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Analysis

Interest-bearing loans and unpayable debts in slow-growing economies: Insights from ten historical cases

Tilman Hartley^{a,*}, Giorgos Kallis^{a,b}^a Institute of Environmental Science and Technology, Universitat Autònoma de Barcelona, Spain^b ICREA, Barcelona, Spain

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ABSTRACT

Under what circumstances are interest-bearing loans compatible with an economy without much growth? The question is becoming increasingly important given a tendency towards declining growth in industrialised economies and increasing evidence that continued growth is incompatible with environmental sustainability. Previous theoretical work suggests that when interest-bearing loans compound, this results in exponentially growing debts that are impossible to repay in the absence of economic growth. We here examine ten historical cases to assess support for this finding. We find that interest-bearing loans have typically resulted in unpayable debts in these non- and slow-growing economies. We further identify four broad category of measures to prevent or alleviate the problem of unpayable debts, and show how they have been employed in the past. Our Appendix compiles sources of debt regulation from across the world over five millennia.

1. Introduction

Longstanding work suggests a conflict between an economy with positive interest rates where compounding results in exponentially growing debt, and a real economy that is subject to environmental and resource limits (e.g. [Soddy, 1926](#); [Daly, 1980](#); [Martinez-Alier, 1987](#); [Douthwaite, 1992, 1999](#); [Grignon, 2009](#); [Svartzman et al., 2020](#); [Arnsperger et al., 2021](#)). Recent economic modelling based on a post-Keynesian stock-flow consistent framework have served to dispel some oversimplifications that had crept into the debate ([Jackson and Victor, 2015](#); [Berg et al., 2015](#); [Cahen-Fourot and Lavoie, 2016](#); [Richters and Siemoneit, 2017](#)). But since these models suggest that under certain conditions positive interest rates are compatible with zero growth, this has led to some confusion about what these macro models actually tell us. Essentially, the condition required for the compatibility of interest with a non-growing economy in these models is zero net saving, since if

there is zero net saving then the compounding of interest is avoided (see the next section of this paper). What these models have really shown therefore is that, although there is no incompatibility between *simple* interest and zero growth, the long-held thesis still holds true: that “compound interest ... is incompatible with a stationary economy” ([Cahen-Fourot and Lavoie, 2016](#): 167–168).

This paper adds an empirical dimension to a discussion that has been until now theoretical for the most part. We ask: what does the empirical record show? How have economies without growth fared – or dealt with – positive interest rates? Do we find in the historical record examples of societies that tried to impose the strict conditions postulated in the aforementioned models? No modern economy has yet experienced prolonged periods of zero or very low growth. In contrast, prior to the nineteenth century, no economy ever sustained annual per capita GDP growth much above 0.3% (see Table A1 and Fig. A1 in the Appendix). Historical research thus serves as a useful empirical complement to the

* Corresponding author.

E-mail address: tilman.hartley@uab.cat (T. Hartley).

Table 1
List of cases.

Case	Approximate dates
Ancient Mesopotamia	24th to 16th centuries BCE
The Hebrews	14th BCE to 14th CE CE
Classical Athens	7th to 3rd BCE
Classical Rome	5th BCE to 3rd CE
India	5th BCE to 19th CE
China	5th BCE to 19th CE CE
Christianity	3rd to 19th CE
Islam	7th to 19th CE
The Nahua ('Aztec')	16th CE CE
The Tolai (Papua New Guinea)	19th CE

current theoretical debates about the feasibility and potential institutional forms a more sustainable economy may take.

Others before us have noted the presence of interest in historical cases. For example, [Strunz et al. \(2017: 346\)](#) note the existence of interest in Egypt, Mesopotamia, America, India, China, and medieval Western Europe. Similarly, [Cahen-Fourot and Lavoie \(2016: 167\)](#) write that "interest [was] in existence long before modern capitalist economies relying on economic growth as their ultimate goal took shape in the Western world. It was for instance the case in ancient Mesopotamia, ancient Italy, the young Islamic world and Middle-Age India".¹ This desire to better understand the circumstances in which interest-bearing loans have been possible in the absence of substantial rates of growth is what motivates this paper.

A first aim of the paper, then, is to examine the extent to which the charging of interest in the absence of substantial economic growth has been problematic historically. Recent research has presented cross-cultural comparisons of debt, including instances of the problems caused by debt in general ([Graeber, 2011](#)), the early development of interest-bearing debt and debt forgiveness ([Hudson, 2018](#)), and a comparison of the European and Islamic traditions ([Geisst, 2013](#)). We here systematically compare the literature on specifically interest-bearing debt, drawing particularly on source materials published in the last few years on the economic history of regions beyond Europe and Western Asia.

We examine literature on ten different cases (see [Table 13](#)). The cases are drawn from across Eurasia, Oceania, and the Americas, their dates ranging from bronze age societies of the 3rd millennium BCE up to the 19th century CE when the period of modern economic growth was just beginning. We find that in these historical cases, interest-bearing debts often did come to exceed the ability of debtors to repay. In general, the presence of interest-bearing debt in a non- or slow-growing economy tended to be accompanied by the accumulation of unpayable debts, debtor dispossession, and social upheaval. Sometimes the problem may be quite limited, since if there are only few debtors then unpayable debts do not become a widespread social issue, and even low rates of aggregate growth might be sufficient for small numbers of debtors to be able to repay loans at interest. Sometimes territorial expansion mitigates the problem of growing debts for a while, whether by providing the resources through which debtors can meet repayments or by providing

new colonies for the dispossessed to go. But at some point expansion encounters limits. Therefore, our research shows that though societies with little or no growth did indeed have lending with interest, this was often a major source of inequality, social division, and instability.²

A second purpose of this paper is, then, to identify the kinds of measures attempted by these different societies to try to avoid or to mitigate the consequences of unpayable debts. We place these different measures into four broad categories: forgiving accumulated debts; eliminating the charging of interest altogether; preventing the compounding of interest; and limitations such as rate caps and setting maxima on the size and duration of loans. Our specific focus here is on historical cases where the accumulation of interest renders debts unpayable.³ The solutions we identify here thus either prevent the accrual of interest resulting in unpayable debts, or mitigate such debts when they do occur. The measures we discuss in our historical cases all fit into one of these four broad categories.

First, cancelling debts could resolve the problem of debt accumulation. Such debt forgiveness measures may take place on the individual level as well as more broadly. More narrowly, creditors may be motivated to forgive individual debts through informal norms such as a desire to behave charitably, or may be compelled to forgive loans through the formal mechanisms provided by bankruptcy legislation, for example. More broadly, debt jubilees provide for the cancellation of debts of large numbers of indebted individuals. We find the broad approach of regular jubilees in ancient Mesopotamia and among the Hebrews, and more occasional debt write-offs, as well as narrower individual cases of debt forgiveness, in Athens, Rome, and China.

Second, banning the charging of interest altogether is another obvious way to prevent the accrual of interest into unpayable debts. Interest bans might be partial, such as when interest is permitted on some forms of loan such as for trade or production, but forbidden on loans that might be expected to quickly become unpayable such as consumption loans to the poor. We find interest bans attempted in Rome, China, Christianity, and Islam, and a variety of partial bans among the Hebrews.

Third, the compounding of interest might be prevented. The compounding of interest is particularly problematic in non- or slow-growing economies, since the compounding of interest leads to exponentially growing debts. The broadest possible measure to prevent compound

¹ [Cahen-Fourot and Lavoie \(2016: 167\)](#) immediately qualify this by writing that "debt money and interest were at work only in a few sectors of these noncapitalist socio-economic formations, so there is no direct comparability with monetary economies of production where the production and the monetary circuits fully overlap". There is some debate as to what extent these historical societies can be described as 'capitalist' (e.g. [Rodinson, 2007](#); [Temin, 2013](#); [Jones, 1988: 74](#); [Frank and Gills, 1993](#); [Epstein, 1968](#)). Whether we call them capitalist or not, our approach to comparative historical research is that it can nevertheless help us see how theories proposed for one society, or parts of it, may or may not apply to others. In fact, a good way to test a theory to see how well it applies in cases that are otherwise quite different (see Case Selection section below).

