EXPLORING COMPUTATIONAL APPROACHES TO LAW: THE EVOLUTION OF JUDICIAL LANGUAGE IN THE ANGLO-WELSH POOR LAW, 1691-1834

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Abstract

The use of natural language processing (NLP) and machine learning (ML) to analyse the structure of legal texts is a fast-growing field. While much attention has been devoted to the use of these techniques to predict case outcomes, they have the potential to contribute more broadly to research into the nature of legal reasoning and its relationship to social and economic change. In this paper, we use recently developed NLP and ML methods to test the claim that judicial language is systematically shaped by economic shocks deriving from the business cycle and by long-run trends in the economy associated with technological change and industrial transition. Focusing on cases decided under the Anglo-Welsh poor law between the 1690s and 1830s, we show that the terminology used to describe the right to poor relief shifted over time according to economic conditions. We explore the implications of our results for the poor law, the theory of legal evolution, and socio-legal research methods.

Keywords: law and computation, poor law, legal evolution, natural language processing

JEL Codes: J41, K31, N33

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1. Introduction

Summing up recent historiography on the Anglo-Welsh poor law, Waddell writes: 'scholars have, with some justification, seen the poor relief system as a key contributing factor in grand narratives of state formation, economic growth and industrialisation'.[1] From the early seventeenth century, the poor law operated as a proto-welfare state, the first of its kind in Europe and the most extensive and comprehensive in its operation.[2] National legislation required the raising of a local tax (poor rate) in the more than 15,000 parishes and the administration of outdoor relief (cash payments) to the unemployed, long-term ill and elderly.[3] The legal right to relief, expressed through the concept of the 'settlement', could be obtained by various means. One of these routes was the 'yearly hiring', which conferred a settlement in the parish where an individual had completed a period of continuous service for one year. The legal institution of 'settlement by hiring' encouraged labour migration by linking the receipt of relief to the parish in which a person had most recently worked rather than that in which they had been born or had married or where they had previously been employed. Failure to establish a year's hiring and service, however, would often lead to an individual's forced removal, along with their dependents, from the place where they had been working to another, sometimes distant, location.

Critical to the operation of this aspect of the poor law was the legal definition of the status of 'servant' for the purposes of acquiring a settlement. Whether or not a person worked as a 'servant' for this purpose turned on the way in which the work was carried out as well as on marital status, with, in general, only those unmarried at the start of the service being capable of acquiring a settlement through the hiring route. It was also based on the juridical understanding of what precisely counted as a full year of service.

Centuries before today's debates about migration, labour flexibility and platform work, the English courts were grappling with the need to adapt legal definitions to a fast-changing social and economic context. Between the 1690s and 1830s, the Court of King's Bench, which heard appeals from removal orders of justices sitting in local sessions, decided hundreds of cases in which the outcome turned on the meaning of the concept of the yearly hiring. These cases took the form of disputes between parishes. A parish to which an individual was due to be removed could deny liability for poor relief on the basis that the person seeking the relief had not completed a year's service in that locality. The parish from which the removal was to occur could, conversely, seek to show that a yearly hiring and related service had not taken place there.

Decisions of the Court of King's Bench in settlement cases constitute a valuable but under-utilised historical resource. The resource is valuable because it constitutes a lengthy time series, covering just over a century of decisions, which is bounded at either end by the legislation first instituting (in 1691) and then abolishing (in 1834) the yearly hiring route to poor relief. This was also the period during which Britain transitioned from being a largely agricultural, 'organic' economy to a rapidly industrialising one dependent on the 'inorganic' resources of coal and steam.[4] Studying the evolution of judicial language in this period promises to throw light on the nature of the relationship between legal change and industrialisation.

There is evidence to suggest that the language used by the courts to define the concept of settlement by hiring changed significantly over time, becoming more restrictive towards the end of the eighteenth century and into the nineteenth.[5] Thus, even before Parliament abolished this route to a settlement, the courts appeared to have adjusted legal categories and definitions in ways that reduced their scope. Was this simply an instance of evolutionary 'drift', an essentially random and undirected process, or was it a structural response to changing economic conditions? From the final quarter of the eighteenth century onwards, the nature of the economy changed as land enclosure speeded up, leading to rural depopulation and an increase in migration to the cities and areas where the manufacturing industry was growing. Harvest failures and deepening recessions led to increases in the prices of necessities at the same time as real wages were falling. These factors combined to put growing pressure on the system of poor relief, thereby engendering calls for it to be scaled back.[6] How far were these pressures reflected in shifting judicial interpretations of the right to poor relief?

Progress in methods associated with the computational analysis of language makes it possible to address this question in a new way. The term 'natural language processing' (NLP) captures a number of techniques for identifying structural patterns in linguistic texts.[7] Through digitisation, datasets consisting of collections of multiple texts ('corpora') can be created in such a way as to facilitate statistical analysis. The sequencing and ordering of words can studied within the elements of a corpus, such as individual cases, and across the dataset as a whole, making it possible to analyse trends in a population of cases.[8] 'Machine learning' (ML) refers, in this context, to techniques capable of observing latent or emergent patterns in a text or body of texts.[9] These methods provide opportunities to analyse in a systematic way how one part of a text is related to, or in a statistical sense, 'predicts' another. This is the basis on which significant literature on case prediction has recently built up: by demonstrating how one part of a legal judgment text (the description of the facts of a case) correlates statistically with another (the outcomes of the case), it becomes

possible to identify the features of a legal dispute which best fit with, or match, a given result.[10]

Case prediction is not, however, the only legal use to which NLP and ML applications can be put. 'Text as data' approaches, while still at an early and largely exploratory stage, are becoming more widely employed across the social sciences to advance basic knowledge, test new hypotheses, and re-evaluate some familiar ones.[11] With machine-readable text, it becomes possible to test for statistical associations between variables of interest that were previously assumed to be unmeasurable and, hence, non-comparable. While measurement is not always feasible or appropriate with respect to social or legal phenomena,[12] extending the range of measurable phenomena opens up new possibilities for socio-legal research. Claims which might previously have seemed plausible from an interpretive or hermeneutic point of view but also somewhat conjectural from a more empirical one can now be approached in a novel way which, while not inherently superior to pre-existing methods, allows for a different perspective to be brought to bear on the question being researched.

In this paper, we use computational techniques to evaluate how far the changing language used in poor law cases between the late seventeenth and early nineteenth centuries displays trends which are more than merely contingent or stochastic but are, rather, structural or patterned. Having identified an underlying pattern in the legal data, we then seek to see how far it is correlated to broader trends associated with the transition to an industrial economy. Section 2 below provides the background to our study, providing an overview of the research context, namely the law relating to settlement by hiring, and explaining the basis for our research questions with reference to the theory of legal evolution. Section 3 sets out how we created the material for our study, in the form of a corpus of poor law cases which we constructed, and how we used a number of natural language processing techniques to analyse it. Section 4 contains our findings. We observe that the usage of 'liberal' and 'restrictive' judicial language with respect to the concept of the settlement by hiring evolved over time, with more restrictive uses, narrowing down the scope of the right to poor relief, predominating towards the end of the period we are studying. When we run a regression analysis to see if shifts in language use are linked to economic trends, we find evidence of a correlation between the increased use of restrictive language, on the one hand, and periods of recession and hardship, on the other. These results suggest that the evolution of judicial language is structural, rather than stochastic, and is linked to changes in the wider social and economic context of the law. Section 5 concludes with some reflections on methodology.

2. Background and research questions

2.1 The nature of the poor law and the concept of the settlement by hiring

The term ‘poor law’ describes a body of legislation and case law governing the administration of poor relief, which was in force across the British Isles from the end of the sixteenth century to the middle of the twentieth. Different versions of the poor law were in operation in separate jurisdictions (England and Wales, Scotland, Ireland and, later, Northern Ireland) during this period.[13] The most extensive and elaborated form of the poor law operated in England and Wales[14] and is the focus of the present paper.

The poor law anticipated certain features of the later welfare state by providing for the legal organisation of poor ‘relief’, either in the form of cash payments or via in-kind provision, to individuals and households with no independent means of support.[15] Although analogies to later systems of social assistance or unemployment compensation are somewhat incomplete and may be hazardous, the poor law recognised the concept of social risk from an early stage. The ‘poor’, according to Dalton’s *Country Justice*, an early legal treatise on the poor law which was first published in 1618, ‘are here to be understood not vagabond beggars or rogues, but those who labour to live, and such as are old and decrepit, unable to work, poor widows and fatherless children, and tenants driven to poverty; not by riot and carelessness, but by mischance’.[16] The reference to those who ‘labour to live’ is particularly significant for its acknowledgement of the precarious position, socially and economically, of a growing wage-earning class, which had no means of subsistence other than their capacity to work.[17]

The poor law was locally administered at the level of the individual parish, which could often be no more than a few square miles in extent, but centrally organised through national legislation. The Poor Relief Act 1597, re-enacted in 1601, placed parish officials (‘overseers’) under a duty to raise a local tax (poor rate) from property holders for the purposes, among other things, of providing ‘competent sums of money for and towards the necessary relief of the lame, impotent, old, blind, and such other among them, being poor and not able to work’.[18] How this far legal obligation on the part of the local state translated into a concomitant legal right to receive relief has been much discussed, but it seems beyond doubt that the poor law was ‘law’ in both a formal and practical sense, with legal issues pervading its administration at all levels: the poor law operated on the basis of ‘rights, duties and obligations [applying to] all citizens of England and Wales’, including the principle that ‘the settled poor possessed a legal right to relief’.[19]

The law of settlement had a basis in the judge-made common law before its codification in the statutes of the late sixteenth and early seventeenth centuries, and it is likely that the right to a settlement by hiring was already recognised when these statutes were enacted. The first reference to it in legislation dates from an Act of 1691. This provided that a servant hired for a year, if unmarried when first employed, would acquire a settlement in the parish of hiring.[20] An Act of 1697 required, in addition to the hiring for a year, actual service for that year.[21] From these origins, the legal institution of settlement by hiring began to take shape. Its role in encouraging labour mobility in an increasingly exchange-based and industrialising economy was noted in the preamble to the 1697 Act, which observed the unwillingness of persons to move from their home parish to 'any other place where sufficient employment is to be had… though their labour is wanted in many other places where the increase of manufactures would employ more hands'.[22]

Unless already resident in the parish in which they had been working, a servant who became 'chargeable' or eligible for relief, whether through unemployment, illness, pregnancy or other similar cause relating to a loss of work, could be forcibly removed to another parish, for example, their parish of birth or marriage, if they could not demonstrate that the work they had been carrying out was sufficient to generate a settlement by hiring.[23] Decisions on removal, and thereby on chargeability, could be made by two justices (local magistrates) on a reference from one of the parish officers. A removal order could be appealed to the justices sitting at Quarter Sessions and, from there, via an application for a quashing order, to the Court of King's Bench. Although an individual seeking relief could request an order for its payment or provision before the local justices[24] and could resist removal to another parish on production of a certificate or payment of a bond,[25] it was more normal for litigation before the King's Bench to be initiated by a parish. In the typical case, the parish in which the work was carried out would seek to show that the hiring and service in question did not qualify under the 1691 and 1697 Acts; the parish to which the individual faced removal would claim the opposite. By these means, the nature and character of the service relationship became the subject of extensive jurisprudence.

