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Poverty in Germany from the Black Death until the Beginning of Industrialization

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Abstract

This paper provides macro-level estimates of the prevalence of poverty in preindustrial Germany, from the Black Death to the onset of industrialization in the nineteenth century. Based on a new body of evidence we show that poverty declined after two large-scale catastrophes: the Black Death in the fourteenth century and the Thirty Years' War in the seventeenth. Poverty increased substantially in the sixteenth century, and stagnated in the eighteenth and early nineteenth centuries. This pattern is broadly in line with a Malthusian model of the preindustrial economy, but also with several other explanations of poverty. Circa 1600, poverty and inequality extraction were at a historical peak – right when social conflict erupted in Germany.

Keywords: inequality, poverty, preindustrial Germany, inequality extraction

JEL: N33, I32, J10

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Introduction

The reduction in the prevalence of poverty is typically seen as a key feature of the transition from preindustrial societies to modern, industrial ones (Allen 2003; Clark 2007; Galor 2011; Koyama and Rubin 2022). Yet we know surprisingly little about the prevalence and the extent of poverty before the Industrial Revolution, that is, for most of human history. To date there exist no macroeconomic estimates of the extent of poverty in almost any preindustrial European society.[2]

In this paper we measure the prevalence and the extent of poverty from the late Middle Ages until the early Industrial Revolution. We do this for Germany, one of the largest and most populous European regions. This area has exceptionally rich historical data, allowing us to measure the share of wealth held by the poor strata of society and the prevalence of households that were propertyless.[3] Moreover, the long time span for which German data are available makes it possible to observe the impact of two major shocks on poverty: the Black Death in the fourteenth century and the Thirty Years' War in the seventeenth century. The latter event was nothing less than the most destructive war in European history, mostly fought on German soil (Wilson 2009). In addition to measuring the extent of poverty, we also estimate how inequality developed in relation to the overall level of economic development, because rising inequality might be experienced very differently in a shrinking or in a growing economy. Several hypotheses exist about the patterns and drivers of preindustrial poverty in Germany, such as Malthusian population growth, resource extraction by elites, ungenerous Protestant welfare reforms, inheritance institutions or deficient economic growth. We confront these hypotheses with the data we generate to provide a tentative explanation of the development of poverty in preindustrial Germany.

We begin by calculating several macro-level indicators of relative and absolute poverty, from the Black Death until the beginning of Industrialization in the nineteenth century. Specifically, we calculate the prevalence of the 'fiscal poor' (those that local administrations

[2] There exist four datapoints of the extent of poverty in England before 1800 (Broadberry et al. 2015: 329) and estimates of relative poverty in three Italian pre-unification states in the early modern period (Florentine State, Sabaudian State and Repoublic of Venice – for the latter, also estimates of absolute poverty are available. Alfani and Di Tullio 2019: 87; Alfani 2020: 37). To these, a recent paper adds information for the southern Low Countries (Alfani, Ammannati and Ryckbosch 2022).

[3] Large and systematic data on the prevalence of poor and propertyless households are not usually available, because these parts of the population are often exempt from wealth taxes, in the past as well as in the modern day. Regarding the absence of large parts of the poor from tax registers in preindustrial England, see Alfani and Garcia-Montero (2022). In contemporary Germany, it is only possible to infer the wealth held by poor strata from survey data, from the 1970s onwards (see Albers, Bartels and Schularick 2022).

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considered too poor to pay taxes) as well as of the relative poor (defined by their position in the observed wealth distribution) (Alfani 2020). In addition, we estimate the wealth shares of poor classes and compare them with the shares of middling and rich classes (see Piketty 2020). We also calculate the 'poverty gap', an indicator of the severity of poverty (Deaton 2005). The data underlying our calculations come from household-level wealth distributions, aggregated at the macro-level to reflect general trends across Germany, recently published by Alfani, Gierok and Schaff (2022). To this, we add newly-collected data about propertyless households. To address potential critiques about the use of wealth as a poverty indicator instead of income, we show that absolute wealth followed the same pattern as recent estimates of per capita GDP and real wages in Germany.

We confront our results with several theories of poverty development, especially the Malthusian model of the preindustrial economy (see Abel 1967; Clark 2007; Pfister 2020). Estimates of per-capita GDP suggest that, for most of the period that we cover, Germany was on average relatively poor compared to England and the Northern Low Countries, the leading economies in the Little Divergence, but even compared to central-northern Italy. We connect this information to our overall inequality estimates by calculating inequality extraction ratios, following the approach introduced by Milanovic, Lindert and Williamson (2011) and recently applied to other areas of preindustrial Europe (Alfani and Ryckbosch 2016; Malinowski and van Zanden 2017; Alfani 2021). We discuss the implications of our findings for recent historical debates about the socio-economic forces that led to social conflict in Germany in the run up to the Thirty Years' War (Schaff 2023).

Our macro-level estimates reveal that in Germany, poverty ebbed and flowed substantially over the five centuries we analyse. We detect four broad phases. First, after the Black Death poverty declined. This was followed by a period of substantial increase of poverty, until a peak around 1600. At that time almost a quarter of the German population was poor, as measured by the poverty share, about 12 percent were propertyless, and the poorest 20 percent of the population owned only about 0.4 percent of total property. During the seventeenth century, and especially after the Thirty Years' War (1618-48), poverty declined again, by 73 percent in terms of propertylessness. These dramatic changes were followed by stagnation or a modest increase in poverty in the eighteenth and early nineteenth centuries. However, the poverty patterns we observe differ according to the measure employed. Our estimates of the severity of poverty in preindustrial Germany are similar those for modern

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developing economies. Our poverty estimates fit a Malthusian model of the preindustrial economy relatively well. But hypotheses about the relationship between increasing fiscal extraction, Protestant welfare reform, and poverty, particularly in the sixteenth century, are also compatible with our data. Similarly, poverty reduction due to the onset of modern economic growth could be part of the explanation for the pattern we observe in the eighteenth century.

Our estimates of the inequality extraction ratio – a metric that can be interpreted as expressing how people actually experienced inequality – indicate that during the sixteenth century, Germany evolved into a society marked by increasing inequality coupled with diminishing prosperity, at a rate surpassing that of any other European region for which we have comparable data. The increase in inequality in relation to prosperity coincided with an intensification of social conflict, namely more frequent urban and rural rebellions, right before the outbreak of the Thirty Years' War. This connection between growing inequality extraction and social conflict has also been reported for modern developing countries (see Milanovic, Lindert and Williamson 2011).

This paper contributes to three streams of literature. It is primarily a contribution to the growing literature on preindustrial inequality (Lindert 1986; Van Zanden 1995; Alfani 2015; 2021; Lindert and Williamson 2016; Scheidel 2017; Alfani, Gierok and Schaff 2022; Schaff 2024),[4] and more specifically to the few recent studies that focus on inequality from the bottom end of the income and wealth distribution, namely on poverty (Broadberry et al. 2015; Alfani and Di Tullio 2019; Alfani 2020; Alfani, Ammannati and Ryckbosch 2022; Schaff 2025).[5] We bring a large amount of new data to this debate, estimating poverty over a long time period and with several different measures for a key area of Europe. Our findings extend an older social history literature, which provided poverty estimates for single places or years, but that failed to provide systematic estimates for the broader German area over the long run (see Dirlmeier 1978; Fischer 1982; Wehler 1987; Jütte 1994). We also contribute to the historical inequality literature by showing that different inequality measures can generate very different patterns: in preindustrial Germany, top and middling wealth shares changed relatively little, while all our poverty measures show substantial changes over time.

[4] This literature is connected to a much wider debate about the development of inequality in history. See Kuznets 1955; Piketty 2014; 2020; Roine and Waldenstrom 2015.

[5] For older studies of preindustrial poverty in Germany, that are, however, much less systematic and based on much smaller datasets, see for example Dirlmeier 1978; Fischer 1979; Jütte 1994.

Ultimately, our estimates are broadly in line with an established theory of poverty in preindustrial times, rooted in the Malthusian framework (Postan 1966; Abel 1967; Clark 2007; Pfister 2020). Yet, hypotheses about the impact of taxation, Protestant welfare reform or economic growth on poverty are also compatible with our data in some periods (Schulze 1980; Schaff 2025; Allen 2003). Overall, no hypothesis fits our data for the whole period of study, so we emphasise the need for more elaborate theories of preindustrial poverty, taking into account multiple forces.

Second, the paper contributes to the growing body of literature on living standards in preindustrial Europe (Allen 2003; Bolt and Van Zanden 2014; Broadberry et al. 2015). Recent research has substantially improved our knowledge about the economy of preindustrial Germany (Pfister 2017; 2022). However, much of this literature centres on estimates of urbanization, real wages, or GDP per capita. These indicators of economic development only inform us indirectly about the wellbeing of poor classes, because they ignore the distribution of prosperity among households. Our estimates fill an important gap in the literature because we put the wellbeing of the poor classes at the centre of analysis

Third, our paper contributes to the historiography of early modern Germany and Europe. Especially the sixteenth and the crisis-ridden seventeenth century, and in particular the socio-economic forces that led to the outbreak of the biggest war in preindustrial Europe – the Thirty Years' War – are intensely debated among historians (see Kamen 1984; Ogilvie 1992; Wilson 2008). Our finding that Germany, in the run up to this conflict, experienced a massive increase in poverty and a fast increase in inequality in relation to society's overall level of prosperity provides new material for these debates. We also provide further nuance to the literature on the post-Black Death agrarian crisis in Europe (Abel 1976; Meuthen 2006; Jedwab, Johnson and Koyama 2022), by showing that moderately poor strata in rural areas experienced a relative decline in their economic situation, contrary to very poor strata who saw an improvement.

The rest of the paper is organized as follows. Section 2 reviews existing theories and evidence about poverty in preindustrial Germany. In Section 3 we give an overview of the data we have collected and evaluate the representativeness of our sample. We also discuss to what extent information about wealth can be informative about poverty. In Section 4 we present our estimates of poverty, using different poverty indicators and comparing the poor to

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middle and rich classes. In Section 5 we present inequality extraction ratios, to investigate how Germany's high inequality developed in relation to its poverty or economic backwardness. Section 6 concludes.

Theory and Evidence of Poverty in Preindustrial Germany

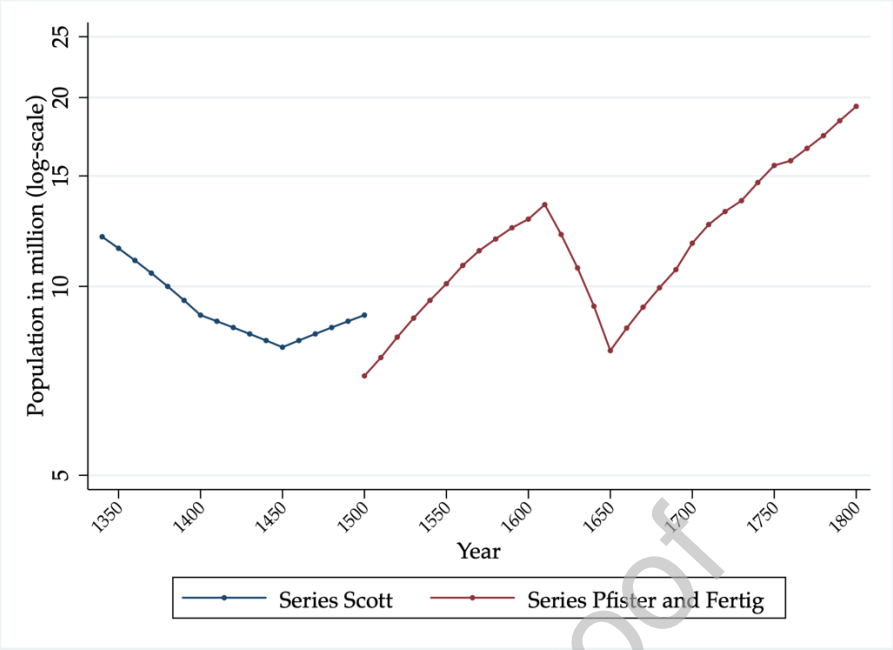
Most scholarship on poverty in preindustrial Europe and Germany assumes, implicitly or explicitly, a Malthusian model of the economy.[6] This theory explains poverty primarily with population development: because productivity growth is almost absent in the preindustrial period and the main factor of production, land, is fixed, agricultural output is relatively constant. This, the argument goes, leads to a positive correlation between population growth and the extent of poverty: when the population increases, so does poverty; when the population decreases, poverty goes down too. Three mechanisms drive this positive correlation. First, a growing population increases labour supply and reduces the wages of workers. Second, a growing population increases the demand and prices, especially of land-intensive products such as food, which reduces the purchasing power of poor households that typically spend large parts of their budget on foodstuffs. Third, recent research suggests that partible inheritance, which was practised in wide parts of preindustrial Germany, may have increased poverty, especially when the population was growing. This because partibility fostered an increase in the number of those households that owned little land, which was the main component of personal property in an agricultural economy (Abel 1967; Rodepeter 1998; Pfister 2020; Ogilvie and Schaff 2024; see also Postan 1966; Clark 2002).[7]

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[6] For a review of some of the theories aiming at explaining preindustrial poverty see Alfani (2020).

