Social Institutions, Violence, and Innovations: Did the Old Poor Law Matter?

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Abstract

Social institutions impact growth by redistributing resources to the young, the poor, the old, and the sick. This paper empirically substantiates that England's pre-modern social institutions—specifically, the Old Poor Law (1601-1834)—contributed to her transition to the modern economy. It reduced violent, innovation-inhibiting reactions from the economic agents threatened by economic change. This conclusion is based on an analysis of a panel of poor relief and social unrest data from 39 English counties over the period between 1650 and 1830. Variations in the amount of poor relief came to bear negatively and statistically significantly on the incidence of food riots. Moreover, food riots came to bear negatively on innovations, while the latter were positively and significantly related to poor relief prior to and during the First Industrial Revolution. The analysis complements the finding that England's and China's distinct social institutions influenced their trajectories of technological changes and social disorder (Greif, Iyigun, and Sasson, 2011, 2012). Social institutions have had multiple and changing roles in economic growth, while inter-societal cultural distinctions and intra-societal cultural dynamics have led to distinct social and cultural institutions.

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1 Introduction

What impact does social instability have on technological and economic innovations in general? And what role did civic unrest and social disorder play in new discoveries that led to the emergence of the first modern economy in England? Do social risk-sharing institutions manifest themselves in social stability, thereby coming to bear on entrepreneurial discoveries? What role, if any, did the enactment of the Old Poor Law (1601-1834) in England have in social discontent and unrest in the period leading up to the first industrial takeoff?

Social institutions can mitigate the threat of violent social responses to labor-saving innovations through income redistribution and thereby mitigate the growth-inhibiting repercussions of the wedge between private and social returns from experimentations and innovations. Specifically, redistributive social institutions can influence entrepreneurial discoveries in two ways: On the one hand, they directly reduce the income risk associated with individuals' experimentation in new technologies or responding to new opportunities that the growth process implies. Entrepreneurs can thus better afford failure if and when they made risky investments of time and resources in new innovative ventures. Similarly, others can take more risk in facing the new challenges and opportunities that innovations entail. On the other hand, the net expected return to entrepreneurial ventures rise because social safety nets lower the risk that part of the return from risky experimentation would be lost due to violent responses by those whose livelihood is threatened by the new innovations.

This paper explores the historical evidence on the ties among social unrest, aid to the poor and incentives to innovate in England's transition to the first modern economy that culminated with the First Industrial Revolution. To that end, we assemble a panel covering 39 English counties between the years of 1685 and 1830. The data include information on the amount of public resources available for poor relief within the counties observed at six different points in time. We combine these data with a variety of measures of social instability observed within each county over subsequent periods of time. We then control for a host of county-specific but time-variant data, such as regional indicators, levels of population, wealth and tax-base indicators as well as the extent to which the local economies were market dependent.

Using this dataset, we first document that the Old Poor Law was particularly good at subduing social unrest, thereby encouraging risk-taking and stimulating entrepreneurial discoveries in England. In particular, we find that county-level variations in the amount of poor relief came to bear negatively and statistically significantly on the propensity of food riots within each county in England over this period. We also show that food riots

came to bear negatively on innovations, while the latter were positively and significantly related to poor relief supplied by each English county.

These findings further support the hypothesis, advanced in Greif, Iyigun and Sasson (2011, 2012), that distinct *social institutions have had a first order effect on historical trajectories of innovations and growth in general.*[1] Social institutions determine the extent of risk sharing and its impact on risk taking, innovations, and social disorder. Growth-promoting social institutions limit the individual-level downside risk associated with developing, implementing and responding to new useful knowledge, thereby mitigating the threat of violent social responses to labor-saving innovations. A stabler and more tranquil social environment then aided and spurred more entrepreneurial risk-taking that resulted in new technological innovations.

Moreover, by comparing European and Chinese institutions these papers highlighted that social and cultural elements not only constrain the design and function of formal social institutions, but also impact long-run economic outcomes. In those papers, we emphasize the importance of *social institutions* in the rise of the modern economy. We argue that *social and cultural factors impacted the design of institutions* with which they subsequently coevolved. Although social institutions were often chosen by the elite to avoid social upheavals, their forms were influenced by pre-existing cultural and social factors. *Institutional forms* mattered because social and cultural elements not only constrained the design and function of formal social institutions, but also impacted long-run economic outcomes.[2]

Our analysis also highlights the multiple and changing roles of social institutions in the process of growth. On the one hand, the favorable impact of the Poor Law on growth critically depended on other factors. Among these were good political institutions, large markets, developments in mechanical techniques and belief in progress (Mokyr 2010). On the other hand, the impact of socially beneficial institutions are historically contingent: The Poor Law helped to spur English economic growth in the run-up to the First Industrial Revolution. But it also fostered population growth and a culture of dependence that, in the long-run, threatened sustained economic growth, while growth reduced the need for, and the benefits of, the Old Poor Law.

Our paper is organized as follows: The next section discusses the historiography of poor relief in England and sets the stage for our empirical study. Section 3 describes our data sources and the summary statistics of our key variables. Section 4 presents a host of baseline estimates of the links between poor relief and social stability. The subsequent

[1] For a summary of this thesis as well as the related empirics, also see Greif and Iyigun (2013).

[2] The latter two points are also made in Greif (1994, 2006). On the relations between culture and institutions, see, for example, Greif (1994, 2006), Zak and Knack (2001); Helpman (2004); North (2005); Tabellini (2005); Guiso, Sapienza and Zingales (2006); Greif and Tabellini (2010, 2012).

section supplies some alternative specifications and robustness tests on the association of poor relief with acts of social unrest by county. Section 6 then brings into our analysis county-level variations of innovation and explores how those are related to poor relief and social unrest. Section 7 concludes.

2 The Historical Context

The working people of pre-modern England were aware of poverty risk as evident in the proliferation of mutual insurance organizations. In the early 16th century, the majority of England's rural and urban populations belonged to fraternities and guilds that provided social safety nets (Richardson, 2005). Friendly Societies were later common. In 18th century Yorkshire county, 15 parishes had at least 144 societies with 5,737 members implying one member per every four households (calculated from Eden, 1797, vol. 3, pp. 811-890). Members included "almost every manufacturer" (ibid, p. 874) in the parish of Wakefield, "several shop-keepers, and respectable trade-men," in Surrey-Epson (ibid, pp. 697-700). More generally, skilled workers, such as bakers, carpenters, tailors, butchers, watchmakers, white-smiths, and paper-makers, comprised the memberships. In 1801, about 40 percent of England's households were members of a friendly society.[3]

The fear of poverty and destitution was the main source of social unrest in England during its industrial transition. The four largest rebellions under the Tudor, and the only ones with more than 10,000 participants, were wholly or partially in response to threats to peoples' livelihood.[4] The link between economic change and social order manifested itself in the 16th century legislation aimed at preventing and reversing enclosures of open fields.

More generally, social disorder was mainly caused by economic concerns involving labor-saving machinery, food prices, wages, and enclosures. About 50 percent (51/101) of the significant riots and protests from 1770 to 1806 fell in this category and four percent (4/101) were concerning taxation.[5] In China, civil disorder was also mainly about livelihood. We know the causes of 484 collective protests against the state from 1740 to 1839. Forty three percent were of those concerned with the right to pursue an economic activity, get a higher wage, or obtain cheaper food, while an additional sixteen percent were concerned with taxation (Hung, 2011, Table 2.3).

"Vagrancy was one of the most pressing problems of" the Tudor and early Stuart

[3] There were about 1.7 million families in England's counties around 1801 and 674,000 members in Friendly Societies in 1803 (1801 Abstract, vol. 1, summary and 1804 Abstract, p. 714).

[4] These four riots were, the Cornish revolt of 1497, Kett's Rebellion in 1549, the Pilgrimage of Grace, and the Lincolnshire rising in 1536.

[5] The data are available upon request.

