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Permalink

<https://escholarship.org/uc/item/0jd753h6>

Journal

Cliodynamics, 10(1)

Author

Levitt, Malcolm Stanley

Publication Date

2019

DOI

10.21237/C7clio10142572

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The Neglected Role of Inequality in Explanations of the Collapse of Ancient States

Malcolm Levitt

Despite recent and past research into the collapse of ancient states and into ancient inequality, the possible role of inequality in collapse has been ignored. Inequality as a potential explanatory factor in civil war and collapse in modern states has been the subject of around 150 flawed regression analyses, from which no consensus has emerged. Data for ancient states is insufficient to enable such quantitative modelling. But case studies of the Egyptian Old Kingdom, the Western Roman Empire and the Classic Maya suggest some role for inequality, although the data is sparse and contentious. Paucity of data probably reflects lack of interest and a recent study (Kohler and Ellyson 2018) shows what can be achieved.

Introduction

In the course of my investigation of explanations for the collapse of ancient states it seemed important to consider the role of inequality (Levitt 2019, forthcoming). The view of inequality as an explanatory factor in political instability and conflict has a lineage stretching back to Aristotle (*Politics* book 5), de Tocqueville ([1835] 1961: 302) and more recent literature including Sen (2003). But the possible role of inequality in the collapse of ancient states has received no robust analysis. This neglect is curious given the current interest in both collapse and inequality. It is not considered in Tainter's encyclopedic and frequently quoted *The Collapse of Ancient Societies* (1988) nor in Yoffee and Cowgill's *The Collapse of Ancient States and Civilizations* (1988). More recent works have not corrected this curious lacuna. Walter Scheidel's major study of inequality (2017) discussed the impact of collapse on inequality (it tends to fall as wealth is destroyed) but ignored the potential role of inequality as a causal factor in collapse. Kohler's and Smith's *Ten Thousand Years of Inequality* (2018) largely eschews discussion of any relationship between inequality and collapse. Smith et al. (2018) consider the influence of political structures on inequality but not inequality as a factor in political dynamics. Middleton's comprehensive review of the collapses of ancient states (2017: 341) acknowledges the roles of fairness and inclusiveness in supporting stability but offers no supporting analysis and does not discuss "unfairness" as a factor in instability and collapse. Demandt (2014) discusses inequality as a factor in the

Corresponding author's e-mail: malcolm.levitt@zen.co.uk

Citation: Levitt, Malcolm. 2019. The Neglected Role of Inequality in Explanations of the Collapse of Ancient States. *Cliodynamics* 10: 31–53.

collapse of Rome and mentions wealth inequality and impoverishment among his list of 210 causes of the fall of Rome. Scott (2017: 207) alludes to rapacious elites who “killed the goose that laid the golden egg.”

However, the relationship has been explored in several quantitative studies of modern societies and some of the issues thrown up are relevant to ancient societies. Studies of the relationship between inequality and civil strife in modern states (Boix 2008; Buhaug et al. 2014; Collier and Hoeffler 2004; Hibbs 1973; Lichbach 1989; MacCulloch 2005; Muller 1985) reveal no consensus concerning inequality as an explanation and their models are fundamentally flawed. In the case of ancient states the available data, such as population size and age structure, are insufficient to undertake quantitative modelling (although Baker [2011] cautiously sought to infer broad population trends from contentious data on Roman settlement patterns). Even case studies have not been utilized to explore any general relationship between inequality and state collapse.

Inequality and State Collapse: Quantitative Analysis

In principle, evidence of any relationship between inequality and state collapse could be examined by testing a sample of countries to see whether a statistically significant positive relationship exists (other things being equal); that has been the approach, over recent decades, of numerous quantitative studies of political strife and civil war. No consensus has emerged about the significance of inequality. This might reflect differences in the definition and measurement of inequality in the distribution of wealth (mainly house size) and income; differences in measures of the incidence of civil war and conflict (such as differences in the number of dead); the variability of the quality of data; different treatments of possible heteroskedasticity; and/or differences in the treatment of other variables that influence political strife, such as state repression and the quality of rebel leadership.

Muller (1985: 58) reported multiple regression analysis that showed that “the explanatory variable of primary importance is income inequality.” He also investigated the effect of regime repressiveness (using data such as the Political Rights Index) and found the relationship can be likened to an upturned **U**: at low levels of repression the incidence of civil strife is low, as people have non-violent means for seeking change, but at high levels of repression the incidence of revolt is also low because of successful repression. This static analysis seems simplistic: revolution might eventually break out, especially if members of the military, dissatisfied members of the elite or rival dynasties join the rebels and even lead them (Turchin and Nefedov discuss intra-elite strife in *Secular Cycles*, 2009).

