Title: Inequality in Wealth: A Case-Study from Mid-19th Century Germany

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Abstract: This paper assesses wealth inequality by using data on village land distributions in mid-19th century Germany. Using a sample of 1,047 different Hessian villages I calculate a Gini coefficient for each village, providing a micro perspective on wealth inequality among the living (unlike estate data). Results show an average Gini of about 0.60, a figure that is comparable to other historical as well as contemporary studies. More striking is the large variation in inequality across villages, with many villages of inequality and many of equality. Multivariate regression estimates show that inequality was higher in densely populated communities as well as ones that practiced impartible inheritance traditions. A panel study of a subsample shows that inequality in land wealth increased between the 18th and 19th centuries.

I Introduction

Thomas Piketty’s recent work on inequality has refocused wide attention onto the recent worsening trends in economic inequality in various developed economies: both income and wealth inequality in developed nations declined after World War II and remained so for a few decades; since 1975, however, inequality has been on the rise again. Piketty’s main argument is that the rate of return on capital is greater than the rate of economic growth ($r > g$), and that this relationship drives inequality.¹ Piketty cares about some of the same questions Kuznets cared about in his analysis of American income inequality between 1913 and 1948: the difference is that Piketty bases his conclusions on much longer time periods as well as on a greater set of national economies.

By employing a rich panel dataset with data for some countries covering centuries, Piketty provides a methodology that greatly appeals to economic historians. While Kuznets had ample reason in the 1950s to have written in a very optimistic fashion about income inequality since it was declining in the U.S. in the 1940s, Piketty is much more pessimistic, suggesting that

¹ Behind this is a low rate of change in real wages, namely that $(r > g > w)$.
trends in inequality are headed back to levels last seen in nineteenth century Europe; in his
discussion of the 19th century, he speaks of even a “natural” structure of inequality (Piketty,
2014, 411). That inequality is trending back to 19th century levels is happening even with all of
the changes in the late 19th and 20th centuries that many economic historians have argued are
important, like the rise of democracies, the decline of aristocracies, more participatory capital
markets, less discrimination in labor markets, massive technological change, and others.
Employing completely different data and methodologies, Greg Clark provides a similarly
gloomy account of socioeconomic change over time, using surnames to show that social mobility
is both fairly constant over time and place and more importantly that it is much lower than one
would expect.

It does not take much convincing that inequality is a serious topic and something social
scientists should pay attention to. Economic historians have contributed much to describing the
rise in long-term living standards in many developed economies over the last three centuries,
which is a story about levels and not distributions. Economic historians can further this
discussion by collecting more evidence on inequality in previous times and in different
geographic and societal contexts. ²

This paper takes up this challenge and provides an empirical case-study on inequality of
the past by looking at rural villages in the German principality of Hesse-Cassel in the 1850s.
Looking at this principality, I examine the land distributions of over 1,000 different villages to
calculate a Gini coefficient for each village, one based entirely on the value of land and its
distribution across the heads of household in the village. In an agricultural community land was
the most valuable capital asset. It provides a different perspective on wealth compared to the oft-

² They can also link it to their findings on the rate of economic growth and its variations across time and
across space.
used estate data in historical studies: estate data capture a picture of the entire portfolio of assets of those at the end of their lives, and here wealth in land provides a snapshot of the variation that all living heads of households in a village owned in terms of the largest capital asset in an agricultural economy.

Much of the debate on inequality uses national statistics, and my analysis here provides a micro perspective and can possibly illuminate whether there are interesting patterns by type of village economy. Specifically, the population of these different Hessian villages ranged from 50 or so people to several thousand. The smaller villages tended to have more of their population engaged in the agricultural sector, while larger villages and towns had a greater variety of types of economic activities (artisanal) and more manufacturing. The importance of land in the wealth portfolio of a citizen may have decreased with the increasing economic complexity of villages. I thus examine here how Gini coefficients varied with population size, the degree of urbanization, and the allocation of property rights in land. Below Section II summarizes some evidence on historical wealth inequality, Section III presents the main evidence for the Hessian principality and Section IV concludes.

II Historical evidence on wealth and income inequality

The topic of inequality has received a lot of attention in the past few years, and we have more and more empirical studies on inequality. Most work focuses on income and not on wealth. In spite of the numerous challenges in collecting good data on wealth, Davies et al. (2011) have produced wealth estimates for 229 different countries for the year 2000; from these data Gini
coefficients for wealth distributions lie between 0.547 and 0.802.³ Wealth distributions are more unequal than income distributions, with Gini coefficients for income distributions typically lying between 0.3 and 0.5 (Davies et al., 2011, 224).

For historical times, we have several studies on U.S. wealth inequality. Shammas (1993) provides an extensive summary of colonial and post-colonial U.S. wealth inequality, much of which is based on probate records.⁴ In their path-breaking study of income and wealth inequality in the U.S., Lindert and Williamson (1980) found that wealth inequality for free citizens/residents in the colonies was high and comparable to contemporary times, that wealth inequality increased in the Antebellum period and then dramatically decreased in the post-Civil War period; again, wealth inequality rose again shortly before World War I, decreased in the immediate aftermath of the war and increased again in the 1920s. Lindert and Williamson (1980) place much emphasis on the increase in inequality in the Antebellum period, while Steckel and Moehling (2001, 180), a study elaborated on below, find that the increase in inequality between 1820 and the Great Depression is a “gain that was divided about evenly between the antebellum and postbellum periods.” Piketty (2014, 348) shows an increase in inequality between 1810 and 1910 for the U.S., but it appears that his graphs use very little data before 1870; also, many of his results on wealth inequality are based on the top 10% and top 1% wealth share statistics, not Gini coefficients, making it difficult to compare to work in this paper.