(Beier 1985, p. xix) and violence due to poverty was perceived by contemporaries as a threat to social order. Such a perception is expressed, for example, by Sir Matthew Hale, the Lord Chief Justice of the Kings Bench who published a book concerning poverty in 1683. Hale recommended to invest heavily in eradicating poverty in England because it undermines "public wealth, and peace" (p. 7) as the poor engaged in "thieving and stealing, ... cutting and destroying of woods, pulling of hedges, and [trespassing] to corn" (p. 58-9). An earlier student of poverty, writing in 1646 estimated that although there were only "80,000 idle vagrants" they "prey upon the commonwealth" thereby causing great damage. Specifically, in addition to a yearly maintenance cost of £88,740.12s.6d they also cause £365,000 in damages (cited in Eden, 1797, vol. 1, p. 167). Taken together, these sums amounted to about 50 percent of the king's revenue from direct and indirect taxes in 1640.[6]

Contemporary elites were highly cognizant of the fact that economic changes increased poverty risk, which in turn could lead to social unrest. In 1797, for example, Sir Frederick Morton Eden, the 2nd Baronet of Maryland and a pioneering social investigator wrote that "by some persons in this country... the recent introduction of machines into the woollen manufacture ... is a great national misfortune, that a wool-spinner can, by means of machines, do ten times the work he could perform without them" (vol. III, p. 874). Violent responses were a possibility and "almost every new form of machinery [in the woolen industry] ... was met with anger in the form of riots" (Archer, 2000, p. 45).

While the interplay between economic change and social instability was recognized fairly early on, the links between poor relief and socially beneficial economic change seem to have penetrated public discourse only by the end of the 18th century. In his aforementioned book, Sir F.M. Eden explicitly recognized the trade-offs between poor relief and socially beneficial economic changes. He argued that enclosures, "manufactures and commerce are the true parents of our national Poor" (vol. 1, p. 60-1). Moreover, "any ... machines or contrivances calculated to lessen labour ... throw many industrious individuals out of work; and thus create distresses that are sometimes exceedingly calamitous. Still,... [they] promote the general wealth, by raising the largest quantity of provisions, or materials for manufacture" (ibid, p. xiv). Poor relief can be used so that "their inconvenience to individuals will be softened and mitigated, indeed, as far as it is practical" (ibid). The alternative is stagnation. Relief should "by no means ... counteract any new plans of improvement, ... If this were not the proper line to pursue, it must be confessed, the Turks alone are right, in not suffering a printing-press to be introduced into their dominions, merely because one of it's immediate- effects would be, the depriving many thousands of unoffending, industrious, hackney writers, of their usual means of earning a livelihood"

[6] Data by P. K. O'Brien and P. A. Hunt at http://esfdb.websites.bta.com/table.aspx?resourceid=11686.

(ibid).

Social risk-sharing arrangements and institutions were thus acknowledged to facilitate economic progress by reducing the likelihood of violent responses from those who would be economically disadvantaged by economic changes.

As far as the evolution of aid to the poor in England is concerned, prior to the 16th century, secular and religious organizations—monasteries, fraternities, mutual-insurance guilds, and communes—assisted the poor or their members in times of need (e.g. Reynolds, 1984; Brenner, 1987; Archer, 1991). They provided individuals with such services as poor relief and unemployment and disability assistance. In the early 16th century, the majority of the commoners in England belonged to fraternities and guilds that provided social safety nets (Richardson, 2005). Getting relief from these risk-sharing institutions was, however, uncertain as they were either provided by charity organizations (e.g., by the Church) or cooperatively financed by working people without much wealth.

Population growth and urbanization during the 16th century pressured this system of poor relief. Matters got worse when, during the Wars of Religion, rulers confiscated the property of many welfare-providing organizations. In England, Henry VIII dissolved the monasteries in 1536-40 and shut down all religious guilds, fraternities, almshouses, and hospitals in 1545-49. These actions "destroyed much of the institutional fabric which had provided charity for the poor in the past" (Slack, 1990, p. 8).

The lack of an effective poor relief system and population growth then began to pressure wages and increased poverty. States responded by demanding local administrative bodies, such as parishes and cities to support the needy. In England, the first tax to support the poor was introduced in 1572 but the Poor Law Act of 1601 (the Old Poor Law) formalized the system which lasted, with some modifications, until 1834. Each parish was authorized and obliged to levy a property tax to care for the poor (Boyer, 1990).

Private relief remained important in England and was encouraged by the state. The Statute of Charitable Uses (1601) was aimed at encouraging charitable gifts and protecting the funds from misuse. Moreover, a 1597 law holding parents and children responsible for each others' support was extended, in 1601, to include grandparents and grandchildren. Thus, relatives, friends, charity organizations, and Friendly Societies were important sources of support (e.g., Dyson, 2009; Ben-Amos, 2008). Yet, 1601 marked the beginning of an era in which the state was a major provider of poor relief.

Shifting the responsibility for poor relief to the state (via local administrators) was a European phenomenon and poor relief systems similar to England's were established elsewhere (Geremek, 1997; de Vries and de Woude, 1997, pp. 654-664). Yet, the English Poor Law system was more reliable and generous than the continental ones. In England, expenses were financed through a variable poor rate on the assessed rental value of local real

estate property and most aid was given without forcing the recipient to move to the poor house.[7] Continental poor relief, by contrast, was financed through a variety of sources: voluntary donations, capital income, subsidies from local and national governments, and general tax revenues. Funding was, therefore, less reliable. Furthermore, the legal right to relief was well defined in England while rights were vaguely defined, less credibly assured, and generally at the discretion of local authorities on the continent.

Annual spending on poor relief in England was about 1 percent of national income in the 17th century and peaked at about 2.5 percent during the 19th century. At that time, it supported about 11 percent of the population and may have boosted average incomes of the bottom 40 percent by 14 to 25 percent. Expenditure per capita was 7.5 times higher than in France in the 1780s, 2.5 times higher than in the Netherlands in the 1820s, and 5 times higher than in Belgium in the 1820s.[8] England's exceptionality reflects distinct needs in the late 16th century when these systems were created. While peasantry and other 'customary' labor relations that insured the poor still dominated in other European states, the transition to wage laborer had already begun in England.[9]

When enacted, the Poor Law improved welfare. The elasticity of mortality with respect to real wages was negative and statistically significant from 1540 to 1640 but it was basically zero from 1640 to 1740.[10] The improvement was due to better poor relief, and not higher real wages, reduced variance of grain output, increased urbanization, or changing climate (Kelly and Ógrada, 2008). Mortality rates of the non-elite declined (ibid). Better nutrition, to which the Poor Law contributed, "should be regarded as one in a battery of factors, often interacting, which played a key rule in Britain's mortality transition" (Harris, 2004, p. 380).[11]

[7] Those who financed the Poor Law had no legal rights to influence risk taking. Moreover, farmers who took risks (by specializing in grains) had the political power to transfer the cost of insurance on to others (Boyer, 1990).

[8] Boyer (1990), Mokyr (2002) and Kelly and Ógrada (2008).

[9] On these and other aspects of the system see, for example, Boyer (1990); Slack (1990); Solar (1995); Kelly and Ógrada (2008). Patriquin (2006) compares the English case with those of Scotland and Ireland. Lindert (2004) is the seminal work in economic history on public goods.

[10] Nicolini (2007); information from Parish's registers is available from 1540. See Landers (1987) about London.

[11] The role of better nutrition in the decline in morality has been particularly emphasized by McKeown and his co-author and surveyed in Harris (2004). Smith (2008) emphasizes the positive role of the Poor Law in reducing the risk of labor migration.

3 The Data

3.1 Data Sources

In order to investigate the role of aid to the poor on social unrest and those in turn on innovations, we gathered an unbalanced panel data covering 39 English counties over the period between 1650 and 1830 CE.

