Welfare Retrenchment and Social Unrest

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Abstract

Does welfare retrenchment cause social unrest? I study this question by using parish-level expenditure on poor relief from post-Napoleonic England and applying generative AI to a corpus of 3.9 million newspaper column transcriptions to collect the category, date and location for each reported unrest incident. Reduced-form analysis leveraging a shift-share instrument finds a causal effect of welfare retrenchment on social unrest between 1819 and 1831, attributable to grievances arising from social and habitual comparisons. Simulations from a counterfactual analysis assuming blanket increases in welfare expenditure highlight the significance of social welfare provision in preventing large-scale unrest.

Keywords: Austerity, Social Unrest, Historical Political Economy

JEL Codes: H53, D74, N43

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1 Introduction

What are the political costs of austerity? Cross-country research finds inconclusive evidence on fiscal retrenchment and electoral punishment, but does find that fiscal retrenchment increases social unrest (Arias and Stasavage, 2019; Ponticelli and Voth, 2020). Whilst theories from behavioural political economy suggest that such ambiguity depends on the perceived financial constraints of the government, heterogeneity in institutions plausibly influences the political costs of austerity (Persson, 2002; Passarelli and Tabellini, 2017). In the context of the 2010s UK, Fetzer (2019) concludes that welfare retrenchment generated electoral costs for the incumbent government. Despite growing scholarly interest in social unrest across different fields of the social sciences, evidence on welfare retrenchment and social unrest from a research setting with fixed social and political institutions remains limited (Cantoni, Kao, et al., 2024).

I study welfare retrenchment and social unrest in the context of the English Old Poor Law. Local authorities in over 12,000 parishes had the legal power to raise taxes locally to provide social welfare for eligible parishioners. Their distinct efforts of welfare retrenchment during the aftermath of the Napoleonic Wars, motivated by both an ideological shift towards laissez-faire and the growing tax burden of local elites, provide a unique research setting in which the intensity of welfare change varied across parishes whilst the underlying social and political institutions remained fixed. Welfare retrenchment during the 1820s was further supported by the passage of the 1819 Poor Relief Act, which enabled individual parishes to form an austerity-oriented institution called the select vestry, constituting a group of local taxpayers who were obligated to tighten welfare eligibility (*Poor Relief Act. 1819. 59 Geo. 3. c. 12.* 1819).[1] Post-Napoleonic England also witnessed sporadic episodes of social unrest during the 1820s in regions such as East Anglia and Lancashire, as well as a major outbreak of unrest known as the Swing Riots during the winter of 1830, which remained as one of the largest episodes of social unrest ever observed in England.

I draw on theories from behavioural political economy to formalise the relationship

[1]The decision on whether or not to form a select vestry, and the election of select vestry members, were collectively made via voting amongst parish ratepayers, who were land occupiers (taxpayers) funding the local welfare system. The enforcement of plural voting established by the 1818 Vestries Act skewed the distribution of local political power towards large property occupiers, as ratepayers occupying property worth over £50 are now endowed with an additional vote for each additional £25 above the threshold, until a maximum of six votes is endowed (*Vestries Act 1818, 58 Geo. 3. c. 69*, 1818).

between welfare retrenchment and social unrest within a framework in which parish elites maximise income by trading off redistribution to parishioners against the probability of income-disrupting social unrest. I derive the conditions that determine the optimal levels of unrest intensity and welfare transfers, and hypothesise that welfare retrenchment causes social unrest when it increases grievances, plausibly arising from social and habitual comparisons. On the one hand, social comparison can lead to a sense of relative deprivation when welfare is retrenched more than a reference group, such as neighbouring parishes. On the other hand, comparison with a past welfare provision that was more generous develops bargaining incentives due to expectations of a recovery towards the habitual level of welfare provision.

I apply generative AI with customised prompts on the transcriptions of over 800,000 digitised contemporaneous newspapers originally printed between 1816 and 1831 to construct a novel social unrest database containing the category, date, and location for each reported rioting incident, thereby streamlining existing data collection efforts that rely on manual reading of newspaper articles. To measure variation in welfare expenditure across parishes over time, I transcribe and geocode post-Napoleonic poor relief expenditure published by the parliament, assisted by generative AI with state-of-the-art vision capabilities to address complex tabular layouts in the data sources.

I empirically test the relationship between welfare expenditure and social unrest using a shift-share instrumental variables research design to address endogeneity concerns. I define the instrument for welfare expenditure as the predicted exposure to shocks in the prices of commodities that a parish is subject to within a given year, stemming from the industries of agriculture and animal husbandry. Intuitively, hikes in commodity prices were more likely to increase the income of parishes with productions that were more specialised in those commodities and therefore their ability to supply higher welfare. The exclusion restriction assumption is plausible. Although shocks in commodity prices affect income variables such as wages, the exposure of these shocks captures the income exposure of parish elites, which plausibly increases or decreases unrest only by decreasing or increasing the supply of welfare. The shift variables are defined as year-on-year price changes for each commodity at the national level. The share variable reflects land suitability at the parish level, so that price shocks are expected to have differential effects depending on the relative importance of land suitability for agriculture and animal

husbandry.

I empirically study how welfare expenditure shapes the intensive margin of unrest by conducting a counterfactual analysis that asks what would have happened to unrest intensity had welfare expenditure increased by 5% across all parishes over the time span of the reduced-form analysis. I leverage the aforementioned equilibrium conditions on unrest intensity and welfare transfers to recover the determinants of weekly unrest at the parish-year level using a logistic regression and to estimate the marginal effect of welfare expenditure on weekly unrest probability from the reduced-form estimate, assuming parish-year welfare transfers linearly induce grievances. Intuitively, I allow the parish-year welfare transfer to linearly affect the parish-year determinant of weekly unrest probability, such that, in a counterfactual scenario in which each observed parish-year welfare transfer is increased by 5%, weekly unrest probabilities could be recovered, and the overall effect on the intensive margin of unrest at the annual level could be predicted.

The reduced-form analysis provides conclusive evidence of a causal relationship between welfare retrenchment and social unrest. Between 1819 and 1831, a 10% decrease in welfare expenditure increased the probability of unrest by 3%, on average, when holding all other variables constant. I found that such an effect is amplified amongst parishes subject to above-median relative deprivation, which supports grievances arising from social comparison, and that lower welfare expenditure relative to pre-1819 levels has a causal effect on the probability of unrest that is consistent with grievances arising from habitual comparison. The counterfactual analysis finds that a 5% blanket increase in the annual welfare expenditure reduces the intensity of weekly unrest by over 40%.

The research findings contribute to the following strands of literature. Firstly, literature on the political costs of austerity.[2] Cross-country studies covering the twentieth to early twenty-first century found no effect of welfare and fiscal retrenchment on electoral punishments, measured by the vote share of incumbent political parties and changes in incumbent leadership, respectively (Armingeon and Giger, 2008; Arias and Stasavage, 2019). Experimental survey evidence from 2010s Europe found that austerity would have increased the electoral punishment for the incumbent government, which is consistent with the findings from 2010s welfare retrenchment in the UK, where empirical research established that austerity-oriented welfare reforms caused political dissatisfaction over

[2]A vast amount of literature has also studied other political effects of austerity, such as populism (Guriev and Papaioannou, 2022; Hübscher and Sattler, 2026).

rising economic vulnerabilities that resulted in the shift of vote share from the incumbent Conservatives to alternative parties (Fetzer, 2019; Hübscher, Sattler, and Wagner, 2021; Wiedemann, 2024). The political costs of austerity are also evident in episodes of protest and unrest, where grievances over austerity may stem from relative deprivation and the existence of a moral economy (Rüdig and Karyotis, 2014; Ketchley, Eibl, and Gunning, 2023). Cross-country evidence from Ponticelli and Voth (2020) suggests a causal relationship between fiscal retrenchment and social unrest during the past century, which resonates with theoretical contributions from Passarelli and Tabellini (2017), where the perceived unfairness of fiscal retrenchment generates aggrievement amongst citizens who participate in social unrest to reap a commensurate emotional reward.

However, the existing literature has yet to examine the effects of specific types of fiscal retrenchment on social unrest within a fixed institutional setting, nor have subjective well-being concepts associating relative deprivation and bargaining incentives with social unrest been empirically tested. By doing so, this paper also speaks to a well-established strand of research on the relationship between economic grievances and social unrest, where participation tends to be triggered when the opportunity costs – such as individual income – decline (Besley and Persson, 2011). Empirical research finds evidence on the general equilibrium effects of income shocks on the incidence of unrest, whereas evidence from specific unrest episodes stresses long-term economic grievances (DiPasquale and Glaeser, 1998; Chaney, 2013; Jia, 2014; Bellemare, 2015; Kawalerowicz and Biggs, 2015).

Secondly, the cliometric literature on social unrest in industrialising England, which has primarily focused on the Swing Riots, drawing on an incredibly rich dataset constructed by Holland (2005) that tracks daily Swing Riots events at the parish level. Recent cliometric studies on the Swing Riots scrutinised the implications of network effects and other factors in driving both the spatial and spatio-temporal diffusion of riotous events (Aidt and Leon-Ablan, 2022; Aidt, Leon-Ablan, and M. Satchell, 2022; Marray, 2025). Whilst agricultural mechanisation has been identified as a cause of the Swing Riots by Caprettini and Voth (2020), existing research has yet to study poor relief retrenchment as a causal factor – which constitutes the main contribution of this paper. By examining the effects of poor relief retrenchment on riotous events occurring throughout 1820s, this paper also speaks to a narrower set of literature from other fields of social science where data from other episodes of social unrest in historical England was used to

study the role of policing and solidarity in shaping how riotous events evolve over time (Tiratelli, 2022; Drury, Ball, and Poole, 2025). Whilst Greif and Iyigun (2012) found a negative correlation between poor relief expenditure per capita and the incidence of food riots between 1650 and 1830 at the county level, this paper develops a more robust identification strategy to test their research findings. By studying the significance of post-1818 poor relief retrenchment, this paper also contributes to recent literature that leverages the 1834 Poor Law Reform to examine the effects of poor relief retrenchment on crime rates and life expectancy (Melander and Miotto, 2023; Green et al., 2025).

Thirdly, empirical literature on the political economy of reference-dependent preferences. Altomonte, Gennaro, and Passarelli (2019) constructed a measure of relative deprivation using the income of wealthier individuals as the reference point to study the propensity to vote for a protest party. In an analysis of relative deprivation and political participation, Fransman and Von Fintel (2024) used the mean income of an individual's region as the reference point. Panunzi, Pavoni, and Tabellini (2024) drew on measures of individual income dissatisfaction from survey data to study relative deprivation and support for populism. Experimental data measuring feelings of relative deprivation towards an arbitrary reference group have been used to study relative deprivation and conflict (Siroky et al., 2020). Besides relative deprivation, there have been limited empirical studies from political economy that analyse the implications of other types of reference-dependent preferences. For example, reference points could also be defined as the status quo to study political behaviour over time, as commonly applied to model habituation in the subjective-wellbeing literature (Kahneman, Knetsch, and Thaler, 1991; A.E. Clark, Frijters, and Shields, 2008).[3] This paper therefore makes two contributions to this strand of literature. First, applying both concepts of relative deprivation and habituation to analyse welfare retrenchment and social unrest. Second, testing the implications of reference-dependent preferences on social unrest using granular objective data beyond the individual level.

Fourthly, literature on the pacifying effects of social welfare provision on unrest and conflicts. Program evaluation research has assessed the effects of social welfare programs on the likelihood of civil conflict, yielding inconsistent findings. On the one hand, Nunn and Qian (2014) found that US food aid increased civil conflict at the intensive margin

[3]Passarelli and Tabellini (2017) noted that habit formation could shape the expectation of fair policies.

in recipient counties, and Crost, J. Felter, and Johnston (2014) found that community-driven development programs increased casualties from civil conflict in the Philippines, primarily due to violent political contest over the support of the population. On the other hand, Fetzer (2020) concluded that workfare programs exhibited pacifying effects on civil conflict in India by strengthening insurance over conflict-fuelling income shocks (Miguel, Satyanath, and Sergenti, 2004; Dube and Vargas, 2013). Moreover, empirical research leveraging data on social spending confirms its pacifying effects over civil conflict in both within and cross-country settings (Berman, Shapiro, and J.H. Felter, 2011; Taydas and Peksen, 2012). However, much of the existing literature neglects plausible pacifying effects of social welfare over social unrest and protests, which constitutes an important assumption underpinning the theory of democratisation proposed by Acemoglu and Robinson (2000) in which the assumed pacifying effects of income redistribution motivate incumbent political elites to democratise as a commitment to prolonging pacification in the long run. Therefore, this paper examines the pacifying effects of welfare spending through a counterfactual analysis that models how welfare expenditure moderates unrest-determining shocks.

Finally, a growing strand of literature that uses data constructed from historical newspaper transcriptions (Beach and Hanlon, 2023). Conventional approaches are typically keyword-based, such as measuring treatment intensity by the frequency of relevant keywords and assigning treatment status based on mentions of geographical locations (García-Jimeno, Iglesias, and Yildirim, 2022; Bernini et al., 2025). When granular variables are desired, datasets are often constructed by manually reading article transcriptions containing relevant keywords (Caprettini and Voth, 2020; Feigenbaum and Gross, 2024). More recent topic modelling and name entity recognition approaches using machine learning techniques have enhanced the data construction potentials of historical newspaper transcriptions, whereas deep learning pipelines have been developed to identify unique newswire articles from the corpus of historical newspaper scans together with their topics and georeferencing information (Silcock et al., 2024; García-Uribe, Mueller, and Sanz, 2024; Aurich, 2024; Djourelova, Durante, and Martin, 2025). Whilst generative AI has the potential to extract complex variables from historical texts, existing literature has yet to apply techniques of generative AI to extract event datasets from historical newspaper transcriptions – this paper makes a contribution by demonstrating the use of

large language models with customised prompts to streamline existing approaches (Korinek, 2023; Dell, 2024; Lagakos, Michalopoulos, and Voth, 2025; Griesshaber and Streb, 2025; Michalopoulos, 2025).

The rest of this paper is organised as follows. Section 2 introduces the historical context. Section 3 describes the data construction. Section 4 develops the main hypothesis and conducts the reduced-form analysis. Section 5 conducts the counterfactual analysis. Section 6 concludes.

2 Historical Context

This section introduces the social welfare regime in historical England and describes the context of post-Napoleonic welfare retrenchment.

2.1 Old Poor Law, 1782–1815

The 1601 Poor Relief Act, known as the Old Poor Law, granted the legal right of the settled poor to relief when destitute, which led to a national social welfare program designed to provide a social safety net for all citizens (Charlesworth, 2010).[4] Under the authority of the Old Poor Law, every parish had a legal duty to raise a poor rate – an annual tax on property occupation – to relieve the impotent deserving (the aged, the infirm and children), provide work for the unemployed and punish the undeserving (abled-bodied yet idle) (Charlesworth, 2010).[5] All in all, the Old Poor Law laid the foundation for the decentralised operation of the poor relief system at the parish level until 1834. It emphasised that the social safety net would be activated only for settled parishioners as a last resort, when private philanthropy, help from kin, and individual self-help had been exhausted (King, 2000). However, the autonomy of such a system resulted in individual parishes setting their own subjective definition of destitute (or criteria for poor relief

[4]Parishes in England and Wales were subject to the Old Poor Law.

[5]Ratepayers collectively formed a vestry to annually appoint administrative posts of the parochial poor relief system and make policy decisions over the parochial poor relief system (Charlesworth, 2010). The overseer of the poor was responsible for setting and collecting the poor rate annually. Together with the churchwarden, they were obligated to meet at least once a month to make decisions regarding the maintenance of existing poor relief recipients and new poor relief applications (Charlesworth, 2010). If an application was refused, an applicant could appeal to local magistrates, who had the legal authority to grant Relief Orders if the refusal was deemed unlawful (Charlesworth, 2010).

eligibility) and enforcing their own format of poor relief.[6]

Since 1601, monetary forms of poor relief consisted of outdoor relief, including variants of income subsidy, unemployment insurance and public works, as well as pension payments (Boyer, 1990; King, 2000).[7] Often, these forms of poor relief were complemented by non-monetary forms, such as food and clothing provision (King, 2000). From 1722, indoor relief – an alternative format of poor relief administered via workhouses that aimed at employment provision and repelling relief applicants – was expanded by the passing of the 1722 Workhouse Test Act, which provided the legal authority for parishes to construct workhouses and deny relief to applicants who refused to enter them (Boyer, 1990).

The 1782 Relief of the Poor Act marked the beginning of a welfare expansion period that popularised the provision of outdoor relief to able-bodied parishioners, which aimed at restricting workhouse residency (indoor relief) only to the impotent poor (Shave, 2017). Given that the eligibility for outdoor relief was temporary in nature, conditional on local economic conditions that make it more cost-effective compared to indoor relief that aimed to make relief recipients eventually self-sufficient, the use of outdoor relief became more widespread since the passing of the Act (Charlesworth, 2010; Boyer, 1990).

An alternative explanation for the increasing prevalence of outdoor relief, particularly since the onset of the Napoleonic Wars, was that outdoor relief functioned as a way for labour-hiring property occupiers to pass on the cost of labour to non-labour-hiring property occupiers (Boyer, 1990). Besides economic motives, welfare expansion during the Napoleonic Wars may have stemmed from threats of famine and potential spillovers of revolutionary sentiments from France (Block and Somers, 2014).

2.2 Laissez-Faire and Austerity, 1816–1831

Since the defeat of Napoleon, poor relief expenditure began to rise due to the surge in cost of living caused by the passing of the protectionist Corn Law and the post-

[6]Destitute parishioners would only be eligible for poor relief if they had a settlement status for the parish they are seeking to receive poor relief, otherwise, they would become liable to be removed back to their place of settlement (Charlesworth, 2010). Generally, an individual's place of settlement follows their father's or (in the case of bastard children) their place of birth (King, 2000). However, an individual's place of settlement could change through (1) marriage, (2) renting freehold poverty worth £10 per year or more, (3) serving a full apprenticeship, (4) paying local taxes, (5) employment for a whole year, or (6) living in a parish for forty days (King, 2000). Overall, a parishioner's settlement status could be considered an objective criterion for their eligibility for poor relief.

[7]King (2000) found that around two-thirds of poor relief recipients were over the age of 50.

Napoleonic trade depression (Wordie, 2000; Wells, 2001). Research on contemporaneous family budgets found that poor relief contributed to households' annual income across a variety of sectors; in particular, it accounted for around 8% of annual income for low-wage agricultural families (Horrell and Humphries, 1997). Around the same time, complaints by local elites over growing welfare demand have been prevalent (Williams, 2011).

The spiralling poor relief expenditure and concerns over rising tax burden thus led to an ideological shift in the parliament where support for the complete abolition of outdoor relief – famously led by Malthus – formed, though the politically acceptable response was the passing of the 1819 Poor Relief Act – an enabling act aimed to scale back poor relief expenditure, which contained an austerity reform option for individual parishes to form a select vestry to tighten welfare eligibility (Boyer, 1990; Wells, 2001; Shave, 2013).[8] Clauses of the Act instructed select vestries to 'examine ... and to inquire into ... the poor Person to be relieved, and shall be at liberty to distinguish ... between the deserving, and the idle, extravagant or profligate Poor' (*Poor Relief Act. 1819. 59 Geo. 3. c. 12.* 1819).[9]

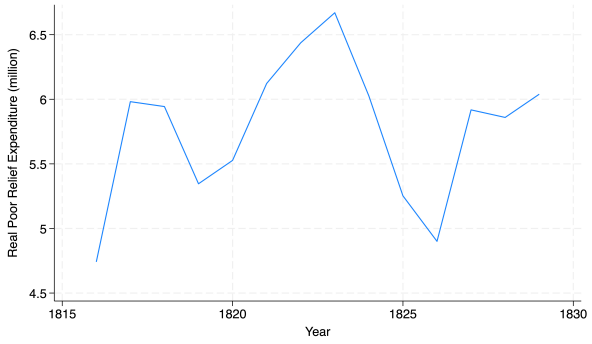


Figure 2.1: Real Expenditure, 1816-1829.

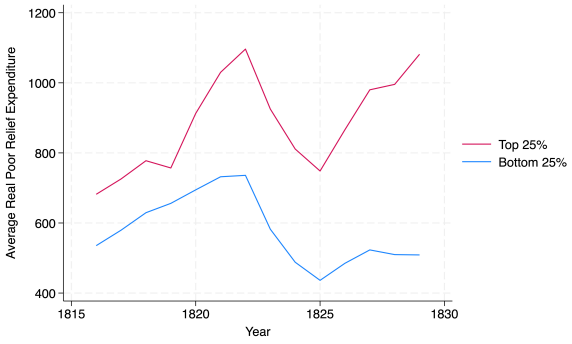


Figure 2.2: Welfare Heterogeneity.

Figure 2.1 plots the national expenditure of poor relief deflated by agricultural prices, which shows fluctuations throughout the post-Napoleonic period.[10] However, the magnitude of post-1818 welfare changes varied substantially across parishes. Figure 2.2 com-

[8]The House of Commons appointed a select committee in 1816, chaired by William Sturges-Bourne, to enquire into possible reforms of the poor relief system; both 1818 Vestries Act and 1819 Poor Relief Act were proposed by the select committee and became known as the Sturges-Bourne Acts (Shave, 2013). Clauses of the Sturges-Bourne Acts took inspiration from the ideas of Samuel Whitbread, an opponent of Malthus (Williams, 2011).

[9]The effectiveness of select vestries was strengthened by clauses of the 1819 Poor Relief Act that enabled the hiring of paid assistant overseers of the poor to carry out tasks such as surveying the circumstances of welfare recipients (C.J. Griffin, 2012; Shave, 2013).

[10]The agricultural price index from G. Clark (2004) was used.

pares the average real poor relief expenditure for the top and the bottom 25% of welfare changing parishes, where the bottom 25% welfare changing parishes saw a sharp reduction in real poor relief expenditure from 1823 that were not yet recovered by 1829, which is consistent with recent social history literature that argued for the presence of welfare cuts in many parishes during the 1820s (Stevenson, 1979; Wells, 2001; Shave, 2013).[11]

2.3 Social Unrest, 1816-1831

The intensity of social unrest during the 1820s relative to the late 1810s increased over time. As shown in Figure 2.3, the number of riotous days across parishes averaged at well over 200 per month towards the end of the 1820s. This challenges arguments that events of unrest during this period were insignificant due to government repression and an improving economy (Archer, 2000; Bohstedt, 2010).

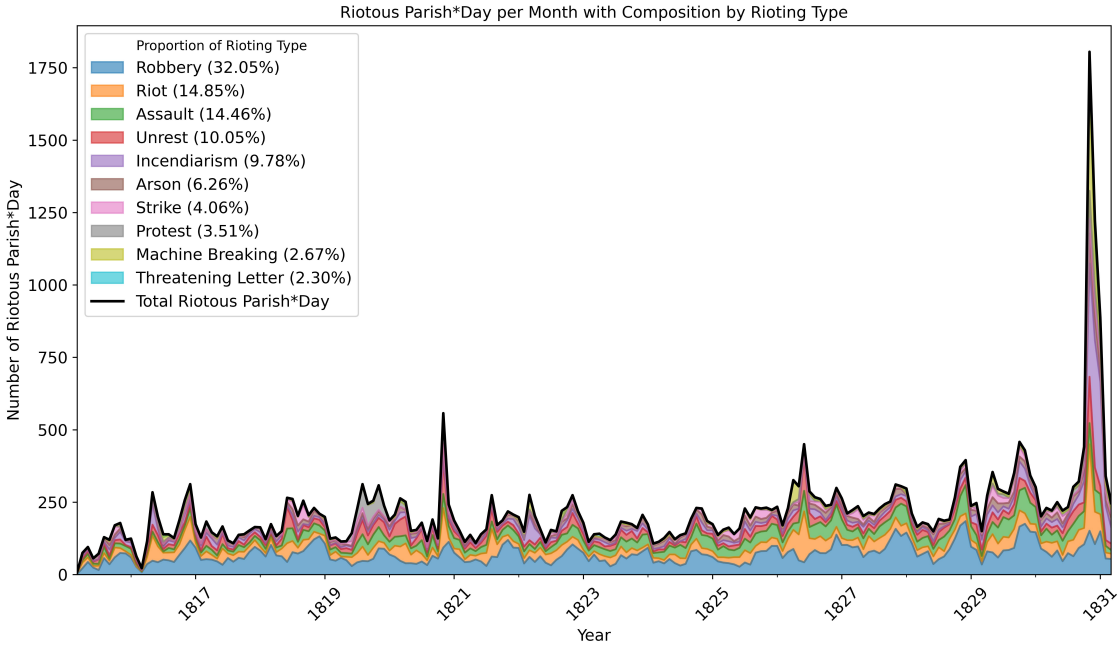


Figure 2.3: Social Unrest in England, 1816–31.

