VIII: Macro- and Structural Changes in the European Economy, 1500 – 1750

A. Population: Demographic Movements and Changes,

c. 1500 – c. 1750

revised 11 January 2012

PART II:		**SECOND SEMESTER: JANUARY TO APRIL 2012**
Week no., Wednesday Dates, and Suggested Readings	**Lect-ure No.**	**LECTURE TOPICS** to be covered
13. **11 January 2012** **Brady**, ch. 1 (de Vries); ch. 2 (Wiesner); **Davis,** ch. 6; **Cipolla**, chs. 5, 10 (pp. 234-37); **de Vries**, ch. 1; **Musgrave**, chs. 1-3 **ET 6**	**14**	**MACRO-ECONOMIC CHANGES: DEMOGRAPHIC CHANGES:** Population Growth in the 'Price Revolution era' (ca. 1520-1640): a Malthusian Crisis? Population Stagnation/Decline during the 'General Crisis' era (1640-1750); on the Eve of the 'Vital' and 'Industrial' Revolutions. [Mid-year voluntary take-home test: due on 18 January 2012]

MAJOR ECONOMIC & DEMOGRAPHIC TRENDS

A. THE MEDIEVAL 'COMMERCIAL REVOLUTION' ERA: RAPID POPULATION GROWTH:

ca. 1100 - ca. 1320 (Phase A)

B. LATE MEDIEVAL 'GREAT DEPRESSION': DEMOGRAPHIC CATASTROPHE

ca. 1320 - ca. 1460 (strong Phase B)

C. ECONOMIC AND DEMOGRAPHIC RECOVERIES

ca. 1460 - ca. 1520 (mild Phase A)

D. THE 'PRICE REVOLUTION' ERA: STRONG DEMOGRAPHIC GROWTH

ca. 1520 - ca. 1640 (strong Phase A)

E. THE 'GENERAL CRISIS' ERA of the 17th Century: DEMOGRAPHIC DECLINE OR STAGNATION

ca. 1640 [or 1620] - ca. 1740 (mild phase B)

F. THE INDUSTRIAL AND DEMOGRAPHIC ('VITAL') REVOLUTIONS

ca. 1740 - ca. 1820 (strong Phase A)

Demographic Changes from 1500 to 1750: Introduction

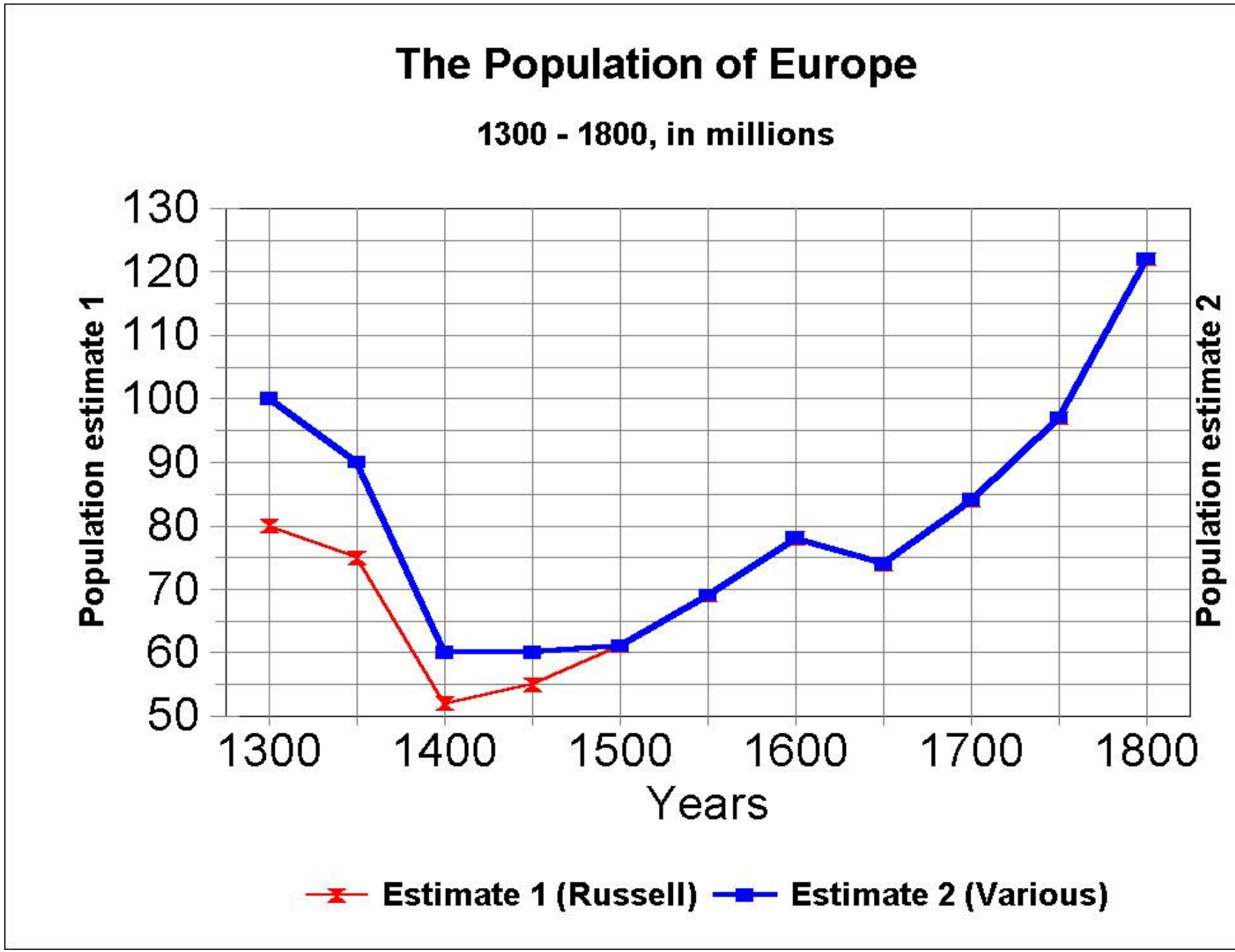
- (1) **To the eve of the Industrial Revolution**
- - **this Revolution was accompanied by a 'Vital Revolution':** an unprecedented growth in population in England and Wales
- - **from 1760 to 1810**: English/Welsh population doubled from about 6 to 12 million
- - **from 1810 to 1910**: it tripled again to 36 million
- - **Continental Europe's population** also grew far more rapidly from 1760s than ever before – if not at the same rate as England's population

Demographic Changes from 1500 to 1750: Introduction 2

- (2) **Recovery from the late-medieval demographic crises:** a population decline of about 40% in 14th & 15th centuries
- - **causes of that decline involved both mortality & fertility** -- and not just the Black Death
- (3) **did recovery begin in mid-15th century?**
- **-** a) **Italy was probably the first region to experience any renewed population growth**
- - b) **Florence's population** fell from ca. 120,000 in 1338 to 37,144 in 1427 (almost 70%))
- - c) **no signs of recovery in Florence** until the 1460s
- - then more substantial growth: see table for Florence
- - c) **in north west Europe: no recovery until ca. 1520**

Population of Florence (Tuscany)

Date	Estimated Urban Population
1300	120,000
1349	36,000?
1352	41, 600
1390	60,000
1427	37,144
1459	37,369
1469	40,332
1488	42,000
1526 (plague year)	70,000

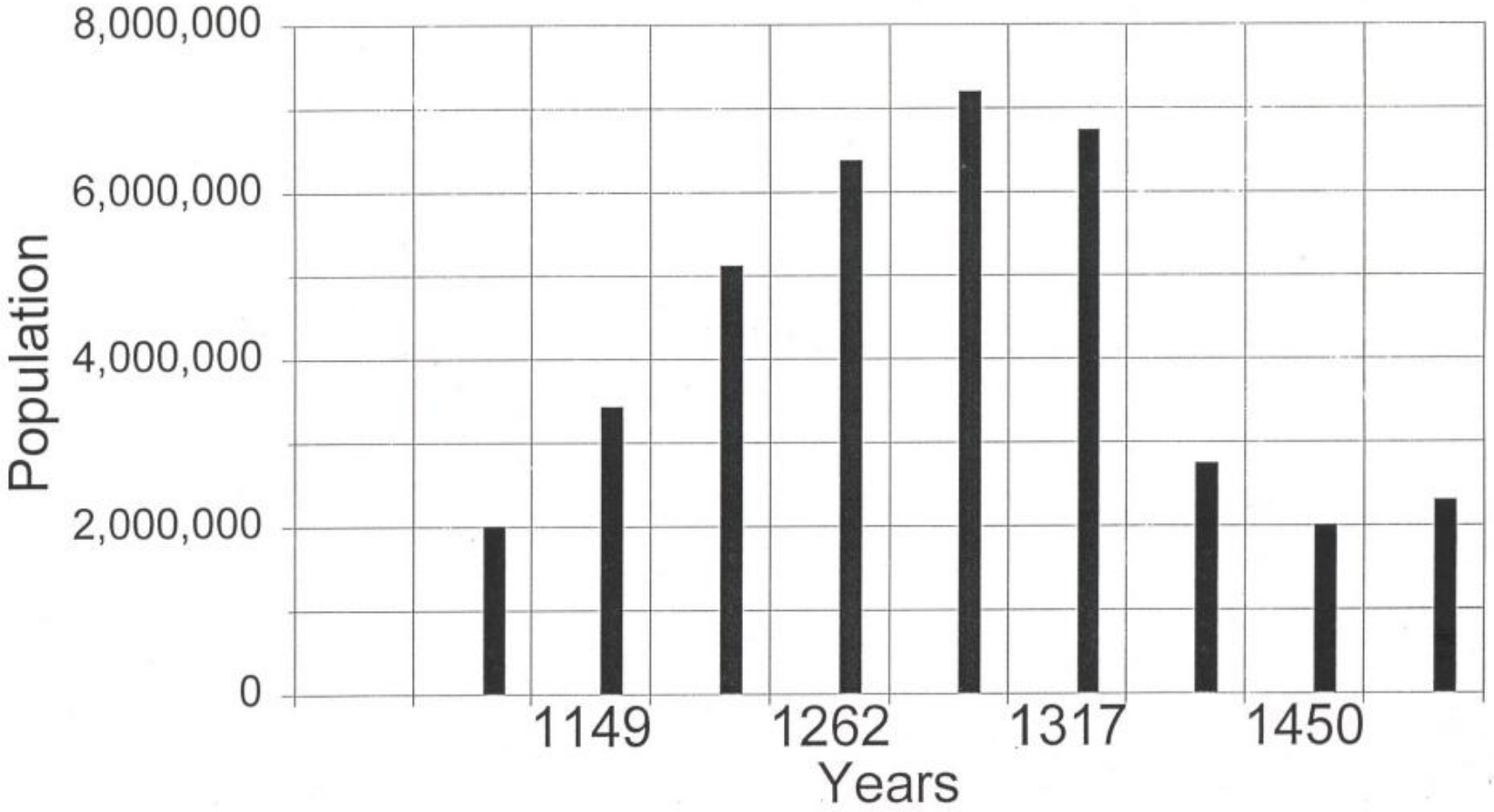

The Population of Europe
1300 - 1800, in millions
Population estimate 1
Population estimate 2
130
120
110
100
90
80
70
60
50
1300
1400
1500
1600
1700
1800
Years
Estimate 1 (Russell)
Estimate 2 (Various)

Demographic Changes from 1500 to 1750: Introduction 3

- (3) **The Confusing Case of England:**
- -a) **our estimate of English demographic recovery and subsequent growth depends on conflicting population estimates for 1300:**
- - **J C Russell (1948)**: 3.75 million (in 1347)
- - **Michael Postan** (1966, 1972) and most other historians after him: a maximum of 6 million in 1300
- - **Hallam** (1988): argued for 7 million (or more) in 1290s
- - **Jan de Vries** (1994): 3.7 million – as in Russell
- - **Bruce Campbell and Pamela Nightingale** (1996): from 4.0 to 4.5 million (probably closer to 4.0 million)
- - b) **English population estimate for 1520** (the end of the demographic decline and stagnation): 2.25 to 2.50 million (England + Wales)
- - **so even the Campbell estimate for 1300** means a demographic decline of 50%!
- - c) **Southern Low Countries**: also reached demographic nadir ca. 1500-10

ENGLISH POPULATION ESTIMATES

1088 - 1523: in Millions



Population Decline and Poverty in the Duchy of Brabant, 1437 - 1496
Number of Family Hearths (Households) and Percentage of Total Hearths without Taxable Income ('Poor Hearths'): 1437, 1480, and 1496

Area of Census	1437: no. of hearths in census	1437: per-cent poor hearths	1480: no. of hearths in census	1480: per-cent poor hearths	1496: no. of hearths in census	1496: no. of poor hearths	Percent Change from 1437 to 1496
Brussels	6,376	10.5	7,414	7.9	5,750	17.1	-9.82%
Antwerp	3,440	13.5	5,450	10.5	6,586	12.5	91.45%
Leuven	3,579	7.6	3,933	18.3	3,069	n.a.	-14.25%
s'Hertogen-bosch	2,883	10.4	2,930	7.9	3,456	n.a.	19.88%
Sub-total Large Towns	16,278	10.5	19,727	14.8	18,861	n.a.	15.87%
Small Towns	14,159	9.2	12,216	28.1	10,600	n.a.	-25.14%
Villages	62,301	29.7	54,540	31.6	45,882	n.a.	-26.35%
Total Duchy	**92,738**	**23.4**	**86,483**	**27.3**	**75,343**	**n.a.**	**-18.76%**
Percentage Change from 1437			**-6.74%**		**-18.76%**		

EUROPEAN POPULATION DISTRIBUTIONS, 1000 - 1450 A.D.

Area	1000 A.D.	1320 A.D.	1450 A.D.
Mediterranean: Greece, Balkans, Italy, Iberia (Spain and Portugal)	17.0 (44%)	25.0 (34%)	19.0 (38%)
West-Central: Low Countries, France, Germany, Scandinavia, British Isles	12 (31%)	35.5 (48%)	22.5 (45%)
Eastern Europe: Russia, Poland-Lithuania, Hungary, Bohemia	9.5 (25%)	13.0 (18%)	9.5 (19%)
TOTALS:	**38.5**	**73.5**	**51**

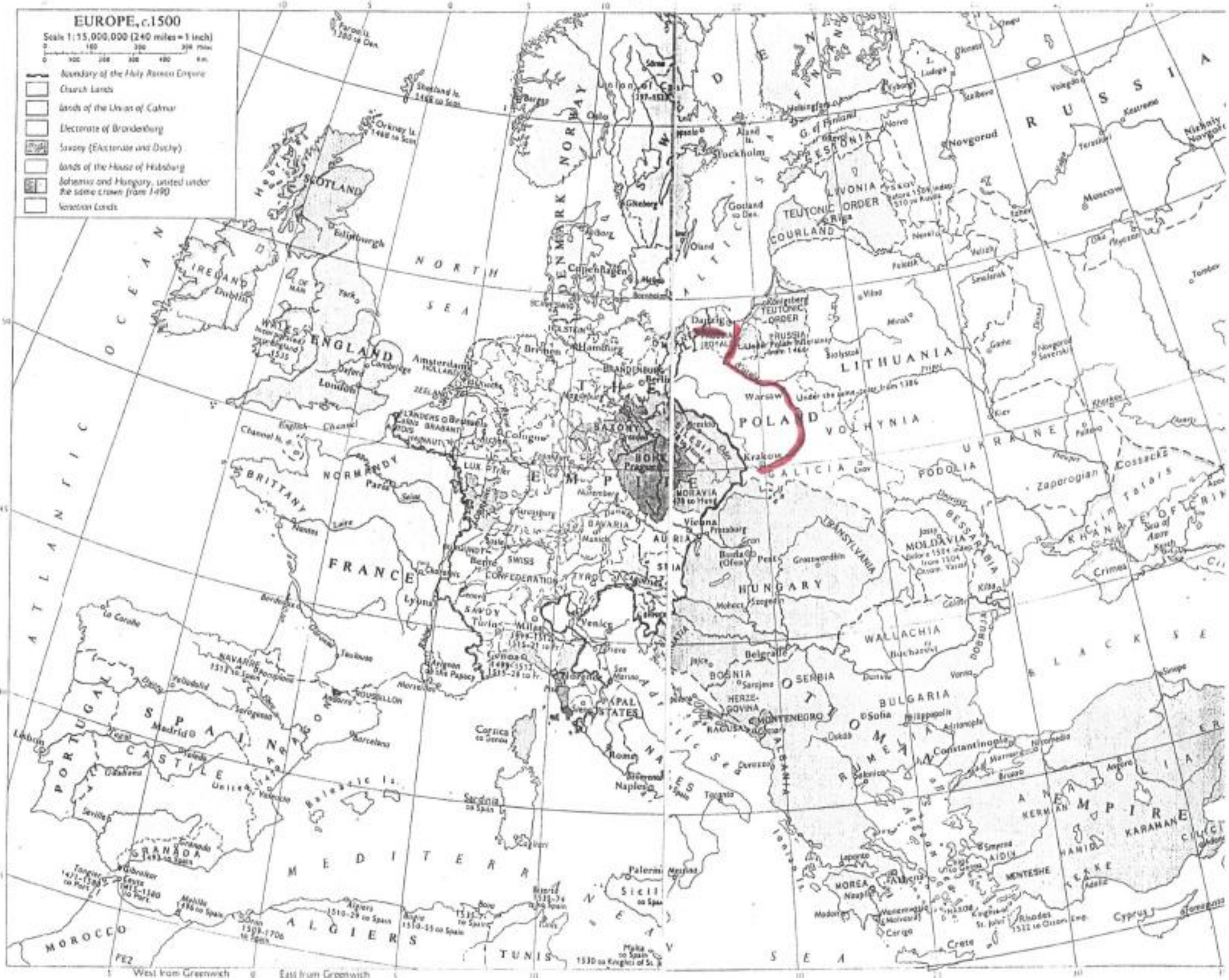
Source: J.C. Russell, 'Population in Europe, 500 - 1500', in Carlo Cipolla, ed., *Fontana Economic History of Europe*, Vol. I: *The Middle Ages, 900-1500* (London, 1972), pp. 25-70: Table 1, p. 19.