[7] The effect of partible versus impartible inheritance on inequality and poverty is debated. Traditionally, scholars assumed that *impartible* inheritance increased poverty and inequality, compared to partible inheritance (Stiglitz 1969; Ekelund, Hébert and Tollison 2002; Pfister 2020). Research by Wegge (2021) and Bartels, Jäger and Obergruber (2024) has shown that this hypothesis holds in late nineteenth-century Germany, that is, in the context of an industrialising and modernising economy and society. However, recent research by Ogilvie and Schaff (2024) shows that *partible* inheritance may have increased poverty and inequality in preindustrial times. The main mechanism behind this seemingly counterintuitive result is that the European Marriage Pattern limited marriage and household formation to those who could demonstrate an independent livelihood in premodern times. Partible inheritance, therefore, may have facilitated household formation for poor strata, thus increasing inequality from the bottom end of the wealth distribution. See also Alfani (2015) for the hypothesis that partible inheritance may increase inequality in certain preindustrial contexts.

Figure 1 – German population c. 1340-1800 (million; log scale)



Notes: Population figures for preindustrial Germany. Data for 1340-1500 from Scott (2000: 57), for 1500-1800 from Pfister and Fertig (2010: 5; 2020: Appendix 2). Missing values were linearly interpolated.

Germany's population mostly grew from the late Middle Ages until the nineteenth century. This growth was only interrupted by two major shocks causing population losses of 30 to 50 percent:[8] the Black Death (1348) and the Thirty Years' War (1618-48) (Figure 1;[9] see also Abel 1967; Outram 2001; Pfister and Fertig 2010). If the Malthusian model can explain the development of poverty, we would expect four distinct phases of poverty development that mirror the population figures. First, we would expect to see a reduction of poverty in the late Middle Ages following the Black Death; second, an increase of poverty from about the fifteenth century until the beginning of the Thirty Years' War; third, a reduction of poverty after the war until the late seventeenth century; fourth, an increase of poverty during the eighteenth century during the run up to the Industrial Revolution (see Abel 1967; Kocka 1990; von Hippel 2013; Pfister 2020). However, recent research shows a Malthusian disequilibrium emerging in eighteenth-century Germany, that is, a weakening of the relationship between population size and material welfare, before the establishment of a post-

[8] The data from Scott (2000) indicate that the German population might have been reduced by about one third after the Black Death. More recent research suggests, however, that the decline may have even been higher, up to about 50 percent, and that local mortality rates may have exceeded even that number (Wilson 2017: 494; Alfani, Gierok and Schaff 2022: 106). For the Thirty Years' War, instead, there seems to be a consensus among historians that it reduced the German population by about 40 percent (Outram 2001).

[9] The two series reported in Figure 4 have been obtained with different data, methods and taking different boundaries for Germany. The absolute figures should therefore not be compared, but the trends are nevertheless informative.

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Malthusian regime in the nineteenth century (Pfister and Fertig 2020).[10] So we would not be surprised to find a similar weakening in the correlation between population size and poverty already in the eighteenth century.

There exist other hypotheses with implications for the development of poverty in preindustrial Europe and Germany. For example, Schulze (1980: 67-9, 72) suggests that increasing taxation of the emerging states within sixteenth-century Germany led to an increase in poverty (on this topic, see also Alfani and Di Tullio 2019; Schaff 2023; Gierok 2023). This argument was made only for a specific historical episode, but if it had explanatory power, we would expect poverty also to rise in the eighteenth century, when state formation and state-level taxation picked up in Germany (Ogilvie 1996: 266; Schilling 1994: 21). Another strand of literature emphasises the welfare reforms brought about by the Protestant Reformation, introduced in wide parts of sixteenth-century Germany (Jütte 1994; Kahl 2009; Dittmar and Meisenzahl 2020). These reforms excluded substantial parts of the poor population from social welfare and increased poverty in Protestant areas, which may have increased aggregate poverty in Germany from the sixteenth century onwards (Hartung 1989; Schaff 2025).

Other scholarship addresses poverty only indirectly. For example, Allen (2003) suggests that poverty reduction was a function of growing overall living standards in early modern Europe, for example, as measured by GDP per capita (see Dollar and Kraay (2002) for the same argument in modern economies). Although Allen does not actually measure poverty, the implication of his work would be that Germany should have experienced considerable poverty reductions in times of economic growth, such as in the seventeenth or from the eighteenth century onwards (see Pfister 2022). However, there are at least two reasons why this intuition, of aggregate growth almost mechanically benefitting the poor, does not always hold. First, it is conceptually wrong to make automatic inferences about distributive dynamics from the mean of a development indicator, such as GDP per capita, as demonstrated by recent research on preindustrial inequality (Alfani 2021). For example, it is entirely possible that a policy or an institution generates aggregate growth, but at the same time substantially harms poor strata economically so that growth is insufficient to

[10] Better integration of grain markets and the expansion of non-agricultural sectors that mitigated the effect of declining marginal output in agriculture on household income might explain this beginning breakdown of the Malthusian equilibrium (Pfister and Fertig 2020).

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compensate poor strata for their losses.[11] Second, in a Malthusian context, economic growth induces demographic expansion, which in turn tends to push the income of the lower strata towards subsistence. This may increase poverty, as argued above.

What does the evidence say? Unfortunately, it is piecemeal at best. There exist a few single estimates of poverty in single places and years, usually coming from tax registers (see, for example, Fischer 1982: 17-18; Wehler 1987: 193; Jütte 1994: 47), but no comprehensive reconstructions. To our best knowledge there exist no macro-estimates of poverty at the household level that would make it possible to identify general trends over the preindustrial period. This is true for Germany, but also for most other European countries before 1800.[12] This lack of evidence is surprising because the reduction of poverty is typically assumed to be one of the key characteristics distinguishing the preindustrial from the industrial period (Allen 2003; Clark 2007; Galor 2011; Koyama and Rubin 2022). This paper contributes to filling that gap for preindustrial Germany, by reconstructing several measures of poverty (relative and absolute), based on a large amount of household-level data from town- and village-level tax registers. We also show how Germany's high inequality developed in relation to the economy's overall poverty.

Data & Representativeness

The macro-level poverty estimates we construct for Germany build on the national wealth distributions published by Alfani, Gierok and Schaff (2022), who studied overall inequality by means of the Gini coefficient only. We add to these distributions a new, substantial body of evidence on propertylessness at the household level.[13] The resulting database covers a total of 27 cities and 76 rural communities.[14] To measure poverty in modern times, scholars usually employ household-level income or consumption expenditure and price data that are

[11] Schaff (2025) shows that the Protestant Reformation in sixteenth- to nineteenth-century Germany was such a policy change, making large parts of the poor population economically worse off, although the Reformation may have generated economic growth in the aggregate (see Becker and Woessmann 2009).

[12] Data on the long-run development of poverty is available for few European regions only. For England, see Broadberry et al. (2015: 329), for Italy and the Low Countries, see Alfani (2020: 37).

[13] We collect information on the share of propertyless households for 20 urban and 69 rural communities, from primary and secondary sources (see Alfani, Gierok and Schaff (2022: Appendix) for a list of the sources). We then calculate national-level averages of the share of propertyless households, weighting urban and rural communities by an assumed urbanization rate of 10 percent. This procedure yields a time series of the prevalence of propertyless households across Germany, which we then added to the national-level wealth distributions of Alfani, Gierok and Schaff (2022) to calculate our four poverty measures.

[14] The replication data for the figures in this article can be accessed on openicpsr (https://doi.org/10.3886/E210402V1). See Alfani, Gierok and Schaff (2024).

comparable across time and space. These types of data make it possible to set an absolute poverty threshold and calculate the share of the population falling below that threshold (see for example Koyama and Rubin 2022). This is not usually possible for preindustrial societies, because such comparable household-level income, expenditure and price data are not available. We therefore use wealth distributions and a number of relative poverty thresholds (explained below), which make it possible to calculate estimates of relative poverty. These relative poverty measures are also increasingly used by today's policy makers, probably a result of relative wellbeing being increasingly seen as a relevant factor in policy decisions (Alfani, Ammannati and Ryckbosch 2022).[15] We validate our findings with an alternative absolute measure of poverty – fiscal poverty or propertylessness, interpreted as severe poverty – *and* provide several pieces of evidence suggesting that trends of absolute wealth and income were similar over time. This makes it unlikely that the trends in poverty would differ, if the kind of data available for calculating poverty in modern societies were available for the preindustrial period. Yet our data does not allow us to systematically estimate what poverty 'meant', for example, in terms of consumption baskets.

As this paper traces long-run trends for Germany as a whole, the representativeness of the sample is crucial. How representative are the selected localities in terms of geography, population size, economic performance and institutional characteristic? The following section assesses the urban sample's representativeness with respect to the universe of German cities – for which no information about poverty has been available until now – comprised in Bairoch, Batou and Chèvre (1988) and De Vries (1984).[16] Economic statistics are taken from Pfister (2022), institutional data are taken both from Wahl (2016) as well as the *Deutsches Städtebuch* (Keyser 1939-1972).

Geography

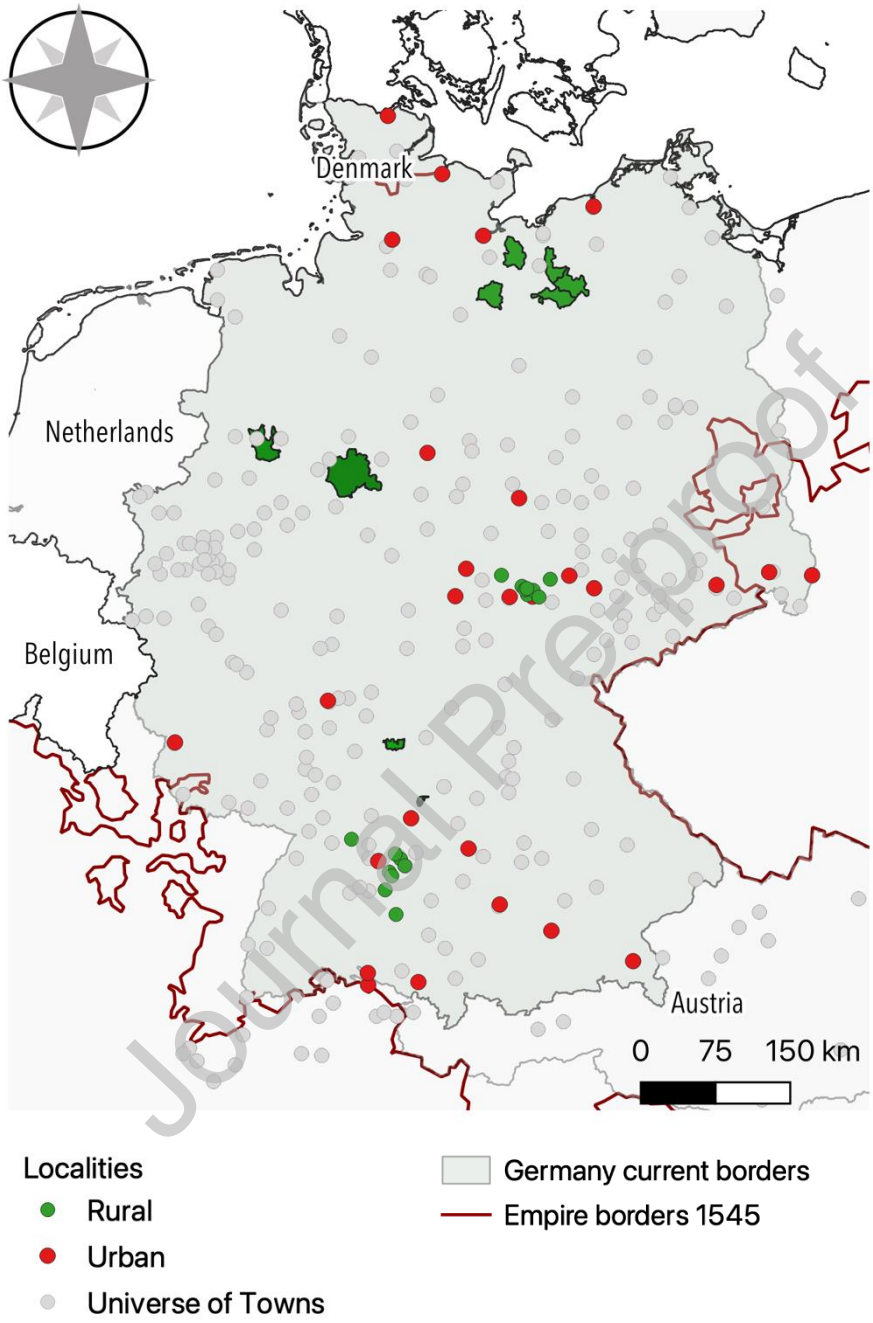
Figure 2 shows the geographic representativeness of our urban sample (red) compared to the universe of German cities included in Bairoch, Batou and Chèvre (1988) and De Vries (1984) (grey dots). The map shows that our urban sample is geographically representative of the universe of cities. The only area lacking representation is the north-west (North Rhine-Westphalia). However, this does not substantially bias our results in the other dimensions,

[15] For example, the European Union considers 60 percent of median income as poverty threshold, a relative measure similar to the ones we employ (see Alfani, Ammannati and Ryckbosch 2022).

[16] At the current state of research, it is impossible to assess the representativeness of the rural part of our dataset, since the universe of rural localities in preindustrial Germany has not been studied systematically yet. For that reason, no descriptive statistics exist to which we could compare our rural sample.

that is, in terms of population size and institutional characteristics. Figure 2 also shows the geographic distribution of our rural sample in green.

