The Duration of Book Credit in Colonial New England

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Abstract

Account books show that merchants frequently used book credit in exchanges with consumers. The ability of credit to act as a substitute for currency in payments depends on the terms attached to the credit, such as its duration. Employing lifetable analysis and the singulate mean age at marriage, I arrive at expected duration estimates in excess of those in the literature. Given the expected duration, book credit seems a good substitute for other forms of payment. If this is the case, I argue that a major revision of literature on colonial monetary matters may be in order.

Keywords: book credit, singulate mean age at marriage, demography

Introduction

Credit and currency are substitutes in transactions. This fact has long been recognized in the debate about the methods of exchange in colonial America. According to Leslie Brock (1975, p.4), "the credit habits of the people conditioned the need for currency." The implications of this statement are profound for how we interpret the exchange relationships in the colonies. The terms attached to credit had a direct impact on the need for currency or barter, the other available methods of exchange. The duration of credit is a variable of particular importance to this debate.

While many credit relationships existed I look at one that was a direct substitute for cash, merchant provided book credit. Book credit was the result of accounting practices by merchants. The merchants recorded the purchases and payments of consumers in the account books, thus the term book credit. Until now the duration of credit has not been subjected to intense empirical scrutiny. Instead, anecdotal evidence, or the practices of a few merchants have been taken as typical for the lot. Merchants certainly varied their practices between different consumers and different regions. My sample of accounts is from New England and represents over 50 merchants and several thousand purchases from the pre-Revolutionary War period.

My results show that on average in Massachusetts and Connecticut book credit lasted over 15 months. Lifetable calculation and the application of the singulate mean age at marriage (SMAM) technique show that these results remain true under various assumptions. While not only shedding light on historical credit relationships, this result can help inform the debate on payments systems as well as the monetary debates over the colonial era.

Book Credit Literature and Data Review

Little work on the colonial economy focuses specifically on credit duration. Rather than direct estimations, some authors use wholesale and international credit flows and account books to place an upper bound on retail credit. Works providing estimates typically use the accounts of only one or a few merchants. The chain of credit from the old world to the new world started when English suppliers sent colonial merchants goods on credit for a period lasting from 6 months to a year, at which time the English supplier demanded payment or charged interest (Egnal 1998; Perkins 1994; Shepherd & Walton 1972; Thomson

1955). The importer did not necessarily sell the goods at retail; instead they supplied other merchants, including those in interior towns, most likely on credit.[1] Estimates of the duration for this form of credit vary, from a lower estimate of three to nine months up to a year or more (Perkins 1988, 1994; Martin 1939).

Account books of eighteenth century merchants contain a wealth of anecdotal and quantitative information about transactions including descriptions of purchases and payments, prices, shipping costs and other fees. I sample fifty-six separate account books from Massachusetts and Connecticut merchants for the data set. The books are a mix of urban and rural accounts recording activity that occurred primarily in Massachusetts and Connecticut. For the most part the accounts are from merchants with a fixed business location, though at least one individual, a doctor, traveled as part of his job. The accounts examined span collectively from 1710 to 1770 with some accounts overlapping years and some years with no observations. Customers from other colonies enter the account books when merchants traded overseas or in other colonies, or when they were near a border, such as the traveling doctor. Both the system of accounting and the unit of account need to be understood to make sense of the account books.

Most merchants failed to use a complete double entry accounting system, though most merchants recorded debits and credits, purchases and payments made by consumers, with detail. Due to lost records or merchant indifference the records fail to provide the accounts payable of the business or accounts for profit and loss. As a result, many account books do not allow a reconstruction of the flows of funds through a business. Despite these problems the data set includes

[1] Credit between a wholesaler and a retailer, commonly called trade credit, still receives attention in current economics journals.

more than 9,600 purchase entries and over 4,300 payments allowing a reconstruction of much transaction activity.