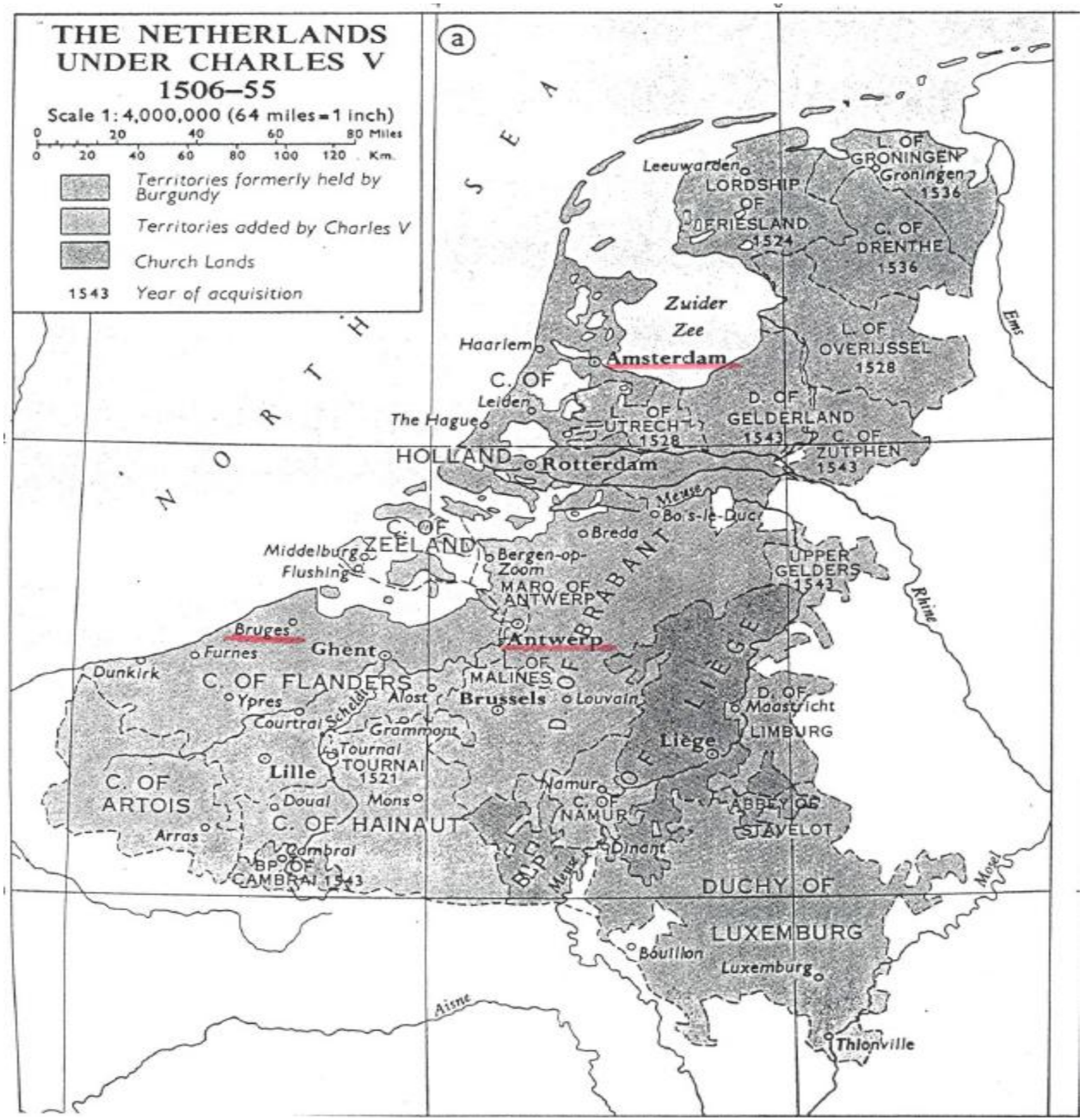
Demographic Recovery Factors 1

- (1) **Diminution of Warfare:**
- - **end of Hundred Years War** (1337-1453)
- - wars continued, but on a far smaller scale, and more localized geographically
- (2) **Diminution of the plague**:
- - less frequent, more geographically localized,
- - with lower mortalities

Demographic Recovery Factors 2

- (3) **Economic recovery**: **preceding demographic recoveries**
- a) **English cloth trade and rise of the Antwerp market:** 1420s to the 1460s
- b) **restoration of long-distance continental trade**: from Venice via Alps through South Germany, Frankfurt, down the Rhine to the Brabant Fairs: from 1440s
- c) **the South German-Central European silver-copper mining boom,** from the 1460s to the 1530s: diverting silver from Venice to Antwerp
- d) **supremacy of the Antwerp market: ca. 1460 – ca. 1550**:
- - **based on the TRIPOD of English woollens, South German metals, Portuguese-Asian spices** (last: from 1500)


EUROPE, c.1500
Scale 1:15,000,000 (240 miles = 1 inch)
Boundary of the Holy Roman Empire
Church Lands
Lands of the Union of Calmar
Electorate of Brandenburg
Saxony (Electorate and Duchy)
Lands of the House of Habsburg
Bohemia and Hungary, united under the same crown from 1490
Venetian Lands
ATLANTIC OCEAN
NORTH SEA
MEDITERRANEAN SEA
BLACK SEA
RUSSIA
SWEDEN
NORWAY
DENMARK
FINLAND
SCOTLAND
IRELAND
ENGLAND
WALES
FRANCE
BRITTANY
NORMANDY
SPAIN
PORTUGAL
CASTILE
GRANADA
ARAGON
NAVARRE
THE EMPIRE
SWISS CONFEDERATION
SAVOY
BAVARIA
AUSTRIA
SAXONY
BRANDENBURG
BOHEMIA
MORAVIA
SILESIA
POLAND
LITHUANIA
VOLHYNIA
PODOLIA
GALICIA
UKRAINE
HUNGARY
TRANSYLVANIA
MOLDAVIA
BESSARABIA
WALLACHIA
BULGARIA
SERBIA
BOSNIA
HERZEGOVINA
MONTENEGRO
ALBANIA
RUMELIA
OTTOMAN EMPIRE
ANATOLIA
KARAMAN
PAPAL STATES
NAPLES
TEUTONIC ORDER
LIVONIA
COURLAND
ESTONIA
PRUSSIA
Zaporogian Cossacks
KHANATE OF CRIMEA
MOROCCO
ALGIERS
TUNIS
London
Paris
Amsterdam
Cologne
Hamburg
Berlin
Prague
Vienna
Krakow
Warsaw
Buda (Ofen)
Pest
Belgrade
Constantinople
Venice
Rome
Naples
Madrid
Lisbon
Stockholm
Copenhagen
Moscow
Novgorod
Kiev
Danzig
Konigsberg
Riga
Lyons
Bordeaux
Toulouse
Barcelona
Valencia
Seville
Sicily
Sardinia
Corsica
Crete
Cyprus
Rhodes
Gotland
Oland
West from Greenwich
East from Greenwich


THE NETHERLANDS UNDER CHARLES V 1506–55
Scale 1: 4,000,000 (64 miles = 1 inch)
0 20 40 60 80 Miles
0 20 40 60 80 100 120 Km.
Territories formerly held by Burgundy
Territories added by Charles V
Church Lands
1543 Year of acquisition
a
NORTH SEA
L. OF GRONINGEN
Groningen
1536
Leeuwarden
LORDSHIP OF FRIESLAND
1524
C. OF DRENTHE
1536
Zuider Zee
Ems
L. OF OVERIJSSEL
1528
Haarlem
Amsterdam
C. OF HOLLAND
Leiden
The Hague
L. OF UTRECHT
1528
D. OF GELDERLAND
1543
C. OF ZUTPHEN
1543
Rotterdam
Meuse
Bois-le-Duc
Breda
C. OF ZEELAND
Middelburg
Flushing
Bergen-op-Zoom
MARQ. OF ANTWERP
D. OF BRABANT
UPPER GELDERS
1543
Rhine
Bruges
Ghent
Antwerp
Furnes
Dunkirk
C. OF FLANDERS
L. OF MALINES
D. OF LIÈGE
Ypres
Alost
Brussels
Louvain
D. OF Maastricht
Courtrai
Schelde
Grammont
LIMBURG
Tournai
TOURNAI 1521
Liège
Lille
C. OF ARTOIS
Namur
C. OF NAMUR
ABBEY OF STAVELOT
Douai
Mons
C. OF HAINAUT
Arras
Cambrai
Dinant
BP. OF CAMBRAI 1543
BP. OF Liège
Meuse
Moselle
DUCHY OF LUXEMBURG
Bouillon
Luxemburg
Aisne
Thionville

European Marriage Pattern

- 1) **Low Pressure Demographic System:** with potentially low birth and also low death rates →
- - **permitted far greater variance or elasticity in birth rates, so that BR became the dynamic variable**
- - **as opposed to Universal Marriage Pattern: high pressure system with high (maximum) birth and high death rates, so that DR was always the dynamic variable**
- 2) **If EMP operative in NW Europe by 15th century, perhaps rising real incomes promoted much higher birth rates:**
- thus: ➔ **earlier marriages ➔larger families** (since women far more fertile in early 20s than later).
- - **also increased proportion of women who married** (i.e., reduced the extent of female celibacy)

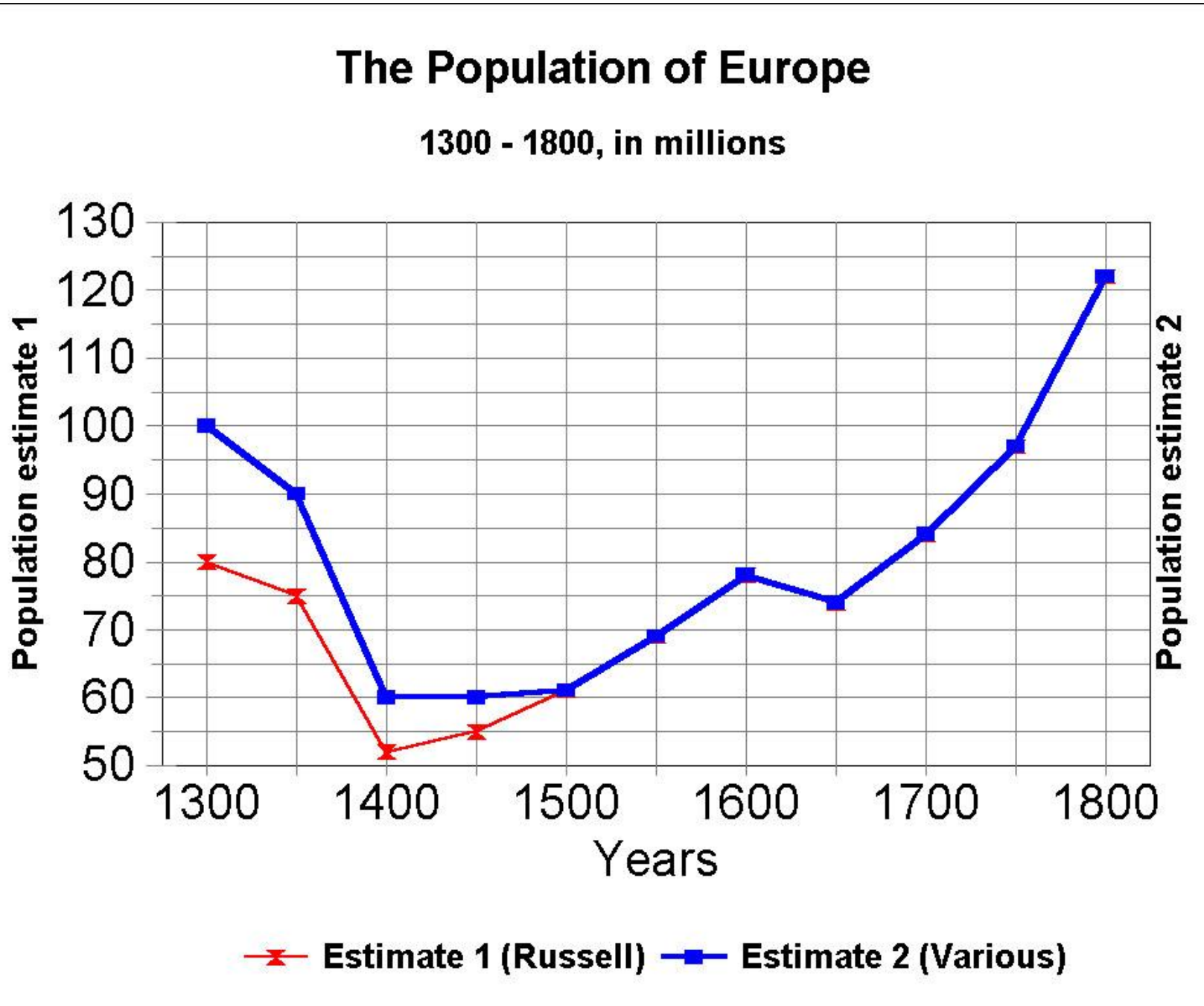
Price Revolution Era: Population changes, ca. 1520 – ca. 1640

- (1) **From early 16th to mid 17th century**: **most of Europe experienced dramatic demographic recovery and growth**: in some place surpassing the medieval peak (but in England?)
- (2) **Total European population grew:** from perhaps 60.9 in 1500 to 97.10 million in 1750: about 60%
- (3) **Important regional shifts:** from 1500 to 1800
- - **NW Europe**: grew from 12.5% to 20.7% of total
- - **Mediterranean Europe**: declined from 30.0% to 25.5%
- (4) **Not just European**: **Islamic North Africa & Asia** also experienced dramatic recovery & growth.

The Populations of Europe, by Regions, 1500 - 1800
in millions

Region	1500	1550	1600	1650	1700	1750	1800
North West	7.6	9.5	11	14.25	15.1	17.4	25.3
NW % of Europe	12.5%	13.6%	14.1%	19.2%	18.1%	17.9%	20.7%
Central Europe	29	33.75	36.9	33.5	38.2	43.8	53.5
Cent % of Europe	47.6%	48.3%	47.4%	45.0%	45.7%	45.1%	43.8%
Mediter-ranean	18.3	20	22.3	19.6	22.8	26.5	31.2
Med: % of Europe	30.0%	28.6%	28.6%	26.3%	27.3%	27.3%	25.5%
Eastern Europe	6	6.6	7.7	7.1	7.4	9.4	12.2
Eastern: % of Europe	9.9%	9.5%	9.9%	9.5%	8.9%	9.7%	10.0%
TOTAL	60.9	69.85	77.9	74.45	83.5	97.1	122.2

Source: Jan De Vries, 'Population', in T.A. Brady, H.A. Oberman, and J.D. Tracy, eds., *Handbook of European History, 1400-1600*, Vol. I: *Structures and Assertions* (Leiden, 1994), p. 13


The Population of Europe
1300 - 1800, in millions
Population estimate 1
130
120
110
100
90
80
70
60
50
1300
1400
1500
1600
1700
1800
Years
Population estimate 2
Estimate 1 (Russell)
Estimate 2 (Various)

European Cities: 1500 – 1750 (1)

- (1) **Change from 1300: when Europe's largest cities were all in Mediterranean**: then accounting for only 8% of total population
- - **Constantinople (now Istanbul)**: 200,000 – 300,00
- - **Venice and Milan:** about 150,00: **Florence**: 120,000
- - **Paris**: largest in north: 50,000 or 300,000?
- (2) **1500 – 1600: despite late-medieval demographic decline,** Europe now had 5 cities over 100,000:
- - **Paris and esp. Naples** (latter: 281,000 by 1600): now the largest, with Constantinople (capital of Ottoman Empire)
- - **how did they grow? -** from rural immigration (because DR exceeded BR)

European Cities: 1500 – 1750 (2)

- (3) **1600 – great urban leap forward:** to 14 cities from 50,000 – 100,000; 12 cities over 100,00, plus another 3 cities over 400,000
- - **London**: the largest about 500,000
- - **Paris and Constantinople:** next largest
- - **despite demographic shift to north**, Mediterranean basin still more urbanized: 17% of total, vs. 10% north of the Alps (towns of 5,000+)
- (4) **1750: Europe now had 512 cities between 50,000** – 100,000;
- 43 from 100,000 - 400,00; 4 over 400,000:
- urban population now 12% of total: denser now in north.

