

**LAND BACKED MORTGAGES AS A SYSTEM
OF EXCHANGE IN THE COLONY OF PENNSYLVANIA
IN THE 18TH CENTURY**

by

Lauren Huston

A thesis submitted to the Faculty of the University of Delaware in partial fulfillment of the requirements for the degree of Honors Bachelor of Science in Economics with Distinction

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ABSTRACT

Prior to the formation of federal government under the Constitution, there existed a system of land-backed mortgages in the colonies that to some extent could be utilized as currency. The colonies lacked a system of exchange due to a paucity of gold and silver so many paper money schemes were enacted to remedy this problem – this was one such scheme. Given the importance of, and trouble caused by, mortgage-backed securities in today's economy, the history of similar methods used in the colonial economy to generate tradable money may be informative of the present. This colonial system of currency creation via land-backed mortgages was described and written about by the famous polymath Benjamin Franklin of Philadelphia. In my studies of this particular type of paper currency I hope to quantitatively prove him correct in his assertions on the importance of paper currency in the economy. Of all the studies conducted on colonial monetary policy, there has been little distinguishing research on these monies. This paper outlines the development of the land-backed mortgages as a medium of exchange in the colony of Pennsylvania and attempts to quantitatively measure the liquidity premium of these land-backed mortgages.

Chapter 1

Introduction

Money is the lifeblood of the economy that lubricates the gears of commerce, the subject of numerous songs and ditties, the motive for murder and theft, and the apple of the eye of many a man and woman, and the reasons for war. Throughout history we have struggled to obtain it, earn it, win it, gamble it, spend it and scholars have strove to discover its hold over the minds of so many. Money is necessary for our economic advancement but it is an ephemeral label used to describe its many different forms. Ancient and modern societies have created various forms of money to barter and trade with from the coins of Rome to the wampum of the Native Americans to United States Dollar Bills. Societies, subject to legal constraints and lifestyles, experiment with different forms of currency to fit their economic needs.

The American colonies also forayed into the realm of monetary experimentation. As the subjects of the larger British Empire they were subjected to the oversight of the British government and its mercantilist policies. Specie, or as many referred to it, “real money”, was the main currency used worldwide; these coins could only be acquired through trade with Europe because gold and silver was not mined in the colonies and colonial governments were disallowed from minting their own coins. These policies forced the colonies into a trade deficit with Britain that encouraged specie to flow out of the colonies into British coffers leaving the colonies

with little to no specie, or coin, with which to conduct commerce.¹ The colonies were unable to restrict their exports of specie and were forced to operate in an open market economy (with regard to specie flow), while its main trading partner, Britain, restricted specie flow to the colonies. Any specie that entered the colonies quickly left it because of the colonies' chronic trade deficit with Britain. A constant thorn in the side of the colonists was the lack of specie² and as a result barter systems proliferated. Without the medium of exchange to facilitate commerce the economy devolved into more rudimentary systems like barter that slowed the process of commerce. They began to rely on pseudo-credit systems like store credit and based bills of credit on whatever goods were common and exceptionally valuable. (In the southern colonies tobacco bills of credit were common.) The lack of gold and silver encouraged monetary experiments.

A likely solution seems to be to produce paper currency, however there were several roadblocks. First of all, there were no central banks in the colonies to issue a paper currency. Second, banks could not be formed in the colonies because of the 1720 "Bubble Act" in which the Parliament prevented any joint stock company to incorporate unless by royal charter (chartered by the crown).³ This prevented any bank from forming in the colonies due to how expensive and difficult it was to incorporate because there was no way to spread risk among investors. Therefore colonial governments turned to another alternative. They created exchangeable debt in the form

¹ See Grubb (2012A, 2012B, 2014); Thayer (1953); McCallum (1990); Schweitzer (1987); Brock (1975); Lester (1983).

² See Grubb (2012A); Schweitzer (1987).

³ Schweitzer (1987).

of bills of credit that were legislated legal tender to act as a medium of exchange and facilitate trade. After the burst of the South Sea Bubble in 1720 many colonies and other parts of the empire struggled to recover. Hence, in the 1720's Pennsylvania was suffering from a depression, which was probably only made worse by their lack of specie. Many hoped that the production of the bills of credit would help stimulate the economy. By the 1730's the economy had improved.⁴ The heading of the first legislative act described the problem the colonists faced:

"Forasmuch as through the extreme scarcity of money the trade of this province is greatly lessened and restricted, and the payment of public debts to the government rendered exceedingly difficult, and likely so to continue, unless some medium in commerce be by law made current instead of money. For remedy whereof, may it please the governor that it be enacted."⁵

Many herculean efforts have been undertaken to quantify the amount of money in circulation and model the connections between paper money, exchange rates, and prices; however, standard monetary models do not seem to apply. These models and counting exercises fail to take into account the structure of the paper money and therefore are unable to model or correctly count the amount in circulation.

This paper will focus on a specific type of currency called loan office bills or land-backed mortgages. These bills functioned on a redemption cycle and served as a medium of exchange but were issued very similarly to zero interest bearer bonds.⁶

⁴ Schweitzer (1987, P. 115-119).

⁵ *The Statutes* (V. 3, P. 324).

⁶ See Grubb (2014); zero interest bearer bonds are also called zero coupon bonds.

This was what most paper currency of Pennsylvania was based on except for several issues based on taxes that were issued during periods of war.⁷

Some have argued that colonial paper money has a substantial liquidity premium because specie was chronically short and was never around long enough to effectively serve domestic trade. Since the lack of specie forced the economy to devolve into barter, for example, bolts of cloth for bushels of wheat, any “money item” that was introduced would be much more valuable since it would greatly reduce transaction costs. Therefore once paper money was actually available, barter was relatively costly, that paper money had a substantial liquidity premium. This paper seeks to replicate for Pennsylvania Grubb’s findings and results for the colony of New Jersey.⁸ Contemporary luminaries such as Benjamin Franklin of Pennsylvania declared that paper currency issues would help all. “A plentiful Currency will occasion Interest to be low; . . . A plentiful Currency will occasion Trading Produce to bear a greater price. Because Trade being encouraged and advanced by it, there will be a much greater Demand for that Produce; which will be a great Encouragement of Husbandry and Tillage, and consequently make land more valuable.”⁹ An earlier proponent of paper money, Francis Rawle, a provincial assemblyman and bill signer of the 1723 bills, wrote a pamphlet in 1721 that presciently describes a plausible system of paper money emissions. Sadly he died before the fruition of his plan.¹⁰

⁷ This paper is focused specifically on loan-office bills so the tax-redemption cycle bills will not be discussed here.

⁸ See Grubb (2014).

⁹ Labaree (1967, Ch. 1, P. 3).

¹⁰ Rawle, (1721) “Some Remedies Proposed.” This pamphlet printed by Andrew Bradford is technically anonymous but much scholarship over the past years has

Many have argued that this liquidity premium encouraged and fostered economic development and expansion. The idea of a liquidity premium in paper money holds with several versions of modern economic analysis of money. The devolution of trade to a barter system was remedied by paper money because it was universally accepted with agreed upon value. No one, before Farley Grubb, has measured the liquidity premium of these paper bills of credit. That is to say, little research exists on measuring the actual extent that paper money was in fact used as “money” as opposed to being traded as just another barter good or asset. In effect we are measuring the extent of the “moneyness” of paper money and this “moneyness” or liquidity premium’s effect on economic growth.

1.1 Why Pennsylvania?

This paper will focus on a single colony Pennsylvania for several reasons. Pennsylvania’s preeminent polymath Benjamin Franklin was a strong proponent of paper currency believing that they could solve the colony’s money problem. Second, Pennsylvania’s laws and legal proceedings are still intact and readily available unlike other colonies’ whose are lost to the destruction of history. Third, there have been few comprehensive studies measuring the amount of Pennsylvania currency in circulation in the modern era. The most recent study of Pennsylvania currencies was completed by Lester in 1938 and Brock in 1941.¹¹ Fourth, there have been erroneous assumptions about the exchange rate of paper money in the Pennsylvania colony and close study of the issuing laws reveals that those exchange rates that are typically utilized in

attributed it to Francis Rawle. An early Pennsylvania statesman, he strongly believed that the colony needed to create paper currency.

¹¹ See Lester (1938); Brock (1975).

calculations regarding colonial money need to be adjusted. Fifth, Pennsylvania has an excellent track record for keeping with their redemption schedule which means that the risk discount to the redemption value is zero. Finally, each issuance of loan office bills of credit made them legal tender so that each grouping of bills was created under the same basic structure except for the last one in 1773.¹²

This paper seeks to thoroughly analyze and give an accurate numbers for the amount of paper money circulating in the colony as well a better understanding of how the structure of the bills of credit affects monetary models.

¹² See Thayer (1953); Schweitzer (1987).

Chapter 2

Colonial Pennsylvania's Loan Office Currency Regime, 1723-1775: A Forensic Accounting Reconstruction of the Data

The section will be a forensic accounting exercise and track how the land office bills were executed. Each emission had a connecting law that explained how much money was to be emitted, its timing, and how much was redeemed yearly (retired/taken out of circulation). Subsequent acts sometimes changed these time frames and re-emitted money that was originally supposed to be destroyed.