Early decisions, in particular those dating from the 1710s and 1720s, were mostly favourable to an expansive reading of the concept of yearly hiring. While the legislation of the 1690s had set out the twin requirements of hiring for a year and service for a year, a decision of 1714 established that these did not have to be precisely coterminous.[26] Nor did the servant have to be present in the parish of hiring throughout the whole year.[27] In practice, this meant that servants moving from one parish to another with the same employer would acquire a settlement in each one after forty days of residence.[28] Although successive hirings for less than a year were acknowledged from an early point to confer no settlement,[29] the

courts were prepared to infer a contract for a year's hiring from evidence of annual service and to disregard breaks by virtue of illness or temporary absence authorised by the employer.[30]

Later in the eighteenth century and into the nineteenth, the trend in judicial interpretation appears to have become more restrictive. In decisions of the 1780s, the courts can be seen construing hirings as contracts for less than a year where wages were paid at weekly or monthly intervals, and in the following decade, they reasserted the need for the hiring and the period of service to match precisely.[31] The exceptive hiring eclipsed the competing and more flexible notion of a 'dispensation' in the hiring, which had early eighteenth-century origins, according to which breaks in service were not incompatible with a settlement.[32]

The abolition of settlement by hiring in 1834 was part of the wider reforms implemented by the Poor Law Amendment Act of that year. From this point on, while a settlement could be obtained by other means, it was no longer possible to establish a right to relief on the basis of a period of continuous service for a year or otherwise. How far had the courts anticipated these statutory developments by narrowing down the scope of settlement by hiring through shifts in the prevailing judicial interpretations?

2.2 The poor law and the theory of legal evolution

The claim that legal rules evolve or adjust over time to changes in their social and economic environment is not a novel one.[33] It has long been recognised that the doctrine of precedent ('like cases must be decided alike') is far from being a rigid formula requiring the mechanical application of prior rules to new facts; the numerous techniques which go under the heading of 'distinguishing' one case from another create ample space for judicial innovation.[34] The doctrine of precedent was already well established by the time of the poor law, and judges deciding settlement cases made frequent references to it in their judgments as a basis both for following and departing from earlier authorities.[35]

By the middle of the eighteenth century, several legal textbooks or treatises had been written on the poor law and were in wide circulation among local justices of the peace.[36] These books meticulously tracked the developing case law. Decisions on settlement appeared regularly in several of the nominate reports of this period,[37] and some series existed solely for the purposes of recording settlement cases.[38] Extensive citation of earlier decisions was normal in poor law cases decided by the King's Bench. Thus, 'precedent', in the sense of a meta-rule influencing the production of more specific, substantive rules, was a significant institutional influence on the law of settlement at this point. However, it did not

prevent the courts from departing from a rule they regarded as outdated or inconvenient.[39]

Although the idea of applying the theory of evolution to legal rules has a long history,[40] a clear basis for doing so did not emerge prior to the publication of two papers in the mode of modern law and economics analysis by Rubin and Priest, respectively, in the mid-1970s.[41] Both papers use evolutionary analogies drawn from economics and biology to explain legal change. Priest's model employs a quasi-Darwinian understanding of environmental selection acting on a population of legal rules. The key to his approach is the observation that rules which impose costs on the parties to whom they are addressed are more likely to be litigated against than those which are deemed to be acceptable. Making the highly parsimonious assumption that judges decide cases randomly, mutations producing rules which impose social costs will be purged from the system over time simply by virtue of the tendency for them to be disproportionately challenged.

It is not necessary to accept all aspects of Priest's reasoning to posit that litigation can operate as a mechanism of selection.[42] In a common law system respecting the meta-rule of precedent, judges do not decide cases entirely randomly. However, some degree of mutation in outcomes can be expected given the open-textured nature of legal rules and the variety of situations to which they have to be applied. In a context where the social or economic context of the law is in flux, for example, as a result of changes in the social relations of production or in the uses of technology, the variability of outcomes can be expected to increase, as previous cases are less reliable as a guide to current decision-making. For an evolutionary model to work, it is only necessary that there be some mutation; the precise cause of that mutation, whether it originates in 'copying errors' or otherwise, is not critical to the operation of an evolutionary dynamic.[43]

We are now in a position to state our principal research question: *is there evidence that changing judicial language systematically reflected or responded to larger changes in the economy and in society during this period?* The relationship we are looking for should be 'systematic' in the sense of being more than contingent or accidental. Evolution through environmental selection may be 'blind', but it is not random. The element of randomness comes from the 'variation' or 'mutation' part of the evolutionary (variation-selection-retention) algorithm, not the 'selection' part. If we are to observe legal evolution in the context of poor law, we should be able to identify a regularity to the relationship between legal change, on the one hand, and changes in the wider economic and social environment of the time.

It is known that levels of poor relief expenditure varied considerably over time during the eighteenth century and into the early nineteenth.[44] Factors pushing up expenditure at particular points in time included harvest failures brought about by adverse weather events, which tended to increase the price of essentials, including bread, while depressing both employment and wages. This would lead, in turn, to increased claims for relief. Recessions would also lead to a heightened burden on the poor relief system; both the rural economy and the emerging industrial one experienced the effects of the business cycle in this period. The enclosure of common land, gathering pace throughout the eighteenth century, also put pressure on poor relief systems. Enclosure meant that rural families could no longer access the commons for grazing and gleaning.[45] These factors contributed to the growing use of wage subsidy systems and thereby to a further ratcheting up of the costs or relief.[46] This enables us to specify our research question somewhat more precisely: *did increases in poor relief expenditure lead the courts to take a more restrictive approach to the definition of the yearly hiring?*

If Priest's model is correct, parish-led litigation represents a mechanism by which changes in the economic environment could have been translated into shifts in judicial reasoning over the course of time. In Priest's account, litigation rates reflect the private preferences of litigating parties and their estimates of returns from litigation. If we were to apply Priest's hypothesis to the evolution of poor law, we would expect to see increasing pressure from litigation in settlement cases at points where poor law expenditure was rising. In particular, parishes which were net importers of labour would have reason to challenge determinations of settlement cases, which made them responsible for meeting poor relief costs arising from unemployment or unstable work. The parcelisation of the poor system implied by the charging of the costs to poor relief to individual parishes was recognised as problematic as early as the 1730s:

> It is certain that the obligation of each parish to maintain its own poor and, in consequence of that, a distinct interest are the roots from which every evil relating to the poor hath sprung and which must ever grow up till they are eradicated. Every parish is in a state of expensive war with all the rest of the nation, regards the poor of all other places as aliens, and cares not what becomes of them it can banish from its own society.[47]

By the later decades of the eighteenth century, it was becoming common for the wealthier agricultural parishes and parishes where manufacturing industries were based to organise systematic removals of the ill and unemployed in times of recession, aimed not just at limiting their access to poor relief but to protect local common land from what was seen as 'predation' by outsiders.[48] There is also

evidence that litigation in poor law cases was becoming more extensive and that expenditure on cases was rising in the final quarter of the eighteenth century.[49] Was there a contemporaneous shift in the legal language used to decide cases? The following section describes how we answer this question using a computational approach to analysing legal texts.

3. Dataset construction: sources and methods

3.1 Legal data: case identification, labelling, and classification

In this section, we describe our legal data[50] and the methods used to construct it. The first step was to build a corpus of decisions on settlement by hiring. We consulted editions of the leading poor law treatises, Nolan's *Treatise of the Laws for the Settlement and Relief of the Poor* and Burn's *Justice of the Peace and Parish Officer*, to identify relevant cases. We initially found around 260 cases relating to settlement by hiring from index entries in Nolan and Burn, which we then reduced to a final total of 243 after deleting duplicates and decisions which turned out not to disclose a relevant point of law. Original texts were sourced from hard copies of law reports held in the Squire Law Library in Cambridge. The texts were copied and scanned, then digitised using an optical character recognition (OCR) reader, translating printed words into machine-encoded text. By way of illustration, the Data Appendix sets out parts of an original text (Figure A1(a)) and a digitised one (Figure A1(b)).

We then cleaned the data, deleted or amended incorrect transcriptions, and annotated it. The annotation uses a schema that breaks each judgment text into its component parts, including 'facts', 'arguments', 'judgment' and 'ruling'. Next, we labelled each case according to a binary categorical classification, which defines a decision as either 'liberal' or 'restrictive'. The purpose of this classification is to identify whether a decision expanded or rendered more 'liberal' the scope of the yearly hiring concept, making it more straightforward for a claimant to receive poor relief in the parish in which they had most recently worked, or made it narrow or more 'restrictive', making it more difficult to do so.

The classification 'liberal-restrictive' is one we impose on the cases *ex post*, rather than one which regularly appears on the face of the judgment texts. However, it captures a distinction that is based on the language the judges themselves used. In *R.* v. *Fifehead Magdalen*, a relatively early decision (1737) which confirmed an expansive reading of the right to settlement by hiring, the King's Bench was called on to reconsider an earlier resolution of the court to the effect that 'a Hiring for a Year and a Service for a Year were sufficient to gain a Settlement, if there were in Fact both; though all the Service should not be under the same Contract'. Affirming this approach, Mr. Justice Probyn commented:

> This Matter was first settled in Lord Macclesfield's Time, as my Lord Chief Justice has mentioned: There was much Doubt about it at first. The Reason of the Resolution was, that these Acts were restrictive of the Liberty of the Subject, and therefore ought to receive a liberal Construction. They require a Hiring for a Year, and a Service for a Year: And Both Requisites were complied with.[51]

A 'liberal' decision may or may not have led to the removal of the claimant, depending on the circumstances of the case. It is possible that a wide reading of the concept of the yearly hiring could have resulted in the removal of the claimant to the parish in which they had last been employed as a servant for a year, in some cases many years or even decades previously.[52] Nonetheless, a series of more liberal decisions would have expanded the rights of migrant workers in general, implying greater liabilities for parishes which mostly 'imported' or 'hosted' migrant workers, as opposed to those 'sending' or 'exporting' them. Thus, 'liberal' decisions are those we would expect 'importing' or 'host' parishes to resist in times of economic hardship, arguing instead for a 'restrictive' approach which would minimise their liabilities. During periods of economic growth, when parishes were competing to attract scarce labour, we would expect fewer challenges to settlement claims and hence a more 'liberal' trend in decision-making.[53]

Some features of our legal dataset may be noted. It consists only of *reported* cases. Since not every case on a settlement matter would have been reported, there is a wider population of *decided* cases of which our corpus forms a subset or part. We do not have access to this wider set. However, the set of reported cases is sufficient for our purpose. We are specifically interested in decisions deemed important enough to be reported. Law reporters would have selected cases for inclusion in their series on the basis of what they took to be their precedential value; textbook writers would have made a similar judgment. Thus, while we cannot assume that our dataset is representative of decisions in general, we can treat it as being representative of (and, in practice, closely synonymous with) the legally significant ones.

3.2 Dictionary construction and augmentation

The classification of a case as 'liberal' or 'restrictive' refers to the *outcome* of the decision, and is expressed as a simple binary or categorical (0, 1) variable. We can also use NLP techniques to classify the *language* used in a case as 'liberal' or 'restrictive'.

The NLP method of 'sentiment analysis' enables us to generate a continuous measure of the meaning or *sentiment* of the text. Sentiment analysis works by categorising words as having either a positive or negative value according to the meaning they have within a particular body of text. We use it here to assign a positive value to words associated with 'liberal' decisions within our corpus of cases, and a negative value to words associated with 'restrictive' decisions.

In order to do this, we build a context-based dictionary of terms. For this purpose we use the pre-defined dictionary embedded in the package 'sentimentr' developed by Rinker in 2018.[54] We rely on this particular dictionary for the following reasons. First, the dictionary is large. It contains around 11,000 English words and, as such, provides a high degree of word-matching with our texts. Secondly, it uses valence shifters to score the words. This means that the impact of a word is amplified or de-amplified depending on the neighbouring words. This way, the overall score for a word is generated via its context. A particular feature of sentimentr is that it takes account of negators which reverse the sign of a word ('*not* a dissolution'), amplifiers or intensifiers which can increase its impact ('*entirely* put an end to'), and de-amplifiers or downtowners which might reduce it ('*merely* continued').[55] This feature is especially useful in the context of legal judgment texts, in which arguments for and against particular propositions are often expressed according to varying degrees of positivity and negativity. Thirdly, the dictionary allows for customisation, which we take advantage of in order to adjust it for the specific legal terms and historical language used in our data.

