CITP
CENTRE FOR INCLUSIVE TRADE POLICY

The dawn of inequality

Mattia C. Bertazzini, Gina Eckhoff, Leander Heldring

Jan 2026

Centre for Inclusive Trade Policy
Working Paper No.029

UKRI Economic and Social Research Council

Centre for Inclusive Trade Policy
https://citp.ac.uk/
info@citp.ac.uk

Established in 2022, the Centre for Inclusive Trade Policy (CITP) is the first research centre dedicated to trade policy to be funded by the Economic and Social Research Council. As a centre of excellence for innovative research on trade policy and its inclusiveness, we aim to equip the UK with the capability to formulate and implement a trade policy tailored to the needs of the whole of the UK, while recognising the importance of the multilateral trading system and the UK's role within it. The CITP is funded by the Economic and Social Research Council [grant number ES/W002434/1]

Abstract

Why did enduring socio-economic inequality emerge between the 4th and 3rd millennium BCE, after millennia of substantial egalitarianism? We test the hypothesis of inequality being a by-product of state formation in an archeological panel covering Southern Iraq between 3900 and 1900 BCE. We implement a difference-in-differences design that compares areas that became part of a state in the first half of the 3rd millennium, during the first phase of substantial state expansion, with the rest of the area. State formation led to a persistent increase in socio-economic inequality over the following millennium in the form of labor specialization, income inequality and slavery. Early states protected trade and property rights, which led to the early increase in income inequality which then crystallized into persistent socioeconomic differences as captured by slavery.

Suggested citation

Bertazzini, M; Eckhoff, G; Heldring, L (2026) The dawn of inequality, Centre for Inclusive Trade Policy, Working Paper 029

Non-Technical Summary

Inequality is on the rise across the world, but what are its origins? Social scientists have asked this question for a long time. Rousseau for instance, viewed men as having lived in complete equality and harmony until one invented private property. Relatedly, the Marxist school saw institutions as the vehicle for the growth of inequality and posits that institutions themselves were designed by elites seeking to reinforce their privileged economic status. To the other end of the spectrum, more mainstream economic theory links economic growth and gains from trade to increases in income and wealth inequality. Kuznets (1955), for instance, famously associated the initial rise in inequality to lifting out of poverty and subsistence. While both extractive and growth-related mechanisms were at play simultaneously throughout history, little empirical evidence exists on what led to the initial increase in inequality

Much of the recent literature, in fact, looks at patterns over the 20th century or the early modern period. However, owing to the persistent nature of inequality, one should look back in time to answer this question, ideally at the "dawn of inequality". Scholars have recently identified sudden increases in the overall levels of inequality between the 4th and 3rd millennium BCE by leveraging information from sparse archaeological data (see Bowles and Fochesato (2024) for a discussion). Research on the factors driving this change, however, has been limited by the empirical challenges linked to working with sparse archaeological data.

In this paper, we shed new light on this question by focusing on ancient Iraq, and particularly on its Southern part. This alluvial plain, defined by the presence of the two large rivers Tigris and Euphrates, saw the emergence of the Sumerian civilisation. This was allegedly the first area to develop all cultural and economic traits associated with a complex society, featuring cities, writing, trade, and some of the first documented states. The archaeological record suggests that inequality was very limited in the area before this transition took place. Grave goods in cemeteries, for instance, reflected an essentially egalitarian society and culture. This changed decisively by the end of the 4th and especially throughout the 3rd millennium, when conspicuous consumption in graves became widespread. The most famous example of this was the so called "Royal cemetery" of the city of Ur, where elite members of society were buried in lavish tombs that featured human sacrifices and golden artefacts.

To explore the drivers of early growth in inequality, we created a novel archaeological dataset covering Southern Iraq between the 4th and 3rd millennium BCE, which importantly contains information on the presence of socio-economic inequality, trade activity, and state institutions. We collected this information from an array of sources, which can be broadly split between archaeological architectural records and text-analysis of the large cuneiform body of texts that record detailed information on economic and social activities in the area.

Consistent with inequality being a by-product of institutions, we find that early economic inequality followed states across space and time. Rather than being associated with extractive institutions, this initial rise was linked to economic growth and specialisation. Initially, in fact, locations where new states formed display a marked jump in both, as measured by labour specialisation and a stronger presence of a professional merchant class. As the various professions were associated with a wide range of incomes, this is also indicative of growing income inequality. Most strikingly, we find that early states developed a stronger presence of slavery within 300 years of their first appearance.

These findings show that early economic inequality grew due to a combination of some people gaining more from growth and specialisation than others, and those in power progressively facilitating the appropriation of resources by the elite. State institutions played a role in fostering initial growth and specialisation, in a "natural" fashion, similar to Kuznets' view. Trade, both

across long and short distances, was certainly important in starting and supporting the process which led to income differentiation. With time, however, states also developed institutionalised forms of socio-economic inequality, most notably slavery. This second finding suggests that institutions played a role in fostering inequality directly, either through direct surplus extraction or by providing an institutional setting conducive to the extraction by an elite. The combination of these two processes appears as the driving force behind the high levels of inequality that Southern Iraq communities had reached by the end of the 3rd millennium BCE.

In sum, inequality has not always existed. In fact, for most of human history, inequality was severely constrained. Studying ancient Southern Iraq reveals a process of institutional and economic development between the 4th and 3rd millennium BCE that, due to growing trade and specialisation, led to initially higher income inequality. This initial phase was followed by a longer one where early income inequality crystallised into enduring forms of socio-economic differences, most notably slavery. While from the distant past, these novel findings on the emergence of inequality reveal a tension between equality and efficiency at the "dawn of inequality", thus indirectly emphasising the importance of policy to manage the "natural" growth in inequality that trade and specialisation may trigger.

THE DAWN OF INEQUALITY

Mattia C. Bertazzini* **Gina Eckhoff†** **Leander Heldring‡**

January 2026

Abstract

Why did enduring socio-economic inequality emerge between the 4th and 3rd millennium BCE, after millennia of substantial egalitarianism? We test the hypothesis of inequality being a by-product of state formation in an archeological panel covering Southern Iraq between 3900 and 1900 BCE. We implement a difference-in-differences design that compares areas that became part of a state in the first half of the 3rd millennium, during the first phase of substantial state expansion, with the rest of the area. State formation led to a persistent increase in socio-economic inequality over the following millennium in the form of labor specialization, income inequality and slavery. Early states protected trade and property rights, which led to the early increase in income inequality which then crystallized into persistent socio-economic differences as captured by slavery.

JEL: D63, D72, D73, N45, N75

Keywords: Inequality, State Formation, Ancient Iraq

*School of Economics, University of Nottingham, Sir Clive Granger Building, Nottingham United Kingdom. E-mail: mattia.bertazzini@nottingham.ac.uk. Website: https://sites.google.com/view/mattia-bertazzini

†Faculty of Economics and Management, Norwegian University of Science and Technology, Adolf Øien Building, Trondheim, Norway. E-mail: gina.a.eckhoff@ntnu.no. Website: sites.google.com/view/ginaeckhoff

‡Kellogg School of Management, Northwestern University, 2211 Campus Drive, Evanston, IL 60208, USA. E-mail: leander.heldring@kellogg.northwestern.edu. Website: www.leanderheldring.com.

This work was generously supported by the Centre for Inclusive Trade Policy Innovation Fund, ESRC [grant number ES/W002434/1]. We are grateful for comments and feedback to participants of ASSA Conference 2025, CITP seminar, Nottingham Applied Micro Seminars, and WEHC Conference (2025). John Melling, John Shannon, Taejun Kim, Alexander Boote, Archa Joe, Liam Muprhy, Kerry Sloan and Andres Martignano provided exceptional research assistantship. All errors are ours.

1 Introduction

During most of pre-history, human societies were egalitarian. While archeological evidence of temporary concentration of significant wealth in the hands of individual chiefs exists, such inequality was temporary (Flannery and Marcus, 2012; Graeber and Wengrow, 2021). Enduring socio-economic inequality spanning multiple generations only emerged later, between the 4th and 3rd millennium BCE (Bowles and Fochesato, 2024), alongside the emergence of state institutions. Explanations of this pattern of inequality and its drivers remain tentative in the literature and the empirical evidence scant.

In this paper, we test the hypothesis that the emergence of enduring inequality was the by-product of the initial process of state formation. We study this question in an archeological panel covering Southern Iraq (known as Mesopotamia in ancient times), specifically the Southern alluvium between Baghdad and the Persian gulf (see Figure 1), between the 5th and the 2nd millennium BCE.

The sample area saw the emergence of the Sumerian civilization in the 4th millennium along with pristine state formation, one of the first such episodes in the world (Nissen, 1988). The development of political institutions was coupled with the emergence of writing in the second half of the 4th millennium BCE. As writing was done on clay tablets, abundant written records are available to us, alongside detailed archeological data from centuries of systematic excavations.