There were several issuances of the loan office bills between 1723 and 1773. Two acts in 1723 created £45,000, one in 1725-26 reissued previous emissions, one in 1729 created £30,000, 1731 reissued all the principal taken in between 1731 and 1737, the 1739 act reissued all the principal taken in between 1739 and 1749 and created an additional £11,110.25, one in 1745 reissued previous principle and finally the 1773 act created £150,000. Overtime, as the legislature became more aware of how their system worked they changed the structures of the bills slightly. For example, they went from creating new bills to re-issuing the previous stock in 1725 and the 1730s; they increased the amounts they were willing to circulate – from a paltry £15,000 in 1723 to £150,000 in 1773. They also experimented with collateral for the loans. While the predominant form was based on land ownership, in some bills they specified the ability to make the loans on good plate with different terms than the regular loan.¹³

¹³ See *The Statutes* (V. 3, P. 335, 401; V. 4, P. 110, 355)

The requirements for these loans were typically different. The term was typically 12 months with interest and a twelfth of the principal due each month and the plate selected as collateral was supposed to remain in the loan office for safekeeping and in case of default. After one month of default the trustees were to put the plate as collateral up for public sale. The maximum that could be loaned out with plate as collateral varied depending on the bill. Amounts range from £100 to £300.¹⁴ The preceding sections will deal with each issuance individually to explain how the money was structured. Each law was supposed to be approved by England but due to lapse of time they became law in accordance with the charter.¹⁵

There were two acts in 1723, the first one was for £15,000 and finding that this was too small an amount of money they issued a second emission for £30,000. They began the act by explaining the dire straits the colony's economy was in because they lacked a medium of exchange with which to do business.

"Forasmuch as through the extreme scarcity of money the trade of this province is greatly lessened and restricted, and the payment of public debts to the government rendered exceedingly difficult, and likely so to continue, unless some medium in commerce be by law made current instead of money. For remedy whereof, may it please the governor that it be enacted:"¹⁶

Interestingly they mention in the text of this act how the creation of this medium of exchange will specifically help the poor of the colony:

¹⁴ The first 1723, 1730-31, 1739 act limited it to £100; the second 1723 act raised the limit to £200 and the 1729 act raised it the highest at £300. See *The Statutes* (V. 3, P. 326, 394; V. 4, P. 103, 199, 350).

¹⁵ See *The Statutes* (V. 1, P. 338) "Allowed to become law by lapse of time in accordance with proprietary charter."

¹⁶ See *The Statutes* (V. 3, P. 324).

“And whereas the aforesaid bills of credit are chiefly intended for the benefit of the poor, industrious sort of the people of this province, at an easy interest, to relieve them from the present difficulties they labor under, which end cannot be so well performed if any one person should be allowed to take up too great a sum of the said bills of credit upon loans.¹⁷

This sentiment is not echoed in the following acts.¹⁸ First they lay out the procedure in which the bills are to be printed down to the design and text on the bill as well as the amounts that are to be created, i.e. 6,000 of the bills will be worth twenty shillings each. In order to prevent counterfeiting there are several men of the colony who are chosen to be signers on the bills. The trustees are chosen separately; these men are supposed to run the day to day business of the loan office and were responsible for the bills of credit until they are officially sunk. In this first act they are only said to sit in Philadelphia but in later acts they will expand their travels and business to other parts of the colony and even into Delaware. The original sum of £15,000 was to be lent out at an interest rate of 5% for the length of 8 years with land as collateral. The mortgagor had to turn in the deed for the land to show that they owned it and the land itself had to be worth 2-3 times the value of the loan so that, in case of default, the lost sum could be recovered¹⁹. The trustees were entrusted with examining the land to see

¹⁷ See *The Statutes*, (V. 3, P. 328)

¹⁸ The limits placed on the size of the loan remained small (£100 was a typical limit) this ensured that everyone had a chance to borrow a fraction of the paper money supply and there was not an inordinate amount in the hands of one man, See Thayer (1953, p. 155); Schweitzer (1987, p. 152-161); *The Statutes* (V. 3, P. 326, 394; V. 4, P. 103, 199, 350).

¹⁹ See Thayer (1954, P. 153). He explains how the Pennsylvania Loan Office did not overvalue the property, a common mistake made by other colonies by their loan

that it held the same value as the deed. Each year one-eighth of the principal was to be paid in, along with the 5% interest. They were to immediately begin lending the bills once they were printed (while the law technically needed royal approval, the necessary lapse passed and it became law passively.) While the law called for £15,000, only £11,000 of that was supposed to be lent out, the rest was distributed between the colonial and county governments to cover expenses. According to the law, the pound rate was issued in accordance with Queen Anne's Proclamation for "ascertaining the rates of foreign coins in the plantations"²⁰ which dictated that 1.3275£ PA = 1£sterling silver. At the end of each year a committee would audit the accounts and destroy the bills that were to be sunk absolving the trustees of their responsibility. This audit would also deduct the salaries and expenses from the interest payments and give the remaining money to the assembly to disburse as they saw fit. Each of the four trustees was to be paid £50 per year and each of the four signers was to receive £20. The interest from the bills was used to defray the costs of governance of the colonies. However this was not enough so they would often add a little additional money into each bill for additional costs. £2,500 went to the provincial government to pay debts

offices. This practice mediated their risk in the loans, lending the currency further stability.

²⁰ In *the Statutes* (V. 3, P. 324,389; V. 4, P. 99), "the plantations" refers to the colonies.

from the past two years, £1,000 went to Philadelphia and £200 went to Bucks County and £300 to Chester County. These bills were to be sunk by county taxes.²¹

As this sum didn't satisfy the voracious needs of trade and was insufficient for the growing colony's needs; another act followed very quickly that issued another sum of £30,000 with relatively similar terms. They had found that the original amount was simply not enough. Of the £30,000, £1,300 was given to the provincial government to defray costs. An additional £1,000 was given to Philadelphia County, £300 to the mayor of Philadelphia, and £300 to the treasurer for "the building and repairing of public wharves and bridges."²² £400 pounds were allotted for Chester County and it was supposed to be used to build a courthouse and bridge repairs. £200 was given to Bucks County to help with expenses. They were to sink these sums by using county taxes. The remaining sum of £26,500 was to be lent out through the loan office at 5% interest for a term of 12.5 years, with part of the principal turned in each year as well as the interest. The trustees were to be paid an additional £20 per year increasing their yearly salary to £70 per year. Each of the four signers was paid £35 fee for their services. Once again, salaries and expenses were deducted from this interest before it was handed over to the provincial treasury to disburse as the legislature saw fit.²³

²¹ These county taxes were to be structured similarly to the penny per pound tax in "An act for the more effectual raising of county rates and levies" See *The Statutes*, (V. 3, P. 334).

²² *The Statutes*, (V. 3, P. 402).

²³ See Thayer (1953, P.157). He describes several ways the loan office interest was used: to erect public buildings, buy presents for Indians, and provide for defense of the colony.

In 1725-26, the legislature made their first attempt at re-emission. The act called for the entire principal paid in between 1725 and 1731 (approximately £3495 a year) to be re-loaned for the remainder of the 12.5 year term (which would end in 1737.5) at 5% interest. A fraction of the principal and interest were due each year. This is the first act to note that the official due date is October 15th each year.²⁴ All money acts after this use the same due date. Out of the interest generated from the bills the government would deduct salaries and expenses. The signers were to be paid £3 per £1000 signed and the trustees were to receive an additional £20 a year.

In 1729 they issued £30,000. In the preamble to the bill they especially note that “the inhabitants of the province, being now become very numerous by the great and constant importation of foreigners as well as others, and our trade also greatly increased, are thereby reduced to very great difficulties for want of currency”.²⁵ Of this £30,000, £4,000 was set aside and disbursed for expenses and community improvement. £1,000 was given to the provincial treasurer and another £1,000 was set aside to build an almshouse in Philadelphia. Finally, £2,000 was set aside to construct a statehouse under the direction of a committee comprised Thomas Lawrence, Andrew Hamilton, and John Kearsley.²⁶ £26,000 was lent out through the loan office for 16 years at 5% interest and a portion of the principal and the interest were returned each year on October 15th. The legislature was responsible for dispensing with the extra interest as they saw fit. At this point the government was facing a counterfeiting

²⁴ This is the first law that describes an actual turn in date; all others simply say that the principal and interest would be turned in yearly.

²⁵ *The Statutes* (V. 3, P. 98).

²⁶ The state house constructed from these funds would eventually become a national monument known as Independence Hall.

problem with the paper bills and the law included new stipulations for the design of the bills and the guarding of the plates and press that printed the bills of credit.

The emissions of the 1730's were more complex as some re-emitted old funds and created new ones, while some printed new bills to be exchanged for worn and torn bills. The calculations here assume that the previous acts were functioning as the law dictated and the mortgagors followed the agreements to the letter.

In the 1731 act the legislature called for that amount of the principal that was turned in be loaned out again that same year. The wording of the law called for the trustees to not sink any part of the principal turned in between 1731 and 1737 and instead re-emit it immediately as a new loan for the residue of the sixteen year period given in the 1729 law. Each year between 1731 and 1737 £6370 were turned in and we can assume that this amount was then re-emitted as a new loan for the remainder of the 16 year period that ended in 1745 at 5% interest. For example, a loan emitted in 1732 would have a period of thirteen years. Each year a fraction of the principal and the interest was paid back into the loan office. This unique structure will later affect the present value calculation which shall be explained in detail later. This act also called for the new design and printing of £40,000 of bills of credit. These bills of credit were not a new emission but they were supposed to be exchanged for bills currently in circulation that were torn or frayed. An additional trustee, John Wright, was given the power of trustee of the loan office and allotted a salary of £50 per year. The previously given date of October 15th was once again supposed to coincide with the return of the yearly payments of principal and interest. This law, in reference to the 1729 law, declared that unless explicitly dictated in this new law everything is supposed to run in accordance with the previous act.

