
Poor, Hungry and Stupid: Numeracy and the Poor Law in Britain, 1780-1850

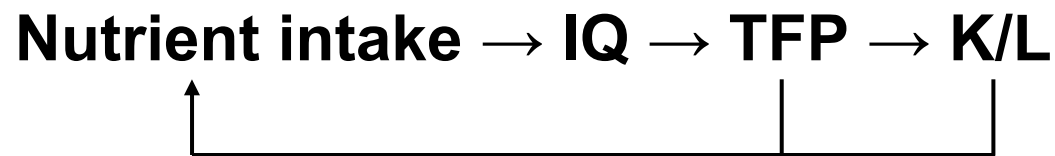
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Main points

- ¶ “numeracy” in the distant past can be measured by people’s ability to remember their age correctly.
- ¶ There is overwhelming evidence that numeracy in the past was low
- ¶ We also know that nutritional standards were low
- ¶ We argue that these two facts are related, and that nutrition was a key determinant of cognitive development. Poor diets were one factor behind low numeracy
- ¶ Show evidence from a “natural experiment” in Britain 1780-1850 that
 - Periods with big price increases for grain saw a large decline in numeracy
 - Counties with more generous welfare provisions insulated their populations from the negative shock to nutrition, and suffered a smaller decline in numeracy

Motivation

- ¶ Understanding the poverty of the past – big question, difficult answers
 - Per capita incomes are approximately 11x higher in real terms
 - Labor input is about 2/3
 - Productivity must be higher by factor 15-20
 - TFP is key [just as in Hall-Jones]
- ¶ This paper is intended as a *first step* to open the black box – what if TFP is crucially driven by cognitive ability?
- ¶ Why would cognitive ability be markedly lower in the past? Nutritional deficiencies, especially in proteins
- ¶ Our “model”:



Motivation and Related Literature

¶ Today

- strong link IQ – earnings [Zax and Rees (2002), Behrman (2004)]
- Some papers: average national IQ – TFP [Lynn and Vanhanen (2002), Jones (2006)]