The British colonies as a whole did not have a standard unit of account; colonies used their own version of the pound (£), shilling (s.) and pence (d.), based on the English pound sterling.[2] Each colony's pound fluctuated against the pound sterling and the pound of other colonies based on their silver value. The pound sterling took its value from a certain weight of silver of a particular fineness. In the eighteenth century the troy ounce was worth 5s. 6d., or £0.275, implying one pound was worth 3.64 ounces of silver (McCusker 1978). Despite its use as the money of account the pound sterling did not circulate as the dollar does today because no pound notes or coins existed.

Exchange between pounds colonial and pound sterling is a complex undertaking because of active exchange rate management by certain colonies (Nettels 1934). The official exchange rate, set in Queen Anne's 1704 proclamation, was £133.33 colonial to £100 sterling, a rate that came to be called lawful money (McCusker 1979).[3] In an effort to attract specie, colonies

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[2] For those unfamiliar with this system, 12 pence equaled 1 shilling and 20 shillings (240 pence) equaled 1 pound. My presentation of amounts is usually in a decimalized pound form to make interpretation easier for those not used to such a system. To find the decimalized amount you can convert an entry into pence and divide by 240.

[3] Lawful money indicates an amount valued at the official, or proclamation, rate of exchange.

competitively valued foreign coin in terms of their pound. The piece of eight was a Spanish silver coin with metallic content worth £0.225 sterling, implying a value of £0.3 colonial, at the lawful money rate (McCusker 1979).[4] In an effort to increase specie inflow, and stem specie outflow, colonies devalued their currencies, in some cases to as much as £0.35 lawful money for a piece of eight (Nettels 1934).[5] When colonies undertook such actions they altered their terms of exchange with England. While the piece of eight was now worth £0.35 in the colony it was still only £0.225 sterling, implying a new rate of exchange at £155.56 colonial to £100 sterling (McCusker 1979).[6]

Regardless of the "real" money used in exchange, coin, notes or goods, merchants converted all into a pound value in the account books. Margaret Martin (1939, p.151) illustrates this through the notes of Deacon Hunt, paid in ten different types of coins from four countries in 1767. Hunt then converted the other currencies into Massachusetts' pounds. For example, 30 English guineas, each valued at 28 s. totaled £42, while 23 Portuguese half Johannes each valued at

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[4] To see that this is the case you should convert 4s. 6d. into decimal form, £0.225, and a third more makes £0.3.

[5] Nettels points out that the long-term consequence of such legislative manipulation was inflation, which led to an erosion of the enhanced value of the coin, leaving the colony once more susceptible to specie exports.

[6] McCusker includes tables of exchange rates for the British American colonies, clearly documenting the fluctuations of exchange rates between colonial pounds and sterling.

48 s. and 5 Moidores valued at 36 s. totaled £64 4s. Hunt received 115 Spanish dollars, another name for the piece of eight, each valued at 6s., the lawful rate mandated by Queen Anne, for a total of £34.50. Hunt received these as payment; that is, they were used in exchange and then converted into the unit of account illustrating the separation between money of account and medium of exchange. Not all transactions were at the legal rate, evidenced by several merchants performing conversions between old tenor and lawful money, two different standards of value for the pound, in their accounts.[7] I use John McCusker's (1979) tables to convert all amounts into a nominal lawful money value. The nominal lawful money amount is used later to parse the credit purchases into separate categories. For modern individuals keeping accounts in a non-circulating currency seems odd, but it was the unit that made the most sense. Other options, such as recording amounts of goods traded were not palatable.

Colony specific differences in the value of money are a potential problem for studying an entire region. Different colonies within a region did not necessarily coordinate their economic policies, such as the silver value of their pound, therefore, exchange rates varied.[8] Fortunately, Massachusetts tended to be the financial and economic leader in New England (McCusker 1979). What Massachusetts undertook the others soon copied, except for a few years in the 1750's. The integration of the different regions of the thirteen colonies was not as

[7] The value of old tenor fluctuated over time given the different rates of conversion between old tenor and lawful money used at different times.

[8] Also, the actions of individual merchants do not necessarily conform to what generally occurred throughout the region.

complete. The unit of account is an important part of the colonial monetary story. Any work involving monetary amounts needs to address this issue and pay close attention to the data.