Figure 2.4 and Figure 2.5 show that many parishes observed unrest for the first time since the immediate years following the end of the Napoleonic Wars. The historiography highlighted several notable episodes of unrest before the Swing Riots, such as the East Anglian riots of 1822 and the Lancashire machine-breaking in 1826, which were attributable

[11]The magnitude of welfare changing for each parish is calculated by regressing poor relief expenditure on year for 1819-1829.

to grievances over the implementation of poor relief and labour-saving mechanisation, respectively (Muskett, 1984; Walsh, 1994; C.J. Griffin, 2025). Growing political grievances over issues since 1828, such as the Catholic Emancipation, certainly contributed to the relatively higher intensity of social unrest towards the end of the decade (Tilly, 1993).

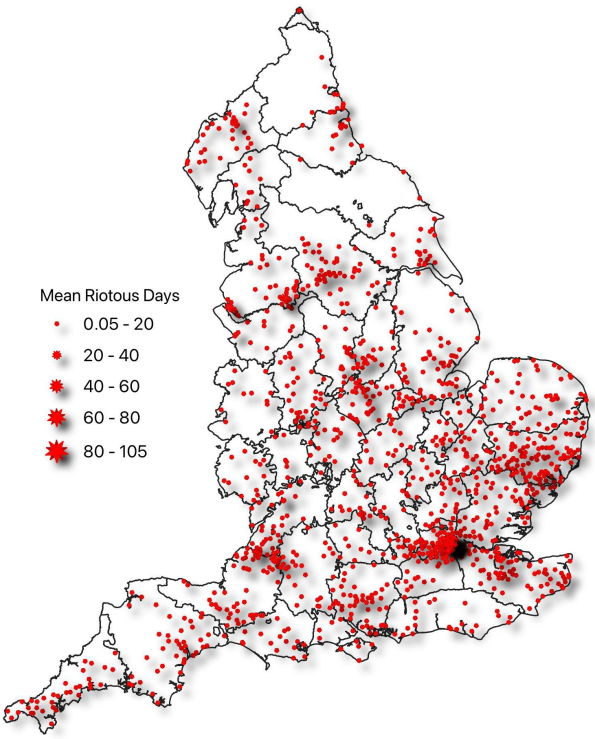


Figure 2.4: Pre-1819 Unrest.

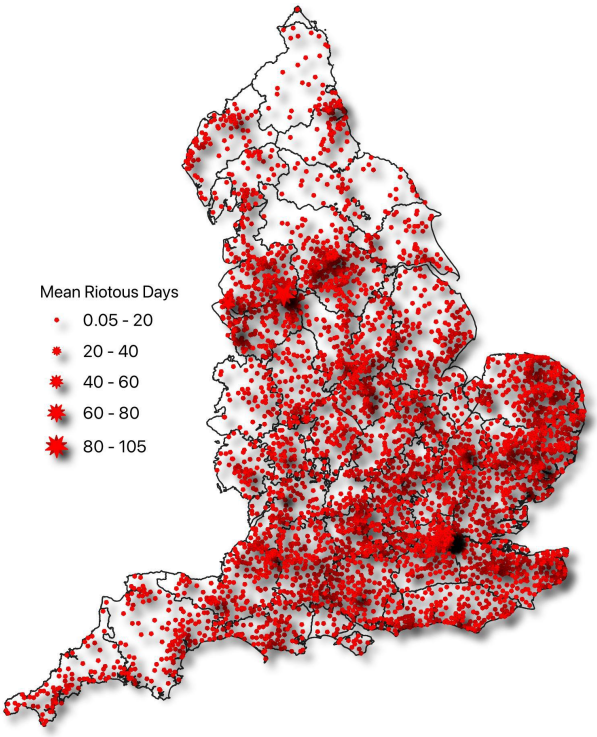


Figure 2.5: Post-1818 Unrest.

Events of social unrest during the winter of 1830 were known for their scale of spatio-temporal diffusion (Aidt and Leon-Ablan, 2022; Aidt, Leon-Ablan, and M. Satchell, 2022). They were described as the Swing Riots plausibly due to 'Swing' being commonly used as an anonymous signature of threatening letters (C.J. Griffin, 2010).[12] The historiography suggests causes such as agricultural mechanisation, enclosure of the commons, harvest failure, and cuts in the Yeomanry Cavalry (Caprettini and Voth, 2020; Hobsbawm and Rudé, 1969; Archer, 2000; Hay, 2017). The Poor Law Commissioners made an argument that poverty, as a result of the poor relief provision being too generous, was an important explanation for the high intensity of rioting observed in areas where the administration of outdoor relief was prevalent (House of Commons, 1834). However, a recent analysis of the Swing Riots reached a contradictory conclusion: that the rioters were aggrieved by past retrenchment in poor relief (Jones, 2007). Whilst agricultural

[12]Extortion via threatening letters was subject to the death penalty (Hobsbawm and Rudé, 1969).

causes of the rioting are significant, the fact that they also broke out in non-agrarian areas suggests the plausibility of more generic causes, such as welfare retrenchment, which motivates the hypothesis of this paper.

3 Data

This section presents the data sources and methods of variable construction for the dependent and independent variables of interest. Details on the unit of observation and data sample are described in Subsection A.3, data sources of covariates and instruments are outlined in Subsection A.4, and the summary statistics of all variables can be found in Subsection A.5.

3.1 Social Unrest

Holland (2005) constructed the most authoritative post-Napoleonic database of social unrest to date, which has been used in recent cliometric studies of the Swing Riots (Caprettini and Voth, 2020; Aidt and Leon-Ablan, 2022; Aidt, Leon-Ablan, and M. Satchell, 2022). The research team improved the data collection efforts of Hobsbawm and Rudé (1969) by using a broader set of contemporary newspapers and other archival sources, such as the Home Office Papers, which identified more than twice as many riotous incidents (Holland, 2005). Nevertheless, the database has two limitations. First, certain geographical areas may be underrepresented because the research team did not utilise the corpus of surviving contemporary newspapers. For example, no newspapers printed in Manchester were cited by the database (Holland, 2005). Second, social unrest incidents before the Swing Riots were not collected.[13]

This paper constructs a novel social unrest database for the post-Napoleonic period using 820,000+ digitised newspaper pages originally printed between 26th March 1815 and 30th April 1831 from the *British Newspaper Archive*, (n.d.).[14] The workflow used to transcribe each newspaper page is described in Appendix A.1.2. The methodology developed in this paper streamlines prior approaches to collecting social unrest data

[13]Datasets from Chambru and Maneuvrier-Hervieu (2024) and Caprettini and Voth (2020) contained pre-Swing riotous incidents, but these were scattered events identified from local studies and a sample of newspaper articles.

[14]Appendix A.1.1 lists every newspaper title from the corpus of digitised newspaper pages used by this paper.

using the *British Newspaper Archive* to extract structured data from raw newspaper transcriptions. Instead of keyword-based manual reading or applying machine learning methods trained on relevant sentence strings, this paper leverages large language models to process newspaper transcriptions and identify riotous incidents (Caprettini and Voth, 2020; Marcucci, Rohner, and Saia, 2023). Rather than fine-tuning individual natural language processing solutions to collect specific attributes associated with each incident, this paper customises prompts at the newspaper-column level to construct structural datasets where context windows contain all structured output possibilities to minimise hallucinations (Silcock et al., 2024).

The extraction of riotous incidents involved three steps: (1) the collection of transcriptions containing rioting reports, (2) the identification of counties associated with each rioting report found in the transcription and (3) the identification of details associated with each rioting incident, including rioting type, date and location. Step 1 involved applying mistral-small-3.2 from Mistral AI, using the prompt outlined in Appendix A.1.3, to the corpus of newspaper transcriptions. Step 2 involved applying gpt-4.1-2025-04-14 from OpenAI to the relevant transcriptions identified by Step 1 using the prompt outlined in Appendix A.1.4.[15] To ensure the consistency of georeferencing at the parish level, Step 3 augments the same prompt from Appendix A.1.4 with a list of county-specific parish information (hundred name, parish name) for any counties detected in the output of Step 2 and applies the transcription-specific prompt on every transcription containing rioting reports identified by Step 2. To mitigate the risk of hallucinations and to improve the precision of the structured output, Step 3 was repeated three times, where three data frames were constructed according to the following structure: 'rioting type, day of the week, DD, MM, YY, country, county, parish, turnout, damages'. After deriving all three sets of outputs, data cleaning involved dropping rioting incidents with rioting types identified that were not listed in the prompt, as well as those with insufficient or erroneous date or location information not listed in the prompt.[16] Finally, riotous incidents (with the same

[15]Whilst Step 2 could have been conducted on the corpus of newspaper transcriptions instead of running a separate Step 1, substantial cost-savings were made without sacrificing as much efficacy. When both steps were run on the corpus of transcriptions from the Swing Riots period, the mistral-small-3.2 model of Step 1 identified over 95.91% of transcriptions that the gpt-4.1-2025-04-14 model of Step 2 identified.

[16]To ensure accurate dating information, rioting incidents with identified dates that were the same or after the printed date were dropped. Insufficient dating and locational information denotes cases where any of the 'day of the week, DD, MM, YY, country, county, parish' returned empty. Erroneous dating and locational information denote cases where 'day of the week, DD, MM, YY' do not match those from the Gregorian calendar or 'county, parish' do not match those listed in the Step 3 prompt.

'rioting type, day of the week, DD, MM, YY, country, county, parish) that were found in all three runs within the same transcription were kept and form the novel social unrest database. Appendix A.1.5 manually checks the data quality for a representative sample of 1% of newspaper transcriptions identified by Step 3 from the Swing Riots period and found that the model accurately processed 89% of transcriptions.

An additional shortcoming of the Holland (2005) database is that many identified riotous incidents may have been duplicates. When incidents occur at the same location on the same day and are of the same type as other incidents, the lack of incident descriptions may not guarantee their uniqueness. As a result, this paper aggregates riotous incidents at the day level, which mitigates the risks of duplicated reporting of riotous incidents.[17] Therefore, riotous days is a variable defined as the number of days in which any of the ten types of social unrest was observed within a given year at a given parish. Overall, when comparing the number of riotous days that occurred between 11th October 1830 and 16th January 1831, the novel Swing Riots database yielded 170% more observations than the Holland (2005) database geocoded by Aidt, Leon-Ablan, and M. Satchell (2022).

Finally, Appendix A.1.6 finds that the reporting of riotous incidents at a given parish may have been affected by proximity to the location and the political leanings of the newspaper titles; the reduced-form analysis addresses both sources of bias.

3.2 Poor Relief Expenditure

This paper constructs a novel dataset on poor relief expenditure covering the post-Napoleonic period between 1816 and 1831 from surviving parliamentary sources (House of Commons, 1822; 1825; 1830; 1835). Existing pipelines combining layout recognition and optical character recognition (OCR) to transcribe historical tables struggle to handle the poor relief expenditure tables because source images are subjbect to distortions (Shen et al., 2021). For example, skewed parts of the original tables (border lines) undermine the performance of computer vision approaches that rely on border-line detection and off-the-shelf table structure recognition models, thereby affecting the accuracy of down-stream OCR models. Whilst more recent approaches have advocated the fine-tuning of off-the-shelf deep learning models, this paper applies generative AI to extract tabular data

[17]Recent literature applies a similar method to measure conflict intensity (Moscona, Nunn, and Robinson, 2020).

from preprocessed OCR results derived from source images to skip the layout recognition procedure altogether and streamlines the post-OCR data cleaning.[18]

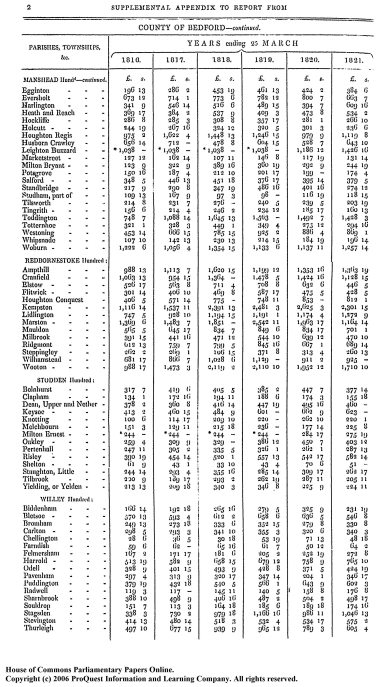


Figure 3.1: 1816-21.

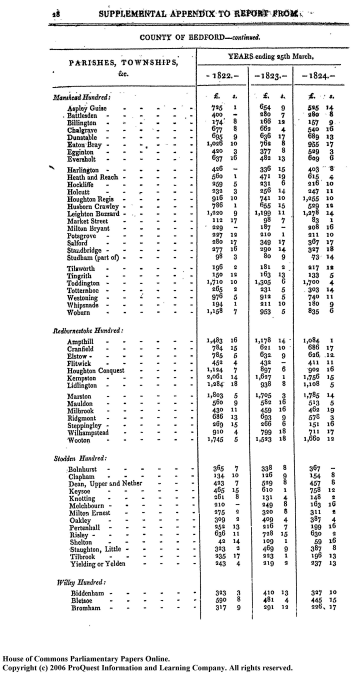


Figure 3.2: 1822-4.

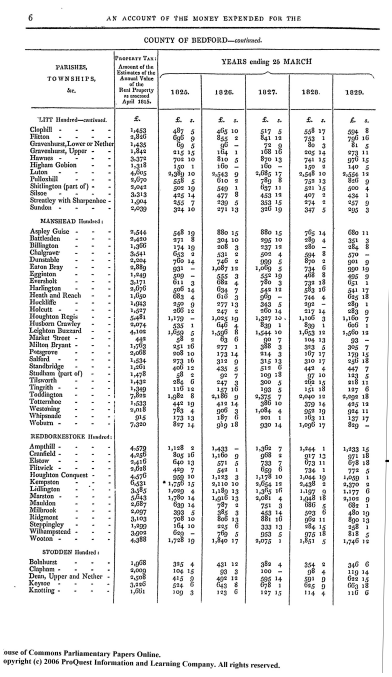
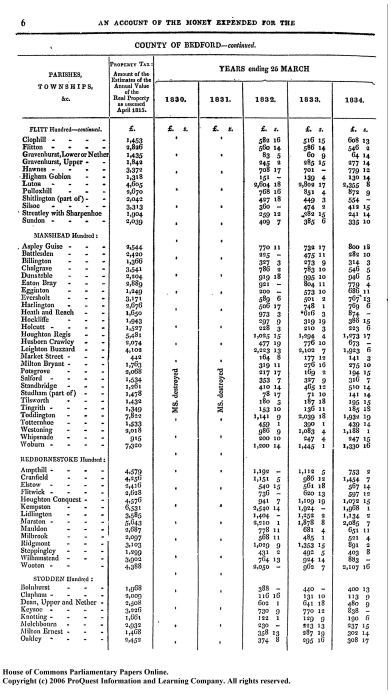


Figure 3.3: 1825-9.

All images are first deskewed via the same method outlined in Appendix A.1.2. Then, the pretrained-ocr-v2.1-2024-08-07 model from Google Cloud is applied to the preprocessed images to extract not only the transcription of individual text lines but also their bounding box coordinates, which are then used to reconstruct each table row by horizontally grouping text lines with similar y-coordinates. Then, the preprocessed OCR results at the page level is split into half and processed via gpt-4.1-2025-04-14 using three separate prompts outlined in Appendix A.2.1 to account for variation in the number of columns as there are three table types to handle, as shown in Figure 3.1, Figure 3.2 and Figure 3.3.

However, the 1830-4 poor expenditure tables were subject to missing data, as illustrated by Figure 3.4, which were poorly transcribed by the aforementioned pipeline. Therefore, a more advanced multimodal gemini-3-pro-preview model was used to transcribe tabular values directly from the source images, using a prompt outlined in Appendix A.2.2.

[18]Data cleaning needs to address the inconsistent spacing between pounds and shillings within the same column, as well as cases where values are replaced with hyphens or notes such as 'No Returns'.



6 AN ACCOUNT OF THE MONEY EXPENDED FOR THE

COUNTY OF BEDFORD—*continued.*

PARISHES, TOWNSHIPS, &c.	Property Tax: Amount of the Estimate of the Annual Value of Real Property as assessed April 1815.	YEARS ending 25 MARCH 1830.	1831.	1832.	1833.	1834.
	£.	£. s.	£. s.	£. s.	£. s.	£. s.
FLITT Hundred—*continued.*						
Clophill	1,453	"	"	582 16	516 15	608 13
Flitton	2,826	"	"	580 14	580 14	546 2
Gravenhurst, Lower or Nether	1,435	"	"	83 5	60 9	64 14
Gravenhurst, Upper	1,842	"	"	245 9	285 15	277 14
Harrold	3,275	"	"	708 17	701 –	739 12
Higham Gobion	1,318	"	"	131 –	139 4	130 14
Luton	4,803	"	"	2,004 18	2,302 17	2,355 8
Pulloxhill	1,070	"	"	768 16	831 4	872 9
Shillington (part of)	2,042	"	"	427 18	449 3	504 –
Silsoe	3,313	"	"	360 –	474 2	412 15
Streatley with Sharpenhoe	1,304	"	"	259 12	282 15	241 14
Sundon	2,039	"	"	409 7	385 6	335 10
MANSHEAD Hundred:						
Aspley Guise	2,544	"	"	770 11	732 17	800 16
Battlesden	1,410	"	"	253 –	272 11	282 10
Billington	1,366	"	"	327 3	273 9	314 3
Chalgrave	3,041	"	"	781 2	783 10	746 5
Dunstable	2,104	"	"	989 18	995 10	946 5
Eaton Bray	2,883	"	"	921 –	804 11	779 4
Eggington	1,249	"	"	200 –	573 10	686 11
Evershott	3,171	"	"	589 6	501 2	767 13
Harlington	2,678	"	"	566 17	748 1	769 6
Heath and Reach	1,650	"	"	972 3	1,016 3	874 –
Hockliffe	1,643	"	"	297 9	319 19	386 15
Holcutt	1,377	"	"	228 3	210 3	213 6
Houghton Regis	5,481	"	"	1,665 15	1,696 4	1,973 17
Husborn Crawley	2,074	"	"	477 19	776 10	673 –
Leighton Buzzard	4,102	"	"	2,202 13	2,102 7	1,963 6
Market Street	442	"	"	184 8	177 12	141 2
Milton Bryant	1,763	"	"	319 11	276 16	275 10
Pangrove	2,068	MS. destroyed	MS. destroyed	217 17	169 2	194 15
Salford	1,534	"	"	353 7	387 2	316 7
Stanbridge	1,761	"	"	416 14	465 13	510 14
Stadham (part of)	1,478	"	"	78 17	71 10	141 14
Tilsworth	1,432	"	"	180 2	187 18	195 15
Tingrith	1,940	"	"	153 10	136 11	185 18
Toddington	7,811	"	"	1,141 9	2,030 18	1,932 19
Totternhoe	1,433	"	"	455 1	390 1	439 14
Westoning	2,018	"	"	986 9	1,083 4	1,188 1
Whipsnade	915	"	"	200 10	547 4	547 15
Woburn	7,520	"	"	1,600 14	1,445 1	1,330 16
REDBORNESTOKE Hundred:						
Ampthill	4,679	"	"	1,150 –	1,116 5	753 2
Cranfield	4,636	"	"	1,151 5	980 13	1,454 7
Eletow	2,416	"	"	540 15	561 18	567 14
Flitwick	2,048	"	"	736 –	620 13	597 12
Houghton Conquest	4,676	"	"	941 7	1,109 19	1,072 15
Kempston	6,531	"	"	2,540 14	1,924 –	1,968 1
Lidlington	3,585	"	"	1,404 –	1,258 8	1,134 2
Marston	5,643	"	"	2,110 1	1,878 8	2,065 7
Maulden	2,687	"	"	778 11	681 4	631 11
Milbrook	2,097	"	"	588 11	485 1	521 4
Ridgmont	3,103	"	"	1,019 9	1,352 15	891 2
Steppingley	1,259	"	"	431 2	491 5	419 8
Wilhamstead	3,922	"	"	764 13	962 14	883 –
Wootton	4,388	"	"	2,030 –	962 7	2,107 16
STODDEN Hundred:						
Bolnhurst	1,968	"	"	388 –	440 –	400 13
Clapham	5,005	"	"	116 16	131 19	113 9
Dean, Upper and Nether	2,408	"	"	601 1	641 18	680 0
Keysoe	3,916	"	"	730 9	770 12	838 –
Knotting	1,061	"	"	122 1	119 9	190 6
Melchbourn	2,032	"	"	230 –	812 13	537 15
Milton Ernest	1,968	"	"	328 13	287 19	268 14
Oakley	2,452	"	"	374 8	493 16	398 17

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Figure 3.4: 1830-4.

Whilst the majority of images have been transcribed accurately, every value in the final output is manually checked, and OCR errors arising from faded ink or extremely skewed table rows are corrected. Appendix A.2.3 discusses the limitations of this dataset.

3.3 Descriptive Statistics

Figure 3.5 and Figure 3.6 visualise the intensity of social unrest and the mean welfare expenditure between 1819 and 1831, which demonstrates an overall somewhat positive correlation between welfare expenditure and social unrest. However, this does not seem to hold in certain areas of north-west and south-west England. Such a finding is plausibly subject to omitted-variable bias, in which factors related to economic grievances positively correlate with both welfare expenditure and unrest, outweighing the potential negative correlation between welfare expenditure and unrest.

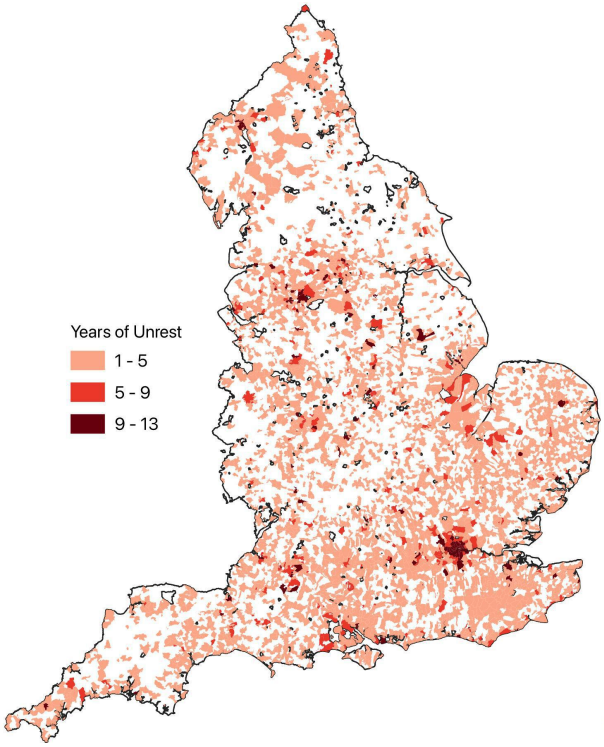


Figure 3.5: Post-1818 Unrest.