¶ Well-known link nutritional deficiencies – IQ

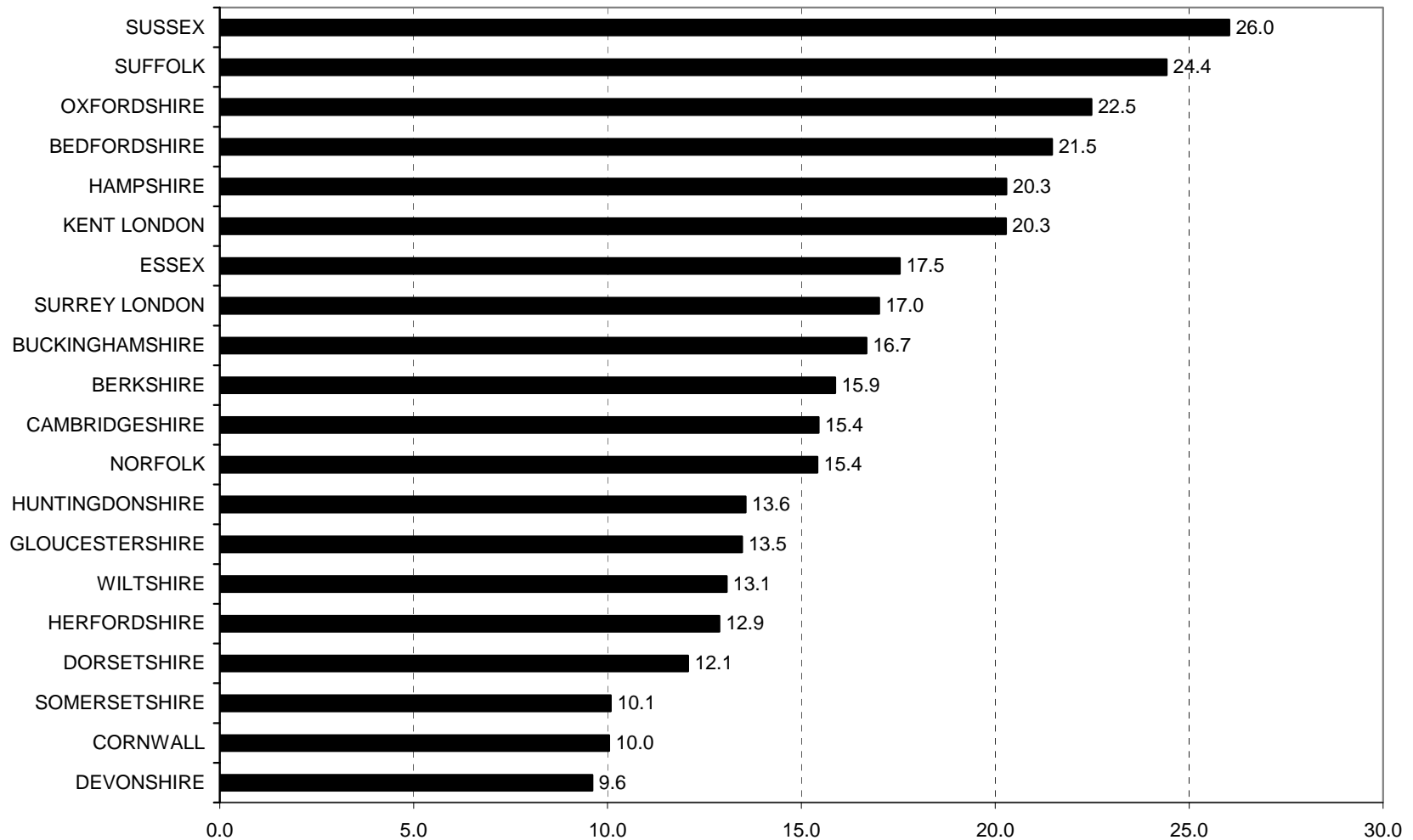
- Lucas (1988) reports results from randomized trial
 - Pre-term babies receive various forms of dietary supplement
 - Some contain much more protein than others
 - Children receiving the less nutrient-rich diets showed markedly lower neurodevelopment (lower mental development scores and psychomotor scores) at the 18 month follow up than the control group.
 - These effects could still be detected at age 7.5, when IQ scores were significantly lower. Since IQ tests at age 7-8 predict adult intelligence, it is highly likely that infant nutrition can harm cognitive development in a major way.
- Richards (2002) shows that IQ scores correlate with maximum height gain during the early childhood and adolescent growth spurt. There is also some evidence that rising IQ scores in developed countries may partly reflect improving nutrition (Lynn and Vanhanen 2002).
- Based on controlled experiments in today's Third World, Maluccio, Hodinott, Behrman et al. (2006) argue that the correlation between height and wages may largely reflect nutrition's impact on early cognitive development, and not strength or resilience to disease. They show long-run (25 y) impact of nutritional supplement on IQ scores, etc.

¶ [early intervention in terms of schooling etc. has strong effects on later-life outcomes]