We have variations for England's 39 counties in both the amount of poor relief offered as well as the documentation of food riots and other types of social unrest, such as land and enclosure protests as well as clubmen and militia protests.[12] These social disturbance data are culled from Bohstedt (2010) and Charlesworth (1983). The source of our other control variables are: for county *population levels*, Colquhoun (1806), the 1801 and 18011 population censuses, and the 1824 Report of the Committee on Poor Relief; for county *wealth measures*, Buckatzsch (1950) based on tax assessments by the state; for *wheat prices*, Clark (2003); for *market dependence* measures, Kussmaul (1989) and the Parish Register Abstracts in the Censuses of 1801, 1811, and 1821; for the county-level patents granted which we use as our *innovation* measure, various volumes of the *Repertory of Patent Inventions, and Other Discoveries* from 1797 to 1820; for land protests and clubmen and militia uprisings, Charlesworth (1983). A list of the main variables, definitions and sources for our dataset is in the appendix at the end.

3.2 Descriptive & Summary Statistics

Table 1 presents the descriptive and summary statistics of our dataset. Due to data limitations, this is an unbalanced panel covering a total of 273 observations as an upper bound. And depending on the estimation and controls involved, the number of observations range from 191 to 233 in each of our baseline regressions.

In fact, the first poor relief data across the English counties are available at six points in time: the first observations are from 1685, and the rest are from 1750, 1776, 1784, 1803 and 1815.[13] Our primary social disorder data are a variety of food riots because the latter are documented for England in fairly high detail for the years between the 1650s and the 1830s. Given this imbalance between our poor relief data and social unrest, we observe poor relief in the years that are available to us, followed by the frequency of food riots in the subsequent windows of time. For instance, we observe poor relief differences in 1685 and assess their impact on food riots in the period from 1686 to 1749. In similar fashion,

[12] We consistently aggregated the data for York and included London in Middlesex.

[13] To be more precise, the 1784 data are averaged using the three consecutive years of 1783, 1784 and 1785, although, depending on the variable in question, they may come from one or two of those years only.

we then relate county-level resources available for poor relief in 1750, 1776, 1785, 1803 and 1815 to the frequency of food riots that occurred in each county in the five additional intervals of time covering 1751 to 1775, 1777 to 1783, 1785 to 1802, 1804 to 1814, and 1816 to 1830.[14] On this basis, we are able to estimate the role of poor relief on social unrest using a panel of 39 English counties, covering six intervals of time.[15]

The measure we use for resources available for aid to the poor is the total amount of tax assessed and raised at the county level for the finance of local expenditures. Only part of this amount was spent on poor relief. For two years only (1685 and 1750), the data available are actual expenditures on poor relief. In general, the fact that our explanatory variable is the hypothetical upper bound for the capacity of counties to supply poor relief, it provides an exogenous source of variation across the counties and over time that should enable us to identify the causal impact of aid to the poor on food riots. The poor were also supported by organized charities, private donations and Friendly societies, but systematic data, to the best of our knowledge, do not exist. Finally, the data for Middlesex county include the city of London.

In terms of some of the controls we employ, such as county population levels and our wealth proxies, data were scarcer than our poor relief and riots data. Thus, we had to extrapolate some of these controls in a variety of ways. In particular, we had population data in the official records from 1700, 1750, 1801 and 1811. The population for other dates were extrapolated from the bracketing official dates. For our *Wealth* variable, we extrapolated from the tax-assessment relative wealth measures produced by Buckatzsch (1950, Table 1), available for the years of 1649, 1672, 1693, and 1803. The market dependency measure we use is based on the population share not employed in agriculture. For our market dependency data in 1784, 1802 and 1815, we calculated this share from the population censuses of 1801, 1812 and 1821. For the other periods, we used Kussmaul (1989) data on proportions of agricultural parishes in a county. Grain prices are from Clark 2003 and they are averaged on an annualized basis following the same procedure we employed for riots.

As shown in the top panel of Table 1, we have an average of 4.31 riots per period, per county, although once we normalize these riots by the differences in the number of years in our windows of observation, we have .779 food riots per annum over each of the six periods in which we observe riots. Our poor relief data are in thousands of British pounds

[14] Due to the fact that our second panel period covers a much longer time interval than the period that precedes it or those that follow, we have experimented with a couple of other narrowers windows of aggregation for food riots over the period between 1686 and 1749. Our results were generally robust to the choice of aggregation during this time period. We elaborate more on this point below.

[15] We are able to rely on six time periods even when we include the lagged dependent variable, *Riots per* $Year_{t-1}$, because, although we do not have poor relief data from a date earlier than 1685, we were able to compile observations on food riots for the period between 1651 and 1684.

expressed in nominal values.[16] The total amount of public resources available for poor relief comes out to slightly under 79 thousand pounds per year, per county. In per capita, county population terms, this comes out to an average of 374 pounds of poor relief per annum, per county.

The bottom panel of Table 1 presents the correlation matrix. Here, we see that riots—both in total and per annum terms—are positively correlated with poor relief resources in total and in per-capita terms. There were more total riots in wealthier, more populous and more market dependent counties. But annualized riot frequency, *Riots per Year,* does not vary positively with county wealth, although it does correlate positively with population and market dependency of counties. *Riots per Year* is also highly positively correlated with our alternative food riots variable available to us from Charlesworth (1983), but it is only slightly positively correlated with land riots and enclosure protests. Finally, note that riots were more common in the northern counties than they were in southern counties, and that both poor relief resources and riot frequencies were increasing over time.[17]

[Table 1 about here.]

4 The Old Poor Law & Social Unrest: Baseline Estimates

In Table 2, we present our baseline results with *Poor Relief per Capita* observed at six points in 1685, 1750, 1776, 1784, 1803 and 1815 followed by *Riots per Year* accumulated and annualized over five corresponding intervals of time: 1686 to 1749, 1751 to 1775, 1777 to 1783, 1785 to 1802, 1804 to 1814 and 1816 to 1830. All of these baseline regressions include region fixed effects, but to start things off we withhold county and year fixed effects until the regression in our next table. The estimates in the first three columns are based on Ordinary Least Square regressions, those in the final three columns rely on Poisson regressions, and all errors reported are clustered by region (i.e., north, middle, south). In columns (1) and (4), we have our most parsimonious specification that only controls for the amount of poor relief per capita in the preceding period, followed by those estimates in columns (2) and (5) that add county population levels and the number of lagged riots per year. In columns (3) and (6), we also include controls for county wealth and market dependency.

As shown, per-capita amount of poor relief in the preceding period is a consistently significant and negative predictor of yearly average riots in the subsequent period. In

[16] An alternative series of poor relief data are exressed in real terms, although our main results are qualitatively similar when we use real and nominal amounts of poor relief.

[17] Our region code progressively increases, going from 1 for northern counties to 2 for counties in mid-England and to 3 for southern English counties.

our OLS estimates, *Poor Relief per Capita* comes in statistically significant at the 95-percent confidence level in two regressions and with a 90-percent significance in our most parsimonious regression shown in column (1). When we use Poisson regression instead, all three regressions yield negative and economically meaningful coefficients on *Poor Relief per Capita* that are all statistically significant at the 99-percent confidence level. Taking the column (3) estimates into account, we see that a one standard deviation increase in the county level aid that could be supplied to the poor (that is, an increase in *Poor Relief per Capita* equal to .293) would reduce food riots within a county by .412, implying a reduction in food riots by about 53 percent.

As far as the control variables are concerned, including lagged values of the dependent variable improves regression fits as lagged food riots indicate generally significant mean reversions. We have no indication that wealthier counties saw systematically higher levels of food rioting, although there is clear evidence here that more populous counties experienced more food riots, on average. Finally, although not shown, our regional dummies generate a very strong geographic pattern according to which, ceteris paribus, counties in mid-England experienced more food riots than northern counties, and those in the south experienced even more than those counties in the middle.

[Table 2 about here.]

Our descriptive statistics show strong time trends in both aid to the poor and riots per annum. On this basis, the regression in the first column of Table 3 replicates the regression in the final column of the preceding table, this time also including year fixed effects. As shown, the inclusion of time fixed effects renders the negative impact of aid to the poor on food riots statistically insignificant.