This combination of early, pristine state formation, alongside reliable archeological data makes this setting particularly suitable to study the relationship between state formation and socio-economic inequality. Given the highly persistent nature of both socio-economic inequality (Clark, 2015) and states, in fact, focusing on a region and period where we can trace and study their first emergence is of paramount importance. Thanks to the rich data, we can also expand our analysis to explore potential mechanisms, namely those state activities that might have influenced patterns of inequality.

We focus on an important episode of state formation that took place between 2900 and 2600 BCE, during the so-called Early Dynastic I-II period, when the first territorial states in the sample area formed (Nissen, 1988; Allen et al., 2023). As visible in Figure 3, this was the first time a significant part of the sample area was located within state boundaries.

To capture socio-economic inequality in our setting, we leverage the rich body of written records pro-

vided by the Cuneiform Digital Library Initiative (CDLI) and perform dictionary-based text analysis on them. We focus on two key aspects of socio-economic inequality highlighted in the literature, namely income inequality, as captured by labor specialization, and institutional inequality in the form of slavery. We search texts from approximately 100,000 geo-referenced and dated CDLI cuneiform tablets and we identify those containing words referring to a specific profession and to slaves.

First, we explore the time-series pattern of our variables of interest. Consistent with recent findings in the literature (Bowles and Fochesato, 2024), we observe income and institutional inequality growing after the turn of the 3rd millennium. Interestingly, the observed rise in inequality follows by a few centuries the Early Dynastic I-II state-building episode, and reaches its peak only in the second half of the 3rd millennium, during the Early Dynastic III period (2600-2340 BCE). This descriptive evidence lends credibility to the hypothesis that socio-economic inequality might have been a by-product of state formation. This is also consistent with anecdotal evidence of rising wealth inequality, often associated with political and religious institutions, towards the end of the 3rd millennium, most famously with the "Royal cemetery" of Ur (Pollock, 1991).

We shed further light on the role of state formation in the emergence of socio-economic inequality through a difference-in-differences design that compares those locations that gained a state between 2900 and 2600 BCE, with those that did not change their political status. Conditional on writing intensity, results show that newly formed states developed a significantly more specialized labor force and, thus, a higher wage dispersion. States were also more likely to have slaves, relative to comparison units. Areas that gained a state in the treatment period were not statistically different from the comparison group before 2900 BCE and were on similar trends, thus reassuring about selection bias and correlated shocks.

The analysis of the mechanisms points to increased protection of property rights and trade as key mechanisms linking the emergence of states and the observed socio-economic inequality in 3rd millennium Mesopotamia. Treated areas, in fact, became more likely to record property in writing, while they also saw a differential increase in mentions of a professional merchant class. States were also more frequently involved in defense, such as warfare with neighbors and building of city walls, both activities geared towards the protection of property and trade interests of citizens[1]. Therefore, we find tentative evidence of early states performing a series of tasks that allowed for capital accumulation, specialization and growth which in turn increased inequality via wage differentiation and wealth concentration in line

[1]The concept of citizenship is anachronistic, but refers to residents of a state.

with Kuznets (1955). Despite early state formation being cooperative in our setting (Allen et al., 2023), this process ultimately led to extreme forms of wealth and institutional inequality, such as slavery.

This paper contributes to two strands of the literature. First, it adds to those works across economics, anthropology and archeology that have studied the drivers of the emergence of socio-economic inequality in human history. Scholars have focused on cultural factors (Flannery and Marcus, 2012; Frangipane, 2007), demography, technology and factor prices (Dow and Reed, 2013; Bowles and Fochesato, 2024; Kuznets, 1955), and extractive institutions (Carneiro, 1970; Olson, 1993). Our work contributes to this strand by focusing on the role of state formation, and by linking states to inequality through more precise channels related to state activities. Second, it adds to those works that have studied the emergence of social complexity and hierarchy and have focused on their drivers and consequences (Allen et al., 2023; Mayshar et al., 2022; Flückiger et al., 2024). We contribute to this strand of literature by identifying socio-economic inequality as a by-product of state formation. In particular, Allen et al. (2023) show the emergence of cooperative state formation in Southern Iraq as being linked to collective action pressure and public good provision at the turn of the 3rd millennium BCE. In this paper, we add to this result by showing that cooperative state formation may lead to increased socio-economic inequality in the medium-run.

The remainder of the paper is structured as follows. Section 2 summarizes the history of state formation and inequality in our setting. Sections 3 and 4 introduce the data and the empirical strategy, respectively. Section 5 presents the main results, while section 6 discusses the mechanisms. Section 7 concludes.

2 Historical setting

Socio-economic inequality in ancient Southern Iraq emerged from the interaction between activities of production and exchange and the political process. This section summarizes the main factors characterizing this interaction in our setting.

2.1 Production and Exchange

The ancient economy of southern Iraq was traditionally based on agricultural production. Part of the fertile crescent, the alluvial plain spanning from Sippar in the North to Ur in the South, enjoyed relatively

high levels of rainfall until the end of the 4th millennium, which made it a particularly wet and fertile area for a variety of products (Pournelle, 2003). Since at least the Natufians (8,000 BCE), throughout the Halaf culture, agriculture had been performed by settled agricultural communities. Settled agriculture also constituted the bulk of the economy throughout the Ubaid and Uruk cultures, which culminated in the emergence of cities, the so-called "urban revolution" in the 4th millennium. Pastoralism and trade were also important economic activities. The following decline in rainfall (Wilkinson, 2012) was compensated by river-based irrigation from the Euphrates and Tigris rivers. The sedentary populations that were present in the area in by the 4th millennium were called Sumerians in Akkadian language, hence the expression "Sumerian civilization", and "Sumer" when referring to the southern part of Iraqi alluvium.

Barley and wheat were the main field crops by the end of the 4th millennium, which gave high yields thanks to the combination of irrigated agriculture, adoption of the plough, and the widespread use of copper tools (for instance sickles). These staples were complemented by the cultivation of vegetables in orchards, as well as widespread livestock farming of sheep and goats. Rich in agricultural resources, southern Iraq was extremely poor in natural ones, for instance lacked timber, stone, precious stones, and metals, which had to be imported from all-over the Levant and beyond (Postgate, 2017).

A flourishing long-distant trade developed in the 4th millennium, which contributed to the emergence of the "urban revolution" in our setting. Some of the first cities in the world, in fact, were the product of the active long-distance trade, where Southern Iraqi cities - chiefly Uruk - exchanged manufactured pottery in exchange for crops and locally scarce materials (Algaze, 2008). Trade continued to facilitate the development of social complexity and urbanization throughout the Bronze Age, with metal being one of the most important commodities (Flückiger et al., 2024). In Southern Iraq, the second half of the 3rd millennium saw a peak in trade both across cities in the area, as well external trade (Postgate, 2017).

2.2 The political economy of early states and emergence of inequality

States

Proto-states in Southern Iraq developed in 4th millennium, in the form of city-states. These were small entities, capable of extending actual control over a small portion of territory outside the city, typically no more than 5-10 kilometers. The most famous of them, Uruk, also had a far-reaching commercial presence across the fertile crescent. These proto-states were able to exercise some form of executive power in the form of labor coordination, extraction of tribute and redistribution (Pollock, 1999). The most visible mark

of this early state capacity growth in the area was the construction of monumental buildings, most famously the Eanna complex in Uruk.

A decisive move towards more modern territorial states controlling large(r) territories around their capital cities took place at the turn of the 3rd millennium, during the transition from the Jamdet Nasr to the Early Dynastic period. As the name suggest, dynastic kingship emerged in the area, which now became characterized by more stable governments controlling better-defined territories (Nissen, 1988). The process of state formation in the 3rd millennium is captured in our data and visible in Figure 3.

Third-millennium states became increasingly involved in public good provision in exchange for tribute, for instance artificial irrigation and defense, which they facilitated by coordinating labor and allocating tribute across local kin-based communities (Allen et al., 2023; Ur, 2014). These petty kingdoms progressively evolved into administrative empires. By the end of the 3rd millennium the Akkadian and, later, UR III empires had absorbed all independent city-states, which now became provinces of larger political entities (Nissen, 1988).

While each historical phase presented its own peculiarities, the overall stability of the Sumerian economy allows to identify a few relevant mechanisms through which states and the production process interacted, in turn affecting redistribution and socio-economic inequality.

The evolution of inequality 5000 BCE - 1500 BCE

While states are inevitably associated with hierarchy and often with socio-economic inequality, early social differentiation in ancient Mesopotamia did not necessarily lead to economic inequality. Frangipane (2007) argues that both horizontal and vertical societies existed in 7th and 6th millennium Mesopotamia, but neither was associated with persistently high levels of inequality. In particular, vertical egalitarian societies were concentrated in Southern Iraq, where the Halaf and Ubaid cultures showed evidence of vertical differentiation akin to a social hierarchy, without evidence of economic inequality among its members, a pattern that continued into the 4th millennium during the Uruk period (Frangipane, 2007; Flannery and Marcus, 2012).