Hibbs (1973), using a lagged multiple regression model, found that repression reduces unrest in the short term but induces greater unrest later. Lichbach (1989)

reviewed 43 studies and found no consensus: some found a positive relationship between inequality and civil war or strife, while others found no relationship. MacCulloch (2005) established, from a review of some 260,000 responses to attitude surveys (World Values Survey, Eurobarometer) that, unsurprisingly, the poor have a greater appetite for revolt than those better off. But such attitudes, while necessary for revolt, are not by themselves sufficient to initiate it. Boix (2008) found a positive relationship between civil war and inequality but Collier and Hoeffler (2004) found none. Buhaug et. al. (2014) reviewed some 100 studies and concluded that since Lichbach's 1989 literature survey, "The link between inequality and internal conflict remains contested and unclear."

The regression analyses noted above of the relationship between the dependent variable, violent civil strife or war (**CW**), and inequality (**I**) as the possible explanatory variable are flawed. They are static and eschew time series analysis: **CW** and **I** are *measured at the same period of time*. If, in reality, the relationship is lagged, so that peak civil violence only breaks out after a lapse of time following the build-up of peak inequality, no correlation can be observed in non-lagged models. But it takes time for popular resentment to grow, for the poor to believe that the costs and risks of revolt are acceptable and for a charismatic leader with an organization to emerge. The authors of such studies need to revisit their data to see whether time series for **CW** and **I** can be established.

Consider the scatter diagram below (Figure 1) of four countries, which suggests no correlation: country **A** demonstrates high inequality but political stability, whereas in **B** high inequality and collapse are present. Country **A**, demonstrating high inequality but political stability, might reflect effective repression of potential revolt or a prelude to collapse at a later date. **B** fits the Aristotle/de Tocqueville model of collapse induced by high inequality. **C** seems anachronistic: it shows low inequality accompanied by collapse but this might indicate that wealth was destroyed by the earlier initiation of collapse, as in Scheidel's *Great Leveler* (2017). **D** is a politically stable egalitarian society in the period observed. **B** and **D** would be on a regression line showing a positive relationship between inequality and collapse but for the existence of **A** and **C**, so the scatter indicates complete randomness. The implication of the above comments is that unless time series of relevant data for the countries studied in analyses of collapse are established, quantitative models are of limited value and need to be interpreted with caution. However, incorporation of time series requires data: a serious problem in the case of most ancient states but not for more modern collapses.

A fundamental flaw in much of the quantitative literature is the absence of a comprehensive theoretical framework to explain the dynamic relationship between inequality and collapse. Such a model is offered by *Structural-Demographic Theory* (Goldstone 1991; Turchin 2003). In essence, SDT proposes that population

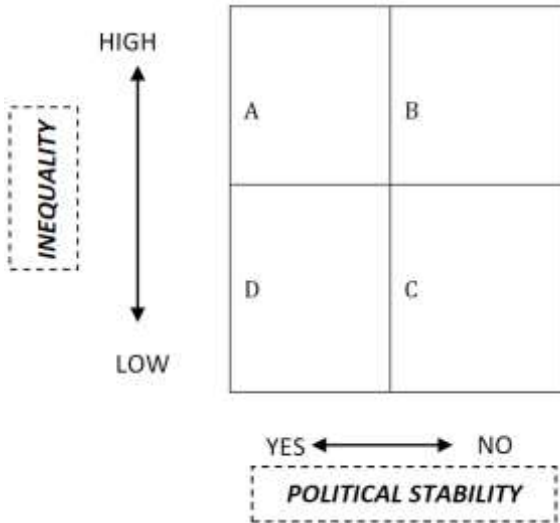


Figure 1. Dynamics of inequality and instability.

growth in excess of productivity gains induces higher prices and lower real wages, migration to towns, immiseration among commoners, food riots, increased landowner wealth, competition for elite state offices, tension between aspirant and established elites, increased military and administrative expenditures, unwillingness to impose matching tax increases, rising state debt, financial crises, the erosion and collapse of social cohesion and central authority, civil war, political collapse, and population decline. Eventually population recovers and a new cycle starts. The theory has been subject to considerable quantitative testing (including Baker 2011; Ortman et al. 2017; Turchin 2003, 2013, 2016; Turchin and Korotayev 2006; Turchin and Nefedov 2009).

Relevant time series data, especially on inequality, for ancient states are unavailable, sparse or not comprehensively marshalled but the key concepts are applicable. The key driver of collapse is the *Political Stress Factor*, which is a function of the *Mass Mobilization Potential (MMP)* of the society, the *Elite Mobilization Potential (EMP)* and of *Fiscal Stress*, which interact multiplicatively and dynamically. MMP is a function of wages relative to GDP per head (a falling ratio means growing inequality between wages and other incomes, inducing rising discontent), urbanization, and the population share of young adults (“youth have provided a prominent role in political violence throughout recorded history”: Ortman et al. 2017: 118). EMP is a function of elite income relative to GDP per head and of the degree of intra elite competition: the lower the elite relative

income, the greater the degree of intra-elite competition (a destabilizing factor in any society and perhaps especially when it faces exogenous threats such as drought or invasion). Fiscal Stress includes indebtedness and decreasing public trust in central authority. State deficits can induce financial crises (and reduced expenditure on military capacity in the face of invasion): “growing distrust in state institutions is particularly worrisome ... it can coincide with exploding public debt in unpredictable ways” (Turchin 2013: 274, cited in Ortmans et al. 2017: 137).