Number of Cities in the Indicated Population Range

YEAR	50,000-100,000	100,000 400,000	Over 400,000
1300	4	3 - 4	0
1500	5	5	0
1650	14	12	3
1750	512	43	4

European Urbanization

- (5) **Urban growth: again from rural immigration**: WHY?
- (6) **Economic Importance of Growing Cities**
- (a) **now engines of economic growth**: as centres of trade, finance, and more industry
- (b) **Large, efficient, concentrated markets** ➔ savings on transaction costs (scale economies)
- (c) **skilled labour:** better education & training ➔ greater, more productive division of labour
- (d) **better access to commercial & financial facilities**

Feeding Early Modern Towns (1)

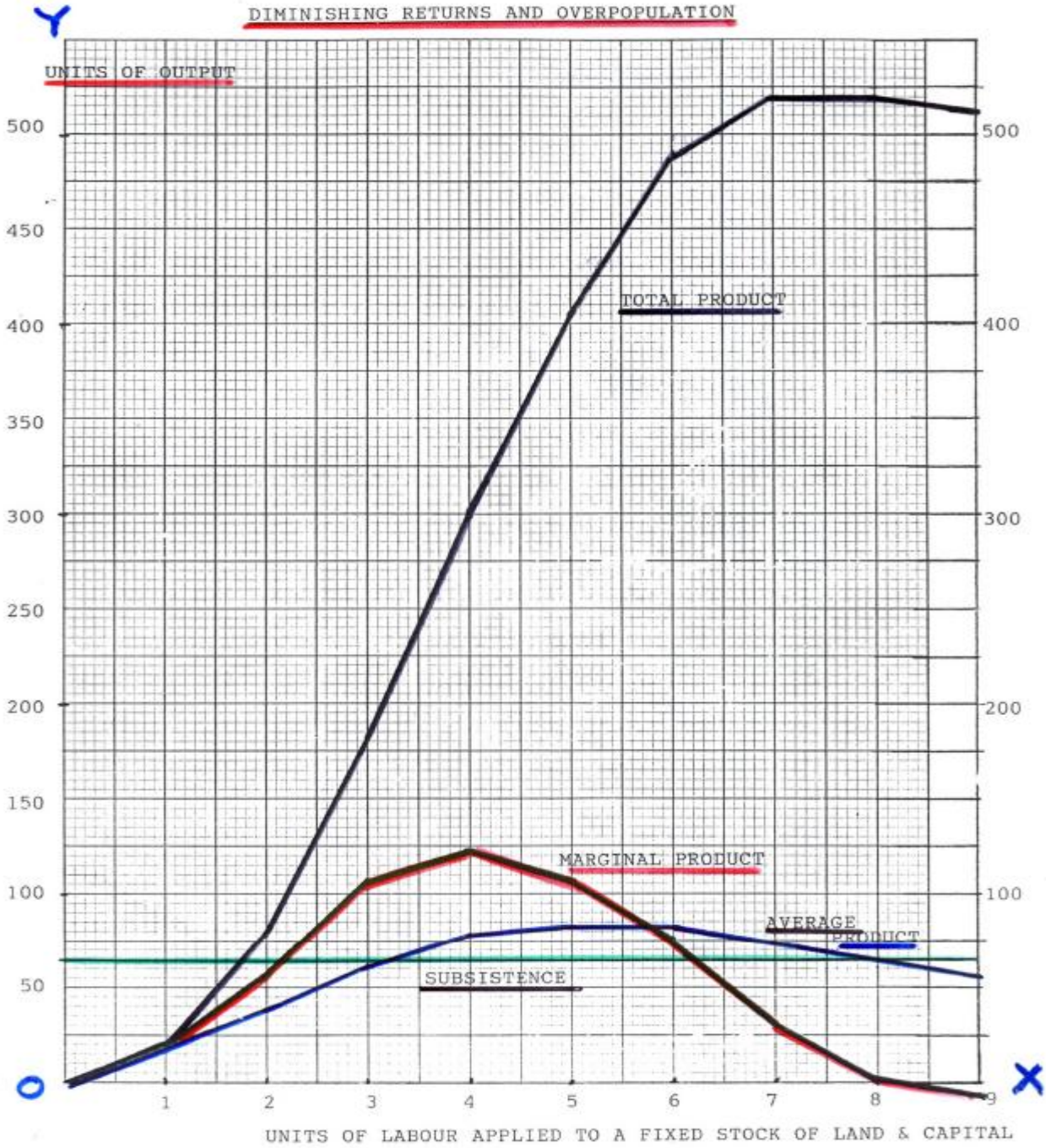
- (1) **Rising agricultural productivity:** lectures on English & Dutch agriculture: from 1400 to 1700, productivity doubled
- (2) **New grain-producing settlements in eastern Europe:** East Elbia: Prussia and Poland
- - **growth promoted by Hanseatic & Dutch shipping** (from Danzig: estuary of Vistula)
- (3) **Greater commercialization of agriculture**

Feeding Early Modern Towns (2)

- (4) **Overseas discoveries & colonizations: in the New World**
- - **North Atlantic (Newfoundland) cod fisheries**
- - **New crops introduced from Americas:**
- - **maize (corn)**: from North America into S. Europe
- - **potatoes:** from South America into N. Europe (1600)
- - **sugar, tea, coffee**: from New World and Asia
- - **But new crops not widely grown, and new beverages not widely consumed** until later 17th century
- - **Americas and Asia: also not a major source of grains** before the later 19th century (see ECO 303Y)

Was there an incipient Malthusian crisis by early 17th century?

- **Some statistical evidence of Malthusian problems:**
- **(1) rising real food prices (i.e., relative to other commodity prices)**: possible evidence of diminishing returns in European agriculture?
- **(2) declining real wages:** at least for industrial workers paid time rates (how many?)
- **(3) rising mortality and falling birth rates**: at least in England
- **(4) evidence of increased frequencies of famines:**
- in France (to 1789); but not England, after ca. 1610-20


DIMINISHING RETURNS AND OVERPOPULATION
Y
UNITS OF OUTPUT
500
450
400
350
300
250
200
150
100
50
0
TOTAL PRODUCT
MARGINAL PRODUCT
AVERAGE PRODUCT
SUBSISTENCE
1
2
3
4
5
6
7
8
9
X
UNITS OF LABOUR APPLIED TO A FIXED STOCK OF LAND & CAPITAL

POPULATION: ENGLAND & WALES 1541-1741

in millions, by decades

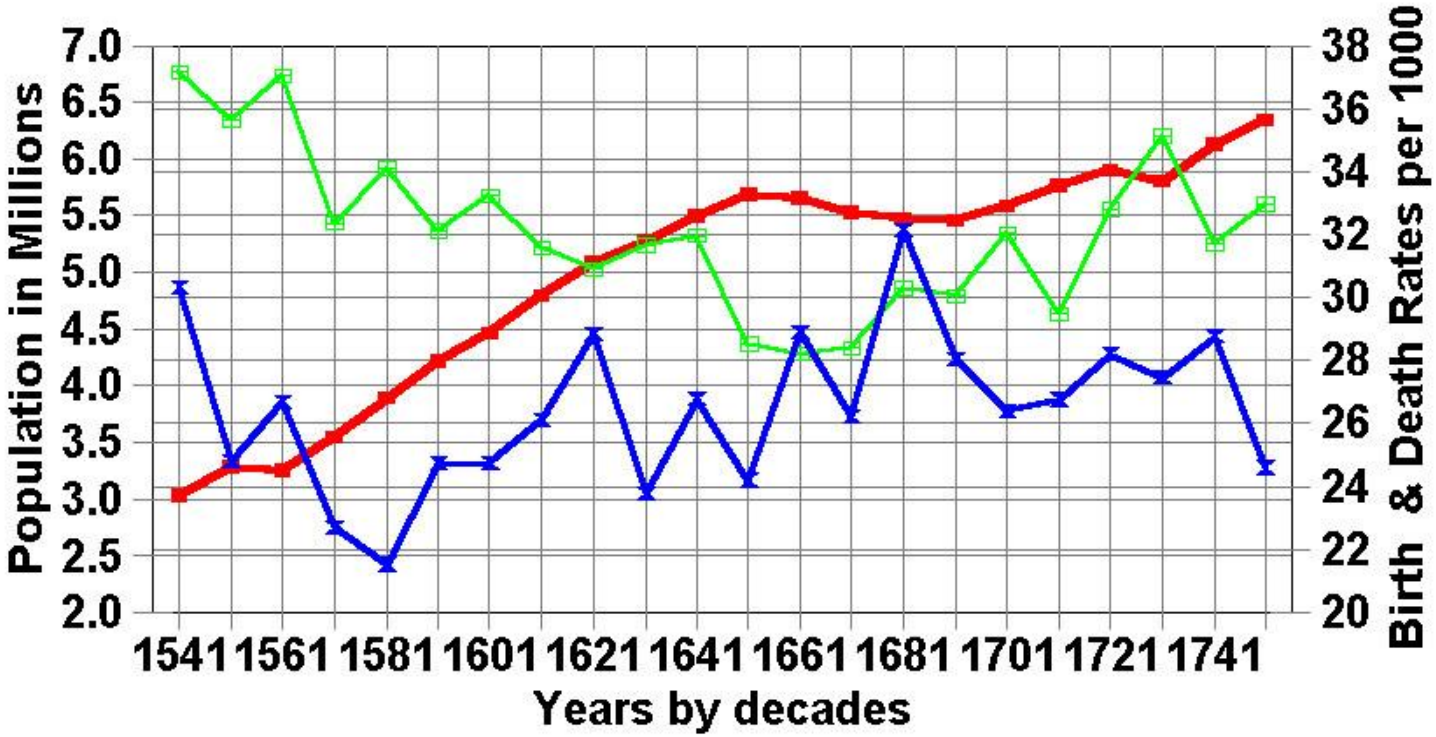
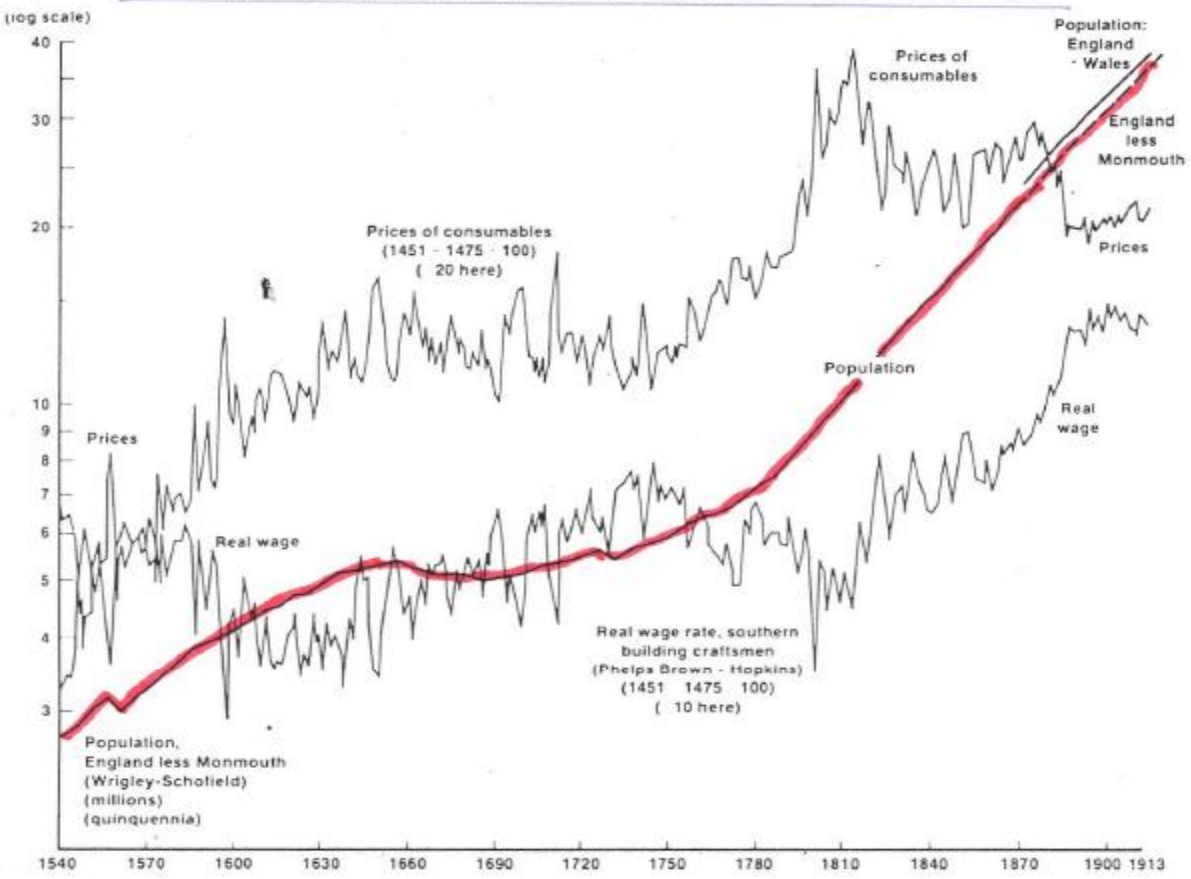


Fig. 1 Real Wages, Prices, and Population in England and Wales, 1541–1913



RWI = NWI/CPI

The Real Wage Index = Nominal Wage Index divided by the Consumer Price Index

Peter Lindert, 'English Population, Wages, and Prices: 1541 - 1913', *Journal of Interdisciplinary History*, 15 (Spring 1985), 614.

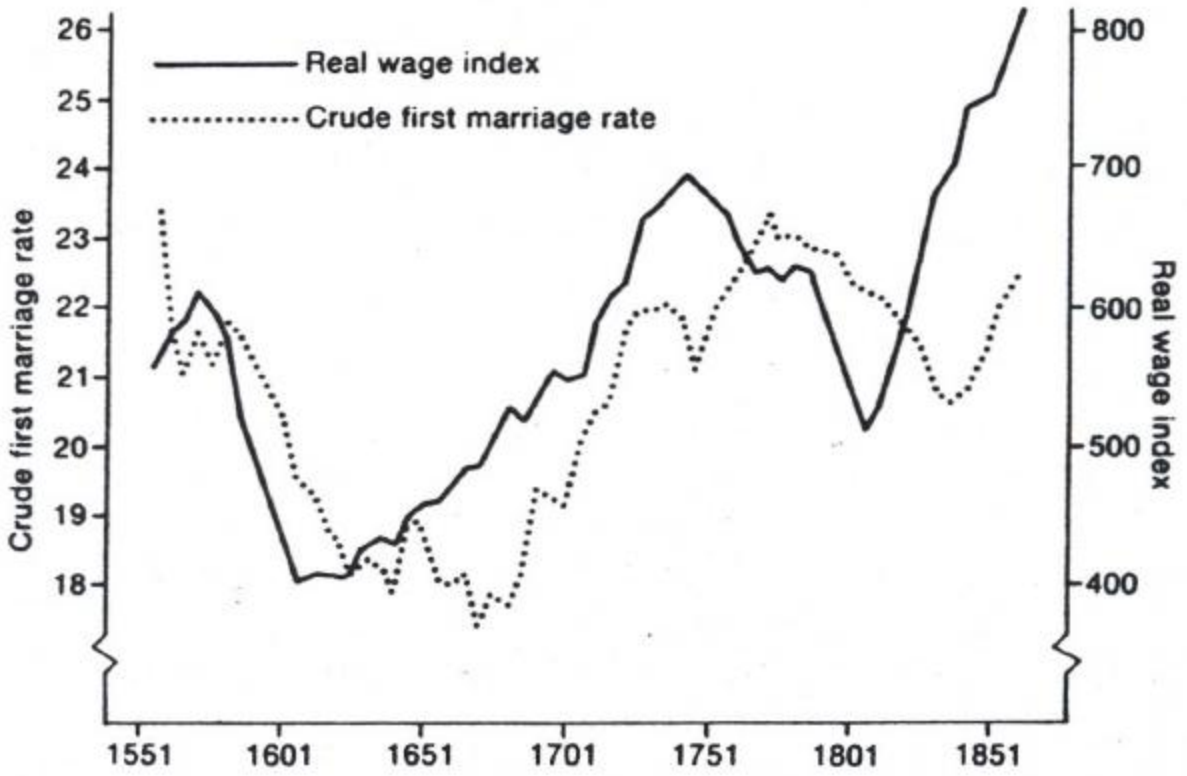


Figure 3. Real Wage Trends and the Crude First Marriage Rate in England. Both in 25-year moving averages.