We begin by identifying keywords in each decision. In the course of the preparation of the dataset, this was done manually, as each case was read and classified. Figure A1(c) (in the Data Appendix) shows how the annotation works in the context of a decided case.

We then categorise the keywords as either 'liberal', 'restrictive' or 'neutral'. Initially, we identify 'liberal' words as those which are more typically found in the liberal decisions, and 'restrictive' words those which are more typically found in the restrictive decisions. We add a further category of 'neutral words', which are associated with both types of decision. The classification of a word is, however, not based solely on the frequency with which it appears in cases of one kind or another. We also use our legal 'domain expertise', as researchers familiar with the legal meanings of the terms used in the reference texts, to determine the classifications.[56]

Table 1 lists the 'liberal', 'restrictive' and 'neutral' words. In the 'liberal' category are words indicating the presence of a stable and enduring employment relationship (*continuous, indefinite, retained, served, subsist*), service connected

across two or more different contracts (*connect, join*), and the employer's willingness to overlook or give permission for periods of leave (*agree, assent, consent, dispense, voluntarily, whole*). The word *discharge* at this point signified that a dismissal had to be for cause, again favouring the stability of the relationship. By contrast, in the 'restrictive' list are words indicating the employer's power to discipline the servant (*coercion, command, compel*), to exercise physical force over them (*beaten*), and to end the contract before its due term had been completed (*denied, depart, determinable, discontinuance, dissolved, end, interruption, leave, rescinded*). Also in this category are words indicating reasons for premature termination in the form of what masters regarded as misbehaviour by servants (*dangerous, defeat, denied, depart, improperly, inconsistent, insolent, misconduct, negative, threatened, unreasonable*), unauthorised absence (*absent, parted, quit, withdrawn*), and having a child out of wedlock (*bastard*). The word *several* is associated with there being a series of contracts which could not be connected or joined together to make a single hiring.

Next, we score the words. Liberal (or positive) words are included in the dictionary with a score of +1, restrictive (or negative) words as -1, and neutral words as 0. Then we use a word-embedding method, the GloVe approach, to augment the dictionary's content beyond our core words.[57] This means employing cosine similarity to identify words which are 'similar' to liberal and restrictive words respectively, similarity here meaning that their usage is statistically correlated with them. Our classification of certain words as 'neutral' avoids them as being mistakenly classified as 'liberal' or 'restrictive' on purely correlational grounds.

For example, of the liberal words, *validity*, *legality*, *respect* and *adhere* are similar (closely related) to *dispensation*, and the words *continuing*, *returning*, *remaining*, and *contrivance* are similar to *sufficiently*. Of the restrictive words, *argued*, *fraudulently*, and *mischief* are similar to the word *denied*. The words *offence, quashing*, and *deduction* are similar to *removal*, and the words *fraudulent* and *defective* are similar to *dissolved*. These new lists of words are then added to the dictionary, with a score of +0.75 for the liberal ones and -0.75 for the restrictive ones.

The end result of this process is a score which indicates the degree to which the overall sentiment of a body of text is liberal or restrictive.[58] This is a continuous variable, in contrast to the binary classification we have for decisions.[59]

Table 1. Liberal, restrictive and neutral words

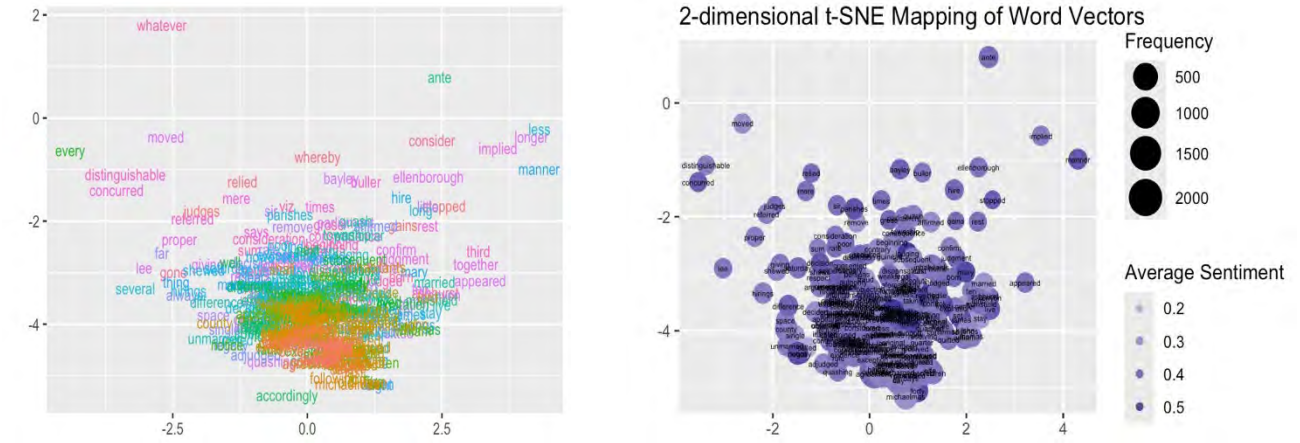
Liberal words	**Restrictive words**	**Neutral words**
abate, acceptance, agree, assent, competent, connect, conditional, consent, continuance, continue, discharge, dispense, entire, favour, favourably, forgiveness, good, hired, holiday, inclusive, indefinite, joined, liberally, limited, new, perfected, pleasure, reasonable, recompense, retainer, returned, reward, served, subsist, sufficiently, valid, voluntarily, whole	absent, bastard, beaten, coercion, command, compel, compleat, control, dangerous, defeat, denied, depart, determinable, discontinuance, dissolved, end, exception, exemption, fraud, half, ill, improperly, inconsistent, insolent, interruption, leave, misconduct, negative, part, parted, presumed purged, quit, reciprocal, rescinded, refused, removal, remove, retrospective, several, strict, threatened, unreasonable, withdrawn	agreement, contract, employment, hiring, hours, master, parish, pauper, notice, servant, service, settlement, wages, weekly, year

Source: Deakin, Shuku and Cheok, *English Poor Law Cases, 1691-1834.* [Data Collection]. Colchester, Essex: UK Data Service, 10.5222/UKDA-SN-857470, available at: https://reshare.ukdataservice.ac.uk/, accessed 3 December 2024.

3.3 Corpus diversity and general language trends

A final issue to consider before proceeding to our results is that our approach may be capturing trends in language use in wider society rather than in judicial decision-making. The mapping of the word embedding helps us address this question by showing how diverse the corpus is. Given that the period under review covers a period of more than one hundred years, it is possible that there was a substantial change in general language use over this course of time. A diverse corpus would indicate that language underwent sharp, dynamic changes, with many new words added and others dropping out of use. A more homogenous language structure would suggest the opposite and imply that the patterns we identify in our data are likely not being driven by the evolution of the language outside the context of our investigation.

Figure 1. (a) Word-embeddings (b) with sentiment and frequency



(a) (b)

Source: see note to Table 1.

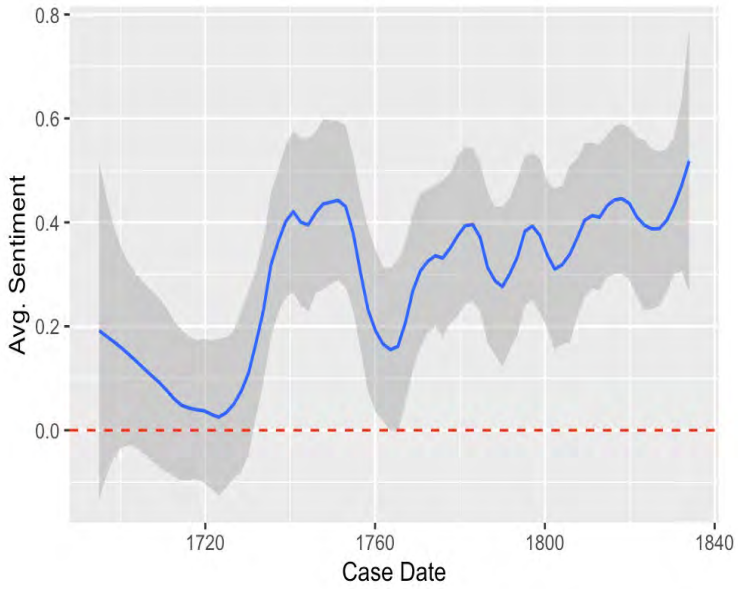
The graphs in Figure 1a illustrate the mapping of the embeddings. The t-SNE mapping method used here allows for natural clusters to emerge from the data without needing them to be specified a priori, which could build in error or bias. The embeddings are situated close to each other, meaning the corpus is relatively homogenous. This indicates that we are not dealing with periods when the content of the texts underwent abrupt change. From the visualisation of the frequency and the sentiment (Figure 1b), which is shown through the size of the circles, we can see that a small number of embeddings, which are predominantly liberal, dominate the corpus.

4. Empirical findings: legal language and economic trends

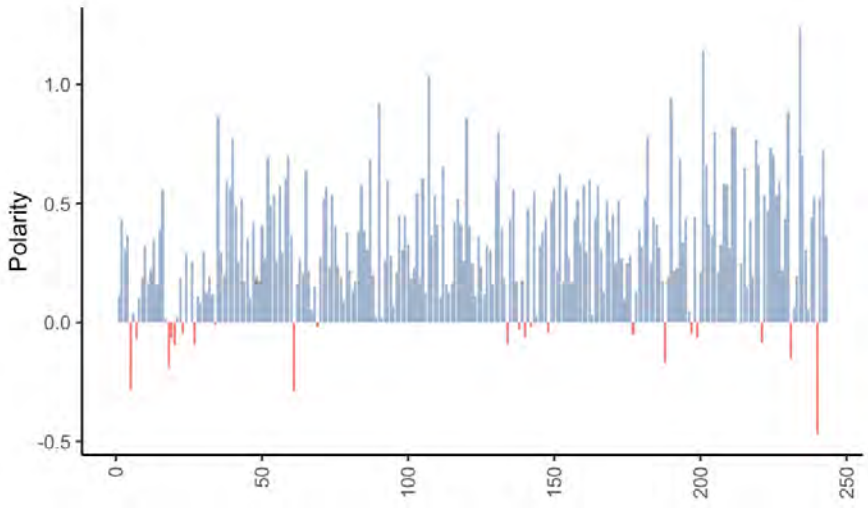
4.1 Exploratory analysis with textual data

We are now in a position to present our findings. We first conduct an exploratory analysis to identify patterns in the data. When we apply the dictionary method, which we generated as described above, we can see that the sentiment of the cases, indicating whether they were becoming more liberal or restrictive, fluctuates over time, as we hypothesised it would. The graphs set out in Figure 2 describe the main trends. There are periods where the language used in the cases was more liberal, and other periods dominated by more restrictive language.

Figure 2. Language evolution (1691-1834) (a) by years, (b) by cases



(a)



(b)

Note: Figure 2(a) shows changing sentiment using the 'loess' (local regression) smoothing method. See Appendix Figure A2 for the same trend without smoothing, showing a rougher distribution of the change in language over time. Figure 2(b) shows the plot of the sentiment score of each of the 243 cases in the dataset, from the first in time to the last.