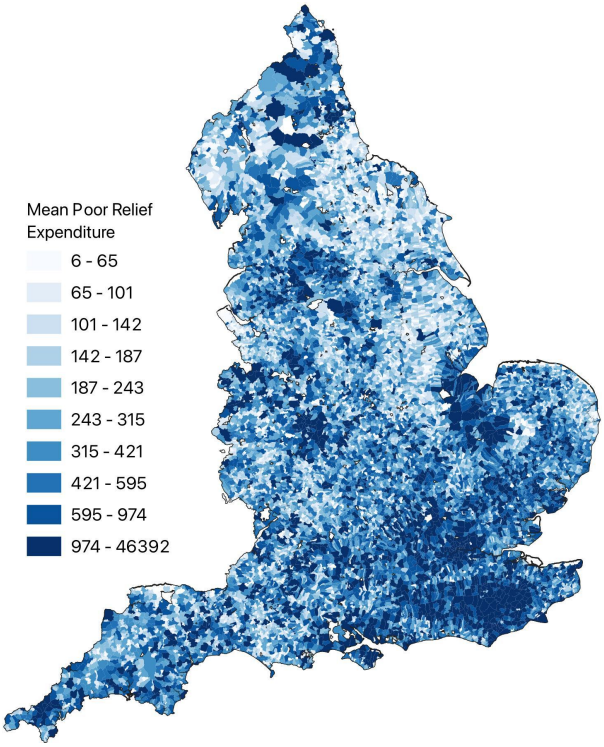


Figure 3.6: Post-1818 Welfare.

4 Reduced-Form

This section develops and tests the reduced-form hypothesis on welfare retrenchment and social unrest. First, the optimal unrest intensity is derived as a function of welfare expenditure, predicting a negative relationship between welfare expenditure and social unrest. Second, the reduced-form analysis confirms the negative causal effect of welfare expenditure on social unrest for 1819-31 at the extensive margin. Third, the heterogeneity analysis finds that welfare retrenchment is a significant driver of the relationship between welfare retrenchment and social unrest.

4.1 Hypothesis Development

To formalise the relationship between welfare retrenchment and social unrest, I adapt the redistribution model from Passarelli and Tabellini (2017), in which the economy consists of two groups: parishioners and elites. Rather than modelling a social planner that sets an optimal redistribution by weighing tax distortions and unrest disruptions in the social welfare maximisation problem, I model unrest as a direct conflict between parishioners and elites that shapes the unrest-minimising redistribution, as pioneered by Acemoglu and

Robinson (2000), to allow for grievances to arise directly from welfare transfers subject to flexible reference welfare transfers.

4.1.1 Set-Up

Parishioners receive a transfer of τ from elites, and gain utility $\Gamma(\tau)+\Omega$ from unrest with intensity $p \in [0,1]$ at a cost of $\frac{1}{2}p^2$:

$$U^P = p[\Gamma(\tau) + \Omega] - \frac{1}{2}p^2 \tag{1}$$

$\Gamma(\tau)$ denotes the magnitude of grievances as a function of the welfare transfer, which affects the utility gain of unrest. As modelled by Passarelli and Tabellini (2017), grievances can be interpreted as a comparable emotional reward to be reaped from unrest; intuitively, unrest could be modelled as a form of venting. Ω denotes unrest participation from neighbouring parishioners.[19]

Elites receive an income of w, which is subject to disruptions from unrest with probability p, and pay a tax of τ that is redistributed to parishioners:

$$U^E = w(1-p) - \tau \tag{2}$$

Such a simple set-up models unrest as an income-disrupting conflict that shapes the optimal redistributive incentives of the elites, as per Acemoglu and Robinson (2000).

4.1.2 Comparative Statics

I solve the optimal intensity of unrest that maximises the utility of parishioners as:

$$p^* = \Gamma(\tau) + \Omega \tag{3}$$

The equilibrium probability of unrest increases in response to a decline in welfare transfer, when a decline in welfare transfer increases the magnitude of grievances ($\frac{\partial p^*}{\partial \tau} = \frac{\partial \Gamma(\tau)}{\partial \tau} < 0$) and holding all else constant, which is a valid assumption given that the welfare transfer that maximises the utility of elites satisfy the following equilibrium condition:

[19] Strategic complementarity of unrest is assumed here. Aidt and Leon-Ablan (2022) and Aidt, Leon-Ablan, and M. Satchell (2022) found evidence of strategic complementarity during the Swing Riots of 1830-1, whereas Cantoni, Yang, et al. (2019) found experimental evidence of strategic substitutability of modern protest movements.

$$\frac{\partial \Gamma(\tau^*)}{\partial \tau} = -\frac{1}{w} \tag{4}$$

Intuitively, elites simply select an optimal welfare transfer that minimises unrest disruptions. Conditional on $\frac{\partial p^*}{\partial \tau} = \frac{\partial \Gamma(\tau)}{\partial \tau} < 0$ holding, elites increase welfare transfer in response to higher grievances-induced unrest. Therefore, I hypothesise a negative relationship between welfare transfer and social unrest, which is empirically tested in subsequent subsections.

4.1.3 Flexible Grievances

I deviate from Passarelli and Tabellini (2017), who model reference welfare transfer as a fair policy that maximises social welfare, to define reference-dependent grievances in which the definition of reference welfare transfers is flexible, thereby enabling empirically testable predictions. This paper draws on the subjective-wellbeing literature to test for grievances arising from social and habitual comparisons in which the reference welfare transfers are arbitrarily defined to enable empirical testing. For example, drawing on the linear utility functions from A.E. Clark, Frijters, and Shields (2008) to define the grievance function, the equilibrium probability of unrest could be rewritten as:

$$p^* = \beta_1 \ln(\frac{R^S}{\tau}) + \beta_2 \ln(\frac{R^H}{\tau}) + \Omega \tag{5}$$

where R^S denotes a reference welfare transfer from social comparison, such as the average welfare transfer of neighbouring parishioners, and R^H denotes a reference welfare transfer from habitual comparison, such as the customary welfare transfer from the past. The existing literature supports the assumption that welfare retrenchment induces social unrest through grievances arising from social and habitual comparisons. On the one hand, the assumption that welfare retrenchment causes unrest by exacerbating relative deprivation resonates with the literature on inequality and unrest (Acemoglu and Robinson, 2000). On the other hand, the assumption that welfare retrenchment causes unrest through habitual comparison resonates with the concept of the moral economy argued by Thompson (1971). Subsection 4.5 assesses both mechanisms.[20]

[20]Cai, De Janvry, and Sadoulet (2020) applies a similar subjective-wellbeing approach to evaluate subsidy policies.

In Section 5, welfare-induced grievances are structurally recovered as a parish-year-specific determinant of weekly unrest, which intuitively captures the interactions between annual parish-specific welfare transfer and parish-year-specific characteristics, including but not limited to an arbitrarily-determined reference welfare transfer.

4.2 Welfare and Unrest

This subsection leverages a shift-share instrumental variables research design to estimate the causal effect of welfare expenditure on social unrest between 1819 and 1831.

4.2.1 Set-Up

The regression equation is specified as follows:

$$Unrest_{p,t} = \alpha_p + \lambda_t + \beta_1 Exp_{p,t} + \beta \mathbf{X}_{p,t} + \varepsilon_{p,t} \tag{6}$$

$Unrest_{p,t}$ denotes whether a riotous day was observed at parish p in year t.[21] $Exp_{p,t}$ denotes the log-transformed poor relief expenditure at parish p in year t. $\mathbf{X}_{p,t}$ denotes a set of parish-specific year-varying covariates that correlate with changes in poor relief expenditure and are plausible determinants of social unrest: distance to the nearest police force to control for suppression capacity, distance to the nearest newspaper to control for newspaper under-reporting, the size of enclosed land to control for economic grievances. α_p denotes parish fixed effects, λ_t denotes year fixed effects and $\varepsilon_{p,t}$ denotes the error term. β_1 is the coefficient of interest, capturing the relationship between welfare expenditure and social unrest. However, a few threats to identification remain: reverse causality and biases from omitted year-varying and parish-specific variables, such as immigration and unemployment, which affect both welfare expenditure and unrest occurrence (Alesina, Baqir, and Easterly, 1999; Mokyr, Vickers, and Ziebarth, 2015; Hobsbawm and Rudé, 1969).

To address endogeneity concerns, the shift-share instrument of year-varying parish-specific exposure to commodity price shocks is used as the exogenous variation, which is defined as follows:

[21] Year t denotes the year ending 25th March of year t. The first year of analysis is the year ending on 25th March 1819, out of respect for the passing of 1818 Vestries Act in June 1818, despite the passing of 1819 Poor Relief Act in March 1819.

$$Z_{p,t} = \sum_{k=1}^{2} s_{pk,t} g_{k,t} \tag{7}$$

The shift component g_{kt} is calculated as the average percentage change in the price of industry k between year t and $t-1$. The two industries are agriculture and sedentary animal husbandry, and the price series come from G. Clark (2004).[22] The goal of the instrument is to predict the exposure of parish p to both price shocks weighted by land suitability for both industries that proxies for the income exposure of parish elites and therefore the supply of welfare, where a positive shock in agricultural prices may have increased the supply of welfare substantially more in agrarian parishes. The share component, $s_{pk,t}$, is defined as the land suitability for industry k as a percentage of the aggregate suitability for both industries, where data on land suitability come from Beck and Sieber (2010), who constructed land suitability scores for both sedentary animal husbandry and agriculture ranging between 0 and 1 at the 5×5 km raster cell level, using a set of environmental variables. Figure 4.1 and Figure 4.2 visualise the share variables.

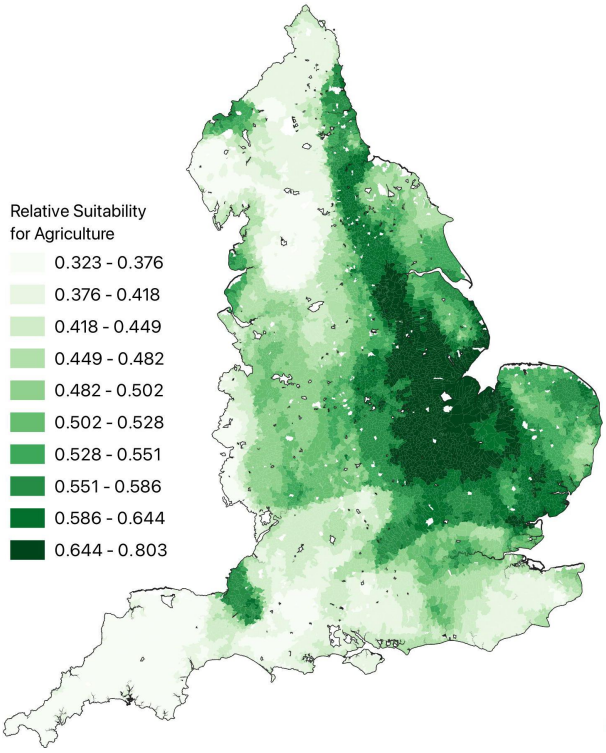


Figure 4.1: Agriculture.

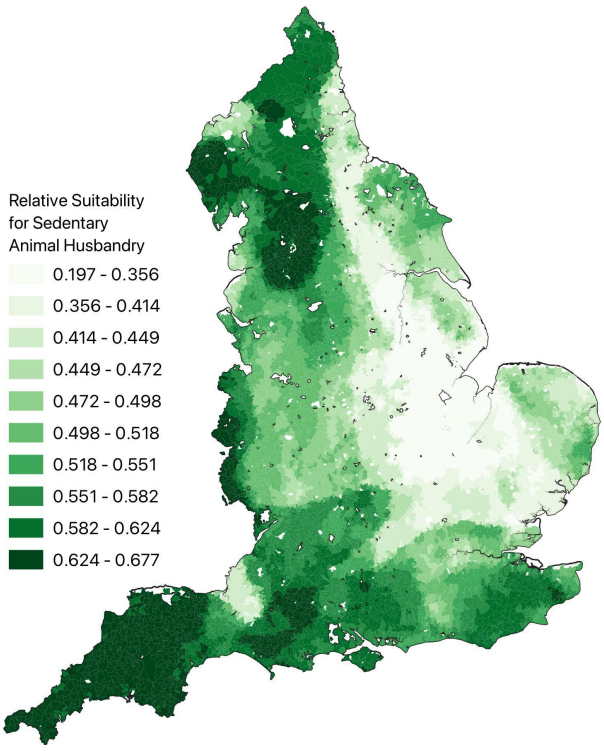


Figure 4.2: Animal Husbandry.

[22]Prices in agriculture include wheat, rye, barley, oats, peas, beans, potato and hops net tax. Prices in sedentary animal husbandry include straw, hay, cheese, butter, milk, pork, bacon and eggs. The industry-specific price series is constructed from the unweighted average across industry-specific products.

4.2.2 Instrument Validity

Comparing Figure B.1 with Figure 2.1 shows that trends in national welfare expenditure correlated with trends in both shift variables, which supports the instrument relevance assumption. The shift-based identification comes from the share-weighted average of random shifts being as-good-as-random, which is a valid assumption given that commodity prices are weighed by production exposure that does not capture unrest-causing cost-of-living fluctuations, meaning that the exclusion restriction assumption is likely to be satisfied, where the predicted exposure to commodity price shocks did not affect unrest via any other unobserved year-varying parish-specific characteristics.



Figure 4.3: IV and Pre-Trend Outcome.

Figure 4.3 shows that the pre-1819 outcome in parishes with high and low levels of the instrument trended similarly, which supports the instrument exogeneity where the instrument affects post-1818 social unrest through post-1818 welfare expenditure.[23]

4.2.3 Results

The empirical results confirm the negative relationship between welfare expenditure and unrest occurrence between 1819 and 1831.

Table 4.1 shows that a 10% decrease in welfare expenditure increases the probability of

[23]The plotted coefficients are derived from the interaction between the time-averaged IV and year; the year before the first year of the panel analysis is used as the base year.

Table 4.1: Reduced-Form Estimates.

	(1)	(2)
	Outcome: Unrest Occurrence	
	OLS	IV
$Exp_{p,t}$	0.007***	-0.314***
	(0.002)	(0.091)
R-Squared	0.356	
First-Stage F-Stat		59.49
Observations	152687	152687
Mean of Outcome	0.067	0.067

Cluster-robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

unrest by 3%, on average, when holding all other variables constant.[24] In Subsection B.2, it is shown that nine pre-1819 covariates were statistically significantly different amongst parishes with low and high levels of the shift-share instrument. However, Table B.8 shows that the reduced-form estimates survive after controlling for trends in those pre-1819 covariates. Table B.9 finds that the first-stage estimates are monotonic across quintiles of the shift-share instrument. Whilst observations in two quintiles yielded weak first-stage estimates, the reduced-form correlations between the shift-share instrument and the outcome remain statistically insignificant, lending support to the exclusion restriction assumption that the shift-share instrument affects the outcome only through poor relief expenditure.

4.3 Robustness

4.3.1 Unbalanced Panel

The dataset is unbalanced in poor relief expenditure, with 1,794 (14.6% of) parishes missing data for 1830 and 4,769 (38.9% of) parishes missing data for 1831. Subsection B.3 finds that the shift-share instrument, as well as several pre-1819 covariates, are different between parishes with missing data versus those without missing data.[25] However, the

[24] $\beta \ln 0.9 = 0.0331$. Subsection B.1 presents estimations without controls, the first stage and reduced form correlations between the outcome and the shift-share instrument, as well as reduced-form estimates obtained via a split sample specification where one half of the sample is used in the first stage and another half of the sample are used in the second stage of the two-stage least squares estimation.

[25] For the year 1830, parishes with missing poor relief expenditure were lower in population, lower in sex ratio, lower in agricultural labour share, lower in turnpike length, further away from ports, further away from garrisons and further away from London. For the year 1831, parishes with missing poor relief

reduced-form estimate survives when using a balanced panel of 4,626 parishes without any missing poor relief expenditure between 1816 and 1834.[26]

4.3.2 Alternative Social Unrest Measurements

Subsection B.4 shows that the reduced-form estimations are robust to dropping non-violent unrest, dropping robbery and assault, restricting to riot and unrest only, collective only, incidents with property damages only and unrest during winter months only.[27] The reduced-form estimations are also robust to using the annual number of days and months of unrest as the outcome variable.

4.3.3 Sample Heterogeneity

Subsection B.5 shows that the reduced-form estimate is robust to dropping extreme values of both the poor relief expenditure and the shift-share instrument.[28] The reduced-form estimate is also robust to dropping London parishes to account for potential measurement error in georeferencing street names to parishes. Table B.22 shows that the reduced-form estimate is robust to restricting the sample of observations located in proximity to a non-conservative newspaper to account for potential bias in newspaper reporting.[29] Splitting the sample into the above and below median of significant pre-1819 covariates concludes that the reduced-form estimate is driven by parishes with a high sex ratio in 1811, low male agricultural labour share in 1817, low exposure to turnpikes in 1810, proximate to ports, garrisons and coal, low property value in 1086 and non-exposure to country banks.

4.3.4 Spatial Autocorrelation

Subsection B.6 shows that the reduced-form estimation is robust to clustering standard errors at the hundred level, as well as two-way clustering of the standard errors at the

expenditure were lower in population, lower in sex ratio, higher in threshing machine installations, lower in turnpike length, further away from ports and closer to garrisons. The pre-1819 unrest was somewhat similar across parishes with observed and missing poor relief expenditure for 1830, but differed across parishes with observed and missing poor relief expenditure for 1831.

[26]The reduced-form estimate also survives using a balanced panel of 4,285 parishes, which also did not have any consecutive poor relief expenditure being homogeneous from possible imputation.

[27]Estimations on turnout and property damages were averaged across three runs. Collective only applies to incidents involving more than two individuals. November, December and January are assigned as winter months.

[28]Extreme values of a variable denote the top and bottom 5th percentile of that variable.

[29]Table B.6 shows that the reduced-form estimate is robust to controlling for distance to the nearest non-conservative newspaper.

parish and the poor relief expenditure percentile levels and at the hundred and the poor relief expenditure percentile levels.[30] The reduced-form estimation is not robust to clustering standard errors at the county level, as well as two-way clustering of the standard errors at the county and the poor relief expenditure percentile levels, attributable to the weak instrument. When using the spatial heteroskedasticity and autocorrelation consistent estimation approach from Hsiang (2010) and Fetzer (2020) the reduced-form estimate is statistically significant at the 5% significance level at the 10km cut-off and 10% significance level at the 20km cut-off but loses statistical significance at the cut-offs of 30km, 40km and 50km.[31] Reassuringly, Figure B.2 shows that Moran's I of the second-stage residuals are below 0.02 beyond the 20km cut-off, despite Figure B.3 showing the time-averaged IV exhibiting spatial clustering. Finally, Table B.28 and Table B.29 reject the null hypothesis of a spatial unit root being present in both poor relief expenditure and the shift-share instrument, respectively (Müller and Watson, 2024; Becker, Boll, and Voth, 2025).

4.4 Discussion

The analysis in this paper does not apply to Wales due to the lack of covariates, despite the system of poor relief being similarly enforced. The reduced-form estimate is robust across parishes with no exposure to country banks, despite the Panic of 1825 may have exacerbated impoverishment (Kenny, Lennard, and Turner, 2021). The reduced-form estimate is also robust, whilst controlling for trends in the 1811 population to account for migration patterns to some extent; the shift-share instrument is nevertheless plausibly uncorrelated with migration patterns. Whilst this paper does not account for other potential biases arising from omitted variables, such as wages and charitable giving, which are plausible determinants of unrest, the existing literature nevertheless finds inconclusive relationships with poor relief expenditure (Boyer, 1986; Roberts, 1984; Lindert, 1998).

[30]The definition of a hundred follows the 1830 poor relief expenditure table. Divisions within a hundred and towns may have been coded as individual hundreds. The two-way clustering approach follows Heblich, Redding, and Zylberberg (2024).

[31]In all specifications, the time lag cut-off of 12 was used to allow for serial correlation in the error term within the entire panel.

4.5 Heterogeneity

Table 4.2 confirms the significance of welfare retrenchment in driving the empirical findings. Columns 1 and 2 study the effects of welfare retrenchment stemming from social comparison. Drawing on the relative deprivation literature pioneered by Yitzhaki (1979), the reference level of poor relief expenditure for parish p in year t is defined as the average level of poor relief expenditure amongst neighbouring parishes expending higher poor relief in year t.[32] Column 1 presents the negative and statistically insignificant IV estimate for observations with levels of relative deprivation below the median.[33] However, in Column 2, when restricting to observations with levels of relative deprivation that are above the median, the IV estimate becomes statistically significant and is much larger in magnitude. Such a result lends support to the significance of welfare retrenchment arising from social comparison.

Table 4.2: Heterogeneity Analysis.

	(1)	(2)	(3)
	Outcome: Unrest Occurrence		
	IV	IV	IV
$Exp_{p,t}$	-0.083	-0.606***	
	(0.142)	(0.155)	
$\Delta Exp_{p,t}$			-0.019***
			(0.005)
First-Stage F-Stat	16.49	41.90	98.78
Observations	75797	75741	152687
Mean of Outcome	0.051	0.083	0.067

Cluster-robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Notes: Column 1 restricts the sample to below the median relative deprivation. Column 2 restricts the sample to those with relative deprivation above the median.

To test welfare retrenchment arising from habitual comparison, the reference level of poor relief expenditure for parish p in year t is defined as the average level of poor relief

[32]Neighbouring parishes of parish p were located within 10 km of the centroid of parish p. Recent empirical literature used physical proximity as a definition for reference groups (Hvidberg, Kreiner, and Stantcheva, 2023). Social history literature supports the assumption that social comparison occurred in historical England, attributable to high labour mobility (Mills and Shortt, 1983).

[33]Relative deprivation is defined as the difference between poor relief expenditure and the reference level of poor relief as previously defined. When the poor relief expenditure of a parish is the highest amongst its neighbouring parishes, relative deprivation is assigned zero.

expenditure between 1816 and 1818 in parish p.[34] The variable $\Delta Exp_{p,t}$ in Column 3 is defined as the inverse-hyperbolic-sine-transformed difference between the 1816-8 average level of poor relief expenditure observed in parish p and the poor relief expenditure of parish p in year t, which is instrumented by the same shift-share instrument. The estimated coefficient is negative and statistically significant, suggesting that the retrenchment of welfare relative to the customary level contributed to the main findings, due to incentives to bargain violently with the expectations of a recovery towards the habitual level of welfare provision that characterised the moral economy argued by Thompson (1971).

The empirical analysis so far has focused on the retrenchment aspect of welfare and unrest at the extensive margin. It is plausible that the poor relief system in many parishes may have functioned well to minimise unrest, particularly by acting as a policy to offset time-varying parish-specific shocks. Section 5 studies welfare and unrest at the intensive margin and examines the pacifying effects of social welfare.

5 Structural

This section structurally estimates the model outlined in Subsection 4.1 using a sufficient statistic approach that leverages unrest dynamics at the weekly level. First, the parish-year determinant of weekly unrest is recovered from running a logistic regression.[35] Second, the marginal effect of welfare transfer on the parish-year determinant of weekly unrest probability is estimated. Finally, counterfactual unrest intensity is predicted at the parish-week level by assuming blanket increases in annual poor relief expenditure that offset the parish-year determinant of weekly unrest.

5.1 Set-Up

The first step of the counterfactual analysis estimates the following regression equation:

$$Unrest_{ptw} = \gamma \Omega_{pt,w-1} + \mu_{pt} + \varepsilon_{ptw} \tag{8}$$

[34]Such a time-invariant reference welfare draws on the timing of the 1818 Vestries Act and the 1819 Poor Relief Act. It is plausible that the poor relief system during the immediate years following the end of the Napoleonic Wars remained customary and served as a valid reference point for habitual comparison, as Thompson (1971) argued that 'charity — and Speenhamland' were the only two surviving features of the moral economy in post-Napoleonic England.