Explanation of Duration Calculations

To develop a general estimate for the duration of credit in the two colonies, I generate the duration experience for as many credit purchases as possible. The duration of a credit purchase is the length of time from the debt's inception to complete payment. Many consumers paid for their credit purchases in several installments, though for my present purposes I focus only on the time to the payment that extinguishes a particular debt. The raw calculation gives the number of days the credit was outstanding, which I divide by 30 to provide an approximate number of months. The conversion eases interpretation of duration results.

Merchants were not always precise when they recorded dates. Many times they entered only a month and a year while at others they omit the date completely. A term calculation is possible in both these cases. With the month/year recording, the calculation yields an interval for duration, with an upper and lower bound for the number of days until complete repayment. Even entries with omitted dates are salvageable if the omission occurred between events with date entries. Those entries with precise date information are given a lower and upper bound value that are identical.

Unfortunately, the resolutions of many accounts are lost due to the transfer of accounts between ledgers over time. Over the course of several years, merchants would switch to new books as old ones became filled. Not all ledgers have survived and in some situations, the merchant made no note after a transfer,

so the outcome of the account is unknown. In these circumstances the account records end before final payment. We are faced with questions such as: Was the account transferred to a new ledger? Was a final payment made and he either forgot or decided not to record it? Without any clue from the merchant about the resolution of the account the choices of how to proceed are few.

The best decision is to assume the merchant did not transfer the account, and it was not paid before the book ended. Given the information available I assume the account remained outstanding until the end of the merchant's record keeping in that particular account book. The accounting practices make this unlikely for all accounts, but it is the only option available that allows the calculation of term estimates. In these circumstances I use the last date recorded in the account book as a censor date, a substitute for the date of the final payment. The identical calculation used earlier provides the amount of time a debt was under observation without being completely paid. These observations are an important part of the data set and the life table calculations explained below. A few examples using actual data from the accounting records make the method clear.

Figure 1 about here.

Figure 1 illustrates the complete information case. Griffith made one payment in cash to Parker to satisfy the debt from his earthenware purchase. The cash payment was 267 days after the purchase, divided by thirty is approximately 8.9 months, which is the duration of this debt. The next figure presents an example that incorporates difficulties encountered in the actual data set.

Figure 2 about here.

I stated earlier that not all merchants were conscientious record keepers. Sometimes merchants would not record a particular date with the rest of an

account book entry.[9] Figure 2 illustrates this problem well and also provides an example of multiple purchases along with multiple payments. The first purchase of earthenware is repaid with one "cash" payment sixty-three days (2.1 months) later.[10] Computation of the term of the second loan is more complicated. The last two payments satisfy the purchase amount, so Adams repaid the loan completely. Unfortunately, Parker left out the date for the second payment. Obviously the time until first payment is zero for both the upper and lower bounds since the purchase and payment occurred on the same date. The second payment occurred on or after July 22, 1748, so this date is the lower end of the interval. The minimum time between purchase and second payment, the lower bound of duration, is zero days, but computation of an upper bound is not possible due to the lack of information. When the account records provide so little information that a calculation is not possible I exclude that record from the duration analysis.

[9] It seems that this frequently occurs at the end of a list of entries, particularly when the credit fully satisfies an outstanding purchase as in Figure 2.

[10] The term "cash" is placed in quotation marks because it is woefully nondescript. Discussions of terminology show that merchants and researchers using account books tend to group several different items under the heading cash. For example, Martin (1939, pp.150-2) includes minted coins of various nationalities different issues of paper money and personal notes under the common heading "money."

This does not preclude the use of the record in another form of the analysis, for example, discussions of anecdotal evidence on business practices.[11]

The next section details the method used to arrive at general estimates of duration. Two demographic methods provide average duration estimates, the life table and Hajnal's technique. Censoring problems prevent an estimate of term to complete payment for all debts, but calculating average duration for debts paid within a certain time is possible.