Figure 2 – Geographic Representativeness of Sample of Pre-Industrial German Communities



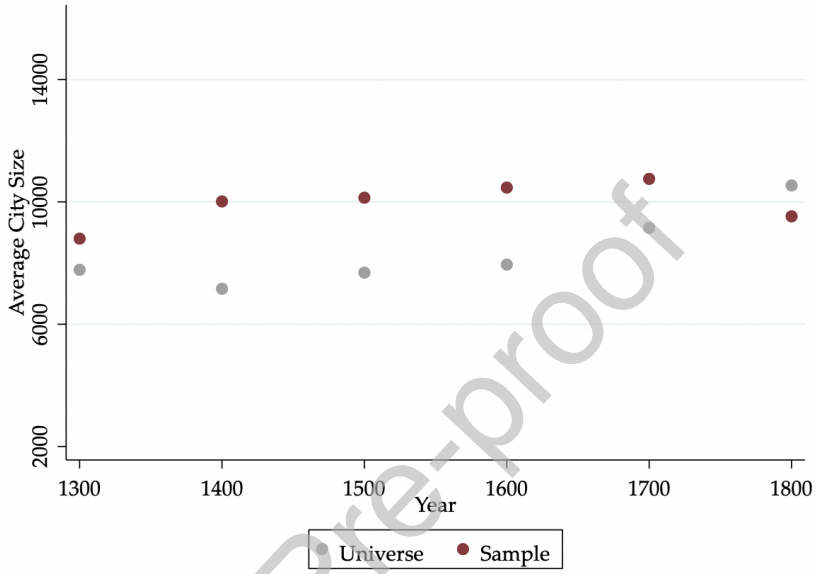
Notes: The figure shows a map of the Holy Roman Empire (borders around 1545). Grey dots denote all towns included in the *Deutsches Städtebuch* ('Universe'), red dots denote all towns included in our sample, and green dots/areas denote rural communities included in our sample.

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Population Size

Comparing average city size in each century in our sample to the reference universe shows that the sample comprises slightly larger cities on average than the reference universe – see Figure 3. However, these differences are small in absolute terms; the sample cities are on average 1,500 inhabitants or about 17 percent larger.

Figure 3 – Average City Size per Century in Sample and Universe, Germany, c. 1300-1800



Notes: Century-averages of the population in towns in an extended version of the 'Bairoch-dataset' over the period of analysis. The 'Universe' is all towns included in the extended Bairoch-dataset. The 'Sample' includes only those towns that are included in our dataset.

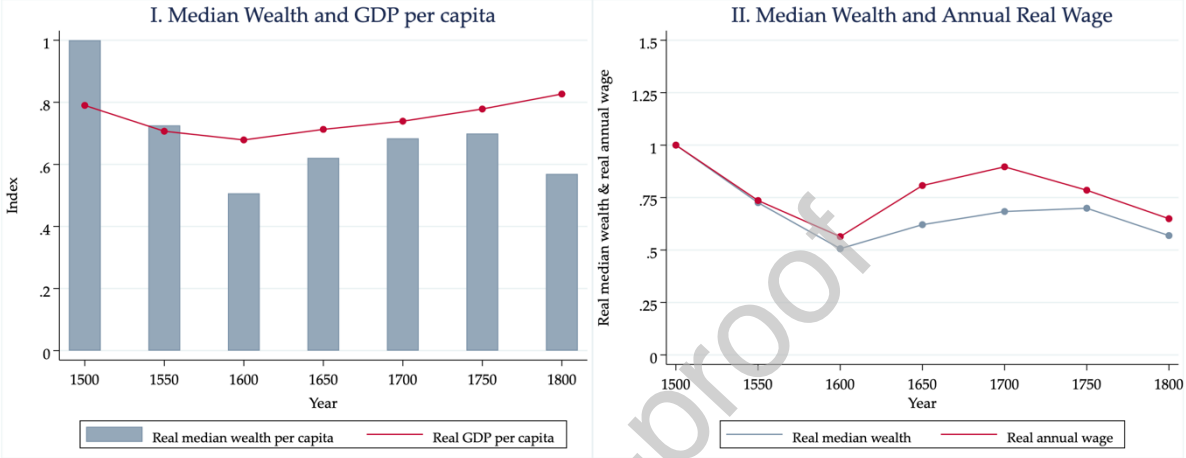
Economic Performance: wealth and income measures as close correlates

The aim of this paper is to estimate poverty and inequality extraction ratios in preindustrial Germany. For our results to be representative, the economic performance of the localities in our sample should be similar to Germany's overall economic performance and wealth should be a good proxy for income. We provide evidence that both of these conditions are met. First, we show that our sample provides overall a representative picture of the economic dynamics at play in preindustrial Germany. As no regional or local estimates of GDP per capita exist, we calculate real average household wealth for our sample based on the information obtained from tax registers.[17] We compare our results with real GDP per capita estimates published by Pfister (2022). Figure 4 (Panel I) shows both measures. Real average household wealth of

[17] For the details of this calculation see Gierok (2023). Given that information on local currencies and tax rates is needed for these calculations, this measure could not be calculated for all cities in the sample. In total, we calculated average household wealth for 20 of the 27 cities in the sample.

urban communities follows a similar trajectory to real GDP per capita until the second half of the eighteenth century. The Pearson correlation coefficient for these two measures is 0.35 (and much stronger, at 0.80, when excluding the year 1800) confirming that macroeconomic trends in Germany are reflected in our sample as well.

Figure 4 – Comparison of Wealth, Wages and GDP per capita, Germany, c. 1500-1800



Notes: Panel I: Data for real GDP per capita from Pfister (2022). Pfister's series is indexed in the year 1850; whereas our series is indexed in 1500. Panel II: Real wealth has been calculated using Pfister's (2022) CPI consumption basket. Annual wage was calculated by multiplying Pfister's (2022) daily wage data with the number of days worked assumed to be 180 in any given year. Both, Pfister's and our series are indexed 1500 = 1.

Second, we show that wealth trends are a good proxy for income trends. While no household-level income distributions exist for the Holy Roman Empire, evidence on the daily wages of unskilled urban male labourers is available (Pfister 2017). Therefore, we can compare the trend in estimated annual real wages of unskilled labourers across Germany with the trend in median household wealth in our sample. As Figure 4 (Panel II) shows, the rise and fall in real wages is mirrored by the rise and fall of median wealth. The partial correlation coefficient (controlling for the effect of having the same deflator) is 0.85, which suggests a strong relationship between wealth and income in preindustrial Germany. This evidence is further strengthened by examining how wealth was assessed and taxed in preindustrial Germany. In contrast to wealth tax registers from other areas in central and southern Europe (Alfani 2021), German registers have a useful feature: they recorded not only real estate but also movable goods, including merchants' inventories and financial wealth such as annuities and shares in mines and other commercial endeavors. Consequently, our taxable wealth captures most

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income-generating assets and it is therefore unsurprising that wealth and income follow very similar trends.

Finally, there is evidence from other European regions that show a close correlation between taxable wealth and income. For example, exceptional sources in early modern Spain show that wealth and income were highly correlated (Palencia and Nicolini 2016, Fernandez and Santiago-Caballero 2018). For all these reasons, our results, which technically concern wealth-poverty only, can reasonably be taken as indicative of poverty *in general*.

Institutional Characteristics

Lastly, we compare our sample to the reference universe in terms of political institutions and religious affiliation. Political institutions are considered via two variables: whether or not a city had Imperial City status and whether it had some form of participative government.[18] The Imperial Register (*Reichsmatrikel*) of 1521 lists 85 cities as Imperial or Free Cities.[19] The information on participative government is taken from Wahl (2016) who records three types of participative institutions.[20] Finally, religious affiliation is assigned based on the information in the *Städtebuch*. A city is considered 'Protestant' if it introduced the Reformation and 'Catholic' if it did not. It is considered 'Mixed' if it introduced the Reformation but was re-catholicized later on or if a substantial share of Catholics continued to live within the city.

The results of these comparisons are presented in Table 1. Overall, the sample and reference universe are comparable. Imperial Cities and cities with guild participation are slightly overrepresented in our sample. It is a well-known historical fact that Imperial Cities had greater administrative autonomy, which could be captured by elites for their own material benefit (see Schaff 2024). However, to the best of our knowledge, there existed no systematic difference in poor relief provision between Imperial and territorial cities (see Isenmann 2014). Moreover, excluding Imperial Cities from the sample would eliminate a historically important group of towns, diminishing the representativeness of our results. Similarly, it is

[18] Broadly speaking, there existed two types of cities in the Holy Roman Empire: Imperial Cities and territorial cities (for a more detailed exploration of city types and legal distinctions see Isenmann 2014: 281ff). While Imperial Cities only recognized the Emperor as their immediate overlord, territorial cities were under the control of a territorial lord, such as a prince, baron or bishop. This implied that Imperial cities had greater autonomy, similar to city-states in other parts of Europe (Isenmann 2014: 300ff).

[19] We do not take into account in the constitutional status of cities. If a city was listed as an Imperial City in the Imperial Register in 1521, it is designated as such for the entire period of analysis, even if it lost its status after 1521.

[20] We designate a city as having city council elections if Wahl (2016) registers this city as having city council elections at least once over his period of analysis. We code the other two variables in Wahl's (2016) sample, burgher representation and guild participation, in the same way.

true that the market restrictions upheld by guilds benefitted guild members at the expense of outsiders – in particular women, Jews and other marginal groups. It is likely that this had implications for the scale of poverty in cities dominated by guilds. However, guilds were important special interest groups in practically all cities, enjoying privileges and imposing market restrictions even in those places where they were not formally represented on the council. This makes it unlikely that guild representation on the city council can account for large differences in poverty levels between cities (Ogilvie 2014a).

Table 1 – Institutional Characteristics: Sample vs. Universe of Pre-Industrial German Towns

Measure	Sample	%	Reference Universe	%
City Status				
Imperial City	10	37.1	40	13.9
Territorial City	17	62.9	247	86.0
Religion				
Protestant	22	68.4	193	67.3
Catholic	4	23.7	42	14.6
Mixed	1	7.9	50	17.4
Participative Government				
Elections	2	8.3	78	27.18
Institutionalized Burgher Representation	14	58.3	126	43.9
Guild Participation	13	54.2	99	34.5

Notes: Institutional characteristics in our sample and the universe of preindustrial German towns. For the two cities in the reference universe of Mecklenburg and Brünn data on religious affiliation was unavailable. The numbers and percentages of the government measure are not meant to be added up since towns can have none, one, two or all three of the characteristics listed here. For the sample, that means the percentages are calculated by dividing the number of cities with that criteria by the total number of cities in our dataset for which information on governmental institutions are available in Wahl (2016).

Description of the rural sample

The rural sample covers 76 communities across Germany in nine geographic areas: the counties of Tecklenburg, Lippe and Wertheim, the parishes of Boizenburg, Crivitz-Parchim, Gadebusch and Neustadt in Mecklenburg, the rural areas around Mühlhausen in Thuringia, Dresden and Wangen as well as Wildberg and Eckartsberga. The latter are classified as rural due to their small population size. Except for Wangen and its surroundings, all rural areas in

this sample later adopted Protestantism. The parishes in Mecklenburg are located in an area characterised by the 'second serfdom'. However, even serfs owned property in Germany, and although they were unfree, being subject to restrictions on mobility, marriage and market access, and having to render coerced labour to their landlord, they paid taxes to the state (Ogilvie 2014b).[21] Consequently, tax registers cover serfs (see Hagen 2002: 208-9), allowing us to estimate inequality among the free and unfree population.

Poverty in Pre-Industrial Germany: First Long-Run Estimates

Methods

In general, there are two ways to define poverty: the absolute poor, i.e. those below a minimum level of resources however defined, and the relative poor, i.e. those below a threshold value set in relation to the overall distribution of wealth or income. This study will provide long-run estimates of both, based on the household-level wealth distributions constructed by Alfani, Gierok and Schaff (2022). The main reason why we mostly focus on relative definitions of poverty are data limitations: information about income, consumption expenditure and prices needed to calculate the cost of living of the poor is not systematically available in the preindustrial period, as explained above. The following section introduces the four poverty measures that form the basis of our analysis: relative poverty will be measured via the wealth shares popularized by Piketty (2014). We also follow the more traditional approach of setting a poverty line (Ravallion and Bidani 1994), to calculate poverty shares and the Poverty Gap Index (PGI), a measure of the severity of relative poverty (Foster, Greer and Thorbecke 1984). The extent of absolute poverty will be measured by estimating the share of the fiscal poor (or propertyless).

Measure 1: Wealth Shares of Poor Classes

To get a first impression of the development of poverty in Germany between the Black Death and the Industrial Revolution (1350-1800) we calculate wealth shares of poor classes and, for comparison, of other parts of the population. We start by following the approach introduced by Piketty (2014) and divide the population based on their position in the wealth distribution: the bottom 50 percent of the population represent poor classes in economic terms; the top 10 and top 1 percent of the population represent the 'rich', and the parts between rich and poor,

[21] The dominant form of serfdom in early-modern Germany was 'estate subjection' (*Erbuntertänigkeit*), but also the stricter 'personal bondage' (*Leibeigenshcaft*) existed. However, the difference between the two systems was not whether serfs owned landholdings that could have been listed in tax registers, but rather how secure their ownership rights were. In strict serf systems the landlord could eject the unfree holder at will. But under both forms of serfdom serfs occupied independent households, farmed their own land, practised crafts and commerce, laboured for wages and paid taxes to the state (Ogilvie 2014b).

that is, deciles six to nine of the population, represent the 'middle class' (Piketty 2014). But since the bottom 50 percent is a very broad definition of poverty, we also report estimates for a narrower group, namely the bottom 20 percent (Dollar and Kraay 2002; Schaff 2025). Wealth shares capture inequality and poverty as the loss or gain of wealth of some part of the population, and not as changes in the whole distribution. They indicate how poor or rich different parts of the population were. Compared to the Gini coefficient, a widely used inequality indicator, wealth shares have the advantage of being more intuitive, making it easy to assess the magnitudes of change in the estimates (Alvaredo et al. 2013).