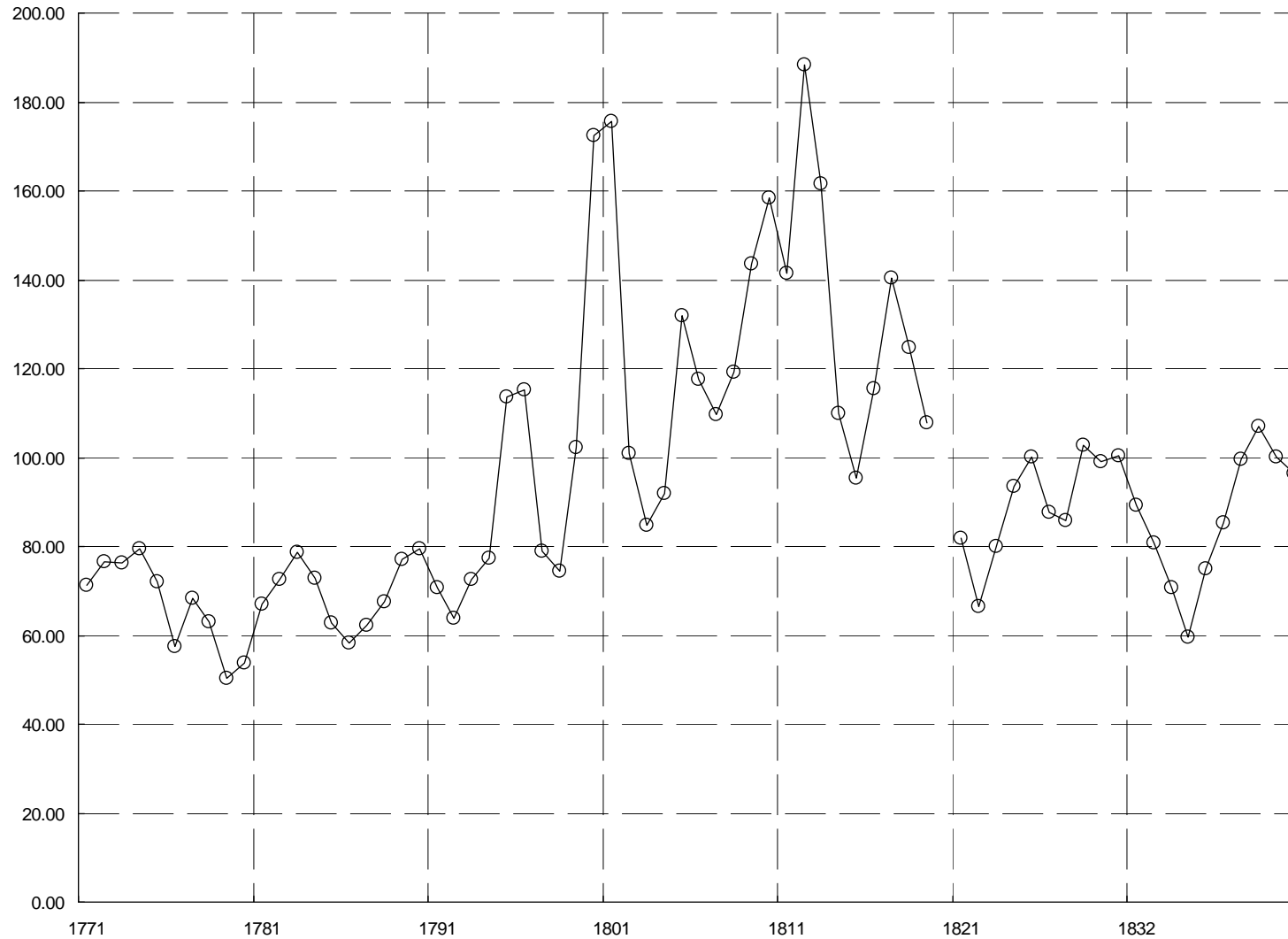
Research Setup

- ¶ England had an unusually generous welfare system (“Speenhamland”)
 - “outdoor relief”
 - consumes up to 2% of GDP
 - Boosts working class income by up to 40% (Mokyr 1993)
 - Differs markedly from parish to parish in generosity
- ¶ System in place before the Napoleonic wars, when prices of grain explode
- ¶ Ideal setup for a difference-in-difference analysis