Evidence of economic differentiation in the form of wealth inequality remains scarce until the end of the 4th millennium, when the first evidence of intra-community differentiation started to appear in the form of house sizes, possibly suggesting inter-household differences (Stone, 2018). Published data from

graves - the closest proxy of individual wealth - also suggest low levels of inequality during the Ubaid and Uruk periods, with Ubaid cemeteries reflecting substantial material and cultural equality, and Uruk burials being few and essentially lacking evidence of economic differentiation (Pollock, 1999; McMahon and Stone, 2013). By contrast, wealth inequality exploded by the second half of the 3rd millennium, when tangible signs of extreme affluence become more frequent. Across the Southern Mesopotamian alluvium, cemeteries and domestic graves start to show an increase both in quantity and value of grave goods (Pollock, 1999; Postgate, 1994). The so-called "Royal cemetery" of Ur, dating to the Early Dynastic III period (c. 2600-2340 BCE), represents the most lavish form of burial, featuring several "royal graves" containing a number of golden artefacts and funerary "attendants" that were sacrificed at the death of their masters (Pollock, 1991). The emergence of these examples of extreme wealth was coupled with significant variation across graves, where many featured no grave goods.

The drivers of such rise in economic inequality were multi-faceted, and the literature identifies a few common sources of socio-economic differentiation. These factors operated hand-in-hand with state development in creating the complex and unequal societies of the Southern Mesopotamian plain.

States and inequality

The emergence of territorial states in the 3rd millennium coincided with urban growth through migration away from rural settlements (Adams, 1981). This concentration of available labor in smaller area of the Southern Iraqi alluvium increased population density, which made labor more abundant and land and capital relatively scarcer near large settlements, a factor-price mechanism that is identified as important in the inequality literature (Bowles and Fochesato, 2024; Dow and Reed, 2013). Capital-rich individuals and institutions, for instance temples, were better-positioned to take advantage of this new equilibrium (Postgate, 1994).

Political institutions could increase returns to capital through the creation of specific economic institutions, such as establishing property rights on land, which made investments more secure and allowed able farmers to thrive. Plentiful evidence on land sales and lease contracts exists throughout the 3rd millennium, which suggests the presence of a thick market for land, as well as houses (Diakonoff, 1969, 1975; Postgate, 1994). Other than protecting property within the community, Sumerian states also acted to defend their own interests and the rights of their "citizens" abroad. The 3rd millennium saw the emergence of documented conflict in the region, centered around territorial control of fertile agricultural land - as in the case of the famous conflict between Umma and Lagash - and protection of medium and long-distant

trade, either via warfare or diplomacy (Hamblin, 2006). Archeological evidence suggests how trade was at the core of state activity in the Early Dynastic I period, when administrative seals suggest the existence of stable trade relationships between Southern Iraqi states (Yoffee, 1995). Increased trade volumes allowed for the emergence of a wealthy merchant class, as well as provided the necessary materials for conspicuous consumption for the elites by making luxury goods and materials available.

Protection of property rights and trade, in turn, facilitated labor specialization. A number of new professions are documented in the 3rd millennium, and particularly in the Early Dynastic III period (2600-2340 BCE). Luxury crafts became widespread, such as stone and leather workers, while industrial establishments grew, mostly in pottery and textile production (Postgate, 1994). Labor specialization was coupled with increasing income differentiation, which had the potential to further increase wealth inequality (Prentice, 2010).

The strongly hierarchical institutions that emerged between the 4th and 3rd millennium were also well-positioned to translate vertical inequality (Frangipane, 2007) (i.e. nominal social differentiation) into economic differences, by extracting rent and tax farming. Evidence of this mechanism is limited, but clear signs of the political and religious elites appropriating public revenues and imposing extortive prices for the carrying out of religious functions (for instance funerals) exists. Tribute demands increased between the end of the 4th and throughout the 3rd millennium, as ruling classes extracted an increasing share of the available surplus (Pollock, 1999). The pivotal reforms of Urukagina, an Early Dynastic III ruler from Lagash who implemented state policies to curb widespread institutional extortion (Pollock, 1999; Postgate, 1994), are indicative of elite extraction becoming an important problem in the 3rd millennium. In this scenario, wealth inequality could surge due to concentration of wealth in the hands of state officials and state capture. The emergence of social statuses of clear socio-economic dependence, namely slavery which also spread during the same period, is also indicative of political elites becoming more extractive (Richardson et al., 2023; Flannery and Marcus, 2012).

To sum up, state formation coincided with a process of urbanization and population concentration, which in itself had the potential to increase socio-economic inequality. Moreover, by making property more secure and by fostering trade, states also made capital accumulation possible. Labor specialization and wage differentiation also had the capacity to increase wealth inequality, while state capture and extraction by political elites could turn vertical social differentiation into economic disparities. At the same time, it is important to note how states also operated in ways that could curb socio-economic inequality.

First and foremost, by increasing wages through growth and specialization these could reduce inequality by increasing returns to labor. Finally, political institutions could foster redistribution through taxation and public good provision, or also directly tackle extreme inequality, such as debt slavery, through debt forgiveness edicts, which are common in Mesopotamian history (Postgate, 1994).

3 Data

The fundamental structure of our data builds on the dataset assembled and published by Allen et al. (2023). It relies on our capacity to reconstruct the location of settlement, states, and writing in ancient southern Iraq.

Settlement and cities

We collect information on the location, size and distribution of settlements from a series of archeological surveys carried out by the Chicago School of Oriental Studies and led by Robert Adams between the 1960s and 1980s.[2] These pioneering settlement surveys covered 31 archeological periods spanning between 5,000 BCE and present day. In carrying out these surveys, archeologists systematically located ancient settlement mounds and canal levees through aerial photograph and later manually surveyed the area on foot, dating each site based on pottery finds.[3] The coverage of these surveys roughly corresponds to the central southern Iraqi plain in between the current courses of the Tigris and Euphrates river, as well as the Diyala plain East of Baghdad.

Other than using this source to reconstruct the settlement network which we use to test for balance, we leverage survey information to locate cities across our sample areas. These are those settlements that are identified by name in Adams' work and correspond to large agglomerations. This approach based on systematic surveys allows us to mitigate concerns regarding large urban centers being omitted either for survivor bias, or selective excavations.

Sample area and period

We select our sample area based on the coverage of these archeological surveys, so to limit chances to omit important settlements. To operationalize our empirical strategy, as visible in Figure 1, we split the sample area into 5x5km grid-cells. For city-level outcomes, we match each grid-cells to a city based on

[2] Adams (1965); Adams and Nissen (1972); Adams (1981).
[3] See Allen et al. (2023) for a more detailed description of the data and its limitations.

the euclidean distance of each centroid to the nearest city. The sample area is thus composed of a total of 1,094 intensively surveyed cells.

We rely on the standard archeological periodization from Adams (1981). To study the research question we focus on the first period of significant formation of territorial states in the first half of the 3rd millennium, the so-called Early Dynastic I-II period[4], spanning between 2900 and 2600 BCE. To estimate leads and lags, we select 4 periods before and after this treatment period. This makes our panel range between the Early Uruk period (3900-3600 BCE) and the Isin Period (2000-1900 BCE). Overall, our estimation panel spans over 9 periods with an average length of 222 years.[5]

States and conflict

We locate presence of states and we reconstruct the size of their territories by combining information on presence of public buildings in a city with information from the secondary literature on territory size and shape. We provide a more detailed description on the methodology in Allen et al. (2023).[6] Public buildings proxy the presence of a functioning government. We have three main types of buildings in our dataset: two are of religious type, namely temples and ziggurats. We also have information on secular palaces. Both types of buildings housed a political elite capable of exercising an administrative role in the surrounding territory (Nissen, 1988). By combining city-level information on public buildings with their territories, we obtain grid-cell level variation in state presence across all periods of our archeological panel.

We complement data on states with data on warfare and conflict. First, we add information on the presence of defensive walls at the city-level.[7] Second, we collect novel data on recorded information on conflicts between cities and polities. We rely on Hamblin (2006) for the overview of recorded conflicts across archeological and written sources and we complement this information with additional information from Meyers (1997) and Bryce (2009). The resulting dataset informs about conflict fought between two or more actors (if alliances of cities fought each other).[8]

Writing and inequality:

[4]We combine the Early Dynastic I and II periods as provided by Adams' surveys to make the archeological data consistent with the textual data from CDLI, which only provides data for a combination of the two periods.