² There are, of course, many other potential sources of societal conflict, but our focus in this paper is on those problems attributed to interest-bearing loans.

³ There are many reasons a debt may become unpayable, and we even find some instances where debt forgiveness is applied to individuals whose debts have become unpayable due to some specific misfortune or difficulty (see [Appendix Table A3](#)). But for the most part the measures we have found are applied broadly and are intended to prevent the accumulation of debts across wide cross-sections of the population, not only those who have suffered some particular misfortune. Indeed, one of our four categories of measure specifically targets compound interest, suggesting that the people implementing these measures considered the compounding of interest to be the underlying cause of these problems.

interest would be to prevent creditors lending any of their interest income, since then no interest would be paid on interest. In Christianity, we find charitable lenders allowed to charge interest only to cover the costs of lending, effectively preventing interest income being lent, and in China interest income was often earmarked for specific spending purposes. In these cases the intention seems to have been to prevent charging excessive interest and to raise funds, respectively, rather than to explicitly prevent interest compounding, though that would have been the result. A narrower version of preventing compounding is to prevent a creditor charging interest on the interest owed by any individual debtor. This is often effected as a ban on adding interest to the loan principal. Such a measure would at least prevent the exponential accumulation of interest on individual debts, if not in the economy as a whole. Such a ban seems likely to have been much easier to police than attempting a broader ban on compounding by trying to prevent lenders lending their interest income. We find such bans on charging compound interest in Rome, China, India, and Christianity.

Fourth, limitations capping the maximum interest rate, the maximum size of a loan, or the maximum duration of a loan could be applied. Though they would not prevent the accrual of unpayable debts altogether, such measures would limit the number of debts that become unpayable and the rate at which those debts increase. We find such measures in Rome, India, China, Christianity, Islam, perhaps among the Nahua, and among the Tolai.

Finally, we found no cases of a society imposing a condition of zero net saving on their population – the condition which renders positive rates of interest compatible with zero growth in recent theoretical models (Berg et al., 2015; Cahen-Fourot and Lavoie, 2016; Richters and Siemoneit, 2017). A ban on all saving would be equivalent to a ban on borrowing, since nobody would have anything to lend, though we did not find a ban on saving or borrowing in any of our cases. Historically, perhaps the closest we found is some suggestion of a ban on borrowing among the Persians around 430 BCE – clearly an effective way to avoid unpayable debts, since if there is no debt then no-one will ever find themselves with a debt they cannot pay. But we have not included this in our case studies since the available information consists of a single sentence from the Greek historian Herodotus: “They hold lying to be the most disgraceful thing of all and next to that debt; for which they have many other reasons, but this in particular: it is inevitable (so they say) that the debtor also speak some falsehood” (I.138, trans. Alfred Denis Godley). Although societies can effectively operate without individuals saving or lending (Hartley, 2019), they tend to be small-scale and, given the absence of saving or lending, will not have experienced the problems associated with interest-bearing loans that we find in the ten cases we describe below.

2. Theoretical models

We begin by briefly reviewing the findings of recent macro-economic models that have investigated the conditions in which positive interest rates are theoretically possible in non-growing economies (Jackson and Victor, 2015; Berg et al., 2015; Cahen-Fourot and Lavoie, 2016; Richters and Siemoneit, 2017).

In Jackson and Victor (2015), the government pays interest to the central bank who returns all profits to the government (so such loans are effectively interest free) and firms pay all post-depreciation income to households. Jackson and Victor write: “We assume a funding model for firms in which firms’ cash flow or retained earnings is equal to the depreciation, so that profits, distributed as dividends, are equal to profits net of depreciation”, and explain in a footnote that relaxing this

assumption “would immediately lead to positive net investment and accumulation of the capital stock” providing growth (p. 37, mathematical notation removed). Banks also pay out all interest income to households, and those households consume all their post-tax income, with government taxation set to ensure that consumption is equal to disposable income. Hence firms do not retain profits, and banks do not retain interest income – both pay them out to households. In turn, households are prevented from earning interest upon their interest income by ensuring that household consumption equals their disposable income. Jackson and Victor write: “For a stationary state solution, as Godley and Lavoie (2007, p. 73) point out, the net lending of the household sector must also be equal to zero” (p. 39, mathematical notation removed). So to reach a stationary state where no sectors have increasing stocks, households (as the ultimate recipients of interest income) must not be saving and no interest income is ever lent, thus the compounding of interest is avoided.

The model by Berg et al. (2015) aggregates the banking sector, the central bank, and the government sector. Firms in the industry sector pay interest on loans to the government, which pays interest to households; firms also distribute all profits to households. Unlike Jackson and Victor, Berg et al. assume no immediate consumption out of interest and profit income at all, but instead assume that all household consumption is out of wealth and wages. Examining their model to establish the parameter space within which a stock-flow equilibrium is reached, the authors conclude that “[t]hrough our model shows that positive interest rates do not necessarily imply exponential growth of government liabilities, this result crucially depends on consumption decisions by households” (p. 13). Specifically, in order to remain in a stationary state, taxes and consumption must be sufficiently high to avoid household deposits increasing exponentially as the “[f]lows of interest payments from the government accumulate” (p. 13). As in Jackson and Victor (2015), when the model is in a stock-flow equilibrium, the total income of households equals taxes and consumption, so no interest income is ever lent at interest and no compounding of interest can occur.

Cahen-Fourot and Lavoie (2016) present a static model in which, as in Jackson and Victor (2015) and Berg et al. (2015), banks and firms do not retain their income but pay all income out as dividends to individuals. Again, these individuals do not lend but consume this income. Cahen-Fourot and Lavoie thus similarly conclude that whilst interest per se is possible in a stationary economy, “our article supports the argument that compound interest debt-based money is incompatible with a stationary economy but interest bearing debt-based money does not necessarily imply compound interest” (pp. 167–168, emphasis added).

Finally, Richters and Siemoneit (2017) present a detailed review and stability analysis of these models; they also examine two models by Godley and Lavoie (2007) which yield similar results. They do not dispute the previous modellers findings but seek the general conditions for stability. They find that across these five models “[p]ositive interest rates do not systematically lead to exponentially growing deposits, because taxation and consumption out of wealth and income can dampen the positive feedback loop of compound interest” (p.120). Since all models follow Godley and Lavoie’s (2007, p. 73) definition of a stationary economy as one in which there is no saving, consumption must equal disposable income (as in Jackson and Victor, 2015: 39; Berg et al., 2015: 13; Cahen-Fourot and Lavoie, 2016: 165). Endorsing the findings of Berg et al. (2015), Richters and Siemoneit therefore find that “[i]f creditors spend their interest income for investments or consumption, money flows back into circulation and is available for repayment, so exponential growth of debt and deposits does not happen” (p.115). Though Richters and Siemoneit importantly emphasise that “this is not

‘independent of the will of agents’, but dependent on consumption decisions of those who achieve income” (p.115), they concede the point (raised by Glötzel, 1999, 2009) that “it is unrealistic that creditors decide to fully spend their interest income, which is why credit claims increase and the collective of debtors is powerless to repay the debt” (p.115).⁴

3. Case selection

Our starting point for this paper, then, is the longstanding body of literature which suggests that when interest compounds it can result in exponentially growing debts that are unpayable in the absence of economic growth. This body of theory has been developed to analyse modern economies, with the particular aim of better understanding what may happen if today’s economies stop growing.