A Brief Introduction to the Life Table

Debts have beginning and ending dates that define the interval of time survived. Life the study of a biological event such as mortality, the study of debt mortality is an examination of a span of time. The duration values calculated earlier are the building blocks in a life table analysis of merchant provided credit.[12] A life table takes mortality rates calculated from a specific population and applies those rates to a population of standardized size. I do the same for the merchant provided credit. To begin the life table I estimate age specific death rates (ASDR) as the number of deaths in a time interval divided by the total amount of time observed in that interval. For my work with debts the ASDR is actually an age specific repayment rate (ASRR), the number of debts completely paid in a time interval divided by the total number of debt months outstanding in that interval. For any interval with starting point t and end point $t+n$,

[11] Records with incomplete date information do add narrative and descriptive support to the statistics, but cannot be used in duration calculations.

[12] For an introduction to life table analysis see Newell (1990, pp.63-81).

$$ASRR_{t \to t+n} = \frac{\#\,debts\ repaid}{total\ months\ observed} = {}_{n}M_{x} \qquad (1)$$

The number of rates calculated depends on the chosen length of the age interval. In my work I adopt six-month intervals. The ASRR for the category 0 to 6 months is the total number of debts repaid within six months of initial contraction, divided by the total number of months observed for that interval. The fact that the debts in the data set include censored observations requires some further explanation. Censored observations do not count as repaid debts, but they do provide an amount of time observed without complete payment. A debt repaid at 14.7 months contributes 6 months to each of the categories 0-6 and 6-12 and then contributes 2.7 months of observed time to the interval 12-18 months. These rates are the building blocks of the life table. An observation censored at 7 months would contribute 6 months to the interval 0-6 months and 1 month to the 6-12 month interval.

The life table takes the ${}_{n}M_{x}$ values and applies them to a population with an arbitrary starting value, which I set to 1,000. By making a life table information about the expected duration remaining at a certain age can be calculated, as well as survivorship ratios, the number of debts surviving from one interval to the next, and the median age at repayment. The life tables I present contain thirteen separate columns, labeled (a) through (m). The first column, labeled (a), contains the age in months at the start of the interval, x. The intervals are always six months in length to insure they are wide enough to capture enough activity. Column (b) contains the ASRR calculated from the account book data according to the explanation above.

Column (c) lists ${}_nq_x$, the probability of dying between the age of x and $x+n$, where n equals six. ${}_nq_x$ is based on ${}_nM_x$ and is:

$$ {}_nq_x = \frac{n \cdot {}_nM_x}{\left(1 + n \cdot (1-a)\right) {}_nM_x)} . \tag{2} $$

a represents the average amount of the interval lived by those that die in the interval and is set to 0.5. With ${}_nq_x$ it is possible to estimate the probability of surviving from age x to age $x+n$,

$$ {}_np_x = 1 - {}_nq_x . \tag{3} $$

Note that this probability of survival has a natural interpretation in this context: it is the probability of not being repaid in a particular time interval.

The l_x column is the number of debt surviving, or going unpaid, to age x. l_0 is the arbitrary value set at the beginning, 1,000 in my life tables. The number of debts surviving to age $x+n$ is given by equation (4).

$$ l_{x+n} = l_x \cdot {}_np_x . \tag{4} $$

The number of debts in any category other than the one is the product of the probability of not being paid and the number of debts entering the previous category. With the l_x column calculated I apply Hajnal's technique, which allows me to close the life table and make an estimate for duration.

John Hajnal (1953) tried to quantify the average age at which women marry, the singulate mean age at marriage.[13] The average age at marriage is the same as the average number of years spent single. Unfortunately some individuals do not marry or marry late in life, creating problems for statistical work. Hajnal considers these individuals distinct from the rest of the population,

[13] For a traditional explanation of this technique I refer readers to Newell, *Methods*, pp. 97-101.

that is there is some special unobserved characteristic that explains why they do not marry, or marry late, and, therefore, he excludes them from the data set. Hajnal's cut off for first marriage was fifty years of age. The exclusion of the others allows for estimation of the average age at marriage for those that marry by age fifty. An exact parallel can be made to the data set on debts.