[35]In a structural analysis to study the network effects of modern protests, González (2020) recovers network protest participation using baseline characteristics.

$Unrest_{ptw}$ denotes whether a riotous day was observed at parish p in week w of year t. $\Omega_{pt,w-1}$ denotes the distance-weighted average of neighbouring parishes' unrest in the previous week, moderated by γ that captures the coordination dynamics of unrest (Cantoni, Yang, et al., 2019; Aidt and Leon-Ablan, 2022; Aidt, Leon-Ablan, and M. Satchell, 2022). μ_{pt} denotes the parish-year fixed effects, and ε_{ptw} denotes the error term that follows a Type 1 extreme value distribution.

The second step of the counterfactual analysis recovers the weekly probability of unrest p_{ptw} from the logistic function, $\Lambda(\gamma\Omega_{pt,w-1} + \mu_{pt})$. Then, the probability of unrest at the annual level could be defined as:

$$P_{pt} = 1 - \prod_{w=1}^{W} (1 - p_{ptw}) \tag{9}$$

By defining μ_{pt} as the parish-year grievances that determine weekly unrest probability p_{ptw}, and assuming the parish-year welfare transfer linearly induces grievances, Appendix C derives an expression of the reduced-form estimate from Section 4 as follows:

$$\frac{\partial P_{pt}}{\partial \tau_{pt}} \;=\; \psi \cdot Q_{pt} \cdot S_{pt} \tag{10}$$

Here, Q_{pt} denotes the probability that parish p experiences no protest throughout year t and S_{pt} denotes the sum of weekly protest probabilities in parish p throughout year t. ψ is the parameter of interest that denotes the marginal effect of a unit increase in welfare transfer on the parish-year determinant of weekly unrest probability, which could be derived by setting the reduced-form estimate from Section 4 as the sample average of $\frac{\partial P_{pt}}{\partial \tau_{pt}}$; ψ is therefore specified as:

$$\psi \;=\; \frac{\beta_{IV}}{Q_{pt} \cdot S_{pt}} \tag{11}$$

5.2 Results

Table 5.1 presents the estimated γ and ψ.[36]

The estimated γ lends support to the strategic complementarity of unrest, consistent with the findings from Aidt and Leon-Ablan (2022) and Aidt, Leon-Ablan, and M. Satchell (2022).

[36] β_{IV} is taken from Table C.1, where the poor relief expenditure is not log-transformed.

Table 5.1: Structural Estimates.

	(1) Outcome: Unrest Occurrence
	MLE
$\hat{\gamma}$	8.0044***
	(0.2814)
Observations	8,281,000
$\hat{\psi}$	−0.0068

Bootstrap standard errors in parentheses (200 iterations)

5.3 Counterfactual Analysis

By endowing a 5% increase in observed annual poor relief expenditure across parishes, the counterfactual analysis suggests that unrest intensity would have fallen by over 40% throughout post-Napoleonic England, and the outbreak of the Swing Riots would have had an unrest intensity comparable to the mean baseline unrest intensity of the 1820s.[37]

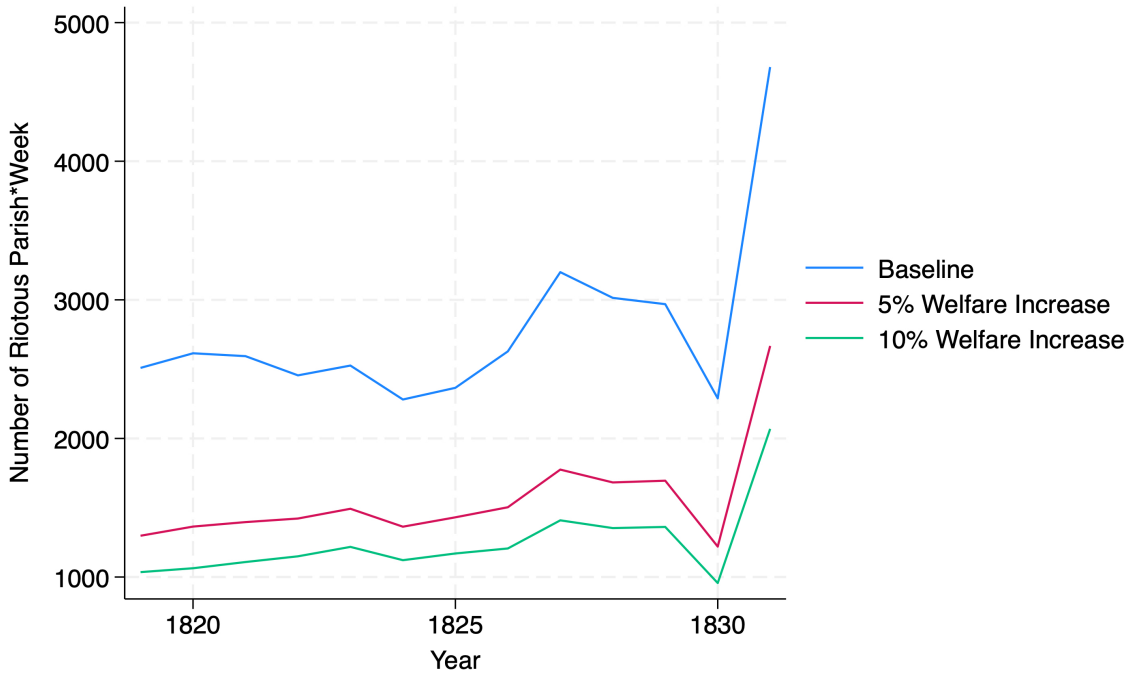


Figure 5.1: Counterfactual Analysis.

Whilst the simulations confirm the pacifying effects of social welfare provision, the diminishing nature of such an effect suggests the importance of other causes of unrest.

[37]No weekly unrest intensity is predicted for a parish during a given year in which annual poor relief expenditure is unobserved, which affected the simulation of spatio-temporal lags of unrest where the baseline weekly unrest intensity is used in place of those missing predictions.

6 Conclusion

Post-Napoleonic England constitutes a unique historical setting for austerity research, in which welfare retrenchment efforts supported by the parliament led to stark differences in welfare provision across thousands of parishes during the 1820s. This paper finds evidence that welfare retrenchment increases the equilibrium level of unrest and argues that grievances arising from social and habitual comparisons are plausible explanations for the empirical findings. By integrating concepts from the subjective-wellbeing literature to the grievance-induced unrest framework of Passarelli and Tabellini (2017), this paper bridges a gap between strands of conflict research that respectively scrutinise the rational and behavioural incentives of unrest (Lichbach, 1989). The research findings of this paper conclude that, in conjunction with austerity, policymakers could draw on providing more equitable public services and strengthening institutions for peaceful bargaining to minimise political costs. This paper also finds evidence on the pacifying effects of welfare provision in offsetting unrest-inducing shocks. Future research could carefully study the interactions between social welfare and specific unrest-inducing shocks, whether economic, political, or beyond, to better understand how the general equilibrium effects of welfare retrenchment on social unrest may translate into large-scale unrest episodes, which are often violent and contagious over time and across space, resulting in substantial property damages and disruptions to the broader economy. Future research could also systematically analyse qualitative sources, such as trial records, to pin down plausible grievances over welfare retrenchment, or study the research question in an experimental setting to capture reference-dependent preferences that may underpin welfare retrenchment and social unrest at the individual level.

A Data Appendix

A.1 Social Unrest Database

A.1.1 List of Newspaper Titles

The corpus of digitised newspaper page scans used by this paper comes from 265 newspaper titles:

> Aberdeen Press and Journal; Age (London); Albion and the Star; Anti-Gallican Monitor; Aris's Birmingham Gazette; Atlas; Aurora Borealis; Baldwin's London Weekly Journal; Ballot; Bankers' Circular; Barbadian; Barbados Mercury and Bridge-town Gazette; Bath Chronicle and Weekly Gazette; Bath Journal; Beacon (Edinburgh); Beacon (London); Belfast Commercial Chronicle; Belfast News-Letter; Bell's Life in London and Sporting Chronicle; Bell's Weekly Messenger; Berkshire Chronicle; Berwick Advertiser; Birmingham Chronicle; Birmingham Journal; Bombay Gazette; Brighton Gazette; Bristol Mercury; Bristol Mirror; Bristol Times and Mirror; British Luminary; British Mercury or Wednesday Evening Post; British Neptune; British Press; Brunswick or True Blue; Bucks Gazette; Bury and Norwich Post; Bury and Suffolk Herald; Caernarvon & Denbigh Herald; Calcutta Gazette; Caledonian Mercury; Cambridge Chronicle and Journal; Carlisle Journal; Carlisle Patriot; Carmarthen Journal; Champion (London); Chelmsford Chronicle; Cheltenham Chronicle; Cheltenham Journal and Gloucestershire Fashionable Weekly Gazette.; Chester Chronicle; Chester Courant; Clonmel Herald; Cobbett's Evening Post; Cobbett's Weekly Political Register; Colonist and Commercial Weekly Advertiser; Commercial Chronicle (London); Common Sense; Constitution (London); Constitution 1827; Constitution; Cork Constitution; Course of the Exchange; Coventry Herald; Coventry Standard; Cumberland Pacquet and Ware's Whitehaven Advertiser; Cumberland Pacquet, and Ware's Whitehaven Advertiser; Derby Mercury; Derry Journal; Devizes and Wiltshire Gazette; Dorset County Chronicle; Drakard's Stamford News; Drogheda Journal, or Meath & Louth Advertiser; Dublin Correspondent; Dublin Evening Mail; Dublin Evening Packet and Correspon-

dent; Dublin Evening Post; Dublin Mercantile Advertiser, and Weekly Price Current; Dublin Morning Register; Dublin Weekly Register; Duckett's Dispatch; Durham Chronicle; Durham County Advertiser; Edinburgh Evening Courant; English Chronicle and Whitehall Evening Post; Englishman; Enniskillen Chronicle and Erne Packet; Essex & Herts Mercury; Essex Herald; Evans and Ruffy's Farmer's Journal; Evening Mail; Evening Times 1825; Exeter and Plymouth Gazette; Exeter Flying Post; Fife Herald; Fleming's British Farmers' Chronicle; Fleming's Weekly Express; Freeman's Journal; General Evening Post; Glasgow Herald; Glasgow Sentinel; Globe; Gloucester Journal; Gore's Liverpool General Advertiser; Government Gazette (India); Halifax Express; Hampshire Advertiser; Hampshire Chronicle; Hampshire Telegraph; Hereford Journal; High Life in London; Hull Advertiser; Hull Packet; Huntingdon, Bedford & Peterborough Gazette; Imperial Weekly Gazette; Instructor and Select Weekly Advertiser; Inverness Courier; Inverness Journal and Northern Advertiser; Ipswich Journal; John Bull; Johnson's Sunday Monitor; Kentish Gazette; Kentish Weekly Post or Canterbury Journal; Kerry Evening Post; Kilkenny Moderator; La Belle Assemblée; Lancaster Gazette; Lancaster Herald and Town and County Advertiser; Law Chronicle, Commercial and Bankruptcy Register; Leamington Spa Courier; Leeds Intelligencer; Leeds Mercury; Leeds Patriot and Yorkshire Advertiser; Leicester Chronicle; Leicester Herald; Leicester Journal; Limerick Chronicle; Limerick Evening Post; Limerick Gazette; Liverpool Albion; Liverpool Mercantile Gazette and Myers's Weekly Advertiser; Liverpool Mercury; Liverpool Saturday's Advertiser; Lloyd's List; London Chronicle; London Courier and Evening Gazette; London Evening Standard; London Free Press; London Mercury 1828; London Mercury; London Moderator and National Adviser; London Packet and New Lloyd's Evening Post; London Telegraph; Londonderry Sentinel; Macclesfield Courier and Herald; Madras Courier; Maidstone Journal and Kentish Advertiser; Manchester Courier; Manchester Guardian; Manchester Mercury; Manchester Times; Mayo Constitution; Military Register; Mirror of the Times; Monmouthshire Merlin; Montrose Review; Morning Advertiser; Morning Chronicle; Morning Herald (London); Morning Post;

Nation; National Register (London); New Globe; New Times (London); Newcastle Chronicle; Newcastle Courant; Newry Telegraph; Norfolk Chronicle; North Devon Journal; North Wales Chronicle; Northampton Mercury; Norwich Mercury; Nottingham and Newark Mercury; Nottingham Gazette; Nottingham Journal; Nottingham Review; Observer of the Times; Oxford Journal; Oxford University and City Herald; Palladium 1825; Palladium 1829; Perry's Bankrupt Gazette; Perthshire Courier; Pierce Egan's Life in London, and Sporting Guide; Pierce Egan's Weekly Courier; Pilot (London); Police Gazette; Political Observer; Preston Chronicle; Public Cause; Public Ledger and Daily Advertiser; Reading Mercury; Representative 1822; Representative 1826; Roscommon & Leitrim Gazette; Roscommon Journal, and Western Impartial Reporter; Royal Cornwall Gazette; Royal Gazette of Jamaica; Royal York; Saint James's Chronicle; Salisbury and Winchester Journal; Satirist; or, the Censor of the Times; Saunders's News-Letter; Sheffield Independent; Sherborne Mercury; Shrewsbury Chronicle; Sligo Journal; Sligo Observer; South Eastern Gazette; Southern Reporter and Cork Commercial Courier; Staffordshire Advertiser; Stamford Mercury; Star (London); Statesman (London); Stockport Advertiser and Guardian; Suffolk Chronicle; Sun (London); Sunday Morning Herald; Sunday News; Surrey Herald and County Advertiser; Sussex & Surrey Chronicle; Sussex Advertiser; Taunton Courier and Western Advertiser; The Day; The Examiner; The Irish Racing Book and Sheet Calendar; The News (London); The Pilot; The Scots Magazine; The Scotsman; Tipperary Free Press; Town Talk 1822; Trades' Free Press; Tyne Mercury; Northumberland and Durham and Cumberland Gazette; Verulam; Warwick and Warwickshire Advertiser; Watchman; Waterford Chronicle; Waterford Mail; Weekly Dispatch (London); Weekly Globe; Weekly Intelligence; Weekly Times (London); West Briton and Cornwall Advertiser; Western Times; Westmeath Journal; Westmorland Advertiser and Kendal Chronicle; Westmorland Gazette; Wexford Independent; Windsor and Eton Express; Wolverhampton Chronicle and Staffordshire Advertiser; Wooler's British Gazette; Worcester Herald; Worcester Journal; World and Fashionable Sunday Chronicle; York Herald; Yorkshire Gazette.

A.1.2 Image Preprocessing and OCR

This paper downloads digitised newspaper scans from the *British Newspaper Archive*.[38] A total of 822,293 scans of newspaper pages originally printed between 1st March 1815 and 30th April 1831 were used to construct the social unrest database.[39] Figure A.1 shows all steps involved in converting raw newspaper page scans into a structured social unrest database.[40]

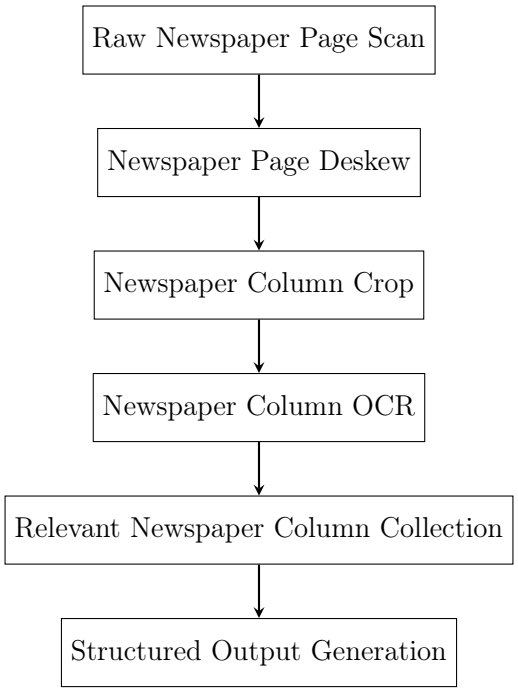


Figure A.1: Social Unrest Database Construction Work Flow.

Figure A.2 demonstrates an example raw newspaper page scan. Often, scans were skewed, which undermines the performance of OCR.[41] Therefore, a custom Python script was applied to deskew each image according to the angle of the detected vertical lines separating each column.[42]

[38]Access to the scans requires a paid subscription, which imposes a monthly cap of 6,000 scans for each subscription. The design of the digital archive requires each newspaper page scan to be downloaded from page-specific webpages.

[39]The *British Newspaper Archive* frequently uploads newly scanned newspaper pages, meaning that newspaper pages originally printed between 1st March 1815 and 30th April 1831 uploaded from April 2024 may not have been used to construct the social unrest database.

[40]Image preprocessing draws on capabilities from OpenCV. All images were preprocessed in Python; an Intel Core i9-14900K was used as the hardware.

[41]Recent literature highlighted OCR inaccuracies of newspaper archives (Burchardt, 2023).

[42]Around 1% of images with lines detected were dropped, primarily due to fading ink.

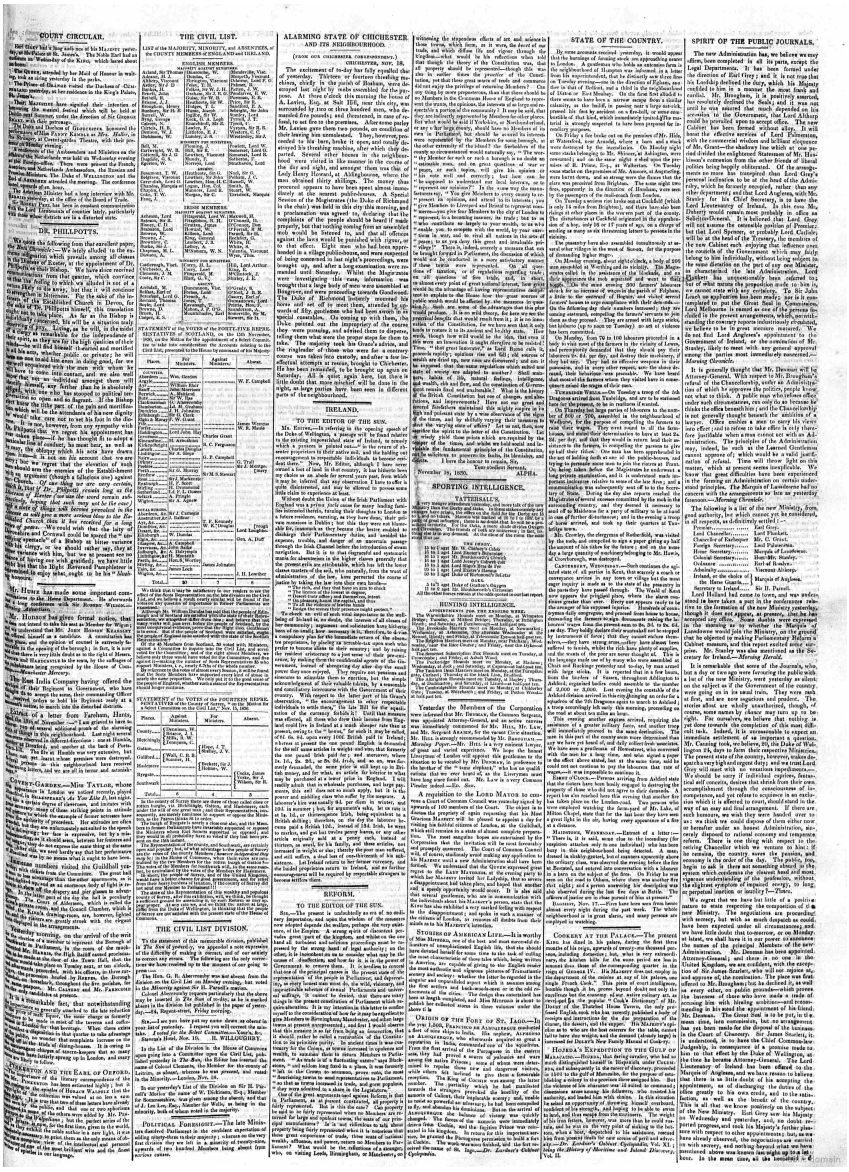


Figure A.2: Example Raw Newspaper Page Scan.

The next image-preprocessing step splits up newspaper pages into columns, which enables the preservation of reading order.[43] Figure A.3 shows an example newspaper column crop.

[43]It is possible that a tiny proportion of images are subject to the incomplete splitting. For example, a 5-column page is split into four columns because one of the vertical lines has faded ink. Distortions in reading order in these cases may be insignificant for the extraction of social unrest incidents, as riot reporting was often very brief, with dates and locations conveniently placed on the same line.



STATE OF THE COUNTRY.

By some accounts received yesterday, it would appear that the burnings of bowing-stacks are spreading nearer to London. A gentleman who lately made a tour through the neighbourhood of Hampton was informed in a letter from his superintendent, that he distinctly saw three fires on Tuesday evening—one in the direction of Egham, another in that of Bedfont, and a third in the neighbourhood of Staines or East-Bradley. On the first fire alluded to there seems to have been a narrow escape from a similar calamity, as the bailiff, in passing near a large rick-yard, observed fire first by accident on a faggot, or some combustible matter, which was immediately removed. The material is strongly supposed to have been prepared for incendiary purposes.

On Friday a fire broke out on the premises of Mr. Hide, at Waterfield, near Arundel, where a barn and a stack were destroyed by the incendiaries. On Monday night some stacks belonging to Mr. Skinner, at Ashington, were consumed; and on the same night a stack upon the premises of R. Prime, Esq., at Walberton. On Tuesday even barns during, and an attempt was made to fire that of Mr. Gates was prevented from brighton. The same night two fires, apparently in the direction of Henfield, were seen by the passengers of the mail-coach from London.

On Tuesday a serious riot broke out at Cuckfield (which is only 14 miles from Brighton), and there have also been risings at other places in the western part of the county. The disturbances at Cuckfield originated in the apprehension of a boy, only 16 or 17 years of age, on a charge of sending as many as six threatening letters to persons in the vicinity.

The peasantry have also assembled tumultuously at several other villages in the west of Sussex, for the purpose of demanding higher wages.

On Monday evening, about eight o'clock, a body of 200 men assembled at Worthing and its vicinity. The Magistrates called in the assistance of the Yeomanry, and on their appearance the mob separated and went to their homes. On the same evening 200 farmers' labourers struck for an increase of wages in the parish of Pulpham, a little to the eastward of Bognor, and visited several farm-houses in the neighbourhood, and obtained their wish. On the following day their numbers increased; they were coming eastward, compelling the farmers' servants to join them as they passed. They are armed with large sticks, but hitherto (up to noon on Tuesday) no act of violence has been committed.

On Monday, from 70 to 100 labourers proceeded in a body to visit most of the farmers in the vicinity of Lewes, and peremptorily demanded that they should pay their labourers 2s. per day, and that those who were single should have 10s. per week. They had no offensive weapons in their possession, and in every other respect, save the above demand, their behaviour was peaceable. We have heard that most of the farmers whom they visited have in consequence raised the wages of their men.

TUNBRIDGE WELLS.—On Tuesday a troop of the 4th Dragoons arrived here Tunbridge, and are to be stationed here for the present, to be in readiness if wanted.

On Thursday last large parties of labourers to the number of 500 or 600, assembled in the neighbourhood of Hartfield, Rotherfield, and Mayfield, and went from farm to farm with their wages. They went round to all the farm-houses, and stated their determination to have at least 2s. 6d. per day, and that they would in return lend their assistance to the farmers, in compelling the parsons to give up half their tithes. One man has been apprehended in the act of holding forth at one of the public-houses, and trying to persuade more men to join the throng at Fuest. On being taken before the Magistrate he underwent a long private examination, and it is understood much important information relative to some of the late fires; and a reward is expected to be offered for the capture of the ringleaders of the mob. During the day also reports reached the Magistrates of several crimes committed by the mob in the surrounding country, and they deemed it necessary to send off to Maidstone for a party of military to be at hand in case of further disturbance; and in the evening a troop of horse arrived, and took up their quarters at Tunbridge here.