The cases we present here are historical economies, for which this body of theory was not explicitly intended. These cases thus resemble an ‘out-of-sample’ test of those theories (Carugati et al., 2019). The purpose of comparative historical research is not to uncritically apply examples from the past to modern issues, but instead to use historical cases to test hypotheses and assertions made in the social sciences in a more systematic way (Curtis et al., 2016: 768). Such an approach does not in any way imply that there are no differences between different historical contexts, nor between historical cases and modern societies. Indeed, the very premise of comparative research is that there is no prior reason that a body of theory developed to analyse one particular society should necessarily apply elsewhere, but that it can be useful to examine the extent to which theory developed for one particular context might or might not apply to another. Our cases therefore include a range of economic and social contexts within which loans at interest occurred. Among the Tolai, for example, the extent and range of purposes for which borrowing at interest is entered into are quite limited, and we might expect unpayable debts to arise only in those sectors of the economy where such loans take place. On the other hand, in some of our other cases interest-bearing loans occurred much more widely. Rome, for example, had significant levels of financial intermediation and credit creation, with one recent comparative analysis concluding “that financial institutions in the early Roman Empire were better than those of eighteenth-century France and Holland. They were similar to those in eighteenth-century London and probably better than those available elsewhere in England” (Temin, 2013: 189).

⁴ One potential source of controversy remains, since Richters and Siemoneit (2017: 122) also write that: “Net saving can drop to zero in a non-growing economy either by complete spending of income or (more plausibly) through parallel saving and dissaving”. Some have taken this to imply that, contrary to the statements from the modellers we quote above, even compound interest is compatible with zero growth. For clarity, this saving and dissaving mechanism does not appear in any of the models, and to our knowledge there are no models that dispute the finding that compound interest results in unpayable debts in a non-growing economy. Our own understanding is that, just as the compounding of interest *between* sectors results in unpayable debts in zero growth, the compounding of interest *within* sectors would give rise to the same problem; but if those who believe compounding to be possible *within* sectors of a non-growing economy were to produce a model that shows this then we would be happy to see this clarified. For our part, we do not see how such a model could be produced. Intuitively, as long as debtors are making their interest payments every period then this results only in simple interest, since it is just a transfer of money from the debtor to the creditor each period and so no exponential debts accumulate. But if debtors do not pay off their interest every period, they will start to accumulate interest on their missed interest payments, and thus to accumulate debts at the rate of compound interest. In that case, for these debtors to eventually be able to pay off those debts they will have to pay more than if they had just paid simple interest – and so will have to earn this extra money from somewhere, which they can only do if the economy grows. So it seems to us that the central finding still holds: if there is compound interest in an economy that is not growing, then some people will end up with unpayable debts.

Clearly the socio-political and institutional contexts of these diverse civilizations were often very different from today’s economies. For one thing, these historical economies were in general less monetized, and the use of interest may have been less widespread than it is now. Markets for lending were often more limited, and one might expect perhaps more room for abusive rent extraction from creditors (though even in modern times interest rates of 1000% per year are not unheard of (Martin, 2010)). So if it turns out that a theory intended for modern economies also applies to economies with such diverse institutional contexts as these, this would provide some support for that theory. We further contextualize the insights from these past experiences bearing in mind differences from the current era in the Discussion section at the end of this paper. But what particularly motivates us here is a desire to understand the consequences of positive interest in the absence of growth, and also to shed light on how these societies tried to mitigate the potential negative effects of interest-bearing loans.

We have examined a geographically broad set of cases. In Eurasia, the earliest evidence for interest-bearing loans appears in Mesopotamia and later among the Hebrews, Athens, Rome, India, and China. The strategies of Athenians, Hebrews and Romans go on to influence Christian and Islamic law, whilst the Indian Law of Manu becomes influential in the Buddhist countries of Southeast Asia as far as Sumatra and Java, particularly in Burma and Thailand (Olivelle, 2005: 3; Vesey-Fitzgerald, 1925: 172). In Oceania, accounts of the lending of shell-money date to the late 19th and early 20th centuries among the Tolai, whose neighbours with similar practices include the Buin (Thurnwald, 1912: 42–43; Connell, 1977: 85), the Kinawanua (Danks, 1888: 308; Parkinson, 1907: 94), the Kilial (Connell, 1977: 85 citing Counts 1970), and the Siuai/Siwai (Connell, 1977: 85). Outside of these communities in New Britain and Bougainville, however, it is doubtful that shells were used as true currency in Melanesia (Connell, 1977:85). Current scholarship suggests that earlier reports of interest elsewhere in Melanesia and among the New Zealand Maori were actually a means to secure contributions, and not loans at all (Liep, 2009: 302–303). In the Americas, the Nahua (Aztecs) are the only case we have found with some form of interest-bearing loans; again, earlier reports of interest among the North American Kwakiutl seem to refer to means of securing contributions and not really loans (Liep, 2009: 302–303).

We could not, of course, claim nor have aimed for comprehensive coverage, and future research might usefully examine cases we have not presented here in detail (we include some information in the Appendix). Most obviously, we have found relatively little on pre-Islamic and pre-colonial Africa, with information on Eastern and Southern Africa still particularly hard to find (Stiansen and Guyer, 1999: 8n4). More detailed work on ancient Egypt (Hudson, 1993; Vesey-Fitzgerald, 1925), Japan (Morris, 1999) and Russia and Ukraine (e.g. Law of Vladimir II, articles 48 and 49; Smith, 1966: 509) would also be very welcome. But there is nothing in these nor any other cases of which we are aware that would have changed our findings.

4. Ten historical cases

We begin by surveying the ten historical cases, for each briefly describing where unpayable debts arose due to interest-bearing loans, as well as the measures attempted to prevent those problems. We proceed roughly chronologically, according to the date of the earliest evidence for the appearance of interest-bearing loans in each of the cases. We list the evidence and our sources in more detail in the Appendix.

Case 1. Ancient Mesopotamia.

Charging interest appears around the 25th century BCE⁵ in records found in the Sumerian city-state of Lagash and relate to tributes owed by neighbouring Umma (Hudson, 1993: 73). By the 21st century BCE

⁵ Dates according to the Middle Chronology.

private households as well as the temples and palaces were engaged in money-lending for economic gain (Garfinkle, 2004). The adoption of interest is thought to have allowed a more complex social structure to develop and even to have provided the impetus to develop writing and abstract mathematics (Schmandt-Besserat, 1992; Mattessich, 1989: 79–81; Carmona and Ezzamel, 2006: 182). Any unpaid interest was treated as a new loan upon which interest could be charged after a period of sixty months had elapsed. Since the customary rate of interest was 1/60th per month (20% percent per year), this was the date at which interest would equal the size of the original loan (Hudson, 2000a: 147). By the 24th century, the first recorded debt cancellations are made in the Edict of Enmetena, the ruler of Lagash (Hudson, 1993: 74). There is evidence of at least 39 debt cancellations by various Mesopotamian rulers between the years 2400 BCE and 1600 BCE (Hudson, 1993: 8–9, 18–19, 23, 25, 39, 46, 72, 74), with some suggestion that the practice persisted in the north of Mesopotamia into the 15th century BCE (Hudson, 1993: 26). Proclamations enforced the forgiveness of debts (Akkadian: *mīsarum*) and allowed those enslaved due to indebtedness to return to their place of origin (*andurārum*), though an exception was made for debts incurred to obtain a profit or in the course of commercial travel, which were not in general forgiven (Lemche, 1979: 12; Hudson, 2002). However, by the first millennium BCE, and possibly already in the period leading up to the Sack of Babylon in 1595 BCE, Mesopotamian rulers had gradually lost their power to annul the titles acquired by private creditors. Though rulers continued to proclaim clean slates, these retained a largely symbolic function, and no longer had the restorative effects they had had before (Hudson, 2002: 14).

