018	1.74	70.11	62.73
1766				5,498	64,520		74.43	67.95
1767				7,775	56,745	1.74	76.73	70.63
1768				0	56,745	1.80	78.09	72.17
1769	#17	20,000	20,000	0	76,745		77.30	71.39
1770				14,941	61,804		82.07	77.35
1771				12,586	49,218		82.54	77.83
1772	#18	60,000	60,000	12,477	96,741	1.60	69.99	62.72
1773				0	96,741	1.75	70.22	62.72
1774				0	96,741	1.75	74.57	67.95

Sources: Brock (1975, pp. 108-112, 428-45); Clark, Saunders, and Weeks [cited as *CR* hereafter] (v. 1, p. 839; v. 2, pp. iv-v, 50, 296, 575-8, 608-24; v. 3, pp. 142-56, 151, 154, 175, 177-9, 189, 259, 266-9, 271, 283-325, 475-89, 561-622; v. 4, pp. 24, 67, 102, 115-55, 178-80, 225, 246, 266-7, 282-3, 345, 382-414, 418-9, 501-11, 514-5, 527-31, 552-77, 651-5, 719-54, 770-91, 808, 814-34, 838-43, 855-66, 997-9, 1,022, 1,073, 1,293-5, 1,298, 1,341-2, 1,346; v. 5, pp. 58, 73-5, 210-11, 234-5, 307-9, 318, 556-7, 588, 726-7, 851, 898-900, 1,083-4, 1,088; v. 6, pp. 4, 17, 134, 197-9, 249, 305, 378, 396, 435, 504-5, 599, 621, 693-4, 712, 811, 825-6, 829, 944, 949-50, 988, 1,046-8, 1,057, 1,154, 1,162, 1,166, 1,174, 1,185-6, 1,205-8, 1,245, 1,267, 1,274, 1,277, 1,282-5, 1,289, 1,304-5, 1,308-11; v. 7, pp. 61-88, 99, 393-4, 491, 493, 565-94, 627, 644, 649, 653, 661-3, 666, 683, 924-86; v. 8, pp. 9, 105-41, 144-8, 211-5, 261, 302-46, 387, 397-420, 427, 433-4, 440, 443, 453-4, 459-63, 471-3, 478, 697; v. 9, pp. 166-7, 142, 147-222, 226, 230-5, 368-70, 454-6, 464, 475-6, 478, 494-523, 549-50, 557, 563, 572-7, 580, 582-4, 586, 647-51, 653-5, 733-88, 874-953, 1,187-1,205; v. 23, pp. 54-5, 90-1, 94-5, 98, 112, 217, 292-6, 392-8, 516-8, 539-41, 781-3, 850-1; v. 25, pp. 157-8, 173-5, 234-5, 331-3, 345-8, 350-2, 361-4, 370-2, 394-5, 457-8); Cutsail and Grubb (2018); *Earliest Printed Laws* (pp. 90-2, 152-8, 173-5, 234); McCusker (1978, pp. 215-9); Newman (2008, pp. 314-20).
Notes: EM # = emission number by chronological count. $£_{NC}$ = North Carolina paper pounds at face value. $£_S$ = pounds sterling. The difference between authorized emissions and net new emissions is due to currency swaps of new bills for old bills and for interest owed on old bills, to new bills never spent out of the treasury, and to new bills released at a later date than authorized. The 1748a and 1748b values capture the change over from the old to the new paper money and the legislated change in the par at redemption value and partial default on pre-1748 paper money. The exchange rates reported here differ from those reported in McCusker (1978, pp. 217-9) in that exchange rates that were not observed market rates were not included. These included rates McCusker reported that were statements of what the legislated par at redemption was rather than what the current market exchange rate was, statements that were lobbying efforts to increase a particular person's salary, hearsay statements by a person in Boston, and statements that could not be found in the sources McCusker cited. See the text for how *APV6* and *APV8* are constructed. For calculation purposes, the bills redeemed post-1774 are estimated to be what would be forecast based on the poll tax enforced in 1774 continuing until all bills were redeemed. For each year from 1775 through 1781, the estimate takes the North Carolina population * 0.20986 = compliant taxables * shillings poll tax / 20 = $£_{NC}$ redemption taxes used to redeem bills each year. See Cutsail and Guibb (2018, p. xxx) for poll taxes in 1774 and Carter, *et al* (2006, v. 5, p. 651) for population numbers with interpolated values used between decadal benchmarks. The 0.20986 factor comes from actual pre-1774 poll tax revenue yields per capita.