Real Wage Rate: Construction wage rates deflated by an index of the cost of consumables.
Crude First Marriage Rate: Marriages per 1000 population, excluding re-marriages.

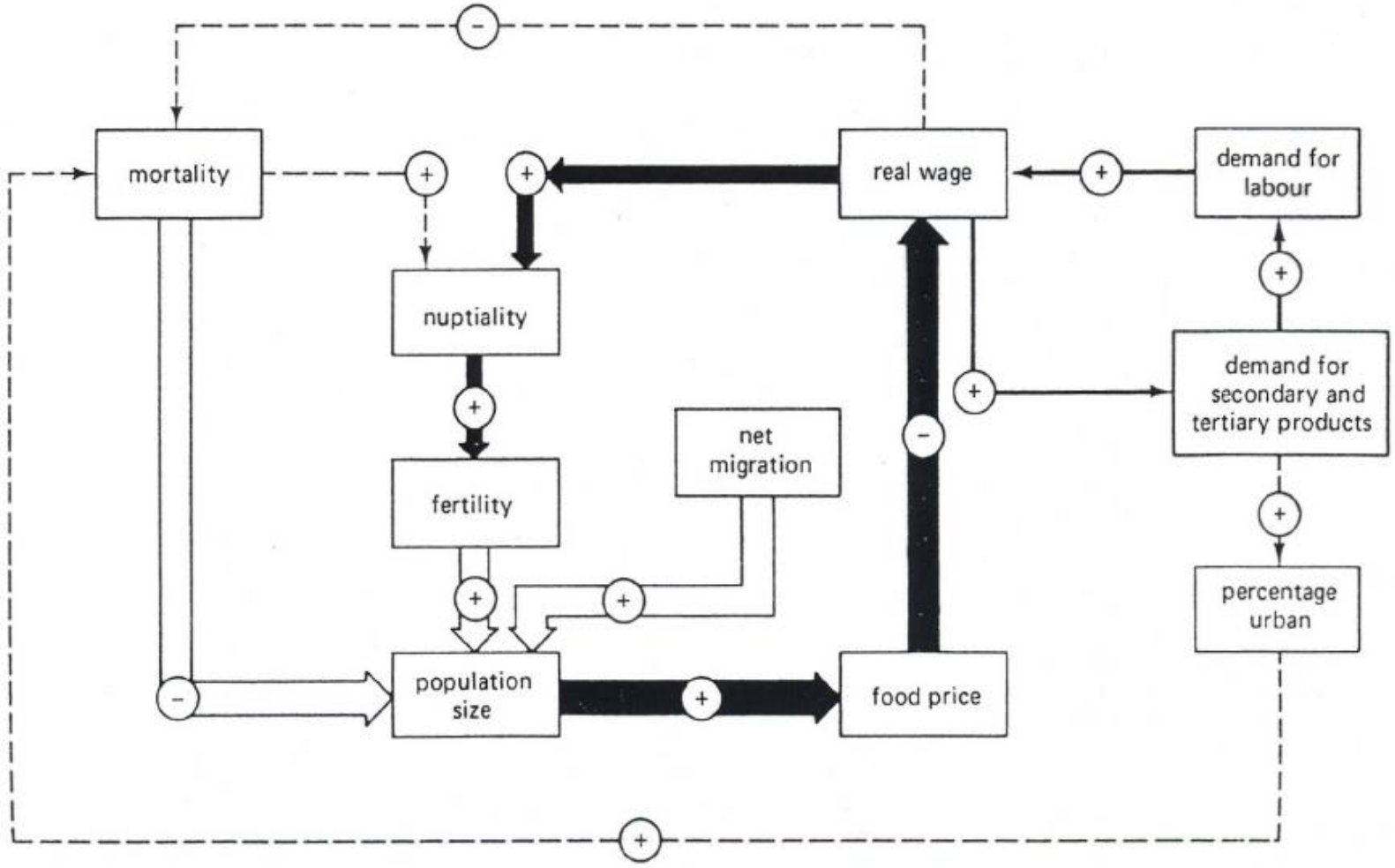
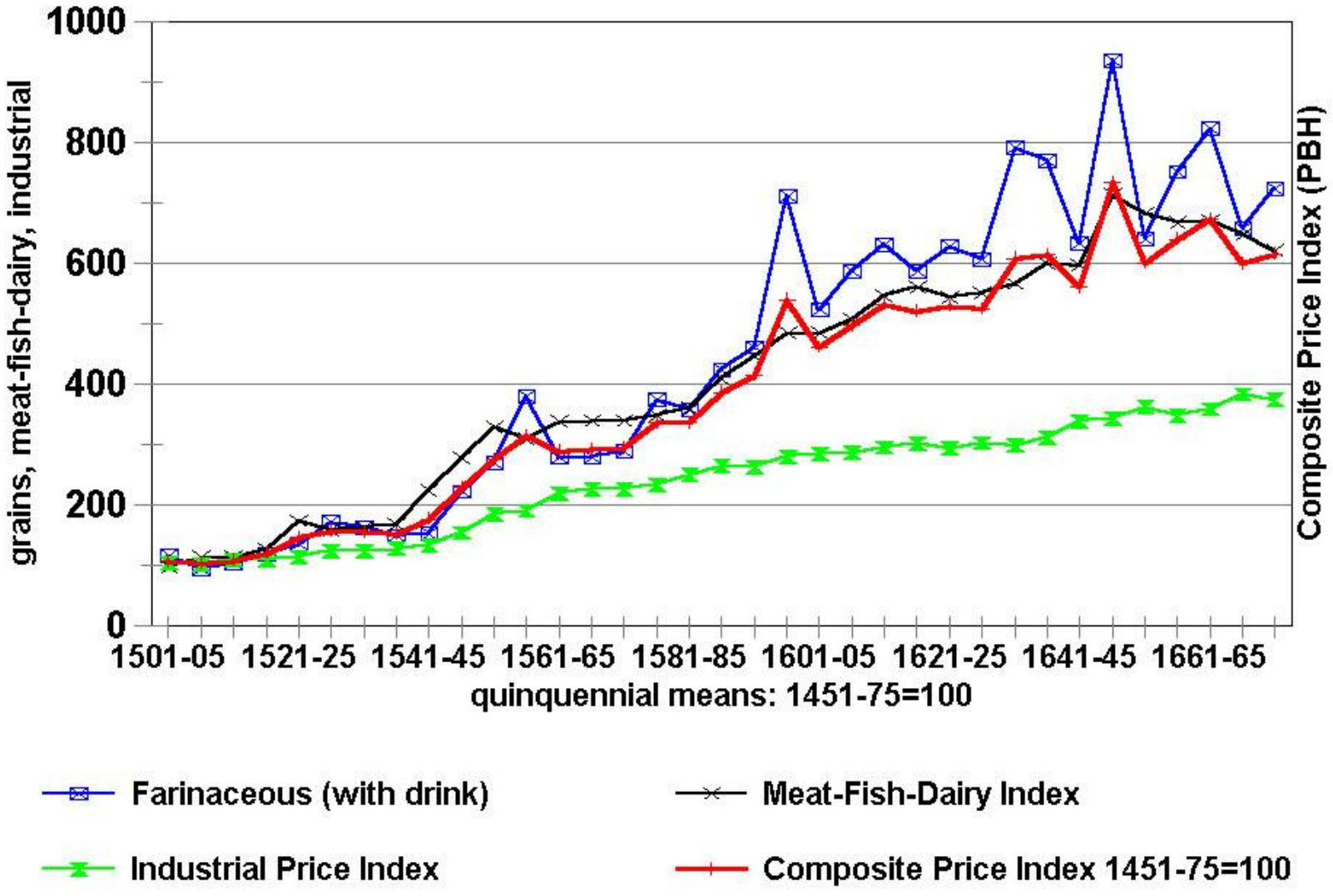