Case 2. The Hebrews.

The Hebrews may well have their origins in the Hapiru people who in the second millennium BCE were made landless through their inability to pay interest-bearing debts and left Mesopotamia to settle westwards (Hudson, 1993: 72). Charging interest may have facilitated trade beyond an otherwise close-knit community (Millett, 1991: 101). The main source of Hebrew law is the five books of the *Torah*, or ‘law’. One of these, Leviticus, uses the words *darar* and *misarim*, loan-words from the Akkadian *andurārum* and *mīsarum*, to refer to the freeing of indentured debtors and the forgiving of debts during the jubilee (Hudson, 2002). Partial bans on charging interest are also in evidence. Leviticus 25:36–37 forbids charging interest to the poor, as does another book, Exodus 22:25. A prohibition against interest is also stated in another book of the *Torah*, Deuteronomy 23:19–20,⁶ though with an apparent exception: whilst ‘brothers’ may not be charged interest, interest may be charged to non-resident ‘foreigners’ (Hebrew: *nokri*; see Issler, 2016; Gordon, 1975: 75–76; Cornell, 2006).

Later books of the Hebrew bible record the subsequent enforcement and reform of the laws, alongside prophetic and didactic text. These books include further injunctions against interest in Psalms 15:5, Proverbs 28:8, and Ezekiel 18:8, 13, 17, and 22:12. Around 600 BCE, Habbakuk (2:6–7) explains that charging interest is a major source of social instability as debtors turn against creditors causing internecine strife (Gordon, 1975: 76). At least four debt cancellations are likely to have taken place during the 6th and 5th centuries BCE (*Jeremiah* 34:8–19; *2 Chronicles* 32; *2 Kings* 25; *Nehemiah* 5:3–5; see Hudson, 1993: 33), and a further cancellation is recorded for the 2nd century BCE (*I Maccab.* 13–14; Hudson, 1993: 48). Though reforms around the end of the first century BCE allowed contracted exceptions to the law, injunctions that debts between Jews should be forgiven during the jubilee year persist until the 13th century CE (Hudson, 1993: 38).

Case 3. Classical Athens.

The charging of interest appears in the civilisations of Greece and Etrurian Italy during the eighth century BCE, likely due to the influence

of Syrian and Phoenician merchants (Hudson, 1992, Hudson, 2002: 41). As with the Hebrews, charging interest seems likely to have facilitated trade beyond an otherwise fairly closed community, later also allowing risk-sharing between lenders and merchants with interest paid out of the profits of successfully completed voyages (Millett, 1991: 101). But as early as around the start of the sixth century BCE debtor unrest led the newly democratised Greek city-state of Megara to adopt the *palintokia* (Plut. *Quaes. Gr.* 18), probably a requirement for creditors to repay interest to debtors (Millett, 1991: 48–49), but possibly a general debt cancellation (Hudson, 1992). Similar debtor unrest and measures in response are also reported for the Greek cities of Olbia, Miletus, Corinth, and Sicyon around this time (Hudson, 1993: 32, 81; Wallace, 2007: 51–52; Murray, 1993: 137–139; see also Asheri, 1969 for a list of ancient Greek debt legislation).

In Athens, in an attempt to prevent similar revolt, the lawmaker Solon’s 594 BCE reforms cancelled all debts and outlawed debt bondage and dependent labour among Athenians (*Constitution of the Athenians* 13.3; Wallace, 2007: 59, 73). However, this debt cancellation was a one-off, and subsequent laws permitted lending at interest and did not set a maximum rate (Lysias *Theomnestus* 1: 10.16, 10.18; Millett, 1991: 50). Three decades of unrest culminated in the poorer Athenians supporting a populist, Peisistratus, in his bid to become tyrant of Athens in 561 BCE (*Politics* 1305a; Wallace, 2007: 75–76). Peisistratus is reported to have assumed the role of providing loans to assist with farming, and appears not to have charged interest, instead issuing loans partly in the expectation that improved yields would increase the tithes that he levied on the produce (*Const. Ath.* 16.2–4; Millett, 1991: 50).

Subsequent democratic reforms in Athens proved somewhat more durable, and tensions that might otherwise have arisen may have been reduced by the steadily growing economic base. Between 750 and 500 BCE the area of arable land under Greek control roughly doubled (Morris, 2004: 733), and increased trade across the Mediterranean allowed perhaps as much as three quarters of Athens’ food to be imported (Morris, 2006: 42). Nevertheless, the 5th–4th century BCE Athenian philosopher Plato still condemns charging interest, and proposes an outright ban, on the grounds that it creates a group of aggrieved indebted and disenfranchised citizens and thereby weakens the state (*Laws* 5.742, *Republic* 8.555).

Case 4. Classical Rome.

A single ancient source suggests that the Roman king Servius Tullius (r. 575–535 BCE⁷) personally paid the debts of impoverished subjects, and legislated that debts should be secured only against property and not against the person (Dion. Hal. *Ant. Rom.* 4.9.6–8; Savunen, 1993: 145n16). Reports of tensions due to interest-bearing debt reappear soon after the beginning of the Roman Republic, traditionally dated 509 BCE. By 494 BCE a “blaze of hatred” was rising among those who found themselves “enslaved and oppressed” by their indebtedness to their fellow citizens (Liv. 2.23, trans. Livy, 1912; Savunen, 1993: 144–5). In 450 BCE legal reforms, inspired by earlier Greek laws, sought to regulate the bondage of debtors to creditors, and to set a maximum interest rate at 10%, with subsequent laws reducing the rate to 5% and ultimately banning compound interest (Tables 3.1–7, 6.1, 8.18; Liv. 3.33; Tac. *Ann.* 6.16; Geisst, 2013: 16; Hudson, 1993: 50; Momigliano, 2005: 180; Savunen, 1993: 145). Unrest over debt is again recorded in 385, 380, and 378 BCE, and colonies such as Satricum are founded specifically as a means to alleviate the debt crisis (Liv. 6.11–16, 6.27.1–8, 6.31–1.5 7.6–7; Cornell, 1989: 322; Savunen, 1993: 145–146). A law of 367 BCE stated that the interest already paid on debts should be deducted from the principal, and that the rest should be paid in three equal annual instalments (Liv. 6.35.4; Cornell, 1989: 333–7; Savunen, 1993: 147). A law of 357 BCE reiterates an interest cap (Liv. 7.16.1; Cornell, 1989: 333, Hudson, 1993: 50; Savunen, 1993: 148), and a law of 347 BCE

⁶ Numbered according to the Christian convention.

⁷ We use the conventional dates, derived from Varro, throughout.

halves the rate to 4 1/6%, again scheduling repayment of remaining debts over three years (Livy 7.27.3; Tac. *Ann.* 6.16; Cornell, 1989: 333; Hudson, 1993: 50; Savunen, 1993:149). As Savunen notes (1993: 157) “Romans did not abolish their laws but simply neglected them”, explaining the need for similar legislation to be repeatedly introduced. The historian Livy briefly reports that severe penalties were inflicted upon money lenders in 344 BCE (Liv. 7.28.9; Cornell, 1989: 333; Savunen, 1993: 151). A further law of 342 BCE appears to be another debt cancellation; the same year interest charges were prohibited altogether, though this was only rarely enforced (Liv. 7.42.1; Savunen, 1993: 144, 149–150). In either 326 or 313 BCE,⁸ legislation called the *lex Poetelia* abolished the indenture of debtors (Varro 7.105; Liv. 8.28; Savunen, 1993: 155–156). But chronic indebtedness continued, and the numbers of dispossessed continued to grow. Many were recruited into the army or became colonists: between 367 and 287 BCE twenty-one Latin and six Roman colonies were founded (Abbott, 1901: 49). Debts were again cancelled in 287 BCE, alongside wider political reforms (Cassius Dio 8.37.2; Zonaras 8.2; Liv. *Periochia* 11; Savunen, 1993: 156).