In 1739, there was a new law that combined re-emissions and new emissions. At the time many of the old bills were worn out and needed to be replaced, in addition the colony crawled with counterfeiters. In response the legislature redesigned the bills with more mechanisms to make replication harder such as elaborate escutcheons and a more guarded bill-printing process. At the time the act estimates that there was about £68,889 and 15 shillings in circulation.²⁷ They printed about £80,000 of new bills which were official current money as of August 10th, 1739. Of those bills £11,110.25 pounds were to be new emissions for a term of sixteen years to begin on October 15th, 1739 at 5% interest. A fraction of the principal and the interest was to be turned into the loan office each year. All the bills were to be turned in by August 10th, 1740 and exchanged for the new bills. The bill also provided for re-emissions. All the money turned in between 1739 and 1749 was to be remitted for the period ending in 1755. Assuming that the correct amounts listed in the previous laws were paid into the loan office each year and the entirety of that which was paid in was then immediately re-issued as a new mortgage, the amount issued each year are as follows. Each year between 1739 and 1745 £6515.34 was issued in new mortgages and for the years between 1746 and 1749 £2319.39 was issued as new mortgages. The length of the loan was for the remaining time between the year it was emitted and 1755 for 5% interest. This law also extended itself to the colony of Delaware.²⁸ The salaries of the trustees were £110 per annum between 1739 and 1749 and then reduced to £80 per

²⁷ The estimates given in the law do not match what is marked outstanding for the loan office bills in Table 1. However, by this time, the provincial government had issued additional paper currency that might have made up the difference in numbers.

²⁸ Technically under the governorship of Pennsylvania, Delaware was not explicitly mentioned in these acts until this one.

annum for the remaining years between 1749 and 1755. The signer's pay changed from a lump sum to a fee per amount of work so they received fifteen shillings for every £1,000 worth of bills signed. These fees were also supposed to be deducted from the interest payments.

Another act was issued in 1745-46 that also called for previously redeemed amounts to be reissued. It called for all principal received between 1750 and 1755 (about £ 4683.93 per year) to be re-loaned for the residue of the sixteen year term from 1739 at 5% interest. The trustees continued to receive their salary of £110 per annum deducted from the interest.²⁹

The final loan office bill act was issued in 1772-73 and emitted the largest sum yet, £150,000. The entirety was to be loaned out for a term of sixteen years at 5% interest. The interest was to go toward provincial expenses once salaries and expenses were deducted. The trustees were each to receive £120 per year while they issued new mortgages. Once all the loan office bills were loaned out their salaries were reduced to £100 per year. Most likely this structure was disrupted once the Revolution began and discontinued.

Table 1 reconstructs a quantitative paper money history of Pennsylvania. New emissions and redemptions are taken from the original laws and the amounts outstanding are derived by subtracting redemptions from new emissions. This data reconstruction was necessary because doubts exist about the validity of the current numbers listed as the amounts of money in circulation for the colony of Pennsylvania. As can be seen in the appendix, there are vast differences between the most commonly

²⁹ The quantitative descriptions above for each of the issuances of loan office bills are constructed from *The Statutes* (V. 3, P. 324-338, 389-407; V. 4, P. 38-52, 98-116, 197-208, 344-359; V. 5 P. 7-15; V.8, P. 284-300).

used numbers for the amount of paper money in Pennsylvania and the ones found in this paper. These new numbers are correct and the information compiled above is necessary for constructing the liquidity premium.

Table 1 Colonial Pennsylvania Paper Money: Quantities Planned vs. Executed, 1720-1775

End of Year	Planned New Emissions (Face Value)	Planned Redemptions (Face Value)	Face Value Expected to be Outstanding	End of Year	Planned New Emissions (Face Value)	Planned Redemptions (Face Value)	Face Value Expected to be Outstanding	End of Year	Planned New Emissions (Face Value)	Planned Redemptions (Face Value)	Face Value Expected to be Outstanding
1721	£ -	£ -	£ -	1739	£ 17,925.59	£ 7,560.48	£ 47,872.22	1757	£ -	£ 2,814.06	£ 12,541.89
1722	£ -	£ -	£ -	1740	£ 6,515.34	£ 7,986.44	£ 46,401.13	1758	£ -	£ 2,814.06	£ 9,727.82
1723	£ 15,000.00	£ -	£ 11,000.00	1741	£ 6,515.34	£ 8,420.79	£ 44,495.67	1759	£ -	£ 2,814.06	£ 6,913.76
1724	£ -	£ 1,375.00	£ 9,625.00	1742	£ 6,515.34	£ 8,886.18	£ 42,124.84	1760	£ -	£ 2,814.06	£ 4,099.69
1725	£ 33,495.00	£ 1,375.00	£ 38,245.00	1743	£ 6,515.34	£ 9,387.36	£ 39,252.83	1761	£ -	£ 2,814.06	£ 1,285.63
1726	£ 3,495.00	£ 3,774.60	£ 37,965.40	1744	£ 6,515.34	£ 9,930.30	£ 35,837.87	1762	£ -	£ 1,285.63	£ 0.00
1727	£ 3,495.00	£ 4,078.51	£ 37,381.89	1745	£ 6,515.34	£ 10,522.60	£ 31,830.61	1763	£ -	£ -	£ -
1728	£ 3,495.00	£ 4,411.37	£ 36,465.52	1746	£ 694.39	£ 3,613.66	£ 28,911.34	1764	£ -	£ -	£ -
1729	£ 33,495.00	£ 4,779.26	£ 65,181.25	1747	£ 694.39	£ 3,613.66	£ 25,992.07	1765	£ -	£ -	£ -
1730	£ 3,495.00	£ 6,815.44	£ 61,860.81	1748	£ 694.39	£ 3,613.66	£ 23,072.80	1766	£ -	£ -	£ -
1731	£ 9,865.00	£ 7,281.44	£ 64,444.37	1749	£ 694.39	£ 3,613.66	£ 20,153.53	1767	£ -	£ -	£ -
1732	£ 6,370.00	£ 7,053.52	£ 63,760.85	1750	£ 4,308.05	£ 3,613.66	£ 20,847.92	1768	£ -	£ -	£ -
1733	£ 6,370.00	£ 7,751.15	£ 62,379.70	1751	£ 4,308.05	£ 3,972.66	£ 21,183.30	1769	£ -	£ -	£ -
1734	£ 6,370.00	£ 8,506.91	£ 60,242.79	1752	£ 4,308.05	£ 4,364.31	£ 21,127.05	1770	£ -	£ -	£ -
1735	£ 6,370.00	£ 9,331.38	£ 57,281.41	1753	£ 4,308.05	£ 4,795.11	£ 20,639.99	1771	£ -	£ -	£ -
1736	£ 6,370.00	£ 10,238.29	£ 53,413.12	1754	£ 4,308.05	£ 5,273.78	£ 19,674.25	1772	£ -	£ -	£ -
1737	£ 6,370.00	£ 11,245.97	£ 48,537.15	1755	£ 4,308.05	£ 5,812.29	£ 18,170.02	1773	£ 150,000.00	£ -	£ 150,000.00
								1774	£ -	£ 9,375.00	£ 140,625.00
								1775	£ -	£ 9,375.00	£ 131,250.00

Sources: *The Statutes* (V. 3, P. 324-338, 389-407; V. 4, P. 38-52, 98-116, 197-208, 344-359; V. 5 P. 7-15; V.8, P. 284-300).

Notes: Includes loan office bills only, not tax-redemption paper currency. The difference between planned new emissions and the expected amount outstanding can be accounted for in the following manner. Even though an act would emit a certain amount, say £15,000 in 1723, only £11,000 was issued as loan office bills; the rest was given to the provincial and county governments to be redeemed through taxes. “Face Value Expected to be Outstanding” only includes the amount that was loaned out as loan office bills. (This table is still in the process of being fully checked and completed.)

This system worked quite well for the colonists but it was discontinued due to its structure. The loan office bills were a passive currency; they sat in the land bank office until a colonist came to take out a loan – therefore they did not circulate well in the economy during wartime. In the early 1740's and 50's the colonists joined their European counterparts in several wars that gobbled up funds and manpower that would have utilized the loans.³⁰ During these times it was far easier to simply print money to pay for soldiers, ammunitions, and supplies and have it redeemed by taxes later on.

Finally, who used this currency? Throughout history farmers are typically personified as the opponents of paper money and the merchants as the main proponents. An interesting analysis of these loans would be who actually mortgaged their lands for these loans. A thorough analysis of this is not possible because of missing or incomplete registers and records. However from those that exist we can generalize who would have taken out a mortgage - they would have most likely been male, a farmer or yeoman and they took out a sum around 30-50 pounds³¹. Mary Schweitzer has compiled tables that divide the mortgagors by occupation, mortgage amount and counties. Her data is attached in an appendix to better illustrate her findings.³²

³⁰ King George's War (1744-1748) and the French and Indian War (1754-1763).

³¹ Schweitzer (1987).

³² Mary Schweitzer (1987) does an excellent job of extracting data from the remaining Registers of the General Loan Office ledgers located in the archives of the Historical Society of Pennsylvania and provides a qualitative analysis of who borrowed from the loan office. In Appendix A.3 there is a table replicated from her book that details those who took out mortgage loans.

In the 1740's and 1750's, war forced the legislature to begin to more actively print money in order to fund the salaries of troops and munitions. They printed money in large quantities (typically between 45,000 and 100,000 at a time) and immediately paid their debts with it. They were to be sunk by taxes. While this paper is about loan office bills of credit these tax-redemption bills deserve to be mentioned because the trustees of the loan offices were responsible for the printing of the bills and part of the tax-redemption process.³³

These loan office bills were extremely successful in solving the twofold problem of raising provincial funds and providing an adequate medium of exchange for the growing colonial economy. The loan office bills were so successful in fact that Franklin proposed starting a continental land-bank to replace the hated Stamp Act. The Crown would receive the funds instead of the provincial government. Ironically, this was not enacted due to fears that "a continental loan office and currency would draw the colonies together as never before and it would surely hasten the day when they would demand a central government for America, with a consequent lessening of British control."³⁴

³³ See the Appendix for an expanded Table 1 which includes an extra column that contains all paper money emitted (includes loan office and tax-redemption currency). This table is still a work in progress and is not fully complete and checked at this point.