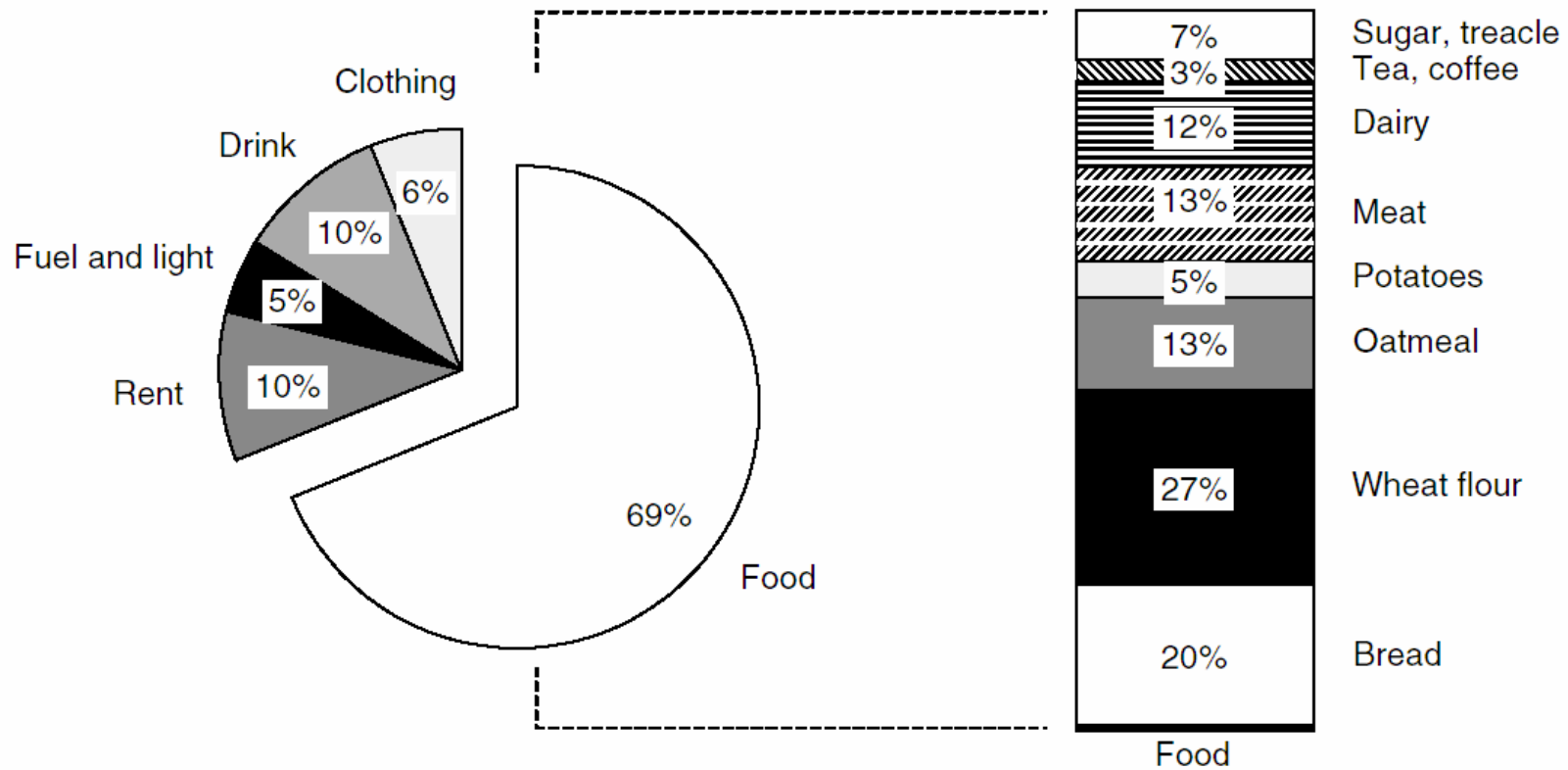
Differences in poor relief payments, per capita