The century or so after 287 BCE is characterised by internal political stability and colonial expansion, the two likely related as lasting improvements for the worst-off became possible only through large-scale territorial acquisitions (Raaflaub, 2005; Von Ungern-Sternberg, 2005: 313). The only major debt legislation during this period, in 193 BCE, closes a loophole by making debts contracted with Latin allies subject to the same regulations as debts between Romans (Liv. 35.7).

However, between 177 and 128 BCE no new colonies are established (Kay, 2014:168). In 86 BCE three quarters of all Roman debts are remitted (Sall. *Bel. Cat.* 33; Hudson, 1993: 52). During the first century BCE, when the Roman Republic entered its final crisis, Cicero reports that the problems of indebtedness had never been greater (*De Officiis* 2.84), and the historian Sallust writes that numerous dispossessed farmers were moving to the city and swelling the number of urban poor (*Bel. Cat.* 37). Assuming control of government in 49 BCE, Julius Caesar refuses to annul debts but instead enacts bankruptcy laws allowing debtors to surrender their possessions and subtracting interest paid from the remaining loan, measures which reduces outstanding debts by about a quarter (Suet. *Jul. Caes.* 42; Cass. Dio 41.47, 42.51; Hudson, 1993: 52; Mommsen, 1894: V.398). The confiscations and conquests of the first emperor, Augustus, makes money so plentiful that the interest rate falls, and he himself lends money interest-free (Suet. *Aug.* 41). In 33 CE the emperor Tiberius re-enacts a law of 46 BCE reiterating an interest cap, presumably at the longstanding rate of 8 1/3% (Tac. *Ann.* 6.16–17; Hudson, 1993: 52; Frank, 1933: 32ff). Around the end of the first century CE, income from loans of the personal treasuries of the emperors Trajan and Hadrian, and perhaps their predecessor Nerva, are used to support poor children in the small inland towns of Italy (Duncan Jones, 1964). The empire reaches its largest extent under Trajan in 117 CE, but his successors no longer pursue a policy of expansion and increasingly debase the coinage to cover expenditures (Abbott, 1901: 324, 326). The ‘Crisis of the Third Century’, characterised by rampant inflation and civil wars, is often considered the end of the classical period (Abbott, 1901: 329, 334; Graeber, 2011: 283).

Case 5. India.

Though debt is mentioned in texts dating from perhaps as early as 1400 BCE (Kosambi, 1996: 147–148), the earliest surviving discussion of interest (*vṛddhi*) in India is in texts by the Sanskrit grammarian Pāṇini dating to the 5th or 4th century BCE. Pāṇini mentions rates of 0.5, 2.5, and 10%, with 10% described as a rate that ‘was not favoured’ (Pāṇini V. I.47, IV 4.30; Chatterjee, 1971: 21). Buddhist texts – the *Jātakas* relating events from the 5th century BCE and the *Therīgāthā* poems dating from the 6th–3rd centuries BCE, but both written down much later – also refer

to interest (*vṛddi*). One of the *Jātakas* expresses tolerance for the profession of money-lending, though elsewhere ascetics accused of lending at interest are described as hypocrites and there are descriptions of slavery resulting from debt (*Jātaka* IV, 422, 184, 521; *Therīgāthā*. 444; Rhys Davids, 1922: 205). But similar to Athens, there were also benefits of lending, including loans for maritime and overland trade which by around 300 BCE allowed risk-sharing between lender and merchant with interest paid out of the profits of a successful voyage (Kosambi, 1996: 148).

Dating to around 3rd–1st centuries BCE the sources of ancient Indian law, the *Dharmasūtras*, begin to regulate interest explicitly. The four surviving *Dharmasūtras* detail circumstances in which no interest should be charged, including if the debtor is imprisoned, if the creditor refuses to accept repayment, or if the debtor has given a pawn in security from which the creditor can earn an income (Chatterjee, 1971: 64). Interest is sometimes limited to one year (Gautama G.D.S XII.27), often at a rate of 15% (Gautama G.D.S XII.26; Vasistha II.50; Chatterjee, 1971: 21–23; Kosambi, 1996: 254), sometimes 12% (Baudhāyana 1.5.10.23; Chatterjee, 1971:23; Kane, 1973, 420), and sometimes rates are given as 2, 3, 4, or 5% per month depending on the debtor’s caste (Vasistha II.48; Chatterjee, 1971: 26). The amount of interest is not to exceed the principal (Gautama G.D.S. XII. 28; Chatterjee, 1971: 49), though this rule sometimes applies only to loans of gold or money and higher multiples are permitted on loans of agricultural and weighable goods (Vasistha II 44; Chatterjee, 1971: 49, 54, 55, 57, 61).

Later legal treatises and commentaries dating to between the 1st and 10th century CE are known as the *Dharmasāstra*. Monthly rates of 2, 3, 4 and 5% by caste are reiterated, but an annual maximum of 24% is also set, a rate cap that is consistently restated for the next thousand years (Chatterjee, 1971: 23–35; Kosambi, 1996: 147–148). From the first to the fourth or fifth centuries CE, higher rates for commercial loans are allowed up to 60% annually, 120% if the debtor passes through a forest, and 240% when the debtor crosses an ocean (Chatterjee, 1971: 22 29; Kautilya 3, II.1; Yājñavalkya II.38). Already by the second century CE commercial rates are deemed acceptable if agreed by those expert in commerce (Manu VIII, 157). By the ninth century, 5% per month is held acceptable if the lender thinks the borrower will use the loan for extensive business, though other rates may be agreed among travelling traders or where cloth is to be received in payment (Medhātithi on Manu VIII 152; Chatterjee, 1971: 28, 60–61). The rule that interest should not exceed principal is also repeatedly endorsed (Manu VIII 151; Yājñavalkya, Brhaspati X 17, also 21, 24; Bhārucci VIII 15; Chatterjee, 1971: 49–52) and persists into modern Indian law where it is known as *Dāmpudat* (Vesey-Fitzgerald, 1925; Chatterjee, 1971: 50–51).

Case 6. China.

In China, lending at interest is well attested for the Warring States period from 5th–3rd century BCE (Von Glahn, 2016 ch.4). There are also mentions of emergency state loans of grain or money, but these were regarded as a form of philanthropy with little expectation they would be repaid (Von Glahn, 2016 ch.5 n51). The 3rd century BCE philosopher Mengzi blames increasing lending for “causing the old and the very young to be cast into the ditches” (quoted in Peng, 1993: 107 n11). The *Zhou li*, a detailed description of government administration from around the 3rd or 2nd century BCE, records that the state should limit interest to 20% (Peng, 1993: 535, Von Glahn, 2016). The Qin dynasty of the 2nd century BCE banned the taking of interest on private debts altogether, outlawed debt bondage for wives and slaves, and capped land ownership (Von Glahn, 2016: ch3).