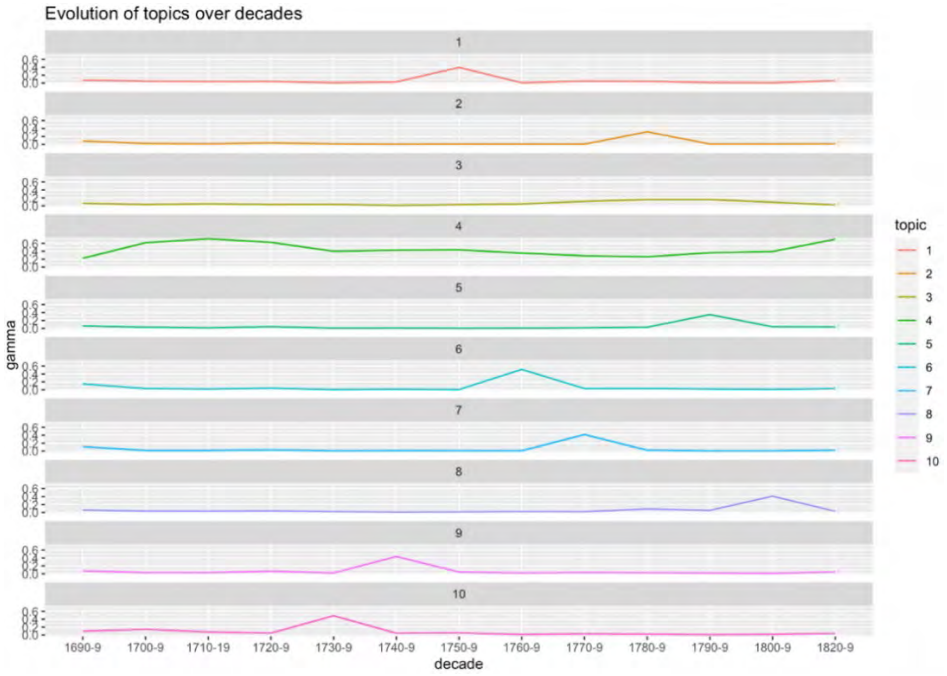
Source: see Table 1.

The sentiment measured is predominantly positive. However, the beginning of the period is characterised by comparatively more restrictive language. Liberal language peaked between 1740 and 1750, and then around 1780. In line with our expectations, the later decades of the eighteenth century, from the 1780s onwards, show progressively more restrictive language. The early nineteenth century shows a high degree of variability (Figure 2(a)) and a marked increase in decisions containing more restrictive language in the 1820s (Figure 2(b)).

We can also use topic modelling to explore trends in the data over time.[60] We apply the Latent Dirichlet Allocation (LDA) method to identify prominent themes in the cases. This gives us a measure of the heterogeneity of judgment texts making up the corpus and enables us to observe how different themes evolved through time. Identifying topics that became prominent in a single period can then be interpreted as signalling a specific, event-driven effect on case outcomes. Alternatively, where we observe that no topic has an overwhelming prominence in a particular period, we can conclude that several factors most likely influenced the case outcome. The ten most prominent topics are set out in the Data Appendix (Figure A3).

Figure 3 illustrates trends in these topics over time. We aggregate topics over decades. Although topics generated statistically are not straightforward to interpret, Figure 3 suggests that particular themes are prominent at certain times and that this prominence is connected to issues which were coming before the courts on a regular basis in those periods. In the 1740s, a liberal period, topic 9 dominated. Among the leading words in topic 9 are time-related terms, including *day* and *Martinmas* (a feast day on which workers were often hired for the year). Time-related terms are also prominent in topics 2 and 5, both of which show spikes in the 1780s, another period recording more liberal language. Topic 4, which spikes in the more restrictive periods between 1700 and 1730 and again in the final decades of our study, contains several terms relating to the work relation (*service*, *servant*, *master*, *hiring*, *contract*, *hired*).

Figure 3. Top ten topics over decades



Source: see Table 1.

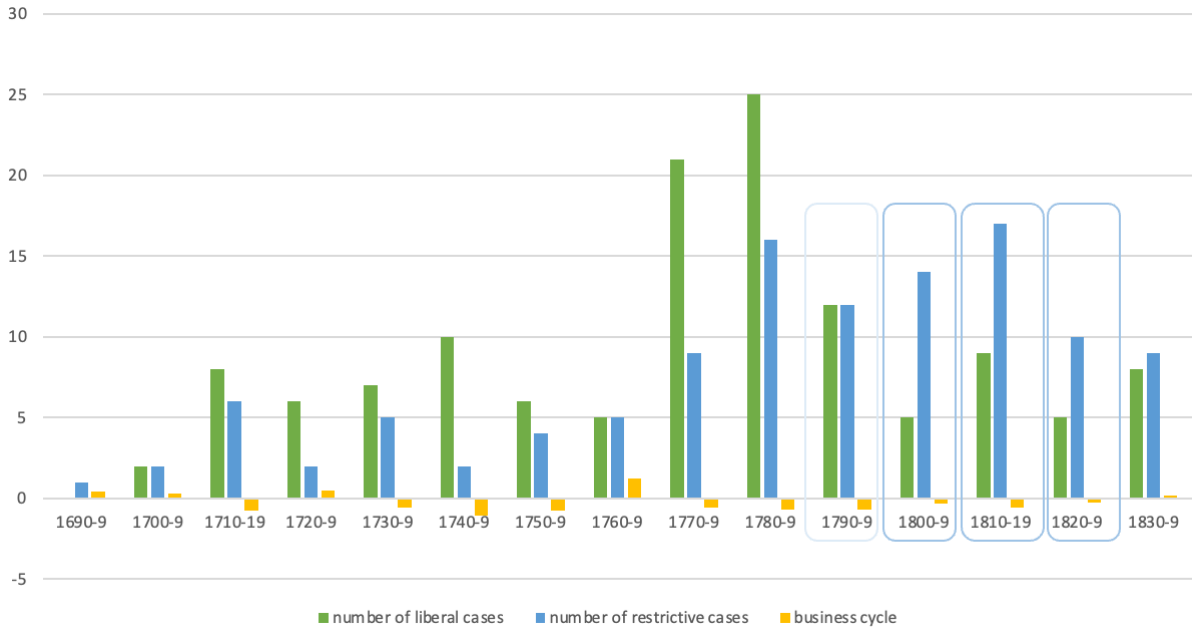
4.2 Exploratory analysis with economic data

Next, we perform exploratory analysis at the 'count' level to establish the relationship between our text data and trends in the economy. Our economic data come from several sources. Data on the annual rate of growth of per capita GDP are obtained from Broadberry et al. (2015),[61] the average cost of living and wage growth from Clark (2001),[62] and prices for main grains (wheat, barley, and oats) from Clark (2004).[63] We also retrieved annual data on the periods of recession and overall output losses from Broadberry, Chadha et al. (2022),[64] and data for the business cycles from Broadberry, Campbell et al. (2022).[65] These economic data series mostly go back to the beginning of the 1700s, which is also the approximate start of our legal time series. The basis for choosing them is that they are good indicators of the level of prosperity in the economy as a whole as well, more specifically, of factors driving poor law expenditure.

We expect to find a relationship between case type and economic growth. Periods of declining economic growth should be associated with a higher number of restrictive cases and periods of increasing growth with more liberal ones. The graph in Figure 4 shows the average deviation from GDP, labelled as 'business cycle',[66] and the number of liberal and restrictive cases, all aggregated by decade. For our expectations to hold, in decades when the number of restrictive cases is higher than the liberal ones, we would expect to observe negative output growth.

The expected relationship holds for the decades noted in rectangles. Broadberry, Campbell et al. (2022) explore the causes of recession in these historical periods. In each of the highlighted decades, the source of the shock was either a sectoral decline affecting agriculture or a war affecting the overall economy.

Figure 4. Exploratory analysis between case type and economic measures at the 'count' level



Source: see Table 1.

We also conduct a correlational analysis of the relationship between our continuous measure of language sentiment and trends in the economy. We find that GDP per capita is positively correlated with more liberal language, and output losses with more restrictive language. These results are set out in more detail in the Data Appendix.[67]

4.3 Regression analysis

The next step is to conduct a regression analysis, which aims to identify the relationship between measures, the direction of the movements, and their statistical significance. This allows for a more complete evaluation of the patterns revealed in the exploratory analysis just set out. As in our exploratory analysis, we use both categorical and continuous measures of the text data. We focus here on the century after 1700 as the critical period of transition from an agrarian economy to an industrial one.

The value of having two measures is to give us a more fully rounded view of the correlations observed in the regression analysis. The categorical measure draws a binary distinction between liberal and restrictive cases. The continuous measure is the one generated through the dictionary approach. Given the nature of the measure and the way we derived it, which involves the use of various text analysis methods as explained above, the evolution of this measure through time generates a smooth pattern, indicating overall trends in language evolution. As such, this measure allows us to gain additional insights into the periods where cases of one type or another were predominant.

Table 2 below shows the values of the regression estimates, the standard errors, and their statistical significance generated through a PROBIT model, where the dependent variable is categorical. In this case, a higher score in the sign of the coefficient estimates indicates a positive relationship between the economic variable in question and a year that is 'restrictive' in the sense of having more restrictive cases decided in it.[68]

Table 2. PROBIT regression of economic indicators on case classifications

variable	case type		
	(1)	(2)	(3)
log.gdp.capita	-1.41		-0.24
	(3.62)		(3.07)
log.cost.living	2.29 **		0.92
	(1.062)		(2.81)
log.grain.price		1.11 *	0.49
		(0.66)	(2.48)
log.real.wage		-1.51	-1.65
		(2.14)	(3.30)
intercept	-7.40 **	4.55	2.37
	(3.628)	(9.57)	(12.02)
N	73	73	73

Note: The results are generated through a standard PROBIT model where the binary dependent variable is specified as 1 if, in the specific year, the number of restrictive cases is greater than the number of liberal ones and 0 otherwise. The parameters are estimated using the maximum likelihood function. Standard errors are included in the parentheses. *p<0.10, **p<0.05, ***p<0.01.

Sources: For the legal data, see Table 1. Economic data are derived from Clark (2001) and (2004) and Broadberry et al. (2015) and (2022). See section 4.2 above for further details.

The results show that an increase in the GDP per capita is associated with a decrease in the probability of a given year being restrictive. This is what we would expect: periods of prosperity are periods when more liberal cases predominate. Increases in the cost of living and in grain prices, on the other hand, are associated with more restrictive years. This, too, is expected: higher grain prices imply pressure on the cost of living and greater resort to poor relief to maintain household incomes. Real wages are negatively correlated with restrictive years. This also is consistent with our hypotheses: higher real wages imply less dependence on poor relief and greater competition by masters, and thereby parishes, to attract labour. The correlation coefficients in the case of GDP per capita and real wages are not statistically significant, meaning that the null hypothesis (no result) cannot so clearly be ruled out in these cases, but the direction of the effects may still be noted.

By way of a robustness check, we carry out a further analysis, this time seeing how far the same results hold if we test for the relationship using lagged values of the economic indicators. This enables us to see how far past economic trends (at time t-1) are correlated with current decisions (at time t). This analysis is set out in the Data Appendix, Table A1. They are similar to the results without the lagged variable in terms of the sign and significance of the coefficients. Figure A5 in the Data Appendix shows the marginal effects of the variables in the PROBIT analysis, both lagged and unlagged.

Next, we perform a regression analysis where the dependent variable is the continuous measure, constructed using the dictionary approach. We use a standard OLS regression with multiple independent variables representing the economy. The dependent variable represents language evolution, such that an increase in this measure is understood as language becoming more liberal, and a decrease is associated with the language becoming more restrictive. Similarly to the previous model, the cases are aggregated annually. The model is run by adding one independent variable at a time to capture the added value of the individual effects deriving from each one.

Table 3 reports the values of the regression estimates, the standard errors, and their statistical significance. An increase in GDP per capita is associated with more liberal language and a rise in the cost of living with more restrictive language. This is in line with our expectations and with the analysis from the PROBIT regression. However, the increase in grain prices here is associated with the language becoming more liberal. This is the opposite of the previous result and contrary to our hypothesis. It is possible that grain prices are a more ambivalent indicator than the others we are using.[69] Real wages, on the other hand, are positively correlated with liberal language, as we would expect.