Price of Wheat, England, 1771-1841



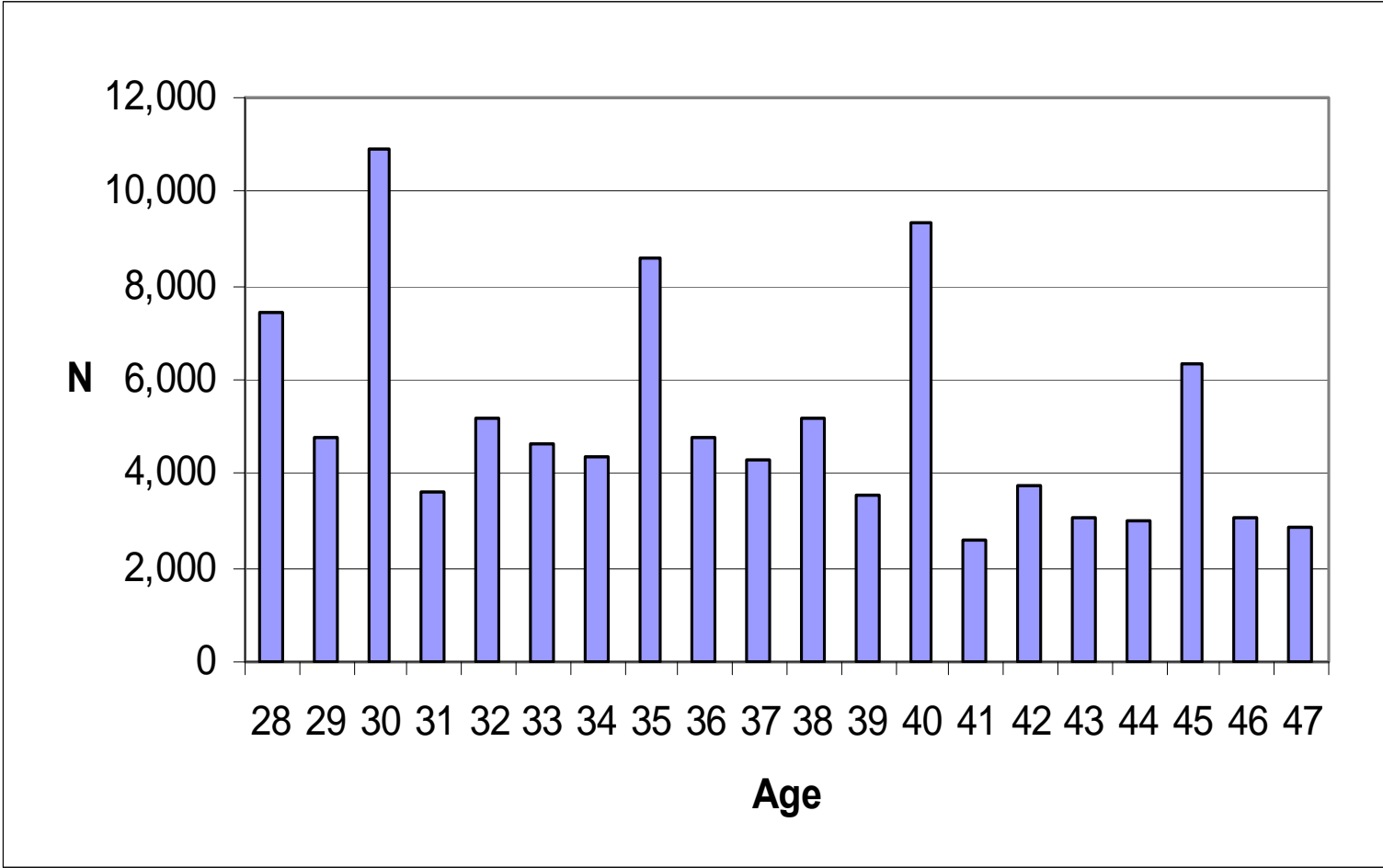
Composition of Working Class Expenditure, 1788-92



¶ Our measure of numeracy: Age Heaping

- Ages reported should be relatively evenly distributed
- In actual fact, large number of individuals report ages rounded to the nearest multiple of 5
- Measure of heaping varies strongly in different samples
- Historical applications include Herlihy and Klapisch-Zuber (1978) on fourteenth century Florence, Mokyr (1983) on selectivity bias among Irish emigrants, and Duncan-Jones (1990) on the Roman Empire.
- Over the very long run, numeracy as proxied by age-heaping varies strongly with income, and is highly correlated with literacy (Clark 2001)

Age-Heaping, example US census 1870



The shorter are also more likely to remember their age incorrectly

Country/Region	Institution	Birth decades	Whipple index		Ratio
			Short	Tall	
England	Wandsworth prison	1800s-1840s	133	129	1.03
Ireland	NSW convicts	1790s-1810s	160	131	1.22
US (North)	Union army	1800s-1840s	103	101	1.03
Paris	French Army	1650s-1760s	141	102	1.38
France (Northeast)	French Army	1650s-1760s	125	117	1.07
France (Southwest)	French Army	1650s-1760s	142	125	1.14
France (Total)	French Army	1650s-1760s	135	123	1.10