Work on wealth inequality exists for several other nations. Lindert (2000), for example, contributes a summary of inequality for both Britain and the U.S., while Piketty (2014) provides

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³ See Davies et al (2011), p. 246 and 249 for Gini coefficients from 2000 for several different nations. See also Davies (2009), p. 131. Further, studies that capture the value of public and private pension wealth produce lower these Gini coefficients (Davis, 2009, 132).

⁴ Steckel and Moehling ((2001, 160) also provide a short and efficient summary of work on American wealth inequality.
much information about France and a bit on Sweden, Britain and Europe in general. We also have wealth inequality studies for many different regions small and large or for cities at one point in time: Milanovic et al. (2011), for example, uses social tables to quantify inequality at many different times and in many different places around the world, and Benjamin and Brandt (1997) provides wealth inequality estimates for rural China in the 1930s.

In measuring inequality in the past a heavy burden has been placed on estate records.\textsuperscript{5} We know from contemporary studies, however, that the measurement of inequality depends on which data are used to measure wealth (Kopczuk, 2105). Estate records provide a convenient list of assets and liabilities of a recently deceased person. Such convenience must be weighed with the matter that estate data describe individuals’ wealth at the end of their lives and that they describe the wealth of such a small percentage of the population at any given point in time. Steckel and Moehling (2001) get around this issue by using property tax records to measure wealth inequality. In an innovative study on wealth in nineteenth century new England, Steckel and Moehling (2001) find like Lindert and Williamson that wealth inequality increased in the Antebellum period; in contrast however, Steckel and Moehling argue that inequality increased in the latter decades of the nineteenth century.

Further, studies of contemporary inequality that use consumer survey or income tax data get around the age bias problem and provide a better snapshot of wealth across an entire population. Again, such data tend not to exist for many populations before 1900. As economic historians well know, they must work with the data sources left behind. Scholars of contemporary times can set up new surveys, an option out of the question for the study of economic history.

III Evidence from Hessian Villages

In this study I draw on land distribution data from a Hessian village survey completed in the 1850s by the Hesse-Cassel Historical Commission. I have used these data in other studies focused on emigration from the principality of Hesse-Cassel. At this time, this region was rather rural and not as economically advanced as other areas in Germany like the Ruhr area close by in present-day North-Rhine Westphalia or certainly industrialized regions in Britain. Agriculture was still the main way Hessians made a living, and land was the most important tangible asset, however illiquid it was in certain communities. It is probably safe to assume that in agricultural communities, one’s wealth was fairly positively correlated with the amount of land one owned. Other studies show something similar: in their study of wealth in 19th century New England, for example, Steckel and Moehling (2001, 166) show that most wealth, in many years over 65%, consisted of real estate holdings. In analyzing global wealth in 2000, Davies et al. (2011, 228-29) claim that financial assets are more important in more developed countries, while in less developed countries “Real property, particularly land and farm assets, are more important.” So the focus on land seems appropriate for this time and place. In addition, by using land assets I capture information on all of the living heads of households and avoid the age bias that estate data lead to.

These data allow one to calculate a Gini coefficient for a village, which is obviously at a more micro level than Gini coefficients calculated for more aggregated regions, such as large cities or nations, as we typically have for historical periods. Below I provide a Gini coefficient for 1,047 different villages, which covers a large number of places. Such a large dataset allows one to understand more about the possible variability of Gini coefficients.
The Historical Commission collected information on land ownership in every Hessian community.\textsuperscript{6} Included in this survey was arable land owned by famers; excluded were lands owned by nobility. The survey asked villages to complete over two hundred different questions, two of which are shown below. Those from which I construct a land distribution are as follows, with my English translation followed by the questions in German:

1. How much land makes up the largest farm? (Wie viel stellbares Land besitzt der groesste Bauernhof?)
2. How many farmers own 60 or more Acker in arable land? (Wie viele Bauern besitzen 60 und mehr Acker (Morgen) an Ackerland?)\textsuperscript{7}
   - How many 50 – 59 Acker? (Wie viele 50-59 Acker?)
   - How many 40 – 49 Acker? (Wie viele 40-49 Acker?)
   - How many 30 – 39 Acker? (Wie viele 30-39 Acker?)
   - How many 20 – 29 Acker? (Wie viele 20-29 Acker?)
   - How many 10 – 19 Acker? (Wie viele 10-19 Acker?)
   - How many 5 – 9 Acker? (Wie viele 5-9 Acker?)
   - How many less than 5 Acker? (Wie viele weniger als 5 Acker?)

Consider the village of Raboldshausen in the Kreis (district) of Homberg and its respective land distribution, as shown in Table 1. Column 2 shows the percentages of households who fell in each group, and Column 3 shows what assumptions I had to make to create non-zero integer values for the calculations in STATA, as I elaborate on below.

\textsuperscript{6} Vits (1993, 153) refers to this survey specifying that community leaders/officials, teachers and/or ministers filled these surveys out.

