

# The Pursuit of Objectivity:

## Philosophies of Science

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How close to the truth can we hope  
to get?

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# What is the authority of science?

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- Science is a norm for secure knowledge.
- Establish validity on logical foundations.
- But two centuries' quest for objectivity:
  - Suggests that knowledge is inescapably *insecure*.
  - How insecure? Two views:
    - Not quite secure.
    - Radically insecure.

# Good knowledge vs. bad knowledge? demarcation principles

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- **Max Weber:** Facts vs. Values (Is vs. Ought)
- **Logical Positivists (Vienna Circle) :** Sense [impressions] vs. Nonsense
- **Logical Empiricists:** Confirmed vs. Unverified
- **Karl Popper:** Falsifiable vs. not-Falsifiable: Science vs. Metaphysics
- **Imre Lakatos:** Protective Belt vs. Hard Core
- **Thomas Kuhn:**
  - Pre-scientific vs. Scientific.
  - Normal science vs. scientific revolution.
- **Paul Feyerabend:** No demarcation. Anything goes!!
- **Edinburgh School:** No knowledge. Social construction.



# David Hume (1711-1776): Scepticism

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Our sense impressions -- the only things we know for sure.

- **General to Particular.** [‘analytical’ truths]
  - Starting from premises, every deduction can be shown to be true. But no more true than the premises. [**Deduction**] e.g. ‘all swans are white’. If this is a swan → it is [necessarily] white.
- **Particular to general.** [‘synthetic’ truths]
  - Sense impressions suggest that observation is true. But cannot *prove* it is *always* true. [**Induction**] ‘this swan is white → all swans are white’
- **We know neither for sure.**
- Is mathematics an exception?
- Subsequent philosophy of science is an effort to wriggle out of this conundrum. **Failure.** So far.

# Logical Positivism

- **Foundations.** Quest for ‘foundations’, for solid ground. Hilbert’s Paris programme in mathematics (1900): ‘every mathematical problem has an exact settlement.’ Russell and Whitehead, *Principia Mathematica* (1914).
- Primacy of **Observation**.
- **Wittgenstein:** ‘Of that which one cannot speak of, one must remain silent’ [1922]
- **Science:** *Verification* by means of sense impression.
- Three types of **statements**:
  - **Scientific** (i.e. **verifiable** by means of sense impressions) [synthetic]
  - **Circular** (i.e. logical or mathematical) [analytic]
  - **Nonsense** (i.e. not verifiable) [metaphysical]



# Logical empiricism and ‘Covering Law’ method of explanation [Hempel]

- Not ‘from facts to theory’ but ‘from theory to facts’
- Not *inductive*, but '**hypothetico-deductive**'
  - **Explanans** = covering law + initial conditions
  - **Explanandum** = thing to be explained
  - **Prediction** = *if initial conditions exist, then covering law predicts/explains explanandum.*

# Scientific models

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- **Explanans:** Combination of *axioms* and *logical rules* which combine to produce scientific laws with observable outcomes.
- Has **deterministic** form. *If  $x$ , then always  $y$ .*
  - Successful **prediction/observation** is a **Verification**, or more weakly,
- Probabilistic form: a **Confirmation**, which increases probability [truth value] of explanans.



# Explanation and Prediction

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- **Explanandum:** Different suicide rates in European countries.
- **Explanans: Durkheim's theory of suicide**
  - **Covering law:** Suicide rate co-varies with individualism.
  - **Protestantism** a proxy for individualism.
  - **Initial conditions:** Sweden Protestant, Spain is not
- **Prediction:** Suicide rate in Sweden will be higher than in Spain. *Counter-intuitive?*
- If observed, constitutes a **confirmation** of Durkheim's theory.

# What's wrong with logical empiricism?

-How good is the proxy?

How stable is the

Association?



FIG. 2. My Wife and My Mother-in-Law

# Problems with Confirmation

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- Sense impressions are subjective and fallible.
- Observation is not independent of theory.
- Concepts may have no observational analogues (quarks, quanta)
- **Duhem-Quine problem**: Argument taken as a whole. If no confirmation, does blame lie with - observation, theory, some auxiliary assumption, values, beliefs?
- E.g. **anomalies**: if suicide in one Protestant country lower, what is to blame?
- **Underdetermination** of theory by facts. More than one theory can ‘explain’ the same observations.
  - Unacknowledged problem for economics. E.g. statistical significance not sufficient, if there are other possible theories.

# Problems with logical positivism

## **-Mathematics: Gödel's Theorem. (1932)**

‘Within any given branch of mathematics, there would always be some propositions that couldn't be proven either true or false using the rules and axioms ... of that mathematical branch itself....The implication is that *all* logical system of any complexity are, by definition, incomplete; each of them contains, at any given time, more true statements than it can possibly prove according to its own defining set of rules.

[Jones and Wilson, *Incomplete Education* (1988)]

## **-Turing-Church Thesis (1936)**

‘Turing machine’ could solve any solvable problem, but could not prove that a proof existed for every true statement.

Non-computable problems: no existing algorithm can solve.

E.g. correctness of software. Tiling a room.

# But -- *Confirmation*

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- Not abandoned by scientists... [descriptively appealing]
- e.g. ‘testing’ of models in economics is *confirmation*; Bayesian updating is *confirmation*.

$$Y_i = \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon$$

- ‘Inference to the Best Explanation’

Actual explanation is the best we can think of. Imputed facts and laws are real. Good explanation has probative value. E.P. Thompson and Capitalism. Chomsky and universal grammar. [*good* explanations are scarce. Constrained by the state of the world]

- Implies realism and truth.
- Tough minded, common-sense, unsentimental.
- Confirmation is the dreaded ‘Positivism’.
- Too soon to give it up?



# Karl Popper: Falsification

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- **Hume's problem of induction: no amount of confirmation can achieve certainty.**
- **But theory can be *falsified* with certainty.**
- **'All swans are white' -- falsifiable, but not verifiable.**
- **'Confirmed' theory is not truth, but merely conjecture.**

# Falsification (continued)

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- **Good theory**
  - **forbids certain states of the world.**
    - If they exist, theory falsified.
  - makes bold predictions.
  - resists falsification.
  - Scientists should not seek to confirm their theories, but to falsify them!
- A theory that resists falsification acquires ‘**versimilitude**’ [IBE?]
- Falsification demarcates **Science** from **Metaphysics**.
- Is falsification **normative** or **descriptive**?



# Critiques of Popper

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- Duhem-Quine. No such thing as crucial experiment, with other things kept equal. **Underdetermination** of theory by facts. Facts cannot select among theories.
- Observation fallible, so cannot reject theories absolutely.
- Survival of falsification tests is rather like confirmation, i.e. induction.
- Some science does not conform to falsification model, e.g. theory of evolution:
  - 'survival of the fittest' not falsifiable, but circular.
  - Do scientists really strive to overthrow their own theories?
  - Scientific practice often 'confirmationist'
    - **Is falsification falsifiable? [is it 'reflexive']?**

# In practice

- Construct **falsifiable** theories. Must exclude some states of the world.
- Theories must be **consistent**.
- Try to increase **number of observations**.
- Get **more observations than variables** [causes]; **include** relevant ones, **exclude** irrelevant ones.
- Get **variables that vary** (include controls)
- Seek for **encompassing** explanations. Avoid overdetermination

King, Keohane, Verba, *Designing Social Inquiry* (1994).

