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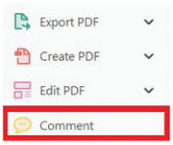

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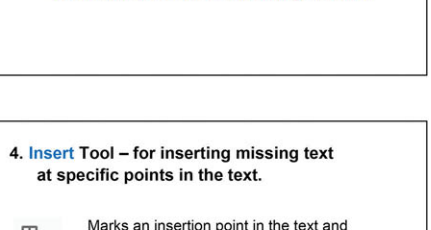

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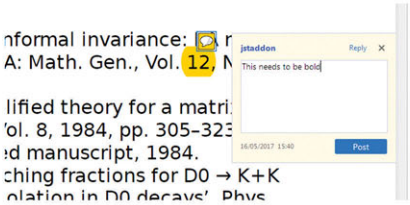

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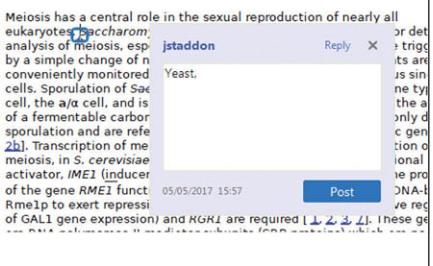

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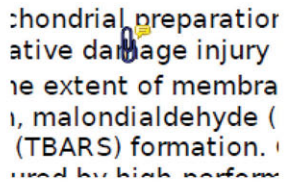

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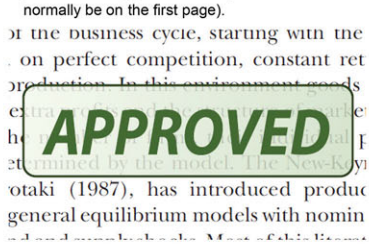

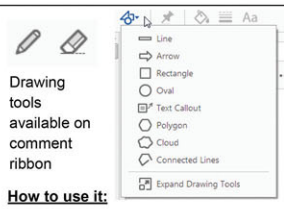

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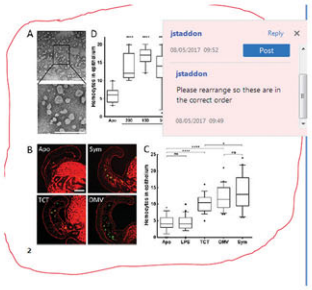

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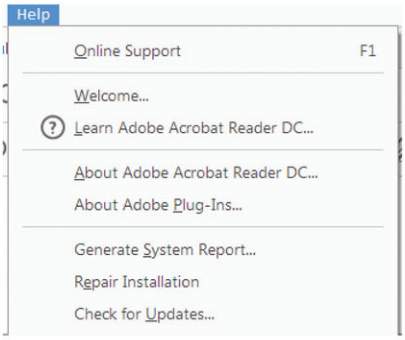

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Economic History Review, 00, 0 (2017), pp. 1–19

Towards an explanation of inequality in premodern societies: the role of colonies, urbanization, and high population density†

By BRANKO MILANOVIC*

Using a newly expanded set of 41 social tables from premodern societies, this article tries to identify the factors associated with the level of inequality and the inequality extraction ratio (how close to the maximum inequality the elites have pushed actual inequality). Strong evidence is found to show that elites in colonies were more extractive, and that more densely populated and less urbanized countries exhibited lower extraction ratios. Several possibilities are proposed, linking high population density to low inequality and to low elite extraction.

The past decade has seen substantial increase in the number of estimates of inequality for premodern societies (defined broadly as societies that had not yet experienced the industrial revolution).[1] Most of these estimates are based on social tables, some originally created by contemporaries and reused and modified more recently, and some created recently from archival evidence. In 2016, Lindert and Williamson published a book on US inequality that included the first detailed social tables for the US, created for the years 1774, 1850, 1860, and 1870.[2] In several important publications Álvarez-Nogal and Prados de la Escosura have charted the evolution of Spanish inequality over more than five centuries.[3] Reis has estimated inequality in Portugal over two centuries (between 1565 and 1770).[4] Rodriguez Weber's recent work, using 'dynamic social tables', has done something similar for Chile, covering the period from the country's independence in 1820 to 1970.[5] Bertola et al. and Prados de la Escosura have studied inequality in the

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[1] The definition of premodern used here is, by necessity, fluid and heuristic. A society is defined as 'modern' at the point in time when it begins to undergo an industrial revolution (a decrease in the share of employment in agriculture and an increase in manufacturing) and is integrated in the world economy. Other definitions of 'modern' (starting, for example, with the Commercial Revolution) are of course possible and useful in different contexts.

[2] Lindert and Williamson, *Unequal gains*.

[3] Álvarez-Nogal and Prados de la Escosura, 'Rise and decline of Spain 800–1850'; eisdem, 'Decline of Spain 1500–1850'; eisdem, 'Rise and fall of Spain'.

[4] Reis, 'Deviant behaviour?'.

[5] Rodriguez Weber, 'La economic politica'.

Southern Cone countries around the turn of the twentieth century.[6] Merette and Lopez Jerez have produced recent papers (dissertations) on inequality in colonial North and South Vietnam.[7] Ober's book on Athens includes estimates of Athenian income inequality in the fourth century BC.[8]

Very detailed empirical work on wealth inequality in the cities and larger areas of northern Italy and the Low Countries in the middle ages (but falling short of a 'nation-state' or empire) was carried out recently by Alfani; Alfani and Ammannati; Ryckbosch; and Alfani and Ryckbosch.[9] Their work has focused on the effects of epidemics and the role of the commercial revolution in Europe from the fourteenth to the nineteenth century. There are also studies of inequality in the cities of western Europe (Amsterdam in the eighteenth century by McCants), the Iberian peninsula (by Reis, for several cities and urban areas in Portugal between the sixteenth and eighteenth centuries; and by Nicolini and Ramos-Palencia, for the cities in the Spanish province of Palencia in the mid-eighteenth century), and the Middle East (on Bursa by Canbakal; and on Kastamonu, a city in Anatolia, by Coşgel and Ergene).[10] Ottoman surveys have also provided very valuable evidence for selected parts of the empire (utilized by Coşgel and Ergene).[11]

While all this accumulation of new evidence is remarkable, work on the causal factors that might have driven inequality and on explanations of the changes in historical inequality has hardly begun. In 1995 van Zanden published an important paper that argued for the existence of a premodern Kuznets curve whereby inequality rose as mean income in northern Europe increased.[12] This could be viewed as the upward portion of a Kuznets curve. Van Zanden and then Ryckbosch posit that the explanation for the rising inequality resides in what they call the 'classical factors', namely, an increased share of capital in national income. Since income from capital tends to be much more unequally distributed than income from labour, the change in factoral composition translates into an increase in interpersonal inequality.

Epidemics, wars, and natural catastrophes were proposed, especially by Alfani and Herlihy, as possible explanations for the declines in inequality.[13] Here the mechanism is seen to go through a reduction in population which shifts the proportion between produced capital and labour, making labour relatively scarcer and increasing the wage rates. This then reduces interpersonal inequality. Scheidel, in his book *The great leveler*, has taken this line of reasoning even further, maintaining that all substantial declines in inequality over the course of recorded history are due to major natural or political dislocations, that is, to epidemics, wars, revolutions, and the collapse of states.[14]

[6] Bertola, Castelnuevo, Rodriguez, and Willebald, 'Income distribution'; Prados de la Escosura, 'Inequality and poverty'.
[7] Merette, 'Preliminary analysis'; Lopez Jerez, 'Deltas apart'.
[8] Ober, *Rise and fall*.
[9] Alfani, 'Effects of plague'; idem, 'Economic inequality'; Alfani and Ammannati, 'Economic inequality'; Ryckbosch, 'Inequality and growth'; Alfani and Ryckbosch, 'Growing apart'.
[10] McCants, 'Inequality among the poor'; Reis, 'Deviant behaviour?'; Nicolini and Ramos-Palencia, 'Decomposing income inequality'; Coşgel and Ergene, 'Inequality of wealth'; Canbakal, 'Wealth and inequality'.
[11] Coşgel, 'Estimating rural incomes'; Coşgel and Ergene, 'Inequality of wealth'.
[12] van Zanden, 'Tracing the beginning'.
[13] Alfani, 'Effects of plague'; idem, 'Economic inequality'; Herlihy, 'Distribution of wealth'.
[14] Scheidel, *Great leveler*.