During the Han dynasty of the 2nd and 1st centuries BCE charging interest was subject to a rate cap. Some nobles were stripped of their titles for charging excessive rates (Yang, 1971: 5). The rate cap may have been 20%, though might have been higher (Peng, 1993: 209, 104; Yang, 1971: 94). In 40 BCE the Emperor Yuan issued an edict forgiving the poor who had borrowed money from having to pay it back (Han Shu 9, Annals of Emperor Yuan). Nevertheless, there are reports of distress

⁸ Varro dates the law to 326 BCE, Livy to 313 BCE (see Varro, 1958: 359n; Savunen, 1993: 154n63; Bernard, 2016: 320).

sales of land, homes, children, and grandchildren in order to pay debts (Peng, 1993: 211; Von Glahn, 2016 ch.3 n89, ch.4). The state attempted to resettle families, but even this land tended to end up accumulated by powerful landowners, whether through usurpation or default (Von Glahn, 2016: ch.4). At the start of the 1st century CE, Wang Mang successfully mounted a coup in an attempt a return to a more interventionist state inspired by accounts of the ancient Zhou. One of Wang Mang's sympathisers, the scholar Huan Tan, remarks that usury by rich merchants was reducing those from middling families to indentured labour (Von Glahn, 2016: ch.4). Among other redistributive reforms, Wang Mang is said to have strictly regulated money-lending and reinstated state lending programs (Peng, 1993: 288; Von Glahn, 2016: ch.4). The Han restoration of the 1st and 2nd centuries CE saw increasing social polarisation as land again became accumulated through purchase and debt forfeiture (Von Glahn, 2016: ch.4).

Distress sales due to debt were also recorded during the Jin dynasty of 266–420 CE (Peng, 1993: 286). In 511 CE, the Wei dynasty prohibited the accumulation of interest to more than the original principal (Yang, 1971: 95). Further distress sales are reported during the Northern Qi (550–577 CE) (Von Glahn, 2016: ch. 5). During the Sui dynasty (581–681 CE) interest was charged on state loans to meet the expenses of officials, and the official regulations on interest were broken even by the heir of the dynasty's founder (Peng, 1993: 289). During every reign of the Tang Dynasty (618–907 CE) interest-bearing government loans were used to pay for the expenses of government offices and official salaries, with loans charged at a rate of 8% per month, reduced to 7% around 650 CE and to 5% in 728 CE (Peng, 1993: 383; Yang, 1971: 96). Grain loans were limited to one year (Peng, 1993: 382). The Tang revived the Wei period law banning interest exceeding the principal, and banned compound interest, a ban that would be reiterated for the next 1294 years (Yang, 1971: 95; Peng, 1993: 385, 625, 741).

As under the Tang, debtors under the Song dynasty (960–1279 CE) were often reduced to indentured labour. One Song reformist, Wang Anshi, identified the chief cause of distress to family farms as a perpetual indebtedness and a lack of capital for investment (Von Glahn, 2016: ch.6). Public loans set up in the 11th century to relieve these problems charged 20% interest per growing season, but this amounted to 40% per year and was thus attacked for driving households to starvation or flight by charging twice the level stipulated in the *Zhou li* twelve centuries earlier (Peng, 1993: 535; Von Glahn, 2016: 535). A large part of the problem seems to have been that the initially secondary goal of increasing government income ultimately took primacy, and so the program ultimately reinforced rather than alleviated the cycle of rural indebtedness (Peng, 1993: 535, Von Glahn, 2016: ch.6).

In 1173 CE the Jin emperor Shizong ordered the establishment of pawnshops charging 1% interest per month (Peng, 1993: 625). Under the Yuan dynasty (1271–1368 CE), legislation again set rate caps and prohibited interest exceeding principal, but this seems often to have been flouted, particularly by Uighur moneylenders who lent at annual rates of 100%. In 1240 debts owed to Uighur moneylenders were paid off by the government using official goods (Peng, 1993: 625). In 1282 powerful families are recorded as causing a crisis by charging 5% per month on loans, and making debtors who could not pay enter new contracts, effectively compounding the interest (Peng, 1993: 626). A 3% monthly rate cap and ban on interest exceeding principal is reiterated by the founding emperor of the Ming dynasty (1368–1644) (Peng, 1993: 741–2). From the end of the 17th century a sliding scale between 0.8 and 3% per month depending on the size of the loan was introduced for pawnshops in some Chinese regions (Yang, 1971: 98–99). Under the Qing (1636–1912), the government frequently used pawnbrokers to lend government funds, with the interest generally earmarked for specific purposes such as scholarships to public schools, famine relief, or the maintenance of an orphanage (Yang, 1971: 99). The last Imperial Dynasty, Qing law still stated that no more than 3% interest could be charged per month, and that interest could not exceed the principal (Von Glahn, 2016: ch.8).

Case 7. Christianity.

In 325 CE the Roman emperor Constantine called a meeting of bishops, the First Council of Nicaea, in an effort to reach a consensus on Christian doctrine and law. Among the laws agreed was a ban on clergy charging interest (Geisst, 2013: 20). In 345 CE the ban was extended to lay people (Canon 12 of the Council of Carthage). In 380 CE Saint Ambrose, the influential Archbishop of Milan, relates stories of debtors forced to sell their children and committing suicide from shame, and equates usury with violent robbery and murder (*De Tobia* 15.51; *De Officiis* 2.25.9; Graeber, 2011: 284; Issler, 2016). Carefully examining every Biblical reference to moneylending, Ambrose particularly notes the exemption from a complete ban on charging interest indicated by Deuteronomy 23:20, the verse explicitly permitting loans to 'foreigners'. If charging interest is equivalent to fighting only without a sword, Saint Ambrose reasons, then it would not be a crime to charge interest to those "whom it would not be a crime to kill" (trans. Zucker, quoted in Issler, 2016). Only much later⁹ is an alternative explanation put forward: that Hebrew law allows interest to be charged to *nokri* because these non-resident foreigners have come to Israel to trade; but such an interpretation appears not to have occurred to the thinkers of the early Church.

In 443 CE Pope Leo reiterates a ban on all lending at interest (Geisst, 2013: 22). However, as early as 529 CE, the legal code of Eastern Emperor Justinian acknowledges the religious ban but notes that it is hard to enforce. Justinian's Code instead resurrected the classical Roman ban on both the compounding of interest and the charging of interest in excess of principal, but otherwise permitted an annual rate of 8%, later 4% (Vesey-Fitzgerald, 1925: 176; Geisst, 2013: 3, 18). Justinian's Code would remain the basis for law in the Eastern Empire until the 15th century fall of Constantinople to the Ottomans (see below).

In the Western Empire, several jurisdictions reiterated complete bans on interest, including laws of 789 CE, 806, and 850 (Gordon, 1975: 144–145; Geisst, 2013: 26). In other jurisdictions interest was sometimes permitted up to a maximum rate, such as the 12.5% per year permitted by the 7th century Visigoth Code (Geisst, 2013: 30). The Catholic Church, often noting that previous bans had been evaded, reiterated its ban on interest in 1139, 1179, 1215, 1245, 1274, and 1311, the last of these laws specifically voiding any secular law permitting interest (Geisst, 2013: 34–46).

In Italy in the 14th century, public lenders known as *montes de pietatis* were set up to provide the poor with low interest loans as an alternative to the high interest charged by private creditors. This received Church approval in the Fifth Lateran Council of 1512–1517 on the condition that the interest charged was sufficient only to cover the costs of lending by the *montes* and was not causing the borrowers harm (Geisst, 2013: 28, 64). The principle of allowing interest when a loss had been incurred by a lender began to be applied more widely (Noonan, 1957: 35, 100; Issler, 2016: 783). But by 1600 the prevalence of money markets effectively meant that making an interest-free loan to one person would mean that a lender always lost the opportunity to make a return elsewhere (Noonan, 1957: 249–268). Despite repeated attempts in 1569, 1571, and 1586 to close loopholes (Burke, 2009: 14; Noonan, 1957) the Catholic Church eventually gave up its attempts to discern legitimate interest from illegitimate usury. Though Pope Benedict XIV's 1745 encyclical *Vix pervenit* would reassert that usury could not be condoned, it would also concede, vaguely, that legitimate reasons to charge interest nevertheless existed (Noonan, 1957).