# Lakatos: Scientific Research Programmes

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- ‘contrary to naive falsificationism, no experiment, experimental report or well-corroborated low-level falsifying hypothesis alone can lead to falsification.’**
- **Hard Core** (immutable)
  - **Protective Belt** (exposed and changeable)
    - 'there is no falsification before the emergence of better theory.'
  - **Progressive Problem shifts** (positive heuristic)
  - **Regressive problem shift** (negative heuristic)
  - **Old theories never die.**



# Crisis of Objectivity: Thomas Kuhn (1962)

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**Newton: 'Natura non facit saltum' : nature does not proceed by leaps.**

- **Kuhn: Growth of knowledge not a *logical* process but a *social* one.**
- **Pre-science: 'All facts seem equally important'**
- **Paradigms: Newton, Adam Smith, Darwin, Einstein**
- **Normal science: 'puzzle solving'.**
- **Arbiter is peer consensus.**
  - ***Paradigm* defined by institutions: textbooks, departments, degrees, appointments, promotions, journals, conferences, honours.**


# Scientific Revolutions (contd.)

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- **Anomalies**  $\implies$  **Crisis**  $\implies$  **New Paradigm.**
  - 'Gestalt Switch' [*like wife & mother-in-law*]
  - No 'crucial experiment'
  - Generational shift
- **Critiques:**
  - Scale: what is boundary of normal science and paradigm shift?
  - Normative or descriptive? *is* or *ought*?
  - How should science be done?



# Paul Feyerabend: Against Method.



- **Science not objective, disinterested or detached.**
- **Fudges results.**
- **Not superior to other types of knowledge, which also achieve reliable results, e.g. acupuncture.**
- **Hence no need for demarcation.**



# e.g., Science vs. Roman Catholic Church (consequentialism?)

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- **RCC makes good sense of the world.**
- **Consequences more important than ‘truth’**
  - **Compare Consequences: Atom Bomb vs. Cathedrals.**
  - **Social impact: Stable society vs. competitive frenzy**
  - **Subjective well-being: anomie vs. integration**
  - **Internal, aesthetic coherence? Science indifferent to human welfare.**
- **‘this almost universal urge for objective guidance is somewhat of a puzzle for me’**
- Knowledge essentially a **social construct?**
- Epistemic benefits may have damaging human consequences

# Social Construction of Science

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- No truth apart from social acceptance
- ‘Symmetry’: no system of belief is constrained by reason or reality, none is ‘privileged’.
- Social structure of science affects how research is transmitted and received
- Social context and structure determines what questions and what answers are important and significant.

# Against Feyerabend

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- Commitment to truth a pre-requisite of communication.
- Opposite of truth is not fulfilment, but deception.
- Without truth as arbiter,
  - anarchy leads to tyranny
  - might becomes right.

'If anything goes, everthing stays'

- **'Good science must be indifferent to consequences'** - *Discuss.*
  - the case of Benny Morris.
  - Epistemic benefits – at what cost? Up to what point?

# social construction deconstructed

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- Contingency: was the course of a particular science *inevitable*? were other routes possible?
- Nominalism: ‘a rose is a rose by any other name’? are the ‘facts’ independent of their description?
- If knowledge is temporally specific, why does it persist? Maxwell T-shirt might go out of fashion, but the equations are eternal [?]
- Deconstructing social construction: is it hostile to science?

# Growth of Knowledge

- Still beyond our grasp?
- A final theory of knowledge will be the end of knowledge? Nothing more to know.
- Good Theory: a parsimonious account of some aspect of the world.
- ‘How well does it fit with the facts?’ completeness, power, detail
- Concise, simple, elegant.. [why?]
- Accounting for [‘encompassing’] other theories?
  - Accounts for more existing facts.
  - Predicts entirely new facts.

**R E P O R T S**  
**FROM**  
**COMMISSIONERS:**  
**TWENTY-TWO VOLUMES.**

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—(9.)—

**POOR LAWS.**

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**Session**

**4 February—15 August 1834.**

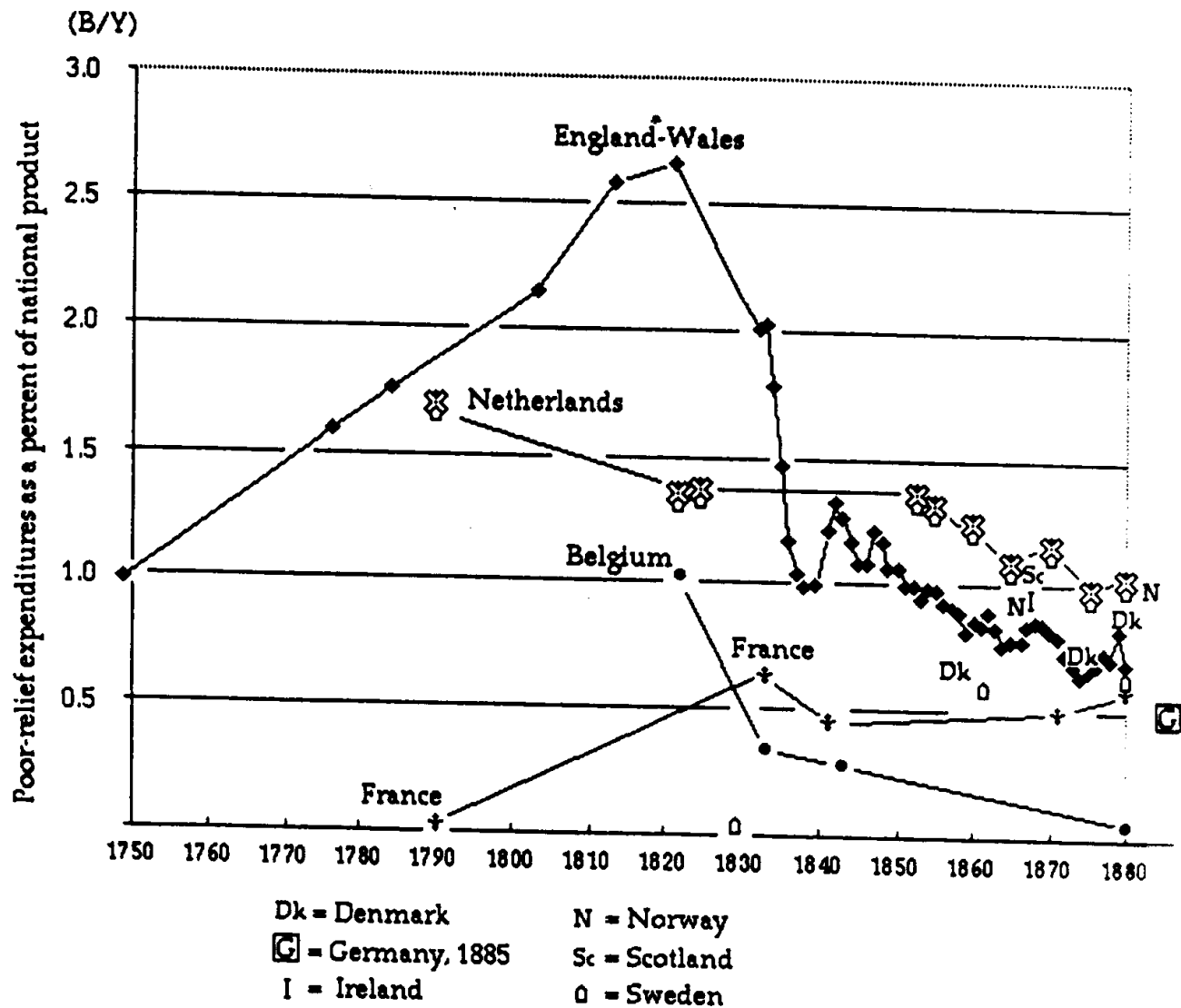
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**VOL. XXVII.**