[5]For the line graphs we expand the periodization to the Old Babylonian period (1800-1600 BCE).

[6]The main data sources for buildings presence is Heinrich (1982, 1984). For states territories, we rely on Roaf (1990) and related literate. We triangulate and cross-check all information with general compendia, chiefly Meyers (1997); Bryce (2009)

[7]See Allen et al. (2023) for details.

[8]If a polity containing several cities was involved, we record the conflict as only involving capital cities.

The main source of information for reconstructing inequality and social complexity both across and within cities is written record from cuneiform tablets. We recover transliterated cuneiform texts, as well as their corresponding metadata from the Cuneiform Digital Library Initiative (CDLI).[9] This is a vast cross-country and cross-institutions project in digital humanities aiming at digitizing and making available all know texts typically written on clay tablets from across the Near East.

The project has pooled records from multiple museum collections across the world and contains more than 350,000 inscribed objects, ranging from writing tablets to seals, here more generically referred to as "tablets". Thanks to information on periodization and city of production we restrict the sample of tablets to roughly 100,000 associated with cities in our sample area and produced between the 4th millennium BCE and the 1st millennium BCE.

Each tablet entry in the CDLI repository contains the transliterated text from cuneiform symbols, in Sumerian or Akkadian, information on the period and city of production, as well as CDLI-specific content-based categorization, for instance whether a tablet is of administrative, literary, or legal type. The vast majority of tablets in our sample are administrative.

We rely on Assyriology Lexicons[10] to compile lists of words that identify particular occupations and socio-economic conditions. For our sample period, we focus on Sumerian and Akkadian, as these were the two languages for written communication in our sample area. For the main results discussed in this paper, we focus on words for "slave", "merchant" and "property", which are meaningful categories in tracing socio-economic complexity. As each English word corresponding to one of these categories could be associated to different versions of the same Akkadian/Sumerian word, as well as various synonyms, we employ all translations and their versions for both languages for each of the categories of interest, as provided by our two sources.

We also compile a list of professions following the same methodology in order to measure labor specialization. Contrary to the previous set of words, which professions to search for is nor ex-ante clear, so we rely on lists of professions attested in the secondary literature. More specifically, we search all professions reported in Justel (2018), which we then cross-reference with our main Lexicons. This source surveys professions attested by the end of our sample in the Middle-Babylonian period. As such, we are

[9] https://cdli.earth/. Accessed on May 2024.
[10] We employ Borger (2004) and Roth (2001) as our main sources.

more likely to capture the emergence of the universe of professions. Inevitably, if a job disappeared over time, we would exclude it from our lists. Importantly, while the attestation of such words may come from CDLI materials, the underlying sources are not limited to it and leverage a broader set of materials.

This exercise yields a total of 33 unique professions and roughly 230 attestations between Sumerian and Akkadian, which we then group into 13 main economic sectors for tractability. These represent the main groups of professions in which the ancient Iraqi economy was organized. These are reported in Figure 2, which shows the attestations by sector in our CDLI data for the Early Dynastic III period, towards the end of the 3rd millennium BCE. These are "animal husbandry", "farming", "fishing", "forestry", "general laborers", "general craftsmanship", "pottery making", "service workers", "construction", "metal making", "breweing", "textiles", and "soldiering". Overall, by triangulating across lists and lexicons, we are confident to be able capture close to the universe of professions and their attestations in our sample area and over our sample period.

Variables construction from text-analysis:

We use the information gathered in our dictionary-method text analysis to construct indicators of socio-economic inequality at the nearest-city level. For each grid-cell and period, we code binary indicators for mentions of slaves, merchants and property. With respect to specialization, we compute the share of sectors represented in the nearest city, where 1 implies that all 13 sectors are mentioned while 0 indicates that none are mentioned. To account for the fact that a given city did not extend its control indefinitely over the surrounding territory, we set all our baseline indicators to 0 beyond 25km from a city.

4 Empirical strategy

To study the effect of early state formation on socio-economic inequality we rely on a simple difference-in-differences estimation that compares grid-cells of the sample area that became part of a state with those whose political status remained unchanged. We start by running a pre-post comparison as in Equation (1) in our archeological panel of 9 periods, spanning from 3900 BCE (beginning of the Early Uruk period) to 1900 BCE (end of the Isin period).

$$y_{ct} = \beta_1(State * Post) + \gamma_c + \rho_t + \varepsilon_{cn} \tag{1}$$

Here, y_{ct} is an outcome observed in grid-cell c and time t. Our two main outcomes are professions

share, namely the share of all 13 existing sectors in the city nearest to a grid-cell, and a binary indicator for whether one or more slaves were recorded in the city nearest to a grid-cell. As we want to avoid city-outcomes to be associated to very distant cells, we set all outcomes to 0 for grid-cells located more than 25km away from their nearest city.

As discussed in Section 2, there was a major episode of state formation and expansion in the first half of the third millennium, when small proto-states from the 4th millennium gave way to larger territorial polities (Nissen, 1988). This increase in state presence is visible in Figure 3, and corresponds to the increase from 5 to roughly 40% of the sample area being under a state. In our baseline estimation, therefore, we exploit this first historical episode of state formation as our treatment. The treatment dummy $State$ equals 1 if a grid-cell was not under a state in the pre-treatment period and became part of a state in the treatment period. The dummy $Post$ equals 1 for all periods following (and including) the treatment period, namely the Early Dynastic I-II period (2900-2600 BCE). We expect the coefficient of interest β_1 to be positive and significant if state formation increased socio-economic inequality. The coefficient captures the average treatment effect across all periods following the main state formation period. By contrast, this should be negative or indistinguishable from 0 if states operated so to reduce pre-existing inequality, had no effect, or followed it.

γ_c and ρ_t represent two vectors of grid-cell and archeological period fixed effects, respectively. We double-cluster the standard errors (ε_{cn}) at the grid-cell and nearest city-period level so to account for spatial correction in the outcome, which is important as our main outcomes are at the city-level. We restrict the baseline sample to those grid-cells that were systematically surveyed by the Chicago team.

For identification, we require that the inequality outcomes would have evolved similarly between treated and comparison cells in the absence of state formation. We mitigate concerns regarding potential violations of this otherwise untestable assumption by studying pre-trends in an event graph (Figure 5), which we estimate through an equation similar to 1, but that interacts our treatments with -4 to +4 lags and leads. A second potential violation of identifying assumptions is the existence of correlated shocks. This is particularly problematic in our case, as we exploit a non-staggered adoption centered on the first large-scale episode of state formation. Any correlated shocks that may have driven both state formation alongside an increase in inequality would result in selection bias. In Table 2, we address this concern by testing for balance of observables before treatment.

5 Results

5.1 Time-series evidence

We start our investigation of the link between state formation and the emergence of inequality in Figure 3. We plot the share of grid cells in our study area that showed evidence of state presence and inequality indicators. As our most important proxies rely on written evidence from cuneiform tablets, in Figure 3a, we visualize the emergence of states alongside population growth and writing. This exercise shows how Southern Iraq experienced a marked population increase in the 4th millennium BCE, well before sizeable state formation in the 3rd millennium. The diffusion of writing, instead, sped up alongside state formation, so that by the end of the 3rd millennium roughly 40% of the sample area had recorded writing. Cuneiform tablets, however, were already present in the sample area by the beginning of the 3rd millennium, with cities such as Uruk, Ur and Jamdet Nasr (among others) having large numbers of them.

By contrast, inequality only increased after the expansion of states in Southern Iraq as visible in Figure 3b. Our two measures of socio-economic inequality emerge with a lag viz-a-viz state formation, and only towards the end of the 3rd millennium BCE. Average specialization, our measure of income inequality, is the average within an archeological period of the share of sectors mentioned across grid-cells[11]. As we identify 13 main sectors, a score of 1 would indicate that all grid cell mention all sectors. This indicator shows that income inequality increased only in so-called Early Dynastic III (2600-2340) period, when dynastic kingship consolidated across the sample area.

While specialization and income disparities on their own may not result in wealth inequality, we also find evidence of growing socio-economic inequality when looking at mentions of slaves, whose share grew roughly 25% of the sample area by the end of the 3rd millennium. This fact suggests economic income inequality crystallizing into strong institutional differences between free men and slaves in the medium-long term, despite the cooperative nature of initial state formation at the turn of the 3rd millennium in our sample area (Allen et al., 2023).