\textsuperscript{7} The question asked specifically for amounts of land in units of Acker or Morgen, a measurement used more south of the principality of Hesse-Cassel. I converted all amounts in Morgen to Acker, the more widely used unit for the measurement of land area. An Acker is worth 0.58877 of a U.S. acres; see Fox (1976, 391) and Noback and Noback (1841-50) for information on this conversion.
According to the land distribution data above, these grouped data show that this village had 100 heads of household, with 41% of them renting and not owning land. From other variables in the historical survey it was recorded that the population of this village was 940 people, composed of 144 families living in 129 houses. In this case the actual land distribution provided above was based on 78% of the actual heads of household. Still, it is most likely a good estimate of the true land distribution.

Answers to the second question (#2) in the historical survey provide sufficient information to put together a frequency table on land ownership. Still, to use these land distribution data some assumptions needed to be made. The most difficult assumption to make was what to do with the right tail of the land distribution. The first part of question 2 asks about the number of heads of households who owned 60 Acker or more in arable land. The answer to question 1 is helpful here in that it provides the extreme value on the right hand side of the distribution. In the case of the village of Rabboldshausen, for example, nine households had farms of 60 Acker or more, and the biggest farm of these nine was 70 Acker. What should one do in general though, given that the right tail is not specified and that the STATA command I use to calculate a Gini coefficient requires a general solution?

Examining the distribution for question 1 for the entire principality provides a better perspective: the average amount of land above 59 Acker was 123 Acker, and the median amount was 100 Acker. I thus calculated two sets of Gini coefficients below, one assuming for the largest land category to be 65 Acker (6500 in the calculation), which I refer to as the more conservative measure, and a second calculation where I assume 100 Acker (10,000 in the
calculation). I find it too arbitrary to assume what the right tail of this distribution looks like based on such little information. These two assumptions, especially the more conservative one, bias the village land distributions a bit towards equality. Nevertheless, an attenuating circumstance is that the land distributions were so skewed to the right for so many villages, both overall and within the 60+ Acker category, with many large farms in the biggest category close to 60 Acker.

I then calculated the Gini coefficient for each different Hessian village for which I have land distribution data, a total of 1,047 villages, by using the Ineqdeco command in Stata. This particular command requires one to use non-zero integer data. The third column in Table 1 shows what values I assumed for quantities of land. Those who rented also owned essentially no land, but I cannot use a zero in the calculation, so I multiplied all of the midpoint amounts (in Acker) by 100, giving the landless an amount of 1. For those who owned a house and no arable land I assumed that they owned plots of land equal to 5,000 square feet, which amounts to 11.48% of an acre and thus 19.5% of an Acker (rounded up to 20). Standard errors for Gini coefficients calculated on grouped data are in general very high.

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8 Alternatively I could have done this differently and created the right tail of the distribution by adding farm sizes between 60 Acker and the size of the largest farm. In the case of Rabboldshausen I could have spread out the 9 farms across possible values between 60 and 70 Acker (60, 62, 63, 64, 65, 66, 67, 68, 69, 70), for example. While this matters very little for a village like Rabboldshausen where the largest farm is only 70 Acker, making such an assumption where the largest farm is 200 Acker seems too haphazard and arbitrary in my opinion.

9 The Ineqdeco command allows one to easily compute Gini coefficients for grouped data and for a cross-section of communities. It also provides Atkinson statistics.

10 Heads of household act as the fixed weights for the Ineqdeco calculation, and STATA requires that they be non-zero.

11 My grouped data provide 10 buckets of possible land amounts for the heads of households of each village. If one were to assume that each one in a given bucket owns the midpoint amount (of their particular bucket) and then recalculate Gini coefficients, the resulting standard errors plunge to more acceptable levels without changing the point estimate of the Gini coefficients. This occurs since grouped data assume an equal distribution among the individual observations within each group.
The land distribution data are essentially grouped data, and when calculating inequality measures of grouped data, a downward bias occurs, and this bias can reach close to ten percent. Wodon and Yitzhaki (2003) showed this by taking unit-record data and grouping into 5 groups, which then created a downward bias of almost 8%, thus reducing the measure of inequality by 8%. Bottom-line, some of the various quirks of the land distribution data along with the assumptions I have made make it so that inequality is under-estimated.

Lastly, in terms of technical details, the value of any financial asset is a variable constructed from multiplying a price times the size of an asset (acreage or number of shares of stock, etc.). While the Hesse-Cassel Historical Survey provided three different quality-adjusted land prices for each village, no information exists to link prices to individual land owners. So, while I can easily construct an average land price per village, multiplying land distribution amounts in a given village by a single scalar does not affect the calculation of a village’s Gini coefficient. Land prices may still be of interest when comparing the value of land across different villages.

Figures 1a and 1b show frequency graphs for the Gini coefficients of all 1,047 Hesse-Cassel villages for which a non-zero land distribution exists, with Figure 1a using the more conservative assumption for the largest land category.

[Figures 1a and 1b here]

The more conservative method yielded a Gini coefficient of 0.598 (standard deviation of 0.145), while the other method yielded 0.621 (standard deviation of 0.167), fairly close results. Recall
that the higher the Gini coefficient the more unequal a society or place is.\textsuperscript{12} The frequency
graphs look possibly bi-modal. Both sets of Gini distributions have large standard deviations,
showing that the variability in inequality was large across villages, with approximately 68% of
the gini coefficients lying between the values of 0.43 and 0.76, a fairly wide range of possible
Gini values. This large dispersion provides an opportunity for a more refined explanation of why
some villages had high inequality and others had low measures of it. Most studies on wealth
inequality dwell on national or regional point estimates of Gini coefficients and do not discuss
the variation lying them.