[*Indigence vs Poverty*]      [Basis of entitlement]

In all extensive civilized communities, therefore, the occurrence of extreme necessity is prevented by alms-giving, by public institutions supported by endowments or voluntary contributions, or by a provision partly voluntary and partly compulsory, or by a provision entirely compulsory, which may exclude the pretext of mendicancy.

But in no part of Europe except England has it been thought fit that the provision, whether compulsory or voluntary, should be applied to more than the relief of *indigence*, the state of a person unable to labour, or unable to obtain, in return for his labour, the means of subsistence. It has never been deemed expedient that the provision should extend to the relief of *poverty*; that is, the state of one who, in order to obtain a mere subsistence, is forced to have recourse to labour.



Lindert,  
1998

Figure 2. *Poor relief expenditures as a share of national product, selected countries, 1750–1880.*

Notes and sources: See notes to Table 2.



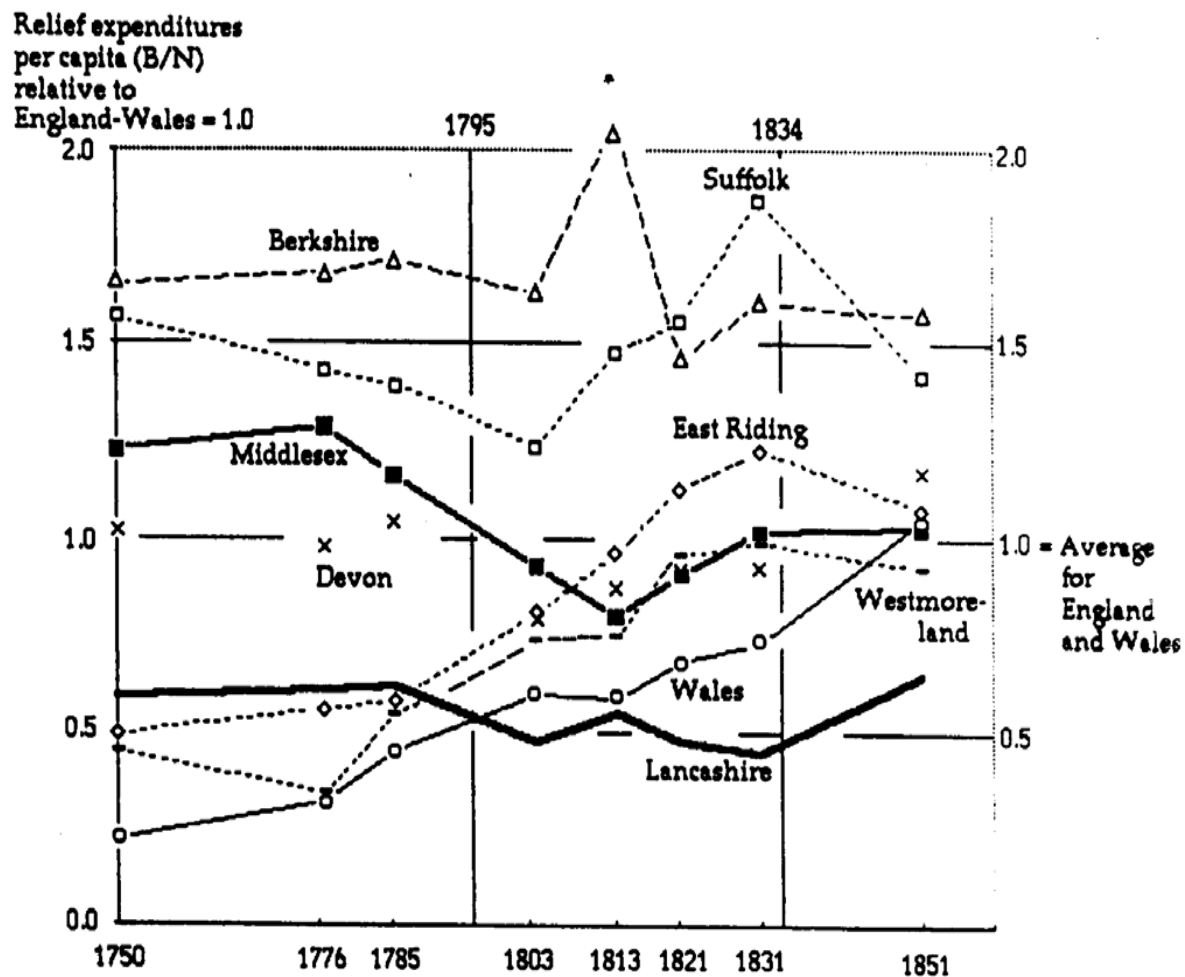


Figure 3. *Spatial differences in poor relief per capita (B/N) in England and Wales, 1750–1851.*

Sources: Expenditures through 1831: Marshall (1833, pp. 34–41).

For 1851: Fourth Annual Report of the Commissioners for Administering the Laws of Relief of the Poor in England, in Parliamentary Sessional Papers, 1852, xxiii, pp. 1ff.

Population of counties and of England and Wales, 1751–81: Deane and Cole (1969, p. 103).

Population, 1801–51: Mitchell (1988, pp. 26–31).

Lindert,  
1998

## [PRINCIPLE OF ADMINISTERING RELIEF TO THE INDIGENT] [Incentives]

THE first and most essential of all conditions, a principle which we find universally admitted, even by those whose practice is at variance with it, is that his situation on the whole shall not be made really or apparently so eligible as the situation of the independent labourer of the lowest class. Throughout the evidence it is shown that in proportion as the condition of any pauper class is elevated above the condition of independent labourers, the condition of the independent class is depressed; their industry is impaired, their employment becomes unsteady, and its remuneration in wages is diminished. Such persons, therefore, are under the strongest inducements to quit the less eligible class of labourers and enter the more eligible class of paupers. The converse is the effect when the pauper class is placed in its proper position, below the condition of the independent labourer. Every penny bestowed that tends to render the condition of the pauper more eligible than that of the independent labourer, is a bounty on indolence and vice. We have found that as the poor's rates are at present administered, they operate as bounties of this description, to the amount of several millions annually.