Table 3. OLS regression analysis of economic indicators on language evolution

variable					
	(1)	(2)	(3)	(4)	(5)
log.gdp.capita	0.57 *		0.28		0.25
	(0.30)		(0.41)		(0.44)
log.cost.living	-0.006		-0.78		-0.76 *
	(0.14)		(0.37)		(0.40)
log.grain.price		0.25 ***	0.75		0.74 **
		(0.09)	(0.33)		(0.34)
log.real.wage		0.46	0.53		0.53
		(0.30)	(0.45)		(0.46)
b.cycle				-0.03	-0.006
				(0.05)	(0.05)
output.loss				-0.008	-0.0008
				(0.009)	(0.01)
intercept	-1.05 **	-2.02	-0.08	0.30 ***	-0.08
	(0.49)	(1.34)	(1.64)	(0.02)	(1.69)
N	73	73	73	73	73
Adj. R^2	0.02	0.08	0.11	0.01	0.09

Note: The dependent variable is language sentiment, which has a higher value if the sentiment is liberal. Standard errors are included in the parentheses. *p<0.10, **p<0.05, ***p<0.01.

Sources: see Table 2.

We add two additional economic measures in column (5), referring respectively to the business cycle and output loss. The business cycle measure is a dummy variable, with a year in recession coded 1. It can be seen that liberal language is negatively correlated with periods of recession and output loss, as anticipated. The results for real wages, business cycle, and output loss are what we would expect, although in each case, they do not attain a high level of statistical significance and should be regarded as indicating the general direction of the effect. As with the PROBIT model, we carried out a further analysis to see if the results remained the same with lagged independent values. Appendix Table A2 shows a similar picture for these lagged variables.

4.4 Assessment

We are now in a position to return to our research questions. These were a general question: *is there evidence that changing judicial language systematically reflected or responded to larger changes in the economy and in society during this period?*; and a more specific variant of it: *did increases in poor relief expenditure lead the courts to take a more restrictive approach to the definition*

of the yearly hiring? On the basis of the empirical evidence we have presented, the answer to both is a qualified 'yes'. Shifts in judicial language over the century or so of the evolution of the pre-1834 poor law were related to changes in the level of economic growth (GDP per capita), the business cycle, grain prices, and the level of wages. More precisely, recessions, rising prices, and falling real wages were correlated to the tendency of judicial language to become less liberal over time. As a result, the concept of the settlement by hiring, previously a well-established route to the receipt of poor relief, became more narrowly confined.

The suggestion of a causal connection should be advanced with the usual qualification that a statistical association of the kind we have identified does not necessarily imply a causal effect. As evidence that the effect is causal as opposed to being merely correlational, we can point to the presence of an effect when the lagged or past values of our economic indicators are used in the regression equations: changes in the economy preceded the judicial effects that we identified. Our results are also consistent with the theoretical framing of our study, which suggests a role for parish-led litigation in driving legal change.

5. Conclusion

In this study, we set out to explore the possible uses of computational techniques to study the evolution of judicial language and its connections to shifts in the economy. We found evidence to suggest that language evolution is systematic and structural in nature and linked to wider processes of economic and social change associated with industrialisation.

What are the wider implications of our results? We consider three issues: the significance of our findings for the substantive context of our study, the Anglo-Welsh poor law, the contribution of our study to the theory of legal evolution, and its methodological importance.

5.1 The nature of the poor law as a legal and economic institution

Recent historical studies have stressed the functionality and the relative generosity of the pre-1834 poor law, as well as its juridical nature: the poor law conferred rights and not simply discretionary benefits. There is a strong case for seeing the poor law as an institution which helped to promote labour mobility when a fundamental transformation in the British economy, from being an organic and rural one to an increasingly industrial and urban one, was getting underway. Yet this apparently central institution of the early modern market state was beginning to weaken in the second half of the eighteenth century and was to be swept aside in favour of the highly disciplinary workhouse model in the Poor Law Amendment Act of 1834. Our study suggests some reasons for the fragility of

the pre-1834 poor law. Competition between parishes to offload the costs of poor relief spilled over into the judicial arena, and when it did so, the courts responded in a 'pro-cyclical' fashion. Instead of maintaining poor relief rights in the face of economic downturns, which would have potentially mitigated business cycle trends, the courts intensified the social effects of recession and transition by cutting back on the entitlements of migrant workers and the working poor more generally.

5.2 The theory of legal evolution

The theory of legal evolution predicts that judicial decision making is likely to respond to external economic and social shocks, such as business cycle effects, as well as to longer-term transitions associated with changes in the technological and social bases of the relations of production, with litigation acting as the conduit between economic shocks and legal adjustments. Our study suggests that this evolutionary process can be studied at the level of the linguistic terms used by courts. Legal language is not simply a filter or mask for economic interests but rather a medium through which economic forces come to shape the substantive content of legal rules. The interaction of legal language with the wider, material context of the law would merit further study. Our findings leave open the question of the two-way nature of this interaction. While we found evidence of the law's response to economic changes, our results do not rule out reverse effects, which would imply the law's ability to shape the path of economic development. Possible co-evolutionary dynamics between law and the economy can be analysed in future work.

5.3 Methodological considerations: limitations and potential of computational approaches

We used computational techniques, including sentiment analysis, word embedding and topic modelling, to arrive at an understanding of the inherent or latent structure of a corpus of legal texts. These methods helped us to see what would otherwise be largely hidden, namely the existence of patterns across a linked population of cases. We used these techniques to show that case law displays evolutionary tendencies which are correlated with broader economic trends.

We suggest that these are significant findings from the perspective of socio-legal research methodology. Quantitative techniques can reveal patterns and structures which remain largely invisible or conjectural at the level of interpretive or qualitative analysis. At the same time, the study we have presented should not be understood as a turning away from interpretive and qualitative approaches. From the initial framing of hypotheses to the interpretation of results, qualitative

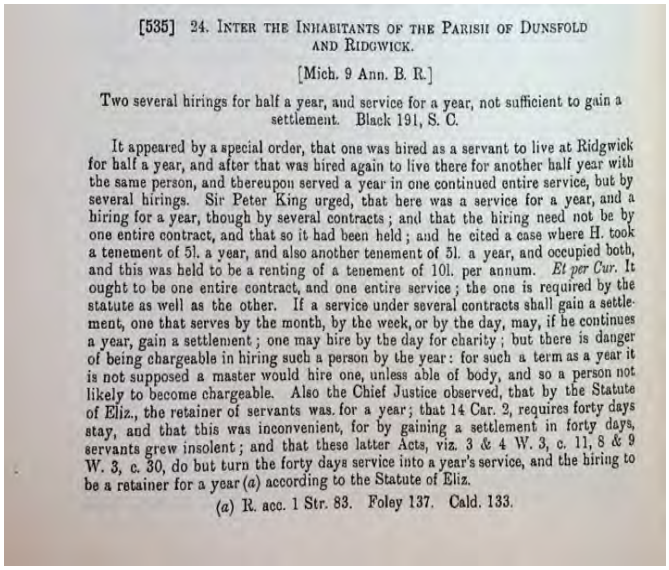
understandings of the issues at stake remain essential. At various points in the construction of quantitative data, statistical associations need to be cross-checked against domain-specific knowledge to see if they are coherent and valid. Thus, interpretive and computational methods should be understood as complements, not substitutes.

If the advantage of computational approaches is that they can reveal macro-level trends and structures across and within texts which would otherwise remain invisible, they also have a number of limitations. These stem from the fundamental nature of statistical algorithms, which are akin to what Daston describes as 'thin' rules, which are generic and rigid in their application. They 'assume a predictable, stable world in which all possibilities can be foreseen'. By contrast, legal concepts, making use of the complexity and variability inherent in natural language, are 'thick in formulation and flexible in application'.[70] They assume a world which is open and in a state of flux. Translating from text to data runs the risk of missing precisely this specificity and variability. Unless steps are taken to address this problem, econometric analyses which take machine-generated values as data points run the risk of generating false outcomes.

There are ways to address this issue at the level of methodology. One, we suggest, is for quantitative analyses to be more explicit in the need for human judgment in constructing and applying statistical models. Researchers have choices to make in the applications they use and in how they use them; these should be stated upfront. Secondly, results generated through computational approaches need to be cross-checked against legal understandings of the reference texts. This is best done where legal researchers and data scientists work together in the design and implementation of projects. With these caveats, computational methods can contribute significantly to foundational research on the law-economy relation.

Data Appendix

Figure A1. Example of a case in the dataset



[535] 24. INTER THE INHABITANTS OF THE PARISH OF DUNSFOLD AND RIDGWICK.

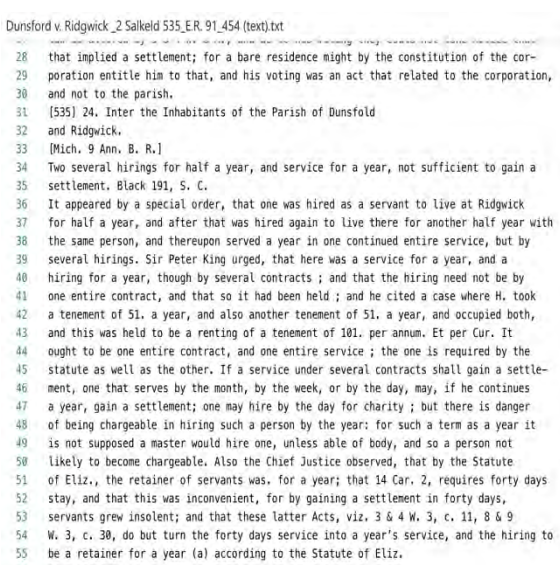
[Mich. 9 Ann. B. R.]

Two several hirings for half a year, and service for a year, not sufficient to gain a settlement. Black 191, S. C.

It appeared by a special order, that one was hired as a servant to live at Ridgwick for half a year, and after that was hired again to live there for another half year with the same person, and thereupon served a year in one continued entire service, but by several hirings. Sir Peter King urged, that here was a service for a year, and a hiring for a year, though by several contracts; and that the hiring need not be by one entire contract, and that so it had been held; and he cited a case where H. took a tenement of 5l. a year, and also another tenement of 5l. a year, and occupied both, and this was held to be a renting of a tenement of 10l. per annum. *Et per Cur.* It ought to be one entire contract, and one entire service; the one is required by the statute as well as the other. If a service under several contracts shall gain a settlement, one that serves by the month, by the week, or by the day, may, if he continues a year, gain a settlement; one may hire by the day for charity; but there is danger of being chargeable in hiring such a person by the year: for such a term as a year it is not supposed a master would hire one, unless able of body, and so a person not likely to become chargeable. Also the Chief Justice observed, that by the Statute of Eliz., the retainer of servants was. for a year; that 14 Car. 2, requires forty days stay, and that this was inconvenient, for by gaining a settlement in forty days, servants grew insolent; and that these latter Acts, viz. 3 & 4 W. 3, c. 11, 8 & 9 W. 3, c. 30, do but turn the forty days service into a year's service, and the hiring to be a retainer for a year (a) according to the Statute of Eliz.

(a) R. acc. 1 Str. 83. Foley 137. Cald. 133.

(a)



Dunsford v. Ridgwick _2 Salkeld 535_E.R. 91_454 (text).txt

that implied a settlement; for a bare residence might by the constitution of the corporation entitle him to that, and his voting was an act that related to the corporation, and not to the parish.