³⁴ Thayer (1953, P. 159).

Chapter 3

Estimating the Liquidity Premium to Paper Money in Colonial America: Pennsylvania, 1720-1775

In this section we will explore and quantitatively estimate the liquidity premium. Liquidity is different from the liquidity premium. Liquidity is a greater universality of acceptance in trade; for example, as transaction costs decrease, liquidity increases. An item must have liquidity if it is to have a liquidity premium; however, just because an item is liquid does not mean that it has a premium. The liquidity premium is the extra amount people are willing to pay for this liquidity above and beyond its next best use or opportunity (opportunity cost). Coins can be liquid in the sense that they are universally accepted and easily transacted. However, in order to also have a liquidity premium, people must be willing to pay more to use this coin versus using the equivalent amount of gold plate or another alternative as the medium of exchange in transactions. Hence if people are not willing to pay more, the coin will be liquid but not necessarily have a liquidity premium and simply be equivalent to another barter good. If coins have a liquidity premium they must lower the cost of transactions and people will pay more for this increased ease and efficiency. This extra amount they are willing to pay is the liquidity premium and this property is what separates money from a regular barter good and allows money to increase transaction efficiency and augment economic growth and development.

According to the musing of Benjamin Franklin, chronic specie scarcity had forced the colonies to rely on crude barter for trade, then the introduction of paper

money could lower transactions costs and lead to economic development. The dramatic increase in efficiency between barter and a liquid medium of exchange would be enough that many would be willing to pay more to use paper money than the next best alternative and this colony specific paper money would possess a substantial liquidity premium. The lowered transaction costs would translate into increased trade and would accelerate economic growth and development. By measuring the liquidity premium we are also measuring this effect.

Following the approach developed by Grubb³⁵ this paper seeks to replicate his results from New Jersey for Pennsylvania. First we must establish what money is, we cannot assume that something is money just because it is labeled as such.³⁶

In order to determine the market value (MV) of a “money thing” utilized as a medium of exchange we must add the barter value (AV) of that good when it is used simply as another barter good and then add its liquidity premium (LP), or “moneyness”. So $MV=AV+LP$ or $LP= MV-AV$. Most likely there is some uncertainty that exists about the barter value of the “money thing” so there must be some risk discount (RD) so $MV=AV+LP-RD$, or $LP=MV-AV+RD$.

This formula can be clarified by comparing the two extremes. Let's compare a fiat currency like a U.S. dollar bill and a regular barter good like a candlestick. On one hand we have a good where the entirety of its market value is its liquidity premium; $RD=0$ and $AV=0$, thus $MV=LP$. If we take the U.S. Dollar bill, it is composed of a piece of paper that as a barter good is practically worthless so $AV=0$. Since the U.S.

³⁵ See Grubb (2014).

³⁶ See Grubb (2014) and see Grubb (2012b) for his description and analysis of how even if a good is called money it is not necessarily money. It must possess certain other qualities in order for it to qualify as money in the economic sense.

dollar is very reliable and utilized as a global standard there would be very little risk discount, $RD=0$. Since the value of the good itself is zero any value it holds its based solely on its ability to function as money, or its liquidity premium.

On the other hand, if we look at privately produced good in a free market system there is no liquidity premium. In a perfectly competitive, unregulated market, the equilibrium of this commodity's market value (MV) will equal its true costs of production. Even if this good holds a liquidity premium, market forces will arbitrage this away through new commodity production until it reaches equilibrium again where its $AV=MV$. This will occur even if the good is universally accepted and the most common barter good. This commodity will have no liquidity premium or unique "moneyness" so $MV=AV$ and $RD=0$ and $LP=0$.

The methods utilized in this paper to measure the market value of colonial paper monies as a medium of exchange are similar to the methods above but since they are not fiat currencies or physical commodities but exchangeable forms of government debt the process is a bit trickier. The paper monies created by the colonial governments were bills of credit (government debt instruments). The structure of these debt instruments is most similar to zero interest bearer bonds redeemable in real taxes, real assets, or real monies at fixed future dates by the issuing government and transferable from person to person. Except for this transferability, their structure resembles that of U.S. savings bonds. To calculate the current money values of U.S. savings bonds, relative to their face values, as a barter good (AV) is to find the expected present value given its maturity dates when discounted using the market interest rate. Given the certainty of redemption, this same process will be used for the colonial paper money's value.

Grubb points out an analogous exercise to the procedure in this paper would be to assume that U.S. savings bonds are now transferrable and can be used as money. The liquidity premium that a U.S. savings bond holds when used as a general medium of exchange is the difference between the current value of U.S. savings bond when used as a form of money in the market place and it's time-discounted present value as non-money or as non transferrable assets.

The rest of this section will create the necessary data to apply this approach and interpret the results of the liquidity premium to colonial paper money.



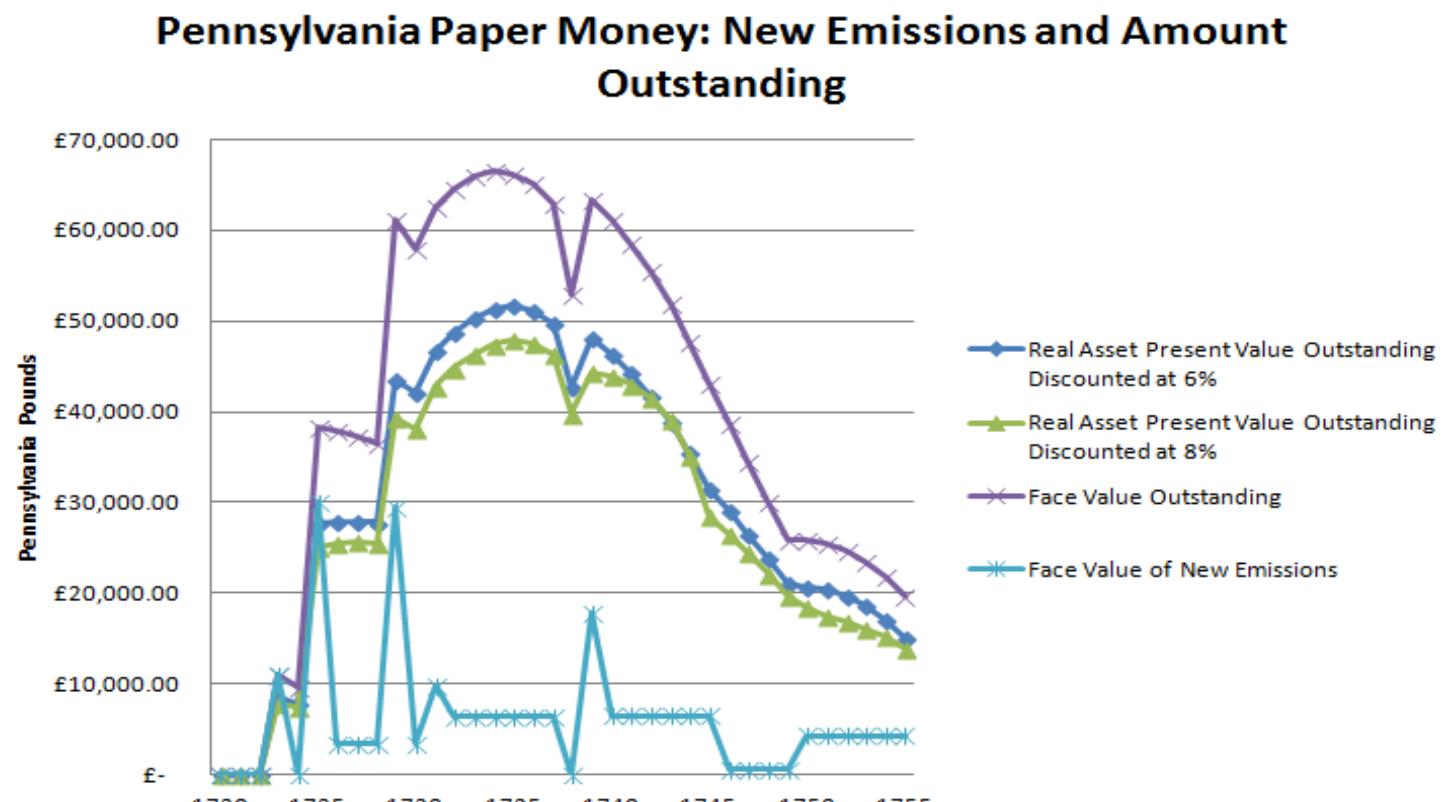
Figure 1 Example of Pennsylvania Paper Money, Issued 1723. Source: Newman (2008, P. 332).

3.1 Data Construction

Table 1 in the first section of this paper explains how the amounts of money outstanding are constructed for each year; this information will be utilized later in this

section. Figure 2 shows how new emissions would boost the money supply but then are followed by a decline during the redemption cycle until the money supply is bolstered by a new emission so the graph displays a saw-like pattern.

Figure 2 Colonial Pennsylvania Paper Money, 1720-1755, New Emissions and Amounts Outstanding (Currently in Circulation)



Source: Derived from Table 1 and Table 3.

As seen in the graph, the discount reduces the severity of the amplitude and the variation. In order to construct the expected present value of the current bills outstanding as a real asset barter good we have to have data on the actual redemptions executed relative to the actual amount in circulation. These calculations assume that the general populace knows approximately how much money is in circulation.

Since the money functioned similar to a zero interest bearer bond, the method for finding the real asset value of Pennsylvania paper money when used as just another barter good is calculated very similarly to a U.S savings bond but with a few changes. The face value at maturity, or redemption by the government, is discounted back to the present using the market interest rate. These values as percents of face value are shown in Table 2 below.