Figure 11.6: England in the late sixteenth century

Note: Net migration = immigration less emigration

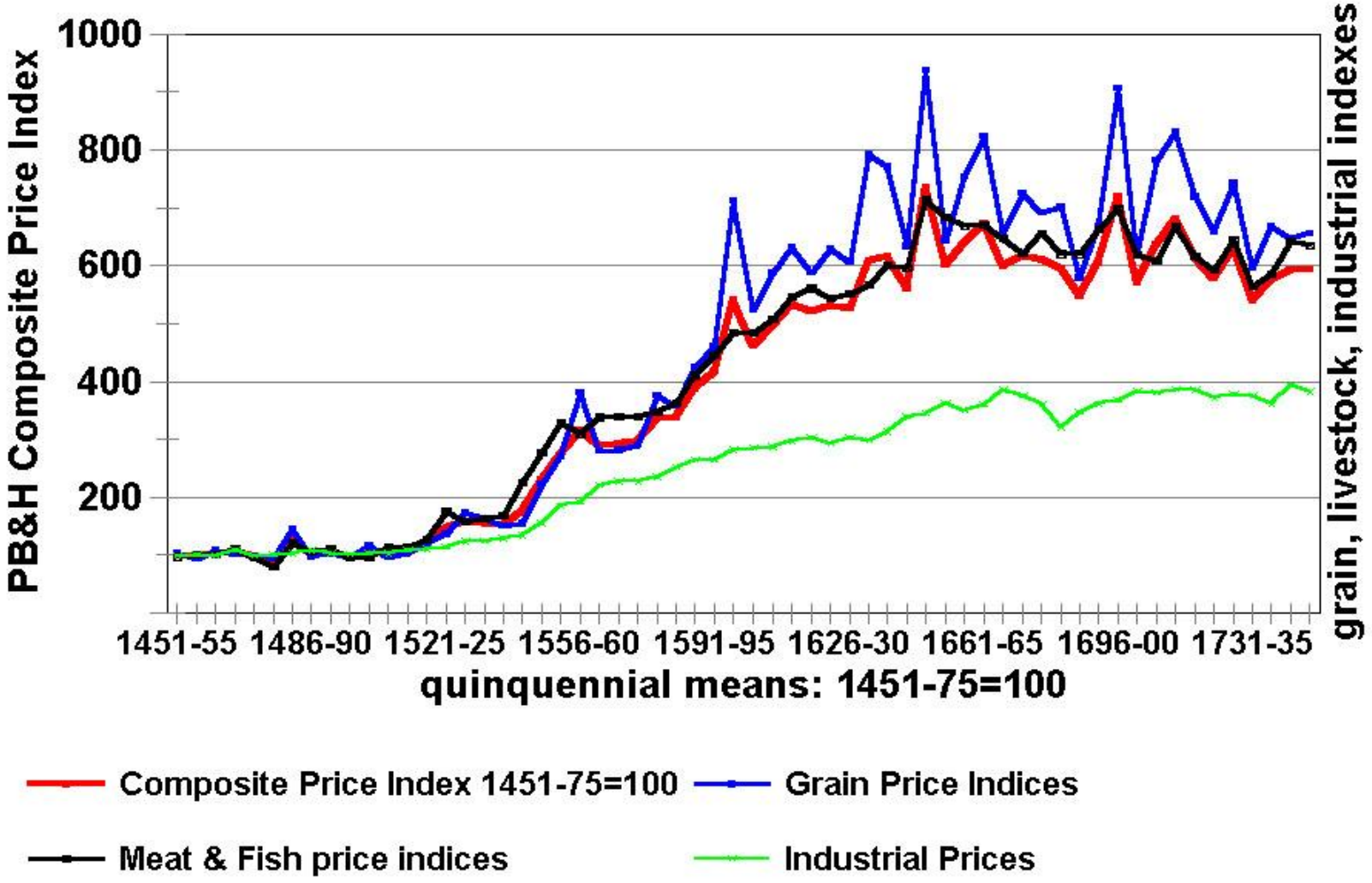
English Commodity Prices 1501 - 1675

PBH Indexes in 5 yr means: 1451-75=100



English Price Indexes, 1451-1750

grain, livestock, industrial,composite



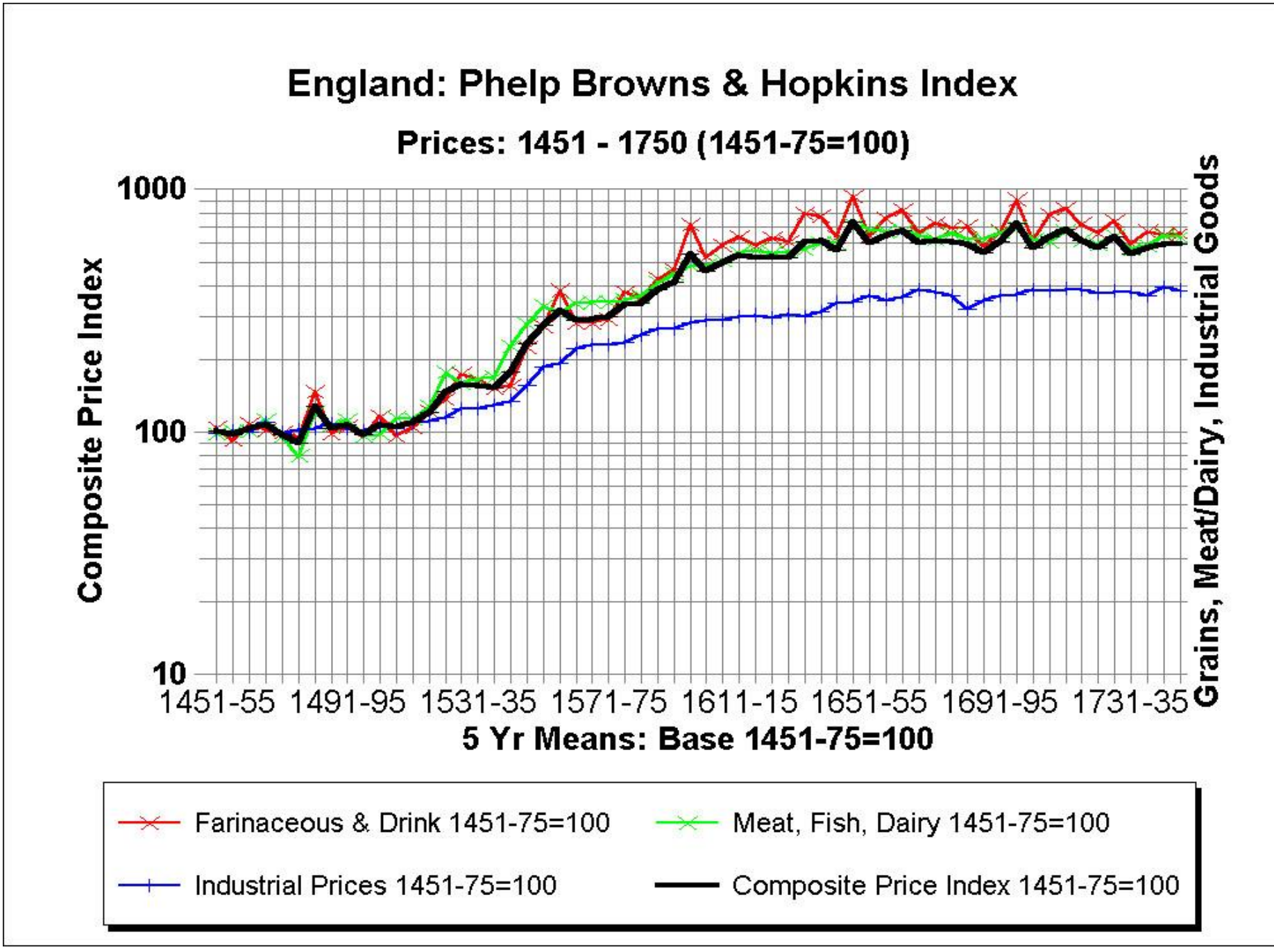
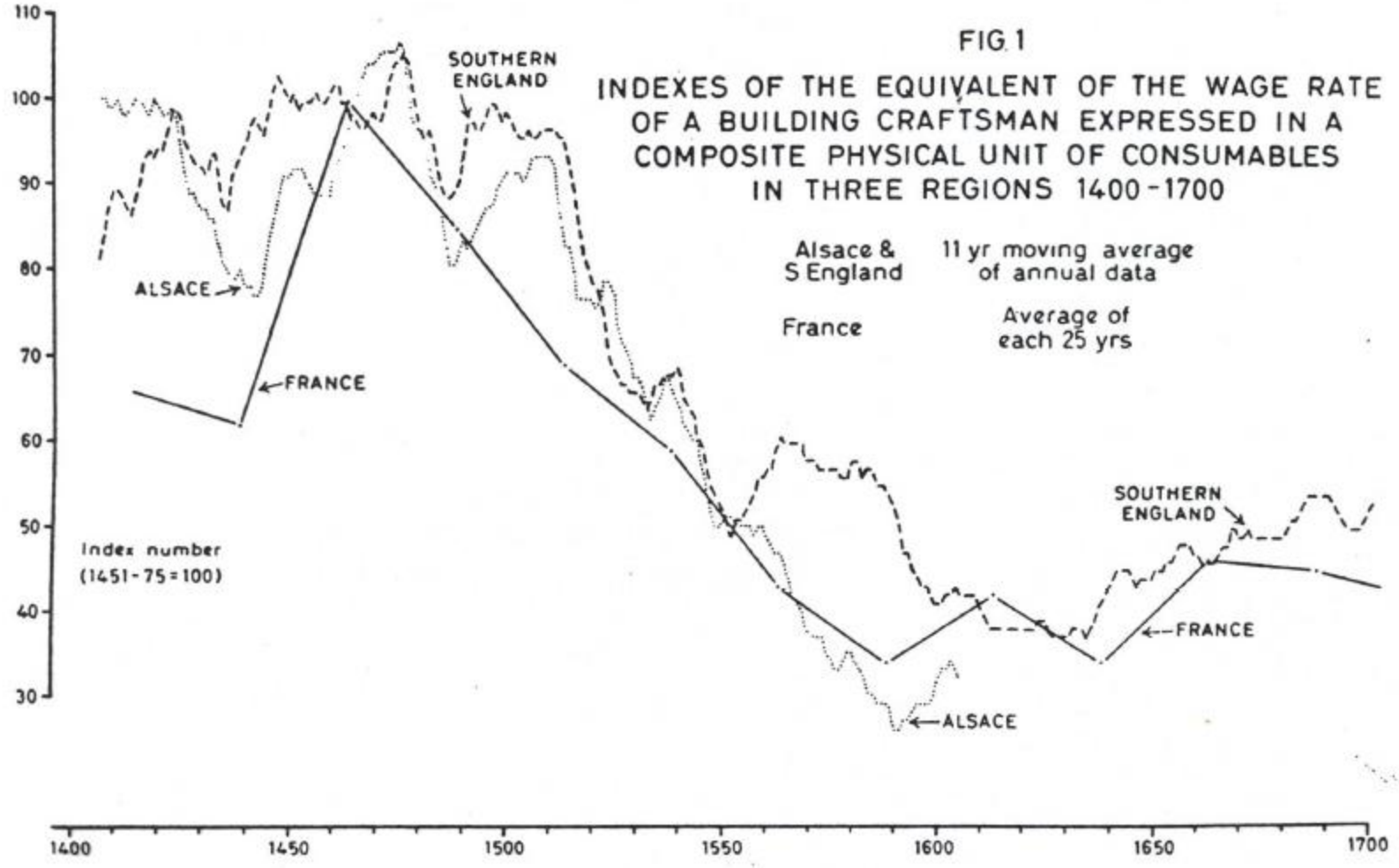

England: Phelp Browns & Hopkins Index
Prices: 1451 - 1750 (1451-75=100)
Composite Price Index
Grains, Meat/Dairy, Industrial Goods
1000
100
10
1451-55
1491-95
1531-35
1571-75
1611-15
1651-55
1691-95
1731-35
5 Yr Means: Base 1451-75=100
Farinaceous & Drink 1451-75=100
Meat, Fish, Dairy 1451-75=100
Industrial Prices 1451-75=100
Composite Price Index 1451-75=100

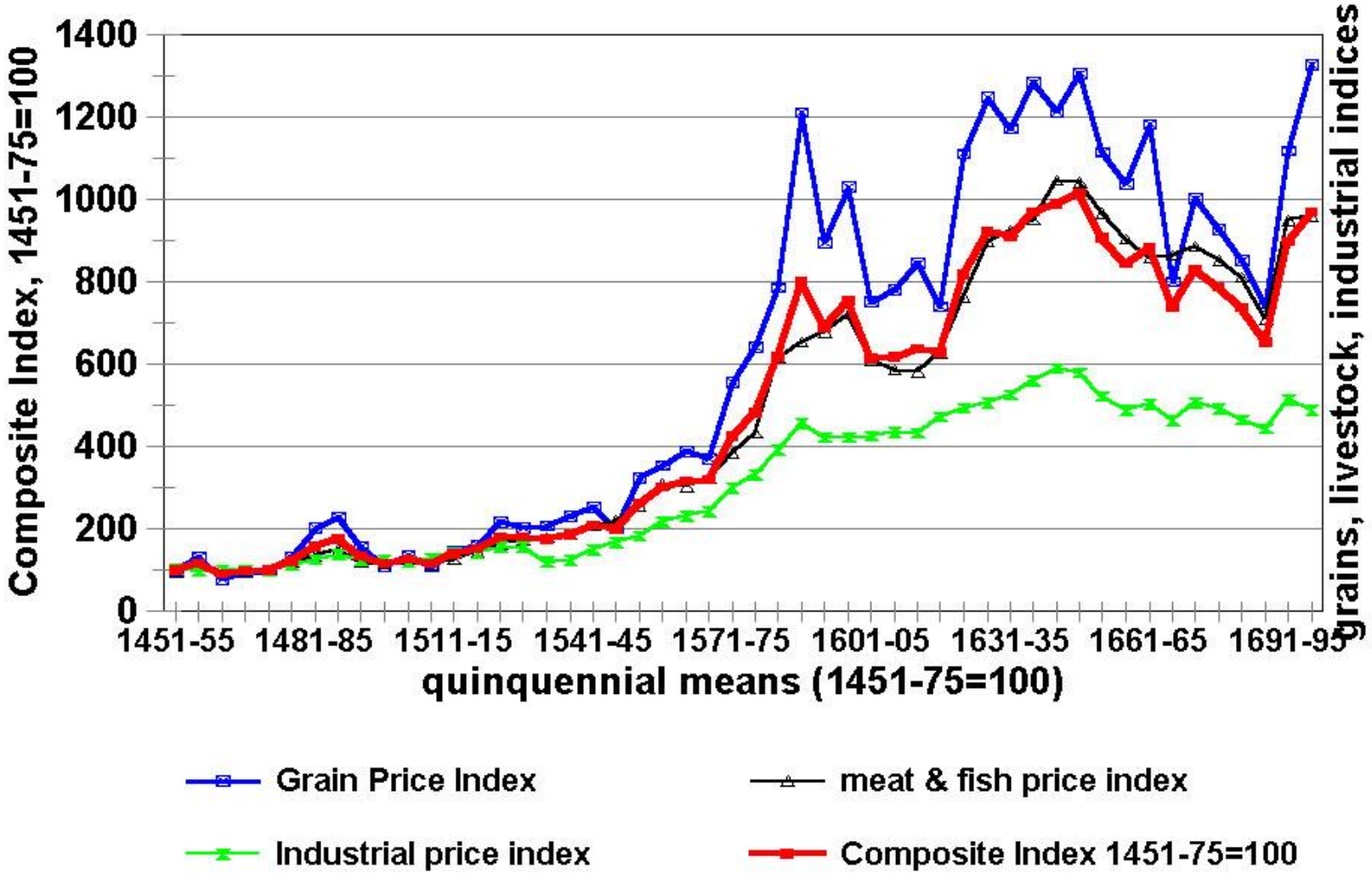
FIG. 1

INDEXES OF THE EQUIVALENT OF THE WAGE RATE OF A BUILDING CRAFTSMAN EXPRESSED IN A COMPOSITE PHYSICAL UNIT OF CONSUMABLES IN THREE REGIONS 1400 - 1700