Consumers default on some debts with no notation by the merchant and others leave account open for long periods. In these situations the observations are usually censored at high values for the number of days. With many observations of this sort the ASRRs would be driven to artificially low values. I report results for three different cutoff points, fifty-four months, sixty months, and sixty-six months. For each of the three cutoffs I remove those debts not paid completely by the cutoff value. The identification of the appropriate cutoffs is difficult because I want to keep the number of excluded observations as low as possible. The results show that the difference made to duration estimates by adding or reducing the cut off by six months is not usually large. The end result of the application of this technique is an estimate of the length of time to complete payment for debts completely repaid by the particular cutoff.[14] What remains is to show how to employ Hajnal's technique in the life table.

I will use the sixty month cutoff for my example. To employ Hajnal's technique subtract the value l_{60}, those debts not completely repaid at the beginning of sixty months, from each previous l_x value. The new column of l_x

[14] Hajnal's method arrives at the Singulate Mean Age at Marriage (SMAM), so a parallel description of this technique for my work would be the Singulate Mean Age at Repayment (SMAR).

values represents the total number of debts entering each age category completely paid by sixty months. Rescaling the column of adjusted l_x values to a starting value of 1,000 eases interpretations and is done in column l'_x.[15]

Using l'_x the new survival and repayment rates are given by:

$$ {}_n p'_x = \frac{l'_{x+n}}{l'_x}, \tag{5} $$

${}_n p'_x$, the probability of not being paid from age x to age $x+n$, is equal to the number of debts not repaid at age $x+n$ divided by the number not repaid at age x. The rate of repayment from x to $x+n$, ${}_n q'_x$, is simply one minus the survival rate:

$$ {}_n q'_x = 1 - {}_n p'_x . \tag{6} $$

With l'_x the number of debts repaid between x and $x+n$, d'_x, is the number not repaid at age x less the number not repaid at age $x+n$:

$$ {}_n d'_x = l'_{x+n} - l'_x . \tag{7} $$

L'_x is the total number of months debts are unpaid during the interval x to $x+n$,

$$ {}_n L'_x = n\left(l'_{x+n} + a \cdot {}_n d'_x\right). \tag{8} $$

[15] All variables in the formulae and the tables with an apostrophe represent calculations based on the subset of debts repaid by age sixty months, those still under consideration after implementing Hajnal's technique.

L'_x is a vital part of deriving duration; it permits calculation of T'_x the sum of all future ${}_nL'_x$ values. T'_x is the total months debts remain unpaid after age x.

$$T'_x = T'_{x+n} + {}_nL'_x. \tag{9}$$

With T'_x it is possible to calculate the expected duration of debts from age x, e'_x.

$$e'_x = \frac{T'_x}{l'_x}. \tag{10}$$

e'_x is the number of months debts survive unpaid after age x, divided by the number of debts unpaid at age x.

The expected duration is the expected time to complete payment of a debt x months old. With the adjustment provided by Hajnal's technique the interpretation of e'_x is the expected duration, at age x, for those debts fully repaid by sixty months, for example. e'_0 is an estimate of expected duration at the debt's inception. The life table provides median term lengths estimates as well. There are two choices for median term at complete repayment, either the age at which 50% of debts are paid or the interval in which 50% of the total months spent unpaid occurred.

An example of the technique described above provides a foundation for interpreting results better than solely using equations (5)-(10). I refer the reader

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[16] Recall from earlier that "a" represents the portion of the interval lived by those debts that die and is set at 0.5.

to Table 1, which uses the lower bound values for all Connecticut debts, regardless of amount.

Table 1 here.

Table 1 presents the results for the lower bound of all Connecticut debts and shows the implementation Hajnal's technique. Column (a) displays the age at the start of the interval, the variable x. Equation (5) explained the calculation of the ASRRs in column (b), repayments divided by observed time in the given interval. From these rates equations (6)-(8) explain the derivation of columns (c)-(e). Hajnal's technique starts with column (f). At this point subtract the total number alive at the 60-66 month interval, l_{60}, from each earlier l_x value. In Table 1 l_{60} is 234. Such a manipulation results in the values in column (f), the adjusted l_x column. The values in column (f) are the number of debts not completely repaid at the start of the interval, for the subset of all debts repaid at or before sixty months. The rescaled column, l'_x, is column (i). Equations (9) and (10) show the derivation of the survival and mortality rates, columns (h) and (g), respectively. Equation (11) provides the number of deaths between categories, column (j); equation (12) calculates the number of months spent unpaid by debts, column (k). Equation (13) shows the number of months spent unpaid by debts for all future categories, column (l), and finally, equation (14) calculates the expected duration, shown in column (m) of Table 1. The next section describes the division of the data set and the duration results.