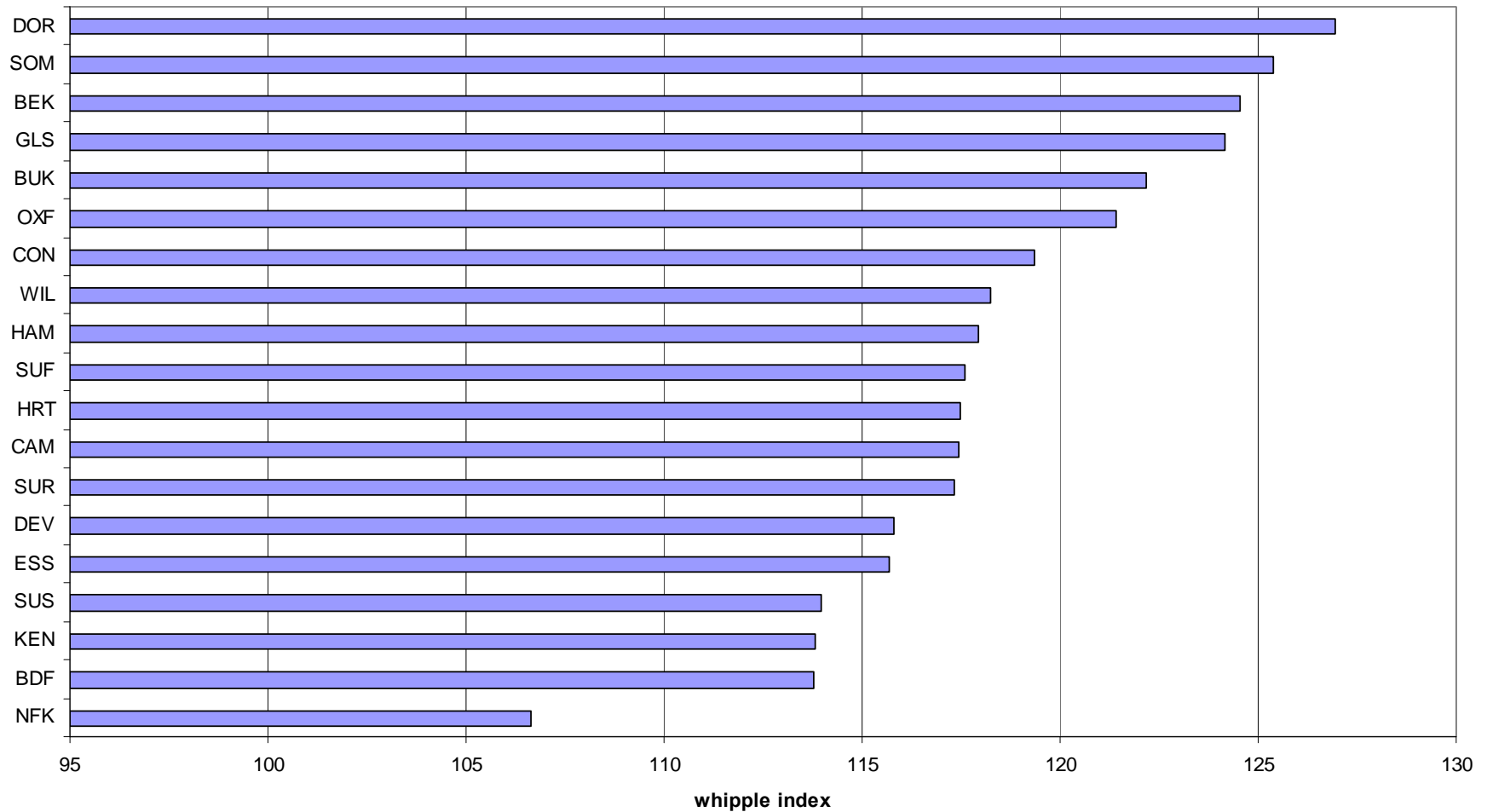
Data

- ✓ Source 1: British Census 1851 and 1881
 - ✓ County of birth
 - ✓ Age (as remembered)
 - ✓ Gender