The above concepts refer to deep-seated structural factors but actual collapse is initiated by a trigger the nature and timing of which are unpredictable, such as the self-immolation of a fruit seller in Libya that initiated the “Arab Spring.” Sometimes the trigger is exogenous, such as a natural disaster like drought that induces famine among the poor (a possible trigger in the cases of the Egyptian Old Kingdom and some Maya collapses). But when invasion (perhaps by barbarians) is the trigger, it is in some degree endogenous: invaders take advantage of opportunities provided by ineffectual government and weakening military budgets, as with the Western Roman Empire in the fifth century CE. Indeed, invasion might be described as a function of internal weakness, which it further exacerbates in a dynamic interactive process. The possible endogeneity of triggers does not seem to feature in the SDT literature.

A driver of MMP is the relationship between average wages and GDP per head, so that the lower the average wage relative to average GDP, the greater the average non-wage income, and if over time average wages fall in relation to GDP per head, the potential for mass protest (MMP) will increase. The wage/GDP measure can be regarded a proxy indicator of inequality in that it compares the income of wage earners *as a group* with average national income (GDP per head). As such it is not a measure of *interpersonal inequality* like the Gini coefficient, which is often used as an indicator of wealth or income inequality. For wealth (or income) inequality, a Gini coefficient of 0 indicates zero inequality and 1 means one individual owns all the wealth (or receives all the income). Many examples of Ginis for ancient wealth inequality are cited in *Ten Thousand Years of Inequality* (Kohler and Smith 2018). According to a study by Checchi and Penalosa (2010) of several OECD member states, an average increase of 1 percentage point in the share of wages in GDP was associated with a 0.7 percentage-point fall in the Gini. Of course, the precise numerical relationship will vary between societies and over time, depending on the economic and social structures in place.

Seen in this light, the SDT model implicitly incorporates the notion of inequality as a driver of MMP. Wage data are absent or only sparsely available for most ancient states. Nonetheless, the implied hypothesis that inequality is a factor in collapse is powerful in principle even when comprehensive wage data are unavailable.

However, changes in the average wage/GDP per capita ratio over time incorporate two elements. When total GDP falls and there is a reduction in wages relative to GDP per capita, this indicates both a rise in inequality and a drop in living standards. A drop in the ratio when total GDP is rising indicates a rise in inequality but not necessarily a fall in average living standards. One reason for the lack of consensus in the recent regression studies about the role of inequality in civil wars is the difficulty of distinguishing the separate role of each.

Data on ancient wages and incomes more broadly are generally unavailable or are sparser than data on wealth measured by house size. But if grievance derives from inequality of living standards, meaning income, and the only archaeological evidence relates to wealth, inferences about the role of inequality in collapse require heroic assumptions about the relationship between income and wealth.

From another, but complementary, perspective, state-level societies can be regarded as composed of commoners, elites, and the state as an administrative mechanism (Turchin et al. 2017). The question arises of the degree of autonomy of the state. This can vary from being the instrument of an elite faction, to serving the elites as a whole, to serving elites and commoners alike (Turchin et al. 2017: 161). An implication of such a model is that popular alienation is likely when the state is perceived as the tool of the elite, from which it can be inferred that loyalty to the defence and preservation of the state is less likely when it faces external threats like barbarian invasion. An early analysis of collapse along these lines was proposed by Ibn Khaldun in his *Muqaddimah: An Introduction to History* ([1377] 1958). Although his focus was on Arab despotism, his explanation of collapse was in terms of cycles of dynastic and elite conspicuous consumption resourced by exploitation of alienated commoners, followed by nemesis in conditions in which the founding spirit of social cohesion, *asabiya*, had been lost (Turchin 2006).

Studies of modern grievance and political instability stress that grievance alone is insufficient to induce state collapse or civil war, a view relevant to ancient collapse. In particular, leadership, organization and resources are required if any action is to stand a chance of effectiveness as distinct from mob behavior alone. (The issue is relevant to the role of the Bacaudae in the collapse of the Roman Empire, discussed below.) This theme is debated in the literature on the theory of collective behavior by Smelser (1962) and critically appraised by Currie and Skolnick (1970).

Ancient Collapse

In the case of the collapse of ancient states, the role of inequality has been largely ignored, notwithstanding impressionistic assertions, such as those of Aristotle and de Tocqueville, that inequality causes collapse. Data on inequality are difficult to obtain but *Ten Thousand Years of Inequality* (Kohler and Smith 2018) contains

numerous estimates of Gini coefficients, largely based on wealth indicated by house sizes, so difficulty is not a robust excuse for failure to investigate the possible role of inequality in causing collapse.