Since the 16th century Protestant reformers, often funded by banks, had argued for the relaxation of the interest ban, particularly where lending facilitated production and the borrower was using the loan to make a profit (Geisst, 2013: 74–76; Burke, 2009: 14). Legislation in the

⁹ Matthew Henry's 1706 *Complete Commentary on the Bible* is the earliest we have found. This interpretation now has broad scholarly consensus; see Issler (2016).

16th century by northern Swiss Protestants, the Habsburg Netherlands, and the Holy Roman Emperor Charles V permitted interest up to a limit on commercial loans, and a law passed in 1545 by newly protestant England effectively decriminalised interest below 10% on all loans (Gordon, 1975: 257; Helmolz, 1986: 379). Rescinded in 1552 but reinstated in 1571, laws permitting interest up to a certain rate became standard in England, later in the United Kingdom, and in British colonies. In the UK and in almost all states in the post-independence USA, interest rate maxima around 5–8% per annum were in place until well into the nineteenth century (Geisst, 2013: 149, *passim*).

Case 8. Islam.

Founded by Mohammed (c. 570–632 CE), Islam is in many ways a continuation of the Hebrew and Christian tradition. Hebrew and Christian texts are frequently referred to in the central text of Islam, the Quran (e.g. 4:163, 5:43–44, 5:110, 7:157, 17:55, 21:105, 48:29). The practice of *riba* is banned in the Quran (2:275–6, 3:129), but from the earliest Muslim times there has been debate about what *riba* is. Umar ibn al-Khattab (584–644 CE), a companion of Mohammed and the second caliph, even lamented that Mohammed died before being able to provide a satisfactory explanation of what *riba* actually meant (Algaoud and Lewis, 2007: 43; Khalil, 2006: 53). The Quran itself describes *riba* as a “doubling and redoubling” (3:130) and enjoins Muslims who charge *riba* to repent and to accept repayment of only the principal of the loan (2:279; Algaoud and Lewis, 2007: 43). It also suggests that a debtor who has difficulty repaying should be given more time, and that ideally the debt should be altogether written off as charity (2:280; Hunwick, 1999: 80). Various passages prohibiting *riba* sometimes seem aimed at pagans, sometimes at Muslims, and at other times at Jews and Christians, with Jews accused of breaking their own laws by charging interest (Rodinson, 2007: 15). The controversy persists into the twenty-first century (Rahman, 1964; Hunwick, 1999; Khalil, 2006; Farooq, 2007; Algaoud and Lewis, 2007).¹⁰ Nevertheless, the mainstream position in both past and current debates has been that all interest is, at least in theory, strictly prohibited in Islam (Hunwick, 1999; Khalil, 2006; Stiansen, 1999: 107; Algaoud and Lewis, 2007: 44).

But there is also some debate about the extent to which the ban on *riba* has been observed in practice. No penalty for *riba* is specified in the Quran, so under Islamic law punishment is left to the complete discretion of the judge or ruler deciding the case (Lewis, 2007: 72). Unlike the Catholic Church’s attempts to police interest and punish violators, Islam treats the question of *riba* more as a matter of individual conscience, emphasising charitable behaviour and encouraging leniency towards borrowers in difficulty (Lewis, 2007: 78; Kuran, 2012: 165). Where a case is brought, even into the 21st century the penalty is often simply to give any illegitimately acquired interest to charity (Lewis, 2007: 72). Moreover, from very early on Muslims developed simple techniques (*hiyal*) to evade the ban, techniques often actually devised by religious authorities (Kuran, 2012: 143–150; Rubin, 2011: 1315). Nevertheless, one cache of documents from Cairo¹¹ suggests that until the 12th century the lending of money at interest was both shunned and of economically limited significance, with investment instead taking the form of partnerships; by the mid-12th century, however, interest began to be charged through contracts which concealed it in some way (Rubin, 2011: 1315; Kuran, 2012). By the 16th and 17th century, the Ottomans effectively permitted interest up to a set rate, provided the requisite

contractual devices were used. In various Turkish cities loans were charged at annual rates ranging from 10 to 20%, and were permitted by both legal and religious authorities (Kuran, 2012: 148; Rubin, 2011: 1316n15).

Case 9. The Nahua (Aztecs).

Among the Nahua, interest-bearing loans are recorded by Spanish chroniclers, the earliest dating from twenty-two years after the start of the Spanish conquest in 1519. Terms relating to lending at interest were already well established in the Nahuatl language at the time of conquest, but the details of what this actually consisted of is much harder to state with certainty. In 1541 the earliest chronicler, Motolinia, initially wrote that interest was charged, but apparently later came to believe that this was not the case (Millhauser, 2017). The Codex of Tepeucila, from 1543, relates that in 1535 the local leadership of a town had borrowed Spanish coin from local merchants at a rate of 200% in order to pay a tribute demanded by the Spanish overseer, eventually defaulting and being run out of town by their creditors (Hirth, 2016: 222, 267). But particularly since the idea of lending money, rather than goods, was novel for the Nahua the story seems more a reflection of European influence than of pre-conquest practices (Millhauser, 2017: 267). An ethnographic research study begun in 1545, Sahagun’s *Florentine Codex* mentions usury alongside profiteering as a vice of merchants and rich men and describes a bad merchant as one who practices usury and demands excessive interest, which suggests both that norms may have prevented high rates and that lower rates were considered socially acceptable (Sahagún, 1961: 59 in Hirth, 2016: 267). Molina’s Nahuatl-Spanish dictionary compiled between 1555 and 1571 contains five translations of the Spanish word ‘logrero’, which meant a usurer or someone whose profits are excessive (Millhauser, 2017: 267). Intriguingly, Molina’s dictionary also contains four different terms to refer to using one debt to pay another, suggesting that some of these debtors may have begun to experience the compounding of interest, perhaps even the accumulation of unpayable debts (Molina, 1571, 2.41v, in Millhauser, 2017). Writing in 1570, Zorita states that interest was not charged, but according to his translators someone had written in the margins that in fact “interest was used in many places” (quoted in Millhauser, 2017: 268–269). It may be that what they observed was the contracting for repayment of a greater amount of some good at some future date, the Spanish phrase ‘dar a logro’ also referring similar contracts in medieval Europe which were used to create the appearance that no interest was being charged (Hirth, 2016: 267). There is no evidence that unpayable debts constituted a chronic societal problem (Smith, 2015: 102). However, some instances of debt indenture and the selling of family members are reported (Millhauser, 2017: 268–270).

Case 10. The Tolai (Papua New Guinea).

The Tolai and their Melanesian neighbours¹¹ have been described as ‘primitive capitalists’ (Epstein, 1968), the earliest surviving accounts of their practice of lending shell-money dating to the late 19th and early 20th centuries. Sometimes borrowing occurred when someone wanted to avoid breaking up their own cache of shell-money but needed a small sum for a purchase, in which case the borrower might prepare a small dinner for their creditor, or otherwise pay a rate of 10%, considered as a gift in expression of gratitude for the loan (Epstein, 1968: 25–26; Parkinson, 1907: 94; Danks, 1888: 308). Other loans, such as after the death of a relative for ritual purpose, would be charged at 20 or 50% (Epstein, 1968: 25–26; Parkinson, 1907: 94). Among the neighbouring Buin, a rate of 50% was due after about 2 months, a rate of 100% after 9 or 10 months, and social pressure to repay after 10 months effectively placed an upper limit on both the length of the loan and the amount of interest that would need to be repaid (Thurnwald, 1912: 42–43; Connell, 1977: 85). A similar limit is also thought likely for the Tolai, though some suggest loans of 2 or 3 years or more might have occurred without further interest being charged (Connell, 1977: 85). Nevertheless, kinship or friendship obligations typically placed the creditor under

¹⁰ The controversy is somewhat downplayed by Kuran (2012: 144–145), who takes the view that *riba* refers only to the pre-Islamic practice of ‘doubling’. This view is far from the consensus, however, is described as ‘dissenting’ and ‘revisionist’, and is accepted neither by religious authorities nor by Islamic banks (Stiansen, 1999; Khalil, 2006; Algaoud and Lewis, 2007).