Table 2 combines the land distributions for all 1,047 Hessian villages. It is remarkable to
see how concentrated the distribution is at the bottom, with 72% of households owning 9 Acker
(5.4 acres) or less. Large farmers, those with 30 Acker (18 acres) or more, consist of 13% of the
households.

[Table 2 here]

What does land ownership look like in other places? Brandt and Sands (1997, 812)
present similar data for 1930s rural China, based on 1.75 million households in 16 different
provinces and find that 81.8% of households owned 5 acres or less. Their percentage of the
landless population, 25.8%, looks comparable to 23.2% for 1850s Hesse-Cassel.

One can make a rough calculation on how much of the total arable land the top 10% owned, a common statistic in inequality studies. In Table 2, the top three land categories are
comprised by 9.4% of the households; assuming no differences in land prices across villages, this

\textsuperscript{12} At the extreme, a zero Gini indicates perfect equality, and a value of 1 indicates perfect inequality.
9.4% of the population owned 56.4% of the arable land. This is quite a bit lower than what Kopczuk (2015, 51) finds for 20th century U.S., where the share of total wealth owned by the top 10% ranges from 62% or so to a bit over 80%. Granted, the Hessian data do not include information on landed estates, but analogously modern wealth data suffer from improper measurement of the financial portfolios of the wealthiest.13

**The Rural-Urban Divide**

Smaller communities in terms of population sizes had little variety in types of economic activity, with most of their residents involved in agriculture. Larger communities, in contrast, had more artisans per capita and were more likely to have factories that provided an alternative way to make a living. I calculated separate Gini distributions for small villages (150 or fewer people in 1858) and large villages (750 or more people in 1858). The former is a 17% sample, and the latter is a 15% sample of the 1,047 villages. Essentially I am looking at Gini’s for villages located in the left tail and the right tail in the population distribution.

[Figures 2a and 2b here]

[Table 3 here]

Statistics for these two different distributions are in Table 3. The average Gini coefficient for smaller villages is substantially lower at 0.48, compared to the higher one for larger villages at 0.64. A comparison of means test shows that these are statistically different at the 1% significance level. Figures 2a and 2b show also that the small village distribution is more spread

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13 See Kopczuk (2015) for an analysis of how wealth of the top wealth shares is measured and how complicated it is and how it changes over time.
out and has a left tail and that low inequality in terms of land is virtually non-existent among the larger villages. Was low inequality virtually impossible in bigger villages, or is this mostly reiterating the lower importance of agriculture in more populated places? It is unclear.

**Did Property Rights matter? A Multivariate Perspective**

Is there a multivariate interpretation of Gini coefficients? Regressions of this nature have a precedence in previous scholarship. Here I regress Gini coefficients onto various socioeconomic and physical variables related to each individual village, including the type of inheritance institution practiced, the log of population, artisans per capita, laborer per capita, log of elevation, and so forth. Estimations are shown in Table 4, and right hand side variables are also described here.

[Table 4 here]

Estimations (1) and (2) include all villages with non-missing data on all of the variables included. Many variables are highly statistically significant. Inequality seems to be greater in bigger villages, which often tend to be at lower elevations, due possibly to the better transportation possibilities there. This highlights that there is an urban character to higher inequality, as inequality is higher in villages with more laborers per capita; in these more urban places fewer citizens owned land. In addition, inequality is greater in places with higher land prices and higher wages for farmhands. Piketty (2014, 341) shows something similar, namely

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14 See Benjamin and Brandt (1997, 480) for one example.
that wealth inequality was higher in Paris than in all of France, based on probate records. This gap can be seen over two centuries.\textsuperscript{15}

Very clearly, and not surprisingly, villages that used the impartible inheritance tradition, whereby one child inherited the land, experienced higher inequality. In this Hessian principality there was a lot of local variation in inheritance institutions: villages either practiced impartible inheritance or some version of partible inheritance, with about 70\% using the former institution. This differs from France, where inheritance rules were uniformly determined at the federal level by the Code Napoleon in 1804 such that all children were heirs.

Piketty (2014) takes a firm stand on inheritance, arguing that inequality is driven by the societal allocation of property rights, or who owns what. He shows that in periods of greater equality the percentage that inheritances made up of national income is low; this relationship is reversed when there is less equality and inheritances then make up a greater portion of national incomes. This is analogous to 19\textsuperscript{th} century Hesse-Cassel, where communities that practiced impartible inheritance experienced greater inequality.\textsuperscript{16} Other economists have shown this theoretically or empirically.\textsuperscript{17}

In the regressions in Table 4, a self-reported measure of village prosperity is used. The variable is statistically significant and negatively associated with increasing inequality, so that poorer villages were more likely to experience higher levels of land inequality. Yes, poverty and inequality can go hand in hand.

\textsuperscript{15} This work is based on Piketty, Postel-Vinay and Rosenthal (2006).
\textsuperscript{16} While Piketty is referring to the relative amounts of inheritance and I am using inheritance tradition in my analysis, in the case of Hesse-Cassel, the tradition determines the amounts.
\textsuperscript{17} Chu (1991) uses a theoretical model to show that even when the institution of primogeniture is chosen endogenously, in comparison to other option of “the rule of equal sharing,” it leads to increased inequality. Similarly, Stiglitz (1969), Blinder (1976) and Pryor (1973) all discuss the effects of inheritance institutions on inequality from a theoretical perspective.
Estimation (3) excludes villages with more than 750 inhabitants, with goal here to see if in smaller villages Gini coefficients based on land wealth have a different explanation. Here the results are very similar to the first two estimations. Elevation, inheritance, and population size are all a bit more important, while land prices are less important. Wages and the number of factories all disappear in importance: very few villages of this size had any factories in operation.