According to Milanovic, the premodern evolution of inequality can be placed in the same context as the evolution of inequality in the modern era. He claims that both can be explained as Kuznets-wave-like movements, of waxing and waning inequality.[15] The difference though is that in the premodern era the swings were driven by non-economic factors (epidemics and Malthusian pressure, wars) and the institutional framework, while in the modern era economic, social, and political factors—the latter often linked with mass political parties—became more important: technological change and the transfer of labour from agriculture into manufacturing and nowadays from manufacturing into services; the spread of education; political demand for social transfers; trade union density; and the like.

The objective of this article is to apply this line of research to premodern societies. It is an attempt to identify the regularities that exist between economic and demographic factors, and changes in inequality in the premodern era. It is important to note that while agreement on the exact drivers of inequality in the contemporary period is not perfect, our knowledge of the changes in inequality in the latter part of the twentieth century and in the first decade of the twenty-first is incomparably better than our knowledge of premodern inequality, and so is our reasoning about the factors that may influence inequality. When it comes to premodern inequality, we are very much at the beginning of our exploration of this subject.

As far as the hypotheses of what might explain movements in premodern inequality, our situation is now at about the same point as analysis of contemporary inequality was in the 1970s or 1980s: we do have some data, but they are fragmentary and often not fully comparable, and we have at best some guesses about the forces that might explain changes in inequality. The situation may be arguably even worse because the number of 'independent' variables that we have for premodern societies is extremely limited, much more so than we had for contemporary societies in the 1970s or 1980s. With these severe limitations in mind, this article aims to collect in one place the evidence that we have on historical inequality and to suggest a hypothesis regarding the forces that are responsible for it.

The rest of this article is organized as follows. Section I discusses the data used in the article. Section II gives descriptive statistics of premodern Gini coefficients and presents empirical evidence of the relationship between inequality and 'independent' variables that might influence it. Section III concludes the article by discussing possible next steps to improve our understanding of premodern inequality.

I. The data

The data from which inequality is estimated in this article come from social tables, and in a few instances from surveys of settlements (villages) or fiscal data. Social tables are the lists of salient socio-economic groups at a given point in time and in a given country, that can run from just a few groups to several hundreds. The prototype and the earliest example of a social table is Gregory King's famous social table for England and Wales in 1688, which includes 31 groups ranging

[15] Milanovic, *Global inequality*.

from beggars to high nobility. Often, social tables have not been created by contemporary writers (such as Gregory King, or William Colquhoun, who created an almost equally famous social table England and Wales in 1801), but by more recent researchers using archival evidence. The social tables created by Lindert and Williamson for the US are an example of this.[16] This article uses only social tables that pertain, at least in principle, to an entire 'political unit' or a significant portion of an entire 'political unit', that is, to what we would call today a nation/country or empire. This rules out social tables referring to individual cities.[17]

Social tables are a far-from-perfect instrument for measuring inequality. However, for historical periods for which we lack both household surveys and fiscal data (the two sources most commonly used to study inequality today), they are still the best source. In principle, the more detailed the social table (that is, the more social groups included), and the less the variability of incomes within each social group, the more reliable they are as a source. If the social groups used are few, the mean group income will tend to conceal a lot of intra-group inequality. Similarly, if the number of groups is given, but groups are heterogeneous, including both very rich and very poor people, inequality would be underestimated. It is important to mention that underestimation of inequality also occurs in modern-day household surveys because the rich refuse to participate or underestimate their incomes (as noted by Korinek et al. and van der Weide et al.), but it is even more pronounced in social tables that ignore within-group inequality.[18] Some of these issues will be discussed in the last section, but it is important to point out from the outset the inescapable limits of the data and the fact that the calculated measures are lower bounds of actual inequality.

Most of the social tables used here (28 out of 41) were also used in Milanovic et al.'s 'Pre-industrial inequality', and a detailed explanation of the procedure applied to the individual tables, their characteristics, and their sources is provided in that article and in an earlier paper by the same authors.[19] However, the publication of 'Pre-industrial inequality', a significant number of new social tables for premodern societies have been created, and this article takes advantage of them. There are 13 new social tables included here, and information on each of them is provided in appendix I (the new data are also highlighted by note *a* in table 1).

Table 1 summarizes the main features of each social table. The data are arranged in chronological order, from the earliest one for Athens in 330 BCE to the 1938 social table for British India. As in Milanovic et al.'s 'Pre-industrial inequality', the cut-off point after which the label 'premodern' no longer applies is, for the countries that were 'early developers' (western Europe and North America), the mid-nineteenth century, and for all the others 1939, the outbreak of the Second World War. After that point, it could be argued, no premodern economies existed, not solely because many that were colonies became independent and most started

[16] Lindert and Williamson, *Unequal gains*.

[17] As mentioned before, a number of such studies have been undertaken recently. They are extremely valuable for our understanding of inequality, but in this context could lead to biased results where, for example, inequality in Paris is ascribed to the entire Kingdom of France. However, the data on Tuscan (basically Florentine state) income distribution obtained from the famous 1427 *Catasto* are acceptable because Tuscany was then a 'political unit'.

[18] Korinek, Mistiaen, and Ravallion, 'Survey nonresponse'; van der Weide, Lakner, and Ianchovichina, 'Inequality'.

[19] Milanovic, Lindert, and Williamson, 'Pre-industrial inequality'; eisdem, 'Measuring ancient inequality'.

Table 1. *Key characteristics of countries included*

Country (political unit)	*Year to which social table refers*	*Estimated inequality (in Gini points)*	*Estimated GDP per capita (in 1990 PPP dollars)*	*Estimated population (in 000s)*	*Source of data*
Athens[a]	330 BCE	37.4	1,333	240	Social table
Roman Empire	14	39.4	633	55,000	Social table
Byzantine Empire	1000	41.1	533	15,000	Social table
England[a]	1290	26.8	616	4,746	Social table
England[a]	1381	42.2	920	3,822	Social table
Tuscany	1427	46.1	978	38	Census
South Serbia	1455	20.9	443	80	Census of settlements
Holland	1561	56.0	1,129	376	Fiscal data
Cracow voivodship[a]	1578	53.0	810	476	Social table
Levant (Syria, Lebanon, Israel)	1596	39.8	974	237	Survey of settlements
England and Wales	1688	45.0	1,418	5,700	Social table
Holland	1732	61.1	2,035	2,035	Fiscal data
Moghul India	1750	48.9	530	182,000	Social table
Old Castile (Spain)	1752	52.5	745	1,980	Social table
England and Wales	1759	45.9	1,759	6,463	Social table
US (13 colonies)[a]	1774	45.7	1,182	2,376	Social table
France	1788	55.9	1,135	27,970	Social table
Nueva España (Mexico)	1790	63.5	755	4,500	Social table
England and Wales	1801	51.5	2,006	9,053	Social table
Bihar (India)	1807	33.5	533	3,362	Social table
Netherlands	1808	57	1,800	2,100	Fiscal data
Kingdom of Naples	1811	28.4	637	5,000	Social table
US[a]	1850	48.7	1,292	23,580	Social table
US[a]	1860	51.1	2,178	31,839	Social table
Chile[a]	1860	46.6	1,282	2,074	Social table
US[a]	1870	51.4	2,292	40,241	Social table
Brazil	1872	43.3	721	10,167	Occupational census
Peru	1876	42.2	653	2,469	Social table
China	1880	24.5	540	377,500	Social table
Java (Indonesia)	1880	39.7	661	20,020	Social table
Maghreb	1880	57.1	694	5,002	Social table
Japan	1886	39.5	916	38,622	
Chile[a]	1900	45.0	2,232	2,527	Social table
European Russia[a]	1904	37.5	1,237	106,230	Social table
Kenya	1914	33.1	456	3,816	Social table
Java (Indonesia)	1924	32.1	988	35,170	Social table
Kenya	1927	46.2	558	3,922	Social table
Cochinchina (South Vietnam)[a]	1929	36.8	1,580	5,741	Social table
Tonkin (North Vietnam)[a]	1929	25.6	1,122	9,036	Social table
Siam (Thailand)	1929	48.5	793	11,607	Social table
India	1938	49.7	617	346,000	Social table
Mean	–	43.7	1,066	–	–