This observation is reassuring given the history and importance of the Poor Law. As most other institutions, it had multiple functions, some of which evolved over time.[18] Particularly important to our analysis is that, in the early nineteenth century, the authorities turned away from using poor relief to sustain social order. While in the sixteenth century, civic humanism and political centralism were important interests shaping policy toward the poor, by the mid seventeenth century, these "absolutist" initiatives appeared "bankrupt intellectually because they were bankrupt financially" (Slack, 1999, p. 74). A mixed economy of welfare in which economic considerations played a larger role followed. By the late eighteenth century, the dominant economic consideration became the one we associate

[18] Thus, for example, Blaug (1963, 1964) argued that the Poor Law was a means to deal with structural unemployment in a declining agricultural sector. Boyer (1989, 1990) examined the political economy of the Poor Law at the county level, while Solar (1995) discussed its impact on economic development.

with the Malthusian check. Poor relief perpetuated the growth of the 'unproductive' poor and this process was deemed to be unsustainable (Slack 1999).

By the early nineteenth century, policy was progressively based on the view expressed, for example, in the Report on the Poor Law of 1817. The "compulsory contribution... from the funds originally accumulated from the work of others, could not fail in the process of time... to produce the unfortunate effect of abating those exertions on the part of the labouring classes... that this system: is perpetually encouraging and increasing the amount of misery it was designed to alleviate, creating at the same time an unlimited demand of funds" (p. 4). This concern with a Malthusian income effect dominated policy at the time.

In order to empirically investigate the extent to which Malthusian income effects of aid to the poor began to dominate after the 1810s, we separated the 1815 poor relief data and the subsequent food riots data covering the period between 1816 and 1830 from the rest of the sample and reran our OLS specification using these two subsamples. Results using the 1815 poor relief data are shown in column (2) of Table 3 and results based on the remaining time periods are shown in the following column.[19] In both specifications, we still have regional fixed effects and in column (3) we include year fixed effects as well.[20]

As shown, the results in column (2) are consistent with Malthusian income effects (e.g., Boyer (1989), according to which higher amounts of poor relief per capita are associated positively and significantly with more riots. But focusing on the period between 1685 and 1814, as we do in column (3), we see that the social stability inducing effects of aid to the poor are restored. Here we see that more populous counties experienced more rioting and the point estimate of the negative coefficient on *Poor Relief per Capita* is significant at the 90-percent confidence level. Once we exclude the 1815 data from our sample, the quantitative impact of aid to the poor rises a bit more, with a one standard deviation increase in poor aid generating nearly a 60 percent reduction in food riots.

In the final three columns of Table 3, we rerun the regression in column (3) this time replacing the region fixed effects with county fixed effects and clustering the error terms by county. In these regressions, *Poor Relief per Capita* continues to enter the regressions negatively and, in two of the three regressions where we estimate using a generalized linear model (within the negative binomial family) and a Poisson specification, it comes in with a 99-percent statistical significance.[21]

[19] The time periods cover the five points in time when *Poor Relief per Capita* is observed in 1685, 1750, 1776, 1784 and 1803 followed respectively by *Riots per Year* covering the windows of 1686 to 1749, 1751 to 1775, 1776 to 1783, 1785 to 1802 and 1804 to 1814.

[20] Since column (2) estimates rely on only one time period, year fixed effects cannot be included in that specification.

[21] Negative binomial regressions are suitable for estimation purposes here because our key explanatory variable, *Poor Relief per Capita,* as well as some of our other control variables are clustered around realtively

[Table 3 about here.]

In our final set of baseline estimates, we explore whether aid to the poor primarily affected the incidence of food riots or it came to bear on the frequency of those kinds of riots as well. To that end, we created an incidence indicator, I(*Riots per Year*), which took the value of one if there were any riots in the county within the specified period of time and zero otherwise. In Table 4, we report the results of three linear probability models in which this incidence variable is regressed on *Poor Relief per Capita* and other control variables. Then, we estimate three OLS regressions that explore if the frequency of food riots depended on aid to the poor conditional on the predicted food riot incidence derived from the corresponding first-stage indicator being positive. Here we have some consistent support that *Poor Relief per Capita* primarily came to bear on whether or not food riots occurred at all. In all of our first three regressions, aid to the poor comes in negatively and statistically significant at the 99-percent confidence levels. However, when we explore the role of poor relief on the frequency of food riots in counties and during times when at least one food riot occurred, as we do in columns (4) through (6), *Poor Relief per Capita* has no meaningful impact.

[Table 4 about here.]

5 Alternative Specifications & Robustness

We experimented with various alternative specifications and controls in order to establish the robustness of the role of aid to the poor in social unrest in England between the late-17th and early-19th centuries.

First, we ran a set of regressions without county and year fixed effects to see the extent to which controlling for such invariant determinants of social unrest influences the role of aid to the poor on rioting. Second, we turned to an alternative data source in Charlesworth (1983) for social protests in England to see if our key results would remain intact using alternate data sources and coverages of time periods. Using Charlesworth we were also able to investigate if other kinds of riots that should hypothetically not be as responsive to aid to the poor, such as land and enclosure protests as well as militia uprisings, were affected by aid to the poor. Third, we explored alternative measures of aid to the poor as the main explanatory variable in variations in food riots. In what follows, we discuss some of these empirical estimates in turn.

small values.

In Table 5, for example, we report the outcomes of three generalized linear models within the negative binomial family, starting with an estimate that has neither time nor county fixed effects. In all the three regressions, we include the same set of controls: the lagged dependent variable, county population levels and our two proxies for wealth and market dependency. In all but one of the regressions on this table, we find evidence of mean reversion in food rioting, with *Riots per Year*$_{t-1}$ entering the regressions with highly significant and negative coefficients. Likewise, we also confirm in six of the seven estimates shown here that more populous counties experienced more rioting, ceteris paribus. Most importantly, however, we find that county and year fixed effects are both important in our estimates although neither county nor time fixed effects impact the statistical significance of *Poor Relief per Capita*. The inclusion of county fixed effects do reduce the quantitative impact of aid to the poor on food rioting thus suggesting that some unobservable and time-invariant county characteristics influenced food riots as well.

Year fixed effects are important too and, in an attempt to better identify time trends, we ran two regressions shown in columns (4) and (5) that include *Year* linearly and nonlinearly, respectively. While the effect of poor relief on food riots remains highly negative and significant in both regressions, we see that there is a strong nonlinear time trend in the frequency of food riots. Taken together, the coefficient estimates for *Year* and *Year*^{2} imply that food riots were increasing at a decreasing rate for the whole time period over which we estimate our model (i.e., from 1685 to 1814).

In our final two regressions listed in Table 5, we experimented with two additional controls that were available to us. In column (6), we removed year fixed effects and the linear and non-linear year controls and ran a regression with wheat price data from Clark (2003). Doing so, we are able to verify that wheat price fluctuations did positively correlate with food riots. Nevertheless, the significant and quantitatively meaningful role of aid to the poor in dampening food riots remained intact. In the final column of the table, we entered an indicator of whether the county in question was in the north, the middle or the south (recall that our region code progressively increases, going from 1 for northern counties to 3 in southern counties). As shown, the relationship between *Poor Relief per Capita* and *Riots per Year* remains negative and statistically significant at the 99-percent confidence interval. However, we do find that, ceteris paribus, southern counties were more prone to food riots, despite the fact that the raw correlation between *Riots per Year* and *Region* is negative (see Table 1).

[Table 5 about here.]

A potential source of bias and endogeneity in our main explanatory variable, *Poor Relief per Capita*, is that county population levels could be endogenous with respect to

the amount of county resources that were available for aid to the poor.