Measure 2: Extent of Relative Poverty

The second measure we employ is a standard measure of relative poverty that is able to capture the extent of poverty ('how many were poor?'). This measure crucially relies on defining a relative poverty line. Poverty lines are threshold values, expressed either in absolute monetary terms (absolute poverty lines) or in relative terms, that is as a percentage of the median income or wealth (relative poverty lines), below which a household is considered poor (Ravallion and Bidani 1994; Haughton and Khandker 2009: 39-45). Once the poverty line is defined, the share of households below this line can be easily calculated. Formally:

$$H = \frac{q}{N} = \frac{1}{N}\sum_{i=1}^{N} I\,(w_i < z)$$

where H is the headcount index, q is the number of poor households, N is the total number of households, w_i is the wealth of household i, and z is the poverty line (Haughton and Khandker 2009: 68-69). I is an indicator function that equals 1 if its argument is true and 0 otherwise – that is we only sum up households whose wealth is below the poverty line z. The choice of poverty line z is discussed below. The interpretation of H is straightforward as it simply records the share of households below the defined poverty line, ranging between 0 and 1.

Measure 3: Severity of Relative Poverty

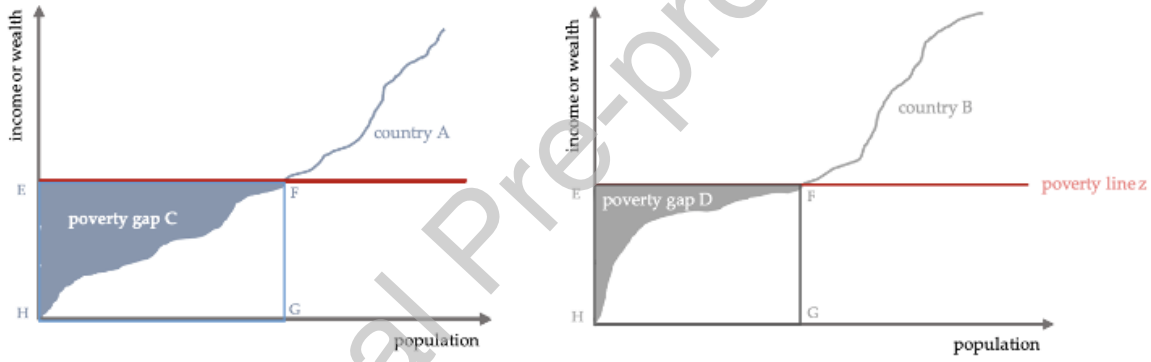
The third measure is another measure of relative poverty, but one that captures the severity of poverty ('how poor were the poor?') and not just its extent. This measure is commonly referred to as the Poverty Gap Index (PGI). Formally:

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$$PGI = \frac{1}{N} * \sum_{i=1}^{q} (\frac{z - w_i}{z})$$

where N is the total population, q is the total population of poor below the poverty line, z is the poverty line and w_i is the wealth of individual i (adapted from Haughton and Khandker 2009: 70). As Figure 5 shows, the PGI can be understood as the size of the area between the poverty line and the observed wealth (or income) distribution. The PGI varies between 0 and 1. For interpretation, note that the PGI can increase even when the prevalence of the poor is kept constant, by moving households further away from the poverty line, i.e. towards abject poverty. The PGI allows to assess whether stable poverty shares hide underlying changes in the intensity of poverty.

Figure 5 – Visual Representation of the Poverty Gap Index



Notes: These graphs depict the poverty gap in two fictitious countries (A and B) illustrating the total shortfall in income or wealth needed to lift individuals above the poverty line. Country A has a larger poverty gap (blue area C), indicating more people below the poverty line and in more severe poverty, i.e. farther from the poverty line, while Country B has a smaller gap (grey area D), showing less people below the poverty line and also less severe poverty. The difference in the size of the shaded areas highlights the severity and extent of poverty in each country.

Measure 4: Extent of Absolute Poverty

The fourth measure we employ is one of absolute poverty. It captures the share of households labelled as propertyless or 'too poor to pay taxes' by early modern tax authorities. We call these the fiscally poor and define their share as:

$$F = \frac{f}{N} = \frac{1}{N} \sum_{i=1}^{N} I\,(w_i < t)$$

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where F is the fiscal poor headcount index, f is the number of fiscally poor households, N is the total number of households, w_i is the wealth of household i, and t is the wealth tax threshold below which a household is considered too poor to be taxed. I is an indicator function that equals 1 if its argument is true and 0 otherwise – that is, we only sum up households whose wealth is below the tax threshold.[22] The calculation yields a simple percentage measure of the share of the fiscal poor. This is an absolute measure of poverty because t is fixed at a specific wealth threshold that is determined by a city's local tax authority.[23] The measure has been used by other scholars of poverty in preindustrial Germany (e.g. Dirlmeier 1978; Fischer 1982; Mollat 1984) although it has usually not been formally defined. It has also never been calculated for a large number of cities and rural communities covering a period of several centuries.

Fixing a poverty line

While for wealth shares the poverty line corresponds to the upper boundary of the second and the fifth decile of the distribution, for measures 2 and 3 we had to fix the poverty line at a proper level. Studies of relative income-poverty usually assume a poverty line set at 50 percent of the median. The limited literature available on wealth-based poverty lines has suggested that this threshold might be too high for wealth-poverty. The reason is that, in the past as today, wealth tends to be more concentrated than income, and many households will have no (net) wealth at all. Therefore, the first study using wealth data to estimate poverty in the preindustrial period (Alfani and Di Tullio 2019) adopted a poverty line of 25 percent of median wealth and compared the results with those coming from a poverty line set at 13 percent and at 50 percent of the median[24]. That study, which focused on the Republic of Venice in northern Italy, argued that both the 13 and the 25 percent poverty line tended to produce results in line with previous estimates of the prevalence of the poor based on other kinds of information. We use 25 percent of the median as our preferred estimate of what we call 'severe poverty', but we also consider a poverty line at 50 percent of median wealth to capture a condition of 'moderate poverty'. This choice of poverty lines makes sense for the German case, as the tax registers we use are usually more comprehensive than their northern Italian counterparts. They include in the assessment of taxable wealth even small belongings such as household goods, and often tax the propertyless on a per capita basis. Some of these

[22] Adapted from Haughton and Khandker's (2009: 68-69) headcount ratio formula.
[23] Note that this measure does not include homeless and travelling populations.
[24] Azpitarte (2012) proposed, for modern societies, a wealth-poverty line set at 13 percent of the median.

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tax records explicitly state that they aim to capture *all* income-generating property, including very specific types of assets, such as kitchen equipment for innkeepers. This means that the median wealth estimates in our poverty sample tend to be relatively low because virtually the entire population is covered.[25] That our choice of poverty lines is reasonable is evident when drawing on data listing wealth as well as occupation (although not income), from the city of Lübeck. Median wealth in seventeenth and eighteenth century Lübeck is around 2,000 *Lübische Mark* with the average day-labourer-household owning taxable wealth between 500 (i.e. 25 percent of the median) and 1,500 Mark (i.e. 75 percent of the median). Therefore, to capture (and to distinguish) severe and moderate poverty, poverty lines at 25 and at 50 percent of median wealth are appropriate. However, the main focus of our analysis, in line with the literature on preindustrial poverty, will be on the 25 percent threshold indicating severe poverty.

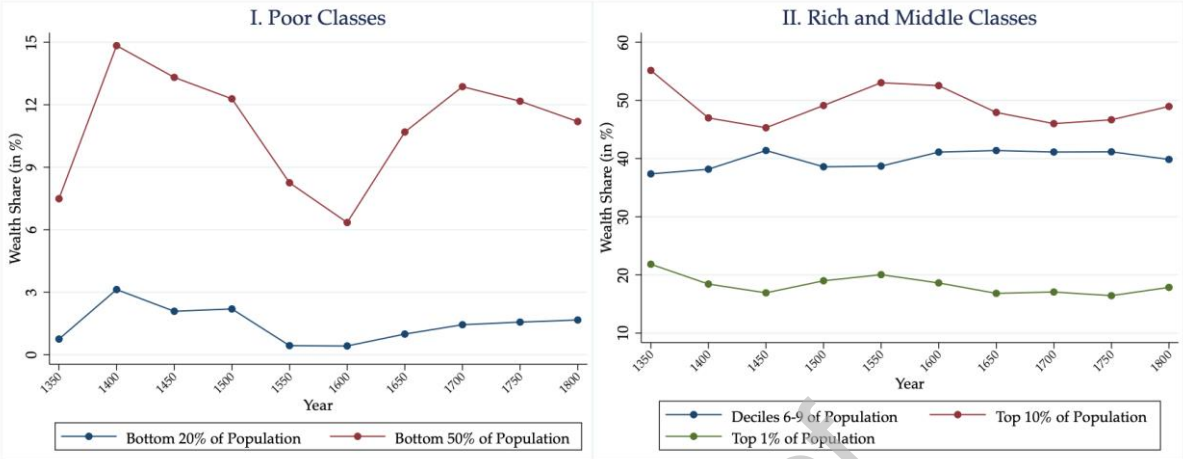
Results

Wealth Shares of Poor Classes (Measure 1)

Panel I of Figure 7 reports the wealth shares of the bottom 50 and 20 percent of the population, that is, the poor defined in a wider and narrower way. In 1350, right after the Black Death, the bottom 50 percent held about 7 percent of total wealth, corresponding to only about one-seventh of their population share. The bottom 20 percent held 0.7 percent, about one-fourteenth of their population share. Over the half-century following the epidemic these shares increased substantially, to about 15 and 3 percent in 1400. This trend inverted in the fifteenth and sixteenth centuries: the wealth share of the bottom 50 percent was more than halved by 1600, to about 6 percent, and more than quartered for the bottom 20 percent, to 0.4 percent. The second half of the sixteenth century is the low point found for these groups throughout the period covered by our analysis. This low point was followed by a rapid wealth share increase during the crisis-ridden seventeenth century, to 13 and 1 percent respectively in 1700. The eighteenth century saw a small decline (bottom 20 percent), or increase (bottom 50 percent) of the wealth shares of the poor classes, to about 11 and 2 percent in 1800, making them slightly better off than in 1350.

[25] Most of our observations have been obtained from wealth distributions of single taxpayers. However, some of our data come from secondary sources that report the distribution of wealth in synthetic tables, grouping taxpayers into wealth brackets. Synthetic tables are often the only available data source for studying inequality. They represent the overall distribution of wealth fairly well (see Alfani Gierok and Schaff: Appendix), but they can pose challenges when computing measures of poverty. For example, the grouping of taxpayers in these tables can be such that the second lowest class contains the median wealth owner. This data structure implies that fixing the poverty line at 25 percent of median wealth would yield an estimate of zero poverty, which would be a distorted representation of historical reality. To avoid such potential computational problems, we also report results adopting a 50 percent threshold. Since the results with both thresholds yield similar poverty trends, we are confident that the use of data from synthetic wealth tables does not create substantial problems for our analysis of poverty.

Figure 7 – Wealth Shares (in Percent) of Different Parts of the Population, Germany, c. 1350-1800

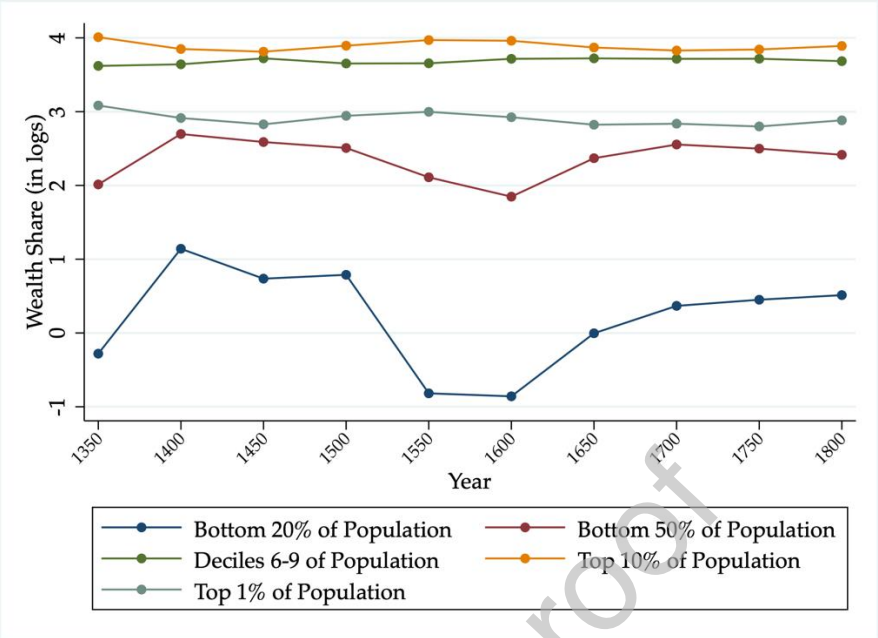


Notes: Wealth shares of poor, middle and rich classes are calculated based on the aggregate household-level wealth distributions of Alfani, Gierok and Schaff (2022). Information on the prevalence of propertyless households has been added.