- ✓ Source 2: variables provided by George Boyer
 - ✓ Poor relief (expenditure per head), by county
 - ✓ Cottage shop manufacturing
 - ✓ % of total land in grain production
 - ✓ Density: inhabitants per acre

- ✓ Source 3: Price data (Liam Brunt)
 - ✓ Cost of a quart of grain, per year and county

Whipples vary a lot by county



Descriptives

Variable	Obs	Mean	Std. Dev.	Min	Max
whipple	210	120.0236	14.10041	101.0164	175.2577
gprice	210	100.9425	22.74426	60.786	147.971
relieflack	210	9.544886	5.099002	8.20e-07	16.4311
density	210	.4593414	.3316614	.2245737	1.553241
cottind	210	.3325903	.3102526	0	1
grain	210	12.41807	4.468365	4.476939	19.08522

Relief expenditure per capita in Shilling and Pence for 1831

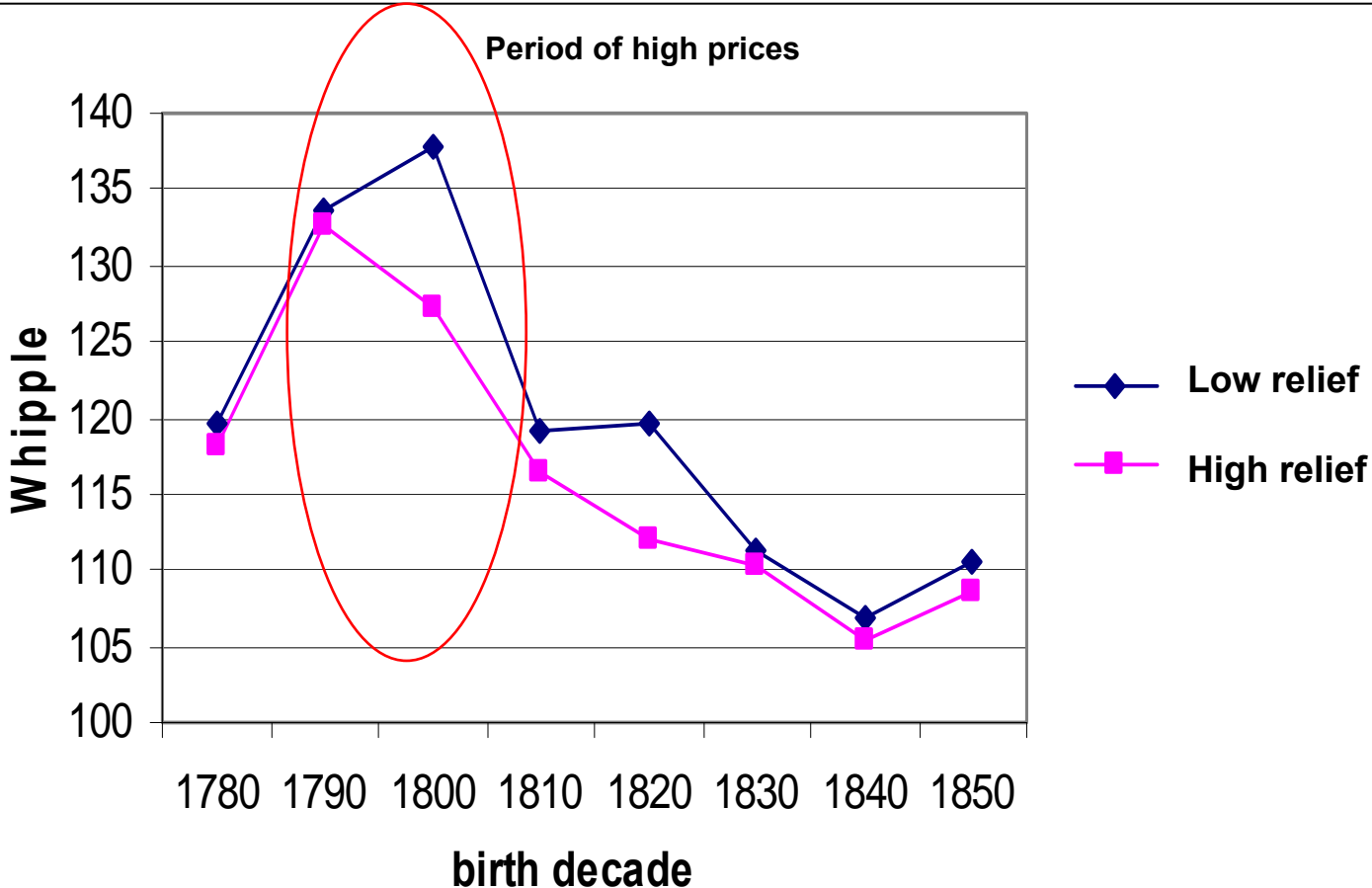
Cottage Industry: % of parishes with cottage industries