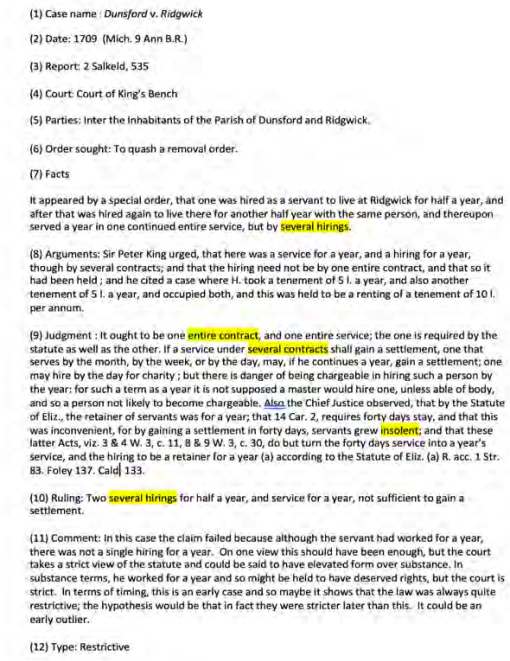
[535] 24. Inter the Inhabitants of the Parish of Dunsfold and Ridgwick.

[Mich. 9 Ann. B. R.]

Two several hirings for half a year, and service for a year, not sufficient to gain a settlement. Black 191, S. C.

It appeared by a special order, that one was hired as a servant to live at Ridgwick for half a year, and after that was hired again to live there for another half year with the same person, and thereupon served a year in one continued entire service, but by several hirings. Sir Peter King urged, that here was a service for a year, and a hiring for a year, though by several contracts ; and that the hiring need not be by one entire contract, and that so it had been held ; and he cited a case where H. took a tenement of 5l. a year, and also another tenement of 5l. a year, and occupied both, and this was held to be a renting of a tenement of 10l. per annum. Et per Cur. It ought to be one entire contract, and one entire service ; the one is required by the statute as well as the other. If a service under several contracts shall gain a settlement, one that serves by the month, by the week, or by the day, may, if he continues a year, gain a settlement; one may hire by the day for charity ; but there is danger of being chargeable in hiring such a person by the year: for such a term as a year it is not supposed a master would hire one, unless able of body, and so a person not likely to become chargeable. Also the Chief Justice observed, that by the Statute of Eliz., the retainer of servants was. for a year; that 14 Car. 2, requires forty days stay, and that this was inconvenient, for by gaining a settlement in forty days, servants grew insolent; and that these latter Acts, viz. 3 & 4 W. 3, c. 11, 8 & 9 W. 3, c. 30, do but turn the forty days service into a year's service, and the hiring to be a retainer for a year (a) according to the Statute of Eliz.

(b)



(1) Case name : *Dunsford* v. *Ridgwick*

(2) Date: 1709 (Mich. 9 Ann B.R.)

(3) Report: 2 Salkeld, 535

(4) Court: Court of King's Bench

(5) Parties: Inter the Inhabitants of the Parish of Dunsford and Ridgwick.

(6) Order sought: To quash a removal order.

(7) Facts

It appeared by a special order, that one was hired as a servant to live at Ridgwick for half a year, and after that was hired again to live there for another half year with the same person, and thereupon served a year in one continued entire service, but by several hirings.

(8) Arguments: Sir Peter King urged, that here was a service for a year, and a hiring for a year, though by several contracts; and that the hiring need not be by one entire contract, and that so it had been held ; and he cited a case where H. took a tenement of 5 l. a year, and also another tenement of 5 l. a year, and occupied both, and this was held to be a renting of a tenement of 10 l. per annum.

(9) Judgment : It ought to be one entire contract, and one entire service; the one is required by the statute as well as the other. If a service under several contracts shall gain a settlement, one that serves by the month, by the week, or by the day, may, if he continues a year, gain a settlement; one may hire by the day for charity ; but there is danger of being chargeable in hiring such a person by the year: for such a term as a year it is not supposed a master would hire one, unless able of body, and so a person not likely to become chargeable. Also the Chief Justice observed, that by the Statute of Eliz., the retainer of servants was for a year; that 14 Car. 2, requires forty days stay, and that this was inconvenient, for by gaining a settlement in forty days, servants grew insolent; and that these latter Acts, viz. 3 & 4 W. 3, c. 11, 8 & 9 W. 3, c. 30, do but turn the forty days service into a year's service, and the hiring to be a retainer for a year (a) according to the Statute of Eliz. (a) R. acc. 1 Str. 83. Foley 137. Cald 133.

(10) Ruling: Two several hirings for half a year, and service for a year, not sufficient to gain a settlement.

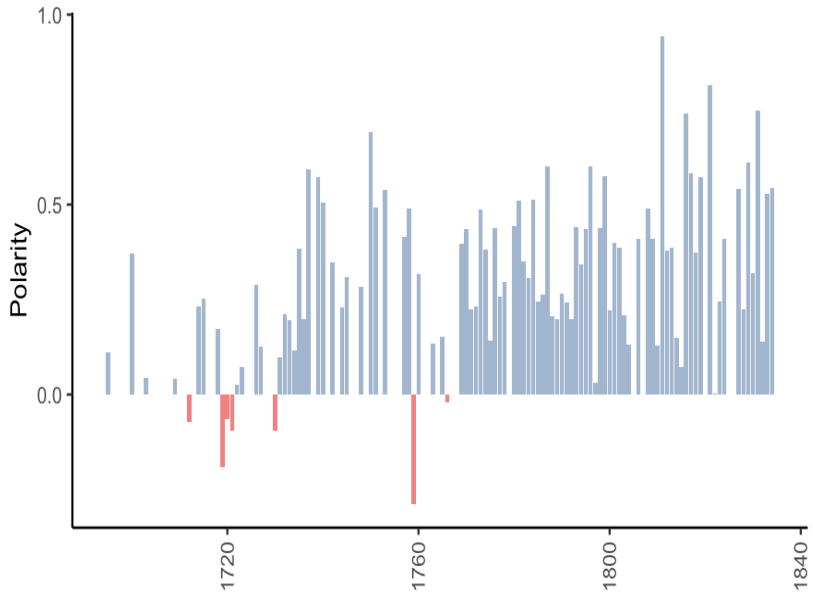
(11) Comment: In this case the claim failed because although the servant had worked for a year, there was not a single hiring for a year. On one view this should have been enough, but the court takes a strict view of the statute and could be said to have elevated form over substance. In substance terms, he worked for a year and so might be held to have deserved rights, but the court is strict. In terms of timing, this is an early case and so maybe it shows that the law was always quite restrictive; the hypothesis would be that in fact they were stricter later than this. It could be an early outlier.

(12) Type: Restrictive

(c)

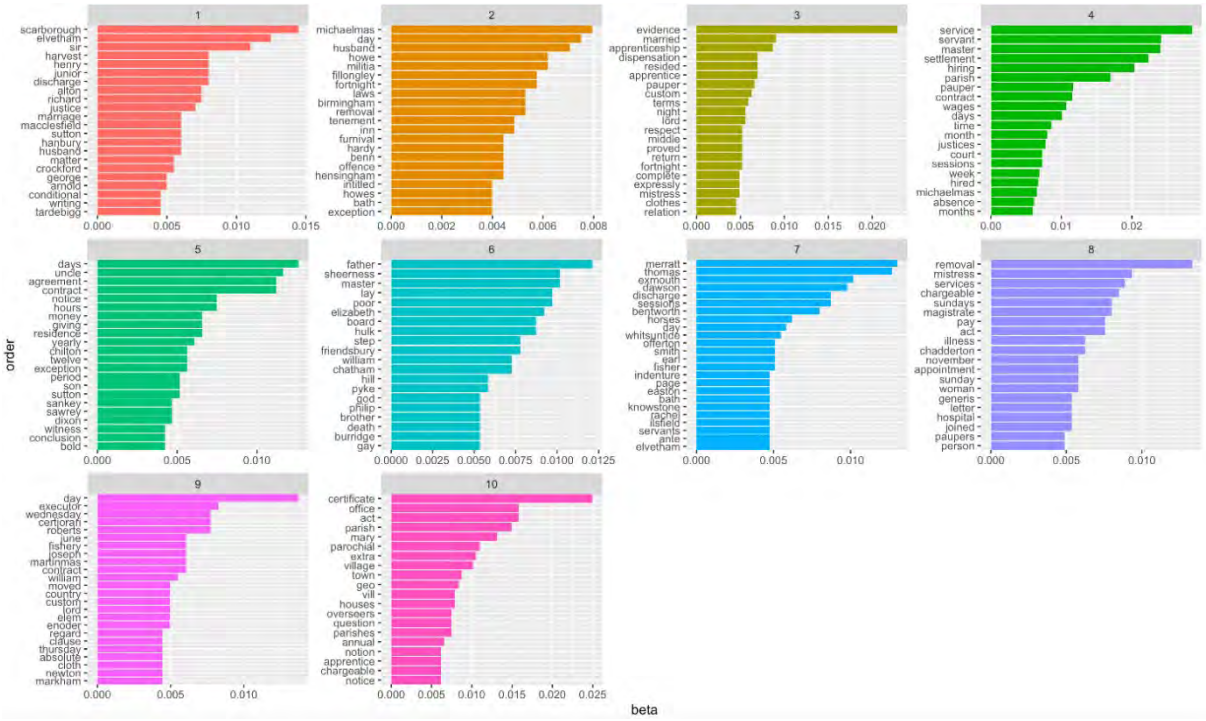
Note: Figure (a) shows the original source, (b) is the digitised version, and (c) is the same case annotated.
Source: see Table 1.

Figure A2. The evolution of the language over time – sentiment polarity



Source: see Table 1.

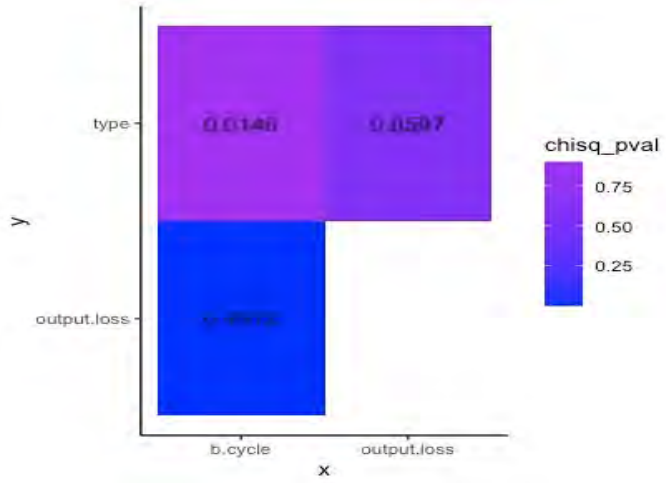
Figure A3: Top terms for top 10 topics generated by the LDA method



Source: see Table 1.

Figure A4

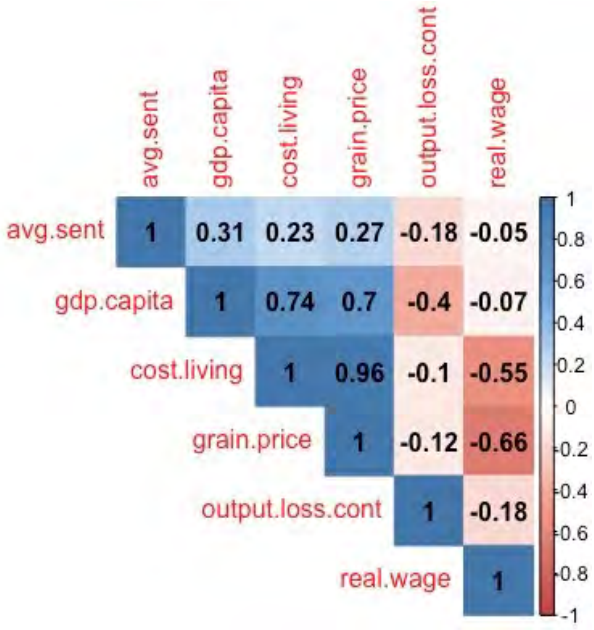
(a) Correlation matrix between categorical variables



Sources: see Tables 1 and 2.