Figure 4 investigates potential drivers of growing inequality in the 3rd millennium. Dow and Reed (2013) highlight the role of property rights as a means for insiders to exclude outsiders within sites. Flückiger et al. (2024) and, specifically for our sample area, Algaze (2008) link the emergence of hierarchical societies to long-distance trade. Figure 4a shows how both indicators for trade (mentions of merchants)

[11] Where the value corresponds to the one in the closest city within a 25km cutoff.

and development of property rights (mentions of property) emerge with a timing similar to our inequality measures, thus suggesting these as potential mechanisms through which states led to the emerge of inequality. Exchanges of good and services, both across and within sites, is key for specialization in the labor market. Similarly, the existence of property rights is crucial to both existence of slavery as an economic institution, and as a way for free people to enter into a slave-master relations. Ample evidence, in fact, exists of debt slavery being a very frequent occurrence in ancient Iraq (Postgate, 2017; Garfinkle, 2004).

The provision of defense as a public good underpins both explanations, as this was crucial to guarantee the safety of merchants, as well as the protection of property. Figure 4b shows that our measures of defense also peak following the emergence of states in the 3rd millennium, albeit with less of a lag compared to inequality and economic ones. Interestingly, as our war-related measures are not based on textual evidence, but rather on the secondary literature (conflict) and archeological evidence (defensive walls), this result reassures about potential sampling bias in our text analysis.

Overall, we find suggestive descriptive evidence of socio-economic inequality being a consequence of state formation at the "dawn" of history. We find further evidence of states operating as providers of protection for an increasingly complex society that implemented long-distance trade and for property rights. The emergence socio-economic inequality, as measured by the spread of slavery and by increasing income inequality due to labor specialization possibly emerged as a by-product of this growing complexity.

5.2 Difference-in-Differences results

So far, we have provided some time-series evidence of the relationship between state formation and inequality and visually shown that socio-economic inequality followed state formation in our sample area. In this part of the analysis, we exploit our panel of rich textual and archeological data to explore whether a causal link exists between the two variables of interest. In Table 3, we report our main difference-in-differences results from equation 1. This is estimated in our main archeological panel comprising of 9 periods spanning between the Early Uruk and the Isin periods, and 1094 cells covered by archeological surveys. The panel is centered around the Early Dynastic I-II period, which corresponds to the major episode of state formation between 2900 and 2600 BCE, visible in Figure 3.[12]

[12]This period corresponds with the emergence of what Nissen (1988) refers to as "territorial states".

When looking at specialization in column 1, results show a differential increase of 12 p.p. (twice the sample's mean) in the share of sectors mentioned in the cities closest to areas that became part of a state. This suggests that state formation led to an increase in labor specialization, in turn indicative of income inequality. Results for mentions of slaves show a similar increase relative to the sample's mean (25 p.p.) in the probability of slaves being mentioned in the closest city, which indicates how state formation also led to enduring socio-economic inequality as captured by the presence of unfree labor and, thus, distinct social status. In both cases, the increase is large and corresponds to more than twice the sample mean. The inclusion of a control for number of tablets in the closest city in columns 3 and 4 suggests that results are not driven by an extensive margin increase in the probability or intensity of writing. Rather the observed differential increase in our indicators of inequality is associated with more reporting of specialized jobs and slaves, for similar amounts of written records.

This intensive margin increase in reporting of inequality indicators is consistent with the time-series evidence in Figure 3a, that shows how the spread of writing preceded the emergence of socio-economic inequality. Despite cooperative state institutions forming to solve collective action problems (Allen et al., 2023), they appear to turn extractive in the medium and long-run as suggested by the slavery result.

5.3 Threats to Identification

The main threat to identification for the difference-in-differences results discussed so far is a violation of the parallel trends assumption. In other words, we would not be able to interpret the coefficients from Table 3 as the causal effect of state formation on inequality if treatment and comparison groups would have evolved differently in the absence of state formation. To test for a potential violation of the parallel trends assumption, we study pre-trends in Figure 5, where we report all leads and lags separately for our two proxies of socio-economic inequality. In both cases, the results show no pre-trends before the treatment period.

Despite evidence of parallel pre-trends, one may still worry that the estimates may reflect correlated shocks rather than the causal effect of state formation on inequality. In our context, this possibility may arise if any shocks, for instance technological or demographic, affecting a certain region could simultaneously boost state formation and inequality. While we cannot fully account for this possibility due to unobservables, we can mitigate concerns in this direction by testing for balance on observables before treatment.

We do so in Table 2, where we regress the first lag of a set of variables capturing population density and technological change, in particular writing. In column 1, we consider the count of settlements present in a grid cell, while in column 2 we look at distance from the closest city. In both cases, the coefficients are small an insignificant, suggesting that demographic shocks are unlikely to be driving the results. In columns 3 and 4, we study balance in terms of writing. This is particularly important for our study, as not only endogenous technological adoption maybe a driver of state formation, but also because we rely on text analysis for several variables in our analysis. Both our binary writing indicator (column 3) and the raw number of tablets in the closest city (column 4) do not show any statistically significant difference between treatment and comparison cells before treatment. Lack of selection into treatment is consistent with the exogenous process of state building, linked to unpredictable river shifts described in Allen et al. (2023).

6 Mechanisms

In Section 5, we explored the relationship between state formation and socio-economic inequality and identified a causal link. Areas that became part of a state in the first half of the 3rd millennium BCE in Southern Iraq were on average more likely to show more income inequality and slavery presence over the next 1000 years. In this section, we shed light on the mechanisms linking state formation and inequality at the "dawn" of history. We first investigate two economic mechanisms that are often mentioned in the literature as drivers of socio-economic complexity and inequality, namely the development of long-distance trade and property rights. Second, we explore the relationship between states, conflict and inequality.

6.1 Trade and property rights

States perform strategic activities that influence patterns of inequality through economic growth and capital accumulation. Starting with the pioneering work of Kuznets (1955), that saw rising income inequality as an inevitable by-product of the early stages of transition of an economy out of agriculture, an influential literature has identified a relationship between economic growth and income inequality throughout history (Acemoglu and Robinson, 2002; Alfani, 2023).

More specifically, the literature has long posited the role of trade as a key component in the growth process in driving income inequality upward, typically through specialization (Richardson, 1995). We

start by testing whether trade was an important mechanism in our setting. While the literature agrees on the role of trade and growth in increasing income inequality in the short-term, its role in shaping wealth inequality in the long-term is ambivalent. On the one hand, it may boost wages for specialised workers, thus increasing returns to labor and human capital. On the other, it may boost returns to capital and create a wealthy merchant group and, more generally, a "capitalist" class (Piketty, 2014).

Both the archeology and economics literatures on the early history of the Near East have pointed at long-distance trade as a major contributor to the socio-economic complexity that characterized the urban revolution between the 4th and 3th millennium BCE (Algaze, 2008; Flückiger et al., 2024). Other than being a driver of state formation, can increased specialization through trade be an important mechanism linking state formation to income and socio-economic inequality?

Columns 1 and 3 of Table 4 provide a first answer to this question. They show that treated cells that experienced state formation early on in the 3rd millennium were also more likely to mention merchants over the the following centuries. In other words, our analysis suggests that the emergence of a professional merchant class systematically involved in the exchange of goods was pivotal in fostering the process of labor specialization that we have described so far.

Consistent with this hypothesis, we also test the emergence of property rights as a complementary mechanisms. If states had the capacity to foster economic growth via specialization through trade, they may have also facilitated economic growth by protecting property rights and thus creating a growth-friendly incentives structure (Acemoglu and Robinson, 2019). Similar to trade, the role played by the establishment and protection of property rights viz-a-viz inequality is ambivalent. On the one hand, exclusion by an insider class of an "outsider" one through property rights could also be a major driver of enduring inequality both across and within communities (Dow and Reed, 2013). On the other, by providing stronger incentives for capital investments it may have increased economic growth and returns to labor. In columns 2 and 4 of Table 4, we study the emergence of property rights by coding a binary indicator for the word "property" across CDLI tablets. Results clearly show that the process of state formation also developed property rights, as visible from the higher frequency of mentions of property, both at the extensive and intensive margin (conditional on writing).

Overall, results from Table 4 suggest that state formation at the "dawn" of history increased income inequality by facilitating trade and protecting property rights, which fostered growth and specialization.

The fact that early state formation led to deep institutional differences between between a free and a slave class, suggests that over the medium-term the effect of these state activities crystallized early income differences into enduring wealth inequality, rather than reducing it through sustained economic growth. The unequal distribution of property and the enormous gains from long-distance trade, in fact, seem to have magnified initial income inequality, for instance through debt slavery (Postgate, 2017).

6.2 Defense

An influential view in the social sciences, dating back to Tilly (1992), posits a central role of warfare in state building, particularly in strengthening the state by increasing fiscal capacity. In our setting, defense could be an important complementary mechanisms to explain the rise in socio-economic inequality captured by our measures. On the one hand, capacity to defend insiders from external threats was a key role played by early states, both in terms of protecting long-distance trade, property and agricultural surplus (Postgate, 2017; Nissen, 1988). In this vein, Dow and Reed (2013) hypothesize a role of violence in fostering inequality through excluding external groups from resources. On the other hand, warfare more generally may have played a more direct role in explaining the increase in slavery, as war raiding was an important source of slaves throughout Mesopotamian history (Richardson et al., 2023).