[Wages  
Fund]

Before the experiment was made, it might fairly have been anticipated that the discontinuance of parochial allowance would effect little or no improvement in wages unless a similar change were made in the neighbouring parishes. When a considerable proportion of the labourers who had been entirely dependent upon the parish were driven to rely on their own industry, it might have been anticipated that the wages of the entire body of labourers within the parish would have been injuriously affected by their competition. And this certainly would have been the case if they had added nothing to the fund out of which their wages came.

That fund is, in fact, periodically consumed and reproduced by the labourer, assisted by the land and the farmer's capital, and, all other things remaining the same, the amount of that fund, and consequently his share of it, or, in other words, the amount of his wages, depends on his industry and skill. If all the labourers in a parish cease to work, they no longer produce any fund for their own subsistence, and must either starve or be supported, as they were at Cholesbury, by rates in aid. A single person who has no property and is supported without working bears the same relation to the labourers who do work as the parishioners of Cholesbury bore to the neighbouring parishes. He is supported by a sort of rate in aid on their industry. His conversion from a pauper, wholly or partially supported by the labour of others, into

*We therefore submit, as the general principle of legislation on this subject, in the present condition of the country:*

*That those modes of administering relief which have been tried wholly or partially, and have produced beneficial effects in some districts, be introduced, with modifications according to local circumstances, and carried into complete execution in all.*

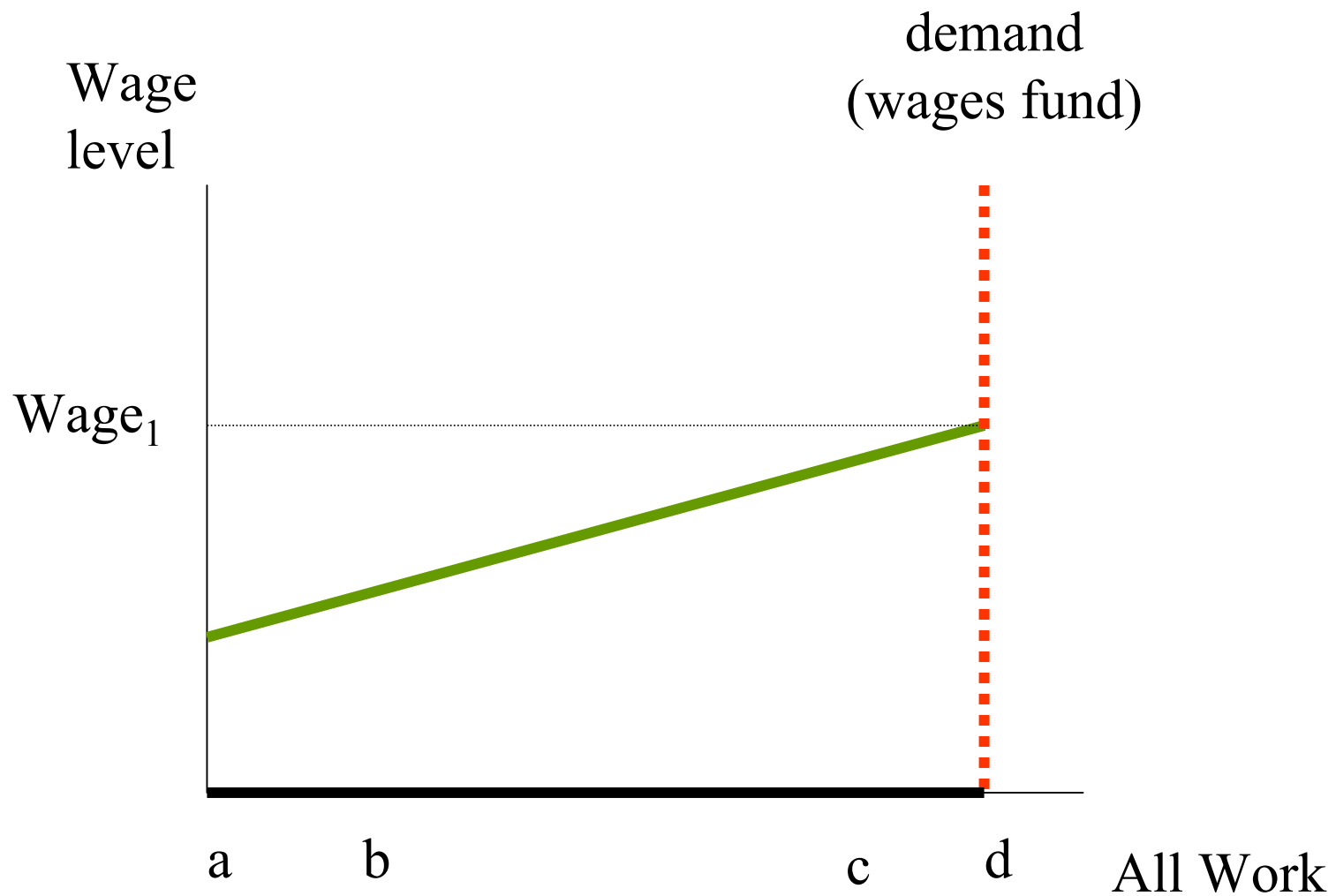
The chief specific measures which we recommend for effecting these purposes, are —

FIRST, THAT EXCEPT AS TO MEDICAL ATTENDANCE, AND SUBJECT TO THE EXCEPTION RESPECTING APPRENTICESHIP HEREIN AFTER STATED, ALL RELIEF WHATEVER TO ABLE-BODIED PERSONS OR TO THEIR FAMILIES, OTHERWISE THAN IN WELL-REGULATED WORKHOUSES (i.e., PLACES WHERE THEY MAY BE SET TO WORK ACCORDING TO THE SPIRIT AND INTENTION OF THE 43 ELIZABETH) SHALL BE DECLARED UNLAWFUL, AND SHALL CEASE, IN MANNER AND AT PERIODS HEREAFTER SPECIFIED; \* AND THAT ALL RELIEF AFFORDED IN RESPECT OF CHILDREN UNDER THE AGE OF SIXTEEN SHALL BE CONSIDERED AS AFFORDED TO THEIR PARENTS.