The so called Settlement Laws might give the impression that the poor could not respond to poor relief in the parish of their residency. The Settlement Act of 1662 allowed relief only to the poor who had the right of residency in the parish due to birth, marriage, or apprenticeship. Parishes had the to right to extradite the non-resident poor to their parish of settlement. This law was put into effect and the Abstract of Answers and Returns of 1804, for example, reveals (pp. 714-5) that for the year ending at Easter 1803 expenditures on the removal of non-residents poor and other administrative costs were about 4.5 percent of the total spent on poor relief. At the same time, support of non parishioners was common. At the same time, non-residents who received poor relief were also common. In fact, in 1803, the share of the poor on financial support who were non-parishoners amounted to more than 16 percent of all adults and children who were supported. And this figure excludes greater London where the share of such aid recipients was more than twice as high.

While Poor Relief per Capita might be exposed to endogeneity issues, the total amount of public resources available for aid to the poor, which is the numerator of *Poor Relief per Capita*, is more immune to this problem, as it represents the county level government revenues collected net of collection costs. Specifically, it is the amount assessed and collected by the local authorities using a 'rate' imposed on the assessed value of property in that locality. Although the law allowed imposing this rate on (real or personal) productive property of any kin, the rate was de facto imposed, by and large, on real estate.

In our next table, we reran our baseline regressions, this time using *Poor Relief* as our main explanatory variable. These estimates, which all include year and county fixed effects and cluster the error terms at the county level, produce statistically significant and negative effects of *Poor Relief* on *Riots per Year* in five of the six regressions. Unlike the estimates involving *Poor Relief per Capita,* these estimates do not suggest that wealthier and more populous counties experience more riots, which in all likelihood, is manifested in such counties having more total resources available for aid to the poor. In any case, the effect of poor relief on food riots is quantitatively large and in line with our earlier estimates using *Poor Relief per Capita*: for example, taking the GLM estimate in column (3), we find that a one standard deviation higher amount of resources allocated to *Poor Relief,* which as shown in the top panel of Table 1, comes out to 123.6 (in thousands of British pounds), generates a .394 reduction in the number of *Riots per Year*. Given that the average of food riots in our sample is .779, this corresponds to a 51-percent dampening impact which is remarkably close to the 53 percent we derived using our baseline regressions with *Poor Relief per Capita*.

[Table 6 about here.]

As we noted above, our main data source for social unrest and disorder data is Bohstedt (2010). Nevertheless, we have an alternative resource in Charlesworth (1983) which provides periodic maps of social protests in England between the years of 1548 and 1900. We coded the numbers of food riots and protests involving land and enclosure disputes in Charlesworth to have at our disposal two additional dependent variables. First, we produced an alternative series of food riots based solely on the data in Charlesworth which we labeled as *Charlesworth Riots*. The data we use in our baseline regressions include those in Charlesworth but are also based on additional sources, thereby making our baseline food riots data more comprehensive than those in Charlesworth. In addition, the years of coverage differ between the two datasets, providing us an opportunity to test the empirical ties between aid to the poor and social disruptions over slightly different time horizons.[22]

In Table 7, we reproduce our baseline regressions with year and county fixed effects, this time using *Charlesworth Riots* as our dependent variable. As shown, all of our six estimates produce highly significant and negative coefficients on poor relief with five of the six estimates generating statistical significance at the 99-percent confidence level and one yielding a negative coefficient that is within the 95-percent confidence band. As we already pointed out, the Charlesworth data enable us to explore the role of poor aid on food riots using a different source and somewhat different time intervals although, on the downside, we have significantly fewer observations once we also control for lagged food riots across the counties. Despite fewer observations and a different data source, all the results shown in Table 7 replicate and confirm our earlier findings: there is systematic mean reversion in food riots within counties and higher levels of county population tend to generate more rioting. However, the availability of more public resources that could be devoted to poor relief per capita helps to statistically significantly depress riots in all of our six empirical specifications.

[Table 7 about here.]

To the extent that riots and social upheavals were politically driven or they were less economically motivated, they should not have been contained via the amount of county-level variations in resources available for aid to the poor. An important benefit of using the

[22] Recall that we have poor relief data across the 39 English counties at six points in time: the first observations are for 1685, and the rest are for 1750, 1776, 1784 and 1803. Our baseline primary social disorder data are then observed in six subsequent corresponding windows of time. Consequently, we can work with a panel of six time periods when we use our baseline data.

By contrast, the Charlesworth dataset enables us to observe social disruptions through 1818, although it does not provide a breakdown of the data on social unrest for the interval between 1776 and the 1790s. Hence, with the Charlesworth data, we are able to explore the link between poor aid and social unrest in the following way: aid to the poor observed in 1685, 1776 and 1803; food riots observed between 1686 and 1749, from 1777 to 1783, and between 1804 and 1814. Thus, this dataset allows us to utilize a panel covering 3 time periods.

data supplied by Charlesworth (1983) is that rural protests in England are broken down by their type and motive. Thus, we were able to compile Charlesworth's data on land and enclosure protests over the time periods for which we have commensurate poor relief and control data. Using the same source, we were also able to construct an alternative series on clubmen and militia protests in England for the period between 1650 and 1798.[23]

Table 8 presents the regressions in which English land and enclosure protests were regressed on *Poor Relief per Capita* as well as the set of our key control variables, including the lagged dependent variable, *Population, Wealth* and *Market Dependency.* As shown, wealthier, more populous and market dependent counties observed more land and enclosure protests. Most importantly, however, we see that poor relief exerted positive and statistically significant effects on land and enclosure related social disruptions, in stark contrast to its negative impact on food riots.

[Table 8 about here.]

6 Social Unrest, Poor Relief & Innovation

The history of England in the 17th and 18th centuries suggests that social risk-sharing arrangements limited the individual-level downside risk associated with developing new useful knowledge, thereby mitigating the threat of violent responses to labor-saving innovations.

If that were indeed the case, the Old Poor Law should have influenced entrepreneurial ventures that had the potential to usher in useful new technological innovations. Then, as we articulate in fuller detail in Greif, Iyigun and Sasson (2011, 2012), the Poor Law should have operated on two margins: On the one hand, it directly should have reduced the income risk associated with individuals' experimentation in new technologies. That is, entrepreneurs should have better been afforded failure if and when they made risky investments of time and resources in new innovative ventures. As Woodcroft noted in his 1863 book on inventors, "it has been observed, as a peculiar characteristic of Britain, that almost all the inventions on which her colossal system of manufactures has been founded have been produced by individual projectors, mostly poor and of obscure condition" (p. VII).

On the other hand, the net expected return to entrepreneurial ventures should have risen with the enactment of the Old Poor Law because it eliminated the risk that part of the return from risky experimentation was potentially captured through extralegal means

[23] Results using the clubmen and militia protests were similar to the ones we produced using land and enclosure riots. Thus, we have chosen not to report them here, although they are available upon request.

or lost due to social disruptions. John Kay, the inventor of the Flying Shuttle provides a vivid example. In July 1733, Kay formed a partnership in Colchester to begin fly-shuttle manufacturing, By September 1733, the Colchester weavers, petitioned the King to stop Kay's invention because of its ill-effect on their livelihood. Kay moved to France. (Woodcroft, 1863.)

It is with these considerations in mind that, in the remainder of our analysis, we turn to an investigation of the potential three-way links among social unrest, poor relief and innovations. To that end, we use data regarding patents. Although the original patents record from this early period did not survive, a contemporary journal, *The Repertory of Patent Inventions and Other Discoveries and Improvements in Arts, Manufactures, and Agriculture*, published information on patents granted each year. Specifically, the information includes the county in which the inventors resided when the patent was granted. This proxy for innovations has obvious limitations. In particular, patents are a partial measure of innovations and the county of residence is not necessarily the county of implementation. Yet, our conjecture implies that potential entrepreneurs would have been lukewarm to innovate in a county that had recently experienced social instability. In other words, those who learned the hard way the social upheavals that riot cause would have been less inclined to rock the boat. Our conjecture also implies that riots were more likely following innovations. Regular reporting of the variables we need began in 1797-8 (based on 104 patents) which we used for the 1784 poor relief data. And we used the years 1814 through 1816 (covering 180 patents) and 1818 through 1820 (with 297 patents) for the other subsequent dates and time intervals upon which we focus.