However, words of caution are appropriate. First, as alluded to above, wealth inequality, commonly measured by house size variation, entails assumptions about the number of inhabitants per room and whether or not all the occupants were from the same family, and about the relationship between house size and total wealth including artifacts, arable land and livestock. Measuring wealth inequality by reference to grave goods requires assumptions about whether or not the objects in question were owned by the buried individual(s) or deposited by friends and relatives. A method of weighting different deposited items (jewelry, animal teeth etc.) is needed (e.g. the 23 grave goods used by Windler et al. 2013) but different weights give different measures of inequality. When it comes to measuring income inequality, the difficulties are multiplied; wages of workers recorded in ancient texts follow no consistent accounting system over time or between different places and may take no account of whether wages include income in kind, the need to reconcile data referring to wage per hour or day (or week), how many of either are worked in a year, and how representative they are of the class of workers in question as a whole. Such issues are exposed, somewhat scathingly, with reference to studies of more modern times in *Seven Centuries of Unreal Wages* (Hatcher and Stephenson 2018).

The Gini coefficient of inequality is almost universally used by archaeologists interested in these questions, but even measuring modern inequality is fraught with difficulties, including incomplete and contentious data (Alvaredo et al. 2016). Moreover, differences or similarities between Ginis over time or between places can obscure differences in interpersonal inequality. Wiles (1974) showed that redistribution from the poorest to better-off people can leave Gini unchanged (see also Atkinson 1970: 257).¹

Sadly these problems are rarely mentioned in the archaeological literature.

Inequality and Violence in Ancient States

The existence of massive architectural constructions, such as palaces and pyramids, indicates huge inequality between royalty and the commoners. Another marker of economic inequality besides Gini coefficients based on house sizes (as in Kohler and Smith 2018) is provided by Boix and Rosenbluth (2014), who suggest height as a proxy for historical economic inequality: for ancient Egypt, the average height of male mummies dating to c. 1500 BCE was 166.2 cm but that of

¹ When I was responsible for advising on the impact of budgets on inequality in the UK Treasury, we stopped using the Gini because it was too crude.

commoners was 157.0 cm. For Middle Bronze Age Mycenae, they found the average height of royal males to be 172.5 cm, but commoners were over 6 cm shorter. Analysis by Schepartz et al. (2011) of teeth from the Mycenaean state of Pylos revealed differences in diet and health between males and females. In principle a comparable analysis could be undertaken to examine differential health by status and wealth. Evidence of great inequality in the Roman Empire is provided by Scheidel (2017). Hutson (2016: 156) estimates several Gini coefficients for the Maya.

Ancient inequality is indisputable, although the evidence is fragmentary, only sometimes quantifiable and only rarely as time series. But what are the implications for understanding of state collapse? Four case studies of collapse illustrate the difficulty of establishing an answer.

Egyptian Old Kingdom

The centralized Egyptian Old Kingdom, which encompassed both Upper and Lower Egypt, collapsed following the death of Pepy II of the Sixth Dynasty in 2184 BCE. Its rulers were hugely rich and were believed to be divine, with powers over the seasons and the Nile flooding (Malek 2000). Their immense wealth was displayed through their command over the resources needed to construct massive monuments, including the pyramids. Although the Old Kingdom was a highly centralized state, authority was delegated to regional administrators, nomarchs, with responsibility for the administration of law and order, tax collection, the management of water resources and food storage. Over time their ambitions grew and they arrogated powers to themselves at the expense of the center, including the retention of taxes intended for central government, emulation of royal habits including hereditary rule, and monumental construction. In short, intra-elite competition was a fatal feature of the Old Kingdom. Responsibility for irrigation, flood controls and grain storage were neglected as they focused on self-enrichment (Kemp 1983; Wilkinson 2010); they displayed inaction in the face of crop failure, the tax system collapsed, the center was fatally weakened, and thus “the ensuing crisis was inevitable” (Malek 2000: 106–07).

The state failed through a combination of political and administrative incompetence in the face of drought. The economic and cultural scale of the collapse is contentious but the fact of political collapse is undisputed (Bell 1971; Butzer 1980; Seidlmayer 2000; Wilkinson 2010). The Middle Kingdom text *The Dialogue of Ipuwer and the Lord of All*, ostensibly an account by an eyewitness to the chaos that followed the collapse of the Old Kingdom state, describes violent attacks on the nobility (Parkinson 1997): “noblemen are in distress, while the poor man is full of joy. Every town says ‘let us suppress the powerful among us’” ... “the children of princes are dashed against walls” (translation by Faulkner 1965: 53,

55). Van de Mieroop (2011) is skeptical about its authenticity and date. But it is plausible that food riots and attacks on grain stores maintained by royal palaces and elites broke out in times of drought-induced famine. However, such acts of violence do not necessarily imply a political aim of state destruction, although they might have been a contributory factor.