*Change over time: 27 villages in 18th century versus 19th century*

What may be especially interesting to economic and social historians is whether inequality changed over the long run. Panel data are often elusive in economic history; however, Brigitta Vits, in her geographical history of rural Hessian communities, put together a panel data set of land distributions for 29 Hessian villages, using the same data I have used above. Data are shown in Table 5 for twenty-six different Hessian communities for two different points in time, the first time period between 1736 and 1786, and the second point in time in the 1850s. Vits focused her study on the Northern parts of Hesse-Cassel and chose villages in five of the twenty-one different Kreise (districts) of the principality. She categorized them into eight different categories as follows, with the first column in Table 5 showing villages’ respective categories:

- Group 1: The Village between Stagnation and Expansion
- Group 2: Villages with distinctive/Pronounced social differences
- Group 3: Villages with Lords and their manors (not included in land distribution)
- Group 4: Villages with Lords
- Group 5: Communities with predominance of (large) farmers
- Group 6: Farmer Hamlets (created through division of manors)
- Group 7: Small farmer villages (*Das Köttendorf*, villages created by small farmers)
- Group 8: Villages with lousy returns (on farming) and overwhelming part-time farmers

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18 See Vits (1993). I excluded 3 villages because their land distributions had too much missing data. For the 1850s Vits used the same archival source on the 1850s village survey (Bestand H3) as I have in Section III of this paper. For a few villages she used an alternative archival sources, namely Bestand 16 (*Ministerium des Inneren*). Both archival sources are from the State Archive in Marburg, Germany.

19 The translations from German to English are mine.
Vits provides quite a variety of types of rural villages, and the distinctions she draws are based on mostly economic variables and partially political power (the presence of lords). According to Vits, one needs to understand the variety of possible agricultural villages to appreciate the actual long-term mobility of the underclasses that took place from landless to small farmers and from small farmers to large farmers. She emphasizes the change in social structure that took place: she really means inter- and not intra- generational mobility, in the sense that in many of the villages in her sample there were actually more large farmers in the 19th century than in the 18th century, as one can see in Table 5. She may exaggerate the actual upward mobility that took place, which I explain below.20

Her sample has some biases. Most importantly, with the exception of villages in Group 8, which practiced partible inheritance, all of these villages exercised the institution of impartible inheritance. In addition, there is the geographic bias that these villages are in five of the twenty-one possible Kreise (districts) of Hesse- Cassel.

Further, while population figures are not readily available (and possibly nonexistent) for the 18th century, I display the village population for the 1850s along with the number of houses for each time period in Table 5. The number of houses is strongly correlated with population numbers.

[Table 5 here]

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From these land distribution data I calculated Gini coefficients for each time period, displayed also in Table 5. What is noteworthy here is that the Gini coefficient for the land distribution in the villages increased for the majority of communities, meaning that inequality increased between the 1700s and the 1850s. This may reflect the predominant use of the impartible inheritance tradition in this subsample, a tradition which restricted heirs to the eldest son or the best suited son and relegated their siblings to alternative economic strategies, such as marrying an heir of land, taking up a career as an artisan, or seeking their fortunes elsewhere.

The upward mobility that Vits emphasized needs to be placed in context. In many villages the number of farmers owning 60 or more Acker increased between the 1700s and the 1850s, while at the same time inequality in the village increased. The principal change that villages experienced, the one that pushed up Gini coefficients, was thus an increase in the percentage of its citizens belonging to the lower classes.

It is unclear whether the amount of arable land for these villages expanded between these two time periods, whether it had to do with villagers converting meadows into arable land or manors being converted into arable land for a village or commons land being privatized. The 1850s village survey provides the amount of land that can be considered as arable in addition to the total amount land in the village’s cadaster (inclusive of meadows, waster, forest, etc.), but it is not readily available for this study. If the amount of arable land remained the same between the two centuries, a reasonable summary of increasing inequality is very much a Malthusian

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21 I use the 6500 assumption for the largest bucket in the land distribution.
22 Vits (1993) did not provide or use data on total arable land of each village; I suspect that she would have if it were readily available. It is uncertain at this stage. The analogous figures may still exist in the State Archive of Hessen in Marburg for the 18th century; her study focused instead on the number of houses. She does discuss the aftermath of the Thirty Years war, which allowed villages to annex deserted settlements, but this is trend is basically complete by the middle of the 18th century (Vits, 1993, 141).
interpretation, where most villages were dividing up the same pie in the 1700s as in the 1850s; coupled with the impartible inheritance tradition (Anerbenrecht), it is a simple explanation for increasing inequality. If the amount of arable land increased for many communities, making the so-called pie increase, this simple explanation still holds but in an attenuated form. The villages Vits studied were places where agricultural products were the main outputs, and land was the chief input to production as well as the main asset in villagers’ portfolios. Micro theory predicts that there are diminishing returns to a fixed input.

Still, the Gini coefficients calculated above only capture the agricultural part of the economy. Some of these villages were on the cusp of economic development in non-agricultural sectors. This is a similar story to what Brandt and Sands (1990) tell of late 19th century China and what Lindert (1986, 1156) describes for eighteenth century England as a “drift toward human skills and away from land.”