Table 5 suggests that warfare and defense were certainly an important activity of early states. As opposed to the previous results, outcomes of this table, namely dummies for conflict and city walls presence, are not based on text analysis of CDLI cuneiform tablets. The binary indicator for conflict incidence at the city level used in columns 1 and 3, in fact, is largely based on work by (Hamblin, 2006)[13], and combines historical data from cuneiform tablets, archeological evidence and other historical sources. The binary indicator for city-walls used in columns 2 and 4, instead, is purely based on archeological information from excavations.[14] The use of alternative sources allows us to triangulate information and thus validate our text analysis results.

Interestingly, newly formed states became rapidly involved in defense, with both our conflict and city walls indicators showing a positive and significant coefficient around 25 p.p., or more than double the sample's mean. Results do not change when controlling for number of tablets, which reassures about results potentially capturing the increased recording of conflict rather than more warfare and defense. Overall, these results suggest that early states were actively involved in warfare and provision of defense

[13]This is cross-checked and complemented with Bryce (2009) and Meyers (1997).
[14]See Allen et al. (2023) and its companion data appendix for a detailed description of the sources.

as a public good. Arguably, we can speculate that such state activities could foster the emergence of the observed socio-economic inequality in several ways. Most likely protection and power projection facilitated trade and thus specialization, which in turn led to income inequality, and provided protection of property which facilitated the exclusion of outsiders by insiders (Dow and Reed, 2013) and boosted capital accumulation and returns (Piketty, 2014). Moreover, increased conflict involving treated areas may have increased the number of slaves due to war captives.

7 Conclusion

We have studied the relationship between pristine state formation and the emergence of socio-economic inequality in an archeological panel covering Southern Iraq between 3900 BCE and 1900 BCE. We have provided preliminary evidence of enduring socio-economic inequality at the "dawn" of history being an unintended consequence of state formation rather than a driver of state institutions. We have implemented a difference-in-differences estimation comparing locations that became part of a state in the early 3rd millennium with areas that did not change their political status. Results show that treated areas experienced labor specialization quickly after state formation, thus leading to income inequality. New states were also more likely to develop slavery, an important indicator of enduring socio-economic inequality in ancient societies.

States facilitated trade and developed property rights, which led to increasing specialization and, naturally, to income differentiation and inequality. This "natural" emergence of inequality due the growth process and in line with Kuznets (1955)'s views, still led to enduring inequality in the long-term rather than re-balancing, with persistent socio-economic stratification between a free-class and a slave class.

The analysis carried out in this paper presents two main limitations that require further investigation. First, while we have proxied socio-economic inequality through labor specialization and slavery, we do not have good measures of intra-community wealth inequality, which limits our capacity to understand the patterns of wealth inequality in any detail. Second, while we have studied some important mechanisms to explain the rise of income inequality and slavery, we have not been able to explore in any detail the role played by fiscal policy, nor the role of elites' rent capture and extraction more generally. These aspects constitute the main avenues of future research.

References

Acemoglu, D. and J. A. Robinson (2002). The political economy of the kuznets curve. *Review of development economics 6*(2), 183–203.

Acemoglu, D. and J. A. Robinson (2019). *The narrow corridor: States, societies, and the fate of liberty: Winners of the 2024 Nobel Prize in economics*. Penguin UK.

Adams, R. M. (1965). *Land Behind Baghdad*. Chicago: University of Chicago Press.

Adams, R. M. (1981). *Heartland of cities*. Chicago: University of Chicago Press.

Adams, R. M. and H. J. Nissen (1972). *The Uruk Countryside: the Natural Setting of Urban Societies*. Chicago: University of Chicago Press.

Alfani, G. (2023). As gods among men: a history of the rich in the west.

Algaze, G. (2008). *Ancient Mesopotamia at the Dawn of Civilization: the Evolution of an Urban Landscape*. Chicago: University of Chicago Press.

Allen, R. C., M. C. Bertazzini, and L. Heldring (2023). The economic origins of government. *American Economic Review 113*(10), 2507–2545.

Borger, R. (2004). *Mesopotamisches Zeichenlexikon*. Ugarit-Verl.

Bowles, S. and M. Fochesato (2024). The origins of enduring economic inequality. *Journal of Economic Literature 62*(4), 1475–1537.

Bryce, T. (2009). *The Routledge Handbook of the Peoples and Places of Ancient Western Asia: The Near East from the Early Bronze Age to the Fall of the Persian Empire*. Abingdon: Routledge.

Carneiro, R. L. (1970). A theory of the origin of the state: Traditional theories of state origins are considered and rejected in favor of a new ecological hypothesis. *Science 169*(3947), 733–738.

Clark, G. (2015). *The son also rises: Surnames and the history of social mobility: Surnames and the history of social mobility*. Princeton University Press.

Diakonoff, I. M. (1969). The rise of the despotic state in ancient mesopotamia. *Ancient mesopotamia*, 173–203.

Diakonoff, I. M. (1975). The rural community in the ancient near east. *Journal of the Economic and Social History of the Orient/Journal de l'histoire economique et sociale de l'Orient*, 121–133.

Dow, G. K. and C. G. Reed (2013). The origins of inequality: Insiders, outsiders, elites, and commoners. *Journal of Political Economy 121*(3), 609–641.

Flannery, K. and J. Marcus (2012). *The creation of inequality: how our prehistoric ancestors set the stage for monarchy, slavery, and empire*. Harvard University Press.

Flückiger, M., M. Larch, M. Ludwig, and L. Pascali (2024). The dawn of civilization: Metal trade and the rise of hierarchy. Technical report, CEPR Discussion Papers.

Frangipane, M. (2007). Different types of egalitarian societies and the development of inequality in early mesopotamia. *World Archaeology 39*(2), 151–176.

Garfinkle, S. (2004). Shepherds, merchants, and credit: some observations on lending practices in ur iii mesopotamia. *Journal of the Economic and Social History of the Orient 47*(1), 1–30.

Graeber, D. and D. Wengrow (2021). *The dawn of everything: A new history of humanity*. Penguin UK.

Hamblin, W. J. (2006). *Warfare in the ancient Near East to 1600 BC: Holy warriors at the dawn of history*. Routledge: London.

Heinrich, E. (1982). *Die Tempel und Heiligtümer im alten Mesopotamien: Typologie, Morphologie und Geschichte*. Berlin: de Gruyter.

Heinrich, E. (1984). *Die Paläste im alten Mesopotamien*. Berlin: de Gruyter.

Justel, D. (2018). Middle babylonian terminology related to workforce. In A. Garcia-Ventura (Ed.), *What's in a Name? Terminology Related to the Work Force and Job Categories in the Ancient Near East.*, pp. 264–267. Munster: Ugarit-Verlag.

Kuznets, S. (1955). Economic growth and income inequality. *American Economic Review 45*(March), 1–28.

Mayshar, J., O. Moav, and L. Pascali (2022). The origin of the state: Land productivity or appropriability? *Journal of Political Economy 130*(4), 1091–1144.

McMahon, A. and A. Stone (2013). The edge of the city: Urban growth and burial space in 4th millennium bc mesopotamia. *Origini: Preistoria e protostoria delle civiltà antiche* (35), 83–110.

Meyers, E. (Ed.) (1997). *The Oxford Encyclopedia of Archaeology in the Near East. 5 Volumes*. Oxford: Oxford University Press.

Nissen, H. J. (1988). *The early history of the ancient Near East, 9000-2000 B.C.* Chicago: Chicago: Chicago University Press.

Olson, M. (1993). Dictatorship, democracy, and development. *American political science review 87*(3), 567–576.

Piketty, T. (2014). *Capital in the twenty-first century*. Harvard University Press.

Pollock, S. (1991). Of priestesses, princes and poor relations: the dead in the royal cemetery of ur. *Cambridge Archaeological Journal 1*(2), 171–189.

Pollock, S. (1999). *Ancient Mesopotamia: the Eden that never was*. Cambridge: Cambridge University Press.

Postgate, N. (1994). How many sumerians per hectare?—probing the anatomy of an early city. *Cambridge Archaeological Journal 4*(1), 47–65.

Postgate, N. (2017). *Early Mesopotamia: society and economy at the dawn of history*. Abingdon.

Pournelle, J. (2003). *Marshland of Cities: Deltaic Landscapes and the Evolutions of Early Mesopotamian Civilization*. Ph. D. thesis.

Prentice, R. (2010). *The exchange of goods and services in pre-Sargonic Lagash*. Münster: Ugarit-Verlag.

Richardson, J. D. (1995). Income inequality and trade: how to think, what to conclude. *Journal of economic perspectives 9*(3), 33–55.