The Old Kingdom displayed deep-seated structural, social and political risk factors: huge economic inequality, mass immiseration, competition between central and regional elites, dysfunctional administration, and fiscal mismanagement: all of which feature in SDT models of political instability (although we cannot quantify any demographic factors in the ensuing collapse).

The trigger for collapse appears to have been drought followed by famine and disorder. Bell (1971) stressed the immensity of the drought and its dire consequences for the population. Seidlmayer (2000) and Moeller (2005) were skeptical about the severity and consequence of drier conditions. However, subsequently, confirmatory evidence was established, from pollen analysis, of a drop in vital Nile flooding (Bernhard et al. 2012). It seems that the response of the authorities was inadequate, and the collapse demonstrates several features associated with political instability in SDT models.

Mycenaean Palace States

Sometime around 1200 BCE, “the Mycenaean palatial period came to a dramatic end. The palaces were destroyed and the palace system collapsed, never to be rebuilt” (Deger-Jalkotzy 2008: 387). Mycenaean palace-based polities were autonomous, each ruled by a *wanax* (king); like the Maya, they did not form a united state and the palatial complexes were centers of ritual and feasting as well as government. Mycenaean architectural features demonstrate great wealth inequality, shown by the coexistence of palaces, large houses and humble homes. Their geographical boundaries cannot be firmly established, although they appear to have had some degree of suzerainty over their surrounding territories, from which they extracted food and labor. Their political structures are disputed. Betancourt (2000) suggests they were totalitarian but Sherratt (2001) disagrees, arguing that their focus was on controlling trade routes rather than political dominance.

The absolute chronology of events and exact timescale of the collapse are uncertain. Chronology is usually expressed as relative and is based on ceramic styles. However, the collapse has been roughly dated (partly on the basis of correlation with Egyptian ceramic styles) to the end of the thirteenth century BCE (Vlachopoulos 2003). Though Cline (2014) has referred to 1177 BCE as “the year civilization collapsed,” the crises in the Late Bronze Age eastern Mediterranean were not simultaneous and could have spanned at least 25 years (Popham 1994).

There is evidence of physical destruction in the Mycenaean archaeological record, including ruined palaces and houses. The Linear B writing system vanished (Sherratt 2001: 214–15) but elements of Mycenaean culture continued (Deger-Jalkotzy 2008: 406; Thomatos 2006: 259). However, proposed explanations of collapse are unsupported by robust evidence. (Middleton [2010] provides a comprehensive review of the competing hypotheses). Hooker (1976) suggested class-based strife internal to Mycenaean states, claiming that the lower social strata, who spoke a Dorian Greek dialect, were prompted by drought-induced famine to revolt against the elite. Dickinson (2006) also suggested a popular uprising. Drought is a possibility but there is no evidence for a revolt, Dorian or otherwise. Nevertheless, a breakdown in civil order, class-based or not, is possible if the Mycenaean states were collapsing for other reasons. Those proposed embrace interstate warfare, dynastic disputes, invasion by marine marauders (“Boat People”), a steep fall in foreign trade (Cline 2007), and natural disasters (Cline 2003; Drake 2012; Drews 1993; Nur and Cline 2000). Interstate warfare and dynastic and intra-elite conflict are the principal themes of Homer’s writings, for which confirmatory archaeological evidence is lacking. Linear B texts refer to weaponry but not actual warfare.

Social stress leading to collapse has been proposed by Maran (2009) and Deger-Jalkotzy (1996). Maran (2009: 255) asserts that (in the case of Tiryns, at least) the resource demands of the palaces for labor and tribute from the surrounding countryside placed rural communities which “under more and more strain” and reduced agricultural output, causing poverty. He suggests that once provisions and tribute for the palaces dried up, the political order collapsed and this led to the spread of armed conflict: a hypothesis consistent with SDT’s focus on mass mobilization potential. Maran’s explanatory model combines MMP and fiscal stress. Likewise, Deger-Jalkotzy (1996: 717–18) argues that elite resource extraction meant that the general population was “stressed and impoverished by the overload of taxes and labour obligations.” This is disputed by Dickinson (2006).

The Mycenaean collapse is an enigma: textual evidence is largely absent and archaeological data are sparse and subject to conflicting interpretations. Intra-elite conflict and warfare between the elites of different polities both feature prominently in the Homeric texts, which may be based on centuries-old oral histories and thus are often considered to shed light on the Late Bronze Age Aegean. Mass immiseration and fiscal stress may have arisen through excessive resource extraction by elites, which killed the goose that laid the golden egg, resulting in collapse.