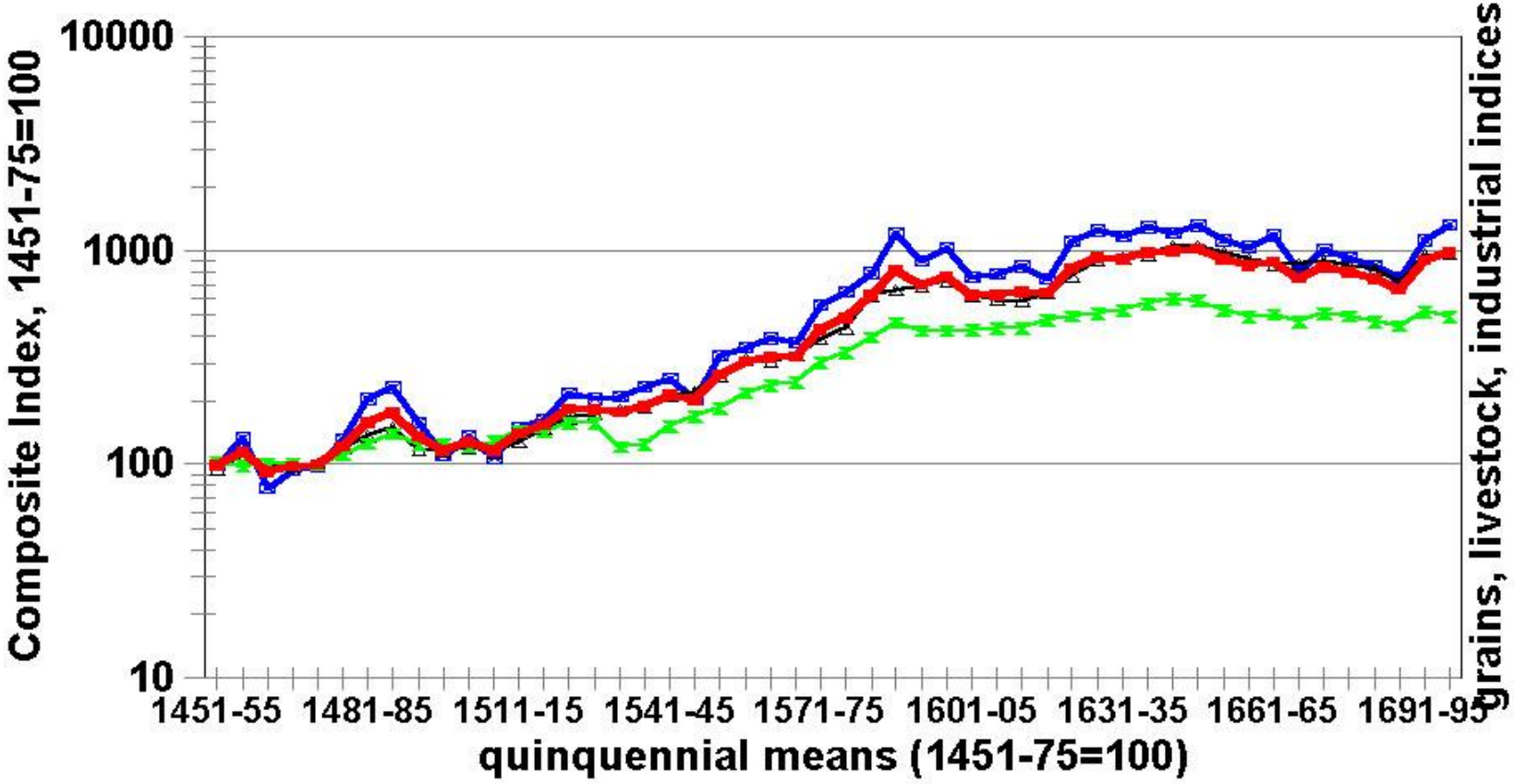
Brabant: Price Indexes, 1451-1700

grain, livestock, industrial,composite



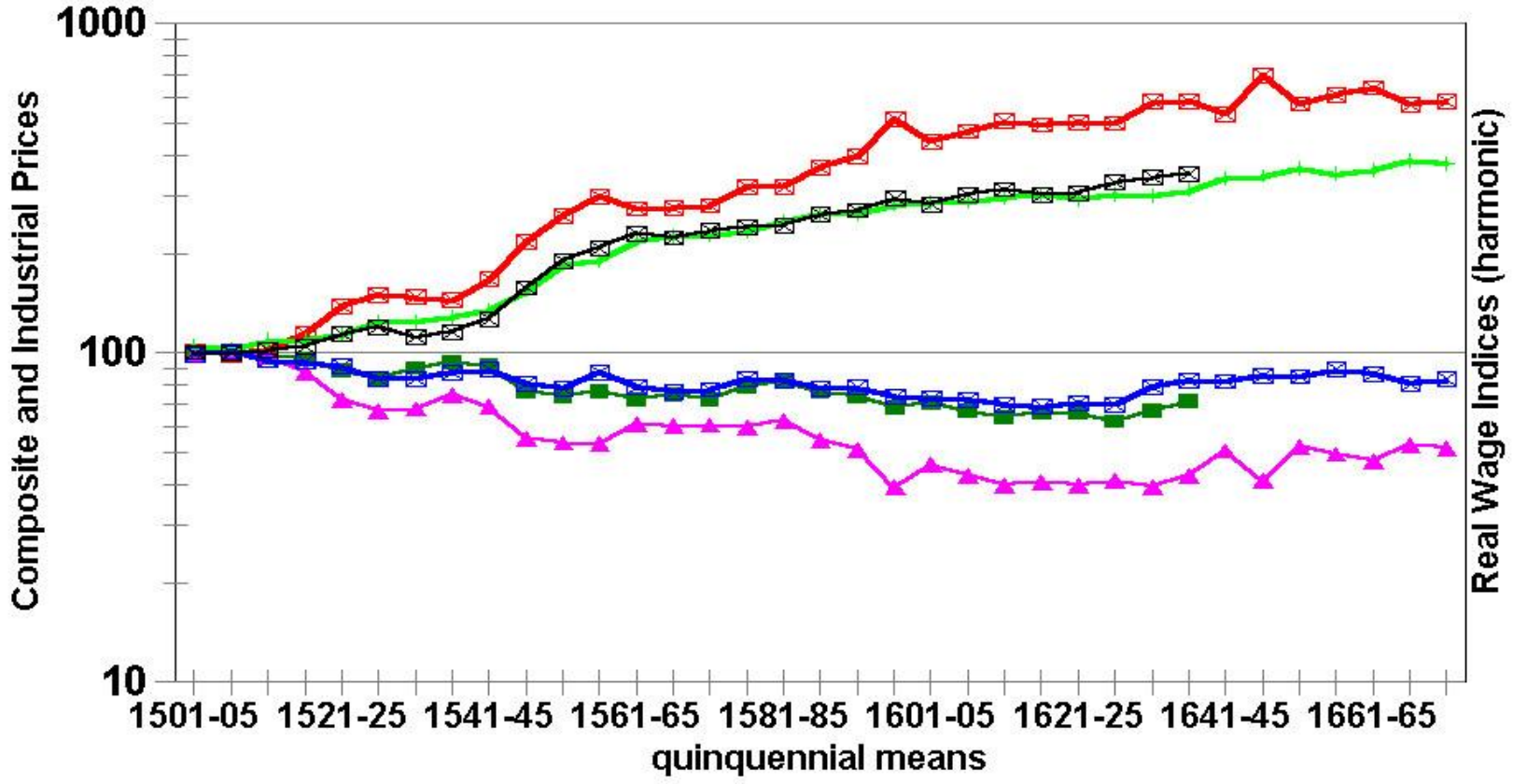
Brabant: Price Indexes, 1451-1700

grain, livestock, industrial,composite



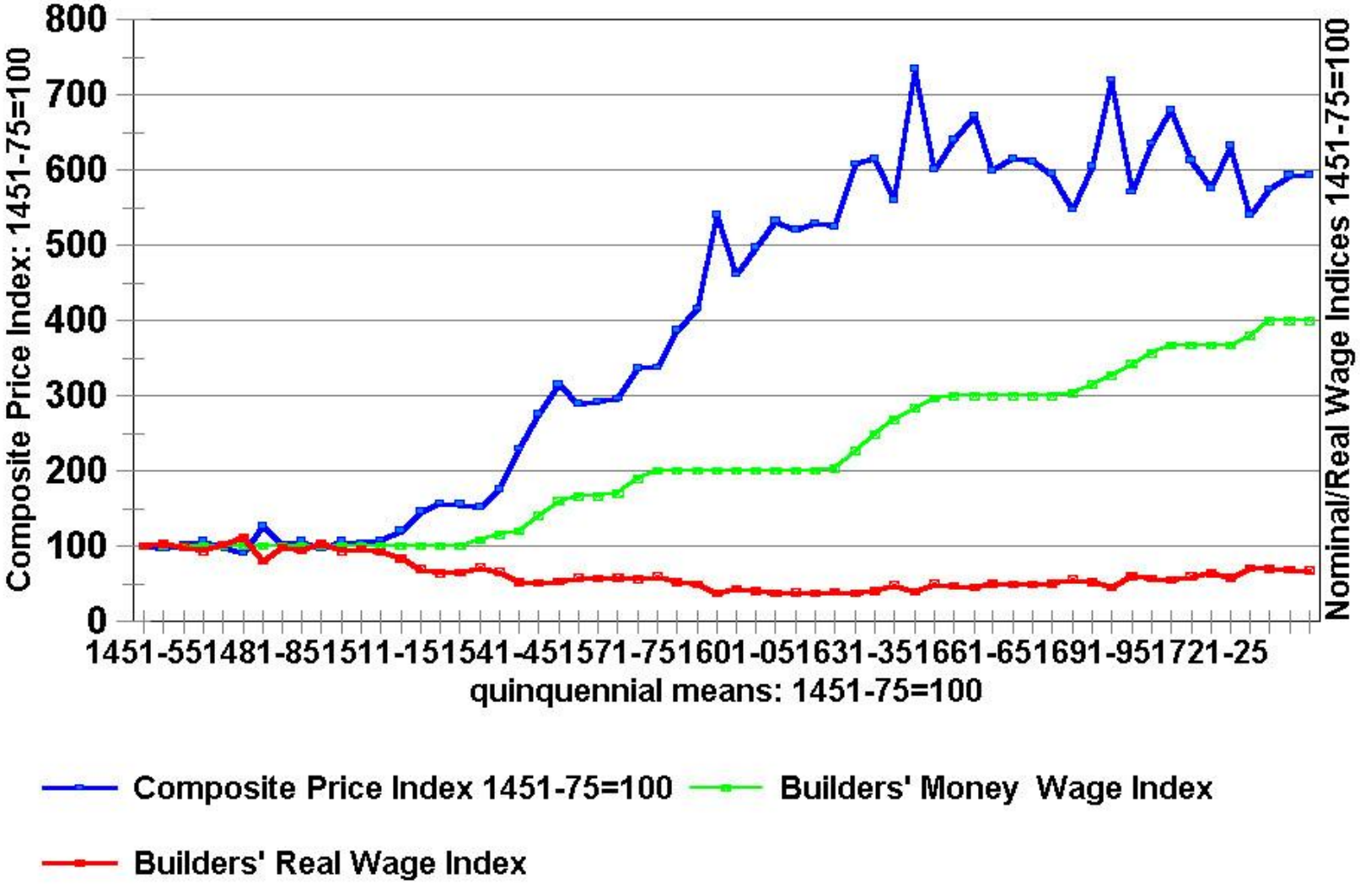
England: Prices & Wages, 1501-1675

5 yr means: 1501-10=100



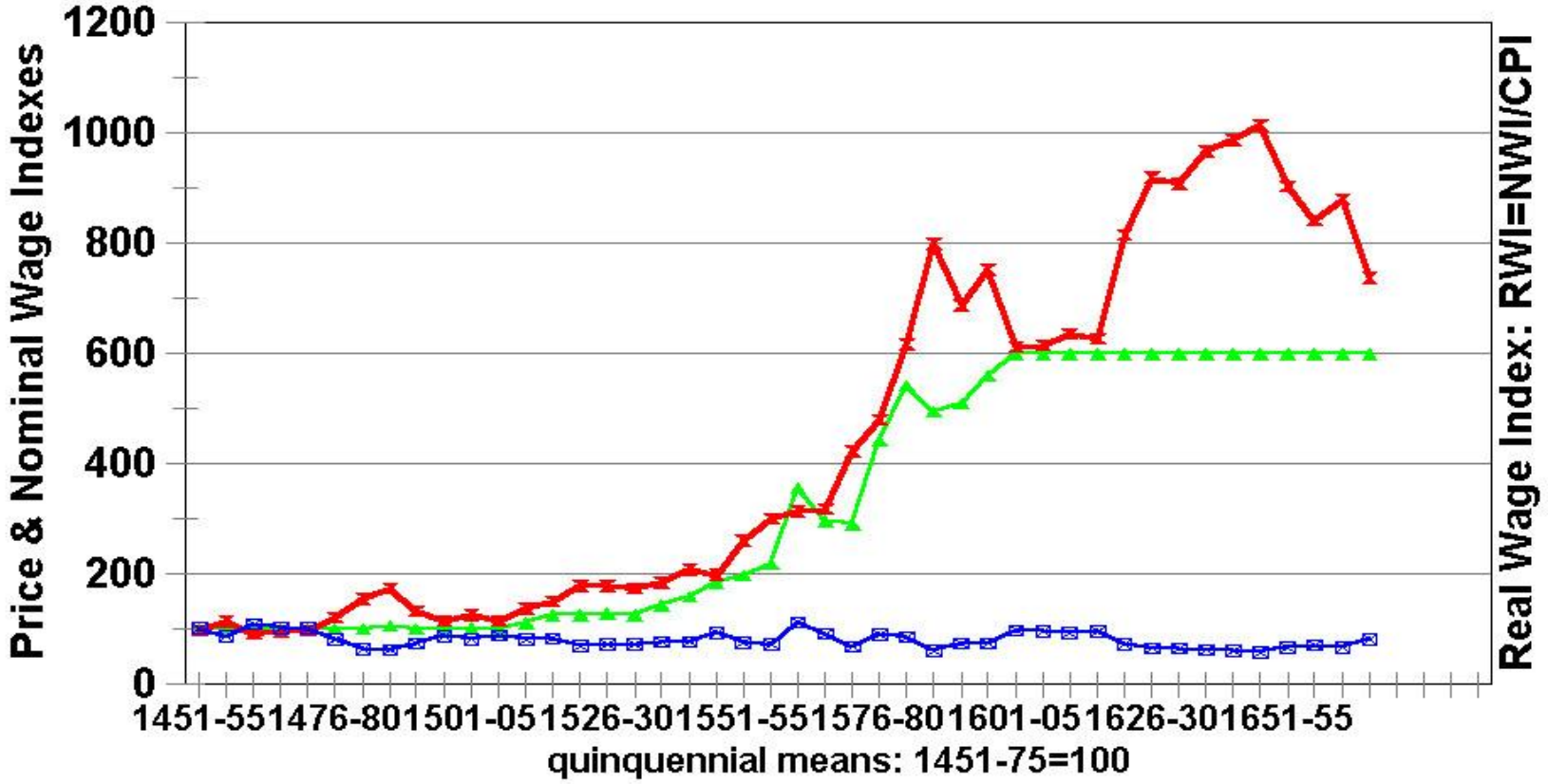
Prices and Wages in England, 1451-1750

Quinquennial means: 1451-75=100



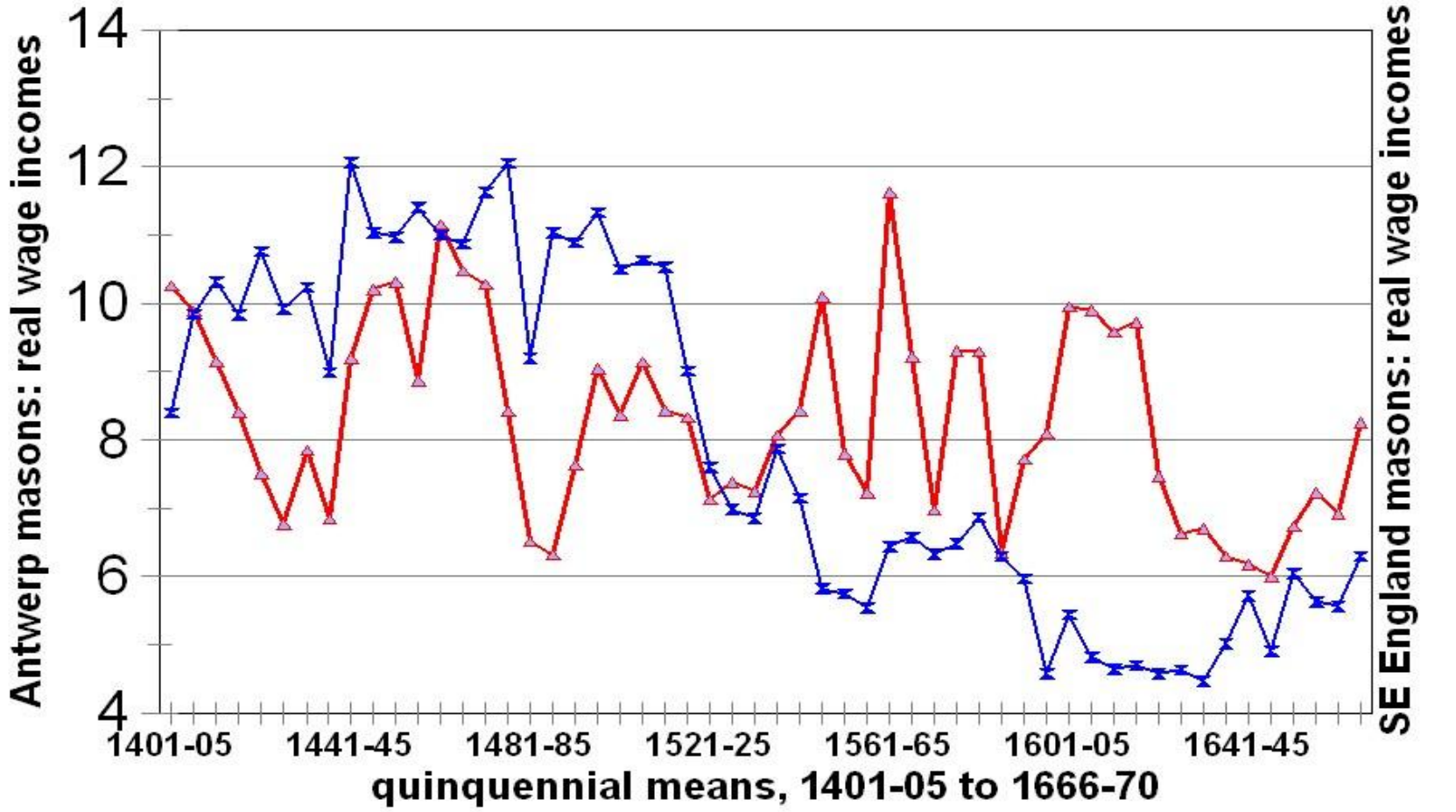
Prices and Wages in Brabant, 1451-1670

5 yr means: mean 1451-75=100



Masons' Real Wages: Antwerp & England

real wages: consumer baskets 1401-1670



The KUZNETS CURVE: 1

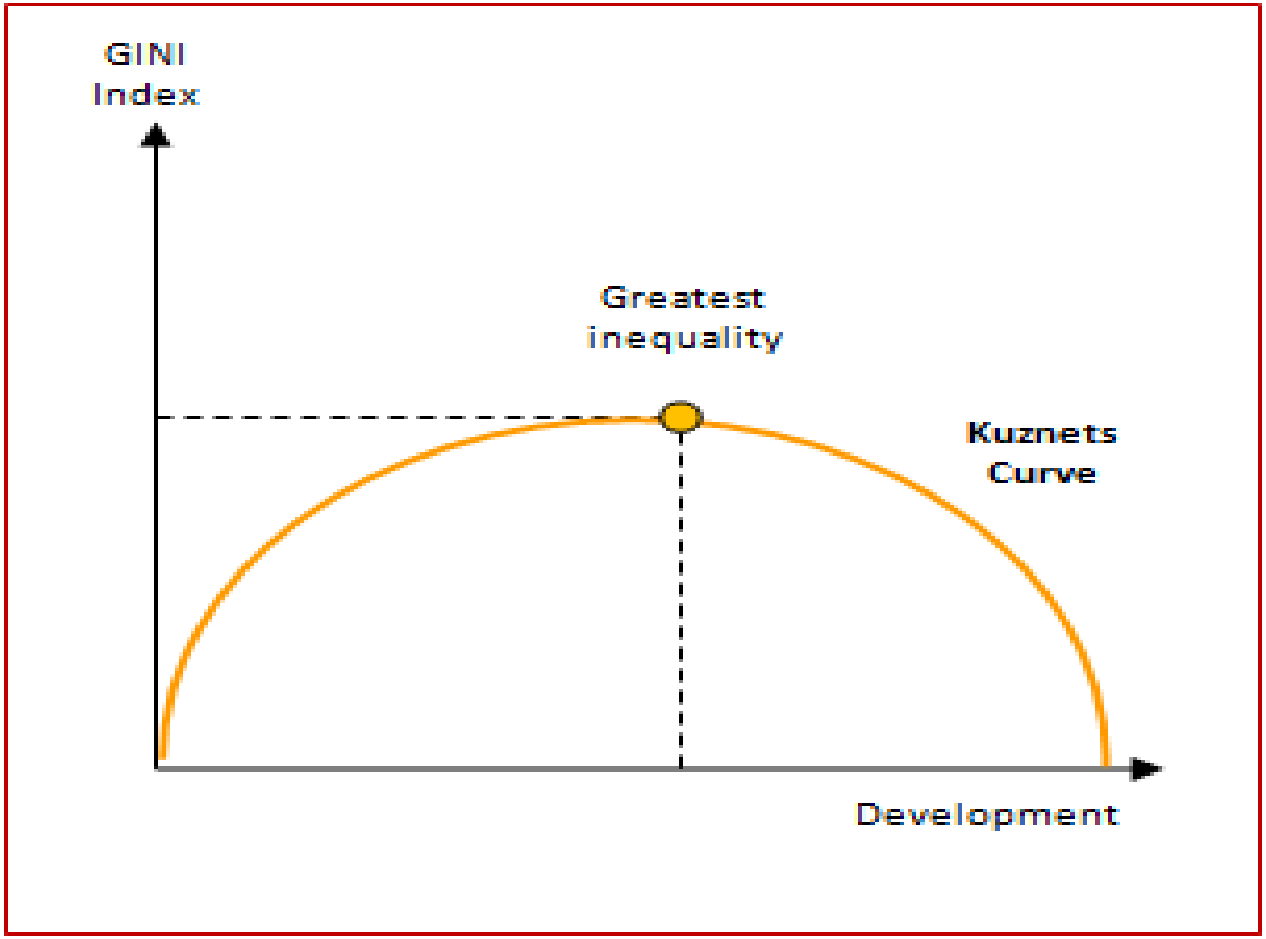
- 1) **The U-Curve:** a new perspective on the relationship between population growth, economic growth, and living standard
- - **a new look at the early-modern Malthusian problem**
- 2) **Simon Kuznets (1901-85): Russian-born US economist who won Nobel Prize in Economics** in 1971: 'for his empirically founded interpretation of economic growth'

The KUZNETS CURVE: 2

- 1) **Modern economic growth and industrialization: begins by shifting incomes and wealth from lower to upper economic strata:** from wage-earners to profit/rent earning entrepreneurs
- 2) **Entrepreneurs use such wealth accumulations to create new wealth → economic growth →** while reducing real incomes of lower classes: i.e., with more highly skewed income distributions

The KUZNETS CURVE: 3

- 3) **Fruits of modern economic growth → Δ increased productivity → raising real incomes for all of society**, including lower classes
- 4) **Applicability to Price Revolution era (1520-1640)?: No evidence of any turn to rising real wages** – which continue to fall
- - **because of Kuznets or Malthusian curves**?
- 5) **No such rise in RW until 2nd phase of Industrial Revolution era,** from the 1840s (or more, from the 1870s): examined in ECO 303Y