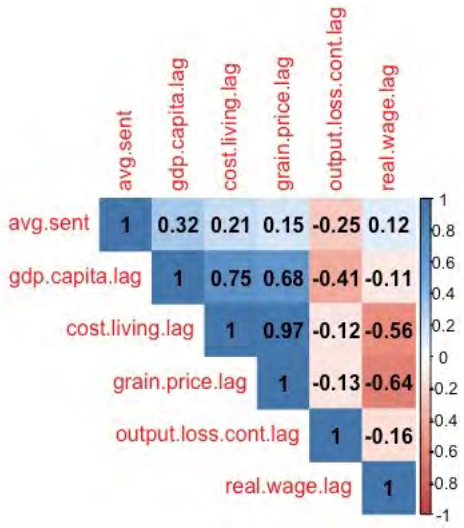
The correlation matrix of the 'dummy' or categorical variables contains the output loss defined as D=1 if greater than 3.5% of the GDP and 0 otherwise; the type of case defined as D=1 if restrictive and 0 otherwise; and the business cycle defined as D=1 if there is a recession and 0 otherwise. The graph reports Cramér's V statistic and the chi-squared p-value for statistical significance. The correlation between the business cycle and the case type is positive. This indicates that recessionary periods are correlated with periods that had predominantly restrictive cases. The correlation between output loss and the period type is also positive. Severe recessionary periods are correlated with periods with many restrictive cases.

(b) Correlation matrix between continuous variables



Sources: see Tables 1 and 3

(c) Correlation matrix between continuous variables - lagged



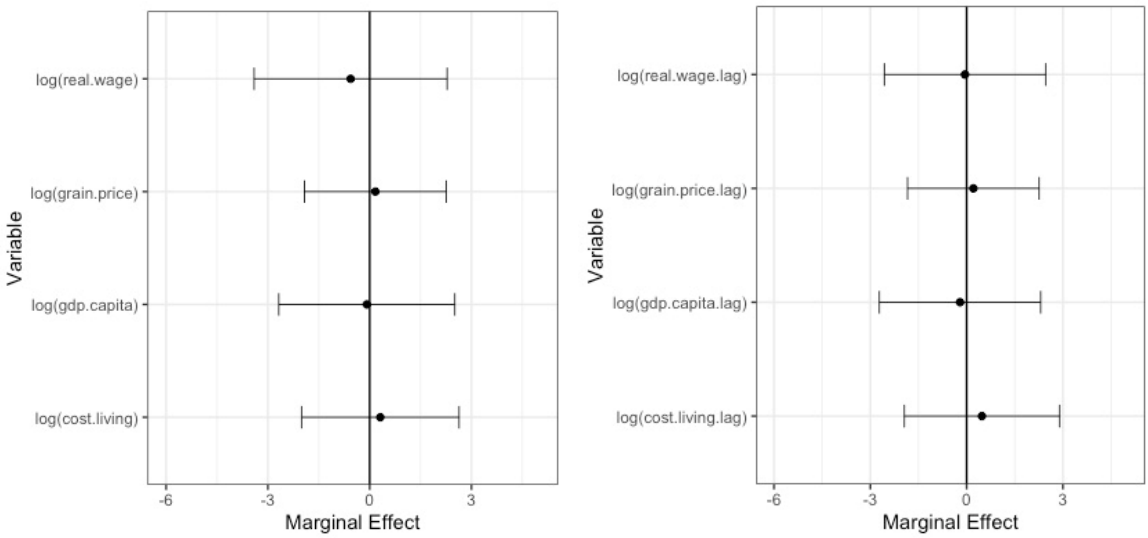
Source: see Tables 1 and 3

Figures (b) and (c) show the Pearson correlation matrix for the continuous variables. In this case, the primary variable of interest is the average sentiment, which is constructed using the dictionary method explained in section 3.2. An increase in this measure would imply that the language becomes more liberal and a decrease in that it is less so. In Figure (b), the correlation between average sentiment and GDP per capita, as well as the cost of living and grain prices,

is positive in each case. So, a unit increase in these measures is correlated with more liberal language. Output loss is negatively correlated with the average sentiment. So, during periods of economic downturn, courts used more restrictive language in their decisions on poor relief. In Figure (c), which shows the lagged relationship between variables, average sentiment is positively correlated with GDP per capita, cost of living, grain prices and real wages and negatively correlated with output loss. The results for the cost of living and grain prices are not entirely consistent with our hypothesis (grain prices may be an ambivalent indicator for reasons discussed in section 4.3), but the results for GDP growth and output loss are as expected.

Figure A5. Marginal effects of all variables: PROBIT model

(a) Marginal effects without lags (b) Marginal effects with lags



Sources: see Table 2.

Similarly to the regression equations, the sign of the coefficients in the graphs of the marginal effects does not change when adding the lagged measures; however, a slight change is noted in the magnitude of the coefficients. This difference does not appear to be accompanied by a difference in statistical significance between the two specifications of the model.

Table A1. PROBIT regression of economic indicators on case classifications – lagged

variable	case type		
	(1)	(2)	(3)
log.gdp.capita.lag	-0.79		-0.61
	(2.22)		(3.10)
log.cost.living.lag	2.35 **		1.42
	(1.08)		(2.93)
log.grain.price.lag		1.47 **	0.62
		(0.680	(2.51)
log.real.wage.lag		-0.12	-0.15
		(2.19)	(3.32)
intercept	-9.16 **	-1.74	-5.52
	(3.77)	(9.79)	(12.65)
N	72	72	72

Note: The results are generated through a standard PROBIT model where the binary dependent variable is specified as 1 if, in the specific year, the number of restrictive cases is greater than the number of liberal ones and 0 otherwise. The parameters are estimated using the maximum likelihood function. Standard errors are included in the parentheses. *p<0.10, **p<0.05, ***p<0.01.

Sources: see Table 2.

Table A2. OLS regression analysis of economic indicators on language evolution – lagged

variable					
	(1)	(2)	(3)	(4)	(5)
log.gdp.capita.lag	0.64 **		0.25		0.14
	(0.30)		(0.42)		(0.45)
log.cost.living.lag	- 0.02		0.31		0.33
	(0.14)		(0.39)		(0.41)
log.grain.price.lag		0.28 ***	-0.05		- 0.08
		(0.09)	(0.34)		(0.34)
log.real.wage.lag		0.86 ***	0.56		0.50
		(0.30)	(0.45)		(0.46)
b.cycle				-0.06	- 0.04
				(0.04)	(0.04)
output.loss.lag				- 0.01 **	- 0.009
				(0.007)	(0.008)
intercept	- 1.11 **	- 3.72 ***	- 4.04 **	0.33 ***	- 3.55 **
	(0.50)	(1.35)	(1.73)	(0.03)	(1.75)
N	72	72	72	72	72
Adj. R^2	0.08	0.1	0.09	0.03	0.04

Note: The dependent variable is language sentiment, which has a higher value if the sentiment is liberal. Standard errors are included in the parentheses. *p<0.10, **p<0.05, ***p<0.01.

Sources: see Table 2.

The results are largely the same as those without lags, although particularly when focusing on recessions and output loss, the effect is larger, and there is a gain in statistical significance. The results are lagged for one period only. This is so because, primarily, we believe that one year was sufficient for economic changes to be internalised in the approach of the courts. Additionally, analysis with additional lags would further decrease our sample size. We performed regression analysis where the output loss is taken as a dummy variable, which would take the value of 1 if the output loss was larger than the average and 0 otherwise. The outcome was the same, but to avoid reporting similar output repeatedly, we only provide the analysis where the output loss is taken as a continuous measure.

Notes

1 B. Waddell, 'The Rise of the Parish Welfare State in England, c. 1600-1800' (2021) 253 *Past and Present* 151, at p. 152.

2 P. Solar, 'Poor Relief and English Economic Development before the Industrial Revolution' (1995) 48 *Economic History Review* (NS) 1.

3 L. Charlesworth, *Welfare's Forgotten Past: A Socio-Legal History of the Poor Law* (2010).

4 E.A. Wrigley, *Continuity, Chance and Change: The Nature of the Industrial Revolution in England* (1988). On the implications of the shift from water to steam power, dependent on the extraction of coal, see A. Malm, *Fossil Capital: The Rise of Steam Power and the Roots of Global Warming* (2016).

5 S. Deakin, 'The Contract of Employment: A Study in Legal Evolution' (2001) 11 *Historical Studies in Industrial Relations* 1.

6 K.D.M. Snell, *Annals of the Labouring Poor: Social Change and Agrarian England* (1987), ch. 2.

7 For an overview of NLP methods and their relevance to law, see C. Markou and S. Deakin, 'Ex Machina Lex: Exploring the Limits of Legal Computability', in S. Deakin and C. Markou (eds.) *Is Law Computable? Critical Perspective and Law and Artificial Intelligence* (2020).

8 K. Tanaka-Ishii, *Statistical Universals of Language: Mathematical Chance vs. Human Choice* (2021), chs. 1-3.

9 Markou and Deakin, 'Ex Machina Lex'.

10 Representative works include N. Aletras, D. Tsarapatsanis, D. Preotiuc-Pietro and V. Lampos, 'Predicting Judicial Decisions of the European Court of Human Rights: A Natural Language Processing Perspective' (2016) *PeerJ Computer Science 2e93* https://doi.org/10.7717/peerj-cs.93; I. Chalkidis, I. Androutsopoulos and N. Aletras, 'Neural Legal Judgment Prediction in English' (2019) *Proceedings of the 57th Annual Meeting of the Association for Computational Linguistics* 4317; M. Medvedeva, M. Wieling and M. Vols, 'Using Machine Learning to Predict Decisions of the European Court of Human Rights' (2020) 28 *Artificial Intelligence and Law* 237; M. Medvedeva, M. Wieling and M. Vols, 'Rethinking the Field of Automatic Prediction of Court Decisions' (2023) 31 *Artificial Intelligence and Law* 195.

11 For recent surveys see E. Ash and S. Hansen, 'Text Algorithms in Economics' (2023) 15 *Annual Review of Economics* 659; P. Grajzl and P. Murrell, 'Combining Machine Learning and Econometrics to Examine the Historical Roots of Institutions and Cultures', in C. Ménard and M. Shirley (eds.) *Handbook of New Institutional Economics* (2024).

12 A. Supiot, *La gouvernance par les nombres* (2015).

13 On the roots of the Scottish poor law, see R. Mitchison, *The Old Poor Law in Scotland: the Experience of Poverty, 1574-1845* (2000), and on its later development, A. Paterson, 'The Poor Law in Nineteenth Century Scotland', in D. Fraser (ed.) *The New Poor Law in the Nineteenth Century* (1976); on the Irish poor law, see V. Crossman, *The Poor Law in Ireland 1838-1948* (2006).

14 On the historical development of the Anglo-Welsh poor law, see L. Charlesworth, 'Poor Laws in English Common Law', in S. Katz (ed.) *The Oxford International Encyclopaedia of Legal History* (2009). The foundational work of Sidney and Beatrice Webb, *English Poor Law Policy* (1910) remains an important point of reference, although the negative view the Webbs took of the old poor law has been qualified by an understanding that it was both more generous and more functional than they had argued (see in particular, Solar, 'Poor Lw and Economic Development in England' and Snell, *Annals of the Labouring Poor*). The Webbs also underplayed the significance of the poor law as a legal institution: see Charlesworth, *Welfare's Forgotten Past*.

15 The precise form taken by relief was determined locally and could include 'wages, assistance for large families, provision of housing, apprenticeships for pauper children, and extra payments as an allowance system to top up depressed wages': Charlesworth, 'Poor Laws'.

16 M. Dalton, *The Country Justice: Containing the Practice, Duty and Power of the Justices of the Peace, as Well in as Out of their Sessions* (1746), at p. 164.