Mr. Crowley, the clergyman of Rotherfield, was visited by a party of the rioters on Thursday, who threatened a great deal of mischief to his tithes for the future; and on the same day a large quantity of machinery belonging to Mr. Hare, of Cowfarrough, was destroyed.

CANTERBURY, WEDNESDAY.—Such continues the agitated state of all parties in Kent, that scarcely a coach or conveyance arrives in any town or village but the most eager inquiry is made as to the state of the peasantry in the parts they have passed through. The Weald of Kent now appears the principal place, where the alarm continues greater than ever. Every one appears ready to be thrown into open opposition parties. Hundreds of meetings, public and private, are held in most towns to house, discussing the farmers wages that are now demanded, the lowest wages from the present sum to 2s. 2d. to 2s. 6d. per day. They boldly declare their wretchedness not be stopped by instruments of force; that they cannot endure themselves,—they have strong arms,—they have almost been suffered to perish, whilst the rich have plenty of supplies, and the wants of the poor are never thought of. This is the universal cry, and the only way they were assembled at Chatham and Rochester yesterday was to meet the rioters with large strides. It is reported that in a few hours, from the borders of Sussex, throughout Ashington to Ashford, organised bodies could assemble to the number of 5,000 or 6,000. Last evening the constable of the Ashford division arrived in this city, bringing an order for a squadron of the 7th Dragoons again to march to Ashford; a troop accordingly left early this morning, proceeding on the road at about ten miles an hour.

This evening another express arrived, requiring the attendance of the Yeomanry Cavalry at Ashford, who will immediately proceed to the same destination. 72 men in this part of the county were were determined than any we have yet heard of, and daily reflect fresh anxieties. We have seen a gentleman of Hemstreet, who conversed with the men for a long time, and who signed a paper to the effect above stated, but at the same time, said he could not not continue to pay the labourers that rate of wages—it was impossible to continue it.

MAIDSTONE, WEDNESDAY.—Letters from Ashford state that the rioters have been busily engaged in destroying the property of those who did not agree to their demands. A report late this morning here this evening that another fire has taken place on the London-road. Two persons who were employed watching the farm-yard of Mr. Lake, of Milton Chapel, state that for the last hour they have seen a great light in the sky, having every appearance of a fire at a distance.

MAIDSTONE, WEDNESDAY.—Extract of a letter:—"Town is, it is said, soon close to the boundary (for the present) of the disturbances, which are very serious here in this neighbourhood being detected. A man, dressed in shabby-genteel, but of manners apparently above the ordinary class, was observed the evening before the fire at Bentsted, and entered into conversation with a labourer in a barn on the subject of the fires. On Friday he was seen on the road to Otham, where there was another fire that night; and a person answering his description was also observed during the last few days at Battle. The officers of justice are on the alert to apprehend him."

HASTINGS, MAY 17.—Fires have been seen in every town almost every night during the past week. The whole neighbourhood is in great alarm, and many persons are employed in watching.

COOKERY AT THE PALACE.—The present KING has dined in his palace, during the first three months of his reign, upwards of twenty-one thousand persons, including domestics; but, what is very extraordinary, the kitchen bills for the same period are less in amount than those of the corresponding quarter in the reign of GEORGE IV. HIS MAJESTY does not employ in the department of the cuisine as any of his princes, one single French cook. This piece of rare intelligence, which, we believe, has, previously, never been made public, explains but the economy of our entire culinary art, as revealed in the popular "Cook's Dictionary" of Mr. DUBAY of the Thatched House Tavern, the only published English cook who has recently published a body of receipts and instructions for the due preparation of the dinner, the dessert, and the supper. HIS MAJESTY'S epicurean tastes are the best consulted for the table, and is left to have the wealth and resources of the [illegible] largely, in command for DUBAY'S New Family Manual of Cookery.

HOZIER'S EXPEDITION TO THE GULF OF MARATHON.—Hozier, that daring cruiser, who had so much distinguished himself in the Adriatic, on the Coast of Greece, and in the Archipelago, has recently fitted out a yacht to the gulf of Marathon, for the purpose of rebuilding a colony in the precise there assigned him. But his violence of his character was ill suited to command; a [illegible] arose among his followers, who resisted his authority, and landed him with them. In this situation he seized an opportunity of throwing himself overboard, and swam to the yacht, which he reached in safety, after a struggle, and five hours from the first start. The loss of his two friends, however, was more than he could endure, and he was on the very point of sinking to the bottom, when a blast, despatched to his assistance, rescued him from [illegible] death by one stroke of pull and stroke.—*Dr. London's Cabinet Cyclopædia*, Vol. XI.; *Hozier the History of Maritime and Inland Discovery*, vol. II.

Figure A.3: Example Newspaper Column Crop.

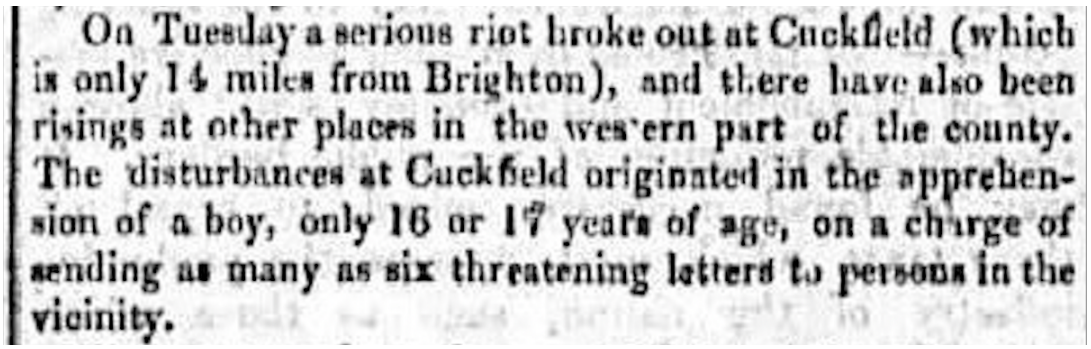
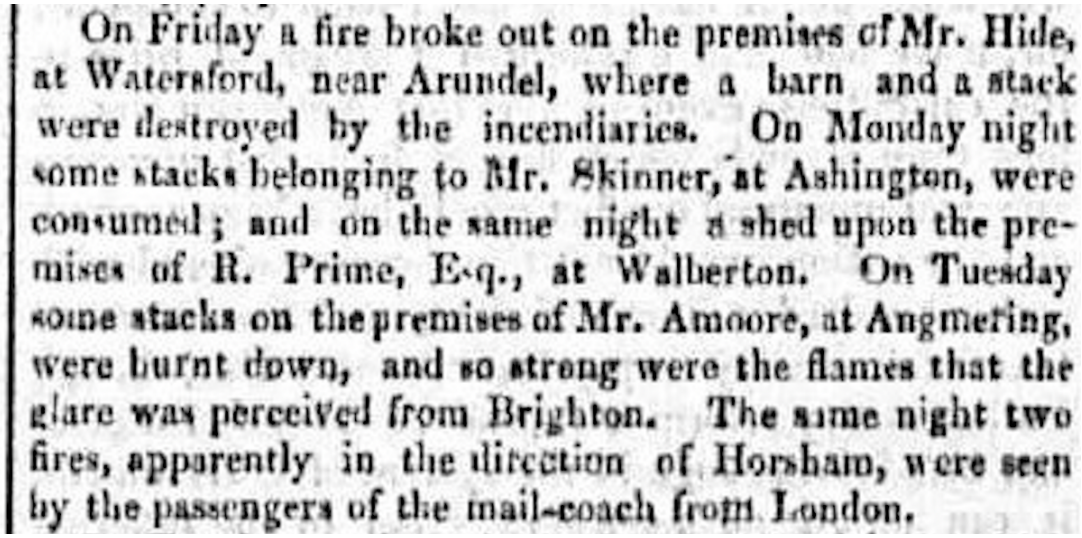


Figure A.4: Type 1 Riotous Incidents Report.

Riotous incidents were typically reported individually by an entire article, as shown in Figure A.4 or in groups, as shown in Figure A.5.



On Friday a fire broke out on the premises of Mr. Hide, at Watersford, near Arundel, where a barn and a stack were destroyed by the incendiaries. On Monday night some stacks belonging to Mr. Skinner, at Ashington, were consumed; and on the same night a shed upon the premises of R. Prime, Esq., at Walberton. On Tuesday some stacks on the premises of Mr. Amoore, at Angmering, were burnt down, and so strong were the flames that the glare was perceived from Brighton. The same night two fires, apparently in the direction of Horsham, were seen by the passengers of the mail-coach from London.

Figure A.5: Type 2 Riotous Incidents Report.

A total of 3,977,653 newspaper columns were then transcribed via Google Cloud.[44]

A.1.3 Riot Reporting Context Window

The corpus of transcriptions was processed via mistral-small-3.2.[45] The following prompt was used:

> You are an expert in analyzing historical newspaper reports for rioting incidents. You will be given content from newspaper reports, which may or may not include details of rioting incidents. Your task is to identify any mentioned rioting incidents. If incidents are found, summarize each one using the schema provided below. If no incidents are present, return an empty list.
>
> For each rioting incident, extract and report the following details: - rioting_type: Specify the type of incident. Choose from: 'Riot', 'Unrest', 'Arson',

[44]Newspaper pages scans originally printed during the Swing Riots period from May 1830 until April 1831 were transcribed via Google Cloud Vision in June 2024, and all other newspaper pages scans were transcribed via pretrained-ocr-v2.0-2023-06-02 of Document AI in June 2025.

[45]All transcriptions were processed via LM Studio; three Nvidia GeForce RTX 5090 GPUs were the hardware used. The following transcription-specific system instruction was inserted within the context window to ensure dating accuracy: 'The following newspaper reports were published on {formatted_date}:{newspaper_transcription}'. {formatted_date} denotes the original publication date of the newspaper page scan embedded within the name of the source file.

'Protest', 'Incendiarism', 'Strike', 'Machine Breaking', 'Robbery', 'Assault', or 'Threatening Letter'.

If no rioting incidents are mentioned, return an empty list of incidents.

A.1.4 Riotous Incidents Context Window

The corpus of relevant transcriptions was processed via gpt-4.1-2025-04-14.[46] The following prompt was used:

> You are an expert in analyzing historical newspaper reports for rioting incidents. You will be given content from newspaper reports, which may or may not include details of rioting incidents. Your task is to identify any mentioned rioting incidents. If incidents are found, summarize each one using the schema provided below. If no incidents are present, return an empty list. For each rioting incident, extract and report the following details: - rioting_type: Specify the type of incident. Choose from: 'Riot', 'Unrest', 'Arson', 'Protest', 'Incendiarism', 'Strike', 'Machine Breaking', 'Robbery', 'Assault', or 'Threatening Letter'. - day_of_week: The day of the week when the incident occurred. - day: The day of the month when the incident occurred (DD). - month: The month when the incident occurred (MM). - year: The year when the incident occurred (YYYY). - country: The country where the incident took place. - county: The county where the incident occurred. If in England, use one of the following: 'Bedfordshire', 'Berkshire', 'Buckinghamshire', 'Cambridgeshire', 'Cheshire', 'Cornwall', 'Cumberland', 'Derbyshire', 'Devon', 'Dorset', 'Durham', 'Northumberland', 'Essex', 'Gloucestershire', 'Herefordshire', 'Hertfordshire', 'Huntingdonshire', 'Kent', 'Lancashire', 'Leicestershire', 'Lincolnshire', 'Middlesex', 'London', 'Monmouthshire', 'Norfolk', 'Northamptonshire', 'Nottinghamshire', 'Oxfordshire', 'Rutland', 'Shropshire', 'Somerset', 'Hampshire', 'Isle of Wight', 'Staffordshire', 'Suffolk', 'Surrey', 'Sussex', 'Warwickshire', 'Westmorland', 'Wiltshire', 'Worcestershire', 'Yorkshire East Riding', 'Yorkshire North Rid-

[46] All transcriptions were batch processed via OpenAI. The same transcription-specific system instruction was inserted within the context window to ensure dating accuracy: 'The following newspaper reports were published on {formatted_date}:{newspaper_transcription}'.

ing', 'Yorkshire West Riding'. If in Wales, use one of the following: 'Anglesey', 'Breconshire', 'Cardiganshire', 'Carmarthenshire', 'Caernarfonshire', 'Denbighshire', 'Flintshire', 'Glamorgan', 'Merionethshire', 'Montgomeryshire', 'Pembrokeshire', 'Radnorshire'. - parish: The parish or local area where the incident occurred. {parish_info}[47] - turnout: The estimated number of people who participated in the incident. - damages: The estimated value of property damages caused by the incident in pounds, measured using 1830 prices. If no rioting incidents are mentioned, return an empty list of incidents. The following newspaper reports were published on {DATE OF NEWSPAPER REPORT}: {NEWSPAPER TRANSCRIPTION}.

A.1.5 Generative AI Diagnostics

This subsection focuses on the generative AI output derived from the newspaper transcriptions of the Swing Riots period.[48] Cleaning of the generative AI output involved dropping riotous incidents with unmatched 'rioting type', 'day of the week, DD, MM, YYYY', 'county, parish', as well as those with identified dates after the printed date of the newspaper. Table A.1 demonstrates that the dataset is subject to vague reporting of dates and geographical locations, which resonates with the findings of existing literature evaluating historical newspapers as a source for collecting social unrest data (C. Griffin, 2006).

Category	Output 1	Output 2	Output 3
Rioting Type	0.19%	0.17%	0.19%
Day of the Week, DD, MM, YYYY	32.28%	32.24%	31.03%
County, Parish	50.34%	50.90%	50.39%
Date Hallucination	4.04%	4.08%	4.06%
Total	64.60%	64.35%	64.15%

Table A.1: Unmatched Rate per Category.

[47] {parish_info} is only added in Step 3, for each of the counties identified in Step 2. The {parish_info} for each county contains: If in the county of {county name}, use one of the following: parish name, hundred name; ...

[48] There is no reason to believe that newspaper transcriptions and the style of rioting reports from the period between 1815 and 1830 are different from those of the Swing Riots period. The rationale for using the OCR model from DocumentAI was to mitigate the impact of erroneous cropping of newspaper columns.

Although the system's temperature setting has been set to 0 across all steps of generative AI applications, hallucinations still occur. For example, the identification of rioting types other than those listed by the prompt and the identification of erroneous dates of riotous incidents that occurred after the printed date of the newspaper as specified in the prompt.

To further assess the accuracy of the novel Swing Riots database, a representative sample of 1% of newspaper columns from the Swing Riots period containing reports of riotous incidents was manually read, selected by applying k-means clustering to newspaper title, date of publication, page number, and column number.[49]

Error Type	Error Rate
Dating Error	3.42%
Georeferencing Error	3.42%
Type II Error	10.96%

Table A.2: Error Type and Rate.

The identification of rioting types was accurate, and the model managed to ignore hard-to-interpret reports such as accidental fires and domestic assaults.[50] Georeferencing errors are attributable to reports of street names in urban areas, particularly in London, where the model may have found it difficult to associate them with particular parishes. Such vague reporting of locations has been noted in the existing literature (C. Griffin, 2006). The identification of dates was largely accurate, and the model handled historical or Latin date phrases well, such as 'yesterday week' and 'yesterday se'nnight'. However,

[49] A total of 292 newspaper columns containing reports of riotous incidents were selected. 54% of newspaper titles and 41% of dates were represented

[50] A more generic 'Others' rioting type was not introduced in the prompt to tighten the definition of a riotous incident to those events that fall under any of the listed rioting types. The chosen categories, except for Arson and Unrest, represented 92% of incidents recorded by Holland (2005). The following categories from Holland (2005) are not included in the prompt: SHOOTING; ANIMAL MAIMING; MALICIOUS KILLING OF LIVESTOCK; DAMAGE TO CROPS, FENCES ETC; SEDITIOUS NOTICE (anonymous letter in poster form); SENDING ANONYMOUS THRE; GENERAL DISCONTENT; THEFT; PETITION FOR HIGHER WAGES, BETTER CONDITIONS ETC; DEMANDING WITH MENACES; MASS (but peaceful) MEETING OF LABOURERS; CREATING AN ATMOSPHERE OF FEAR; ATTEMPTED RESCUE OF PRISONERS FROM CUSTODY; FOUND ON ENCLOSED PREMISES; Peaceful meeting to discuss wage rise; KILLING OF A HUMAN BEING BY A HUMAN BEING WITH MALICE AFORETHOUGHT, which constituted around 8% of recorded incidents. 45% of these incidents were categorised as ANIMAL MAIMING, MALICIOUS KILLING OF LIVESTOCK and DAMAGE TO CROPS, FENCES ETC. 40% of these incidents were categorised as ATTEMPTED RESCUE OF PRISONERS FROM CUSTODY. Although Arson and Unrest were categories not used by Holland (2005), they were included to capture more significant property damage from fire and incidents of unrest, such as coordinated jailbreaks.

dating errors largely come from the reporting of trials. For instance, the model may have been prompted to identify the trial date as the unrest date when the unrest description omitted precise dates.[51] The poor quality of source images, such as fading ink, also contributed to errors in dating and georeferencing.[52]

Besides intrinsic errors, when the transcription reported riots from many counties, which inflated the context window in Step 3, the model struggled to identify the complete set of rioting incidents reported within a given newspaper transcription, plausibly due to vague reporting and long context windows that undermined its performance. Moreover, the model tended to ignore incidents that were reported as petty crimes. For example, reports of robberies may have been occasionally ignored if no perpetrators were reported. Nevertheless, this type of error has been mitigated by the duplicated reporting of riotous incidents by separate newspaper titles, as plagiarism was a common practice (C. Griffin, 2006).[53] After accounting for the duplicated reporting, the false negative rate is reduced from 10.96% to 3.77%. Overall, 89% of transcriptions were accurately processed by the model.

The final evaluation of the generative AI approach involved asking the model to process all 208 pages of the *Course of the Exchange* printed during the Swing Riots period; no riotous incidents were identified.

A.1.6 Newspaper Under-Reporting

Sources of the distance to the nearest newspaper and the distance to the nearest non-conservative newspaper are listed in Subsection A.4. Distance to the location of newspapers was arguably a source of under-reporting of riotous incidents (C. Griffin, 2006). Figure A.6 shows that parishes with reported riotous incidents were more likely to be located closer to a newspaper than parishes without reported riotous incidents.[54]

[51] Trial reporting serves as a useful source of information that has been used by existing literature. Given that errors in handling trial reporting are rare, the prompt was not modified to ignore them.

[52] It is possible for image preprocessing to affect the reading order of newspaper transcriptions, where distortions in source images led to newspaper pages being split up more or less than the actual column counts. 11 out of the 292 images were subject to cropping issues, but only 3 out of the 11 cases contributed to errors by the model.

[53] It could be speculated that variation in the report of the same riotous incident by individual newspaper titles comes from detail and style of reporting, where the model may have performed better if the reporting was more regionally specific or included keywords indicative of the rioting types listed in the prompt.

[54] Data from the Swing Riots period was used.

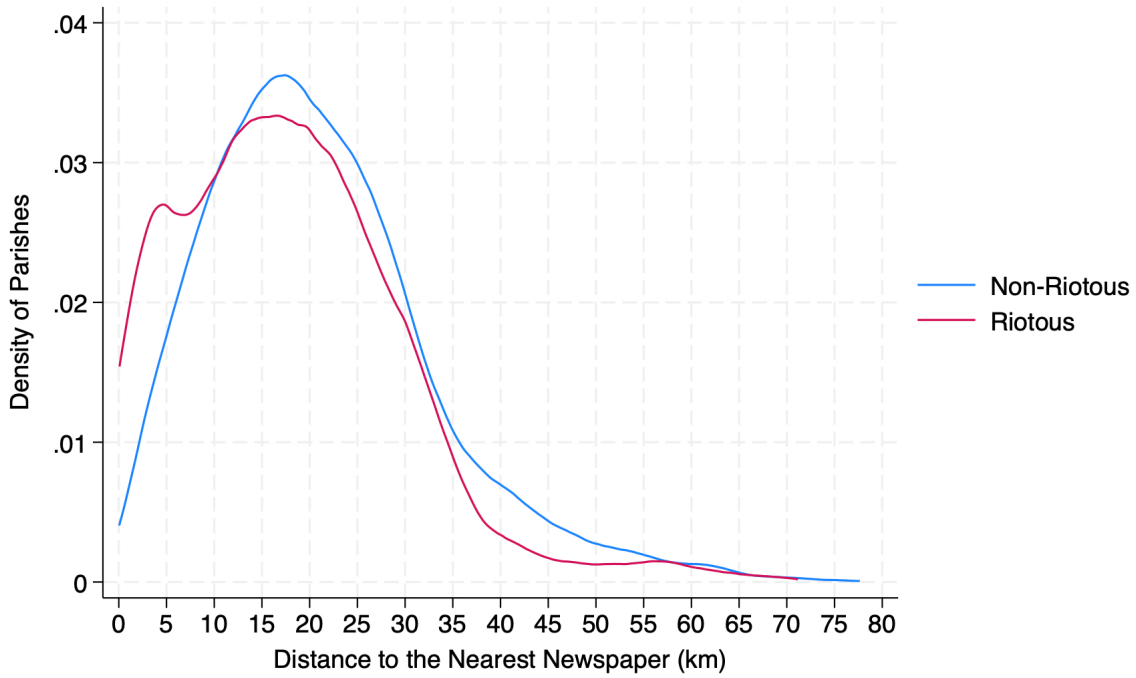


Figure A.6: Proximity to Newspaper.

Figure A.7 shows that parishes with reported riotous incidents were more likely to have been located in proximity to non-conservative newspapers.[55]

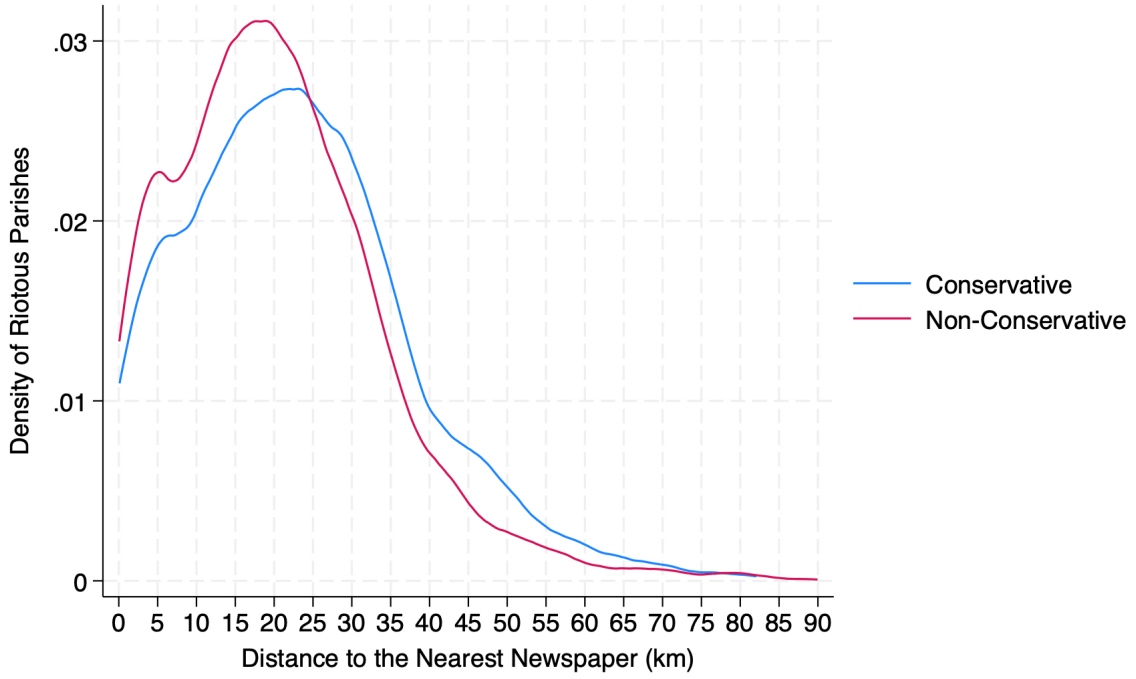


Figure A.7: Political Leaning of Newspaper.