Appendix Table B *Counterfactual Paper Money Redemption Regimes and Present Values, 1712-1757*

Year	EM #	Face Value of Net New Emissions £NC	Face Value Amounts of #3 Redeemed £NC	Face Value Amounts of #5 Redeemed £NC	Face Value Amounts of #6 Redeemed £NC	Face Value Amounts Remaining in Circulation £NC	Counterfactual (as a Percentage of Face Value) 1713-1747 APV6	APV8
1712	#1	4,000	0			4,000		
1713	#2	8,000	0			12,000	85.91	79.19
1714	#3	12,000	2,000			22,000	63.45	56.15
1715			2,000			20,000	63.85	56.46
1716			2,000			18,000	63.96	56.49
1717			2,000			16,000	63.63	55.94
1718			800			15,200	62.75	54.65
1719			800			14,400	6458	56.60
1720			800			13,600	66.48	58.72
1721			800			12,800	68.48	60.99
1722			800			12,000	70.63	63.43
1723			*800*			*11,200*	72.92	66.07
1724			*800*			*10,400*	75.36	68.92
1725			*800*			*9,600*	78.01	72.09
1726			*800*			*8,800*	80.90	75.56
1727			*800*			*8,000*	84.05	79.46
1728			*800*			*7,200*	87.56	83.85
1729			*800*			*6,400*	91.51	88.89
1730	#5	30,000	*800*	2,000		*33,600*	72.15	65.38
1731			*800*	*2,000*		*30,800*	74.13	67.69
1732			*800*	*2,000*		*28,000*	76.23	70.15
1733			*800*	*2,000*		*25,200*	78.43	72.74
1734			*800*	*2,000*		*22,400*	80.73	75.55
1735	#6	12,500	*800*	*2,000*	500	*31,600*	70.00	63.53
1736			*800*	*2,000*	500	*28,300*	71.01	64.70
1737			*800*	*2,000*	500	*25,000*	71.79	65.58
1738				*2,000*	500	*22,500*	72.29	66.14
1739				*2,000*	500	*20,000*	73.47	67.62
1740				*2,000*	500	*17,500*	74.51	68.85
1741				*2,000*	500	*15,000*	75.25	69.74
1742				*2,000*	500	*12,500*	75.53	70.11
1743				*2,000*	500	*10,000*	74.95	69.44
1744				*2,000*	500	*7,500*	72.96	66.95
1745					500	*7,000*	67.95	60.59
1746					500	*6,500*	69.70	62.57
1747					500	*6,000*	71.84	64.67
1748					500	*5,500*		
1749					*500*	*5,000*		
1750					*500*	*4,500*		
1751					*500*	*4,000*		
1752					*500*	*3,500*		
1753					*500*	*3,000*		
1754					*500*	*2,500*		
1755					*500*	*2,000*		
1756					*500*	*1,500*		
1757					*500*	*1,000*		
1758					*500*	*500*		
1759					*500*	*0*		

Totals	66,500	24,000	30,000	12,500

Sources: Appendix Table A and the text.
Notes: Italics for amounts indicate counterfactual values. Only net new emissions are counted. Because emission #4 was a pure currency swap, it is not counted. See the notes to Figure 2 and Appendix Tables A.