17 On the significance of the poor law for the legal institution of wage labour and the related emergence of a modern labour market in Britain, see S. Deakin and F. Wilkinson, *The Law of the Labour Market: Industrialization, Employment, and Legal Evolution* (2005), at pp. 112-130; on the poor law as a framework for labour migration, see D. Feldman, 'Migrants, Immigrants and Welfare from the Old Poor Law to the Welfare State' (2003) 13 *Transactions of the Royal Historical Society* 79.

18 43 Eliz I c. 2, s. 1.

19 Charlesworth, *Welfare's Forgotten Past*, at p. 2.

20 3 William & Mary c. 11.

21 8 & 9 William III c. 30.

22 Ibid.

23 On the origins of the power to remove in the Settlement Act of 1662 (13 &14 Charles II c. 12), and the mode of its operation, see Charlesworth, 'Poor Laws'; Deakin and Wilkinson, *The Law of the Labour Market*, at p. 116.

24 See Charlesworth, 'Poor Laws': 'any settled pauper denied aid could assert a common-law right to relief by applying in person to a magistrate. That magistrate had the authority to issue an order to the overseer for aid if he was satisfied about the destitution of the applicant. The overseer could be indicted for failing to honour such an order'.

25 By virtue of s. 1 of the 1662 Act, an individual facing removal 'had the opportunity to produce or procure a certificate or indemnity from his settled parish to give security to the examining parish': Charlesworth, 'Poor Laws'. On the certificate system, see P. Styles, 'The Evolution of the Law of Settlement' (1963-64) 9 *University of Birmingham Historical Journal* 32.

26 *Brightwell* v. *Westhallam* (1714) Foley 143; *R.* v. *Aynhoe* (1727) 2 Ld. Raym. 1521.

27 *Silverton* v. *Ashton* (1714) Foley 188.

28 Under the Act of 1662, a writ for removal had to be moved within 40 days of a person's arrival in the parish or, from 1685, within 40 days of notice being given of their arrival.

29 *Dunsford* v. *Ridgwick* (1711) 2 Salk. 535.

30 *R.* v. *Islip* (1720) 1 Str. 423.

31 *R.* v. *Great Chilton* (1794) 5 Term Rep. 672.

32 On the sidelining of the earlier authorities, see the judgment of Lord Ellenborough CJ in *R.* v. *King's Pyon* (1803) 3 East 351, 354.

33 See P. Stein, *Legal Evolution: The Story of an Idea* (1980).

34 The locus classicus for this view of precedent remains K. Llewellyn, *The Bramble Bush* (1930).

35 See, for example, the dispute over the standing of the concept of the 'dispensation' and its later evasion via the concept of the 'exception', discussed above; Deakin and Wilkinson, *Law of the Labour Market*, at pp. 122-123.

36 On the sense in which law and legal reasoning pervaded all aspects of the administration of poor relief, see Charlesworth, *Welfare's Forgotten Past*. In addition to Dalton's *Country Justice*, dating originally from 1618, poor law treatises in wide circulation included R. Burn, *The Justice of the Peace and Parish Officer*, first published in 1755, and, subsequently, M. Nolan, *A Treatise of the Laws for the Settlement and Relief of the Poor*, first published in 1805.

37 Nominate reports containing settlement cases included Caldecott, Carthew, Douglas, East, Fortescue, Modern Reports, Salkeld, Strange, and Term Reports.

38 Most notably the volume of settlement cases published by the law reporter and sometime president of the Royal Society Sir James Burrow, *Decisions of the Court of King's Bench, upon Settlement-Cases; from the Death of Lord Raymond, in March 1772, to June 1776, Inclusive* (1786).

39 See, for example, Lord Ellenborough's judgment in *R.* v. *King's Pyon* (1803) 4 East 351, 354, on the dispensation cases: 'I should not wish to carry the idea of dispensation any further than it has been already carried; which in many of the cases seems to me to have been stretched as far as ingenuity could go'.

40 Stein, *Legal Evolution*.

41 P. Rubin, 'Why is the Common Law Efficient?' (1977) 6 *Journal of Legal Studies* 51; G. Priest, 'The Common Law Process and the Selection of Efficient Rules' (1977) 6 *Journal of Legal Studies* 65.

42 Priest's claim that common law evolution will tend to produce rules that are optimal in the sense of being economically efficient depends on assumptions that are unlikely to be realised in practice. Litigants will have incentives to minimise their own private costs, and this will only lead to the elimination of social costs if transaction costs are zero or nearly so. The rules produced by evolution are likely then to reflect the preferences of wealthier litigants and repeat players. See M. Galanter, 'Why the Haves Come Out Ahead: speculation on the Limits of Legal Change' (1974) 9 *Law & Society Review* 95.

43 Priest's neglect of the role of precedent in acting as the legal equivalent to inheritance of retention in the evolutionary variation-selection-retention ('VSR') algorithm is a further reason to doubt that inefficient rules simply get purged. Once a role for precedent is factored in, it is likely that legal rules will display lock-in effects and path dependencies of various kinds, placing a limit on any evolution to efficiency. See S. Deakin, 'Evolution for Our Time: A Theory of Legal Memetics' (2002) 55 *Current Legal Problems* 1. However, it does not follow, from the absence of evolution to efficiency, that legal evolution cannot occur. The Darwinian theory of evolution, when understood is its entirety, is non-teleological. If institutional evolution, like evolution in nature, is emergent and non-teleological, evolution in law may be a good use case for the wider theory. Even in the absence of optimal rules, Priest's suggestion that litigation acts as the equivalent to selection in the VSR algorithm remains testable.

44 Waddell, 'The Rise of the Parish Welfare State'.

45 Snell, *Annals of the Labouring Poor*.

46 On the rise of wage subsidies, associated with the so-called Speenhamland system, from the middle of the 1790s, see Snell, *Annals of the Labouring Poor*, and Deakin and Wilkinson, *The Law of the Labour Market*, at pp. 126-134.

47 Sir Thomas Hay MP, *Remarks on the Laws Relating to the Poor* (1735), cited in Feldman, 'Migrants, Immigrants and Welfare', at p. 86.

48 Norma Landau, 'The Regulation of Immigration, Economic Structures and Definitions of the Poor in Eighteenth Century England' (1990) 33 *Historical Journal* 541; Feldman, 'Migrants, Immigrants and Welfare', at p. 86.

49 See Charlesworth, *Welfare's Forgotten Past*, ch. 1.

50 The dataset of annotated cases is archived with the UK Data Service: S. Deakin, L. Shuku and V. Cheok, *English Poor Law Cases, 1690-1815*. [Data Collection]. Colchester, Essex: UK Data Service, 2024, 10.5255/UKDA-SN-856924.

51 *R.* v, *Fifehead Magdalen* (1737) Burr S.C. 116, 118.

52 ‘Liberal’ decisions, in the sense that we describe them, can be seen as benefiting migrant workers *in general*, who could move from one locality to another with greater confidence in retaining settlement rights in the places where they worked. They can also be understood as requiring parishes which received migrant workers to internalise certain of the costs (in terms of the risks of destitution arising from unemployment and work-related injury and illness) of their economic development. That the law turned in part on the idea of reciprocity between employer and worker, and the justice of requiring localities which benefited from economic growth to internalise the resulting costs, was recognised at the time, with the court being sensitive to the possibility of employers and parish officials ‘colluding’ to avoid a settlement by hiring; see, e.g., *R.* v. *North Basham* (1785) Cald. 566.

53 In principle, a claimant was entitled to receive relief somewhere, with the parish of their birth being the default option, so the decision on chargeability affected the parish rather than the claimant. In practice, individuals and households facing removal would, in many cases, have experienced extreme disruption to living arrangements and no guarantee of the level of support they might receive from the ‘home’ parish, but we do not have direct evidence on this point. The implications of removal for overall poor law expenditure are also somewhat unclear. It is possible that removal from a wealthier, more industrialised, more populated and/or urban parish to a less developed rural one would have led to less *overall* expenditure, given likely variations in the extent of poor relief provided, but this cannot be known from our data. Thus, our analysis is limited to studying the impact of chargeability on *individual* parishes. Cost-sharing between parishes was possible on a limited basis before 1834 but only became regularised under the regime of the new poor law, with parishes grouped into the larger units of ‘hundreds’ for administrative purposes.

54 See T. Rinker, ‘sentimentr’, available at https://github.com/trinker/sentimentr.

55 These examples are taken from *R.* v. *Great Chilton* (1794) 5 Term Rep. 672.

56 On the role of ‘domain expertise’ in interpreting results derived from NLP and ML, see C. McCue, *Data Mining and Predictive Analysis* (2007), at pp. 19-20: domain expertise is ‘essential’ in computational analysis since ‘much of the discovery and evaluation process is guided by an intuitive knowledge of what has value, both in terms of input and output, as well as of what makes sense. With a poor understanding of where the information came from and what the results will be used for, the analytical products are unlikely to have much, if any, value. Briefly stated, domain expertise is used to evaluate the inputs, guide the process, and evaluate the end products within the context of value and validity.’

57 On GloVe, see Ash and Hansen, 'Text Algorithms in Economics'.

58 For this purpose, we analyse not just the judgment texts but also the facts of the case and the arguments of counsel. It is important to include the facts of the case as these are not a neutral description of events but an ordering of them which will tend to highlight certain features as opposed to others. The arguments of counsel anticipate to a large extent those which the judges choose to adopt or reject as the case may be; thus they are a significant source of information on the evolution of language use, just as the judgments themselves are.

59 The scoring is enabled by the build function of the dictionary method we used in the analysis, which is executed by using the 'packman' package in R.

60 On topic modelling to study legal-historical texts, see P. Grajzl and P. Murrell, 'A Machine-Learning History of English Caselaw and Legal Ideas Prior to the Industrial Revolution I: Generating and Interpreting the Estimates' (2020) 17 *Journal of Institutional Economics* 1; id., 'A Machine-Learning History of English Caselaw and Legal Ideas Prior to the Industrial Revolution II: Applications' (2020) 17 *Journal of Institutional Economics* 201.

61 S. Broadberry, B. Campbell, A. Klein, M. Overton and B. van Leeuwen, *British Economic Growth, 1270-1870* (2015).

62 G. Clark, 'Farm Wages and Living Standards in the Industrial Revolution: England, 1670-1869' (2001) 54 *Economic History Review* 477.

63 G. Clark, 'The Price History of English Agriculture, 1209-1914' (2004) 22 *Research in Economic History* 124. Clark's dataset uses a weighted average with a 2:1:1 ratio for wheat, barley, and oats, respectively.

64 S. Broadberry, J. Chadha, J. Lennard and R. Thomas, 'Dating Business Cycles in the United Kingdom. 1700-2010' ESCoE Discussion Paper 2022-16.

65 S. Broadberry, B. Campbell, A. Klein, M. Overton and B. Van Leeuwen, 'British Business Cycles, 1270-1870' (2022) *Oxford Economic and Social History Working Papers* No. 198.

66 This data is drawn from Broadberry, Campbell, et al., 'British Business Cycles, 1270-1870'.

67 See Data Appendix Figure A4.

68 Cases are aggregated at year level because this is how each of the economic variables is measured. This is also why the number of cases in the regression analysis is less than the total number of cases in the dataset. We label a year as being 'restrictive' if, in a typical year, we had more 'restrictive' cases than 'liberal' ones. If, in a particular year, the number of cases in these two categories was the same, we label that year in the same way as the previous one. This is to assume some degree of persistence in judicial attitudes in the short term. Such instances were very few. The number of cases per year is not constant, but, as Figure 5 shows, this variability is not correlated to changes in economic conditions.

69 Periods of increasing grain prices could be a sign of a growing and more prosperous economy, which would encourage 'host' parishes to be more generous in their treatment of migrant workers and so less inclined to argue for restrictive outcomes in settlement cases. This is a question that can be explored in more depth in future research.

70 L. Daston, *Rules: A Short History of What We Live By* (2022), at p. 3.