[55]Data from the Swing Riots period was used.

A.2 Poor Relief Expenditure Dataset

A.2.1 Poor Relief Expenditure Context Window

1816-21:

> You are an expert in converting optical character recognition (OCR) results from historical tabular images into structured dataset. You will receive table rows extracted from a historical table that contains 13 columns. Your task is to extract column values within each table row. Ensure every table row is included in the structured dataset, even if some columns have missing values.
>
> For each table row, extract the column values according to the schema below: - column1: Parish name from the leftmost cell. - column2: Always the 1st positive integer from the left, never assign 0 to column2. - column3: 2nd number from the left. - column4: 3rd number from the left. - column5: 4th number from the left. - column6: 5th number from the left. - column7: 6th number from the left. - column8: 7th number from the left. - column9: 8th number from the left. - column10: 9th number from the left. - column11: 10th number from the left. - column12: 11th number from the left. - column13: 12th number from the left.
>
> Ignore hyphens and dashes between the parish name and the 1st positive integer assigned to column2. Hyphens and dashes to the right of column2 represent missing values, assign 0 to each of them. Treat any triple-space gap between two numerical values as a missing value and assign 0.

1822-4:

> You are an expert in converting optical character recognition (OCR) results from historical tabular images into structured dataset. You will receive table rows extracted from a historical table that contains 7 columns. Your task is to extract column values within each table row. Ensure every table row is included in the structured dataset, even if some columns have missing values.
>
> For each table row, extract the column values according to the schema below: - column1: Parish name from the leftmost cell. - column2: Always the 1st

positive integer from the left, never assign 0 to column2. - column3: 2nd number from the left. - column4: 3rd number from the left. - column5: 4th number from the left. - column6: 5th number from the left. - column7: 6th number from the left.

Ignore hyphens and dashes between the parish name and the 1st positive integer assigned to column2. Hyphens and dashes to the right of column2 represent missing values, assign 0 to each of them. Treat any triple-space gap between two numerical values as a missing value and assign 0.

1825-9:

You are an expert in converting optical character recognition (OCR) results from historical tabular images into structured dataset. You will receive table rows extracted from a historical table that contains 12 columns. Your task is to extract column values within each table row. Ensure every table row is included in the structured dataset, even if some columns have missing values.

For each table row, extract the column values according to the schema below: - column1: Parish name from the leftmost cell. - column2: Always the 1st positive integer from the left, never assign 0 to column2. - column3: 2nd number from the left. - column4: 3rd number from the left. - column5: 4th number from the left. - column6: 5th number from the left. - column7: 6th number from the left. - column8: 7th number from the left. - column9: 8th number from the left. - column10: 9th number from the left. - column11: 10th number from the left. - column12: 11th number from the left.

Ignore hyphens and dashes between the parish name and the 1st positive integer assigned to column2. Hyphens and dashes to the right of column2 represent missing values, assign 0 to each of them. Treat any triple-space gap between two numerical values as a missing value and assign 0.

A.2.2 Poor Relief Expenditure Multimodal Context Window

The following prompt is a paraphrased version generated by gemini-3-pro-preview using the prompt used for 1825-9:

You are an expert OCR system. Extract ALL data from the historical tabular image provided.

RULES: 1. Extract every single row found on the page. Do not summarize or truncate. 2. If a cell is blank or a hyphen, return 0 for numeric columns. 3. Output must strictly follow the JSON schema provided.

COLUMN MAPPING: - h: Section/Parish Heading - p: Parish Name (left-most cell) - v2..v12: The numeric values in the columns following the parish name.

A.2.3 Limitations

Due to fire damage, around 50% of the poor relief expenditure data for the year ending 25th March 1830 and around 20% of the poor relief expenditure data for the year ending 25th March 1831 no longer exist in printed parliamentary sources. Several parishes are subject to missing data between 1816 and 1829, represented by 'No Return'.[56] The original publication also acknowledges cases where missing data was automatically inferred using the value from the most recent year with data availability. In exceptionally rare cases of fading ink, guestimates of smudged digits of a number were applied.[57]

A.3 Unit of Observation and Sample Limitations

This paper revises the unit of observation – the 1851 parish – used in the existing cliometric literature on the Swing Riots for the following two reasons. First, the poor law administrative units before the 1834 reform consisted of lower administrative units than parishes, such as hamlets and chapelries, causing multiple policymaking decisions and, therefore, poor relief expenditures to be observed for a 1851 parish. Second, parishes may have been split up or merged between 1831 and 1851, undermining the accuracy of variables constructed from 1851 parish boundaries. Therefore, this paper constructs a novel unit of observation, the OPL (old poor law) parish (quasi-parish by definition), from the poor rate returns printed in 1830, assuming that individual returns of poor relief expenditure represented individual units of poor law administration where policymaking

[56] In a handful of parishes, the expenditure was reported elsewhere, but the stated location cannot be found in the expenditure table, and is therefore treated as missing.

[57] Some unrecognisable digits are treated as zero, or if it is the first digit, inferred from recent years.

was independent (House of Commons, 1835).[58]

Across all three returns, perfect matching was found for 12,002 parishes. The remaining 10% of parishes with a low matching score were matched manually, which often requires the aggregation of parishes.[59] However, several poor law administrative units, as reported in 1830, require further merging to account for cases where property valuations and relief expenditures for several years were reported for a group of usually two or three parishes. For example, a 1830 unit may have been reported as a group of units in 1816, and a 1816 unit may have been reported as a group of units in 1830. Conveniently, the 1825-29 return provides the 1815 property values, which assisted merging by allowing comparison with the 1815 property values listed in the 1813-5 return, which is more analogous to the 1816-21 return (House of Commons, 1818).[60]

After manual matching, the finalised version of the poor relief expenditure dataset consists of 12,656 OPL parishes that entered the final sample; the boundaries for each were reconfigured by first matching them to 1831 census units from Wrigley, Shaw-Taylor, and Newton (n.d.) and then assigning polygons from A.E.M. Satchell, Kitson, et al. (2023) accordingly. 177 parishes were dropped because they had a missing property value in 1815. 77 parishes were excluded from the empirical analysis due to missing expenditure data in any year between 1816 and 1829. 23 parishes were dropped from having missing expenditure data during any years between 1830 and 1834, and are the only parishes within that hundred and county to be subject to missing expenditure data. In total, the main sample for this paper comprises 12,376 parishes.[61]

A.4 Covariates

This paper constructs a set of demographic, economic and other covariates from secondary sources and geo-references them to individual OPL parishes. Census data were matched to OPL parish boundaries directly; male occupational data were georeferenced by overlaying

[58]The units listed in the 1830-4 return are analogous to those listed in the 1825-9 return.

[59]The STATA package of reclink was used, where scores lower than 0.95 were manually matched. Twenty returns from 1816 and four returns from 1822 were unmatched; it is possible that these units made no returns in other years.

[60]Property value is defined as the value of the annual flow of rent for the use of land and buildings (Heblich, Redding, and Voth, 2022). Such merges were also made for cases where the census was conducted for a group of parishes. Overall, these cases of merging account for plausible changes in parish boundaries during the post-Napoleonic period.

[61]Three parishes are dropped due to missing polygons.

polygons onto OPL parish boundaries; and all other covariates were georeferenced by overlaying centroids onto OPL parish boundaries, whereas distance variables were directly constructed from OPL parish centroids. Data sources are summarised below.

Variable	Source
Distance to Nearest Police Force	P. Clark (2018)
Distance to Nearest Newspaper	McKernan (2021)
Distance to Nearest Non-Conservative Newspaper	McKernan (2021)
Area of Enclosed Land	A.E.M. Satchell, Bogart, and Shaw-Taylor (n.d.)

Table A.3: Data Sources, Year-Varying Parish-Specific Covariates.

The distance to the nearest police force is computed by manually georeferencing each police force compiled by P. Clark (2018) to OPL parishes, where time variation arises from the heterogeneous establishment years of the police forces.[62] The distances to the nearest newspaper and to the nearest non-conservative newspaper are constructed by using the centroids of newspapers compiled by McKernan (2021) from the 1846 Newspaper Press Directory, which also contains information on newspapers which survived to 1846, their establishment date, location and political leanings. Total area of enclosed land is constructed by overlaying centroids containing information on the area and year of parliamentary enclosure compiled by A.E.M. Satchell, Bogart, and Shaw-Taylor (n.d.) onto OPL parish boundaries. Table A.4 lists the data sources of pre-1816 parish-specific covariates.

[62] Centroids of police forces matched to multiple OPL parishes were assigned the mean values of latitude and longitude. However, the proxy has several shortcomings. First, the establishment of the Cheshire Constabulary and the London Metropolitan Police Bindler and Hjalmarsson (2021) are not captured by the proxy. Second, specialist police forces, established solely to protect commercial areas such as docks, are not captured by the proxy (P. Clark, 2018). Finally, except for Shadwell, which was closed down in 1821 and is not captured by the proxy, the proxy captures only the effect of the first establishment, which is assumed to be consistent until the end of the period, as investments within police forces over time are not captured.

Variable	Source
Latitude	A.E.M. Satchell, Kitson, et al. (2023)
Longitude	A.E.M. Satchell, Kitson, et al. (2023)
Population, 1811	Wrigley and M. Satchell (2011)
Sex Ratio, 1811	Wrigley and M. Satchell (2011)
Male Agricultural Labour Share, 1811-7	Wrigley, Shaw-Taylor, and Newton (n.d.)
Threshing Machine Installations, 1801–15	Caprettini and Voth (2020)
Turnpike Access, 1810	Rosevear et al. (n.d.)
Distance to Nearest Port, 1651	Alvarez-Palau et al. (2019)
Distance to Nearest Garrison, 1815	War Office (2007) and Aidt and Leon-Ablan (2022)
Average Slope	Heldring, Robinson, and Vollmer (2021)
Wheat Suitability	Heldring, Robinson, and Vollmer (2021)
Distance to River	Heldring, Robinson, and Vollmer (2021)
Distance to London	Heldring, Robinson, and Vollmer (2021)
Distance to Coal	Heldring, Robinson, and Vollmer (2021)
Lay Tax, 1527	Heldring, Robinson, and Vollmer (2021)
Share of Catholic, 1767	Heldring, Robinson, and Vollmer (2021)
Wealth, 1086	Heldring, Robinson, and Vollmer (2021)
Gentry, 1700	Heldring, Robinson, and Vollmer (2021)
Mills, 1400	Heldring, Robinson, and Vollmer (2021)
Banks, 1810	Heblich and Trew (2019)

Table A.4: Data Sources, Pre-1816 Parish-Specific Covariates.

A.5 Summary Statistics

This subsection presents summary statistics for all variables used in this paper. An additional 126 parishes were dropped from the reduced-form analysis due to missing land suitability data from Beck and Sieber (2010).

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
Poor Relief Expenditure	154,239	495.7	1,329	0.250	58,773
Unrest Occurrence	160,888	0.0686	0.253	0	1
Distance to Nearest Newspaper	160,888	21.09	12.33	0.0382	77.65
Distance to Nearest Non-Conservative Newspaper	160,888	24.38	14.75	0.0692	91.05
Distance to Nearest Police Force	160,888	24.01	17.41	0	169.6
Area of Enclosed Land	160,888	431.0	1,225	0	32,614

Table A.5: Summary Statistics, Main Variables, 1819-1831.

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
Agriculture Price Change (%)	159,250	0.823	15.27	-18.96	27.68
Sedentary Animal Husbandry Price Change (%)	159,250	0.287	8.741	-17.01	16.00
Agriculture Suitability Share	159,250	0.508	0.0959	0.323	0.803
Sedentary Animal Husbandry Suitability Share	159,250	0.492	0.0959	0.197	0.677
Shift-Share Instrument	159,250	0.559	10.82	-18.58	23.51

Table A.6: Summary Statistics, Shift-Share Instrumental Variables, 1819-1831.

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
Gentry, 1700	12,409	0.864	10.66	0	1,028
Mills, 1400	12,409	0.0510	0.669	0	64
Lay Tax, 1527	12,409	2.132	25.87	0	2,458
Wealth, 1086	12,409	0.134	1.617	0	153.8
Average Slope	12,409	2.626	1.939	0	22.39
Wheat Suitability	12,396	37.93	15.24	0	96.01
Distance to River	12,409	2.478	2.109	4.87e-05	30.62
Distance to London	12,409	200.0	106.3	0.598	492.6
Distance to Coal	12,409	42.21	40.99	0	192.7
Share of Catholic, 1767	9,604	0.0298	0.108	0	0.986
Banks, 1810	12,409	0.0641	0.426	0	12
Longitude	12,653	-1.260	1.388	-5.688	1.746
Latitude	12,653	52.49	1.176	49.98	55.78
Male Agricultural Labour Share, 1811-7	12,651	17.54	14.95	0	100
Distance to Nearest Garrison, 1815	12,653	59.12	32.94	0.163	145.7
Distance to Nearest Port, 1651	12,653	29.39	21.55	0.0783	134.6
Population, 1811	12,653	742.0	2,435	0	94,376
Sex Ratio, 1811	12,593	0.980	0.182	0.200	7.333
Turnpike Access, 1810	12,653	2.129	3.447	0	57.83
Threshing Machine Installations, 1801–15	12,653	0.0217	0.171	0	5

Table A.7: Summary Statistics, Pre-1819 Characteristics.

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
Unrest Occurrence, 1816	12,379	0.0380	0.191	0	1
Unrest Occurrence, 1817	12,379	0.0570	0.232	0	1
Unrest Occurrence, 1818	12,379	0.0465	0.211	0	1

Table A.8: Summary Statistics, Pre-1819 Unrest Occurrence.

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
Relative Deprivation	152,687	606.3	1,238	0	40,809
Habitual Comparison	152,687	-0.813	4.667	-10.61	10.87

Table A.9: Summary Statistics, Heterogeneity Analysis.

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
Weekly Unrest Intensity, 1819-1831	8.281e+06	0.00441	0.0877	0	7
Poor Relief Expenditure, 1819-1831	152,687	495.4	1,330	0.250	58,773
Shift-Share Instrument, 1819-1831	159,250	0.559	10.82	-18.58	23.51

Table A.10: Summary Statistics, Structural Analysis.

B Reduced-Form Appendix

B.1 Additional Results

This subsection presents additional results on the main reduced-form analysis.

Table B.1: Full Reduced-Form Estimates.

	(1) Outcome: Unrest Occurrence
	IV
$Exp_{p,t}$	-0.314***
	(0.091)
Distance to Nearest Newspaper	-0.001***
	(0.000)
Distance to Nearest Police Force	0.001***
	(0.000)
Area of Enclosed Land	-0.000
	(0.000)
First-Stage F-Stat	59.49
Observations	152687
Mean of Outcome	0.067

Cluster-robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table B.2: Reduced-Form Estimates Without Covariates.

	(1) Outcome: Unrest Occurrence
	IV
$Exp_{p,t}$	-0.341***
	(0.090)
First-Stage F-Stat	62.42
Observations	152687
Mean of Outcome	0.067

Cluster-robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table B.3: First Stage.

	(1) Outcome: $Exp_{p,t}$
	OLS
SSIV	0.005***
	(0.001)
Distance to Nearest Newspaper	0.001
	(0.000)
Distance to Nearest Police Force	0.001***
	(0.000)
Area of Enclosed Land	0.000
	(0.000)
R-Squared	0.957
Observations	152687
Mean of Outcome	0.067

Cluster-robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table B.4: IV Reduced Form.

	(1) Outcome: Unrest Occurrence
	OLS
SSIV	-0.001***
	(0.000)
Distance to Nearest Newspaper	-0.001***
	(0.000)
Distance to Nearest Police Force	0.000***
	(0.000)
Area of Enclosed Land	-0.000
	(0.000)
R-Squared	0.352
Observations	159250
Mean of Outcome	0.069

Cluster-robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table B.5: Split Sample.

	(1) Outcome: Unrest Occurrence
	2SLS
$\hat{Exp}_{p,t}$	-0.235**
	(0.106)
R-Squared	0.404
Observations	79608
Mean of Outcome	0.068

Cluster-robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table B.6: Controlling for Proximity to Non-Conservative Newspaper.

	(1) Outcome: Unrest Occurrence
	IV
$Exp_{p,t}$	-0.344***
	(0.095)
First-Stage F-Stat	56.86
Observations	152687
Mean of Outcome	0.067

Cluster-robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

B.2 IV Validity

This subsection presents additional results on IV validity.

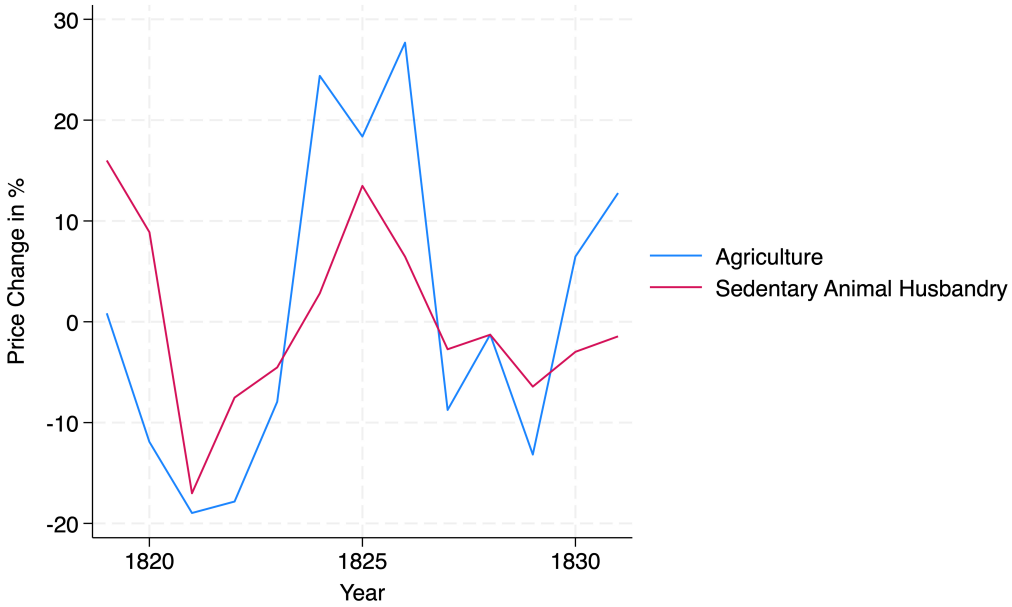


Figure B.1: Shift Variables, 1819–1831.

Table B.7: Above vs Below Median Shift-Share IV Balance, Pre-1819 Covariates.

	Mean(below)	SD(below)	Mean(above)	SD(above)	Diff	StdDiff	p-value
Population1811	788.7566	2170.906	711.7509	2707.288	77.00571	.0313823	.0824671
SexRatio1811	.9827023	.164783	.9746732	.1613767	.0080291	.0492315	.0065239
Agri1817	18.0953	14.89815	16.98647	14.89427	1.108831	.0744371	.0000383
ThreshingM	.0230204	.1713254	.0205714	.1721118	.002449	.0142615	.4299917
Turnpike1810	2.773957	4.148623	1.58001	2.505013	1.193946	.3484125	0
Port1651	30.94202	23.08687	28.12148	19.63875	2.820538	.1316024	3.47e-13
Garrison1815	56.64101	31.22514	61.98577	34.44276	-5.344755	.1625863	2.65e-19
Gentry1700	.6921673	1.2905	1.008518	15.0312	-.3163512	.0296549	.1036059
Mills1400	.0408231	.2268154	.0604643	.9311508	-.0196412	.0289833	.1117203
LStax1525	1.719008	2.732281	2.4926	36.56675	-.7735915	.0298354	.1015193
DDValue1086	.1061742	.2530007	.1594372	2.286531	-.0532629	.0327432	.0723245
AvgSlope	2.62968	1.929794	2.627862	1.955631	.0018183	.0009359	.9590947
WheatSuitab	38.06857	15.29521	37.85758	15.15579	.2109846	.0138572	.4478826
DistTRiver	2.468846	2.110285	2.477995	2.092022	-.0091485	.004354	.8114178
DistTLondon	198.7482	106.1326	201.8061	106.3795	-3.057905	.0287786	.1147939
DistTCoal	42.86271	41.15704	41.41613	40.73612	1.446581	.035328	.052891
Catholic1767	.0293921	.105934	.0299163	.1086275	-.0005242	.0048858	.8137217
Bank1810	.0728631	.4781086	.0547762	.3678297	.0180869	.0424028	.020205

Table B.8: Reduced-Form Estimates with Pre-1819 Covariate Trends.

	(1)
	Outcome: Unrest Occurrence
	IV
$Exp_{p,t}$	-0.215***
	(0.071)
First-Stage F-Stat	94.16
Observations	149230
Mean of Outcome	0.066

Cluster-robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table B.9: First Stage Monotonicity by Quintile.

	(1)	(2)	(3)	(4)	(5)
	Outcome: $Exp_{p,t}$				
	OLS	OLS	OLS	OLS	OLS
SSIV	0.042***	0.038***	0.004	0.020**	-0.003
	(0.010)	(0.014)	(0.004)	(0.009)	(0.002)
R-Squared	0.972	0.975	0.983	0.974	0.983
Observations	24500	24500	15386	18725	22751
Mean of Outcome	0.065	0.067	0.080	0.096	0.055

Cluster-robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Table B.10: Reduced Form, Deciles with Weak First Stage.

	(1)	(2)
	Outcome: Unrest Occurrence	
	OLS	OLS
SSIV	0.002	-0.001
	(0.003)	(0.002)
R-Squared	0.649	0.632
Observations	24076	22751
Mean of Outcome	0.077	0.055

Cluster-robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

B.3 Sample Balance

This subsection presents additional results on sample balance.

Table B.11: 1830 Sample Balance, SSIV.

	Mean(observed)	SD(observed)	Mean(missing)	SD(missing)	Diff	StdDiff	p-value
SSIV	1.542502	.7658494	2.25537	.9378321	-.7128679	.8326241	0

Table B.12: 1831 Sample Balance, SSIV.

	Mean(observed)	SD(observed)	Mean(missing)	SD(missing)	Diff	StdDiff	p-value
SSIV	5.671769	1.372344	6.345618	1.148968	-.6738492	.532437	0

Table B.13: 1830 Sample Balance, Pre-1819 Covariates.

	Mean(observed)	SD(observed)	Mean(missing)	SD(missing)	Diff	StdDiff	p-value
Population1811	827.0524	2683.507	629.7817	2037.117	197.2707	.0828055	.0000143
SexRatio1811	.9843048	.1708294	.9698663	.1498432	.0144385	.0898589	1.83e-06
Agri1817	18.33869	15.09783	16.28973	14.51337	2.048964	.1383642	1.12e-13
ThreshingM	.0225906	.167229	.0205494	.1785393	.0020412	.0118003	.5212213
Turnpike1810	2.258014	3.548343	2.049873	3.361908	.2081411	.0602193	.0012385
Port1651	27.21721	22.01949	33.16249	20.07069	-5.945283	.2821998	0
Garrison1815	51.32547	30.26404	71.84382	33.17072	-20.51834	.6462336	0
Gentry1700	.9636489	13.64193	.6741478	1.132246	.289501	.0299088	.1456518
Mills1400	.0562414	.8482744	.0419225	.2327029	.0143189	.0230215	.2573351
LStax1525	2.381284	33.18335	1.677404	2.218052	.7038805	.0299313	.1455185
DDValue1086	.1500604	2.075721	.105953	.2431752	.0441073	.0298467	.1460116
AvgSlope	2.622288	1.949	2.638786	1.932927	-.0164981	.0084999	.6493694
WheatSuitab	37.8399	15.20054	38.15387	15.26382	-.3139742	.0206125	.2698354
DistTRiver	2.473018	2.1084	2.474003	2.090058	-.0009848	.0004691	.9799826
DistTLondon	198.4422	104.9889	203.0967	108.1488	-4.654455	.0436708	.0190226
DistTCoal	42.54498	41.03902	41.51941	40.81508	1.025579	.0250586	.1800244
Catholic1767	.0302668	.1094024	.0287116	.1039423	.0015552	.0145743	.4943522
Bank1810	.0650206	.4421819	.0620368	.4019286	.0029837	.0070615	.7082179

Table B.14: 1831 Sample Balance, Pre-1819 Covariates.