¹¹ Though most of the merchants referred to in the ‘Geniza documents’ are Jewish, many did business according to Islamic rather than Jewish law (Kuran, 2012: 59).

considerable social pressure to forgive loans altogether (Epstein, 1968: 72, 106).

5. Discussion

Our paper has two aims: first, to examine the extent to which the charging of interest in the absence of substantial economic growth has been problematic historically; second, to identify the kinds of measures attempted by different societies to try to avoid or to mitigate unpayable debts.

In answer to our first question: the charging of interest in the absence of substantial economic growth was accompanied by notable levels of unpayable debt in seven out of our ten cases (see Table 2). In these seven cases, there is evidence that in different periods this resulted in debtor dispossession and indenture, and at least some degree of social upheaval or revolt. The three exceptions are instructive. First, in Islam a ban on interest was legislated at the religion's inception. Second, among the Nahua debt seems to have been relatively small scale prior to Spanish conquest, and even then some instances of debt indenture and the selling of family members is reported. Third, among the Tolai, interest-bearing debt also seems fairly small scale, limits were placed on the length and total size of repayment, and there was a broad social pressure on creditors to forgive overdue debts.

The more extended lending is, the more individual problems of indebtedness are likely to translate into a bigger social problem; where lending is more limited, wider social problem did not inevitably result. In the case of the Nahua, for example, evidence suggests that lending at interest was not widespread, and though a few individuals do seem to have found repayment difficult, there is no indication indebtedness caused wider systemic problems. Moreover, even without rapid growth in the economy as a whole, it is plausible that the incomes of those who do borrow increase sufficiently to repay quite high rates of interest. For example, merchants in Athens, Rome, and India seem to have been able to meet even quite high rates of interest. There is, thus, a logic behind the distinction between commercial loans and other loans made in ancient Mesopotamia for example, where the debts of commercial agents were not forgiven alongside all other debts, and among the Hebrews where interest was permitted only on loans to foreigners travelling for business purposes.

Our second broad question is: how was the problem of unpayable debt confronted? In our two earliest cases, in Mesopotamia and among the Hebrews, regular jubilees forgiving accumulated debts were enacted. One-off or partial debt jubilees were also occasionally instituted in

Athens, Rome, and China; in the cases of both Athens and Rome, territorial expansion is also thought to have helped reduce tension by providing an inflow of resources as well as a place for the dispossessed to colonise. Across cases individual creditors are often exhorted to forgive debts.

Rome, China, Christianity, and Islam all attempted to ban the charging of interest, and partial bans are found among the Hebrews and in India. Though the Roman and Chinese bans are relatively short-lived, the Christian and Muslim bans were upheld in theory and often in practice for centuries, and when interest becomes tolerated it is long regulated by the use of interest rate caps. Rate caps are also found in Rome, India, and China. As for bans on compound interest, arrangements that would have prevented compounding altogether by preventing the lending of interest income are in evidence in Christian *montes de pietatis* and in Chinese pawnbrokers, though in those cases the intention does not seem to have been to prevent compounding as much as to prevent excessive interest and to raise funds. Bans on charging compound interest on individual loans, likely easier to enforce than more general bans on lending interest income, are found in Rome, India, China, and Christianity. Measures to prevent interest accumulating to greater than the principal would also generally have had the effect of preventing interest being charged on previously accrued interest, as well as limiting the total size of the resulting loan, are found in Rome, India, China, Christianity and among the Tolai.

We do not, of course, suggest all these solutions could be applied in a future non-growing economy; nor is the range of solutions we have found in these historical cases logically exhaustive. For example, Hudson and Goodhart (2018) point out that reintroduction of jubilees today would face serious practical obstacles, referring to examples in several of the historical cases we examined above to suggest that any redistributive measures are likely to be resisted by the wealthy, and outlining state-backed equity finance as a possible alternative. Others propose still wider measures to reduce and redistribute the wealth and power of the wealthy (Stratford, 2020; Hartley et al., 2020). One might also argue that if lending markets worked efficiently, real interest rates in modern economies should converge towards the rate of real economic activity, which would suggest that real interest rates in a non-growing economy should tend towards zero. Markets for lending may suppress the difference between interest and growth rates, more than was the case in some of the historical periods that we examined. But the idea that real interest rates will decline to zero in modern non- or low-growing economies remains a hypothesis rather than something that is self-evident. It is true that the rate of government bonds is currently at historic lows, but the

Table 2
Comparison of cases.

Case	Presence of unpayable debts due to interest	Debt jubilees to forgive accumulated debts	Interest ban to prevent accumulation of debts	Compounding ban to prevent excessive accumulation of debts	Rate or other limits to prevent excessive accumulation of debts
Mesopotamia	Yes	Yes	No	No	No
The Hebrews	Yes	Yes	Partial	No	No
Classical Athens	Yes	Yes	No	No	No
Classical Rome	Yes	Yes	Yes	Yes	Yes
India	Yes	No	Partial	Yes	Yes
China	Yes	Yes	Yes	Yes	Yes
Christianity	Yes	No	Yes	Yes	Yes
Islam	No	No	Yes	No	Yes
The Nahua	Some, perhaps	No	No	No	Perhaps
The Tolai	No	No	No	No	Yes

rate at which governments can borrow is not the rate that individuals pay for their loans. Very few individuals actually borrow at zero or negative real rates: rates on mortgages and business loans are often in the low single digits, and rates on credit cards, overdrafts, and micro-loans are typically in double and sometimes triple or even quadruple digits. To the extent that these rates exceed the actual costs of lending, if the income of lenders is in turn lent then compound interest will arise. Of course, the higher the rate, the harder a debt is to repay – and the faster an unpaid debt will compound. But even at a single or double digit rate, the compounding of interest can quickly accumulate into unpayable debts.

Importantly, in none of our cases was a condition of zero net saving imposed upon the population – the condition which renders positive rates of interest compatible with zero growth in recent theoretical models (Berg et al., 2015; Cahen-Fourot and Lavoie, 2016; Richters and Siemoneit, 2017). Maybe imposing such a condition simply did not occur to those trying to confront this issue in the past; even if it had occurred to them, maybe such a measure would have been difficult to design and implement. The historical fact remains that the presence of lending at interest in cases of no or low growth tends to be socially problematic, leading to accumulation of debts and rising inequalities, in turn prompting regulatory and social limitations. We look forward to further work that builds upon this range of potential solutions.

6. Conclusion

Compound interest can result in exponentially growing debts that are unpayable in the absence of economic growth. In this paper, we have examined ten historical cases and found that, when they become widespread, interest-bearing loans have tended to be accompanied by unpayable debt, dispossession and indenture of debtors, and wider social upheaval and revolt. The findings of this paper thus highlight that interest-bearing loans have in general been very problematic in past non- and slow-growing economies. We have found that this problem has in the past been avoided or alleviated by forgiving debts, banning interest, banning compound interest, and setting limits on loan sizes and on interest rates.

It is clear that the scale of lending with interest is today far more widespread, more complex, and more fundamental for the functioning of the economic system than it has ever been in the past. This may make it more difficult to control indebtedness, or require different measures than past societies were able to use. Nevertheless, current theories that suggest interest-bearing loans may become problematic in the absence of substantial growth have significant empirical support when tested against historical cases. We hope our findings will stimulate further research into how the problems caused by interest-bearing loans may best be avoided in future slow- and non-growing economies.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

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