Notes and sources: a Countries not included in the dataset for Milanovic et al., 'Pre-industrial inequality'; they are used for the first time in this article and the sources are given in app. I.
The data are ranked in chronological order. PPP = purchasing power parity. Gini is calculated from the social tables. GDP per capita is either directly taken from Bolt and van Zanden, 'First update', or is calculated based on Maddison's approach by the authors of the tables. See also Milanovic et al., 'Measuring ancient inequality'.

to industrialize but also because they were part of what might vaguely be considered 'modernity', that is, they were all part of the international political and economic system and used economic policy explicitly to try to speed up development.

The average Gini of the countries included here is 43.7 with a standard deviation of 10 Gini points. (A Gini of zero represents perfect equality, and 100, perfect inequality.) The Gini range is from less or equal to 25 (South Serbia in 1455, China in 1880, and Tonkin in 1929) to more than 60 (Nueva España and the Netherlands, both in the eighteenth century).[20] It may be noted at the outset that this range, as well as the average Gini, are similar to what we find for modern economies. Thus, for example, using the most recent global data for 2011, the average national Gini in the world is 38 with a standard deviation of 10 Gini points. In the 2011 data the Gini range is from 25 (Belarus, Slovenia, and Denmark) to 66 (South Africa).[21]

Premodern GDPs per capita range from just barely above subsistence (South Serbia in 1455, Kenya in 1914, and Moghul India) to about 300 international dollars of equal purchasing parity power, $PPP (US in 1870 and Chile in 1900). The latter amount is some six to eight times the subsistence level (depending on whether we assume subsistence to be $PPP300 or $PPP400). Here, however, there are no similarities between premodern and present-day societies. The average (unweighted) country GDP per capita in 2011 was $PPP13,000, which is some six times greater than the highest premodern GDP per capita in our sample.

II. Premodern inequality: description and hypothesis

Figure 1 summarizes the key features of premodern inequality. Figure 1 plots estimated Ginis against GDP per capita (in PPP terms). As can be readily seen, Ginis seem to increase with mean income.[22] This is consistent both with what we would expect from the Kuznets hypothesis and with what is argued in Milanovic et al.'s 'Pre-industrial inequality', namely that higher levels of income give more 'space' for inequality to increase.[23] When mean income is extremely low (barely above the subsistence level), inequality is perforce limited if we require that people are at least able to survive. Then the surplus that can be appropriated by the rich is small, and inequality, measured by a synthetic indicator such as a Gini coefficient, has to be low. (We have to assume that it is not in the interest of the rich to allow a substantial decrease of the population due to famine. It is also not likely that they would be able to implement such a policy without a major uprising that might destroy their power.)

Figures 2 and 3 extend this line of reasoning. Figure 2 does so by plotting the observed Ginis against the inequality possibility frontier (IPF).[24] The IPF shows the maximum level of inequality obtainable at any *given* mean income under the assumption that all but an infinitesimal minority lived at the subsistence level. At

[20] The newly added social tables (compared to the 28 that were included in Milanovic et al.'s 'Pre-industrial inequality') tend to cover a more recent period (for the US, from 1774 to 1870; for Chile, 1860 to 1900) but they are not markedly different in terms of inequality: the average Gini is 42 for the 13 new observations and 44 for those in Milanovic et al.'s 'Pre-industrial inequality'.

[21] Calculated from Luxembourg Income Survey (LIS) micro data; LIS, http://www.lisdatacenter.org/.

[22] The terms 'mean income' and 'GDP per capita' are used interchangeably.

[23] Milanovic et al., 'Pre-industrial inequality'.

[24] Data points for England/the UK and the US are highlighted.

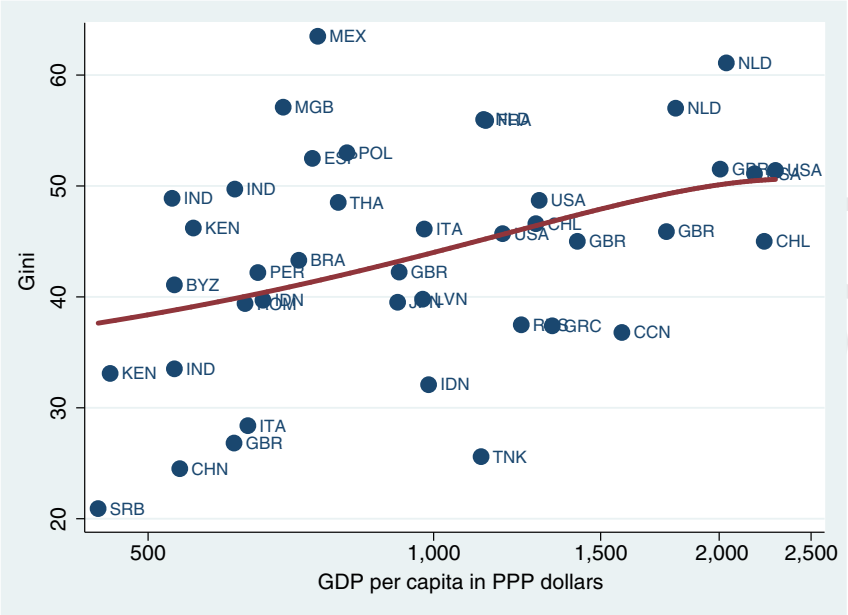

Figure 1. *Gini coefficient and level of GDP per capita in premodern societies [Colour figure can be viewed at wileyonlinelibrary.com]*

Notes: BRA = Brazil, BYZ = Byzantine Empire, CCN = Cochinchina (South Vietnam), CHL = Chile, CHN = China, ESP = Spain (Old Castile), FRA = France, GBR = England/Wales or UK, IDN = Indonesia (Java), IND = India, ITA = Tuscany, JPN = Japan, KEN = Kenya, LVN = Levant (parts of modern-day Lebanon, Syria, and Israel), MEX = Nueva España (Mexico), MGB = Maghreb, NLD = Holland or the Netherlands, PER = Peru, POL = Poland, ROM = Roman Empire, RUS = Russia, SRB = South Serbia, THA = Siam (Thailand), TNK = Tonkin (North Vietnam), USA = 13 colonies (the US).
Gini shown in percentage terms (that is, Gini of 0.3 = 30). Horizontal axis in logs.
Source: Tab. 1.

the theoretical position of maximum inequality, the elite appropriates the entire surplus above the subsistence level. The maximum 'feasible' level of inequality increases as income goes up because with the greater surplus, there is simply more income for the elite to appropriate. The exact formula for the maximum Gini at a given level of income is $\frac{\alpha-1}{\alpha}$ where α is the mean income expressed in the number of subsistence baskets.[25] Clearly, if $\alpha = 1$, there is no surplus and the Gini is 0. For $\alpha > 1$, the maximum Gini becomes positive. In our sample, when the subsistence is assumed to be \$PPP300, α ranges between 1.5 and 8, and the maximum Gini ranges between 0.33 and 0.87.