For rich and middle classes (in economic terms) the picture is different. Their wealth shares are almost a mirror image of each other, and changes were less dramatic than for the poor. Overall, the middle classes' wealth share stayed around 40 percent for the whole period of analysis, which corresponds to this groups' population share, while the top 10 percent held between 55 and 45 percentage points, and the top 1 percent between 16 and 22 percentage points of total wealth.

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Figure 8 – Wealth Shares (in log-Percentage Points) of Different Parts of the Population, Germany, c. 1350-1800



Notes: Wealth shares in log-percentage points of poor, middle and rich classes are calculated based on the aggregate household-level wealth distributions of Alfani, Gierok and Schaff (2022). Information on the prevalence of propertyless households has been added.

To highlight the differences in the relative development of wealth shares, we plot the log-percentage points of rich, middle and poor classes' wealth shares in Figure 8. These calculations confirm that the poor, as measured with bottom 20 and 50 percent wealth shares, experienced substantial ups and downs during the sixteenth and seventeenth centuries, while the middle and rich classes only experienced relatively insignificant changes over the period.

In sum, we observe substantial changes in the wealth shares held by the poor: they increased massively after the Black Death and the Thirty Years' War. The sixteenth century saw a substantial reduction, and the eighteenth century stagnation. We discuss these findings in greater detail below, together with the main estimates of poverty we have constructed, as the results point into the same direction.

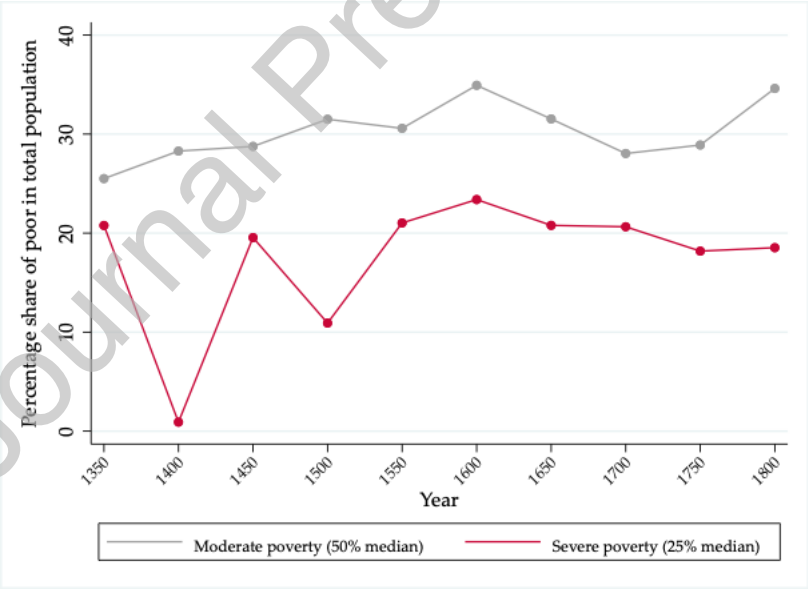
Extent of Relative Poverty (Measure 2)

Figure 9 presents our key findings on relative poverty. First, we observe that setting the poverty line at 50 percent of median wealth yields a proportion of households in relative

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poverty between 25 and 35 percent. Setting the threshold at 25 percent of median wealth yields estimates between 10 and 23 percent, with even lower values of 1 percent around the turn of the fifteenth century due to dynamics specific to rural areas (see below). Second, both poverty lines lead to broadly similar trends after 1550: a peak in poverty towards the beginning of the Thirty Years' War (1618-48) and a long-run decline of poverty in the seventeenth century. Third, the analysis reveals divergent trends before 1550 based on the chosen poverty line benchmark. Whereas relative poverty at 50 percent of median wealth increases slowly but steadily between 1350 and 1600 (bar the small drop in 1550), poverty at 25 percent of median wealth drops substantially after the Black Death in 1350. This suggests that extreme poverty, i.e. households owning less than a quarter of median wealth, is reduced substantially after the Black Death. Nevertheless, moderate poverty, i.e. households owning less than half of median wealth, increases slightly after the pandemic, a seemingly counter-intuitive result which we discuss below.

Figure 9 – Relative Poverty Shares at 50 and 25 Percent of Median Wealth, Germany, c. 1350-1800



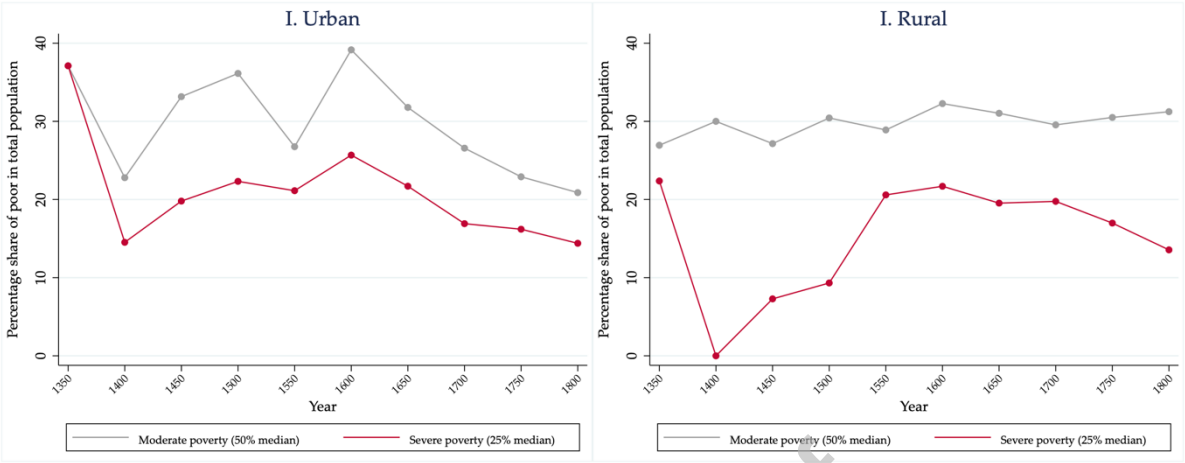
Notes: Relative poverty shares at 50 and 25 percent of median wealth are calculated based on the aggregate household-level wealth distributions of Alfani, Gierok and Schaff (2022). Information on the prevalence of propertyless households has been added.

Figure 10 shows our estimates split into urban and rural communities. It reveals that poverty shares in urban and rural communities were of similar size, ranging between 21 to 39 percent of all households when applying a benchmark of 50 percent of median wealth, and between 0

and 22 percent when applying a benchmark of 25 percent of median wealth. Figure 10 allows us to disentangle some of the trends that are obscured by the aggregate. Most importantly, it shows that the share of poorer households, i.e. those below 25 percent of median wealth, declined substantially both in urban and rural communities after the Black Death. However, while in urban communities moderate poverty (50% share) also declined substantially after the Black Death, this is not the case in rural communities where the share of the moderately poor increases. This divergence may seem puzzling, but it aligns well with a hypothesis previously advanced by Abel (1976) regarding the diverging economic trajectories of urban and rural locations after the pandemic. Urban centres boomed – experiencing increased demand for their manufactured goods and therefore seeking labourers and artisans who could demand higher wages. This opened opportunities among the poor and very poor to better their lot. It also attracted many rural dwellers who migrated to the cities. At the same time, the countryside experienced ambiguous economic changes: Severe poverty decreased as landless farmhands and labourers were able to acquire some of the many empty plots that emerged in the aftermath of the Black Death or migrate to cities with more opportunities. However, moderate poverty increased as the absolute demand for grain and basic foodstuffs was substantially lower than in pre-Black Death times, which depressed grain prices. This hit especially those moderately poor farmers that sold a larger share of their produce on the market. At the same time, these moderately poor households had to pay higher prices for equipment and for hiring labour. Severely poor, less market-dependent farmers did not suffer from such price effects (Abel 1976: 180-181; Meuthen 2006: 9-10). Our estimates are consistent with this hypothesis about urban-rural divergence after the Black Death.

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Figure 10 – Urban and Rural Poverty Shares at 50 and 25 Percent of Median Wealth, Germany, c. 1350-1800



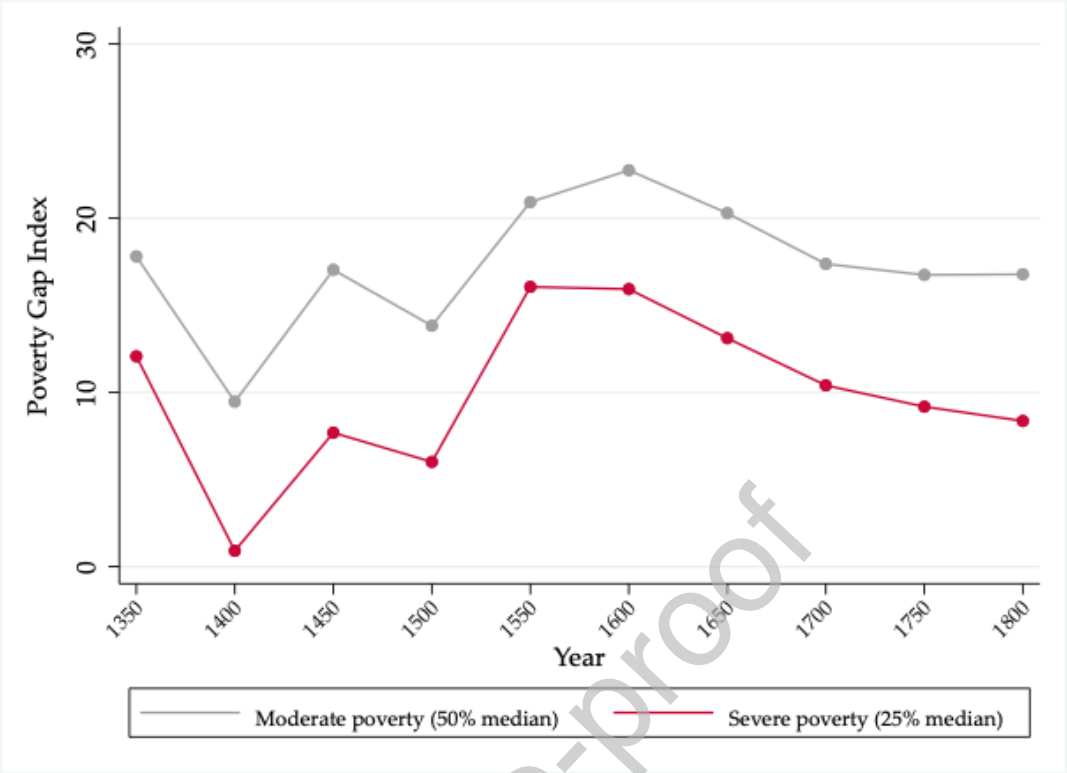
Notes: Relative poverty shares for urban and rural communities at 50 and 25 percent of median wealth are calculated based on the aggregate household-level wealth distributions of Alfani, Gierok and Schaff (2022). Information on the prevalence of propertyless households has been added.

Severity of Relative Poverty (Measure 3)

The previous results are further confirmed when considering the Poverty Gap Index (PGI) as a measure of the severity of poverty. Figure 11 shows that the severity of poverty decreased after the Black Death but rose again from 1400 onwards. Except for a slight decline around 1500, it continued to rise steadily and peaked towards the end of the sixteenth century, just before the beginning of the Thirty Years' War in 1618. The fact that poor households in 1400 were less poor, i.e. closer to the poverty line threshold, than households in 1350 fits well with the large decline in the share of very poor households (below 25 percent of the median) shown in Figure 9. The seventeenth and first half of the eighteenth century are marked by the declining intensity of poverty. From 1750 onwards the share and intensity of poverty both increased again or stagnated.

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Figure 11 – Poverty Gap Index at 50 and 25 Percent of Median Wealth, Germany, c. 1350-1800



Notes: Poverty gap indices at 50 and 25 percent of median wealth are calculated based on the aggregate household-level wealth distributions of Alfani, Gierok and Schaff (2022). Information on the prevalence of propertyless households has been added.

To put the numbers of the PGI into perspective, it is helpful to compare these numbers to current-day estimates published by the World Bank.[26] A PGI ranging between 0.1 and 0.2, as we observe for preindustrial Germany, is close to the values reported for Burundi (0.25), Niger (0.16) and Rwanda (0.18) in the twenty-first century. The average PGI for low-income countries is 0.17, according to the World Bank (see also Chen and Ravallion 2010). So the extent of relative poverty in preindustrial Germany resembles that of modern developing economies.