In Table 9, we present some Poisson and negative binomial regressions that investigate whether or not *Patents* depend on poor relief and food riots in the preceding period. All six regressions control for year and county fixed effects and all errors are clustered at the county level. As shown in our table, lagged and annualized riots have a negative but statistically insignificant effect on patent applications within counties in all six estimates, while the amount of poor relief per-capita exerts a positive role in the number of patent applications.

In the final three columns where we estimate our model using the negative binomially specification, the positive impact of *Poor Relief per Capita* on *Patents* generates coefficients that are also significant at the 95-percent confidence level. We take these findings to be consistent with the idea that, while aid to the poor might have impacted English innovations both directly and indirectly through the two channels we discussed above, poor relief came to influence innovations directly.

[Table 9 about here.]

As an alternative to the estimates above, we also experimented with a simultaneous equations model. Here, we relied on a specification according to which (a) aid to the poor determined food riots and (b) the lagged predicted values of food riots derived from this regression, together with aid to the poor as well as our usual controls, then came to bear on patent applications. Table 10 presents our findings. Here we see estimates that are fairly consistent with those in our previous table: Food riots do not have a direct effect on patent applications by county. However, *Poor Relief per Capita* itself exerts a statistically significant and quantitatively large direct impact on patent applications.

[Table 10 about here.]

7 Conclusion

Social institutions impact the growth processes in multiple ways and this paper focuses on their impact on social order, entrepreneurship, and innovations.[24] The Old Poor Law was enacted, at least in part, to maintain social order and it formalized a system of a social safety-net that lasted, with some modifications, until 1834. But those who enacted it seem to have not initially recognized its impact on innovations and growth. Although designed for risk-sharing, the system promoted risk-taking in the pursuit of economic gains. In the course of England's transition to become the first modern economy the Poor Law Act of 1601 came to bear on the country's social stability in the run-up to its era of sustained economic growth. Poor relief, either directly or indirectly, thereby positively influenced English innovativeness in the late-17th through early-19th centuries.

These conclusions are based on an analysis of a panel dataset of 39 English counties at different time intervals between 1685 and 1830. We find that the Old Poor Law reduced social unrest, thereby encouraging risk-taking and stimulating entrepreneurial activities in England. That is, county-level variations in the amount of poor relief came to bear negatively and statistically significantly on the propensity of food riots within each county in England over this period. Food riots also negatively affected innovations, while the

[24] Political institutions influence growth through their impact on redistribution which, in turn, align the incentives of those with political power. Economic institutions influence growth through their impact on the voluntary exchange of resources. Social institutions, however, influence growth through their impact on the voluntary transfer of resources. Of course, in reality, the boundaries between redistribution, exchange, and transfers are often blurred, and the case of the Old Poor Law was not exception. The Old Poor Law was always predicated on mandatory transfers to the poor, but it constituted a redistribution to the needy to an extent far greater than their relative power. In fact, Scotland did not adopt the Old Poor Law and riots by the poor there were suppressed by force. Similarly, as the 19th century progressed, poor relief was reduced in England in relative terms and force was more often used. Comparisons of the experience of England, Scotland, and Ireland suggest that this policy would not have been compatible with growth early on.

latter were positively and significantly related to poor relief supplied by each English county.

Social institutions promote growth by reducing social disorder and fostering innovations. They do so, however, when conditions are right. On the one hand complementary conditions to innovations should be present but, on the other hand, poverty and thin labor markets are such that the spectre of resistance to labor-saving innovations inhibits innovations. This was the situation in 17th-century England.

While our conclusions regarding the relations between social institutions, innovations, and growth are based on intra-country variations, inter-country analyses reaffirm the same conclusions (Greif, Iyigun, and Sasson 2011, 2012). These papers argued that the distinct technological trajectories of England and China can be consistently explained by the dynamics of their social institutions. Moreover, simulations substantiate the large impact of their distinct social institutions on growth.

The initially more effective system of poor relief in China was mainly based on the so called "clan trust". Risk-sharing within clans fostered more risk-taking and thus innovations than the pre-Reformation, voluntary and Church-based European system of poor relief. In post-Reformation Europe, however, the decline in the wealth of the Church obliged states to provide poor relief via local governments. Compared with the pre-Reformation era and the Chinese system, the new European system motivated more risk-taking and encouraged innovations for any given level of risk-sharing. Within Europe, however, England stood out in being the first—and for a long time, the only—country in which the poor had legal right to aid and the local authorities had the right to impose a poor-relief tax. Although the European social institutions were less effective than those of England, they were nevertheless more similar to them than to those of China. England was indeed the first modern economy, but European transition soon followed while China fell ever behind.

Moreover, Greif, Iyigun and Sasson (2011, 2012) highlight the social and cultural origin of the distinct social institutions and thus growth trajectories. Social and cultural elements inherited from the past not only constrain the design and function of formal social institutions, but also impact long-run economic outcomes. In those papers, we argue that *social and cultural factors influenced the design of institutions* with which they subsequently coevolved. Although social institutions have often been chosen by the elite to avoid social upheavals historically, their forms were influenced by pre-existing cultural and social factors. And *institutional forms* mattered because social and cultural elements not only constrained the design and function of formal social institutions, but also impacted long-run economic outcomes. In particular, growth-promoting social institutions helped to limit the individual-level downside risk associated with developing new useful knowledge,

thereby mitigating the threat of violent social responses to labor-saving innovations. A stabler and more tranquil social environment then aided and spurred more entrepreneurial risk-taking that resulted in new technological innovations. Social institutions matter for growth.

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Table 1.: Descriptives, Summary Statistics and Correlations

	Summary Statistics				
VARIABLE	Obs.	Mean	Std. Dev.	Min	Max
Poor Relief	233	79.0	123.6	.86	1098
Poor Relief per Capita	233	.374	.293	.027	1.33
Riots	273	4.31	8.56	0	76
Riots per Year	273	.779	1.72	0	10.9
Innovations	117	5.49	15.72	0	134
Population	273	177.5	162.0	13.8	1006
Wealth	271	19.6	10.84	1	39
Market Dependency	270	.601	.311	0	1
Region	273	2.38	.739	1	3
Charlesworth Food Riots	156	.258	.464	0	3.04
Charlesworth Land Protests	156	.014	.028	0	.143

Obs. 116	The Correlation Matrix									
	PR	*PRPC*	*Riots*	*Riots/Yr*	*Popn*	*Wealth*	*Market Dp*	*Region*	*CW FR*	*CW LP*
Poor Relief	1									
Poor Relief per Capita	.606	1								
Riots	.234	.029	1							
Riots per Year	.305	.127	.910	1						
Population	.729	.184	.428	.500	1					
Wealth	−.257	−.122	.018	−.006	−.290	1				
Market Dependency	.143	−.137	.136	.117	.325	.217	1			
Region	.125	.285	−.116	−.103	−.072	−.396	−.274	1		
CW Food Riots	.086	−.108	.415	.508	.384	.026	.221	−.029	1	
CW Land Protests	.082	.092	.045	.053	.046	−.128	−.114	.032	−.004	1
Year	.411	.681	.071	.300	.246	.015	−.022	−.023	.240	.016

Table 2: Role of Poor Relief in Food Riots by County (1685 - 1830 CE)

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	Poisson	Poisson	Poisson
VARIABLES	*Riots per Year*	*Riots per Year*	*Riots per Year*	*Riots per Year*	*Riots per Year*	*Riots per Year*
Poor Relief per Capita	-1.188**	-1.386**	-1.405*	-1.663***	-1.851***	-1.909***
	(0.169)	(0.215)	(0.371)	(0.271)	(0.351)	(0.497)
Food Riots$_{t-1}$		-0.133**	-0.135***		-0.197**	-0.196***
		(0.0242)	(0.00949)		(0.0770)	(0.0689)
Population		0.00213**	0.00230*		0.00225***	0.00250***
		(0.000446)	(0.000689)		(0.000630)	(0.000791)
Wealth			0.0129			0.0138
			(0.0306)			(0.0356)
Market Dependency			0.333			0.255*
			(0.261)			(0.141)
Region FEs	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	No	No	No	No	No	No
Observations	233	233	230	233	233	230
R-squared	0.036	0.076	0.086			