After an income level of approximately \$PPP1,000, Ginis no longer remain as close to the IPF as for lower income values (figure 2). In other words, IPF expands faster than the observed Gini. The ratio between the observed Gini and the maximum Gini at a given level of income is called the inequality extraction ratio (IER).[26]

Figure 3 plots the IERs against mean income and highlights colonies (dark dots) for which we often find high extraction ratios. At very low levels of income, the IER

[25] For more detail, see Milanovic et al., 'Pre-industrial inequality', pp. 256–9.
[26] This is simply the distance between the dots in fig. 2 and the corresponding values of the maximum feasible Gini on the IPF, divided by the latter.

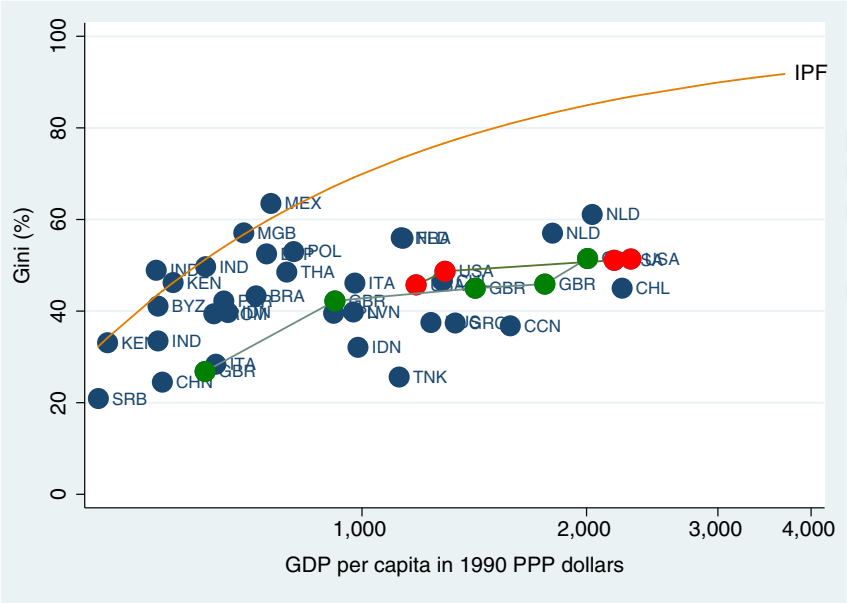

Figure 2. *Observed Gini coefficients against the inequality possibility frontier in premodern societies*
[Colour figure can be viewed at wileyonlinelibrary.com]
Note: For country abbreviations, see note to fig. 1. Horizontal axis in logs.
Source: Tab. 1.

is around 100 per cent, implying that inequality is pushed close (and in some cases even beyond) its maximum 'feasible' level, that is, beyond the level consistent with the maintenance of a society as a going concern.[27] It is also notable that almost all poor countries (those with GDP per capita below $PPP1,000) that were colonies display very high IERs.[28]

With the increase in GDP per capita, however, IER declines which, as we have seen, means that observed Ginis increase less than the maximum feasible

[27] IERs above 100% may be due to mistakes in our measurement of either mean income or inequality, but it is also possible that the extraction ratio could be in excess of 100% for a short period. It is the maintenance of such a ratio over the longer term that is incompatible with stable or increasing population. This also raises the issue (pointed out by a referee) of how reliable GDP per capita estimates are. As mentioned above, they come from the newly revised Maddison series (Bolt and van Zanden, 'First update'), which, like Maddison's original series, uses a variety of sources. However, following Maddison, certain essential rules are observed: constant price income estimates are used so that the growth rates are the same as those from national accounts; income is preferably measured from the output side; and current country borders are used. The two key sources of both GDP and population data are the official national accounts and population statistics, and individual scholars' estimates that hew as closely as possible to the official methods but use a broader range of sources or proxies. Maddison's original data have already been revised and further improvements are forthcoming, but it is very unlikely that the main contours (to use Maddison's term) of the world economy as estimated by Maddison will be affected.

[28] The 13 colonies that in 1776 united and created the United States of America are coded, for the year 1774, as 'not a colony'. There are two reasons for this. The Lindert–Williamson social table is technically anchored in 1774, but is representative of a period at least a decade before or after this. Second, the 13 colonies were settler colonies and, as argued by Sokoloff and Engerman, 'Institutions', fundamentally different from 'extractive' colonies. A similar distinction between 'self-governing' territories, protectorates, and colonies existed in the official British nomenclature.

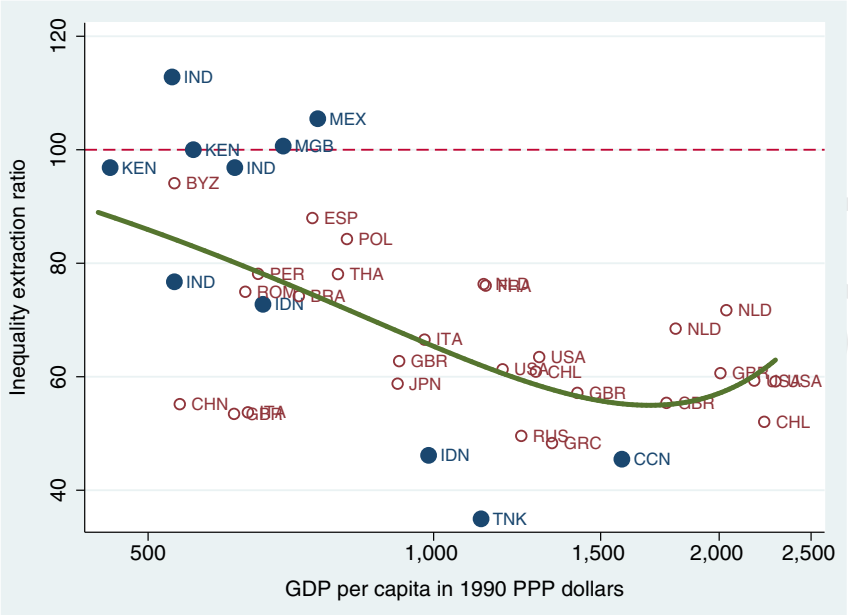

Figure 3. *Inequality extraction ratio (IER) and level of GDP per capita in premodern societies*
[Colour figure can be viewed at wileyonlinelibrary.com]
Note: Inequality extraction ratio in %. Colonies marked by full (dark) dots. Horizontal axis in logs.
Source: Tab. 1.

Gini. This regularity seems to hold throughout our sample, with the exception of the richest countries, where we find very high Ginis that make the IER rise again.

The relationship between, on the one hand, Gini and the IER, and, on the other hand, Gini and GDP per capita is also worth exploring for the three countries for which we have at least three observations at different points in time. These are England/the UK, the US, and Holland/the Netherlands. For England/the UK the analysis is expanded to include the industrial era up to 1911.

It is remarkable that for all three countries, increased GDP per capita went together with an increase in inequality (figure 4). The evolution of inequality in England/the UK is most interesting. The graph shows a steady rise in the Gini in the nineteenth century with a peak in the second half of that century. After that, there is a modest decline estimated for 1911. The level of UK inequality in the latter part of the nineteenth century (which is strictly speaking beyond this article's limit to the premodern era) was extremely high if we use present-day standards. The UK Gini was around today's inequality level in Brazil and possibly even higher, given that the estimates used here are based on social tables with information on income for some 20 to 30 groups (and with the assumption that within-group inequality is zero), while today's estimates of inequality in Brazil are based on nationwide household surveys that include several hundred thousand households. The former is thus (as discussed in section I) an underestimate of 'true' inequality.