Results for Connecticut and Massachusetts Merchants

The tables for Connecticut and Massachusetts present two forms of duration results, first the range of the lower and upper bounds of expected

duration from inception of the debt and second the median interval for the upper and lower bounds. I report results for three different endpoints chosen for the SMAR technique, fifty-four, sixty, and sixty six months. I select as the median interval the life table interval in which one half of all months survived by debts occurs.

I divide the data into seven different categories based on the lawful money value of the credit purchase. These are £0-0.25, £0.25-0.5, £0.5-0.75, £0.75-1.00, £1-10, £10 or more, and lastly I combine the data together in an "All values" grouping.[17] I perform this division because value may influence the duration of a debt, but the direction of the impact is not clear *a priori*. Certainly a colonial customer may have required more time to accumulate the total funds needed to repay a large debt, in which case value and duration exhibit a positive relationship. However, it is possible that merchants made loans of large value to customers thought to have sufficient resources to pay in a timely fashion. Additionally, the extent to which merchants monitored the activities of customers is not clear. If monitoring levels were correlated with debt value it is possible those with larger amounts owed paid earlier than those with smaller debts.

[17] I list the intervals in this fashion for notational ease. The intervals should be interpreted as not inclusive of the upper limit, so £0.25-0.5 includes all observations of at least £0.25 and less than £0.5.

Overall the duration results show fairly consistent intervals for duration, naturally increasing with the extended endpoints. Tables 2 and 3 report the duration estimates and the number of observations for Connecticut and Tables 4 and 5 report the duration and observations for Massachusetts. Specific comments about each are reserved for individual discussions below.

Connecticut Results

Table 2. Connecticut Duration Results Table Around Here

Table 3. Connecticut Observation Table Around Here

The Connecticut intervals extend typically from around fifteen months to seventeen months, with some lower and higher. Debts greater than £10 l.m. are a notable exception to this. This interval lasts from between nine and twelve months. A primary cause of this is the small number of Connecticut observations greater than ten pounds. The lower bound and upper bound each contain less than fifty observations. The fifteen to seventeen month general results for all values of debt show that the average debt in Connecticut was much longer than the typical estimates from the literature. Looking at the median results we see that they occurred almost exclusively in the six to twelve month interval. What earlier authors found in their investigations was a median duration, not the average.

Massachusetts Results

Table 4. Massachusetts Duration Results Table Around Here

Table 5. Massachusetts Observations Table Around Here

The Massachusetts results are more difficult to interpret than Connecticut. A factor contributing to the difficulty is the higher percentage of observations censored in the Massachusetts data which naturally pushes the estimated duration numbers higher.[18] In addition, there are some age intervals with no debts paid which push up the average duration of debts surviving to later intervals. As a result there are some intervals that have a lower bound duration estimate above the upper bound estimate.[19] In these instances, the median intervals are still non-decreasing from lower bound to upper bound. It is also difficult to make generalizations about the Massachusetts results because there are larger

[18] More than seventy percent of Connecticut observations, both lower and upper bound, are uncensored while fewer than forty percent of Massachusetts observations are uncensored. These results may then be the result of a sampling bias, but it certainly calls into question other studies that use only a few account books.

[19] The selection of a later endpoint removes these issues as none of the intervals in the expected duration with 66 months as the endpoint have a lower bound in excess of an upper bound.

differences based on the selection of an endpoint than observed in the Connecticut results.

The Massachusetts results show duration of approximately fourteen to sixteen months. The median intervals are between the six to twelve month interval and the twelve to eighteen month interval. One interesting result is that the lowest value interval (£0-0.25 l.m.) has higher average duration than higher valued categories. This may lend some support to the idea that merchants focused more monitoring effort on higher valued debts. There is also a large difference in the number of observations per value category between the two colonies. The Connecticut merchants in the sample had many more small value transactions while the merchants in Massachusetts had higher value transactions.