Standard errors clustered by region in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3: Role of Poor Relief in Food Riots with County and Year Fixed Effects

	(1)	(2)	(3)	(4)	(5)	(6)
	OLS	OLS	OLS	OLS	GLM	Poisson
VARIABLES	*Riots per Year*	*Riots per Year*	*Riots per Year*	*Riots per Year*	*Riots per Year*	*Riots per Year*
Poor Relief per Capita	-1.009	1.602*	-2.724*	-0.135	-3.065***	-2.940***
	(1.344)	(0.513)	(0.807)	(1.110)	(1.011)	(1.070)
Food Riots$_{t-1}$	0.00668	1.247*	-0.0353	-0.393***	-0.130**	-0.140***
	(0.0459)	(0.333)	(0.0481)	(0.0963)	(0.0628)	(0.0543)
Population	0.00191	-0.00214	0.00336*	0.00796**	0.00922***	0.0113***
	(0.000718)	(0.000873)	(0.000909)	(0.00299)	(0.00277)	(0.00338)
Wealth	0.0135	-0.00488	0.0166	0.0273	0.0957**	0.125**
	(0.0222)	(0.00180)	(0.0290)	(0.0240)	(0.0479)	(0.0637)
Market Dependency	-0.00249	0.164	-0.105	-1.114*	0.00117	-0.278
	(0.210)	(1.628)	(0.153)	(0.655)	(0.458)	(0.431)
Region FEs	Yes	Yes	Yes	No	No	No
County FEs	No	No	No	Yes	Yes	Yes
Year FEs	Yes	n.a.	Yes	Yes	Yes	Yes
Observations	230	39	191	191	191	191
R-squared	0.286	0.159	0.339	0.590		

Standard errors clustered by region (in the first three columns) and by county (in the last three columns) in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 4: Poor Relief & Food Riots—Incidence Models & Est. Conditional on Incidence

VARIABLES	(1) Linear Probability I(*Riots per Year*)	(2) Linear Probability I(*Riots per Year*)	(3) Linear Probability I(*Riots per Year*)	(4) OLS *Riots per Year*	(5) OLS *Riots per Year*	(6) OLS *Riots per Year*
Poor Relief per Capita	-1.149***	-1.239***	-1.245***	-0.0212	0.185	0.970
	(0.320)	(0.313)	(0.344)	(2.015)	(1.674)	(2.488)
I(*Riots per Year*$_{t-1}$)		-0.162**	-0.168**			
		(0.0712)	(0.0785)			
Riots per Year$_{t-1}$					-0.389***	-0.437***
					(0.109)	(0.118)
Population		3.79e-05	-0.000188		0.00669**	0.0111***
		(0.000295)	(0.000778)		(0.00291)	(0.00365)
Wealth			-0.00523			0.0677
			(0.0126)			(0.0403)
Market Dependency			0.138			-2.201
			(0.163)			(1.458)
County FEs	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	194	194	191	122	122	120
R-squared	0.528	0.541	0.550	0.558	0.614	0.639

Standard errors clustered by county in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Poor Relief & Food Riots—Role of Fixed Effects & Time Trends

VARIABLES	(1) GLM *Riots/Year*	(2) GLM *Riots/Year*	(3) GLM *Riots/Year*	(4) GLM *Riots/Year*	(5) GLM *Riots/Year*	(6) GLM *Riots/Year*	(7) GLM *Riots/Year*
Poor Relief per Capita	-2.165***	-1.835**	-3.343***	-6.541***	-2.530*	-11.08***	-4.861***
	(0.549)	(0.892)	(1.217)	(1.044)	(1.321)	(2.430)	(1.125)
Riots per Year$_{t-1}$	-0.201***	0.0793	-0.434***	-0.403***	-0.391***	-0.362***	0.0236
	(0.0664)	(0.0673)	(0.0782)	(0.0616)	(0.0605)	(0.0677)	(0.0755)
Population	0.00259**	0.00217***	0.0197**	0.00905**	0.0118***	0.0114	0.00260***
	(0.00101)	(0.000809)	(0.00811)	(0.00458)	(0.00433)	(0.00715)	(0.000762)
Wealth	-0.00795	-0.00368	0.0587	0.0700*	0.0689	0.0723	-0.00518
	(0.0169)	(0.0143)	(0.0495)	(0.0398)	(0.0491)	(0.0456)	(0.0128)
Market Dependency	0.515	0.192	0.189	0.217	0.179	0.560	0.298
	(0.418)	(0.358)	(0.622)	(0.552)	(0.581)	(0.617)	(0.329)
Year				0.0377***	1.802***		
				(0.00463)	(0.506)		
Year^2					-0.000510***		
					(0.000146)		
Wheat Price						0.789***	
						(0.199)	
Region Code							0.647***
							(0.190)
County FEs	No	Yes	No	Yes	Yes	Yes	No
Year FEs	No	No	Yes	No	No	No	Yes
Observations	191	191	191	191	191	191	191

Standard errors clustered by county in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 6: Role of Aggregate Poor Relief in Food Riots by County (1685 - 1830 CE)

	(1)	(2)	(3)	(4)	(5)	(6)
	GLM	GLM	GLM	Poisson	Poisson	Poisson
VARIABLES	*Riots per Year*	*Riots per Year*	*Riots per Year*	*Riots per Year*	*Riots per Year*	*Riots per Year*
Poor Relief	-0.00231*	-0.00312**	-0.00319**	-0.00170	-0.00313*	-0.00346*
	(0.00120)	(0.00157)	(0.00159)	(0.00151)	(0.00185)	(0.00183)
Riots per Year$_{t-1}$		-0.0266	-0.0237		-0.0431	-0.0424
		(0.0761)	(0.0770)		(0.0738)	(0.0754)
Population		0.00182	0.00195		0.00291	0.00348
		(0.00247)	(0.00250)		(0.00315)	(0.00316)
Wealth			0.000157			0.0187
			(0.0371)			(0.0435)
Market Dependency			0.0622			-0.188
			(0.530)			(0.439)
County FEs	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	233	233	230	233	233	230

Standard errors clustered by county in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 7: Poor Relief & Food Riots—Estimates based on Charlesworth Data

	(1)	(2)	(3)	(4)	(5)	(6)
	GLM	GLM	GLM	Poisson	Poisson	Poisson
VARIABLES	*Food Riots*	*Food Riots*	*Food Riots*	*Food Riots*	*Food Riots*	*Food Riots*
Poor Relief per Capita	-4.875***	-5.171***	-5.486***	-3.182**	-3.378***	-3.389***
	(1.223)	(1.143)	(1.075)	(1.398)	(1.138)	(1.027)
Food Riots$_{t-1}$		-0.0341***	-0.0343***		-0.0313***	-0.0302***
		(0.0110)	(0.0112)		(0.00942)	(0.00965)
Population		0.00415***	0.00531***		0.00436***	0.00490***
		(0.00136)	(0.00184)		(0.00108)	(0.00159)
Wealth			0.0201			0.0132
			(0.0245)			(0.0200)
Market Dependency			0.0818			0.507
			(0.574)			(0.513)
County FEs	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	116	116	116	116	116	116

Standard errors clustered by county in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 8: Poor Relief & Land & Enclosure Unrests—with Charlesworth Data