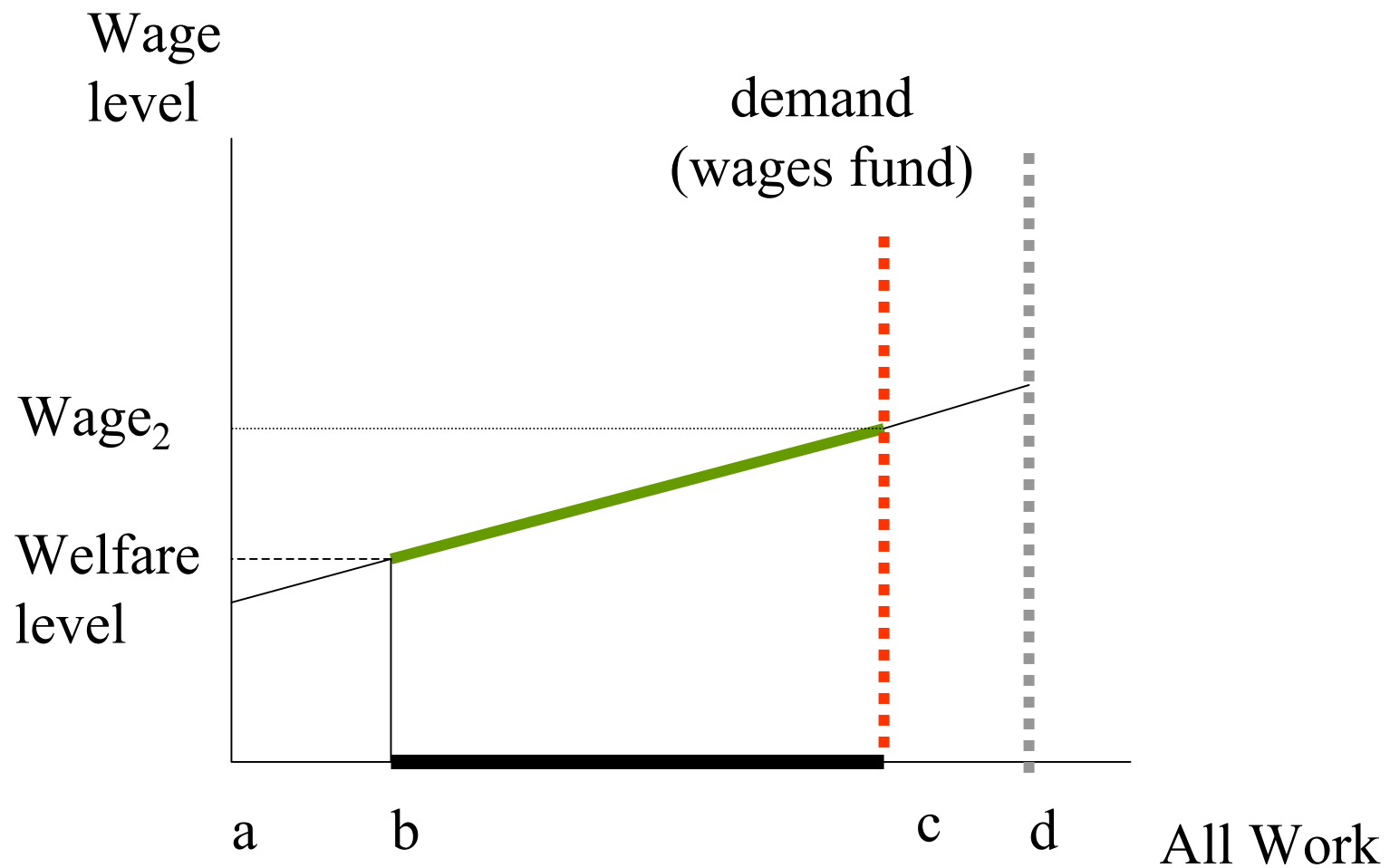
‘In all extensive communities, circumstances will occur in which an individual, by the failure of the means of subsistence, will be exposed to the danger of perishing. To refuse relief, and at the same time to punish mendicity when it cannot be proved that the offender could have obtained subsistence by labour, is repugnant to the common sentiments of mankind; it is repugnant to them to punish even depredation, apparently committed as the only resource against want.’ [Poor Law Report, p. 128]

‘[Parliament] was prepared to abrogate, at a word, the legal and ancient title of the poor to existence – a title 300 years old, as old, as legal, as fully recognized in Acts of Parliament, as the title of the wealthiest noble to his estate, and founded on still more evident principles of justice and truth’ [Poulett Scrope, *Quarterly Review*]

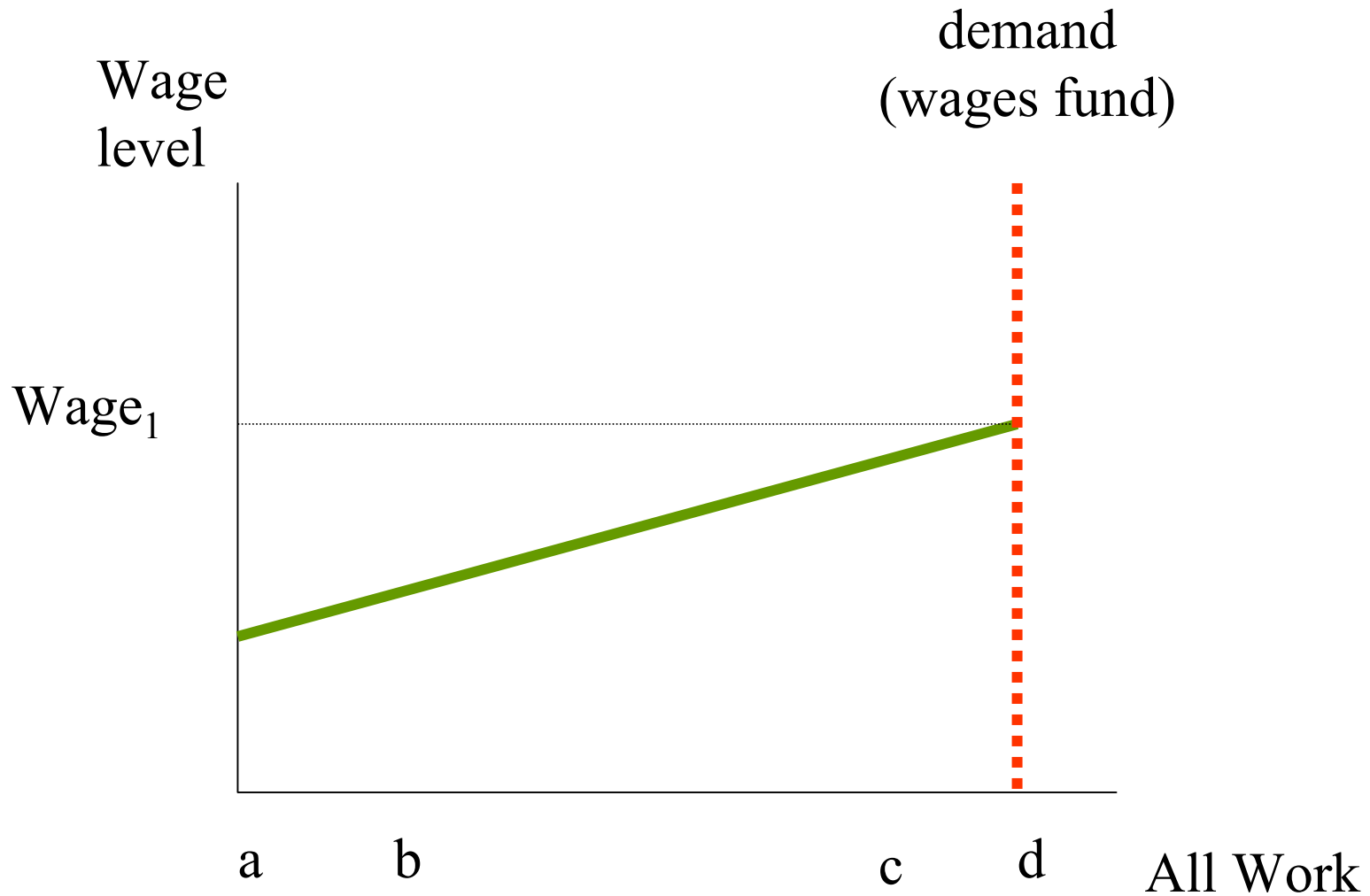
both cited in Brundage, *The English Poor Laws, 1700-1930* (2002)