	Mean(observed)	SD(observed)	Mean(missing)	SD(missing)	Diff	StdDiff	p-value
Population1811	792.7441	2603.476	502.6059	1243.176	290.1382	.1422215	3.69e-06
SexRatio1811	.9817788	.1665587	.9606673	.140203	.0211115	.1371357	4.20e-07
Agri1817	17.53477	14.78749	17.57654	15.58233	-.0417764	.0027502	.9126755
ThreshingM	.0193191	.1565095	.0362319	.2415844	-.0169128	.0830928	.0001157
Turnpike1810	2.315514	3.631637	1.369582	2.23244	.9459323	.31381	1.47e-26
Port1651	29.14485	22.25242	31.7867	16.0641	-2.641849	.136132	1.47e-06
Garrison1815	61.41956	33.79883	47.03799	24.35181	14.38157	.4882305	0
Gentry1700	.8811339	11.5284	.6702187	1.350497	.2109152	.0256977	.4403784
Mills1400	.0525904	.7284363	.0392597	.2027474	.0133307	.0249331	.4427634
LStax1525	2.164497	28.03056	1.760592	2.754749	.4039055	.0202804	.5432546
DDValue1086	.1365901	1.756839	.1105099	.2569756	.0260802	.0207729	.5315555
AvgSlope	2.629264	1.935083	2.625964	1.985946	.0032998	.001683	.9472314
WheatSuitab	38.01649	15.2237	37.6591	15.23721	.3573929	.0234657	.3604377
DistTRiver	2.475396	2.100804	2.461982	2.103491	.0134143	.0063813	.803547
DistTLondon	199.9851	106.2098	201.9194	106.5781	-1.934318	.0181807	.4781547
DistTCoal	42.03521	40.84893	42.75316	41.54795	-.7179533	.0174261	.4945472
Catholic1767	.0296926	.1072656	.0294272	.1073838	.0002653	.0024721	.9322762
Bank1810	.0638319	.4315858	.0639372	.3983067	-.0001053	.0002536	.9923286

Table B.15: 1830 Sample Balance, Pre-1819 Unrest.

	Mean(observed)	SD(observed)	Mean(missing)	SD(missing)	Diff	StdDiff	p-value
Unrest1816	.0382302	.1917643	.036905	.1885484	.0013252	.0069686	.7073917
Unrest1817	.0580136	.2337849	.0547285	.2274733	.0032852	.0142431	.4434922
Unrest1818	.0507953	.2195942	.0404697	.1970788	.0103256	.0494902	.008313

Table B.16: 1831 Sample Balance, Pre-1819 Unrest.

	Mean(observed)	SD(observed)	Mean(missing)	SD(missing)	Diff	StdDiff	p-value
Unrest1816	.039977	.1959147	.0245262	.1547191	.0154508	.0875289	.0015031
Unrest1817	.060635	.2386711	.0340022	.1812854	.0266328	.1256682	6.59e-06
Unrest1818	.0495409	.2170049	.0306577	.1724367	.0188832	.0963468	.0004654

Table B.17: Reduced-Form Estimate with Balanced Panel.

	(1)
	Outcome: Unrest Occurrence
	IV
$Exp_{p,t}$	-0.829***
	(0.280)
First-Stage F-Stat	14.27
Observations	60138
Mean of Outcome	0.073

Cluster-robust standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Notes: A balanced panel of 4,626 parishes is used, where no parish was subject to any missing poor relief expenditure between 1816 and 1834.

Table B.18: Reduced-Form Estimate with Robust Balanced Panel.

	(1)
	Outcome: Unrest Occurrence
	IV
$Exp_{p,t}$	-0.761***
	(0.246)
First-Stage F-Stat	17.17
Observations	55705
Mean of Outcome	0.074

Cluster-robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Notes: A balanced panel of 4,285 parishes is used, where no parish was subject to any missing poor relief expenditure between 1816 and 1834, and no parish was subject to having any consecutive poor relief expenditure being homogeneous from possible imputation.

B.4 Alternative Unrest Measurements

This subsection presents additional results using alternative measurements of unrest.

Table B.19: Outcome Heterogeneity.

	(1)	(2)	(3)	(4)	(5)	(6)
	Outcome: Unrest Occurrence					
	IV	IV	IV	IV	IV	IV
$Exp_{p,t}$	-0.312***	-0.211***	-0.101**	-0.271***	-0.217***	-0.279***
	(0.091)	(0.070)	(0.046)	(0.070)	(0.076)	(0.070)
First-Stage F-Stat	59.49	59.49	59.49	59.49	59.49	59.49
Observations	152687	152687	152687	152687	152687	152687
Mean of Outcome	0.067	0.067	0.067	0.067	0.067	0.067

Cluster-robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Notes: Column 1 uses an outcome variable that drops the occurrence of protests and strikes. Column 2 uses an outcome variable that excludes robberies and assaults. Column 3 uses an outcome variable that strictly measures the occurrence of riots and unrest. Column 4 uses an outcome variable that excludes unrest occurrences with an estimated average turnout of fewer than three individuals. Column 5 uses an outcome variable that drops unrest occurrences with no estimated property damage on average. Column 6 uses an outcome variable that measures annual unrest occurrence only during November, December, and January.

Table B.20: Unrest Intensity.

	(1)	(2)
	Outcome: Unrest Occurrence	
	IV	IV
$Exp_{p,t}$	-0.895***	-0.480***
	(0.295)	(0.141)
First-Stage F-Stat	59.49	59.49
Observations	152687	152687
Mean of Outcome	0.067	0.067

Cluster-robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Notes: Column 1 uses the annual number of riotous days as the outcome variable. Column 2 uses the annual number of unrest months as the outcome variable.

B.5 Sample Heterogeneity

This subsection presents additional results with heterogeneous samples of parishes.

Table B.21: Sample Heterogeneity.

	(1)	(2)	(3)
	Outcome: Unrest Occurrence		
	IV	IV	IV
$Exp_{p,t}$	-0.254***	-0.312***	-0.310***
	(0.095)	(0.105)	(0.092)
First-Stage F-Stat	59.93	51.50	58.16
Observations	137290	136762	151338
Mean of Outcome	0.051	0.068	0.064

Cluster-robust standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Notes: Column 1 restricts the sample to those within the 5th and 95th percentiles of poor relief expenditure. Column 2 restricts the sample to those within the 5th and 95th percentiles of the shift-share instrument. Column 3 restricts the sample to those outside of London.

Table B.22: Proximity to Non-Conservative Newspaper Heterogeneity.

	(1)	(2)	(3)
	Outcome: Unrest Occurrence		
	IV	IV	IV
$Exp_{p,t}$	-0.735**	-0.547***	-0.394***
	(0.351)	(0.202)	(0.127)
First-Stage F-Stat	8.06	18.00	35.68
Observations	109134	132746	143803
Mean of Outcome	0.078	0.072	0.069

Cluster-robust standard errors in parentheses

* p<0.10, ** p<0.05, *** p<0.01

Notes: Column 1 restricts the sample to those located within 30km of a non-conservative newspaper. Column 2 restricts the sample to those located within 40km of a non-conservative newspaper. Column 3 restricts the sample to those located within 50km of a non-conservative newspaper.

Table B.23: Sample Heterogeneity, Pre-1819 Covariates 1.

	(1)	(2)	(3)	(4)	(5)	(6)
	Outcome: Unrest Occurrence					
	IV	IV	IV	IV	IV	IV
$Exp_{p,t}$	-0.219**	-0.417**	-0.230	-0.445***	-0.411***	-0.172
	(0.095)	(0.176)	(0.145)	(0.139)	(0.129)	(0.116)
First-Stage F-Stat	19.46	35.57	27.25	26.75	46.18	20.81
Observations	76184	76503	75945	76321	76228	76433
Mean of Outcome	0.019	0.114	0.090	0.043	0.102	0.031

Cluster-robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Notes: Column 1 restricts the sample to below the median population in 1811. Column 2 restricts the sample to above the median population in 1811. Column 3 restricts the sample to below the median sex ratio in 1811. Column 4 restricts the sample to above the median sex ratio in 1811. Column 5 restricts the sample to below the median agricultural labour share in 1817. Column 6 restricts the sample to above the median agricultural labour share in 1817.

Table B.24: Sample Heterogeneity, Pre-1819 Covariates 2.

	(1)	(2)	(3)	(4)	(5)	(6)
	Outcome: Unrest Occurrence					
	IV	IV	IV	IV	IV	IV
$Exp_{p,t}$	-0.332***	-0.303	-0.655***	0.020	-0.600***	0.025
	(0.099)	(0.234)	(0.174)	(0.115)	(0.127)	(0.081)
First-Stage F-Stat	35.56	12.29	29.08	27.19	48.02	58.39
Observations	76112	76575	77027	75660	76875	75812
Mean of Outcome	0.042	0.091	0.077	0.056	0.078	0.056

Cluster-robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Notes: Column 1 restricts the sample to below the median length of turnpike road in 1810. Column 2 restricts the sample to the above median length of turnpike road in 1810. Column 3 restricts the sample to below the median distance to the nearest port in 1651. Column 4 restricts the sample to above the median distance to the nearest port in 1651. Column 5 restricts the sample to below the median distance to the nearest garrison in 1815. Column 6 restricts the sample to above the median distance to the nearest garrison in 1815.

Table B.25: Sample Heterogeneity, Pre-1819 Covariates 3.

	(1)	(2)	(3)	(4)	(5)	(6)
	Outcome: Unrest Occurrence					
	IV	IV	IV	IV	IV	IV
$Exp_{p,t}$	-0.331***	-0.249	-0.374***	-0.230*	-0.303***	-0.278
	(0.098)	(0.195)	(0.133)	(0.126)	(0.094)	(0.318)
First-Stage F-Stat	48.88	13.70	29.83	29.56	55.80	4.11
Observations	84235	65428	74798	74865	144665	4998
Mean of Outcome	0.065	0.067	0.068	0.065	0.066	0.061

Cluster-robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Notes: Column 1 restricts the sample to below the median property value in 1086. Column 2 restricts the sample to the above median property value in 1086. Column 3 restricts the sample to below the median distance to the nearest coal. Column 4 restricts the sample to above the median distance to the nearest coal. Column 5 restricts the sample to those without country banks in 1810. Column 6 restricts the sample to those with country banks in 1810.

B.6 Spatial Autocorrelation

This subsection presents additional results on spatial autocorrelation.

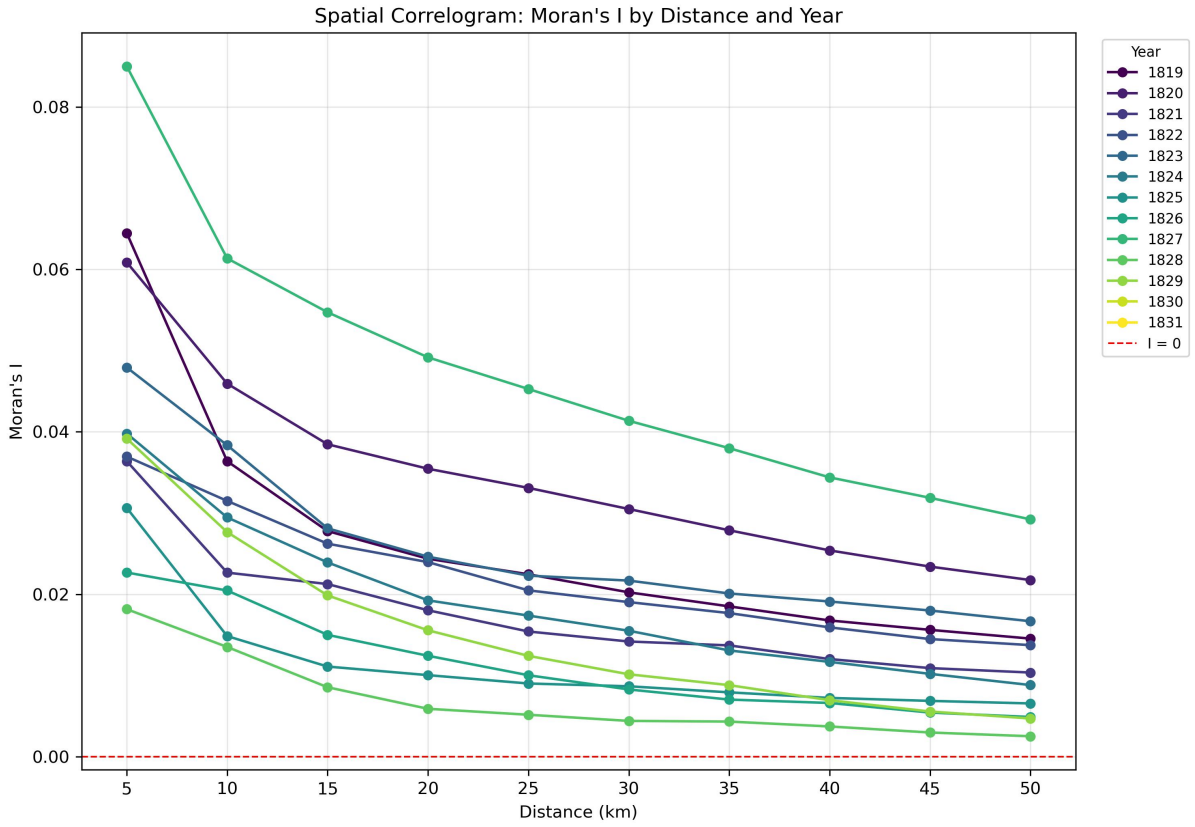


Figure B.2: Spatial Correlogram of Second-Stage Residuals.

Table B.26: Standard Error Clustering.

	(1)	(2)	(3)	(4)	(5)
	Outcome: Unrest Occurrence				
	IV	IV	IV	IV	IV
$Exp_{p,t}$	-0.314**	-0.314	-0.314***	-0.314**	-0.314
	(0.139)	(0.285)	(0.102)	(0.145)	(0.286)
First-Stage F-Stat	15.47	2.57	62.00	15.72	2.61
Observations	152687	152687	152687	152687	152687
Mean of Outcome	0.067	0.067	0.067	0.067	0.067

Cluster-robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Notes: Column 1 clusters the standard errors at the hundred level. Column 2 clusters the standard errors at the county level. Column 3 two-way clusters the standard errors at the parish and the poor relief expenditure percentile levels. Column 4 two-way clusters the standard errors at the hundred and the poor relief expenditure percentile levels. Column 5 two-way clusters the standard errors at the county and the poor relief expenditure percentile levels.

Table B.27: SHAC Standard Errors.

	(1)	(2)	(3)	(4)	(5)
	Outcome: Unrest Occurrence				
	IV	IV	IV	IV	IV
$Exp_{p,t}$	-0.314**	-0.314*	-0.314	-0.314	-0.314
	(0.125)	(0.169)	(0.207)	(0.239)	(0.262)
Observations	152687	152687	152687	152687	152687

SHAC standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

Notes: Column 1 uses the 10km distance cut-off. Column 2 uses the 20km distance cut-off. Column 3 uses the 30km distance cut-off. Column 4 uses the 40km distance cut-off. Column 5 uses the 50km distance cut-off. All columns use the 12-year time cut-off.

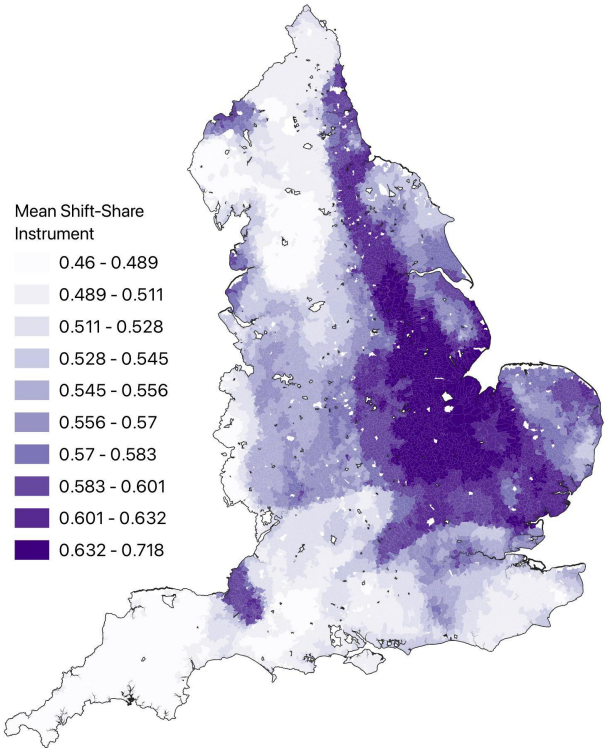


Figure B.3: Shift-Share IV.

Table B.28: Spatial I(1) Test Results by Year, Poor Relief Expenditure.

Year	LFUR Statistic	P-value
1819	7.0205	0.2870
1820	7.2247	0.2586
1821	7.1865	0.2646
1822	6.7965	0.3216
1823	6.4170	0.3768
1824	6.1975	0.4142
1825	6.1057	0.4311
1826	6.1539	0.4236
1827	6.9194	0.3032
1828	6.8299	0.3189
1829	6.6240	0.3460
1830	6.7785	0.3450
1831	7.7257	0.1966

Notes: LFUR denotes the locally feasible unit root test statistic for spatial I(1) dependence. Distances are computed on the sphere using latitude and longitude coordinates.

Table B.29: Spatial I(1) Test Results by Year, Shift-Share IV.

Year	LFUR Statistic	P-value
1819	6.9514	0.2973
1820	6.8639	0.2995
1821	6.9514	0.2994
1822	6.9514	0.2972
1823	6.9514	0.2979
1824	6.8639	0.2993
1825	6.9514	0.2971
1826	6.9514	0.2982
1827	6.9514	0.2968
1828	6.9514	0.2952
1829	6.9514	0.2975
1830	6.9514	0.2953
1831	6.9514	0.2971

Notes: LFUR denotes the locally feasible unit root test statistic for spatial I(1) dependence. Distances are computed on the sphere using latitude and longitude coordinates.

C Structural Appendix

C.1 Welfare and Unrest

The probability of unrest at the annual level is defined as:

$$P_{pt} = 1 - \prod_{w=1}^{W} (1 - p_{ptw}) \tag{12}$$

where the weekly unrest probability follows a logit:

$$p_{ptw} = \Lambda(\gamma \Omega_{pt,w-1} + \mu_{pt}) = \frac{1}{1 + \exp(-\gamma\, \Omega_{pt,w-1} - \mu_{pt})} \tag{13}$$

$\mu_{pt}(\tau_{pt})$ is assumed to be the grievance function linearly determined by τ_{pt}, such that $\frac{\partial P_{pt}}{\partial \tau_{pt}}$ could be derived through the following five steps.

Step 1: Define the probability of no weekly unrest within a given year Q_{pt}

Let:

$$Q_{pt} = \prod_{w=1}^{W} (1 - p_{ptw}(\tau_{pt})) \tag{14}$$

so that the probability of annual unrest is rewritten as:

$$P_{pt} = 1 - Q_{pt} \tag{15}$$

Differentiating:

$$\frac{\partial P_{pt}}{\partial \tau_{pt}} = -\frac{\partial Q_{pt}}{\partial \tau_{pt}} \tag{16}$$

Step 2: Derive $\frac{\partial Q_{pt}}{\partial \tau_{pt}}$

Take the logarithm of Q_{pt}:

$$\ln Q_{pt} = \sum_{w=1}^{W} \ln(1 - p_{ptw}(\tau_{pt})) \tag{17}$$

Differentiate both sides with respect to τ_{pt}:

$$\frac{1}{Q_{pt}} \cdot \frac{\partial Q_{pt}}{\partial \tau_{pt}} = \sum_{w=1}^{W} \frac{-1}{1 - p_{ptw}(\tau_{pt})} \cdot \frac{\partial p_{ptw}(\tau_{pt})}{\partial \tau_{pt}} \tag{18}$$

Multiply through by Q_{pt}:

$$\frac{\partial Q_{pt}}{\partial \tau_{pt}} = -Q_{pt} \sum_{w=1}^{W} \frac{1}{1 - p_{ptw}(\tau_{pt})} \cdot \frac{\partial p_{ptw}(\tau_{pt})}{\partial \tau_{pt}} \tag{19}$$

Step 3: Derive $\frac{\partial p_{ptw}(\tau_{pt})}{\partial \tau_{pt}}$

Since τ_{pt} enters $p_{ptw}(\tau_{pt})$ only through $\mu_{pt}(\tau_{pt})$, apply the chain rule:

$$\frac{\partial p_{ptw}(\tau_{pt})}{\partial \tau_{pt}} = \frac{\partial p_{ptw}(\tau_{pt})}{\partial \mu_{pt}(\tau_{pt})} \cdot \frac{\partial \mu_{pt}(\tau_{pt})}{\partial \tau_{pt}} \tag{20}$$

The derivative of $p_{ptw}(\tau_{pt}) = \frac{1}{1+\exp(-\gamma\,\Omega_{pt,w-1} - \mu_{pt}(\tau_{pt}))}$ gives:

$$\frac{\partial p_{ptw}(\tau_{pt})}{\partial \mu_{pt}(\tau_{pt})} = p_{ptw}(\tau_{pt})(1 - p_{ptw}(\tau_{pt})) \tag{21}$$

Assume $\frac{\partial \mu_{pt}(\tau_{pt})}{\partial \tau_{pt}} = \psi$:

$$\frac{\partial p_{ptw}(\tau_{pt})}{\partial \tau_{pt}} = \psi \cdot p_{ptw}(\tau_{pt})(1 - p_{ptw}(\tau_{pt})) \tag{22}$$

Step 4: Substitute $\frac{\partial p_{ptw}(\tau_{pt})}{\partial \tau_{pt}}$ into Step 2

$$\frac{\partial Q_{pt}}{\partial \tau_{pt}} = -Q_{pt} \sum_{w=1}^{W} \frac{1}{1 - p_{ptw}(\tau_{pt})} \cdot \psi \cdot p_{ptw}(\tau_{pt})(1 - p_{ptw}(\tau_{pt})) \tag{23}$$

The $(1 - p_{ptw})$ terms cancel:

$$\frac{\partial Q_{pt}}{\partial \tau_{pt}} = -Q_{pt} \cdot \psi \sum_{w=1}^{W} p_{ptw}(\tau_{pt}) \tag{24}$$

Define $S_{pt} = \sum_{w=1}^{W} p_{ptw}(\tau_{pt})$, so:

$$\frac{\partial Q_{pt}}{\partial \tau_{pt}} = -\psi \cdot Q_{pt} \cdot S_{pt} \tag{25}$$

Step 5: Substitute back into Step 1

$$\frac{\partial P_{pt}}{\partial \tau_{pt}} = -\frac{\partial Q_{pt}}{\partial \tau_{pt}} = \psi \cdot Q_{pt} \cdot S_{pt} \tag{26}$$

C.2 Non-Transformed Poor Relief Expenditure

Table C.1: Reduced-Form Estimates without Expenditure Linearisation.