Table 2 Average Present Value (Percentage of Par) of Current Bills of Credit, 1720-1775

Calculated on Bill Redemption Only											
YEAR	Discounted at			YEAR	Discounted at			YEAR	Discounted at		
	6%	8%	10%		6%	8%	10%		6%	8%	10%
1723	77.06%	70.95%	65.45%	1741	75.68%	73.51%	68.31%	1759	86.11%	81.94%	77.98%
1724	81.83%	76.85%	72.33%	1742	75.39%	74.80%	67.58%	1760	88.69%	85.21%	81.87%
1725	72.22%	65.47%	59.63%	1743	74.93%	75.24%	63.13%	1761	100.00%	100.00%	100.00%
1726	73.49%	66.93%	61.22%	1744	74.18%	73.69%	62.60%	1762	-	-	-
1727	74.84%	68.49%	62.91%	1745	72.96%	66.12%	60.10%	1763	-	-	-
1728	76.22%	70.09%	64.66%	1746	74.97%	68.47%	62.69%	1764	-	-	-
1729	71.13%	64.26%	57.68%	1747	77.06%	70.95%	65.45%	1765	-	-	-
1730	72.66%	65.99%	58.98%	1748	79.23%	73.55%	68.38%	1766	-	-	-
1731	74.75%	68.42%	62.05%	1749	81.48%	76.29%	71.50%	1767	-	-	-
1732	75.56%	69.38%	63.80%	1750	79.75%	71.52%	66.28%	1768	-	-	-
1733	76.38%	70.36%	65.60%	1751	80.23%	68.40%	64.87%	1769	-	-	-
1734	77.20%	71.33%	67.44%	1752	79.71%	68.05%	62.28%	1770	-	-	-
1735	77.98%	72.24%	69.27%	1753	79.09%	68.48%	62.68%	1771	-	-	-
1736	78.66%	73.02%	71.35%	1754	78.20%	69.33%	63.56%	1772	-	-	-
1737	79.17%	73.57%	72.89%	1755	76.74%	70.42%	64.70%	1773	62.37%	54.18%	47.43%
1738	80.60%	75.26%	75.09%	1756	78.95%	73.08%	67.70%	1774	63.98%	55.94%	49.24%
1739	76.01%	69.96%	66.04%	1757	81.24%	75.88%	70.91%	1775	65.64%	57.78%	51.17%
1740	75.87%	71.83%	67.53%	1758	83.63%	78.83%	74.33%				

Source: Derived from Table 1.

The Pennsylvania legislature issued very clear laws so, since there is little data available to compare with, the table assumes that the actual amounts issued and circulation match those laid out in the original laws.³⁷ The redemption structure of the colonial paper money is more complex than that of the U.S. savings bond, so the calculation for the present value formula must be adjusted. For any bills currently outstanding there was not one exact date on which they would be redeemed but a span of years in which they could be redeemed, or a redemption window. Within the law there was no mechanism that required that certain bills be redeemed at certain times, and, as explained earlier, the span of years could be long. Therefore since we don't know which bills were redeemed when, we must assign a probable redemption date to each current bill.

Additionally, the Pennsylvania laws made the bills of credit legal tender for any taxes, fees, interest, or loan repayments at face value. Legal tender laws could merge redemption windows for outstanding emissions. Since the bills were now legal tender they could be used within other redemption windows to pay off the principals, in other words, bills currently outstanding from other emissions became fungible across redemption windows. Since total emissions equaled total redemptions for all redemption periods Pennsylvania meets the criteria for fiscal credibility. This means that we can set the risk discount or $RD=0$.³⁸

³⁷ The Pennsylvania legislature was quick to punish those trustees who did not faithfully enact their duties - see two laws on Trustee William Fishbourne. See *The Statutes* (V. 4, P. 219,304). In addition, the remaining registrars of the General Loan Office (in the Archives of the Historical Society of Pennsylvania) show clear deeds laid out to the letter of the original laws.

³⁸ Many of the Pennsylvania acts were allowed to become law by lapse of Parliamentarian approval and automatically became law. The proprietors of Pennsylvania did not want to allow paper money acts because colonial paper money

Therefore when calculating the present value of a bill in the current year we need to then take into account the probability that it might be redeemed at face value in each of the future years within the legal tender combined relevant redemption windows. This set of possible maturity dates is then discounted back to the present using a likely market interest rate and then summed together to get the expected present value of a bill currently outstanding for that particular year.

In certain acts they called for the re-emission of the principal from previous acts. In the 1731 act the legislature called for any principal turned in between 1731 and 1737 to be reemitted for the residue sixteen years of the loan period from the 1729 act. Operating on the assumption that there were few defaults we assume that the entire principal was turned in and that the entirety of this was then loaned out.³⁹ At this point colonial Pennsylvania had moved out of its recession and there would probably be a higher demand for it so we also assume that this entire re-issuance is then loaned out and is in circulation.

was unusable to them in Britain. The governors of Pennsylvania were ordered to not allow these acts to pass however they were overruled by the legislature. Once the acts were passed and became law the proprietors were helpless to stop them unless they completely undermined the power and trust in the provincial government and that would have created other issues. However, the proprietors insisted that their quitrents must be paid in specie, or gold and silver. The legislature sought to appease the proprietors by offering to pay them a lump sum so that they could accept the paper money for the quitrents. Since they did not disallow any acts, it allowed for greater stability in the currency. All these actions contributed to their fiscal credibility.

³⁹ This is a reasonable assumption given that there seem to be few records of defaults and there were penalties for defaults. In addition, the length of time until a default was officially declared was lengthy by law to allow the mortgagor time to pay his/her debts and avoid default. Finally, this assumption is necessary because it simplifies our calculations to make them more reasonable.

The present value is calculated using the formula given below. This formula

$$Expected\ Present\ Value = \sum_{i=1}^n \frac{redemptions}{outstanding} e^{-rt}$$

X refers to the total amount of money in circulation, X_i is the specific amount of money we are calculating the weight of, n is the number of years past the year we are calculating the present value for, redemptions refers to the amount that is turned into or redeemed each year, outstanding refers to the amount still in circulation, r refers to the market interest rate and t refers to the length of time remaining on the loan. Since we have many overlapping issuances our final expected present value is weighted.

$$Weighted\ Expected\ Present\ Value = \sum \frac{x_i}{\sum x} \sum_{i=1}^n \frac{redemptions}{outstanding} e^{-rt}$$

Some of the acts reissued the principal of loans as they were paid into the loan office. In order to calculate the present value for these bills, the reissued stock for each year was calculated separately and then the present value was averaged.

Figure 3 Sample Present Value Calculations

	Amt Outstanding	Redempt per YR	Redempt/Outstand	Year	Rate	Year*Rate	E-values	PV at 6% of face value
1723	£ 11,000.00	0	0.00000	0	-0.06	0.00	1.00000	0.00
1724	£ 9,625.00	£ 1,375.00	0.12500	1	-0.06	-0.06	0.94176	0.12
1725	£ 8,250.00	£ 1,375.00	0.12500	2	-0.06	-0.12	0.88692	0.11
1726	£ 6,875.00	£ 1,375.00	0.12500	3	-0.06	-0.18	0.83527	0.10
1727	£ 5,500.00	£ 1,375.00	0.12500	4	-0.06	-0.24	0.78663	0.10
1728	£ 4,125.00	£ 1,375.00	0.12500	5	-0.06	-0.30	0.74082	0.09
1729	£ 2,750.00	£ 1,375.00	0.12500	6	-0.06	-0.36	0.69768	0.09
1730	£ 1,375.00	£ 1,375.00	0.12500	7	-0.06	-0.42	0.65705	0.08
1731	£ -	£ 1,375.00	0.12500	8	-0.06	-0.48	0.61878	0.08
		£ 11,000.00	1.00					0.7706

Source: Derived from Table 1.

Notes: Sample Present Value Calculation. Present Value is shown in red for the year 1723.

The present value calculations require the market interest rate; however evidence from markets producing a quantitative interest rate does not exist for colonial

America. Pennsylvania's legislature in 1700 set the interest rate at 6%⁴⁰ and Benjamin Franklin mentioned 6, 8, and 10% as a range of probable interest rates.⁴¹ Most likely the true average market interest rate (or the real opportunity cost of money) would be slightly higher than the legal 6% due to an added mark-up. In order to accurately reflect this range, all calculations will be completed with 6, 8, 10%. The single best guess would be 6% with a second best guess alternative of 8%.

The face value at redemption set in law for Pennsylvania pounds to pounds sterling (specie) is 1.3275 £PA=1£sterling. The first column of Table 3 contains the exchange rates given in McCusker however these rates are not the par rate of exchange necessary for the calculation. His reported exchange rates, gleaned from merchant records and letters are the “customary” exchange rates or what merchants are willing to offer for it at that moment in time. Since the structure of these debt instruments is similar to zero interest bearer bonds (i.e. a U.S. Savings Bond) then the par value is actually what it is worth at maturity, or when it is redeemed. The 1.667 rate given by McCusker is the customary rate and the actual par rate is 1.3275 Pennsylvania pounds to one pound sterling. All Pennsylvania acts that create any type of money declare that the correct par exchange rate is found in Queen Anne's Proclamation for “ascertaining the rates of foreign coins in the plantations.”⁴² Column

⁴⁰ *The Statutes* (V. 2, P. 338).

⁴¹ Labaree (1967, V. 1, P. 142).