## The Wages Fund Theory (1)

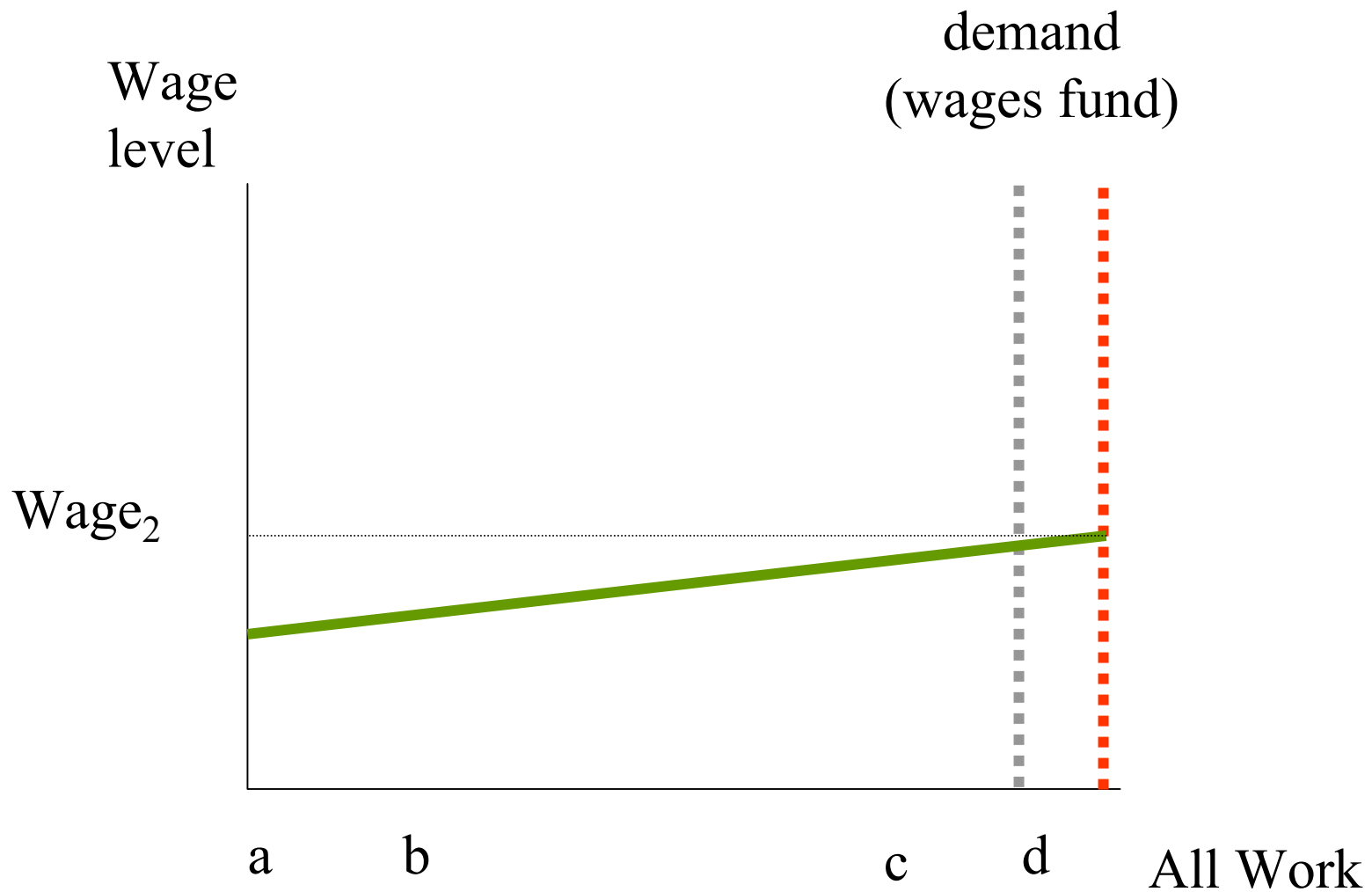


## The Wages Fund Theory (2)

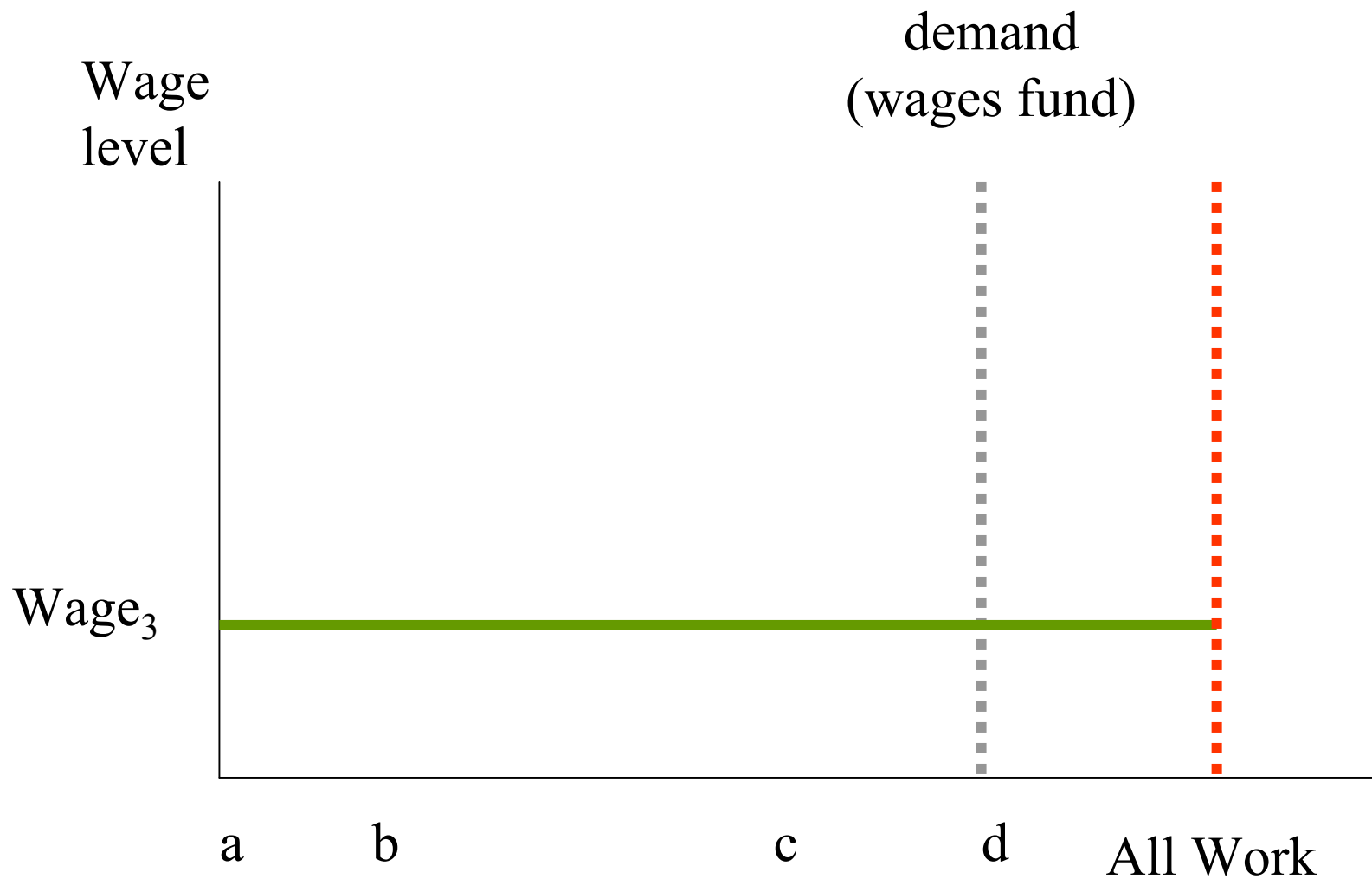