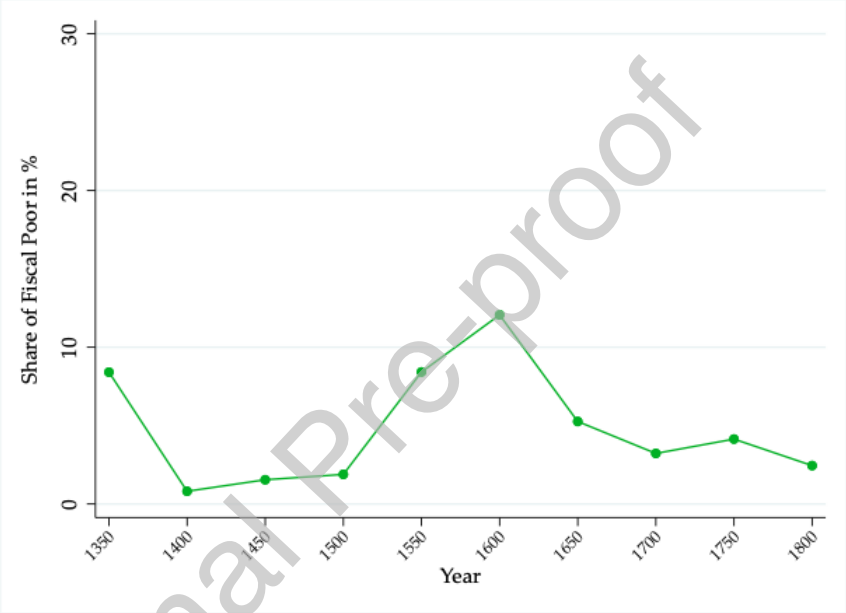
Extent of Absolute Poverty (Measure 4)

Absolute poverty is the share of households classified as 'too poor to pay taxes' by contemporary authorities. These households were seen as propertyless by authorities – that is they had not enough wealth to be taxed at the standard rate. Their wealth was, therefore, recorded as zero. Figure 12 shows the share of fiscally poor households as a share of total

[26] The poverty line applied by the World Bank is $2.15 a day (2017 Purchasing Power Parity), so the results are not perfectly comparable. They still give a sense of how to interpret the size of the PGI values presented here.

households for Germany as a whole. Two main results emerge. First, the share of the fiscally poor households remains within a range of 0 to 12 percent. But most importantly, second, the share of the fiscally poor moves along the same trendlines as relative poverty (Figures 9, 10 and 11): fiscal poverty drops after the Black Death and increases over the sixteenth century, and then peaks in the second half of the sixteenth century, just before the outbreak of the Thirty Years' War.[27] This pattern validates the results we obtained with the other three measures.

Figure 12 – Fiscal Poverty Shares, Germany, c. 1350-1800



Notes: The share of fiscal poor (or propertyless) households in Germany is the average in a sample of 89 urban and rural communities, weighted by an assumed urbanization rate of 10 percent.

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Discussion

The results above provide the first comprehensive long-run estimates of poverty in preindustrial Germany at the household level. There are three main findings which emerge consistently across all measures. First, poverty declined after the Black Death of 1348 – severe poverty defined as households below 25 percent of median wealth declined particularly. Second, poverty rose throughout the long sixteenth century and reached its highest levels on the eve of the Thirty Years' War. Third, poverty declined during and after the war, and remained at low levels until the mid-eighteenth century. In the second half of the

[27] The share of the fiscal poor has garnered criticism (see e.g. Dirlmeier 1978) for being an unreliable measure, because it relies on the definition of poverty by contemporary rulers. While it is true that this measure alone might be misleading, we believe that it is a useful additional indicator of poverty, together with a range of alternative measures.

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eighteenth century we find varying trends, depending on the measure, but overall poverty seems to have stagnated.

These results are broadly in line with Malthusian theories of population growth and poverty but need further explanation. First, as expected by Malthusian theory, the substantial drop in population caused by the Black Death coincides with a substantial decline in extreme poverty in all settings between 1350 and 1400. However, moderate poverty in rural regions increases in this period (see Figure 10). As discussed above, this divergence between moderately and extremely poor groups reflects broader economic shifts in agricultural production following the population decline: as prices dropped due to oversupply of grain, agriculturalists dependent on market sales faced greater hardship, while those producing mainly for their own needs were less affected by these fluctuations. Another explanation for variation in economic outcomes across communities is variation in the intensity and frequency of the plague (see Jedwab, Johnson, Koayama 2022). While we cannot directly assess this with our limited sample, anecdotal evidence from Frankfurt am Main and Rostock seems to confirm the intuition: whereas Frankfurt was hit by the plague at least four times between 1348 and 1425, only one plague has been recorded for Rostock. While Frankfurt saw both absolute and relative poverty levels decline, Rostock experienced increasing poverty and population levels in the same period.[28] However, while recurring plague epidemics led to declining population numbers well into the fifteenth century (see Scott 2000), poverty increased already from 1450 onwards. Therefore, Malthusian population dynamics cannot be the sole explanatory factor. Institutions such as labour regulations, taxation or inheritance institutions likely played a role in driving this increase.

Second, the rise in poverty throughout the sixteenth century – culminating in peak poverty rates just before the Thirty Years' War – was likely driven by several factors: increasing population, expanding tax pressure and Protestant welfare reform. Third, several factors likely contributed to the outsized decline in poverty during and after the war: population losses were substantial and hence a concomitant reduction in poverty fits a Malthusian story. However, we emphasise that this reduction in poverty was most likely not only the result of poor people enjoying better economic conditions. The plague coming with the Thirty Years' War killed poor strata disproportionately, thus reducing their prevalence (Alfani, Gierok and

[28] Local poverty estimates for Frankfurt am Main and Rostock available upon request.

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Schaff 2022). This is an important difference from a welfare perspective. Moreover, this war was financed by massive fiscal extraction, which was unsustainable in the long run (Theibault 2014; Gierok 2023). Hence, the end of the war and the immediate post-war period saw some taxes and levies being discontinued, leading to lower fiscal extraction in the decades after the War. Therefore, the continued decrease in poverty in the post-war years could partially be explained by an easing of fiscal extraction and some redistribution of wealth (see Alfani and Di Tullio 2019 and Schaff 2023 for similar arguments). Lastly, the stagnation of poverty rates over the eighteenth century could be the result of two drivers of poverty – population and per capita growth – now trending in opposite directions (Pfister 2022).

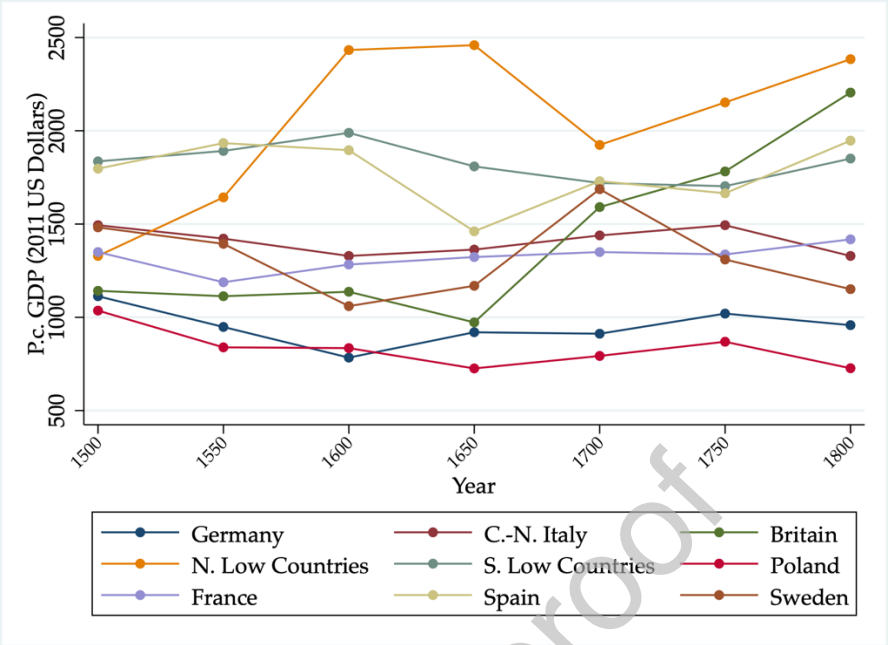
How do these results compare with other estimates of poverty in preindustrial Europe? Poverty shares (25-percent threshold) in three Italian states (Sabaudian State, Republic of Venice, Florentine State) and the Southern low Countries range from 8 to 30 percent between 1500 and 1800 (Alfani 2020), similar to our estimates for Germany.[29] But in terms of trends, steeply growing poverty distinguishes Germany from all the other regions during the sixteenth century. Similarly, Germany's declining poverty during the seventeenth century differs from the trends in most of the other European regions.[30]

High Inequality in a Poor Economy: Inequality Extraction Ratios

The previous sections have shown the development of poverty within preindustrial Germany, in relative and absolute terms. However, recent GDP estimates suggest that early modern Germany as a whole was also poor in comparison to other preindustrial European economies (see Figure 13).[31] At the beginning of the early modern period it was much closer to Poland than to the Low Countries or Italy. Thereafter, Germany was on the losing side of the so-called Little Divergence that saw North-Western Europe experiencing quicker economic growth than Southern Europe (Allen 2001: 429; Acemoglu, Johnson and Robinson 2005: 547; Pfister 2017).

[29] Note that our estimates for Germany include propertyless households, while they are excluded from the estimates for the Italian regions and the Southern Low Countries.
[30] It would be desirable to provide more disaggregate estimates for poverty in different regions of Germany, as has been done for Italy. Unfortunately, the currently available data are not sufficient to calculate reliable poverty estimates at the level of even the main German pre-unification states.
[31] Note that available aggregate measures of economic development, such as GDP, hide large regional variation in economic performance within the German area in preindustrial times (Ogilvie 1996: 265).

Figure 13 – Germany in the Little Divergence: Per capita GDP in Europe, c. 1500-1800 (2011 US$)



Notes: Data on GDP per capita in a number of European countries from Bolt et al. (2018: Appendix).

Method

Germany was not just poor, like Poland, but it was also relatively unequal, like Italy (Alfani, Gierok and Schaff 2022: 115). To represent this 'high inequality in a poor economy'-phenomenon we calculate inequality extraction ratios (IER) (Milanovic, Lindert and Williamson 2011). The IER has an advantage over other inequality measures – for example, the Gini coefficient – because it defines inequality in relation to per capita GDP and the subsistence minimum. Technically, the IER is the ratio between nominal inequality (as measured by the Gini coefficient) and the theoretically possible maximum inequality (the latter being a function of per capita GDP and the subsistence income needed not to force people into starvation). Subsistence income is usually set at an annual Purchasing Power Parity of $300. Including the subsistence income in the calculation is important because practically, only those economic resources that people have above that minimum can be redistributed in an inegalitarian way. The IER is therefore a measure of how much inequality is created in a society relative to *possible* inequality (Milanovic, Lindert and Williamson 2011: 256-9, 262).[32] As per capita GDP, and as a result of this possible inequality, varied

[32] See Milanovic, Lindert and Williamson (2011: 257-8) for a formal derivation of the IER. On the assumption that Purchasing Power Parity $300 is correct for subsistence income, see also Milanovic (2018). For an older account that underlines the necessity to consider the subsistence income when analysing the distribution of wealth and income, but that unfortunately fails to formalize this idea, see Cipolla (1974: 51).

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greatly over time and across different societies (see Figure 13), the IER is arguably a more meaningful measure of inequality. It has been used in several comparative studies (see Alfani 2015; 2021; Alfani and Ryckbosch 2016; Milanovic 2018). To avoid misunderstanding, we emphasise that the computation of the ratio does not explicitly measure *institutional extractiveness*. Rising *inequality extraction* can have many reasons. In fact, all factors that reduced economic growth or increased inequality – including the factors that increased poverty, such as population growth, fiscal extraction or Protestant welfare reform (see above) – could increase inequality extraction. We therefore interpret changes in the IER merely as changes in inequality relative to the overall prosperity (or poverty) of society.

The IER is usually expressed as a percentage; zero would indicate a perfectly egalitarian society, and 100 a society as unequal as it could possibly be without forcing large parts of its population below subsistence.[33] However, since we normalize ratios for the reasons explained below, there is no longer a predefined maximum level. Consequently, the ratios that we present should be simply intuited as indicative of changes in how people 'experienced' inequality in their society, given the economic resources at their disposal. Indeed, it has been shown for contemporary developing countries that periods of IER growth are statistically associated with social conflict, especially civil war (Milanovic 2013: 20-3; Alfani 2015: 1089). This observation will be relevant for the discussion of Germany's inequality extraction trends in the context of the outbreak of the Thirty Years' War.

For calculating the IER for Germany we take the Gini coefficients from Alfani, Gierok and Schaff (2022: 108). Then, adding data on per capita GDP from the Maddison Project (Bolt et al. 2018; see Figure 13),[34] we calculate the IER from 1500 to 1800. We compare our estimates for Germany with those available for other countries in early modern Europe. However, our data refer to wealth and not to income inequality, which is what would be required for a straightforward calculation of the IER. So, to achieve a reasonable degree of comparability in the estimates, we normalize our ratios relative to a base year (all values set to 100 in 1500; value chosen for representational purposes).[35] A key underlying assumption

[33] For income inequality the value 100 represents the maximum inequality that is sustainable in the long run, as it implies that all economic resources above the subsistence level have been redistributed in an unequal manner. If the IER is above 100 the implication is that the distribution of economic resources is so inegalitarian that people have on average fewer resources at their disposal than the subsistence minimum requires (Milanovic, Lindert and Williamson 2011: 256-9).

[34] For Germany GDP data is only available from 1500 (see Bolt et al. 2018; Pfister 2022).