⁴² *The Statutes* (V. 3, P. 324). Repeated in all the succeeding laws, see *The Statutes* (V. 3, P. 324, 389; V. 4, P. 99).

two titled “Percentage of Par” applies this correction by dividing the McCusker market exchange rate in column one by the correct par ($1.3275 \text{ £PA}=1\text{£sterling}$).⁴³

The third column “Percentage of Par adjusted for Time-Discounting and Transaction costs for rates quoted in bills of exchange” accounts for the time-discounting and transaction costs of converting bills of exchange drawn on London to specie in Pennsylvania. This adjusted rate is found by dividing the market exchange rate in column one by 1.2334.⁴⁴ The exchange rates of Pennsylvania Pounds for specie were typically determined through the purchase of bills of exchange in London denominated in pounds sterling and not for specie on the spot. Therefore, the spot exchange rate of Pennsylvania pounds for specie (pounds sterling) has to be adjusted downward to account for time-discounting and the transaction costs of getting bills of exchange to London and then getting it liquidated into Sterling, Sterling Credits, or other specie coins usable in Pennsylvania. The cost of doing this is estimated to be 7.09 percent; this is derived from the exchange rate quoted before bills of credit were issued. So the transaction and time-discounting costs are estimated to be around a year’s interest costs. Hence the effective spot par exchange rate to specie in Pennsylvania would be $1.2334\text{£PA}=1\text{£S}$ which is used in this paper.⁴⁵ Therefore MV equals the McCusker exchange rate divided by 1.2334 (i.e. the effective par rate). In other words, MV equals the market value of paper money as a percent of effective par of face value.

⁴³ Exchange Rates from McCusker (1978, P. 183-186); same exchanges rates given in Carter, Susan *Historical Statistics of the United States: Earliest Times to the Present, Millennial Edition, Volume 5*.

⁴⁴ The exchange rate $1.3275\text{£PA}=1\text{£sterling}$ discounted about 7%.

⁴⁵ Grubb (2014).

Previously, the phenomenon of colonial exchange rates that appeared above par flummoxed researchers however this correction shows that the exchange rates were not above par and the correct par was always $1.325 \text{ £PA} = 1\text{£s}$. In a speech given in 1764 to the Pennsylvania Assembly, Franklin declares that Pennsylvania bills of credit are customarily 20% less than their face value.⁴⁶ Dividing the par rate by the market rate ($1.3275/1.667 = 0.80$) delivers the 80% which shows the 20% markdown cited by Franklin.

⁴⁶ Labaree (1957, V. 11, P. 13-15).

Table 3 Colonial Pennsylvania Paper Money Exchange Rates to Pounds Sterling, 1720-1775

	The Number of £PA Needed to Buy 1£sterling	Percentage of Par of Par; Par Equals (1.3275£PA=1£sterling)	Percentage of Par Adjusted for Time-Discounting and Transaction Costs for Rates Quoted in Bills of Exchange		The Number of £PA Needed to Buy 1£sterling	Percentage of Par of Par; Par Equals (1.3275£PA=1£sterling)	Percentage of Par Adjusted for Time-Discounting and Transaction Costs for Rates Quoted in Bills of Exchange		The Number of £PA Needed to Buy 1£sterling	Percentage of Par of Par; Par Equals (1.3275£PA=1£sterling)	Percentage of Par Adjusted for Time-Discounting and Transaction Costs for Rates Quoted in Bills of Exchange
YEAR	[EX]	[REX]	[MV]	YEAR	[EX]	[REX]	[MV]	YEAR	[EX]	[REX]	[MV]
1723	1.4037	94.57%	87.87%	1741	1.4614	90.84%	84.40%	1759	1.5352	86.47%	80.34%
1724	1.4311	92.76%	86.19%	1742	1.5938	83.29%	77.39%	1760	1.5861	83.70%	77.76%
1725	1.3934	95.27%	88.52%	1743	1.5979	83.08%	77.19%	1761	1.7271	76.86%	71.41%
1726	-	-	-	1744	1.6667	79.65%	74.00%	1762	1.7626	75.31%	69.98%
1727	1.4958	88.75%	82.46%	1745	1.7477	75.96%	70.57%	1763	1.73	76.73%	71.29%
1728	1.5062	88.14%	81.89%	1746	1.7986	73.81%	68.58%	1764	1.7286	76.80%	71.35%
1729	1.4861	89.33%	83.00%	1747	1.8378	72.23%	67.11%	1765	1.699	78.13%	72.60%
1730	1.5203	87.32%	81.13%	1748	1.7412	76.24%	70.84%	1766	1.6296	81.46%	75.69%
1731	1.5328	86.61%	80.47%	1749	1.7139	77.45%	71.96%	1767	1.6602	79.96%	74.29%
1732	1.609	82.50%	76.66%	1750	1.706	77.81%	72.30%	1768	1.6662	79.67%	74.02%
1733	1.6694	79.52%	73.88%	1751	1.6986	78.15%	72.61%	1769	1.5756	84.25%	78.28%
1734	1.7	78.09%	72.55%	1752	1.6685	79.56%	73.92%	1770	1.5392	86.25%	80.13%
1735	1.6611	79.92%	74.25%	1753	1.6749	79.26%	73.64%	1771	1.6569	80.12%	74.44%
1736	1.67	79.49%	73.86%	1754	1.6835	78.85%	73.26%	1772	1.6083	82.54%	76.69%
1737	1.7025	77.97%	72.45%	1755	1.6879	78.65%	73.07%	1773	1.6627	79.84%	74.18%
1738	1.6042	82.75%	76.89%	1756	1.7257	76.93%	71.47%	1774	1.6946	78.34%	72.78%
1739	1.6969	78.23%	72.69%	1757	1.6607	79.94%	74.27%	1775	1.6112	82.39%	76.55%
1740	1.6545	80.24%	74.55%	1758	1.59	83.49%	77.57%				

Sources: Derived from McCusker (1987, P. 184-186).

3.2 Estimating the Liquidity Premium

If a good is used as “money” then its value should be greater than when it is used as a regular barter or asset good. The general acceptance of this money thing as a medium of exchange reduces the transaction costs that are imbedded in barter exchange through the necessity of a coincidence of wants. The added value created by the property of “moneyness” is called the liquidity premium. In order to measure this, data are necessary for the current market value (MV) of the “money thing” when exchanged for other real commodities or assets, such as captured by a price index or exchange rate, and the real asset present value (AV) of the “money thing” when it is used strictly as a barter good or asset. If $(MV-AV)>0$, assuming RD=0, then a liquidity premium exists and it equals the gap between MV and AV, or $MV-AV=LP$.

This paper utilizes the exchange rate or the current market price paid for real specie money as MV (shown in Table 3).

The present value of Pennsylvania’s paper money as a real barter asset (non-money) is calculated by taking the discounted value of the bills based on their expected date of redemption by the provincial government at face value using a best guess of the market interest rate. These are shown in Table 2 at 6%, 8%, and 10%. If $(MV-AV)>0$ then a liquidity premium exists.

There exists a liquidity premium with Pennsylvania money for the years 1723 to 1745, or 1748, or 1750, depending on which interest rate is used. Using 6% as the best guess, between 1723 and 1750 the land-backed bills of credit held a substantial liquidity premium (approximately 8.32% points of face value). In other words, during this time period, when a majority of the loan office bills were issued the paper money

actually operated as “money” in that people were willing to pay more than its value to utilize it as a medium of exchange. After this time period the risk discount obviates the liquidity premium. (That is to say, even if there is a liquidity premium we cannot measure it because the risk discount is larger than the liquidity premium thus obscuring it.) This period starts in the mid-1740s with King George’s War and lasts through the French and Indian War to 1761. Additionally, in 1751, the British Crown put a stop to the New England colonies making bills of credit legal tender and this measure could have made many colonists in other colonies worry about the stability of their own paper money schemes. In fact, by 1764, the Crown extended the Currency Act to the other colonies.

This analysis currently only holds through the mid-1740’s, because bills issued for war support and redeemed via taxes aren’t yet included in the AV measure for the post 1740 period, averaging in war bills would lower AV for the post-1740 years thus increasing the liquidity premium measure for all the bills outstanding in this period.

Once they stopped emitting the war currency issues in the 1770s, the AV measure for the period from 1723-1740 resumes. The liquidity premium for the loan office bills of the 1773 issue is quite substantial at 15 to 25% points of face value. The liquidity premium here is exceptionally high because the colony had recently entered a peaceful period and they expected it to last. (Many colonists did not expect the Revolution to happen and anticipated that their disagreements with Britain would be resolved peacefully.) Additionally, since the previous emissions of loan office bills had been so successful, there were no questions as to its legitimacy or how it would function.

During this stable period where the AV measure holds we can approximately speculate on the quantitative economic benefit of having a liquidity premium. We can approximate the added value of liquidity premium to the economy by multiplying the average liquidity premium and the amount of money in circulation; this added value represents the additional benefit from the lowered transaction costs. For example, the average liquidity premium of 1723-1745 is 8.32% and the amount of loan office bills in circulation in the year 1740 was £46,401.13. (.0832*£46,401.13=£3,860.57) £3860.57 is estimated added value of the liquidity premium of the loan office bills of credit to the economy in the year 1740.

The white population of Pennsylvania in 1740 is estimated to be about 83,582 citizens.⁴⁷ The added value of the liquidity premium found above can be converted to pounds sterling (£PA 3,860.57= £Sterling 2,908.14). Therefore the white per capita income in 1740 from the liquidity premium is about 0.0348 pounds sterling. If per white capita income is about 11 £s then we can divide the white per capita income from the liquidity premium by the white per capita income to find the amount that the loan office bills liquidity premium adds to white per capita income.⁴⁸ ($0.0348/11 = 0.0032$) Therefore about 1/3rd of 1 percent is added to white per capita income due to the liquidity premium of loan office bills. During this period income growth was approximately 0.3 to 0.6 percent per year meaning that the liquidity premium could have added approximately 12% to income growth.⁴⁹

⁴⁷ Carter (2006, V. 5, P. 652).

⁴⁸ Walton and Rockoff (2014, P. 91).