The Wages Fund Theory [Malthusian extension]

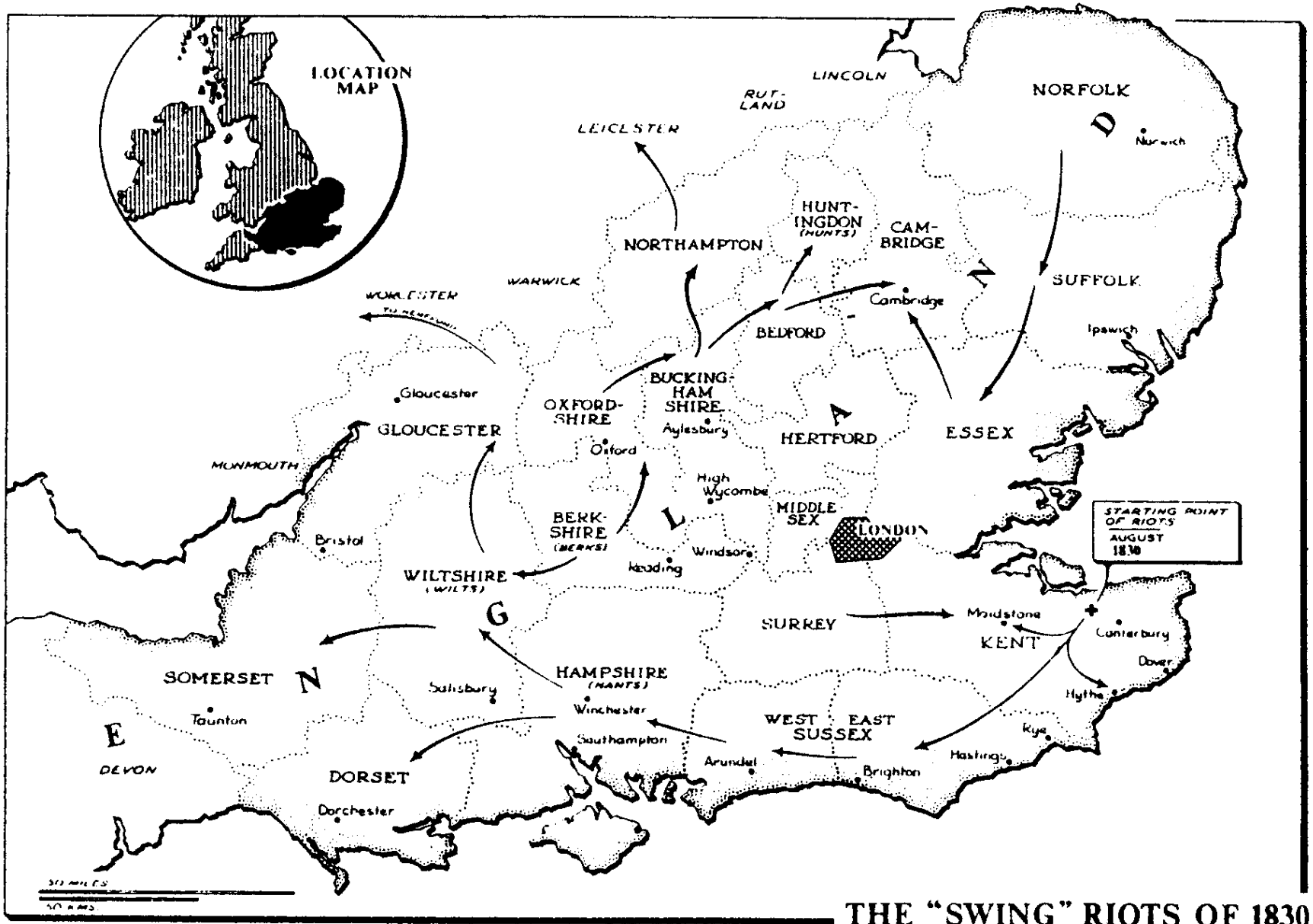




Iron Law of Wages [Malthus/Ricardo] (1)