Richardson, S., D. A. Pargas, and J. Schiel (2023). Mesopotamian slavery. In *The Palgrave Handbook of Global Slavery Throughout History*, pp. 17–39. Switzerland: Springer International Publishing AG.

Roaf, M. (1990). *Cultural atlas of Mesopotamia and the ancient Near East*. New York: Facts on File Inc.

Roth, M. T. (2001). Chicago assyrian dictionary.

Stone, E. (2018). The trajectory of social inequality in ancient mesopotamia. In T. Kohler and M. Smith (Eds.), *Ten thousand years of inequality: the archaeology of wealth differences*, pp. 230–61. Tucson: The University of Arizona Press.

Tilly, C. (1992). *Coercion, capital, and European states, A.D. 990-1992*. Cambridge, MA; Oxford: Blackwell.

Ur, J. (2014). Households and the emergence of cities in ancient Mesopotamia. *Cambridge Archaeological Journal 24*(2), 249–268.

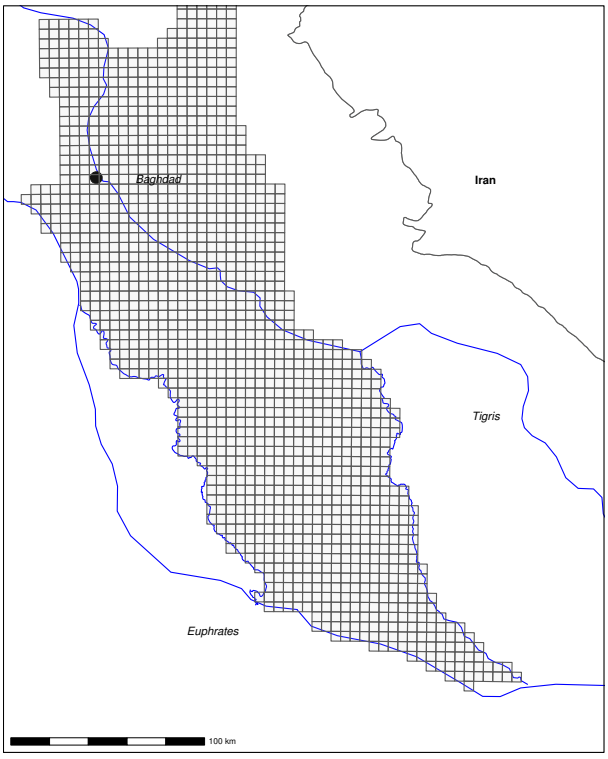
Wilkinson, T. J. (2012). Introduction to Geography, Climate, Topography, and Hydrology. In D. T. Potts (Ed.), *A companion to the archeology of the ancient Near East*, pp. 3–26. Malden, Mass.: Wiley-Blackwell.

Yoffee, N. (1995). Political economy in early mesopotamian states. *Annual Review of Anthropology 24*(1), 281–311.

8 Figures and Tables

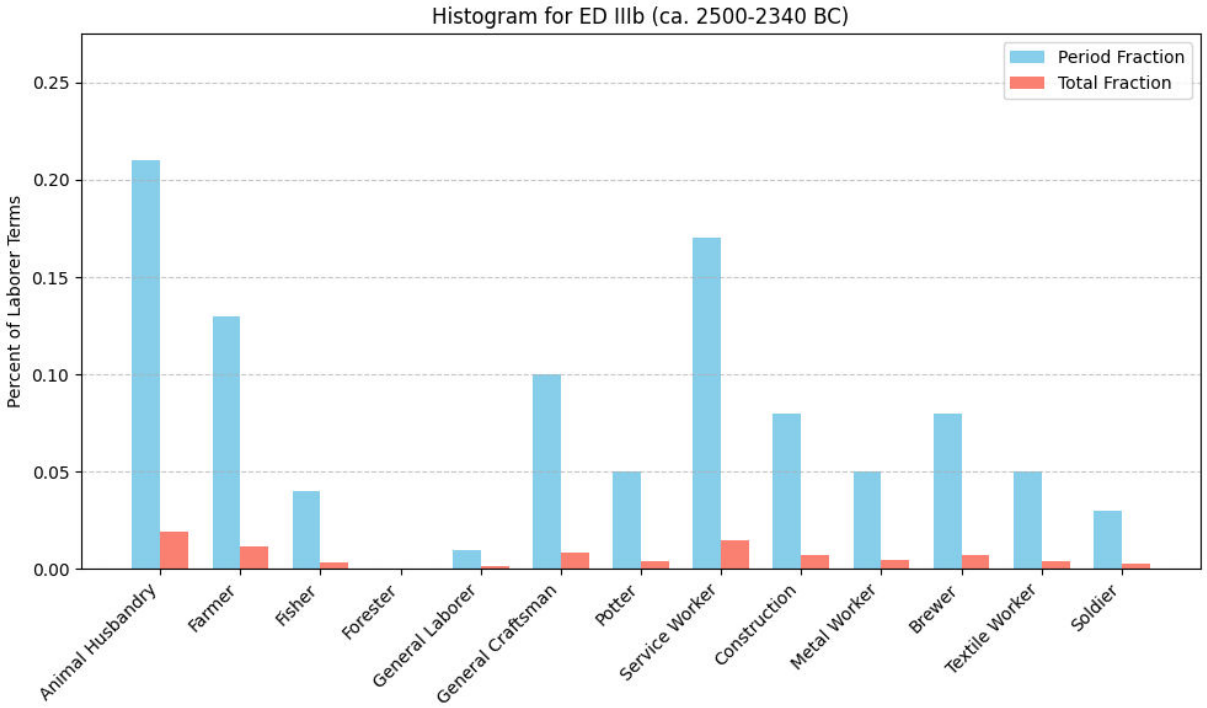
8.1 Figures

Figure 1: SAMPLE AREA: SOUTHERN IRAQ



Notes. Sample area covered in the study. It corresponds to areas included in archeological surveys. See text for details.

Figure 2: TEXT ANALYSIS AND SPECIALIZATION

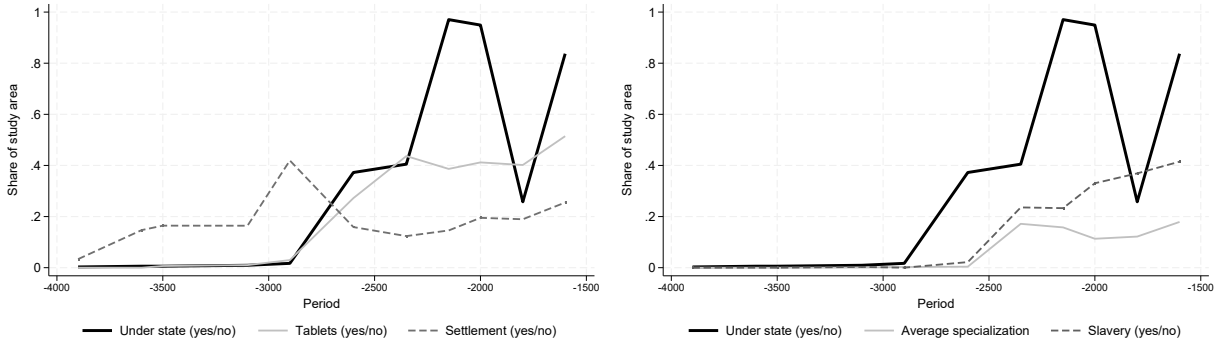


Notes. Share of mentions by economic sector in the Early Dynastic IIIb period. Data come for the Cuneiform Digital Library Initiative. See text for details.

Figure 3: STATES AND INEQUALITY

(a) States, Population and Writing

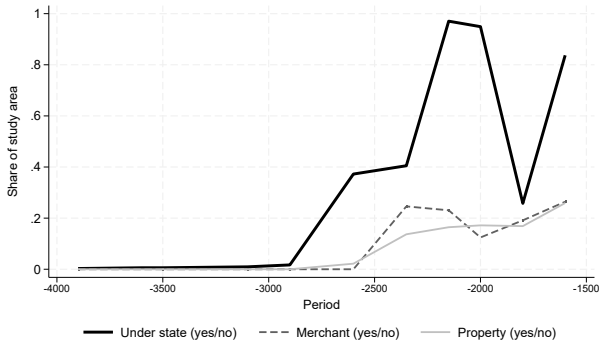
(b) States and Economic Inequality



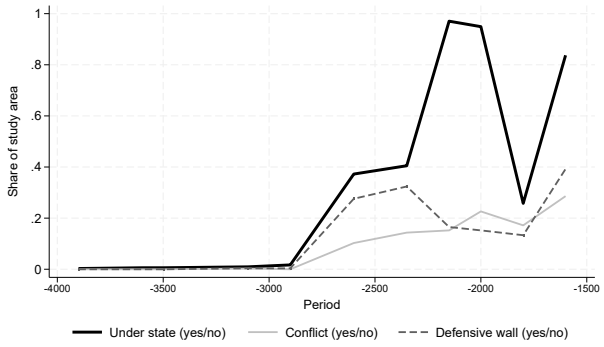
Notes. Panel a: Line graph reporting share of the sample area under a state, featuring settlement and whose nearest city had at least a tablet. Panel b: Line graph reporting share of the sample area under a state, average specialization share in nearest city, and share of grid ells whose nearest city had at least a tablet mentioning a slave. See text for details.