⁴⁹ Grubb (2004, P. 351-354)

Table 4 Liquidity Premium Gap (MV-AV) Calculated at 6%, 8% and 10% for 1723-1775

LIQUIDITY PREMIUM (MV-AV) Calculated at 6%, 8% and 10% interest rates for 1723-1775

YEAR	6.00%	8.00%	10.00%	YEAR	6.00%	8.00%	10.00%	YEAR	6.00%	8.00%	10.00%	YEAR	6.00%	8.00%	10.00%
1723	17.51%	23.63%	29.12%	1738	2.15%	7.49%	7.66%	1753	0.17%	10.78%	16.58%	1768	-	-	-
1724	10.93%	15.91%	20.43%	1739	2.22%	8.27%	12.19%	1754	0.66%	9.52%	15.30%	1769	-	-	-
1725	23.05%	29.80%	35.64%	1740	4.37%	8.41%	12.71%	1755	1.91%	8.23%	13.95%	1770	-	-	-
1726	-	-	-	1741	15.16%	17.32%	22.53%	1756	-2.02%	3.84%	9.22%	1771	-	-	-
1727	13.91%	20.26%	25.83%	1742	7.90%	8.49%	15.72%	1757	-1.30%	4.06%	9.03%	1772	-	-	-
1728	11.91%	18.04%	23.47%	1743	8.15%	7.84%	19.95%	1758	-0.14%	4.66%	9.16%	1773	17.47%	25.66%	32.41%
1729	18.19%	25.07%	31.65%	1744	5.47%	5.96%	17.05%	1759	0.36%	4.53%	8.49%	1774	14.36%	22.40%	29.09%
1730	14.66%	21.33%	28.34%	1745	2.99%	9.84%	15.85%	1760	-5.00%	-1.52%	1.82%	1775	16.75%	24.61%	31.22%
1731	11.85%	18.19%	24.56%	1746	-1.17%	5.34%	11.11%	1761	-23.14%	-23.14%	-23.14%				
1732	6.95%	13.13%	18.71%	1747	-4.83%	1.29%	6.78%	1762	-	-	-				
1733	3.14%	9.16%	13.91%	1748	-2.99%	2.69%	7.86%	1763	-	-	-				
1734	0.89%	6.76%	10.65%	1749	-4.03%	1.17%	5.95%	1764	-	-	-				
1735	1.94%	7.68%	10.65%	1750	-1.94%	6.30%	11.53%	1765	-	-	-				
1736	0.83%	6.47%	8.14%	1751	-2.08%	9.76%	13.29%	1766	-	-	-				
1737	-1.19%	4.41%	5.08%	1752	-0.15%	11.51%	17.28%	1767	-	-	-				

Notes: If $(MV-AV)>0$ then a liquidity premium exists; if $(MV-AV)<0$ then there is no liquidity premium or the risk discount is too large and obscures any existing liquidity premium.

Chapter 4

Conclusion

Scarcity is the mother of invention. Lacking a medium of exchange and limited by the demands of Britain, the American colonists created exchangeable debt in the form of bills of credit to facilitate transactions. Pennsylvania's loan office bills were especially interesting in that they were based on mortgages. This unique structure called for special investigation into how they functioned to better understand how colonial Pennsylvania money operated.

The invention of these debt instruments aided the colony of Pennsylvania's growth. Currently, without further research, it is impossible to definitely express numerically how much better the Pennsylvania economy fared with the aid of a paper currency. However, since the loan office bills held a substantial liquidity premium as illustrated in Table 4, we can declare that it did assist the growth of the economy. The calculations at the end of Chapter 3 that approximated the added value of the liquidity premium of the loan office bills of credit for the year 1740 are still rudimentary but they show a likely line of thought for quantitatively expressing the beneficial economic effects of the liquidity premium in the loan office bills. This liquidity premium lowered the transaction costs of trade, lubricating the gears of commerce. Lowered transaction costs aid the growth of an economy and Pennsylvania was no exception. During the 1720's Pennsylvania, like the rest of the colonies, faced depression like conditions due to the bursting of the South Sea Bubble. By the 1730's they had crawled out of the economic

recession and begun to regain their footing.⁵⁰ While other factors may have aided this recovery, the introduction of a generally accepted medium of exchange that eased the difficulties of trade most likely helped as well. Benjamin Franklin's initial speculations that a paper currency aided growth were correct because these loan office bills held a liquidity premium. Considering monetary experiments with debt instruments (i.e. mortgages), like the loan office bills of 18th century Pennsylvania, can aid policy makers in better understanding modern finances.

⁵⁰ Lester (1939B); Lester (1938).

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Appendix A

References

A.1 Table 1 Extended (Includes Loan Office and Tax-Redemption Bills of Credit), 1720-1775

End of Year	Planned New Emissions (Face Value)	Planned Redemptions (Face Value)	Face Value Expected to be Outstanding	Planned New Emissions Including Non-Loan Office Bills of	End of Year	Planned New Emissions (Face Value)	Planned Redemptions (Face Value)	Face Value Expected to be Outstanding	Planned New Emissions Including Non-Loan	End of Year	Planned New Emissions (Face Value)	Planned Redemptions (Face Value)	Face Value Expected to be Outstanding	Planned New Emissions Including Non-Loan Office
1720	£ -	£ -	£ -	-	1738	£ -	£ 11,030.05	£ 37,507.11	£ -	1756	£ -	£ 2,814.06	£ 15,355.95	£ 155,000.00
1721	£ -	£ -	£ -	-	1739	£ 17,925.59	£ 7,560.48	£ 47,872.22	£ 17,925.59	1757	£ -	£ 2,814.06	£ 12,541.89	
1722	£ -	£ -	£ -	-	1740	£ 6,515.34	£ 7,986.44	£ 46,401.13	£ 6,515.34	1758	£ -	£ 2,814.06	£ 9,727.82	£ 100,000.00
1723	£ 15,000.00	£ -	£ 11,000.00	£ 15,000.00	1741	£ 6,515.34	£ 8,420.79	£ 44,495.67	£ 6,515.34	1759	£ -	£ 2,814.06	£ 6,913.76	£ 136,650.00
1724	£ -	£ 1,375.00	£ 9,625.00	-	1742	£ 6,515.34	£ 8,886.18	£ 42,124.84	£ 6,515.34	1760	£ -	£ 2,814.06	£ 4,099.69	£ 100,000.00
1725	£ 33,495.00	£ 1,375.00	£ 38,245.00	£ 33,495.00	1743	£ 6,515.34	£ 9,387.36	£ 39,252.83	£ 6,515.34	1761	£ -	£ 2,814.06	£ 1,285.63	£ -
1726	£ 3,495.00	£ 3,774.60	£ 37,965.40	£ 3,495.00	1744	£ 6,515.34	£ 9,930.30	£ 35,837.87	£ 6,515.34	1762	£ -	£ 1,285.63	£ 0.00	£ -
1727	£ 3,495.00	£ 4,078.51	£ 37,381.89	£ 3,495.00	1745	£ 6,515.34	£ 10,522.60	£ 31,830.61	£ 6,515.34	1763	£ -	£ -	£ -	£ 55,000.00
1728	£ 3,495.00	£ 4,411.37	£ 36,465.52	£ 3,495.00	1746	£ 694.39	£ 3,613.66	£ 28,911.34	£ 694.39	1764	£ -	£ -	£ -	£ -
1729	£ 33,495.00	£ 4,779.26	£ 65,181.25	£ 33,495.00	1747	£ 694.39	£ 3,613.66	£ 25,992.07	£ 694.39	1765	£ -	£ -	£ -	£ -
1730	£ 3,495.00	£ 6,815.44	£ 61,860.81	£ 300.00	1748	£ 694.39	£ 3,613.66	£ 23,072.80	£ 694.39	1766	£ -	£ -	£ -	£ -
1731	£ 9,865.00	£ 7,281.44	£ 64,444.37	£ 9,865.00	1749	£ 694.39	£ 3,613.66	£ 20,153.53	£ 5,694.39	1767	£ -	£ -	£ -	£ -
1732	£ 6,370.00	£ 7,053.52	£ 63,760.85	£ 6,370.00	1750	£ 4,308.05	£ 3,613.66	£ 20,847.92	£ 4,308.05	1768	£ -	£ -	£ -	£ -
1733	£ 6,370.00	£ 7,751.15	£ 62,379.70	£ 6,370.00	1751	£ 4,308.05	£ 3,972.66	£ 21,183.30	£ 4,308.05	1769	£ -	£ -	£ -	£ -
1734	£ 6,370.00	£ 8,506.91	£ 60,242.79	£ 6,370.00	1752	£ 4,308.05	£ 4,364.31	£ 21,127.05	£ 4,308.05	1770	£ -	£ -	£ -	£ -
1735	£ 6,370.00	£ 9,331.38	£ 57,281.41	£ 6,370.00	1753	£ 4,308.05	£ 4,795.11	£ 20,639.99	£ 4,308.05	1771	£ -	£ -	£ -	£ -
1736	£ 6,370.00	£ 10,238.29	£ 53,413.12	£ 6,370.00	1754	£ 4,308.05	£ 5,273.78	£ 19,674.25	£ 4,308.05	1772	£ -	£ -	£ -	£ -
1737	£ 6,370.00	£ 11,245.97	£ 48,537.15	£ 6,370.00	1755	£ 4,308.05	£ 5,812.29	£ 18,170.02	£ 4,308.05	1773	£ 150,000.00	£ -	£ 150,000.00	£ 150,000.00
										1774	£ -	£ 9,375.00	£ 140,625.00	£ -
										1775	£ -	£ 9,375.00	£ 131,250.00	£ -

Source: Derived from Table 1 and *The Statutes* (V. 3, P. 324-338, 389-407; V. 4, P. 38-52, 98-116, 197-208, 344-359; V. 5 P. 7-15; V. 8, P. 284-300).

Notes: This table is still in the process of being completed and checked.