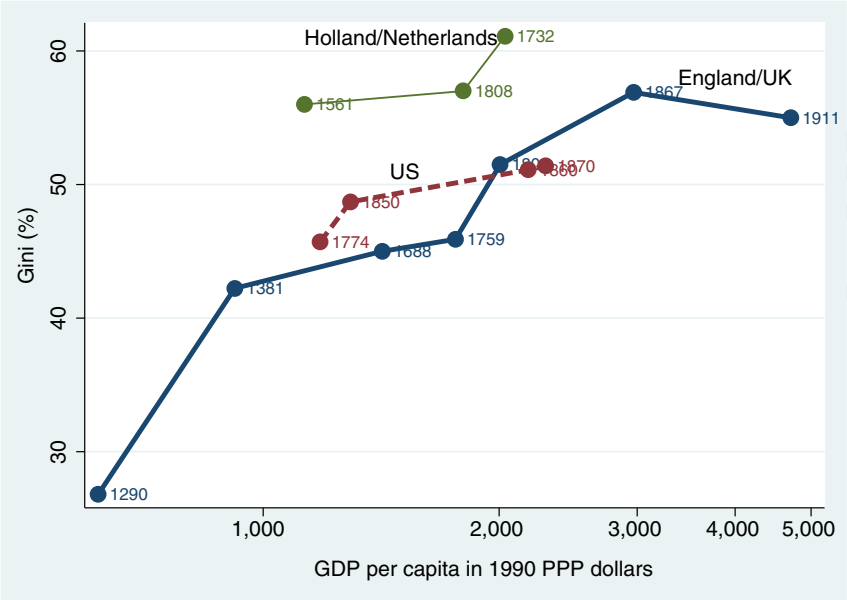

Figure 4. *Gini coefficient and GDP per capita over time in England/the UK, the US, and Holland/the Netherlands*
[Colour figure can be viewed at wileyonlinelibrary.com]
Source: Tab. 1.

At the same time, in all three countries IERs tended to decline with increased GDP per capita (figure 5). An important exception, however, is England/the UK, where the period of the industrial revolution in the first half of the nineteenth century displays an uncharacteristically rising IER despite a substantial increase in mean income. It is of course driven by an even faster rising Gini. This is not unexpected, however, given what we know about the highly unequal and fraught process of British industrialization.

So far we have concluded that premodern inequality (measured by the Gini coefficient) tended to rise as mean income increased. We have also seen some evidence that the observed Gini increase was not as fast as the increase in the maximum feasible Gini and thus that the IER was smaller in more advanced economies.

The next step is to look at possible correlates of premodern inequality. The task here is both more complicated and simpler in comparison with analogous exercises for contemporary economies. It is simpler because the number of economic and social variables that are available for premodern economies and can be regarded as related to inequality is small. Unlike the situation for contemporary economies, where factors such as educational attainment, age composition of the population, trade union density, government spending as a share of GDP, trade as the percentage of GDP, and so on, have been adduced, and tested, as possible explanations of interpersonal inequality, for premodern times we have very few such variables. Thus our choice is rendered relatively simple.

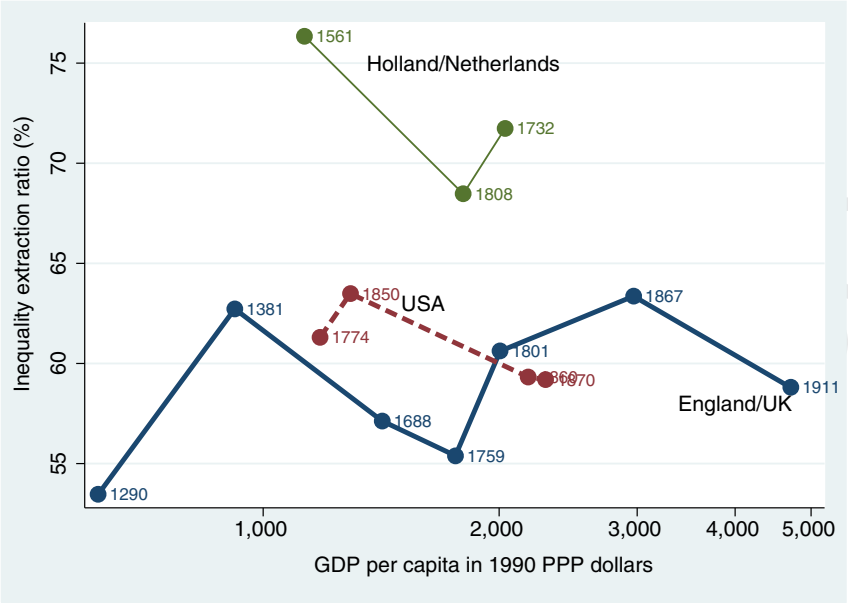

Figure 5. *Inequality extraction ratio (IER) and GDP per capita over time in England/the UK, the US, and Holland/the Netherlands*
[Colour figure can be viewed at wileyonlinelibrary.com]
Source: Tab. 1.

However, on the other hand, the dearth of information on possibly relevant variables makes our conclusions much weaker. We may simply be not including some factors that are important, but for which we lack numeric information. Such factors may include land distribution, fiscal pressure, the size of the armed forces, type of government (oligarchic, despotic, with a weak or strong fiscal capacity), and the like. Therefore, the conclusions that we make will be necessarily very provisional and may be subject to revision when additional and better socio-economic data regarding the past become available.

We now look at the correlates of both Gini and IER in our sample of 41 premodern economies. The results are shown in table 2 (columns 1 and 3).[29] They are as follows. GDP per capita (in curvilinear formulation) is borderline significant when it comes to inequality but not at all when we consider the IER. It would thus appear that the changes in the IER may not be explained simply by countries becoming richer but by the changes in other variables. This is indeed what we find for population density, which is strongly negatively associated with the extraction ratio. Also, being a colony has a strongly positive association with the extraction ratio. Urbanization, which is often argued to be a strong correlate of inequality in both premodern and modern societies, is also positively correlated with the IER.[30] Overall, it could be argued that (not surprisingly) colonies and more urbanized

[29] We also control for specific features of the social tables. These control variables are explained in the notes to tab. 2.
[30] van Zanden, 'Tracing the beginning'; Alfani and Ammannati, 'Economic inequality'.

Table 2. *Explaining Gini and inequality extraction ratio*

	Gini		*Inequality extraction ratio (IER)*	
	1	*2*	*3*	*4*
GDP per capita in PPP dollars	174.9	188.0	−45.2	−23.9
	(0.08)	(0.06)	(0.77)	(0.88)
GDP per capita squared	−12.3	−13.3	1.4	0.2
	(0.09)	(0.06)	(0.90)	(0.99)
Urbanization rate	0.39*	0.37*	0.63*	0.60*
(% of population)	(0.04)	(0.04)	(0.03)	(0.04)
Population density (people per km^2)	−0.07*	−0.05	−0.12*	−0.10
	(0.03)	(0.11)	(0.02)	(0.07)
Colony (dummy variable)	6.1	8.0	14.7*	17.8**
	(0.11)	(0.06)	(0.02)	(0.01)
Asia dummy		−5.0		−8.2
		(0.22)		(0.20)
Survey controls[a]				
No foreign rulers included (dummy)	−13.4	−13.1	−27.5*	−27.0*
	(0.06)	(0.06)	(0.02)	(0.02)
Tax data (dummy)	−1.4	−0.9	−4.8	−3.9
	(0.78)	(0.86)	(0.56)	(0.63)
No. of social groups	−0.0002	−0.0002	−0.0004	−0.0004
	(0.81)	(0.79)	(0.78)	(0.76)
Constant	−578.6	−622.9	307.7	234.9
	(0.09)	(0.09)	(0.56)	(0.66)
R^2 adjusted	0.30	0.32	0.57	0.59
F value	3.2	3.1	5.3	5.0
No. of observations	41	41	41	41

Notes: a These are variables that control for differences in the survey (social tables) set-ups.
'No foreign rulers included' is a dummy variable (= 1) if a country is a colony but foreign colonial population is not included in the survey; 'tax data' is a dummy variable (= 1) if the source is not a social table but tax data; 'no. of social groups' gives the no. of social groups included in a social table. *p*-values shown in parentheses. One (two) asterisks denote coefficients statistically significantly different from zero at the 5% (10%) level.

societies were more extractive while more populous countries were less extractive. The latter finding is probably the most interesting one and we will return to it.