	(1)	(2)	(3)	(4)	(5)	(6)
	GLM	GLM	GLM	Poisson	Poisson	Poisson
VARIABLES	*Land Protests*	*Land Protests*	*Land Protests*	*Land Protests*	*Land Protests*	*Land Protests*
Poor Relief per Capita	5.849**	6.986**	8.997**	5.490**	6.804**	8.781***
	(2.512)	(2.864)	(3.751)	(2.553)	(2.749)	(3.210)
Land Protests$_{t-1}$		-0.0961	-0.111		-0.0753	-0.121
		(0.0859)	(0.123)		(0.0623)	(0.102)
Population		0.00852*	0.0272**		0.00669*	0.0249***
		(0.00449)	(0.0109)		(0.00381)	(0.00823)
Wealth			0.191***			0.181***
			(0.0575)			(0.0494)
Market Dependency			5.058***			3.704**
			(1.908)			(1.567)
County FEs	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	116	116	116	116	116	116

Standard errors clustered by county in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 9: Poor Relief, Food Riots & Innovations by County (1685 - 1830 CE)

	(1)	(2)	(3)	(4)	(5)	(6)
	Poisson	Poisson	Poisson	Neg. Binomial	Neg. Binomial	Neg. Binomial
VARIABLES	*Patents*	*Patents*	*Patents*	*Patents*	*Patents*	*Patents*
Poor Relief per Capita	1.714	1.720	0.956	1.513**	1.376**	1.449**
	(1.082)	(1.067)	(1.062)	(0.670)	(0.647)	(0.695)
Riots per Year$_{t-1}$	-0.00593	-0.00595	-0.0213	-0.0427	-0.0443	-0.0628
	(0.0933)	(0.0925)	(0.0929)	(0.0959)	(0.0944)	(0.0984)
Population		0.00142	0.00347*		0.00170*	0.00229*
		(0.00173)	(0.00193)		(0.000946)	(0.00127)
Wealth			-0.0233			-0.0299
			(0.0481)			(0.0392)
Market Dependency			-3.162**			-0.903
			(1.445)			(1.411)
County FEs	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	117	117	114	117	117	114

Standard errors clustered by county in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 10: Simultaneous Equations Estimates of Poor Relief, Food Riots & Innovations

VARIABLES	(1) Neg. Binomial *Riots per Year*	(2) Neg. Binomial *Innovations*	(3) Neg. Binomial *Riots per Year*	(4) Neg. Binomial *Innovations*	(5) Neg. Binomial *Riots per Year*	(6) Neg. Binomial *Innovations*
$\widehat{Riots\ per\ Year}_{t-1}$		0.0279		0.0104		-0.0311
		(0.0904)		(0.0950)		(0.0986)
Poor Relief per Capita	0.960	1.732**	0.995	1.574**	1.471	1.656**
	(1.532)	(0.712)	(1.396)	(0.667)	0.000334	(0.690)
Population			0.000297	0.00166*	(0.00231)	0.00267*
			(0.00217)	(0.00101)	(0.00231)	(0.00143)
Wealth					-0.00527	-0.0349
					(0.0417)	(0.0372)
Market Dependency					-0.398	-1.027
					(0.452)	(1.540)
County FEs	Yes	Yes	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	233	117	233	117	230	111

Standard errors clustered by county in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Appendix A. UK County-Level Panel Data Variable Definitions and Data Sources

- *Food Riots*: Food riots data for the years between 1650 and 1684, 1777 and 1783, 1785 and 1802 and 1804 and 1815 are from Charlesworth (1893) and those for 1686 and 1749 and 1751 to 1775 are from Bohstedt (2010).

Bohstedt, J. 2010.*The Politics of Provisions : Food Riots, Moral Eonomy, and Market Transition in England*, c. 1550-1850.

Charlesworth, A. 1983. *An Atlas of Rural Protest in Britain, 1548-1900.* (Philadelphia, PA: University of Pennsylvania Press).

- *Poor Relief*:

Year	Date of Source	Source
1685	1797	Eden, The State of the Poor, vol. 1, p. 230.
1750	1824	Report from the Select Committee on Poor Rate Returns. 1824, vol. 2, Appendix C, p. 10.
1776	1804	Report Abstract of Returns, 1804, p. 714.
1784	1804	Report Abstract of Returns, 1804, p. 714.
1803	1804	Report Abstract of Returns, 1804, p. 714.
1815	1817	Appendix, Report of the Committee, 1817, p. 154.

Eden, F. M., Sir, 1797. *The State Of The Poor; Or, An History Of The Labouring Classes In England, From The Conquest To The Present Period.* Vols. I-III. London: J. Davis

Parliamentary Papers. *1803-4. Returns Relative to the Expense and Maintenance of the Poor in England.* Vol. XIII

Report from the Select Committee on Poor Rate Returns. 1824,Ordered by the House of Commons, printed on 15, June 1824. Great Britain.

Report from the Select Committee on the Poor Laws. 1817. Ordered by the House of Commons

- *Wealth:*

Buckatzsch, E.J. 1950. The Geographical Distribution of Wealth in England. 1086-1843: An Experimental Study of Certain Tax Assessment. *The Economic History Review*, ns, Vol. 3(2): 180-202, Table 1.

- *County Population Levels:*

Year	Source
1650	Extrapolated from 1700 and 1801 Population Data
1750	Population Census, 1811, xxviii.
1776	Extrapolated from 1700 and 1801 Population Data
1801	Population Census, 1811, xxviii.
1805	1805 Colquhoun, P. 1806.
1811	Report of the Committee on Poor Relief, 1824, p. 11 Appendix D

Colquhoun, P. 1806. *Treatise on Indigence Exhibiting: A General View Of The National Resources For Productive Labor*, p. 45. (London, UK).

- *Market Dependency*: Proportion of non-agricultural parishes based on their marriage patterns as calculated in Kussmaul (1999) and following the 1784 non-agricultural population in the Population Census.

Year	Name	Source
1650	Non-agricultural Population Estimates, 1650	Kussmaul (1999); 1661-1740.
1685	Non-agricultural Population Estimates, 1685	Kussmaul (1999); 1661-1740.
1750	Non-agricultural Population Estimates, 1750	Kussmaul (1999); 1741-1820.
1776	Non-agricultural Population Estimates, 1776	Kussmaul (1999); 1741-1820.
1784	Non-agricultural Population Estimates, 1784	1801 Census
1803	Non-agricultural Population Estimates, 1803	1812 Census
1815	Non-agricultural Population Estimates, 1815	1821 Census

Kussmaul, A. 1989. *A General View of thr Rural Economy of England, 1538-1840.* (Cambridge, UK: Cambridge University Press).

- *Innovations*: Use published information about each patent granted each year to calculate the numbers of inventors who lived within a county when the patent was pending.

The Repertory of Patent Inventions, and Other Discoveries and Improvements in Arts, Manufactures, and Agriculture. Selected from the *Philosophical Transactions and Scientific Journal of all Nations.* Intelligence *Relation to the Useful Arts, Proceeding of Learned Societies and Notices of All Patents Granted for Inventions.* (London, UK: Repertory Office, Hatton Garden. London, T. London, T. and G. Underwood [etc.]), Various Years.

- *Charlesworth Food Riots:* The recorded numbers of food riots and protests by county, Charlesworth (1983, ch. 3).

Charlesworth, A. 1983. *An Atlas of Rural Protest in Britain, 1548-1900*, (ed.), (Philadelphia, PA: University of Pennsylvania Press).

- *Charleswoth Land Protests:* The recorded numbers of land protests by county, Charlesworth (1983, ch. 2).

Charlesworth, A. 1983. *An Atlas of Rural Protest in Britain, 1548-1900*, (ed.), (Philadelphia, PA: University of Pennsylvania Press).

- *Charleswoth Militia Protests:* The recorded numbers of clubmen uprisings and militia protests, Charlesworth (1983, ch. 5).

Charlesworth, A. 1983. *An Atlas of Rural Protest in Britain, 1548-1900*, (ed.), (Philadelphia, PA: University of Pennsylvania Press).

- *Grain Prices:* Average grain prices over the subsequent inter-poor relief data dates as in the riot data.

Clark, G. 2003. "The Price History of English Agriculture, 1209-1914," University of California, Davis.

- *Region Codes:* North (1), South (3) or Center (2).