A.2 Comparisons of Previous Estimates of Pennsylvania Currency in Circulation, 1723-1775

Comparisons of Previous Estimates of Pennsylvania Currency in Circulation								
Year	Carter (2006)	Huston(2014)	Year	Carter (2006)	Huston(2014)	Year	Carter (2006)	Huston(2014)
1723	£ 15,000.00	£ 11,000.00	1742	£ 80,000.00	£ 42,124.84	1761	£ 409,000.00	£ 1,285.63
1724	£ 44,900.00	£ 9,625.00	1743	£ 80,000.00	£ 39,252.83	1762	£ 320,700.00	-
1725	£ 38,900.00	£ 38,245.00	1744	£ 80,000.00	£ 35,837.87	1763	£ 264,500.00	£ -
1726	£ 38,900.00	£ 37,965.40	1745	£ 80,000.00	£ 31,830.61	1764	£ 316,100.00	£ -
1727	£ 38,900.00	£ 37,381.89	1746	£ 85,000.00	£ 28,911.34	1765	£ 305,100.00	£ -
1728	£ 38,900.00	£ 36,465.52	1747	£ 85,000.00	£ 25,992.07	1766	£ 281,400.00	£ -
1729	£ 68,900.00	£ 65,181.25	1748	£ 85,000.00	£ 23,072.80	1767	£ 258,400.00	£ -
1730	£ 68,900.00	£ 61,860.81	1749	£ 85,000.00	£ 20,153.53	1768	£ 233,900.00	£ -
1731	£ 68,900.00	£ 64,444.37	1750	£ 84,500.00	£ 20,847.92	1769	£ 220,900.00	£ -
1732	£ 68,900.00	£ 63,760.85	1751	£ 84,000.00	£ 21,183.30	1770	£ 201,200.00	£ -
1733	£ 68,900.00	£ 62,379.70	1752	£ 83,500.00	£ 21,127.05	1771	£ 171,900.00	£ -
1734	£ 68,900.00	£ 60,242.79	1753	£ 82,500.00	£ 20,639.99	1772	£ 149,100.00	£ -
1735	£ 68,900.00	£ 57,281.41	1754	£ 81,500.00	£ 19,674.25	1773	£ 135,000.00	£ 150,000.00
1736	£ 68,900.00	£ 53,413.12	1755	£ 96,000.00	£ 18,170.02	1774	£ 217,600.00	£ 140,625.00
1737	£ 68,900.00	£ 48,537.15	1756	£ 147,500.00	£ 15,355.95	1775	£ 318,600.00	£ 131,250.00
1738	£ 68,900.00	£ 37,507.11	1757	£ 247,000.00	£ 12,541.89			
1739	£ 80,000.00	£ 47,872.22	1758	£ 312,900.00	£ 9,727.82			
1740	£ 80,000.00	£ 46,401.13	1759	£ 422,900.00	£ 6,913.76			
1741	£ 80,000.00	£ 44,495.67	1760	£ 446,200.00	£ 4,099.69			

Source: Table 1 and Carter, Susan *Historical Statistics of the United States: Earliest Times to the Present, Millennial Edition, Volume 1 and 5* (originally compiled by Brock in his 1941 thesis which was published in 1975)

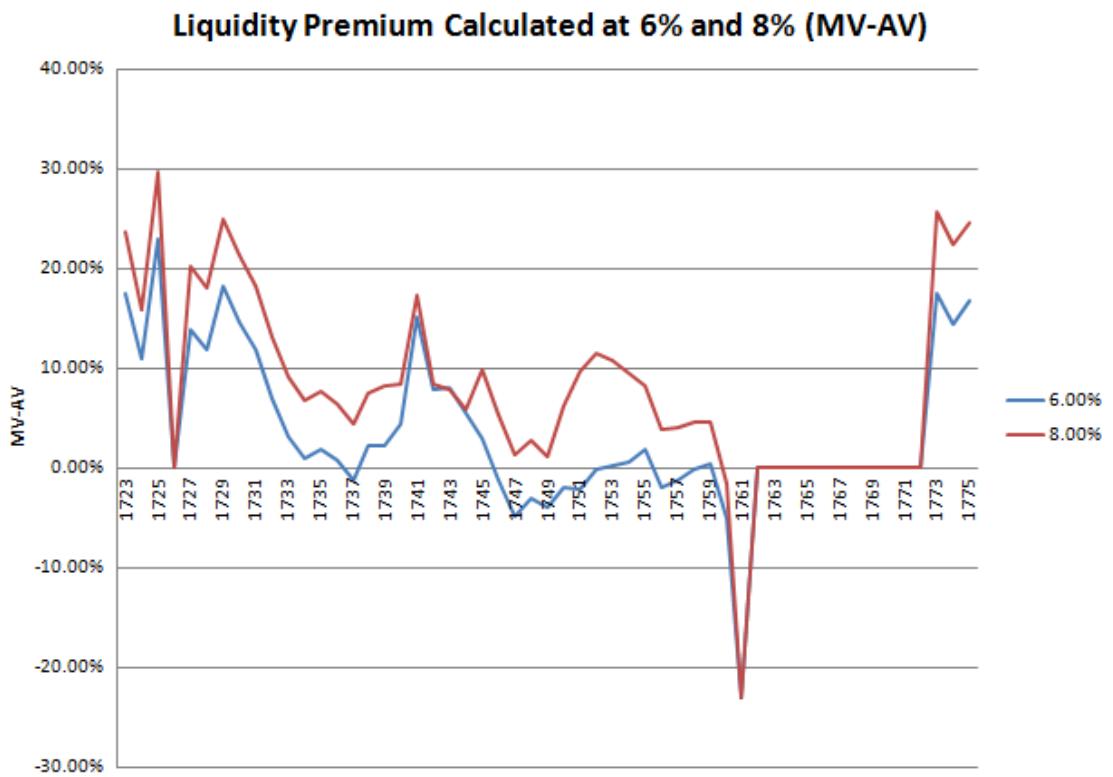
Notes: Carter numbers includes all paper currency in circulation while Huston shows the accurate numbers for the amount of loan office bills in circulation (does not include tax redemption of war issuances). However, this would not account for the entire difference. Brock incorrectly estimates the amount re-issued with the re-emittance bills so his numbers for the amounts in circulation are far larger. Further research will be necessary to determine the errors with Brock's numbers.

A.3 Who Were the Mortgagors?

Occupation	Number	Percent	Average Loan	Size of Loans by Occupation											
				Occupation			Occupation			Occupation			Occupation		
Selected Occupations															
Yeoman	2033	66.88%	64.78	"Silk Dyer"	1	0.03%	54	Retail				Leather			
Widow/Spinstress	69	2.27%	65.39	Staymaker	1	0.03%	100	Barber	1	0.03%	65	Cordwainer	89	2.93%	64.27
Merchant	47	1.55%	87.58	Taylor	60	1.97%	54.51	Haberdasher	1	0.03%	96	Sadler	21	0.69%	74.11
Gentleman	59	1.94%	91.11	Weaver	87	2.86%	58.66	Innkeeper	17	0.56%	63.88	Skinner	12	0.39%	55.98
Miller	47	1.55%	74.04	Woolcomber	2	0.07%	69	Shopkeeper	8	0.26%	74.13	Tanner	25	0.82%	62.07
Shipwright	22	0.72%	77.85	Woolmaker	1	0.03%	26.25	Tavernkeepe	1	0.03%	48	Tabaconnist	2	0.07%	78.75
Total "Artisan"				Metals				Liquor				Brewer	8	0.26%	79.46
Professional	0			Blacksmith/smith	84	2.76%	65.7	Construction				Vintner	1	0.03%	158.75
Clerk	4	0.13%	69	Blockmaker	1	0.03%	38.5	Bricklayer	6	0.20%	61.15				
Lawyer "esquire"	5	0.16%	93.8	Boltmaker	2	0.07%	31.13	Brickmaker	1	0.03%	59.5	Miscellaneous			
Physician	5	0.16%	76	Cutler	2	0.07%	66.75	Carpenter	91	2.99%	65.82	Clockmaker	1	0.03%	60.75
Schoolmaster	1	0.03%	72	Gunsmith	5	0.16%	87	Glazier	3	0.10%	46.5	Collier	1	0.03%	66
Surveyor	1	0.03%	91.25	Hammersmith	1	0.03%	70	Mason	43	1.41%	61.92	Gardiner	3	0.10%	54
				Ironmonger	2	0.07%	201.25	Plasterer	2	0.07%	24.25	Laborer	5	0.16%	53
Cloth/Apparel				Locksmith	2	0.07%	73					Mariner	7	0.23%	73.14
"Blew dryer"	1	0.03%	82.5	Stonecutter	2	0.07%	38	Food				Painter	3	0.10%	69.83
"Brass Button Maker"	1	0.03%	42	"Tine-plate worker	1	0.03%	28	Baker	2	0.07%	68.5	Potter	2	0.07%	70
Clothier	1	0.03%	55					Butcher	10	0.33%	64.73	Ropemaker	1	0.03%	78
clothworker	1	0.03%	56	General Trade				Victualer	4	0.13%	45.63	Soap Boiler	1	0.03%	60
Collarmaker	1	0.03%	52.5	Carter	4	0.13%	42.88				Total	3040			
Feltmonger	4	0.13%	48.56	Cooper	44	1.45%	73.52	Wood							
Fuller	10	0.33%	63.6	Wagon Maker	1	0.03%	70	Chairmaker	1	0.03%	50				
Glover	1	0.03%	97.5	Wheelwright	9	0.30%	48.75	Joyner	20	0.66%	61.53				
Hatter	2	0.07%	73.75					Sawyer	5	0.16%	60.8				
Shoemaker	1	0.03%	59					Turner	14	0.46%	59.88				

Source: Mary Schweitzer (1987, P. 157-158) Custom and Contract: Household, Government, and the Economy in Colonial Pennsylvania.

A.4 Liquidity Premium Calculated at 6% and 8% for 1723-1775



Source: Table 4