GINI
Index
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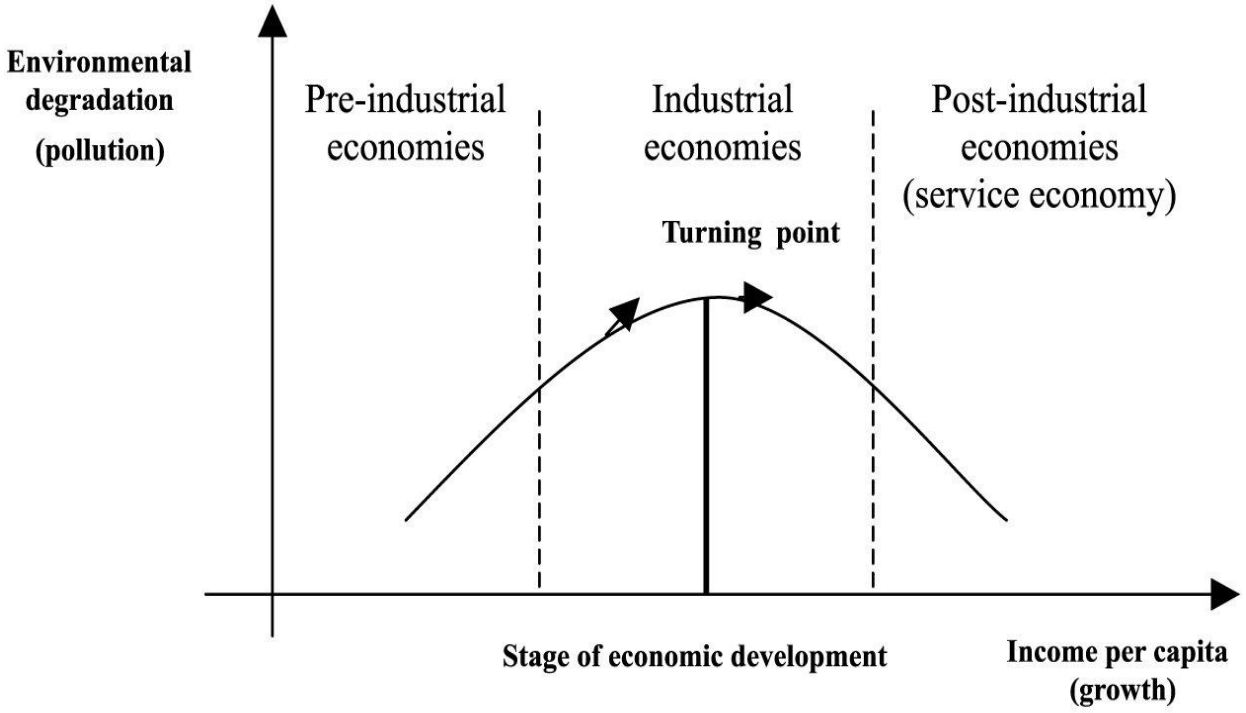
Curve
Development

Kuznets Curve



Lorenz Curve: Income Distribution

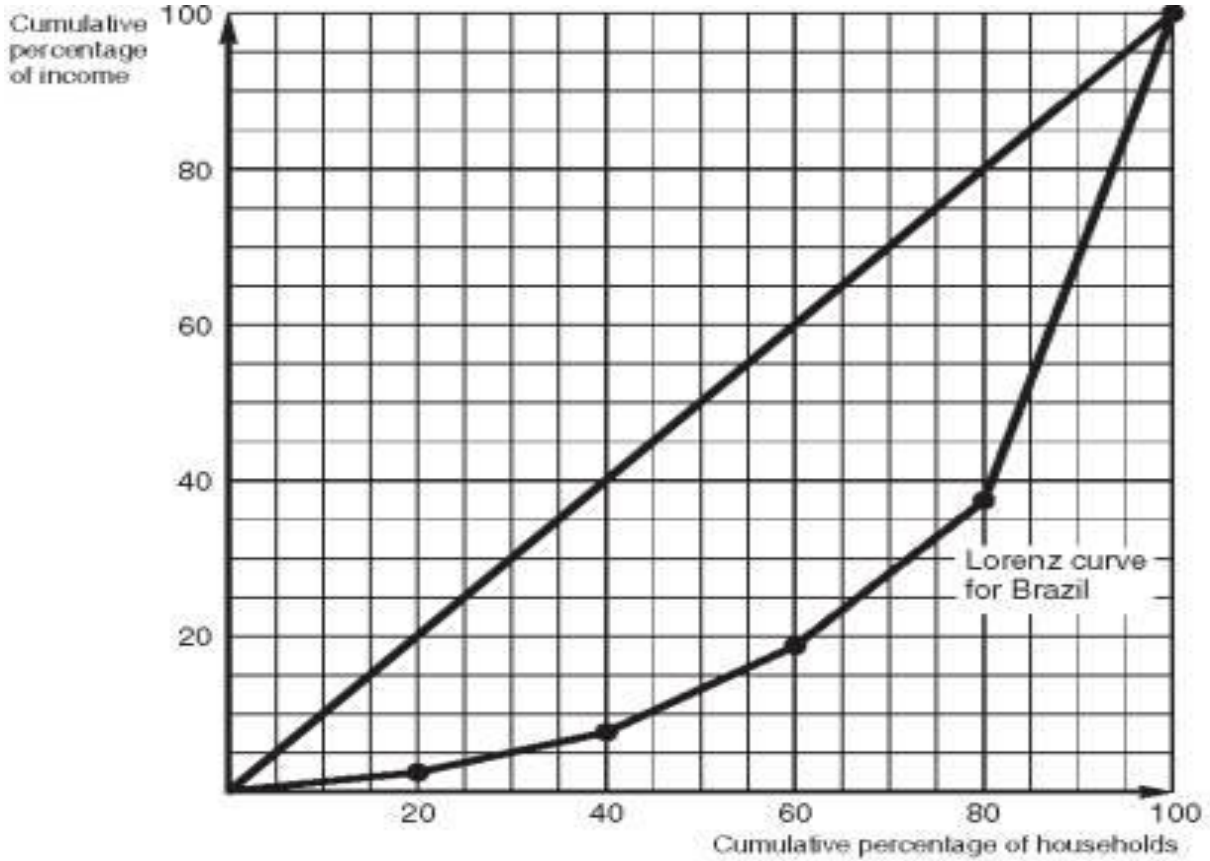


FIGURE 6–2

The Era of the General Crisis: ca. 1620 – ca. 1750

- 1) **Neither demographic nor economic growth continued from the Price Revolution era** into the era of the modern Industrial Revolution
- 2) **An intervening era known as the 'General Crisis' era: ca. 1620 – ca. 1750**
- 3) **Main Economic Features**:
- a) **demographic decline** or stagnation
- b) **increased warfare (30 Yrs War) → commercial crises → industrial declines**
- c) **deflation** or price stagnation
- d) **but evidence of rises** in real wages: wage stickiness

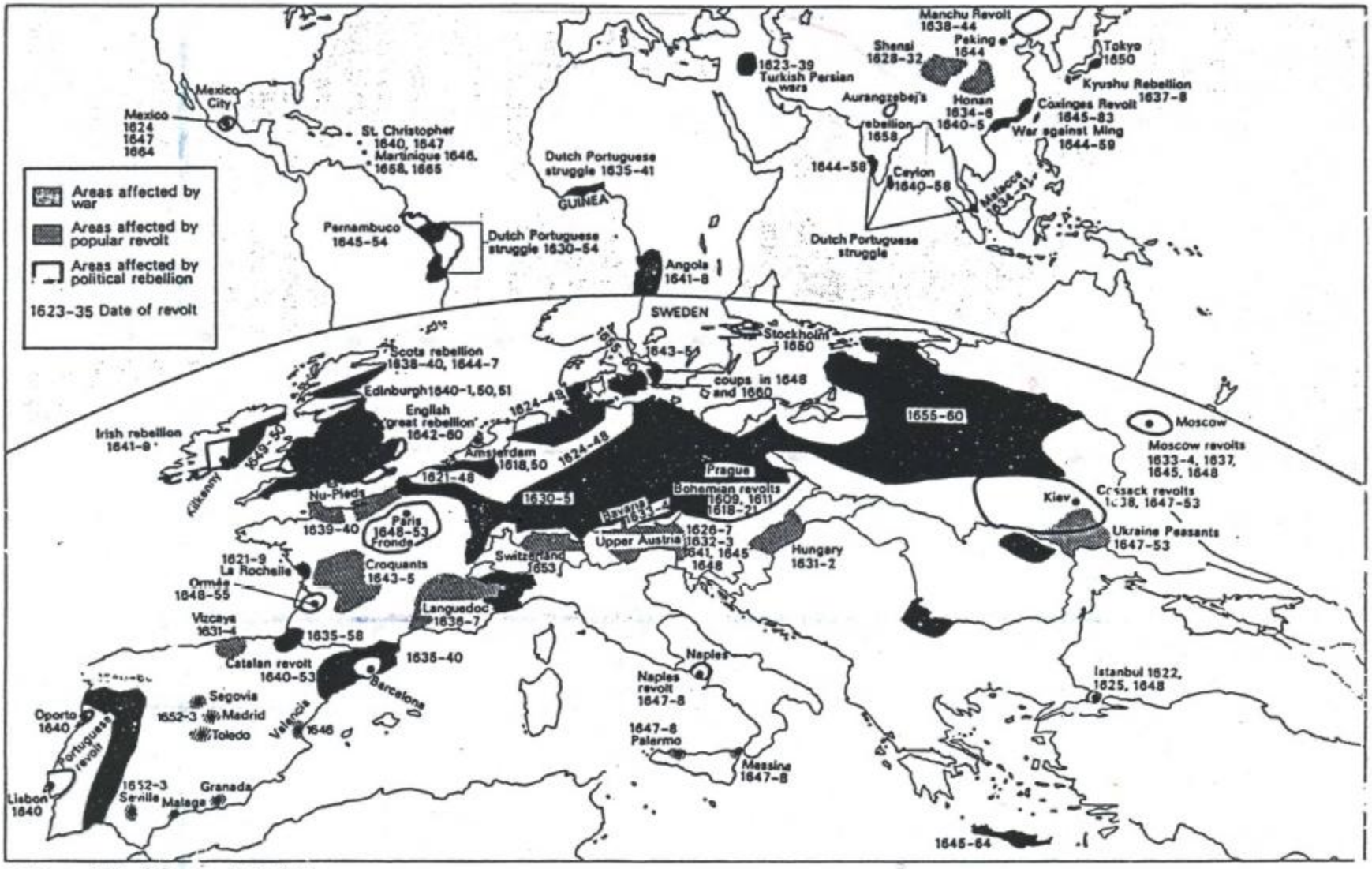
Hobsbawm & the General Crisis 1

- 1) **Eric Hobsbawm (b. 1917): British Marxist historian who put forward his Marxist thesis of a 'General Crisis' in the 17th century (ca. 1620 – 1750) to explain origins of modern capitalism**
- **2) Hobsbawm opposed both demographic and monetary explanations for the General Crisis**

  - that is true of almost all Marxist historians

Hobsbawm & the General Crisis 2

- 3) **Chief features of Hobsbawm's 'Crisis':** -- **involving 'internal contradictions', crises → resolutions** (promoting capitalism), in:
- a) **the Feudal capitalist economy**: chiefly of Italy
- b) **the Home Market** (in western Europe):
- c) **The Eastern Markets:** East of the Elbe (eastern Germany, Bohemia, Poland, Russia, etc)
- d) **The Overseas Markets**: the **Crisis of 'Old Colonialism' → producing 'New Colonialism'**



MAP 1 *The 'General Crisis'*

‘General Crisis’ Era: Demographic Reverses, c. 1620 – c. 1740

- (1) **Evidence for demographic reverses: decline or stagnation – from the 1620s:**
- - **Germany & Central Europe**: lost perhaps 30%-35%: but population flights from 30 Yrs War (1619-1648)?
- - **Italy and Spain**: from 20% to 30% losses
- - **France**: up to 20%, especially in war-afflicted areas
- - **even England and Netherlands** lost some population: see graphs
- - **England**: decline from 5.6 million (1650) to 5.3 million (1590): no sustained growth until 1740s
- - **most European regions had recovered from any losses by the 1740s**: hardly comparable to late Middle Ages

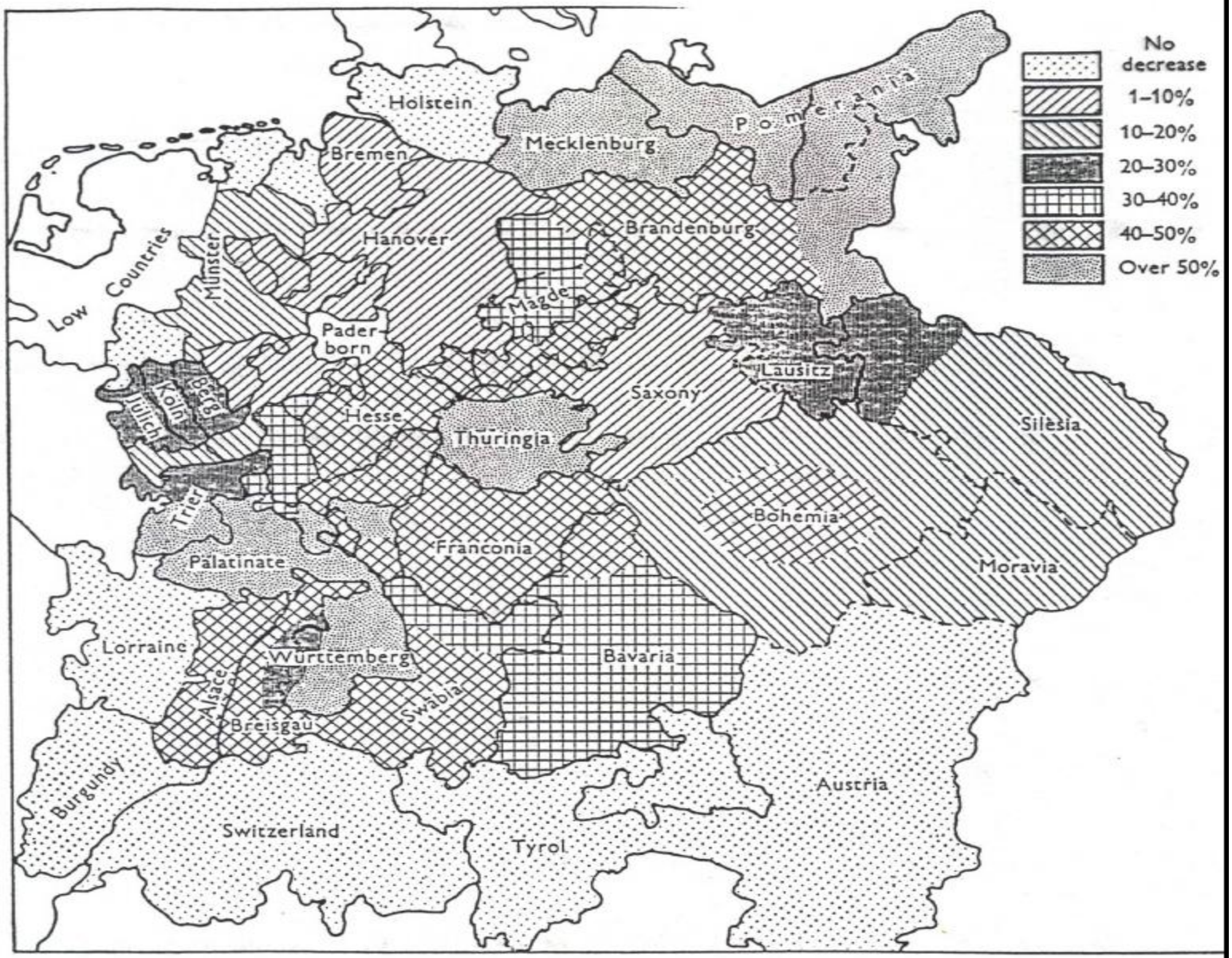
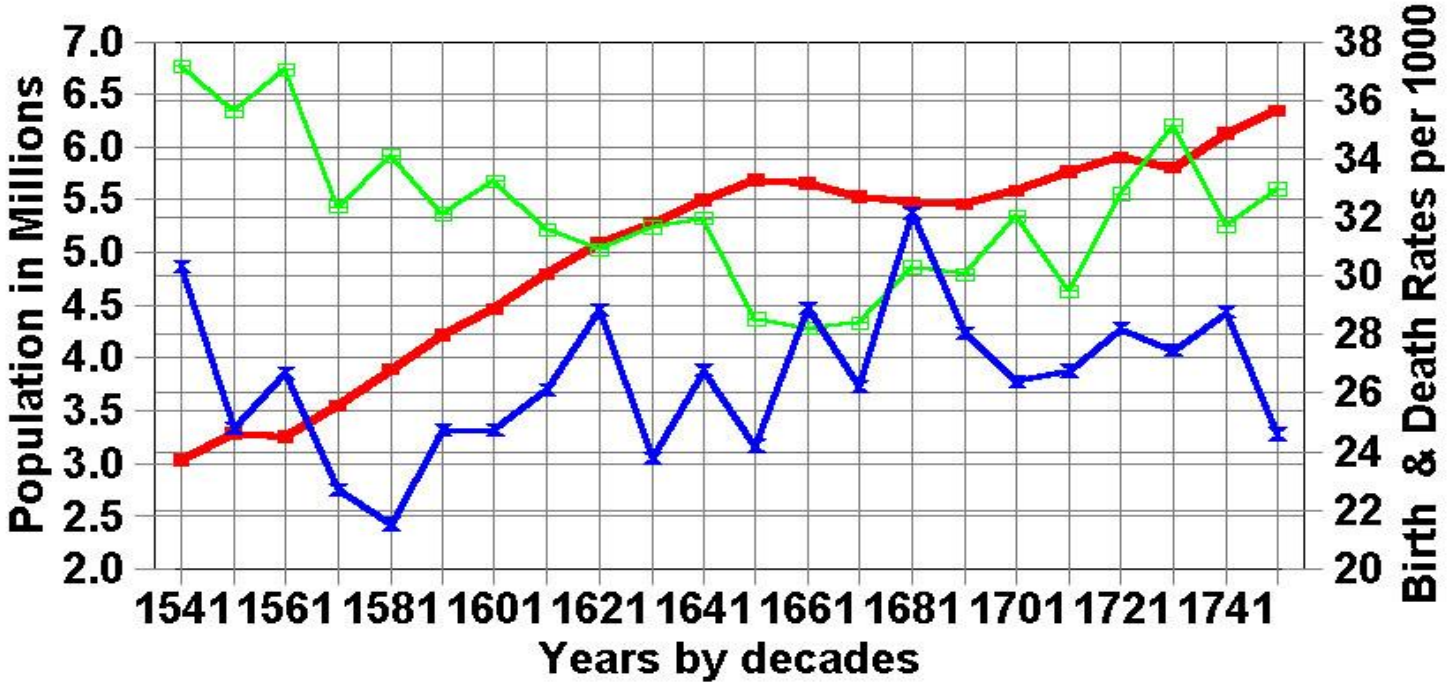
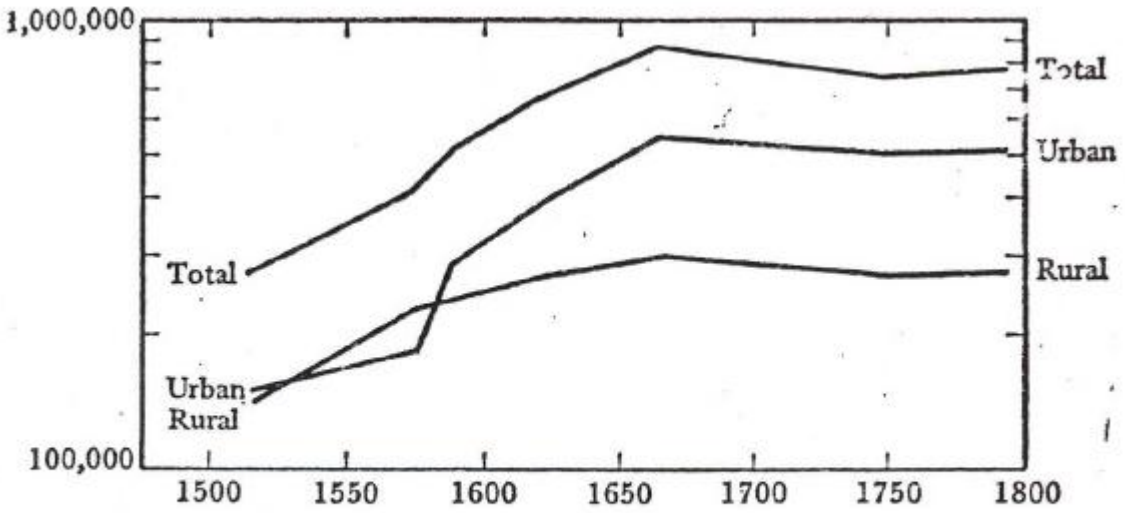