Conclusions

Measured against the literatures estimates of book credit, international credit, or wholesale credit my results show the average expected duration of book credit is longer than originally thought. Book credit was a long term instrument, making it an excellent substitute for payment in hard currency. The more generous credit terms allowed more time for returns on other investments such as improvements in land and harvest yields. The alternative uses of funds for such activities could make the burden of debt smaller if it resulted in more productive land or capital. Significant credit use, especially credit repaid in-kind rather than in money, could change the outcomes of many studies focusing on the colonial monetary situation as a test of the quantity theory of money. The use of credit

would change the velocity of money and potentially destabilize it if credit practices varied over time.

Other characteristics of credit, particularly the interest rates charged and the frequency of credit are needed to gain further insight into credit's role in the economy of colonial New England and America. Estimates for these already exist in the same literature that reported duration estimates. They need testing just as the duration estimates did for us to be clear about credit's role and to make claims about the importance of credit versus money. The concept of default also needs refining for the case of colonial era book credit. The large numbers of debts outstanding after several years raises questions about whether these debts were in default or still open. The answer to this question could have a major impact on the estimates of duration.

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Tables

Table 1. Life table and SMAR for All Connecticut Debts, Lower Bound.

(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
x	${}_nM_x$	${}_nq_x$	${}_np_x$	l_x	adjusted l_x	${}_nq'_x$	${}_np'_x$	l'_x	d'_x	${}_nL'_x$	T'_x	e'_x
0	0.034032	0.1853	0.8147	1000	699	0.26517	0.73483	1000	265	5204.482	16087.984	16.088
6	0.035651	0.1932	0.8068	815	513	0.30664	0.69336	735	225	3732.978	10883.502	14.811
12	0.030417	0.1672	0.8328	657	356	0.30879	0.69121	509	157	2585.002	7150.524	14.034
18	0.023477	0.1316	0.8684	547	246	0.29273	0.70727	352	103	1803.739	4565.523	12.964
24	0.029122	0.1607	0.8393	475	174	0.43890	0.56110	249	109	1166.504	2761.784	11.088
30	0.017247	0.0984	0.9016	399	98	0.40200	0.59800	140	56	669.9927	1595.280	11.415
36	0.007591	0.0445	0.9555	360	58	0.27431	0.72569	84	23	432.6698	925.287	11.071
42	0.00722	0.0424	0.9576	344	42	0.34392	0.65608	61	21	301.3204	492.618	8.122
48	0.005692	0.0336	0.9664	329	28	0.39748	0.60252	40	16	191.2971	191.297	4.808
54	0.009015	0.0527	0.9473	318	17	1	0	24	24	71.92429	71.924	3
60	0.004177	1	0	301	0							
66	0.003977											
72	0.000822											
78	0.002512											
84	0											
90	0.000886											
96	0.000454											
102	0.000478											
108	0											
114	0											
120+	3.53E-05											

Table 2. e_0 and Median Duration Results for Connecticut.

Value category (£ l.m.)	e_0 *range for debts repaid by 54 months* (Median interval)	e_0 *range for debts repaid by 60 months* (Median interval)	e_0 *range for debts repaid by 66 months* (Median interval)
0-0.25	15.16-15.92 *(6-12)-(6-12)*	16.09-17.29 *(6-12)-(6-12)*	16.49-17.74 *(6-12)-(6-12)*
0.25-0.50	14.76-15.30 *(6-12)-(6-12)*	15.19-16.32 *(6-12)-(6-12)*	15.48-16.71 *(6-12)-(6-12)*
0.50-0.75	15.97-17.98 *(6-12)-(6-12)*	16.87-19.72 *(6-12)-(6-12)*	17.45-20.27 *(6-12)-(12-18)*
0.75-1.00	13.82-14.77 *(6-12)-(6-12)*	15.28-16.09 *(6-12)-(6-12)*	16.03-16.74 *(6-12)-(6-12)*
1.00-10.00	15.78-16.55 *(6-12)-(6-12)*	16.11-17.15 *(6-12)-(6-12)*	16.76-17.75 *(6-12)-(6-12)*
10.00<	9.07-10.23 *(6-12)-(6-12)*	9.07-12.02 *(6-12)-(6-12)*	9.07-12.02 *(6-12)-(6-12)*
All	15.03-15.85 *(6-12)-(6-12)*	15.84-17.14 *(6-12)-(6-12)*	16.26-17.59 *(6-12)-(6-12)*

Table 3. Number of Observations for Connecticut Value Categories.