Western Roman Empire

The end date for the Western Roman Empire (WRE) is ambiguous: 410 CE, when the Visigoth leader Alaric sacked Rome, is often proposed (Middleton 2017: 194), although Tainter notes (1988: 148) that the “official date” is 476, when the last emperor, Romulus Augustus, stepped down. Collapse was a drawn-out process and embraced barbarian invasion, system collapse, political and administrative incompetence, inter-elite strife, corruption and natural disasters. Scholars usually ignore dynamic system positive feedback: economic and hence fiscal weakness, due to administrative and political mismanagement, caused depletion of military budgets and military weakness; this induced barbarian invasions, which led to loss of territory and therefore a smaller tax base, further reductions in military finances, further military frailty and yet more invasions until the WRE was dismembered. But extreme inequality, popular alienation from the elite and from the state had a role.

Inequality and violence is well documented in the Roman Republic and Empire. Heather (2005: 138) claims that over eighty percent of the land was owned by fewer than five per cent of the population (see also Scheidel 2017; Turchin 2006: 304–05) long before the collapse of the Western Roman Empire, although the evidence is often contentious. Diocletian’s administrative and fiscal reforms, including higher, regressive taxation, exacerbated grievances among the poor. Constantine decreed that they be tied to their estate, effecting virtual slavery. Peasants were reduced to starvation levels, selling their land or even their children into slavery to survive; they were imprisoned if they could not pay their taxes. According to Salvian (in Maas 2000: 307–08), a fifth-century presbyter in Marseilles, “the poor are despoiled, the widows groan, the orphans are tread underfoot ... far and wide, they migrate either to the Goths or to the *Bagaudae*.” *Bacaudae*, or *Bagaudae*, is the term used to describe participants in peasant revolts, although some of the better off also joined in.

Grey (2006) is skeptical about Salvian’s claims and argues that his motive was to criticize the unchristian profligacy and corruption of the rich. However, Mazzarino (1966: 65) attributed similar accounts of peasants joining the barbarians to the fifth-century commentator Zosimus. Turchin (2006: 160–61) writes of the growth and immensity of inequality prior to the western Roman collapse, contrasting it to “the high degree of internal cohesion”—that is, *asabiya*—that was the foundation for earlier Imperial growth. Its loss was the basis for collapse.

Thompson (1952) provided a detailed account of the history of the *Bacaudae*. They seem to have originated in the second or third century CE and came to be led and organized by a former Roman soldier, Maternus. The term was applied to similar uprisings over the succeeding centuries, when members of the alienated

poor joined the Bacaudae, roving groups of rebellious peasants or the invading barbarians. These revolts “reached such a climax in the first half of the fifth century as to be almost continuous” (Thompson 1952: 20). Their significance is that unlike in the other cases of immiseration and disorganized discontent outlined in this article, the Bacaudae represented an organized, armed force, and moreover one that weakened the state when it was under external threat.

However, Thompson’s thesis is contentious. Couper (2016) doubts that class consciousness existed among the peasantry and thinks it likely that their grievances were prompted by economic downturn rather than class enmity. Van Dam (1985: 25–56) argues that they sought reform, not state collapse. But the story of the Bacaudae reveals considerable resentment at inequality and the degree of alienation of commoners from the state, which they were unwilling to defend, or were prepared to attack through involvement in the Bacaudae or even through collaboration with “barbarian” invaders. Heather (2005: 249) argues that in the crucial Roman defeat at Hadrianople, “the lower orders had been willing to help or even join the barbarian invaders.”

Alongside great inequality, dynastic and intra-elite conflict and a tendency to fragmentation were deep-seated fault lines in Imperial political structure. The great size of the empire required a degree of power sharing with provincial leaders, who had their own agendas. In the third century, dynastic rivalry, popular revolts and intra-elite conflict produced civil wars that were exploited by invading barbarian invaders. “The process of social dissolution reached the peak during the reign of the emperor Gallienus (253–268)” (Turchin 2006: 89). Marcus Cassianus Latinius Postumus, a military commander and governor of Lower Germany, created a Gallic empire in 260, and in the east Zenobia created a breakaway state centered in Palmyra. Aurelian re-established central Roman authority but Britain and Egypt broke away (Middleton 2017: 80). Diocletian sought to establish stability and cohesion, establishing a tetrarchy (rule by four) to govern separate eastern and western empires, each with an emperor (who took the title “Augustus”) and a deputy (“Caesar”). He also subdivided the provinces into smaller units, their number doubling to about 100 over the century to 314. These developments expanded the bureaucracy and intensified intra-elite competition for the spoils of office. The most devastating instance of rivalry was the Roman defeat by the Goths at Hadrianople in 378, when the Eastern Augustus, Valens, jealous of the victories of his nephew Gratian, who was Augustus in the West, launched an attack instead of waiting for the arrival of Gratian’s army and was killed along with thousands of his soldiers (Heather 2005: 178–81). In the Western Empire especially, intra-elite conflict, mass immiseration and civil war were endemic: Emperor Honorius was ineffective; Alaric sacked Rome in 410; Vandals

invaded in 455; civil war broke out in 470; and the last emperor of Imperial Roman descent, Romulus Augustus, stepped down in 476.