When we look at the correlates of inequality, the situation is similar, although both the overall R^2 and the significance of the coefficients are weaker than in the case of the IER. The only variables significant at less than the 5 per cent level are urbanization and population density (respectively, positively and negatively correlated with the Gini coefficient).[31] No other variable, including being a colony, seems to matter.

The preliminary conclusion is therefore that the growth of income as such did not have a discernible effect either on inequality or on the level of extraction of surplus.[32] In premodern economies, it could be argued, change in GDP per capita does not act as a proxy for a structural transformation that we normally associate with it in modern societies[33] (for example, richer economies are now more service-orientated than poorer ones, and in the recent past they were more

[31] Urbanization and population density are weakly negatively correlated ($\rho = -0.13$ and not significant).
[32] This is when we control for other variables. In two-way displays such as in figs. 1 and 3, GDP does play a role.
[33] According to Reis, 'Deviant behaviour?', there is evidence of growth without structural change in Portugal between the mid-sixteenth and mid-eighteenth century.

manufacturing-orientated than poorer ones). It is thus perhaps not surprising that the mean income does not play much of a role in explaining either inequality or IER changes. The same finding was reported recently by Alfani and Ammannati in their study of inequality in the Florentine state (1300–1800), and by Alfani and Ryckbosch in their comparative study of three Italian city-states and the Southern and Northern Low Countries between 1500 and 1800.[34]

The second important conclusion is that colonies were not necessarily more unequal, but were more exploitative in the sense that inequality was pushed closer to the frontier than in non-colonized societies. The fact of being a colony raises the IER by almost 15 points on average, which is one standard deviation of IER in our sample.

Another important conclusion concerns the role of population density: it reduces both measured inequality and the extraction ratio. Thus, a high number of people per square kilometre seems to be a strong predictor of relatively egalitarian economic outcomes. This, of course, holds only *after* we control for urbanization (which has a strong positive association with both inequality and the IER) and income level (which plays no significant role).

Why could this be the case? It is not possible to establish the reason with the available data, but we can make conjunctures. There may be two possibilities. Less extractive economies would imply, everything else being the same, that the poor would have a higher income than in more extractive economies. The relative comfort of the poor might in a Malthusian fashion lead to a greater increase in population. (Note that in the extreme case when the IER is 100 per cent, population is likely merely to reproduce itself.) Thus, over time, we may notice the association between less extractive regimes and higher population density, but the true causality would run from having a more lenient (egalitarian) regime to higher population growth.

The other possibility implies an exactly opposite causal mechanism. Population density may turn out to be high for an entirely different reason that is wholly independent of the level of extraction, but once in existence this relatively high number of people per unit of land may make the ruler's position more precarious and subject to an implicit popular veto, especially in premodern economies where the military force of the ruler, compared to that of people, was not overwhelming. Then the policy of the ruler may be 'milder' and less extractive principally because of the fear of being overthrown.[35] The causality here runs from high population to low extraction ratio. In actuality it is, of course, likely that both mechanisms played a role.

The role of population density is likely to be mediated through institutions because in a simple two-factor model with labour and land, lower population density should increase wages relative to land rent and thus reduce inequality. However, if institutions, akin to what happened during the 'second serfdom' in eastern Europe, counteract the economic forces, tie the peasants to land, and depress wages, lower population density and higher inequality may go hand in hand.[36] Rodriguez Weber mentions a similar evolution in mid-nineteenth century

[34] Alfani and Ammannati, 'Economic inequality'; Alfani and Ryckbosch, 'Growing apart'.
[35] See Do and Campante, 'Keeping dictators honest'.
[36] The *locus classicus* is Kula, *Economic theory*.

Chile where territorial expansion (fuelled by increased world demand for wheat) added to the land holdings of the rich while traditional (oppressive) labour relations checked the increase in wages.[37] Yet another institutional mechanism may produce similar results: greater population pressure on land may lead to the segmentation of landholdings, greater equality among the peasantry, and greater overall equality, even if the gap in average incomes between landlords and peasants goes up. Basically, factoral distribution may move differently from personal income distribution, as pointed out for the early nineteenth-century Kingdom of Naples by Malanima.[38]

Finally, there is another line of argument that it seems we should reject. It is noticeable that the countries with the highest population density are in Asia. In effect, all top four countries by population density are Asian: Java (Indonesia), Japan, India, and Cochinchina (South Vietnam). This might lead us to add an Asia dummy into the regressions. Columns 2 and 4 of table 2 show the results. The interesting result is that for the Gini, population density now becomes insignificant, whereas GDP per capita remains borderline significant, exhibiting the standard Kuznets-like inverted U shape. For IER, the population density also ceases to matter and the only statistically significant variables that remain are colonial status and urbanization.

The question is whether it is reasonable to add the Asia dummy. The arguments against it appear strong. Asian countries included in the sample (China, India, Indonesia, the two Vietnams, Japan, and the Levant) do not share anything in common that could be considered as 'Asian', other than the fact that they belong to a continent whose borders are to a large degree arbitrary. In other words, it is hard to see what factor could be put under the heading of 'Asianness' for countries as different, among themselves and over time, as the Levant (parts of modern-day Lebanon, Syria, and Israel) in the sixteenth century and Siam (Thailand) in 1929. There is nothing obvious in terms of economics, religion, or social or political organization that could be considered common. It is for this reason that we can conclude that the introduction of an Asia dummy—even if econometrically sensible since that variable seems to matter (although not that much by itself as it is not statistically significant)—should be rejected. This in turn leads us to retain the conclusions about the role of population density, urbanization, and colonial status in explaining the level of premodern inequality and, more importantly, the IER.

III. Conclusions and further directions

Despite impressive recent progress in the availability of historical data on income distribution, our knowledge of past inequality is woefully inadequate. Continuous historical data for a hundred or so years (from the turn of the twentieth century to today) exist for barely a dozen countries. Even for those countries, the earlier data are available only sporadically. The situation with other countries is much worse. The advances in estimates of wealth or income inequality in medieval northern Italy or the Low Countries have to be set against the fact that these data exist for only a few years and a few localities, and that between such medieval data and our

[37] Rodriguez Weber, 'La economic politica'.
[38] Malanima, 'Pre-modern equality'.

estimates of income distribution in the Roman Empire, there is a yawning gap of more than a millennium—with almost no information at all.

There are also, as pointed out above, problems with social tables. The number of social groups included can at times be very small. Even when the number is adequate and we trust that the creator of the table has indeed included all salient groups and made correct estimates of their incomes, the assumption that we have to use is that inequality within each group is zero. In other words, the overall inequality as calculated from the social tables is a measure of between-group inequality only. Some attempts to allow for within-group inequality have been made by Modalsli, but the problem there is the arbitrary nature of such within-group inequality adjustments.[39] We can perhaps argue that merchants might have been distributed along the entire income distribution, ranging from the very rich to the very poor, but we have no information on how that particular distribution of merchants' incomes looked and thus no way of superimposing it on top of the merchants' mean income. For the top classes, such as senators in imperial Rome, or for the bottom classes, such as slaves or peasants, we do know that their distributions were extremely narrow—that is, no peasant was likely to be among the rich, and no senator was by definition poor (since there was a wealth census requirement)—and thus a social table that normally gives mean incomes for the two groups would not err much. Thus the between-group-only approach still seems to be the best, not least because it dispenses with the arbitrary widening of within-group distributions and forces us to be conservative in our estimates of overall inequality.[40]

Dynamic social tables, introduced by Rodríguez Weber, represent an important innovation.[41] If the information for the benchmark years is well chosen and reasonably plentiful (as indeed it is for Chile), then keeping the social class structure unchanged and allowing the income of each class to rise or fall in accordance with other available macro data (such as occupational wages) provides annual social tables. The same class structure is maintained until a new benchmark year when information on the (slightly different) class structure becomes available. Hopefully, this approach can be replicated in other countries.