Value category (£ l.m.)	*Uncensored Observations Lower Bound-Upper Bound*	*Censored Observations Lower Bound-Upper Bound*
0-0.25	1254-1409	579-655
0.25-0.50	335-367	100-114
0.50-0.75	156-154	36-43
0.75-1.00	69-76	18-18
1.00-10.00	154-160	43-49
10.00<	38-42	6-7
All	2006-2208	782-886

Table 4. e_0 and Median Duration Results for Massachusetts.

Value category (£ l.m.)	e_0 *range for debts repaid by 54 months* (Median interval)	e_0 *range for debts repaid by 60 months* (Median interval)	e_0 *range for debts repaid by 66 months* (Median interval)
0-0.25	17-27-19.77 *(6-12)-(12-18)*	17.55-20.09 *(6-12)-(12-18)*	18.12-20.63 *(6-12)-(12-18)*
0.25-0.50	**14.68-14.28** ***(6-12)-(6-12)***	**14.93-14.70** ***(6-12)-(6-12)***	16.16-16.32 *(12-18)- (12-18)*
0.50-0.75	12.74-14.33 *(6-12)-(6-12)*	13-96-15.28 *(6-12)-(6-12)*	13.96-15.28 *(6-12)-(6-12)*
0.75-1.00	12.88-13.22 *(6-12)-(6-12)*	12.88-13.22 *(6-12)-(6-12)*	12.88-13.22 *(6-12)-(6-12)*
1.00-10.00	**13.87-13.48** ***(6-12)-(6-12)***	14.48-14.71 *(6-12)-(6-12)*	15.37-15.78 *(12-18)- (12-18)*
10.00<	14.58-16.53 *(6-12)-(12-18)*	17.05-19.56 *(12-18)-(12-18)*	17.05-20.03 *(12-18)- (12-18)*
All	14.76-15.68 *(6-12)-(6-12)*	15.36-16.52 *(6-12)-(12-18)*	16.04-17.33 *(12-18)- (12-18)*

Table 5. Number of Observations for Massachusetts Value Categories.

Value category (£ l.m.)	*uncensored observations lower bound-upper bound*	*censored observations lower bound-upper bound*
0-0.25	325-384	631-660
0.25-0.50	211-254	264-273
0.50-0.75	108-130	167-176
0.75-1.00	78-94	110-117
1.00-10.00	502-571	800-843
10.00<	158-171	367-371
All	1382-1604	2339-2440

Figures

Figure 1. Accounts of Benjamin Griffith, consumer, and Jonathan Parker, Massachusetts Merchant.

Date	Transaction	Debt (£)	Date	Transaction	Credit (£)	Rolling Total (£)
8/9/1747	parcel of earthenware	-22.15				-22.15
			5/12/1748	by cash	22.15	0.00

Source: John Parker Account Book. Baker Library, Harvard Business School. Mss:605 1747-1815 P241. p.1.

Figure 2. Accounts of Joseph Adams, consumer, and Jonathan Parker, Massachusetts Merchant.

Date	Transaction	Debt (£)	Date	Transaction	Credit (£)	Rolling Total (£)
9/7/1747	to earthenware	-30.65				-30.65
			11/9/1747	by cash	30.65	0.00
7/22/1748	to ditto	-22.40				-22.40
			7/22/1748	by ditto	12.40	-10.00
			No Date[20]	by ditto	10.00	0.00

Source: John Parker Account Book. Baker Library, Harvard Business School. Mss:605 1747-1815 P241. p.4.

[20] "No date" is my entry to show that a date is not recorded in the account book.