Grain: % of total land in grain production

Density: inhabitants per acre

Grainprice: d/quarter in 10-year averages

Results



Expected signs

variable	expected sign						
gprice	+						
relieflack	+						
gprice*relieflack	+						
grain	- or +	proximity to grain production (or less valuable protein availability)					
density	- or +	urban areas have more schools/higher numeracy but higher inequality, problematic disease environment					
cottage industry	- or +	puffer effects but rather low wage and family exploitation					

Regression Results: dependent variable whipple index

	Coeff. (1)	p-val.	Coeff. (2)	p-val.	Coeff. (3)	p-val.	Coeff. (4)	p-val.
county dummies included	N		N		N		Y	
decade dummies included	N		N		N		Y	
all or pressure obs.	all		all		pressure		pressure	
sex	-0.10	0.94	-0.15	0.92	1.28	0.57	1.17	0.62
relieflack*gprice					0.01	0.09	0.01	0.19
relieflack	0.40	0.05	0.47	0.03	-0.48	0.41		
gprice	0.08	0.04	0.08	0.02	-0.05	0.32		
density			7.79	0.00	6.60	0.02	6.78	0.00
cottind			2.39	0.48	3.93	0.20	-3.59	0.02
grain			0.40	0.19	0.52	0.14	0.97	0.00
_cons	108.47	0.00	98.15	0.00	112.73	0.00	102.07	0.00
R-sq	0.04		0.07		0.06		0.53	
N	209		209		157		157	
Pressure observation are defined as those with a whipple index >110								

Regression Results: dependent variable whipple index (lead by one decade)

	Coeff. (1)	p-val.	Coeff. (2)	p-val.	Coeff. (3)	p-val.	Coeff. (4)	p-val.
county dummies included	N		N		N		Y	
decade dummies included	N		N		N		Y	
all or pressure obs.	all		all		pressure		pressure	
sex	0.18	0.91	0.17	0.92	1.96	0.37	1.12	0.64
relieflack*gprice					0.017	0.08	0.019	0.04
relieflack	0.37	0.10	0.54	0.02	-1.13	0.25		
gprice(t+10)	0.34	0.00	0.34	0.00	0.16	0.16		
density			7.85	0.01	7.30	0.01	10.57	0.00
cottind			1.42	0.73	2.26	0.57	-0.72	0.74
grain			0.55	0.11	0.74	0.05	1.73	0.00
_cons	83.42	0.00	70.84	0.00	85.96	0.00	63.84	0.00
R-sq	0.28		0.32		0.35		0.54	
N	179		179		151		151	
Pressure observation are defined as those with a whipple index >110						effect of one std.dev increase	11.10	

More work

¶ Improving datawork

- Subdivide by 5 year periods
- At the moment – 19 counties; perhaps use 300 + parishes (possibly aggregated into parish groups)
- Add schooling variables
- Instrument rise in wheat prices with temperature data; war dummy

¶ Additional questions

- Occupations in the census and numeracy
- Use membership of high-whipple group to predict occupational outcomes