Historic data are not, compared to the current standards, poor only on the side of the variables to be explained (Gini or another indicator of inequality). They are also, as mentioned before, poor for the explanatory variables. It is unlikely that some of these omissions will ever be remedied: data on government spending for some ages or countries will probably never be retrieved, and in many places might not have existed in the first place. However, political data could be produced from the information that we have about those societies. As in the case of modern political databases that score democracy and autocracy in different societies, it is not difficult to imagine applying this to historical societies. We have pretty good knowledge about the way the political system functioned in ancient Athens, imperial Rome, eleventh-century Byzantium, or the seventeenth-century Netherlands. Such issues have been extensively studied by historians and political scientists, not least in the publications from which the information on social tables used here has been

[39] Modalsli, 'Inequality in the very long run'.
[40] If we allow for very wide within-group distributions, we can produce almost any overall Gini.
[41] Rodriguez Weber, 'La economic politica'.

drawn (for example, on ancient Athens by Ober, on the US by Lindert and Williamson, and so on).[42] Information therefore exists, but in order to be used for empirical purposes in a cross-country framework its presentation as a unified and codified database is indispensable.[43] (It should of course be noted that such standardized databases are no substitute for much finer and more sophisticated individual country studies of inequality and politics.)

Another important advance would be a more accurate and consistent codification of slavery. Many of the societies included here have had slaves. However, there is an obvious difference between open slavery of the Roman type (what Veyne calls 'vertical slavery')[44] where slaves might be distributed along the entire income distribution and where manumission was frequent, and closed or 'horizontal' slavery, as in the antebellum US, where being a slave implied not only the lowest social status but also the lowest income.

Advances in numerical information or coding of premodern political regimes seem especially important because political factors (including wars and civil strife) are likely to have had a disproportionate influence on inequalities in the past. The fact that the only political variable that we have in this dataset, colony, plays an important role in explaining the extent to which the elite was able to push inequality close to its maximum calls for greater attention to political variables.

We can draw three conclusions. First, to explain pre-industrial inequality, GDP per capita seems to be a bad proxy. The reason may not be so much that the range of GDP per capita is limited in pre-industrial societies, but that GDP per capita does not reflect the underlying structural differences between the societies that are thought to drive inequality in modern settings. The decoupling of the change in GDP per capita from structural transformations in premodern societies, and thus rejection of the role of GDP per capita in explaining inequality, has also been argued recently by Alfani and Ammannati, Alfani and Ryckbosch, and Reis, and is posited by Milanovic in his redefinition of the Kuznets waves for the premodern period.[45]

The results presented here cannot, however, shed light on a potentially important factor that might have led to higher premodern inequality, namely, the rising share of capital income in total income and the attendant 'proletarization' of the labour force. This 'classical' explanation was first proposed by van Zanden and has recently received some support in findings reported by Ryckbosch and by Alfani and Ryckbosch.[46] The data we have do not contain information that could be either directly or indirectly linked to the 'classical' explanation. The issue therefore remains unaddressed and in need of further research.

[42] Ober, *Rise and fall*; Lindert and Williamson, *Unequal gains.*

[43] Polity IV provides such data for all independent entities (with populations greater than 0.5 million) since 1800. See the most recent (1800–2015) version at Center for Systemic Peace, 'INSCR data page', http://www.systemicpeace.org/inscrdata.html.

[44] Veyne, *La société romaine*.

[45] Alfani and Ammannati, 'Economic inequality'; Alfani and Ryckbosch, 'Growing apart'; Reis, 'Deviant behaviour?'; Milanovic, *Global inequality*. While other authors (most notably Alfani and Ryckbosch, 'Growing apart') cannot link changes in GDP per capita to changes in inequality, Reis's result is somewhat different: he finds rising mean income and decreasing inequality for Portugal from the mid-sixteenth century to the second half of the eighteenth century, but no structural change. Hence he concludes that movements in GDP per capita are a poor proxy for structural changes

[46] van Zanden, 'Tracing the beginning'; Ryckbosch, 'Inequality and growth'; Alfani and Ryckbosch, 'Growing apart'.

Second, while the past range of observed inequalities is not very different from what exists today, the IERs tended to go down with development. In other words, inequality did not rise as much as it could theoretically (with the possible exception of England during the industrial revolution).

Third, being a colony, being (relatively) urbanized, and having low population density are shown to be associated with high IERs. In short, this could be summarized in a hypothesis that populous, high-density, non-colonized, rural societies were less extractive. The role of colonies and urbanization is hardly unexpected. Population density presents a much more intriguing proposition and further work should help to reinforce the hypothesis or reject it. If the former, we should to try to tease out whether the causality went from high population density to low extraction ratios, or from low extraction ratios to high population density. Choosing one or the other has obvious implications for the Malthusian view of premodern societies.

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Footnote references

Alfani, G., 'The effects of plague on the distribution of property: Ivrea, northern Italy, 1630', *Population Studies*, 64 (2010), pp. 61–75.
Alfani, G., 'Economic inequality in northwestern Italy: a long-term view (fourteenth to eighteenth century)', *Bocconi Univ, Dondena working paper no*. 61 (2014).
Alfani, G. and Ammannati, F., 'Economic inequality and poverty in the very long run: the case of Florentine state, *c*. 1300–1800', *Economic History Review*, 70 (2017), pp. 1072–102.
Alfani, G. and Ryckbosch, W., 'Growing apart in early modern Europe? A comparison of inequality trends in Italy and the Low Countries, 1500–1800', *Explorations in Economic History*, 62 (2016), pp. 143–53.
Álvarez-Nogal, C. and Prados de la Escosura, L., 'The rise and decline of Spain 800–1850', paper presented at the 15th World Economic History Congress, Utrecht (2004).
Álvarez-Nogal, C. and Prados de la Escosura, L., 'The decline of Spain 1500–1850: conjectural estimates', *European Review of Economic History*, 11 (2007), pp. 319–66.
Álvarez-Nogal, C. and Prados de la Escosura, L., 'The rise and fall of Spain (1270–1850)', *Economic History Review*, 66 (2013), pp. 1–37.
Bertola, L., Castelnuevo, C., Rodriguez, J., and Willebald, H., 'Income distribution in the Latin American Southern Cone during the first globalization boom: ca. 1870–1920', paper presented at the Midterm Conference of the International Sociological Association, Univ. of Neuchâtel (26–2 June 2008).
Bolt, J. and van Zanden, J.-L. 'The first update of the Maddison Project: reestimating growth before 1820', Maddison Project working paper no. 4 (Groningen, 2013).
Broadberry, S., Campbell, B. M. S., Klein, A., Overton, M., and van Leeuwen, B., *British economic growth, 1270–1870* (Cambridge, 2015).
Campbell, B. M. S., 'Benchmarking medieval economic development: England, Wales, Scotland and Ireland *c*. 1290', *Economic History Review*, 61 (2008), pp. 896–945.
Canbakal, H., 'Wealth and inequality in Ottoman Bursa, 1500–1840', draft paper (2012).
Coşgel, M. M., 'Estimating rural incomes and inequality in the Ottoman Empire', *International Journal of Middle East Studies*, 40 (2008), pp. 374–85.
Coşgel, M. M. and Ergene, B. A., 'Inequality of wealth in the Ottoman Empire: war, weather, and long-term trends in eighteenth century Kastamonu', *Journal of Economic History*, 72 (2012), pp. 308–31.
Do, Q. -A. and Campante, F. R., 'Keeping dictators honest: the role of population concentration', Singapore Management Univ. working paper in economics and statistics no. 01–2009 (Singapore, 2009).
Herlihy, D., 'The distribution of wealth in a Renaissance community: Florence 1427', in P. Abrams and E. A. Wrigley, eds., *Towns in societies: essays in economic history and historical sociology* (Cambridge, 1978), pp. 131–57.
Korinek, A., Mistiaen, J. A., and Ravallion, M., 'Survey nonresponse and the distribution of income', *Journal of Economic Inequality*, 4 (2006), pp. 33–55.