IV Conclusion

While economic growth is a goal of most societies, its distribution is also of concern. Recent works on long-run inequality (Piketty 2014) and long-run social mobility (Clark, 2014) both paint pessimistic portraits of the probability of economic advancement without the benefits of rich and socially-connected parents. These works have challenged social scientists in terms of the values of fairness and equity.

This paper provides the wealth distribution for villages in 1850s Hesse-Cassel. Wealth here is based on the agricultural assets in land of the local economies. Villages had an average Gini coefficient between 0.59 and 0.62. My analysis showed large variations across communities: the distribution of village Gini’s was left-skewed and very wide, with at least 15%
of the village Gini coefficients less than 0.43. Thus there were many more than just a handful of communities with fairly equal land distributions alongside many others with very unequal distributions. Inequality coexisted with equality across the Hessian region.

In this principality higher inequality was related to higher population densities, the tradition of impartible inheritance of primogeniture, and some higher factor prices including those for land and farmhand wages. Poorer villages and ones with higher densities of laborers also experienced higher inequality. It is unclear how much the industrial revolution was making land less important, as Brandt and Sands (1990, 827) and Lindert (1986, 1156) describe for China and England respectively, but it is definitely a causal factor to be considered in more depth. The regression estimations provide some preliminary evidence of the same trend these other authors refer to, as inequality was lower for those Hessian villages with more factories.

Inequality in land wealth and how it changed between the 18th and 19th centuries was measured using a subsample of villages. Most of the villages in the sample practiced impartible inheritance and most experienced increases in inequality in moving to the 19th century. These results provide some rare insight into the change in wealth inequality between these two centuries, as information for any place before the nineteenth century is rare. These results may indicate the consequences of population growth in places where acquiring new land for cultivation had reached its limit.

Together, the story of Hessian inequality in the 18th and 19th centuries is a case study that adds to the literature and can shed light on the interactions between growth, structural change in the economy, urbanization and inheritance rules. Economic historians, with our emphasis telling the story of economic growth in all of its manifestations, need to wade in and provide more evidence on inequality.
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Hesse, Germany. Hessisches Staatsarchiv Marburg. Bestand H3 (Village survey).

Hesse, Germany. Hessisches Staatsarchiv Marburg. Bestand 16 (Ministerium des Inneren).


### Table 1

**Land Distribution for Raboldshausen, 1854**

<table>
<thead>
<tr>
<th>Amount of Land in Acker</th>
<th>Number Heads of Household</th>
<th>Midpoint of Group, in Acker</th>
<th>Assumption of Land amount in Gini Calculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 or more Acker</td>
<td>9</td>
<td></td>
<td>6,500 or 10,000</td>
</tr>
<tr>
<td>50 – 59 Acker</td>
<td>6</td>
<td>54.5</td>
<td>5,450</td>
</tr>
<tr>
<td>40 – 49 Acker</td>
<td>7</td>
<td>44.5</td>
<td>4,450</td>
</tr>
<tr>
<td>30 – 39 Acker</td>
<td>8</td>
<td>34.5</td>
<td>3,450</td>
</tr>
<tr>
<td>20 – 29 Acker</td>
<td>4</td>
<td>24.5</td>
<td>2,450</td>
</tr>
<tr>
<td>10 – 19 Acker</td>
<td>10</td>
<td>14.5</td>
<td>1,450</td>
</tr>
<tr>
<td>5 – 9 Acker</td>
<td>5</td>
<td>7</td>
<td>700</td>
</tr>
<tr>
<td>Less than 5 Acker</td>
<td>1</td>
<td>2.5</td>
<td>250</td>
</tr>
<tr>
<td>Own only house</td>
<td>9</td>
<td>0.19</td>
<td>20</td>
</tr>
<tr>
<td>Rent house, no land</td>
<td>41</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Notes: i) The biggest farm in this village was 70 Acker.

### Table 2

**Land Distribution for Total Hesse-Cassel**

<table>
<thead>
<tr>
<th>Amount of Land in Acker</th>
<th>Percentage of Households</th>
<th>Cumulative (Lorenz curve-like)</th>
<th>Cumulative (reverse Lorenz)</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 or more Acker</td>
<td>4.4 %</td>
<td>100.0 %</td>
<td>4.4 %</td>
</tr>
<tr>
<td>50 – 59 Acker</td>
<td>2.3</td>
<td>95.6</td>
<td>6.7</td>
</tr>
<tr>
<td>40 – 49 Acker</td>
<td>2.7</td>
<td>93.3</td>
<td>9.5</td>
</tr>
<tr>
<td>30 – 39 Acker</td>
<td>3.7</td>
<td>90.5</td>
<td>13.1</td>
</tr>
<tr>
<td>20 – 29 Acker</td>
<td>5.5</td>
<td>86.9</td>
<td>18.6</td>
</tr>
<tr>
<td>10 – 19 Acker</td>
<td>9.3</td>
<td>81.4</td>
<td>27.9</td>
</tr>
<tr>
<td>5 – 9 Acker</td>
<td>10.7</td>
<td>72.1</td>
<td>38.6</td>
</tr>
<tr>
<td>Less than 5 Acker</td>
<td>26.4</td>
<td>61.4</td>
<td>65.1</td>
</tr>
<tr>
<td>Own only house</td>
<td>11.7</td>
<td>34.9</td>
<td>76.8</td>
</tr>
<tr>
<td>Rent house, no land</td>
<td>23.2</td>
<td>23.2</td>
<td>100.0</td>
</tr>
</tbody>
</table>

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### Table 3
Gini's for Small and Large Villages

<table>
<thead>
<tr>
<th>Category</th>
<th>Average Gini</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small Villages</td>
<td>0.482</td>
<td>0.204</td>
</tr>
<tr>
<td>Large Villages</td>
<td>0.639</td>
<td>0.152</td>
</tr>
</tbody>
</table>

Note: I use the 1858 population census. Small villages are defined here as having 150 or fewer people, and large villages are defined as having 750 or more people.