The Classic Maya

The Classic Maya (c. 300–1000 CE) were not organized into a centralized unitary state but into smaller polities (as in Mycenaean civilization), the largest of which had suzerainty over their hinterlands, including over smaller cities. Their numbers reached a peak around 800; they formed military alliances and fought one another (Demarest 2004; Hutson 2016; Webster 2002).

Great inequality is displayed by the remains of palaces and large houses together with luxury artifacts (Moholy Nagy 1994). Mass immiseration and discontent are described in the *Books of Chilam Balam*, texts set down in the seventeenth and eighteenth centuries that may reflect earlier periods of Maya history (Joyce and Weller 2007). Hutson (2016: 156) estimated Maya Ginis to demonstrate inequality; Scheidel (2017: 274) cites evidence of elite splendor (palaces, luxury artifacts) “which seems to have gone hand in hand with increasing exploitation and a growing gap between social classes.”

There was no single point in time when collapse occurred; rather a succession of city abandonments—Petexbatun in the mid-eighth century CE, Chichen Itza in the eleventh century and Taysal in the Postclassic late seventeenth century—depopulation, and the end of royal rule and elite dominance was spread over centuries (Aimers and Hodell 2011; Demarest 2004).

Maya polities were dependent on the effective management of water resources, including royal reservoirs, some of which were artificial as at Tikal (Lucero 2002). Control over the water supply formed the basis of elite power and ability to demand tribute (Lucero 2002). When the water supply ran low, cities could be abandoned and their systems of authority fragmented.

Interstate warfare was common, such as that between Calamakul and Tikal (Demarest 2014; Martin and Grube 2008). Calamakul was destroyed in 697 CE. Between 760 and 830, Petexbatun and the surrounding region plunged into incessant warfare; Dos Pilas collapsed c. 760 (Demarest 2004). Intra-elite rivalry for public office and between elite factions and the king preceded collapse at Copán (Fash et al. 2004). Dynastic rivalry over royal succession was also a factor in interstate conflict: a disaffected member of Tikal’s royalty allied himself with Calamakul, Tikal’s enemy, and based himself at Dos Pilas (Demarest 2004; Webster 2002).

The picture of classic Maya polities which emerges is one of popular discontent, interstate warfare and intra-elite competition, consistent with SDT models. These factors, akin to mass and elite mobilization, were probably sufficient to result in collapse but climatic explanations have also been proposed. Gill (2000) asserted

that catastrophic drought persistent over many years, with associated mass famine, was the cause of collapse. However, Demarest (2004) disputes Gill's reasoning and evidence while Aimers and Hodell (2011) emphasize regional variations in weather and pollen evidence. He stresses that Gill's extrapolations of climatic evidence to distant areas lacked rigor. But insofar as climatic deterioration was a factor in collapse (possibly the trigger), the resilience of dysfunctional polities with deep structural political and social fault lines would have been low in the face of climatic challenges. Collapse at different times and in different places suggests that the power of individual explanatory factors varies from place to place and over time, but overall the picture is consistent with the stress factors proposed by SDT. However, demographic time series data are not available.

Evidence of Inequality and Grievance

The ostensible evidence of oppression of the poor, their grievances and violent responses in these case studies includes texts such as *The Dialogue of Ipuwer* in Egypt and the testimonies of Salvian and Zosimus in the Western Roman Empire, all of which are contentious. Possible archaeological evidence, such as the destruction and defacement of Mycenaean and Maya structures perceived as symbols of elite power, implies resentment by the less well off. Similar evidence of defacement comes from the Minoan civilization on Crete, where it appears to have been "especially directed ... towards a class or elite" (Driessen 2002: 252). For the Moche culture of the north coast of Peru, Haas (1981) has interpreted the damage to symbols of power and wealth at the site of Pampa Grande, including adobe pyramids and elite houses, as a manifestation of popular grievance. The Maya *Books of Chilam Balam*, mentioned above, describe extreme maltreatment of the poor, who expressed their grievance through ritual and by destruction and defacement of physical symbols of elite rule; although perhaps such behavior took opportunities afforded by collapse but might not have initiated it (Joyce et al. 2001; Joyce and Weller 2007).

Evidence of the degree of inequality displayed by the case studies is fragmentary: archaeological evidence includes palaces, differences in house size, luxury artifacts, and differences in skeletal height and tooth health. Textual evidence is contentious. Little is available or marshalled as time series apart from that provided in Kohler and Ellyson (2018). Nonetheless the presence of inequality is indisputable.