[35] The results for Germany, Tuscany and Piedmont are based on wealth-tax registers. A comparison is therefore unproblematic. The figures for the Northern and Southern Low Countries derive from housing tax registers, which might bias the results slightly downwards (Alfani and Ryckbosch 2016: 145). Comparing results that are based on different sources is not ideal. However, research into historical economic

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is that in the context of mostly agricultural economies, levels of wealth inequality may be higher than those of income inequality, but these levels will tend to change across time in about the same way. This reasonable assumption has been made by a number of previous studies (see, for example, Alfani and Ryckbosch 2016).

Results

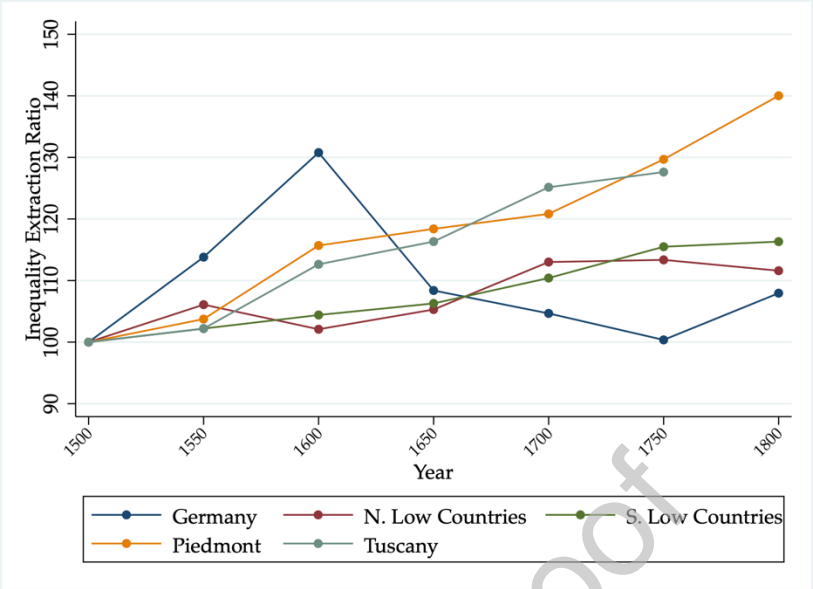
The results in Figure 14 show how inequality evolved over the early modern period, considering how poor Germany and the other countries were. Putting the results into a European context opens a new perspective on Germany. Over the sixteenth century, German inequality extraction grew faster than anywhere else, by 30.8 percent over the century. This dramatic increase happened just before the outbreak of the Thirty Years' War. In comparison, inequality in Tuscany grew by 12.6, in Piedmont by 15.7, in the Southern Low Countries by 4.4, and in the Northern Low Countries by 2.1 percent over the sixteenth century. Germany's increase was driven by both components of the IER: inequality, measured by the Gini coefficient, increased (see Alfani, Gierok and Schaff 2022: 108), whereas per capita GDP declined (see Figure 13).

Over the seventeenth century inequality extraction continued to grow almost linearly in the Low Countries and the Italian regions. Instead, Germany experienced a huge decline. From its high point in 1600, the IER fell by 17 percent until 1650, just after the Peace of Westphalia, and by 20 percent until 1700, compared to the high point in 1600. The one-century long drop is almost entirely driven by a decline in the Gini coefficient due to catastrophe-induced levelling in the period of the Thirty Years' War (Alfani, Gierok and Schaff 2022: 108-110).

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inequality is an emerging field and currently, the data used here are the best available. Also, similar studies of distinguished experts in the field compared the inequality values obtained from different sources before (see Milanovic, Lindert and Williamson 2011; Alfani and Ryckbosch 2016; Milanovic 2018). Moreover, Milanovic (2018) showed that Gini coefficients and IERs obtained from tax data do not significantly differ from those obtained from social tables. Hence, comparing the data obtained from different sources is not a totally arbitrary exercise, although better comparable data would certainly be preferable and will hopefully become available in the future. Moreover, our analysis accounts for problems of comparability by comparing the relative change in inequality extraction in Figure 14.

Figure 14 – Normalized Inequality Extraction Ratios across Europe, c. 1500-1800 (year 1500=100)



Notes: IER values were normalized to 100 in the year 1500, so the values represent relative change with respect to the base year. Gini coefficients (excluding propertyless households) for Germany from Alfani, Gierok and Schaff (2022), for the two Low Countries, Piedmont and Tuscany from Alfani and Ryckbosch (2016). Inequality estimates for the Southern Low Countries are only available from 1550. We therefore linearly extrapolated the IER for 1500 from the period 1550 to 1600. GDP per capita estimates (in 2011 US$) for all countries from Bolt et al. (2018: Appendix). For obtaining a GDP estimate for the two Italian regions, the estimate for Central-Northern Italy reported in Bolt et al. (2018) was weighted by the regional urbanization rate of Piedmont and Tuscany, as has been done by Alfani and Ryckbosch (2016).

During the first half of the eighteenth century, inequality extraction in Germany continued to fall, as GDP was growing, and inequality as measured with the Gini coefficient was stagnating.[36] Most other European regions experienced rising inequality extraction at the time. Only in the last half of the eighteenth century do we see again a tendency for inequality extraction to grow in Germany. But at that time the level of inequality extraction in this area was closer to the relatively egalitarian Low Countries than to relatively unequal Italy.

Overall, a divide between a high inequality extraction-growth group, consisting of the two Italian regions, and a low inequality extraction-growth group, consisting of the northern and southern Low Countries is apparent. Only Germany, due to its considerable drop following the Thirty Years' War, switched group between 1600 and 1750. Crucially, during the

[36] Alfani, Gierok and Schaff (2022) relate the long-lasting drop and stagnation in inequality after the Thirty Years' War to several factors, including widespread physical destruction, commercial and productive breakdown, and famine and death by plague that selectively killed the poor.

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sixteenth century, just before the outbreak of the Thirty Years' War, Germany experienced the most extreme inequality extraction growth of all regions.

Discussion

Two points require further discussion. First, a word of caution is due to avoid misunderstanding. The data presented do not suggest that the Low Countries or eighteenth-century Germany were egalitarian heavens. On the contrary, when comparing IER *levels* from the early modern period – for instance, the Northern Low Countries had an absolute IER of about 76 around the year 1550 (Milanovic, Lindert and Williamson 2011: 263) – with those of contemporary countries (which is approximately possible with the IER), it becomes clear that even the more egalitarian parts of preindustrial Europe were very unequal by modern standards. Around the year 2000, the Netherlands had an IER of 28.5, Italy of 36.5 and Germany of 30.8 (Milanovic, Lindert and Williamson 2011: 263). Early modern Europe was generally a very unequal world, but as shown here, with considerable variations within it. Its inequality levels are more comparable to modern developing countries, such as Tanzania (IER of 78) or Nigeria (IER of 63) (Milanovic, Lindert and Williamson 2011: 264).

Second, this paper is not primarily a contribution to the historical debate about the reasons for the outbreak of the Thirty Years' War. Yet we believe that our results support a scholarly tradition that has focussed on how underlying, structural socio-economic change favoured rebellion in the decades before the outbreak of the war (Kamen 1984: 236-7, 253; Ogilvie 1992; Wilson 2008: 554-5). It is a well-known fact that peasant revolts and urban revolts peaked in Germany in the late sixteenth and early seventeenth centuries in the run up to the Thirty Years' War (Schulze 1984: 77; 1982a: 27; Edelmayer, Lannzinner and Rauscher 2003: 11-2; Blickle 2012: 44-5). This is hardly surprising in the light of Milanovic's argument that a growing IER, as we have documented for sixteenth-century Germany, is a good indicator of the outbreak of social conflict in contemporary developing countries (which have inequality levels that are similar compared to preindustrial economies).[37] Of course, we cannot directly show that growing inequality favoured the outbreak of the Thirty Years' War because we lack a counterfactual. But we believe that the evidence points into that direction.

[37] Our results are also compatible with Turchin and Korotayev's (2006) model of internal warfare: a growing population – an underlying driver of growth in the IER – can increase the likelihood of conflict, by increasing the encounter rate between different groups. But since the IER had already grown much, political authorities may have found it difficult to expand fiscal extraction further, which would have been needed to impose internal peace.

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Conclusion

This paper provides a new body of evidence for the extent and development of poverty in preindustrial Germany. Based on the wealth distributions of Alfani, Gierok and Schaff (2022) and newly collected data on propertyless households, four broad phases of relative and absolute poverty development have been identified between the Black Death and the beginning of industrialization. Poverty declined after the Black Death in the late Middle Ages, and after the Thirty Years' War, the most destructive war in European history. Apart from these two shocks and their aftermaths poverty tended to grow, especially in the sixteenth century, or stagnate. Poverty was at a historical peak around 1600, when almost a quarter of the German population was poor. However, depending on the poverty indicator chosen there was substantial variation in these patterns. Overall, we find that our poverty estimates fit a Malthusian model of the preindustrial economy relatively well. But hypotheses about the relationship between taxation, Protestant welfare reform or economic growth and poverty are also compatible with our data, particularly in the sixteenth and seventeenth centuries. No hypothesis fits our data for the whole period of study, and we believe that there is a need for more elaborate theories of preindustrial poverty that consider multiple factors.

The early modern German economy was overall poor – in terms of per capita GDP and compared to other European economies, such as England, the Low Countries or Italy – and at the same time very unequal. We have systematically quantified this 'high inequality in a poor economy' phenomenon with the inequality extraction ratio. According to our calculations, inequality extraction peaked around 1600. At that time Germany had experienced more inequality-extraction growth than any other European country for which comparable data are available. Given these figures, it seems unsurprising that this was a historical period of widespread urban and rural revolts in Germany, a period that ultimately saw the outbreak of the Thirty Years' War.

This paper puts Germany on the map of preindustrial poverty studies. The data construction effort has provided a nuanced view of the German case, and has provided some indication of which forces might matter for explaining poverty. The extent of poverty ebbed and flowed considerably over the centuries, long before the onset of modern economic growth. However, much more data are needed to clearly identify causes and understand at a deeper level why certain places were poorer than others in the preindustrial period.

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Bibliography

Abel, W., Geschichte der Deutschen Landwirtschaft vom frühen Mittelalter bis zum 19. Jahrhundert, Ulmer, Stuttgart, 1967.

Abel, W., Die Wüstungen des ausgehenden Mittelalters, Gustav Fischer Verlag, Stuttgart, 1976.

Acemoglu, D., Johnson, S., Robinson, J.A., Institutions as the Fundamental Cause of Long-Run Growth, in: Aghion, P., Durlauf, S.N. (Eds.), Handbook of Economic Growth, Volume 1A, Elsevier, Amsterdam, 2005, pp. 385-472.

Albers, T.N.H., Bartels, C., Schularick, M., The Distribution of Wealth in Germany, 1895-2018. CESifo Working Paper No. 9739 (2022).

Alfani, G., Economic inequality in northwestern Italy: a long-term view (fourteenth to eighteenth centuries), J. Econ. Hist. 75(4) (2015) 1058-1096.

Alfani, G., The economic history of poverty, 1450-1800, in: Hitchcock, D., McClure, J. (Eds.), The Routledge History of Poverty in Europe, c.1450-1800, Routledge, London, 2020.

Alfani, G., Economic inequality in preindustrial times: Europe and beyond, J. Econ. Lit. 59(1) (2021) 3-44.

Alfani, G., Epidemics, Inequality, and Poverty in Preindustrial and Early Industrial Times, J. Econ. Lit. 60(1) (2022) 3-40.

Alfani, G., Ammannati, F., Ryckbosch, W., Poverty in early modern Europe: New approaches to old problems, EHES Working Paper No. 222 (2022) 1-25.

Alfani, G., Garcia-Montero, H., Wealth inequality in pre-industrial England: A long-term view (late thirteenth to sixteenth centuries). Econ. Hist. Rev. 75 (4) (2022), 1314–1348.

Alfani, G., Gierok, V., Schaff, F., Economic Inequality in Preindustrial Germany, ca. 1300-1850, J. Econ. Hist. 82(1) (2022) 87-125.

Alfani, G., Gierok, V., Schaff, F., Replication data - Alfani, Gierok and Schaff "Poverty in Germany from the Black Death until the Beginning of Industrialization." MI: Inter-university Consortium for Political and Social Research [distributor], Ann Arbor. https://doi.org/10.3886/E210402V1

Alfani, G., di Tullio, M., The Lion's Share. Inequality and the Rise of the Fiscal State in Preindustrial Europe, Cambridge University Press, Cambridge, 2019.

Alfani, G., Ryckbosch, W., Growing Apart in Early Modern Europe? A Comparison of Inequality Trends in Italy and the Low Countries, 1500–1800, Explor. Econ. Hist. 62 (2016) 143-153.

Journal Pre-proof

Journal Pre-proof

Allen, R., The Great Divergence in European Wages and Prices from the Middle Ages to the First World War, Explor. Econ. Hist. 38 (2001) 411-447.

Allen, R., Progress and poverty in early modern Europe, Econ. Hist. Rev. 56(3) (2003) 403-443.

Alvaredo, F., Atkinson, A., Piketty, T., Saez, E., The Top 1 Percent in International and Historical Perspective, J. Econ. Perspect. 27(3) (2013) 3-20.

Bairoch, P., Batou, J., Chèvre, P., La population des villes européennes. Banque des données et analyse sommaire des résultats, 800 à 1850, Librairie Droz, Geneva, 1988.