### Table 4
Linear Regressions

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>(1) All Villages</th>
<th>(2) All Villages</th>
<th>(3) Villages, w/fewer than 750 population</th>
</tr>
</thead>
<tbody>
<tr>
<td># Estates, Castles</td>
<td>-0.009**</td>
<td>-0.008**</td>
<td>-0.007</td>
</tr>
<tr>
<td>Elevation</td>
<td>-0.036**</td>
<td>+0.035**</td>
<td>-0.049**</td>
</tr>
<tr>
<td>Inheritance</td>
<td>-0.116***</td>
<td>-0.116***</td>
<td>-0.123***</td>
</tr>
<tr>
<td>Avg. Land Price</td>
<td>+0.040***</td>
<td>+0.041***</td>
<td>+0.029***</td>
</tr>
<tr>
<td>Log of Population</td>
<td>+0.073***</td>
<td>+0.073***</td>
<td>+0.093***</td>
</tr>
<tr>
<td>Artisans per Capita</td>
<td>+0.043</td>
<td></td>
<td>+0.114</td>
</tr>
<tr>
<td>Laborers per Capita</td>
<td>+0.353***</td>
<td>+0.352***</td>
<td>+0.344***</td>
</tr>
<tr>
<td># Factories</td>
<td>-0.010*</td>
<td>-0.010*</td>
<td>-0.002</td>
</tr>
<tr>
<td>Farmhand wage</td>
<td>+0.002*</td>
<td>+0.002*</td>
<td>+0.001</td>
</tr>
<tr>
<td>Day Laborer wage</td>
<td>-0.005</td>
<td>-0.004</td>
<td>-0.0004</td>
</tr>
<tr>
<td>Prosperity of Village</td>
<td>-0.069***</td>
<td>-0.070***</td>
<td>-0.077***</td>
</tr>
<tr>
<td>R²</td>
<td>24.4%</td>
<td>24.5%</td>
<td>29.3%</td>
</tr>
<tr>
<td>N</td>
<td>832</td>
<td>834</td>
<td>698</td>
</tr>
<tr>
<td>F statistic</td>
<td>25.7</td>
<td>28.1</td>
<td>26.2</td>
</tr>
</tbody>
</table>

Notes: i) The dependent variable is the village Gini coefficient based on the land distribution; ii) standard errors are White-corrected. iii) Independent variables as described as follows:

- Number of Estates, Castles: denotes large owners of land not classified as farmers.
- Elevation: log of elevation
- Inheritance: 1 if partible, 0 if impartible
- Average Land price: arithmetic average of three prices for each village (quality adjusted)
- Log of Population: natural log of village population in 1855
- Artisans per capita: # artisans in late 1850s village survey divided by population in 1858
- Laborers per capita: # laborers in 1852 Hessian census divided by population in 1855 (closest)
- # Factories: number of factories in the village
- Farmhand wage: annual wage of a male farmhand
- Day Laborer wage: average day laborer wage (per day)
- Poverty of Village: The range of this variable is from 0 to 1, with 1 being the most prosperous. It measures how rich or poor the village is.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Haddamar, 1745</td>
<td>FZ</td>
<td>50</td>
<td>49</td>
<td>363</td>
<td>0.415</td>
<td>0.569</td>
<td>↑</td>
<td>Imparible</td>
</tr>
<tr>
<td>1</td>
<td>Geismar, 1736</td>
<td>FZ</td>
<td>84</td>
<td>131</td>
<td>763</td>
<td>0.549</td>
<td>0.584</td>
<td>↑</td>
<td>Imparible</td>
</tr>
<tr>
<td>2</td>
<td>Maden, 1747</td>
<td>FZ</td>
<td>56</td>
<td>66</td>
<td>483</td>
<td>0.665</td>
<td>0.680</td>
<td>↑</td>
<td>Imparible</td>
</tr>
<tr>
<td>2</td>
<td>Lenderscheid, 1783</td>
<td>ZIG</td>
<td>49</td>
<td>60</td>
<td>376</td>
<td>0.527*</td>
<td>0.600*</td>
<td>↑</td>
<td>Imparible</td>
</tr>
<tr>
<td>2</td>
<td>Siebertshausen, 1783</td>
<td>ZIG</td>
<td>11</td>
<td>18</td>
<td>99</td>
<td>0.803</td>
<td>0.576</td>
<td>↓</td>
<td>Imparible</td>
</tr>
<tr>
<td>2</td>
<td>Cappel, 1747</td>
<td>FZ</td>
<td>18</td>
<td>30</td>
<td>172</td>
<td>0.656</td>
<td>0.643</td>
<td>↓</td>
<td>Imparible</td>
</tr>
<tr>
<td>3</td>
<td>Grifte, 1750</td>
<td>FZ</td>
<td>47</td>
<td>68</td>
<td>584</td>
<td>0.615*</td>
<td>0.680*</td>
<td>↑</td>
<td>Imparible</td>
</tr>
<tr>
<td>3</td>
<td>Obermöllrich, 1749</td>
<td>FZ</td>
<td>45</td>
<td>72</td>
<td>506</td>
<td>0.600</td>
<td>0.670</td>
<td>↑</td>
<td>Imparible</td>
</tr>
<tr>
<td>3</td>
<td>Niedermöllrich, 1750</td>
<td>MEG</td>
<td>60</td>
<td>83</td>
<td>584</td>
<td>0.429</td>
<td>0.664</td>
<td>↑</td>
<td>Imparible</td>
</tr>
<tr>
<td>3</td>
<td>Wassmannshausen, 1772</td>
<td>HOM</td>
<td>23</td>
<td>26</td>
<td>189</td>
<td>0.581*</td>
<td>0.599*</td>
<td>↑</td>
<td>Imparible</td>
</tr>
<tr>
<td>3</td>
<td>Böddiger, 1748</td>
<td>MEG</td>
<td>40</td>
<td>67</td>
<td>473</td>
<td>0.561</td>
<td>0.686</td>
<td>↑</td>
<td>Imparible</td>
</tr>
<tr>
<td>3</td>
<td>Allmuths, 1772</td>
<td>HOM</td>
<td>38</td>
<td>44</td>
<td>248</td>
<td>0.567*</td>
<td>0.537*</td>
<td>↓</td>
<td>Imparible</td>
</tr>
<tr>
<td>4</td>
<td>Lohne, 1747</td>
<td>FZ</td>
<td>84</td>
<td>106</td>
<td>772</td>
<td>0.543</td>
<td>0.612</td>
<td>↑</td>
<td>Imparible</td>
</tr>
<tr>
<td>4</td>
<td>Niedervorschütz, 1750</td>
<td>MEG</td>
<td>38</td>
<td>65</td>
<td>435</td>
<td>0.617</td>
<td>0.769</td>
<td>↑</td>
<td>Imparible</td>
</tr>
<tr>
<td>4</td>
<td>Werkel, 1736</td>
<td>FZ</td>
<td>57</td>
<td>85</td>
<td>555</td>
<td>0.539</td>
<td>0.554</td>
<td>↑</td>
<td>Imparible</td>
</tr>
<tr>
<td>5</td>
<td>Wehren, 1747</td>
<td>FZ</td>
<td>32</td>
<td>47</td>
<td>275</td>
<td>0.467</td>
<td>0.510</td>
<td>↑</td>
<td>Imparible</td>
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<tr>
<td>5</td>
<td>Gleichen, 1749</td>
<td>FZ</td>
<td>35</td>
<td>51</td>
<td>363</td>
<td>0.490</td>
<td>0.763</td>
<td>↑</td>
<td>Imparible</td>
</tr>
<tr>
<td>5</td>
<td>Lohre, 1747</td>
<td>MEG</td>
<td>29</td>
<td>41</td>
<td>292</td>
<td>0.493</td>
<td>0.561</td>
<td>↑</td>
<td>Imparible</td>
</tr>
<tr>
<td>5</td>
<td>Zennern, 1770</td>
<td>FZ</td>
<td>65</td>
<td>80</td>
<td>582</td>
<td>0.411*</td>
<td>0.520*</td>
<td>↑</td>
<td>Imparible</td>
</tr>
<tr>
<td>5</td>
<td>Leuderode, 1773</td>
<td>HOM</td>
<td>31</td>
<td>30</td>
<td>212</td>
<td>0.401</td>
<td>0.535</td>
<td>↑</td>
<td>Imparible</td>
</tr>
<tr>
<td>5</td>
<td>Rodemann, 1773</td>
<td>HOM</td>
<td>24</td>
<td>26</td>
<td>156</td>
<td>0.452*</td>
<td>0.450*</td>
<td>↓</td>
<td>Imparible</td>
</tr>
<tr>
<td>6</td>
<td>Steindorf, 1767</td>
<td>HOM</td>
<td>10</td>
<td>13</td>
<td>88</td>
<td>0.554</td>
<td>0.413</td>
<td>↓</td>
<td>Imparible</td>
</tr>
<tr>
<td>6</td>
<td>Rückersfeld, 1767</td>
<td>HOM</td>
<td>8</td>
<td>8</td>
<td>61</td>
<td>0.141</td>
<td>0.165</td>
<td>↑</td>
<td>Imparible</td>
</tr>
<tr>
<td>7</td>
<td>Wichardorf, 1786</td>
<td>FZ</td>
<td>50</td>
<td>81</td>
<td>629</td>
<td>0.622</td>
<td>0.754</td>
<td>↑</td>
<td>Imparible</td>
</tr>
<tr>
<td>8</td>
<td>Breuna + Röhda, 1748</td>
<td>WOH</td>
<td>138</td>
<td>168</td>
<td>967</td>
<td>0.590</td>
<td>0.579</td>
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<td>Partible</td>
</tr>
<tr>
<td>8</td>
<td>Oberelsungen, 1779</td>
<td>WOH</td>
<td>99</td>
<td>109</td>
<td>726</td>
<td>0.639</td>
<td>0.653</td>
<td>↑</td>
<td>Partible</td>
</tr>
</tbody>
</table>
Notes: i) The abbreviations for the district names are Fritzlar (FZ), Homberg (HOM), Melsungen (MEG), Wolfhagen (WOH) and Ziegenhain (ZIG); ii) The asterisk next to Gini coefficients denotes that it was calculated using 9 buckets because of missing data for the poorest members of these villages.
Figure 2b: Gini Distribution for Large Villages