Figure 4: STATES, TRADE, PROPERTY AND DEFENSE

(a) States, Trade and the Property



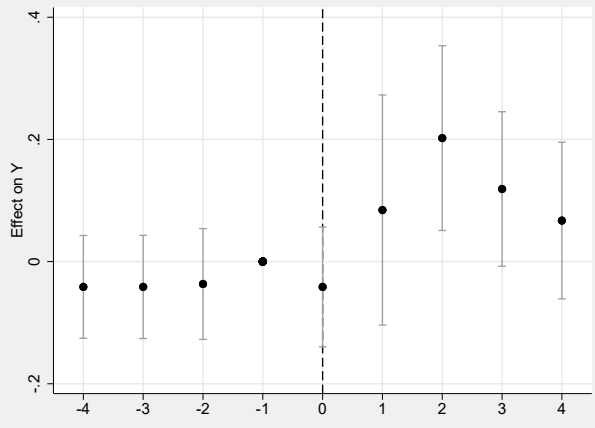
(b) States and Warfare



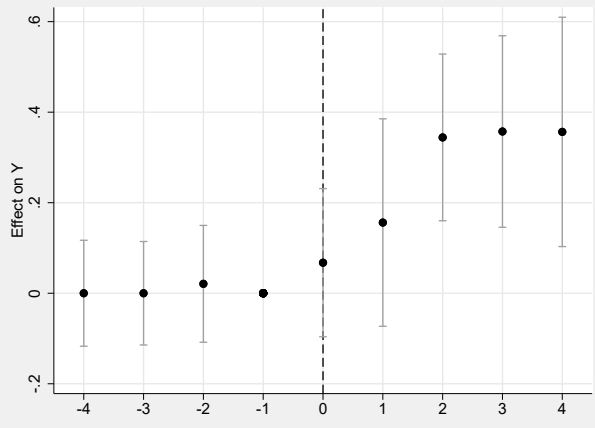
Notes. Panel a: Line graph reporting share of the sample area under a state, whose nearest city had at least a tablet mentioning merchants and property. Panel b: Line graph reporting share of the sample area under a state, whose nearest city was involved in a conflict and had a defensive wall. See text for details.

Figure 5: EVENT STUDY: SPECIALIZATION AND SLAVERY

(a) Specialization



(b) Slavery



Notes. Event graph from Equation 1, with treatment variable interacted through all leads and lags. See text and Table 3 for details on the estimation.

8.2 Tables

Table 1: Summary statistics

	count	mean	sd	min	max
State	9846	0.30	0.46	0.00	1.00
Post	9846	0.56	0.50	0.00	1.00
State x Post	9846	0.17	0.37	0.00	1.00
Share of professions	9846	0.06	0.19	0.00	0.92
Slavery (binary)	9846	0.12	0.33	0.00	1.00
Merchant (binary)	9846	0.08	0.27	0.00	1.00
Property (binary)	9846	0.06	0.24	0.00	1.00
Conflict (binary)	9846	0.08	0.28	0.00	1.00
Defensive wall (binary)	9846	0.12	0.33	0.00	1.00

Table 2: Balance before treatment

Dependent variable:	L1 Settlement count	L1 Dist. City KM	L1 Writing y/n	L1 Tablets count
	(1)	(2)	(3)	(4)
State x Post	-0.02	0.79	0.15	-382.70
	(0.10)	(1.06)	(0.11)	(446.67)
Mean of Y	0.36	27.44	0.25	217.38
Observations	7643	8000	8752	8752
Clusters 1	1094	1094	1094	1094
Clusters 2	145	148	148	148
Grid	yes	yes	yes	yes
Period	yes	yes	yes	yes

Notes. All regressions are estimated using OLS from equation 1. The cross-sectional unit of observation is a 5×5 kilometer grid cell. The time series period is an archeological period. All variables are the first lag relative to treatment (The Jamdet Nasr period (3100-2900)). Settlement count is the count of settlements present in a grid cell. Dist. City KM is the linear distance from the closest city. Writing y/n is a binary indicator equal to 1 if at least a tablet is recorded in the nearest city. Tablets count is the number of tablets in the nearest city. State is a dummy that equals 1 if a grid-cell was not under a state before the Early Dynastic I-II period (2900-2600 BCE) and became part of a state. Post is a dummy equal to 1 for all period following (and including) the treatment period. All regressions include period and grid cell fixed effects. Errors are double-clustered at the grid cell, nearest city-period level.

Table 3: Economic and Institutional Inequality

Dependent variable:	Professions Share	Slave y/n	Professions Share	Slave y/n
	(1)	(2)	(3)	(4)
State x Post	0.12***	0.25***	0.10***	0.24***
	(0.03)	(0.05)	(0.03)	(0.05)
Tablet count			0.00***	0.00**
			(0.00)	(0.00)
Mean of Y	0.06	0.12	0.06	0.12
Observations	9846	9846	9846	9846
Clusters 1	1094	1094	1094	1094
Clusters 2	158	158	158	158
Grid	yes	yes	yes	yes
Period	yes	yes	yes	yes

Notes. All regressions are estimated using OLS from equation 1. The cross-sectional unit of observation is a 5×5 kilometer grid cell. The time series period is an archeological period. Profession share is the share of 13 main economic sectors mentioned in the city nearest to a cell. Slave y/n is a binary indicator equal to 1 if at least a slave is mentioned in the city nearest a cell. State is a dummy that equals 1 if a grid-cell was not under a state before the Early Dynastic I-II period (2900-2600 BCE) and became part of a state. Post is a dummy equal to 1 for all period following (and including) the treatment period. All regressions include period and grid cell fixed effects. Errors are double-clustered at the grid cell, nearest city-period level.

Table 4: Economic channels: Trade and Property

Dependent variable:	Merchant Y/N	Property y/n	Merchant y/n	Property y/n
	(1)	(2)	(3)	(4)
State x Post	0.14***	0.14***	0.12**	0.12***
	(0.05)	(0.04)	(0.05)	(0.04)
Tablet count			0.00***	0.00***
			(0.00)	(0.00)
Mean of Y	0.08	0.06	0.08	0.06
Observations	9846	9846	9846	9846
Clusters 1	1094	1094	1094	1094
Clusters 2	158	158	158	158
Grid	yes	yes	yes	yes
Period	yes	yes	yes	yes

Notes. All regressions are estimated using OLS from equation 1. The cross-sectional unit of observation is a 5×5 kilometer grid cell. The time series period is an archeological period. Merchant y/n is a binary indicator equal to 1 if at least a merchant is mentioned in the city nearest a cell. Property y/n is a binary indicator equal to 1 if property is mentioned in the city nearest a cell. State is a dummy that equals 1 if a grid-cell was not under a state before the Early Dynastic I-II period (2900-2600 BCE) and became part of a state. Post is a dummy equal to 1 for all period following (and including) the treatment period. All regressions include period and grid cell fixed effects. Errors are double-clustered at the grid cell, nearest city-period level.

Table 5: Other Channels: Warfare

Dependent variable:	Conflict y/n	Defensive wall y/n	Conflict y/n	Defensive wall y/n
	(1)	(2)	(3)	(4)
State x Post	0.24***	0.23***	0.23***	0.23***
	(0.04)	(0.05)	(0.04)	(0.05)
Tablet count			0.00	0.00
			(0.00)	(0.00)
Mean of Y	0.08	0.12	0.08	0.12
Observations	9846	9846	9846	9846
Clusters 1	1094	1094	1094	1094
Clusters 2	158	158	158	158
Grid	yes	yes	yes	yes
Period	yes	yes	yes	yes

Notes. All regressions are estimated using OLS from equation 1. The cross-sectional unit of observation is a 5×5 kilometer grid cell. The time series period is an archeological period. Conflict y/n is a binary indicator equal to 1 if the city nearest to a cell was involved in a conflict. Defensive wall y/n is a binary indicator equal to 1 if defensive walls are present in the city nearest a cell. State is a dummy that equals 1 if a grid-cell was not under a state before the Early Dynastic I-II period (2900-2600 BCE) and became part of a state. Post is a dummy equal to 1 for all period following (and including) the treatment period. All regressions include period and grid cell fixed effects. Errors are double-clustered at the grid cell, nearest city-period level.