While detailed analysis of any connection between inequality and civil violence is rare in studies of ancient collapse, Kohler and Ellyson (2018: 145) buck the trend by examining the relationship between peaks of violence (indicated by signs of skeletal trauma) and changes in wealth inequality (signaled by house sizes) in the Pueblo communities of Mesa Verde during the 600–1300 CE period. Peak violence

accompanied or followed peaks in inequality: the latter revealing a *lagged* relationship. This suggests that that the reason regression analyses using contemporaneous data on violence and inequality often find no correlation may be that such analyses ignore the presence of time lags; if lags are present, it is no surprise that correlation is absent. Unfortunately, Kohler and Ellyson's chapter does not examine the possible presence of socially differentiated skeletal trauma to see whether class-based violence was present.

Conclusions

According to the somewhat fragmentary evidence in the case studies, the collapsed states discussed above each displayed economic inequality, some of it considerable, and popular grievance.

The role of inequality in collapse does not necessarily imply some teleological tipping point: when a (reliable) Gini exceeds x , collapse ensues. Instead it involves the build-up over time of grievance, alienation and hostility while elites flourish, creating the conditions in which eventual collapse occurs, triggered by intra-elite conflict, famine, invasion or war. But while inequality might contribute to collapse, it is not sufficient as a major factor without leadership and organization of popular uprisings.

Written evidence of commoner revolt in the Egyptian Old Kingdom is highly contentious. The Roman peasantry and others with grievances sometimes joined groups like the Bacaudae, who did provide leadership and organization, and some written evidence suggests that discontented peasants sometimes welcomed and assisted the barbarian invaders. But the Bacaudae contribution to Rome's collapse is disputed; in any event, the contribution of inequality—leading to alienation, enemy collaboration and revolt—to the fall of Rome is underexplored. Lower-class Dorian revolt in Mycenaean polities is not proven, although the destruction and defacement of elite structures seems to have expressed commoner resentment, as with the Maya. However, possible lower-class damage to elite material culture (for the Egyptian Old Kingdom, the Maya, Minoan civilization, and the Mycenaean states) might well have occurred when it was safe to take such action, when the state was already collapsing, and might not have made a significant contribution to its collapse.

Skeletal evidence from Pueblo societies of the American Southwest does suggest a clear, but lagged, relationship between internal violence and inequality, but Kohler and Ellyson (2018) do not demonstrate whether this caused collapse or specify whether those injured or killed were predominantly upper or lower class (where skeletal height or tooth health could be used as class markers). Mycenaean skeletal evidence of trauma does not appear to have been investigated from the viewpoint of social differentiation.

The degree to which inequality was a factor in the collapse of ancient states has not been systematically investigated. This might reflect (i) the genuine scarcity of archaeological evidence; (ii) a lack of interest in looking for and marshaling evidence; or (iii) the absence of rigorous analysis of possible social differentiation in skeletal trauma, which itself may reflect lack of interest in these research questions.

Although the possibility of direct links between ancient inequality and conflict or collapse has not been tested, inequality can be demonstrated through differences in wealth (palaces, large houses, luxury artifacts) and health (height, teeth). Awareness of inequality eroded loyalty to the social and political *status quo* where mass poverty coexisted with elite wealth, especially when those elites competed for office, wealth and power. Internal strife was inevitable sooner or later, although the particular triggers for collapse varied.

Much of the historical literature on collapse and on inequality neither treats the former as a dependent variable (Scheidel 2018 treats inequality as the dependent variable) nor relates them to one another in a theoretical framework: that is the powerful contribution of Structural-Demographic Theory. However, its application requires data, little of which is available in the necessary time-series form for ancient societies. Nonetheless, the key risk factors for political instability its pinpoints, including mass mobilization, inequality (signaled by wages relative to GDP), elite mobilization and conflict, and fiscal stress, can be applied fruitfully, as I hope the brief case studies show.

In the context of the current interest in both collapse and inequality, it is difficult to understand the reasons for the overall neglect of inequality as a factor in the collapse of ancient states. By “neglect” I do not mean that inequality is a likely cause of collapse by itself. Instead, the possible role of inequality in a collapsing dynamic system, where factors such as alienation, revolt, invasion, oppression, repression, famine and natural disaster interact, simultaneously or with lags, is worthy of attention. This would require the determination of measures of inequality at different times, as was established in Kohler and Ellyson (2018), but for several states. Whether sufficient, robust evidence exists cannot be judged until an effort is made. It might well be that, as studies of income in more modern societies reveal (Hatcher and Stephenson 2018), sufficiently robust data will never be available. The effort would require greater interest in the issue than has been displayed so far and there is little sign of it at present. If a large enough set of observations were to be established, quantitative modelling would be possible, but that seems to be unlikely for several years, if ever. But current neglect of the possible role of inequality in ancient collapse probably reveals a lack of interest in the topic.

Acknowledgments

I wish to thank Professor Stephen Shennan for his encouragement and constructive criticism of my work on inequality as a factor in the collapse of ancient states. Dan Hoyer and two anonymous referees gave valuable comments on an earlier draft of this article. Jenny Reddish provided excellent editorial input.

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