Bartels, C., Jäger, S., Obergruber, N., Long-Term Effects of Equal Sharing: Evidence from Inheritance Rules for Land. Econ. J., forthcoming (2024).

Becker, S., Woessmann, L., Was Weber Wrong? A Human Capital Theory of Protestant Economic History, Q. J. Econ. 124(2) (2009) 531–596.

Blickle, P., Unruhen in der Ständischen Gesellschaft 1300-1800, Oldenbourg, München, 2012.

Bolt, J., Inklaar, R., de Jong, H., van Zanden, J., Rebasing 'Maddison': new income comparisons and the shape of long-run economic development, Maddison Project Working Paper 11 (2018).

Broadberry, S., Campbell, B., Klein, A., Overton, M., van Leeuwen, B., British Economic Growth 1270-1870, Cambridge University Press, Cambridge, 2015.

Chen, S., Ravallion, M., The Developing World is Poorer Than We Thought, but No Less Successful in the Fight Against Poverty, Q. J. Econ. 125(4) (2010) 1577-1625.

Cipolla, C., Storia Economica dell'Europa Pre-Industriale, Il Mulino, Bologna, 1974.

Clark, G., Land rental values and the agrarian economy: England and Wales, 1500-1914, Eur. Rev. Econ. Hist. 6(3) (2002) 281-308.

Clark, G., A Farewell to Alms, Princeton University Press, Princeton, 2007a.

De Vries, J., European Urbanization, 1500-1800, Methuen, London, 1984.

Deaton, A., Measuring Poverty in a Growing World (or Measuring Growth in a Poor World), Rev. Econ. Stat. 87(1) (2005) 1-19.

Dirlmeier, U., Untersuchungen zu Einkommensverhältnissen und Lebenshaltungskosten in oberdeutschen Städten des Spätmittelalters, Carl Winter Universitätsverlag, Heidelberg, 1978.

Dittmar, J., Meisenzahl, R., Public Goods Institutions, Human Capital and Growth: Evidence from German History. Review of Economic Studies 87 (2) (2020) 959–996.

Dollar, D., Kraay, A., Growth Is Good for the Poor. J. Econ. Growth 7 (3) (2002), 195–225.

Edelmayer, F., Lanzinner, M., Rauscher, P., Einleitung, in: Edelmayer, F., Lanzinner, M., Rauscher, P. (Eds.), Finanzen und Herrschaft: materielle Grundlagen fürstlicher Politik in den habsburgischen Ländern und im Heiligen Römischen Reich im 16. Jahrhundert, Oldenbourg, München, 2003, pp. 9-19.

Ekelund, R., Hébert, R., Tollison, R., An Economic Analysis of the Protestant Reformation. Journal of Political Economy 110(3) (2002), 646–671.

Fernandez, E., Santiago-Caballero, C., Economic inequality in Madrid, 1500-1840, Working Papers in Economic History 18-06, Carlos III University of Madrid, 2018.

Fischer, W., Armut in der Geschichte Erscheinungsformen und Lösungsversuche der ‚Sozialen Frage' in Europa seit dem Mittelalter, Vandenhoeck & Ruprecht, Göttingen, 1982.

Foster, J., Greer, J., Thorbecke, E., A Class of Decomposable Poverty Measures, Econometrica 52(3) (1984) 761-766.

Galor, O., Unified Growth Theory, Princeton University Press, Princeton, 2011.

Gierok, V., The Impact of the Thirty Years' War on Urban Germany, Oxford Economic and Social History Working Paper Series 210 (2023).

Hagen, W., Ordinary Prussians: Brandenburg Junkers and Villagers, 1500-1840, Cambridge University Press, Cambridge, 2002.

Hartung, W., Armut und Fürsorge: eine Herausforderung der Stadtgesellschaft im Übergang vom Spätmittelalter zur Frühen Neuzeit, in: Jahn, J., Hartung, W., Eberl, I. (Eds.), Oberdeutsche Städte im Vergleich, Regio Verlag Glock und Lutz, Sigmaringen, 1989, pp. 158–181.

Haughton, J., Khandker, S., Handbook on Poverty and Inequality, The World Bank, Washington D.C., 2009.

Isenmann, E., Die Deutsche Stadt im Mittelalter, 1150-1550. Stadtgestalt, Recht, Verfassung, Stadtregiment, Kirche, Gesellschaft, Wirtschaft, Böhlau Verlag, Köln/Weimar/Wien, 2014.

Jedwab, R., Johnson, N., Koyama, M., The Economic Impact of the Black Death, J. Econ. Lit. 60(1) (2022) 132-178.

Jütte, R., Poverty and deviance in early modern Europe, Cambridge University Press, Cambridge, 1994.

Kahl, S., Religious Doctrines and Poor Relief: A Different Causal Pathway, in: van Kersbergen, K., Manow, P. (Eds.), Religion, Class Coalitions, and Welfare States, Cambridge University Press, Cambridge, UK, 2009, pp. 267–296.

Kamen, H., European Society 1500-1700, Hutchinson, London, 1984.

Journal Pre-proof

Kocka, J., Weder Stand noch Klasse: Unterschichten um 1800. Geschichte der Arbeiter und Arbeiterbewegung in Deutschland seit dem Ende des 18. Jahrhunderts, Verlag J.H.W. Dietz Nachfolger, Bonn, 1990.

Koyama, M., Rubin, J., How the World Became Rich: The Historical Origins of Economic Growth, Polity Press, Cambridge, 2022.

Kuypers, S., Marx, I., The truly vulnerable: Integrating wealth into the measurement of poverty and social policy effectiveness, Soc. Indic. Res. 142(1) (2019) 131-147.

Kuznets, S., Economic Growth and Income Inequality, Am. Econ. Rev. 45(1) (1955) 1-28.

Lindert, P., Unequal British Wealth since 1670, J. Polit. Econ. 94(6) (1986) 1127-1162.

Lindert, P.H., Toward a Comparative History of Income and Wealth Inequality, in: Brenner, Y.S., Kaelble, H., Thomas, M. (Eds.), Income Distribution in Historical Perspective, Cambridge University Press, Cambridge, UK, 1991, pp. 212-231.

Lindert, P., Williamson, J., Unequal Gains: American Growth and Inequality since 1700, Princeton University Press, Princeton, 2016.

Malinowski, M., van Zanden, J.L., Income and its distribution in preindustrial Poland, Cliometrica 11(3) (2017) 375-404.

Meuthen, E., Das 15. Jahrhundert, R. Oldenbourg Verlag, München, 2006.

Milanovic, B., Towards an explanation of inequality in premodern societies: the role of colonies, urbanization and high population density, Econ. Hist. Rev. 71(4) (2018) 1029-1047.

Milanovic, B., The Inequality Possibility Frontier: Extensions and New Application, World Bank Policy Research Working Paper 6449 (2013).

Milanovic, B., Lindert, P.H., Williamson, J.G., Pre-Industrial Inequality, Econ. J. 121 (2011) 255-272.

Mollat, M., Die Armen im Mittelalter, C.H. Beck, Nördlingen, 1984.

Morelli, S., Nolan, B., Palomino, J.C., Van Kerm, P., Inheritance, gifts and the accumulation of wealth for low-income households, J. Eur. Soc. Policy 31(5) (2021) 533-548.

Nicolini, E.A., Ramos Palencia, F., Decomposing Income Inequality in a Backward Pre-Industrial Economy: Old Castile (Spain) in the Middle of the 18th Century, Econ. Hist. Rev. 69(3) (2016) 747-772.

Ogilvie, S., Germany and the Seventeenth-Century Crisis, Hist. J. 35 (1992) 417-441.

Ogilvie, S., Proto-Industrialization in Germany, in: Ogilvie, S., Cerman, M. (Eds.), European Proto-Industrialization, Cambridge University Press, Cambridge, 1996, pp. 118-136.

Ogilvie, S., The Economics of Guilds, J. Econ. Perspect. 28(4) (2014a) 169-192.

Journal Pre-proof

Ogilvie, S., Serfdom and the Institutional System in Early Modern Germany, in: Cavaciocchi, S. (Ed.), Serfdom and Slavery in the European Economy 11th-18th Centuries. Firenze University Press, Florence, 2014b, pp. 33–58.

Ogilvie, S., Schaff, F., Inheritance and Inequality in a Pre-Modern Economy. Unpublished manuscript All Souls College Oxford and European University Institute (2024).

Outram, Q., The Socio-Economic Relations of Warfare and the Military Mortality Crises of the Thirty Years' War, Med. Hist. 45 (2001) 151-184.

Pfister, U., The timing and pattern of real wage divergence in pre-industrial Europe: evidence from Germany, c. 1500-1850, Econ. Hist. Rev. 70(3) (2017) 701-729.

Pfister, U., Economic Inequality in Germany, c. 1500–1800, in: Nigro, G. (Ed.), Economic Inequality in Pre-Industrial Societies: Causes and Effect, Firenze University Press, Florence, 2020, pp. 301-324.

Pfister, U., Economic Growth in Germany, 1500-1850, J. Econ. Hist. 82(4) (2022) 1071-1107.

Pfister, U., Fertig, G., The Population History of Germany: Research Strategy and Preliminary Results, MPIDR Working Paper WP2010-035, 2010.

Pfister, U., Fertig, G., From Malthusian Disequilibrium to the Post-Malthusian Era: The Evolution of the Preventive and Positive Checks in Germany, 1730-1870, Demography 57 (2020) 1145-1170.

Piketty, T., Capital in the Twenty-First Century, Belknap Press, London, 2014.

Piketty, T., Capital and Ideology, Belknap Press, London, 2020.

Postan, M., Medieval Agrarian Society in its Prime: England, in: Postan, M. (Ed.), The Cambridge Economic History of Europe, i, 2nd ed., Cambridge University Press, Cambridge, 1966.

Ravallion, M., Bidani, B., How Robust is a Poverty Profile?, World Bank Econ. Rev. 8(1) (1994) 75-102.

Ravallion, M., Chen, S., Sangraula, P., Dollar a Day Revisited, World Bank Econ. Rev. 23(2) (2009) 163-184.

Rodepeter, R., Die Pest - ein Fall für Ökonomen?, in: Börsch-Supan, A., Schnabel, R. (Eds.), Volkswirtschaft in Fünfzehn Fällen: Studien in Angewandter Mikro- Und Makroökonomie, Gabler, Wiesbaden, 1998, pp. 3-16.

Roine, J., Waldenstrom, D., Long-run trends in the distribution of income and wealth, in: Atkinson, A., Bourguignon, F. (Eds.), Handbook of Income Distribution, vol. 2, Elsevier, Amsterdam, 2015, pp. 469-592.

Journal Pre-proof

Schaff, F., Warfare and Economic Inequality: Evidence from Preindustrial Germany (c.1400-1800), Explor. Econ. Hist. 89(3) (2023) 101495.

Schaff, F., Urban Political Structure and Inequality: Political Economy Lessons from Early Modern German Cities, J. Econ. Hist. 84(4) (2024) 517-553.

Schaff, F., The Unequal Spirit of the Protestant Reformation: Particularism and Wealth Distribution in Early Modern Germany, J. Econ. Growth, forthcoming (2025).

Scheidel, W., The Great Leveler, Princeton University Press, Princeton, 2017.

Schilling, H., Aufbruch und Kriese: Deutschland 1517–1648, Siedler, München, 1994.

Schulze, W., Bäuerlicher Widerstand und feudal Herrschaft in der frühen Neuzeit, Frommann Holzboog, Stuttgart, 1980.

Schulze, W., Peasant Resistance in Sixteenth- and Seventeenth-Century Germany in a European Context, in: Greyerz, K. (Ed.), Religion, Politics and Social Protest, George Allen & Unwin, London, 1984, pp. 61-98.

Scott, T., Society and Economy in Germany, 1300-1600, Palgrave-Macmillan, Houndmills, 2000.

Stiglitz, J., Distribution of income and wealth among individuals. Econometrica 37(3) (1969), 382–397.

Turchin, P., Korotayev, A., Population Dynamics and Internal Warfare: A Reconsideration, Soc. Evol. Hist. 5 (2006) 112-147.

van Zanden, J.L., Tracing the beginning of the Kuznets Curve: Western Europe during the Early Modern Period, Econ. Hist. Rev. 48(4) (1995) 643-664.

Von Hippel, W., Armut, Unterschichten, Randgruppen in der Frühen Neuzeit, Oldenbourg Verlag, München, 2013.

Wahl, F., Participative political institutions in pre-modern Europe: Introducing a new database, Hist. Methods: J. Quant. Interdiscip. Hist. 49(2) (2016) 67-79.

Wegge, S., Inheritance Institutions and Landholding Inequality in Nineteenth-Century Germany: Village-Level Evidence from Hesse-Cassel. J. Econ. Hist. 81 (3) (2021), 909–942.

Wehler, H.U., Deutsche Gesellschaftsgeschichte Erster Band: Vom Feudalismus des Alten Reiches bis zur Defensiven Modernisierung der Reformära 1700-1815, C.H. Beck, München, 1978.

Wilson, P., The Causes of the Thirty Years War 1618-48, Past Present 123(502) (2008) 554-586.

Wilson, P., The Thirty Years' War: Europe's Tragedy. Cambridge University Press, Cambridge, UK, 2009.

Journal Pre-proof

Wilson, P., The Holy Roman Empire: A Thousand Years of Europe's History, Penguin, London, 2017.

Journal Pre-proof