	(1)	(2)
	Outcome: Unrest Occurrence	
	OLS	IV
$Exp_{p,t}$	0.000*	-0.0005174***
	(0.000)	(0.000)
R-Squared	0.356	
First-Stage F-Stat		41.57
Observations	152687	152687
Mean of Outcome	0.067	0.067

Cluster-robust standard errors in parentheses
* p<0.10, ** p<0.05, *** p<0.01

References

House of Commons, T., 1818. *Abridgement of the Abstract of the Answers and Returns Made pursuant to an Act, passed in the Fifty-fifth Year of His Majesty King George the Third, Intituled "An Act for procuring Returns relative to the Expence and Maintenance of the Poor in England; and also relative to the Highways: so far as relates to the poor."*. London: The House of Commons.

Vestries Act 1818, 58 Geo. 3. c. 69, 1818.

Poor Relief Act. 1819. 59 Geo. 3. c. 12. 1819.

House of Commons, T., 1822. *The Supplemental Appendix Referred to in Page 5, of the Report from the Select Committee on Poor Rate Returns.* London: The House of Commons.

House of Commons, T., 1825. *Supplemental Appendix to the Report from the Select Committee on Poor Rate Returns, Ordered to be printed 20th May 1825: containing, An Account of the Money Expended for the Maintenance and Relief of the Poor in every parish, Township, or other Place, in England and Wales, for the Three Years ending 25th March 1822, 1823, and 1824, respectively.* London: The House of Commons.

House of Commons, T., 1830. *An Account of the Money Expended for the Maintenance and Relief of the Poor in Every Parish, Township or Other Place in England and Wales, for the Five Years Ending 25th March 1825, 1826, 1827, 1828 and 1829, respectively; to which is prefixed, the Amount of the Estimates of the Annual Value of Real Property, Assessed April 1815, for the Purposes of the Property Tax.* London: The House of Commons.

House of Commons, T., 1834. *Report from His Majesty's Commissioners for Inquiring into the Administration and Practical Operation of the Poor Laws.* London: B. Fellowes.

House of Commons, T., 1835. *An Account of the Money Expended for the Maintenance and Relief of the Poor in Every Parish, Township or Other Place in England and Wales, for the Five Years Ending 25th March 1830, 1831, 1832, 1833 and 1834, respectively; to which is prefixed, the Amount of the Estimates of the Annual Value of Real Property, Assessed April 1815, for the Purposes of the Property Tax.* London: The House of Commons.

Hobsbawm, E.J. and Rudé, G., 1969. *Captain Swing*. London: Lawrence & Wishart.

Thompson, E.P., 1971. THE MORAL ECONOMY OF THE ENGLISH CROWD IN THE EIGHTEENTH CENTURY. *Past and present* [Online], 50(1), pp.76–136.

Stevenson, J., 1979. *Popular disturbances in England, 1700-1870*, Themes in British social history. London ; New York: Longman.

Yitzhaki, S., 1979. Relative Deprivation and the Gini Coefficient. *The quarterly journal of economics* [Online], 93(2), p.321.

Mills, D.R. and Shortt, B.M., 1983. Social change and social conflict in nineteenth-century England: The use of the open-closed village model. *The journal of peasant studies* [Online], 10(4), pp.253–262.

Muskett, P., 1984. The East Anglian Agrarian Riots of 1822. *The agricultural history review* [Online], 32(1), pp.1–13.

Roberts, R.D., 1984. A Positive Model of Private Charity and Public Transfers. *Journal of political economy* [Online], 92(1), pp.136–148.

Boyer, G.R., 1986. The Old Poor Law and the Agricultural Labor Market in Southern England: An Empirical Analysis. *The journal of economic history* [Online], 46(1), pp.113–135.

Lichbach, M.I., 1989. An Evaluation of "Does Economic Inequality Breed Political Conflict?" Studies. *World politics* [Online], 41(4), pp.431–470.

Boyer, G.R., 1990. *An Economic History of the English Poor Law, 1750-1850*. 1st ed. New York: Cambridge University Press.

Kahneman, D., Knetsch, J.L., and Thaler, R.H., 1991. Anomalies: The Endowment Effect, Loss Aversion, and Status Quo Bias. *Journal of economic perspectives* [Online], 5(1), pp.193–206.

Tilly, C., 1993. Contentious Repertoires in Great Britain, 1758-1834. *Social science history* [Online], 17(2), p.253.

Walsh, D., 1994. The Lancashire "Rising" of 1826. *Albion* [Online], 26(4), pp.601–621.

Horrell, S. and Humphries, J., 1997. The Origins and Expansion of the Male Breadwinner Family: The Case of Nineteenth-Century Britain. *International review of social history* [Online], 42(S5), pp.25–64.

DiPasquale, D. and Glaeser, E.L., 1998. The Los Angeles Riot and the Economics of Urban Unrest. *Journal of urban economics* [Online], 43(1), pp.52–78.

Lindert, P.H., 1998. Poor relief before the Welfare State: Britain versus the Continent, 1780-1880. *European review of economic history* [Online], 2(2), pp.101–140.

Alesina, A., Baqir, R., and Easterly, W., 1999. Public Goods and Ethnic Divisions. *The quarterly journal of economics* [Online], 114(4), pp.1243–1284.

Acemoglu, D. and Robinson, J.A., 2000. Why Did the West Extend the Franchise? Democracy, Inequality, and Growth in Historical Perspective. *The quarterly journal of economics* [Online], 115(4), pp.1167–1199.

Archer, J.E., 2000. *Social unrest and popular protest in England, 1780-1840*, New studies in economic and social history. Cambridge, UK ; New York: Cambridge University Press.

King, S., 2000. *Poverty and welfare in England, 1700-1850: a regional perspective*, Manchester studies in modern history. Manchester, England ; New York: Manchester University Press : distributed exclusively in the USA by St. Martin's Press.

Wordie, J.R., 2000. Perceptions and Reality: the Effects of the Corn Laws and their Repeal in England, 1815–1906. In: J.R. Wordie, ed. *Agriculture and Politics in England, 1815-1939* [Online]. 1st ed. 2000. London: Palgrave Macmillan UK.

Wells, R., 2001. Poor—Law Reform in the Rural South—east; the Impact of the 'Sturges Bourne Acts' during the Agricultural Depression, 1815—1835. *Southern history* [Online], 23, pp.52–115.

Persson, T., 2002. Do Political Institutions Shape Economic Policy? *Econometrica* [Online], 70(3), pp.883–905.

Clark, G., 2004. THE PRICE HISTORY OF ENGLISH AGRICULTURE, 1209–1914. In: *Research in Economic History* [Online]. Vol. 22. Bingley: Emerald (MCB UP), pp.41–123.

Miguel, E., Satyanath, S., and Sergenti, E., 2004. Economic Shocks and Civil Conflict: An Instrumental Variables Approach. *Journal of political economy* [Online], 112(4), pp.725–753.

Holland, M., 2005. The Captain Swing Project. In: M. Holland, ed. *Swing Unmasked: The Agricultural Riots of 1830 to 1832 and Their Wider Implications*. Milton Keynes: FACHRS Publications.

Griffin, C., 2006. Knowable geographies? The reporting of incendiarism in the eighteenth- and early nineteenth-century English provincial press. *Journal of historical geography* [Online], 32(1), pp.38–56.

Jones, P., 2007. Swing, Speenhamland and rural social relations: the 'moral economy' of the English crowd in the nineteenth century[1]. *Social history* [Online], 32(3), pp.271–290.

War Office, T., 2007. *A List of all the officers of the Army and Royal Marines on full and half-pay: with an index, War Office, 13th March, 1815*. OCLC: 225324282. East Sussex: The Naval & Military Press Ltd in association with Firepower, The Royal Artillery Museum.

Armingeon, K. and Giger, N., 2008. Conditional Punishment: A Comparative Analysis of the Electoral Consequences of Welfare State Retrenchment in OECD Nations, 1980–2003. *West european politics* [Online], 31(3), pp.558–580.

Clark, A.E., Frijters, P., and Shields, M.A., 2008. Relative Income, Happiness, and Utility: An Explanation for the Easterlin Paradox and Other Puzzles. *Journal of economic literature* [Online], 46(1), pp.95–144.

Beck, J. and Sieber, A., 2010. Is the Spatial Distribution of Mankind's Most Basic Economic Traits Determined by Climate and Soil Alone? *Plos one* [Online], 5(5). Ed. by A. Dornhaus, e10416.

Bohstedt, J., 2010. *The politics of provisions: food riots, moral economy, and market transition in England, c. 1550-1850*, The history of retailing and consumption. Burlington, VT: Ashgate.

Charlesworth, L., 2010. *Welfare's forgotten past: a socio-legal history of the poor law* [Online]. Abingdon, Oxon New York, N.Y: Routledge.

Griffin, C.J., 2010. The Violent Captain Swing? *Past & present* [Online], 209(1), pp.149–180.

Hsiang, S.M., 2010. Temperatures and cyclones strongly associated with economic production in the Caribbean and Central America. *Proceedings of the national academy of sciences* [Online], 107(35), pp.15367–15372.

Berman, E., Shapiro, J.N., and Felter, J.H., 2011. Can Hearts and Minds Be Bought? The Economics of Counterinsurgency in Iraq. *Journal of political economy* [Online], 119(4), pp.766–819.

Besley, T. and Persson, T., 2011. The Logic of Political Violence. *The quarterly journal of economics* [Online], 126(3), pp.1411–1445.

Williams, S., 2011. *Poverty, gender and life-cycle under the English poor law, 1760-1834*, Royal Historical Society studies in history. New series. Woodbridge, U.K Rochester, N.Y: Boydell & Brewer.

Wrigley, E.A. and Satchell, M., 2011. *The early English censuses*. 1. publ, Records of social and economic history, N.S., 46. Oxford: Oxford University Press.

Greif, A. and Iyigun, M., 2012. *Social Institutions, Violence, and Innovations: Did the Old Poor Law Matter?* [Online]. Unpublished.

Griffin, C.J., 2012. *The rural war: Captain Swing and the politics of protest*. OCLC: ocn778270635. Manchester : New York, NY : distributed in the U.S. by Palgrave Macmillan: Manchester University Press.

Taydas, Z. and Peksen, D., 2012. Can states buy peace? Social welfare spending and civil conflicts. *Journal of peace research* [Online], 49(2), pp.273–287.

Chaney, E., 2013. Revolt on the Nile: Economic Shocks, Religion, and Political Power. *Econometrica* [Online], 81(5), pp.2033–2053.

Dube, O. and Vargas, J.F., 2013. Commodity Price Shocks and Civil Conflict: Evidence from Colombia. *The review of economic studies* [Online], 80(4), pp.1384–1421.

Shave, S.A., 2013. THE IMPACT OF STURGES BOURNE'S POOR LAW REFORMS IN RURAL ENGLAND. *The historical journal* [Online], 56(2), pp.399–429.

Block, F.L. and Somers, M.R., 2014. *The power of market fundamentalism: Karl Polanyi's critique*. Cambridge, Massachusetts: Harvard university press.

Crost, B., Felter, J., and Johnston, P., 2014. Aid Under Fire: Development Projects and Civil Conflict. *American economic review* [Online], 104(6), pp.1833–1856.

Jia, R., 2014. Weather Shocks, Sweet Potatoes and Peasant Revolts in Historical China. *The economic journal* [Online], 124(575), pp.92–118.

Nunn, N. and Qian, N., 2014. US Food Aid and Civil Conflict. *American economic review* [Online], 104(6), pp.1630–1666.

Rüdig, W. and Karyotis, G., 2014. Who Protests in Greece? Mass Opposition to Austerity. *British journal of political science* [Online], 44(3), pp.487–513.

Bellemare, M.F., 2015. Rising Food Prices, Food Price Volatility, and Social Unrest. *American journal of agricultural economics* [Online], 97(1), pp.1–21.

Kawalerowicz, J. and Biggs, M., 2015. Anarchy in the UK: Economic Deprivation, Social Disorganization, and Political Grievances in the London Riot of 2011. *Social forces* [Online], 94(2), pp.673–698.

Mokyr, J., Vickers, C., and Ziebarth, N.L., 2015. The History of Technological Anxiety and the Future of Economic Growth: Is This Time Different? *Journal of economic perspectives* [Online], 29(3), pp.31–50.

Hay, G., 2017. *The Yeomanry Cavalry and Military Identities in Rural Britain, 1815-1914* [Online]. 1st ed. 2017, War, Culture and Society, 1750 -1850. Cham: Springer International Publishing : Imprint: Palgrave Macmillan.

Passarelli, F. and Tabellini, G., 2017. Emotions and Political Unrest. *Journal of political economy* [Online], 125(3), pp.903–946.

Shave, S.A., 2017. *Pauper policies: poor law practice in England, 1780-1850*. Manchester (GB): Manchester University Press.

Clark, P., 2018. *Police Forces of England and Wales (eighteenth century to 2018)*. Kindle.

Altomonte, C., Gennaro, G., and Passarelli, F., 2019. *Collective Emotions and Protest Vote*. Social Macroeconomics Working Paper Series. Oxford: Oxford. Unpublished.

Alvarez-Palau, E.J., Dunn, O., Bogart, D., Satchell, A.E.M., and Shaw-Taylor, L., 2019. *Historical ports and sailing shipping routes in England and Wales 1540-1914* [Online]. UK Data Service.

Arias, E. and Stasavage, D., 2019. How Large Are the Political Costs of Fiscal Austerity? *The journal of politics* [Online], 81(4), pp.1517–1522.

Cantoni, D., Yang, D.Y., Yuchtman, N., and Zhang, Y.J., 2019. Protests as Strategic Games: Experimental Evidence from Hong Kong's Antiauthoritarian Movement*. *The quarterly journal of economics* [Online], 134(2), pp.1021–1077.

Fetzer, T., 2019. Did Austerity Cause Brexit? *American economic review* [Online], 109(11), pp.3849–3886.

Heblich, S. and Trew, A., 2019. Banking and Industrialization. *Journal of the european economic association* [Online], 17(6), pp.1753–1796.

Cai, J., De Janvry, A., and Sadoulet, E., 2020. Subsidy Policies and Insurance Demand. *American economic review* [Online], 110(8), pp.2422–2453.

Caprettini, B. and Voth, H.-J., 2020. Rage against the Machines: Labor-Saving Technology and Unrest in Industrializing England. *American economic review: insights* [Online], 2(3), pp.305–320.

Fetzer, T., 2020. Can Workfare Programs Moderate Conflict? Evidence from India. *Journal of the european economic association* [Online], 18(6), pp.3337–3375.

González, F., 2020. Collective action in networks: Evidence from the Chilean student movement. *Journal of public economics* [Online], 188, p.104220.

Moscona, J., Nunn, N., and Robinson, J.A., 2020. Segmentary Lineage Organization and Conflict in Sub-Saharan Africa. *Econometrica* [Online], 88(5), pp.1999–2036.

Ponticelli, J. and Voth, H.-J., 2020. Austerity and anarchy: Budget cuts and social unrest in Europe, 1919–2008. *Journal of comparative economics* [Online], 48(1), pp.1–19.

Siroky, D., Warner, C.M., Filip-Crawford, G., Berlin, A., and Neuberg, S.L., 2020. Grievances and rebellion: Comparing relative deprivation and horizontal inequality. *Conflict management and peace science* [Online], 37(6), pp.694–715.

Bindler, A. and Hjalmarsson, R., 2021. The Impact of the First Professional Police Forces on Crime. *Journal of the european economic association* [Online], 19(6), pp.3063–3103.

Heldring, L., Robinson, J.A., and Vollmer, S., 2021. The Long-Run Impact of the Dissolution of the English Monasteries. *The quarterly journal of economics* [Online], 136(4), pp.2093–2145.

Hübscher, E., Sattler, T., and Wagner, M., 2021. Voter Responses to Fiscal Austerity. *British journal of political science* [Online], 51(4), pp.1751–1760.

Kenny, S., Lennard, J., and Turner, J.D., 2021. The macroeconomic effects of banking crises: Evidence from the United Kingdom, 1750–1938. *Explorations in economic history* [Online], 79, p.101357.

McKernan, L., 2021. *The Newspaper Press Directory (1846-1880)* [Online]. London, UK: British Library.

Shen, Z., Zhang, R., Dell, M., Lee, B.C.G., Carlson, J., and Li, W., 2021. *LayoutParser: A Unified Toolkit for Deep Learning Based Document Image Analysis* [Online]. Version Number: 2. arXiv.

Aidt, T. and Leon-Ablan, G., 2022. The Interaction of Structural Factors and Diffusion in Social Unrest: Evidence from the Swing Riots. *British journal of political science* [Online], 52(2), pp.869–885.

Aidt, T., Leon-Ablan, G., and Satchell, M., 2022. The Social Dynamics of Collective Action: Evidence from the Diffusion of the Swing Riots, 1830–1831. *The journal of politics* [Online], 84(1), pp.209–225.

García-Jimeno, C., Iglesias, A., and Yildirim, P., 2022. Information Networks and Collective Action: Evidence from the Women's Temperance Crusade. *American economic review* [Online], 112(1), pp.41–80.

Guriev, S. and Papaioannou, E., 2022. The Political Economy of Populism. *Journal of economic literature* [Online], 60(3), pp.753–832.

Heblich, S., Redding, S., and Voth, H.-J., 2022. *Slavery and the British Industrial Revolution* [Online]. (technical report w30451). Cambridge, MA: National Bureau of Economic Research, w30451.

Tiratelli, M., 2022. Crowds, Police and Provocations: Temporal Patterns of Rioting in Britain, 1800–1939. *Sociology* [Online], 56(4), pp.749–765.

Beach, B. and Hanlon, W.W., 2023. Historical newspaper data: A researcher's guide. *Explorations in economic history* [Online], 90, p.101541.

Burchardt, J., 2023. Are Searches in OCR-generated Archives Trustworthy?: An Analysis of Digital Newspaper Archives. *Jahrbuch für wirtschaftsgeschichte / economic history yearbook* [Online], 64(1), pp.31–54.

Hvidberg, K.B., Kreiner, C.T., and Stantcheva, S., 2023. Social Positions and Fairness Views on Inequality. *Review of economic studies* [Online], 90(6), pp.3083–3118.

Ketchley, N., Eibl, F., and Gunning, J., 2023. Anti-austerity riots in late developing states: Evidence from the 1977 Egyptian Bread Intifada. *Journal of peace research* [Online], p.00223433231168188.

Korinek, A., 2023. Generative AI for Economic Research: Use Cases and Implications for Economists. *Journal of economic literature* [Online], 61(4), pp.1281–1317.

Marcucci, A., Rohner, D., and Saia, A., 2023. Ballot or Bullet: The Impact of the UK's Representation of the People Act on Peace and Prosperity. *The economic journal* [Online], 133(652), pp.1510–1536.

Melander, E. and Miotto, M., 2023. Welfare Cuts and Crime: Evidence from the New Poor Law. *The economic journal* [Online], 133(651), pp.1248–1264.

Satchell, A.E.M., Kitson, P.K., Newton, G.H., Shaw-Taylor, L., and Wrigley, E.A., 2023. *1851 England and Wales census parishes, townships and places* [Online]. distributed by UK Data Archive.

Aurich, J., 2024. Collecting Strike Data from Digitized Historical Newspapers (19th Century): Potential and Challenges of an Automated Workflow [Online].

Cantoni, D., Kao, A., Yang, D.Y., and Yuchtman, N., 2024. Protests. *Annual review of economics* [Online], 16(1), pp.519–543.

Chambru, C. and Maneuvrier-Hervieu, P., 2024. Introducing HiSCoD: A New Gateway for the Study of Historical Social Conflict. *American political science review* [Online], 118(2), pp.1084–1091.

Dell, M., 2024. *Deep Learning for Economists* [Online]. Version Number: 3. arXiv.

Feigenbaum, J. and Gross, D.P., 2024. Answering the Call of Automation: How the Labor Market Adjusted to Mechanizing Telephone Operation. *The quarterly journal of economics* [Online], 139(3), pp.1879–1939.

Fransman, T. and Von Fintel, M., 2024. Relative Standing and Political Participation. *Social indicators research* [Online], 174(1), pp.281–311.

García-Uribe, S., Mueller, H., and Sanz, C., 2024. Economic Uncertainty and Divisive Politics: Evidence from the dos Españas. *The journal of economic history* [Online], 84(1), pp.40–73.

Heblich, S., Redding, S., and Zylberberg, Y., 2024. *The Distributional Consequences of Trade: Evidence from the Grain Invasion* [Online]. (technical report w32958). Cambridge, MA: National Bureau of Economic Research, w32958.

Müller, U.K. and Watson, M.W., 2024. Spatial Unit Roots and Spurious Regression. *Econometrica* [Online], 92(5), pp.1661–1695.

Panunzi, F., Pavoni, N., and Tabellini, G., 2024. Economic Shocks and Populism. *The economic journal* [Online], 134(663), pp.3047–3061.

Silcock, E., Arora, A., D'Amico-Wong, L., and Dell, M., 2024. *Newswire: A Large-Scale Structured Database of a Century of Historical News* [Online]. Version Number: 1. arXiv.

Wiedemann, A., 2024. The Electoral Consequences of Household Indebtedness under Austerity. *American journal of political science* [Online], 68(2), pp.354–371.

Becker, S.O., Boll, P.D., and Voth, H.-J., 2025. *Spatial Unit Roots in Regressions: A Practitioner's Guide and a Stata Package* [Online]. IZA Discussion Paper No. 17651. Bonn, Germany: Bonn, Germany. Unpublished.

Bernini, A., Facchini, G., Tabellini, M., and Testa, C., 2025. Black Empowerment and White Mobilization: The Effects of the Voting Rights Act. *Journal of political economy* [Online], 133(10), pp.3078–3131.

Djourelova, M., Durante, R., and Martin, G.J., 2025. The Impact of Online Competition on Local Newspapers: Evidence from the Introduction of Craigslist. *Review of economic studies* [Online], 92(3), pp.1738–1772.

Drury, J., Ball, R., and Poole, S., 2025. Solidarity riots in the diffusion of collective action: Doing historical research to develop theory in social psychology. *British journal of social psychology* [Online], 64(2), e12870.

Green, D., Mesevage, G., Mooney, G., and Szreter, S., 2025. The new poor law and the health of the population of England and Wales. *The economic history review* [Online], ehr.70035.

Griesshaber, N. and Streb, J., 2025. *Multimodal LLMs for Historical Dataset Construction from Archival Image Scans: German Patents (1877-1918)* [Online]. Version Number: 1. arXiv.

Griffin, C.J., 2025. Luddism, Machine-Breaking and the Swing Riots. *Revue française de civilisation britannique* [Online], XXX-1.

Lagakos, D., Michalopoulos, S., and Voth, H.-J., 2025. *American Life Histories* [Online]. (technical report w33373). Cambridge, MA: National Bureau of Economic Research, w33373.

Marray, K., 2025. *Estimating Unobserved Networks from Heterogeneous Characteristics with an Application to the Swing Riots*. Unpublished.

Michalopoulos, S., 2025. *Ethnographic Records, Folklore, and AI* [Online]. (technical report w33700). Cambridge, MA: National Bureau of Economic Research, w33700.

Hübscher, E. and Sattler, T., 2026. Austerity and Populism. *Annual review of political science* [Online].

British Newspaper Archive [Online], n.d.

Rosevear, A., Satchell, M., Bogart, D., Shaw Taylor, L., Aidt, T., and Leon, G., n.d. *Turnpike roads of England and Wales, 1667-1892* [Online].

Satchell, A.E.M., Bogart, D., and Shaw-Taylor, L., n.d. *Parliamentary Enclosures in England, 1606-1902* [Online]. The Cambridge Group for the History of Population and Social Structure, University of Cambridge, Cambridge.

Wrigley, E.A., Shaw-Taylor, L., and Newton, G., n.d. *1831 Census Report of England: County Parish Occupations* [Online]. The Cambridge Group for the History of Population and Social Structure, University of Cambridge, Cambridge.