Kula, W., *An economic theory of the feudal system: towards a model of the Polish economy, 1500–1800* (1976).
Lindert, P. H. and Williamson, J. G., *Unequal gains: American growth and inequality since 1700* (Princeton, N.J., 2016).
Lopez Jerez, M., 'Deltas apart: factor endowments, colonial extraction and pathways of agricultural development in Vietnam' (unpub. Ph.D. thesis, Lund Univ., 2014).
McCants, A., 'Inequality among the poor of eighteenth century Amsterdam', *Explorations in Economic History*, 44 (2007), pp. 1–21.
Malanima, P., 'Pre-modern equality: income distribution in the Kingdom of Naples (1811)', paper presented at XIV International Congress of Economic History, Helsinki (2006), http://www.helsinki.fi/iehc2006/papers3/Malanima.pdf (accessed on 22 Feb. 2017).
Malinowski, M. and van Zanden, J. -L., 'National income and its distribution in pre-industrial Poland in a global perspective', European Historical Economics Society working paper no. 76 (2015).
Merette, S., 'Preliminary analysis of inequality in colonial Tonkin and Cochinchina', mimeo (2013).
Milanovic, B., *Global inequality: a new approach for the age of globalization* (Cambridge, Mass., 2016).
Milanovic, B., Lindert P. H., and Williamson, J. G., 'Measuring ancient inequality', National Bureau of Economic Research working paper no. 13550 (2007).
Milanovic, B., Lindert, P. H., and Williamson, J. G., 'Pre-industrial inequality', *Economic Journal*, 121 (2011), pp. 255–72.
Modalsli, J., 'Inequality in the very long run: inferring inequality from data on social groups', *Journal of Economic Inequality*, 13 (2015), pp. 225–47.
Nafziger, S. and Lindert, P. H., 'Russian inequality on the eve of revolution' (2011), http://web.williams.edu/Economics/wp/Nafziger_Lindert_Inequality_Sept2013.pdf (accessed on 22 Feb. 2017).
Nicolini, E. A. and Ramos Palencia, F., 'Decomposing income inequality in a backward pre-industrial economy: Old Castile (Spain) in the middle of the 18th century', *Economic History Review*, 69 (2016), pp. 747–72.
Ober, J., *The rise and fall of Classical Athens* (Princeton, NJ, 2015).
Prados de la Escosura, L., 'Inequality and poverty in Latin America: a long-run exploration', in T. J. Hatton, K. H. O'Rourke, and A. M. Taylor, eds., *The new comparative economic history: essays in honor of Jeffrey G. Williamson* (Cambridge, Mass., 2007), pp. 291–315.
Reis, J., 'Deviant behaviour? Inequality in Portugal 1565–1770', *Cliometrica*, 11 (2017), pp. 297–319.
Rodriguez Weber, J., 'La economic politica de la desigualdad en Chile, 1850–2009' (unpub. Ph.D. thesis, Universidad de la Republica, Montevideo, 2014).
Ryckbosch, W., 'Inequality and growth before the industrial revolution: a case study of the Low Countries (14th–19th centuries)', Bocconi Univ., Dondena working paper no. 67 (2014).
Scheidel, W., *The great leveler: violence and the history of inequality from the Stone Age to the twenty-first century* (Princeton, NJ, 2017).
Sokoloff, K. L. and Engerman, S. L., 'History lessons: institutions, factor endowments, and paths of development in the New World', *Journal of Economic Perspectives*, 14 (2000), pp. 217–32.
Veyne, P. *La société romaine* (Paris, 2011).
van der Weide, R., Lakner, C., and Ianchovichina, E., 'Is inequality underestimated in Egypt? Evidence from house prices', World Bank policy research working paper no. 7727 (Washington, DC, 2016).
van Zanden, J. L., 'Tracing the beginning of the Kuznets curve: western Europe during the early modern period', *Economic History Review*, XLVIII (1995), pp. 643–64.

Appendix I: Sources and description of new social tables

This appendix gives the essential information on new social tables used in this article (the ones denoted by asterisks in table 1). Other social tables were used in a previous publication by Milanovic et al., and they provide a detailed description,[47] while full listings of social classes in each table and other information is given in another paper by the same authors.[48] The tables are also available on the Global Price and Income History Group website.[49] The 'new' social tables are ranked chronologically.

Athens, 330 BC. All data come from a social table (34 classes) created by Josiah Ober and personally communicated to me. Ober's analysis is based on his book *The rise and fall of classical Athens*, and a similar assessment of inequality and social composition for the 'core

[47] Milanovic et al., 'Pre-industrial inequality'.
[48] Milanovic et al., 'Measuring ancient inequality', app. 1.
[49] Global Price and Income History Group, http://gpih.ucdavis.edu/.

Hellas' (that is, an area larger than Athens but not coterminous with the Athenian Empire) is presented there.[50]

England, 1290 and 1381. The social tables come from Broadberry et al. for 1290,[51] and for 1381.[52] The latter is an entirely new social table; it includes only four social groups. The former (the social table for 1290) was originally compiled by Campbell,[53] and I have used that version before. However, Broadberry et al. (with Campbell as one of the co-authors) now present a revised 1290 social table which provides mean household size for each social group (the previous version did not), and is presumably thought by the authors to be superior to the original version. There are now eight (rather than seven) social groups.

Cracow voivodship, 1578. The social table comes from a paper by Malinowski and van Zanden.[54] It includes 13 social groups, ranging from beggars to the king and his retinue.

US, 1774, 1850, 1860, and 1870. The first detailed social tables for the 13 colonies and then for the US were created recently by Lindert and Williamson. The tables provide the basis for their book *Unequal gains*.[55] The tables, with their many assumptions, were kindly provided by Peter Lindert. The tables consist of 74 social classes in 1774 and six income classes (the top 1%, top 5%, top 10%, top 20%, next 40%, and bottom 40%) with their income shares and mean incomes for 1850, 1860, and 1870. These last three tables therefore display cumulative income distributions. Lindert and Williamson also give similar distributions for 10 geographical areas of the US. Slaves are included throughout, although Lindert and Williamson also show the distributions for free households only.

Chile, 1860 and 1900. The data come from Rodriguez Weber.[56] The data pertain to the benchmark social tables created for 1860–73 and 1900–5 respectively with 49 social groups each and then converted (compressed) by Rodriguez Weber into 10 deciles of income distribution with their income levels and shares. The tables were kindly provided by Javier Rodriguez Weber.

European Russia, 1904. The table was created in a paper by Nafziger and Lindert, 'Russian inequality'.[57] The version used here is the one kindly supplied by Peter Lindert and termed 'the preferred version' by Lindert. It consists of 19 social groups and is in part based on the Russian population census of 1897.

Tonkin and Cochinchina, 1929. The social tables come from Merette.[58] Chapter III estimates the social tables for the two parts of Vietnam. There are nine social groups for Tonkin and eight for Cochinchina. Foreign colonizers are included.

[50] Ober, *Rise and fall*, pp. 89–100.
[51] Broadberry, Campbell, Klein, Overton, and van Leeuwen, *British economic growth*, tab. 8.02, pp. 317–18.
[52] Ibid., tab. 8.03, p. 321.
[53] Campbell, 'Benchmarking', tab. 17, p. 45.
[54] Malinowski and van Zanden, 'National income', p. 17.
[55] Lindert and Williamson, *Unequal gains*, discussed in apps. A–G, pp. 262–348.
[56] Rodriguez Weber, 'La economic politica'.
[57] Nafziger and Lindert, 'Russian inequality'.
[58] Merette, 'Preliminary analysis'.