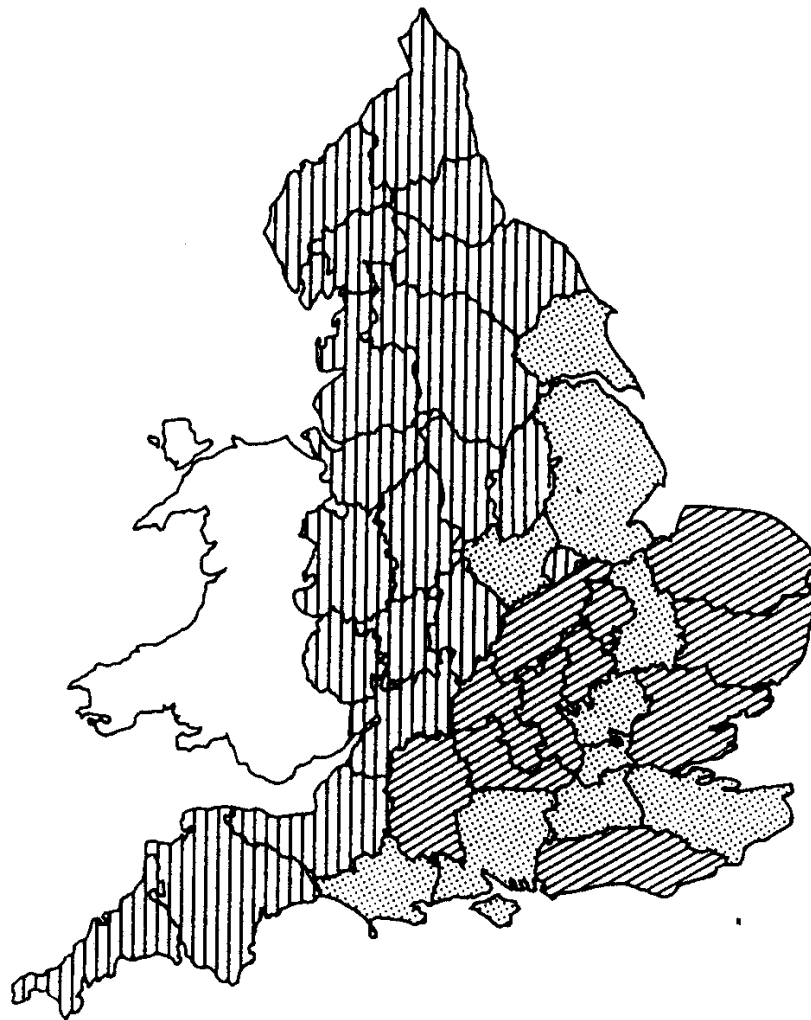



Iron Law of Wages [Malthus/Ricardo] (2)




THE "SWING" RIOTS OF 1830

From George Rudé, *The Crowd in History, 1730 - 1848* (1981), p. 152



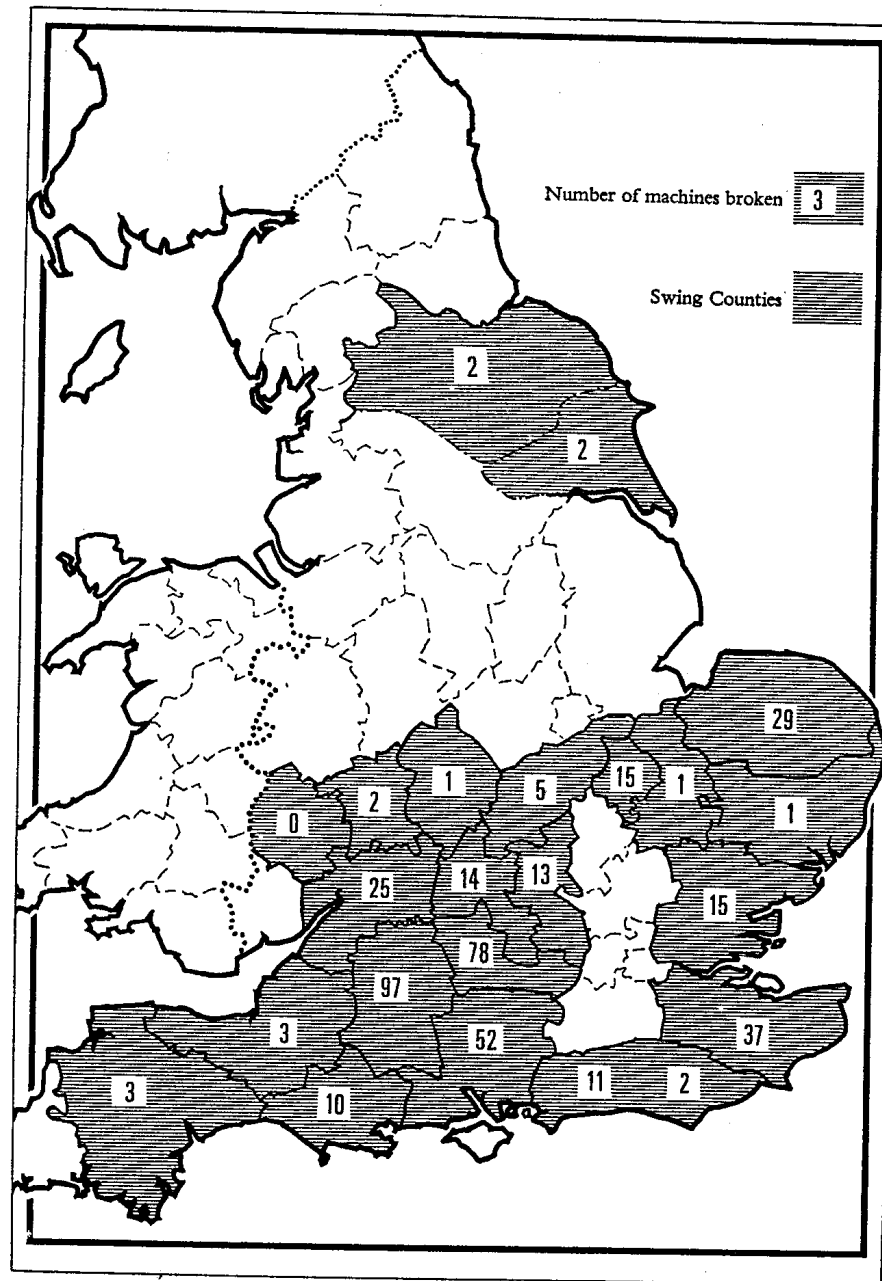
 expenditure  $\geq 15s.$

  $10s. \leq$  expenditure  $< 15s.$

 expenditure  $< 10s.$

County-level data on per capita relief expenditures, 1831-2, Source : G. Boyer, *An Economic History of the English Poor Law, c. 1750 - 1850* (Cambridge, 1990), p. 111

Hobsbawm &  
Rude, 1969



THRESHING MACHINES BROKEN—BY  
COUNTIES (1830-32)

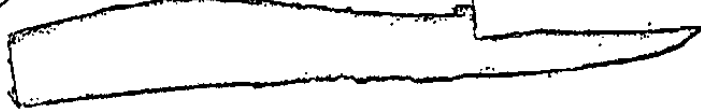
**DESCRIPTION of TWO MEN  
detected in the act of SETTING  
FIRE to a STACK of OATS  
in the Parish of PAMPISFORD,  
in the County of Cambridge, about  
Eight o'clock in the evening of  
MONDAY the 6th of *December*,  
1830.**

One a tall Man, about 5 feet 10 in. high, sandy whiskers, large red nose, apparently between 50 and 60 years of age. Wore at the time a snuff-colored straight coat, light-colored pantaloons, and low shoes.

The other Man was apparently about 5 feet 4 inches, and between 30 and 40 years of age; had large black full whiskers, extending under the chin. He wore a blue straight coat, light colored breeches, and boots with cloth overall-tops.

Both the Men were seen at Pampisford at half-past twelve at noon on Monday, coming from Babraham, and probably from the New-market road.

this is to inform you  
what you have to undergo  
Sentelmen if providing you  
Dont pull down your nes-  
shenes and rise the poor  
mens wages the married  
men give tow and six  
pence a day a day the  
singel tow shilings. or we  
will burn down your  
earns and you in them  
this is the last notice  
from W 1882



Sir

Your name is down amongst the Black hearts  
in the Black Book and this is to advise you and the  
like of you, who are Parson Justices, to make your Wills

Ye have been the Blackguard Enemies of the  
People on all occasions, Ye have not yet done

As ye ought

Swing