Fig. 1. Population decrease in the Holy Roman Empire during the Thirty Years War. (After G. Franz.)

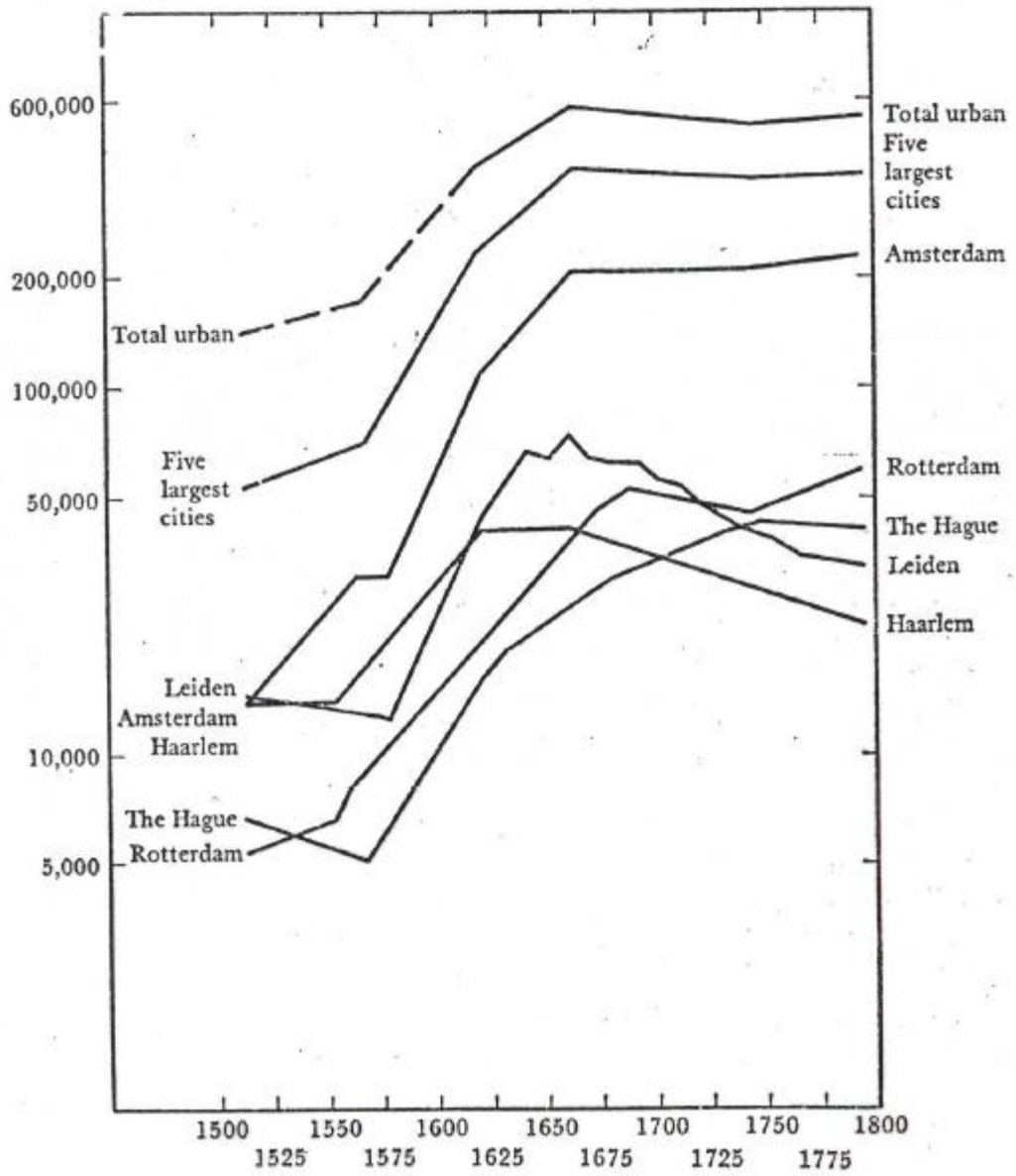
POPULATION: ENGLAND & WALES 1541-1741

in millions, by decades





Graph 3.6. Estimated Total Population of Holland, 1514–1795.



Graph 3.2. Urban Population of Holland, 1514–1795.

Causes of Demographic Reverses?

- (1) **Increased Malthusian Factors?**
- (2) **Warfare → famines → increased mortality from diseases – and adverse climate changes??**
- (3) **Role of Climate: the 'Little Ice Age'**
- - a) **causes not fully known:**
- **-** b) **sun-spot cycles: the 'Maunder Minimum'?**

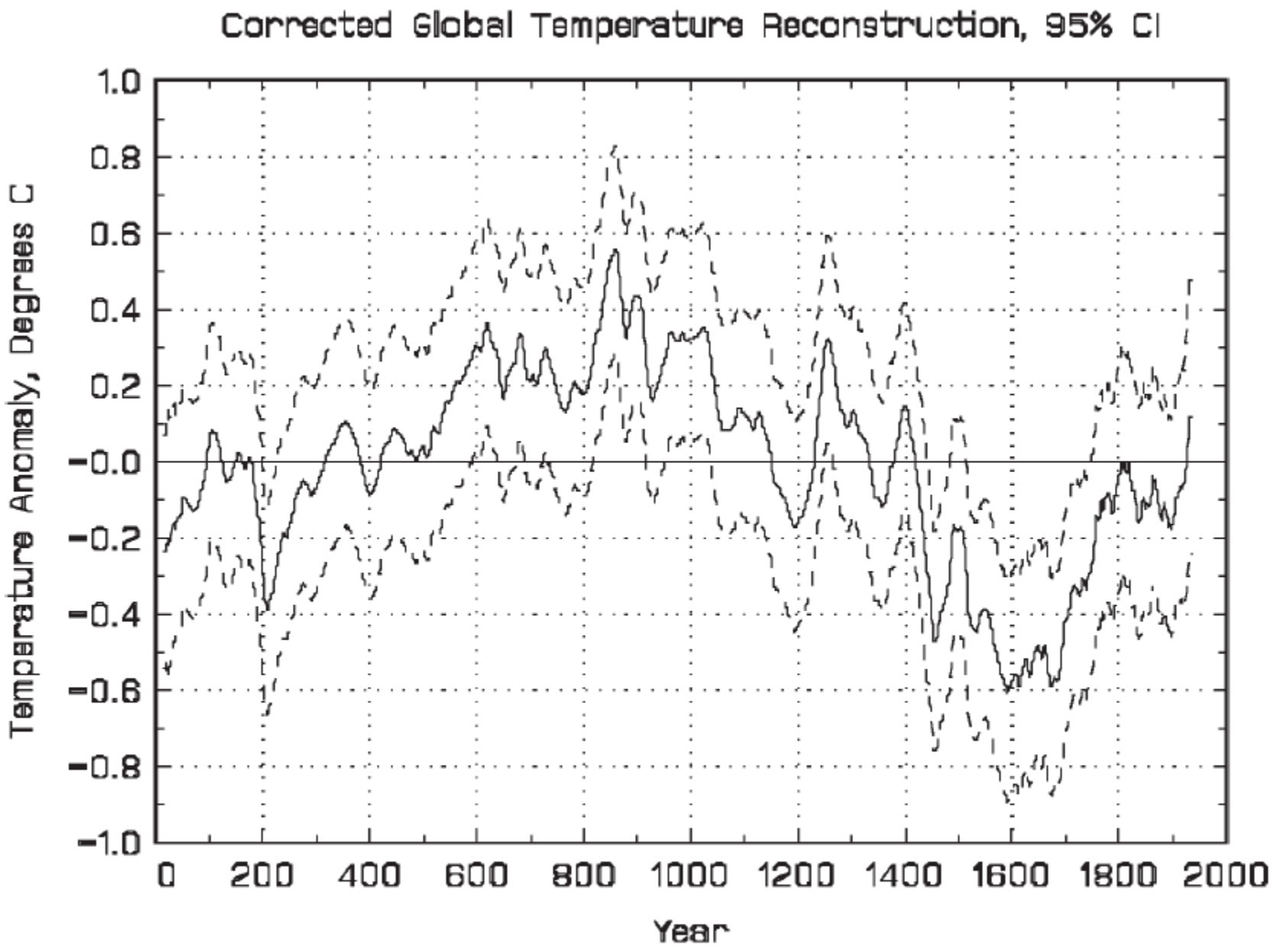


Figure 2. Corrected reconstruction with 95% confidence intervals.

Data for this graph is online at <http://www.econ.ohio-state.edu/jhm/AGW/Loehle/>

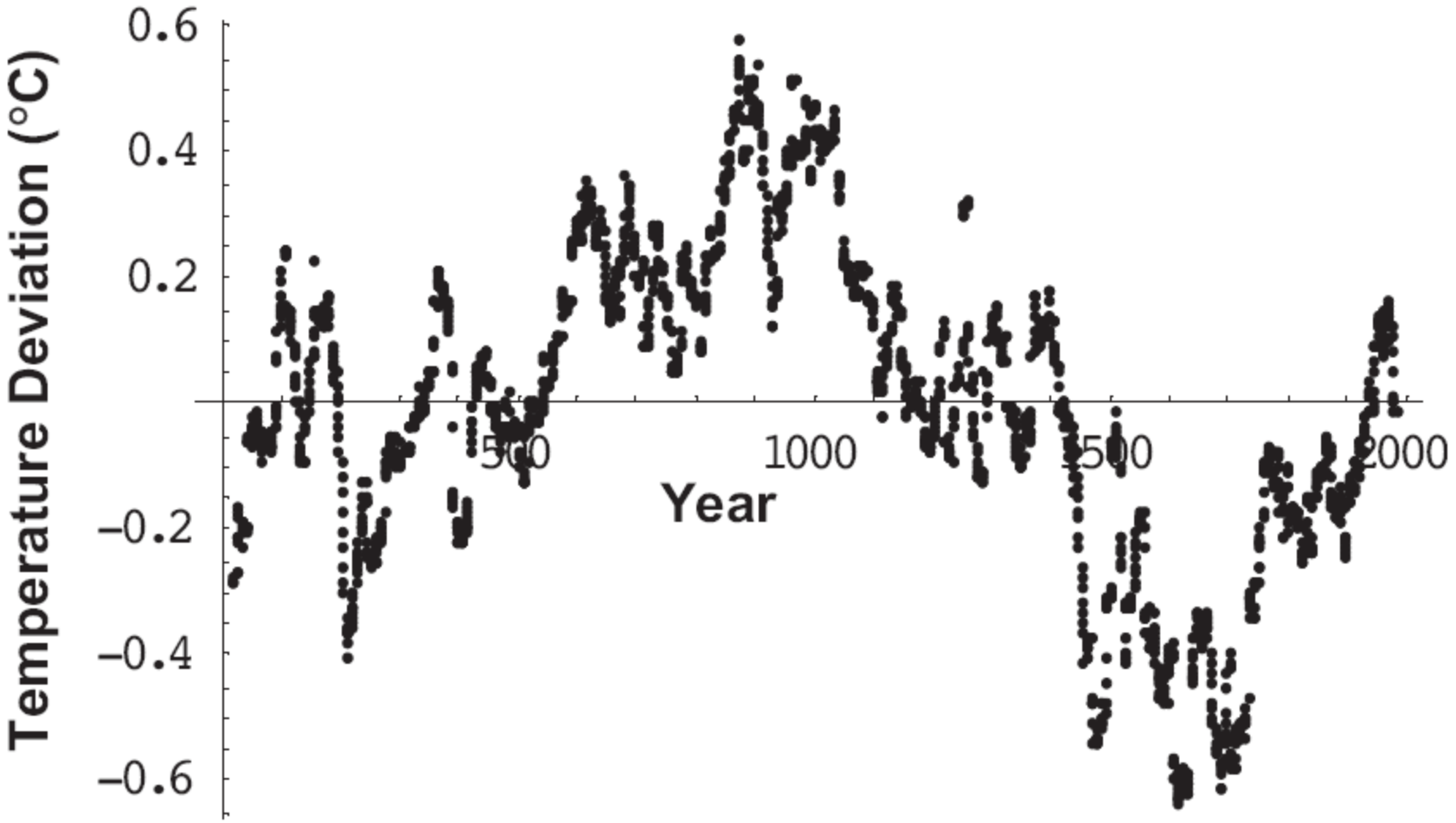


Figure 1. Mean of temperature data for 18 series.
Data archived at http://www.ncasi.org/programs/areas/climate/LoehleE&E2007.csv

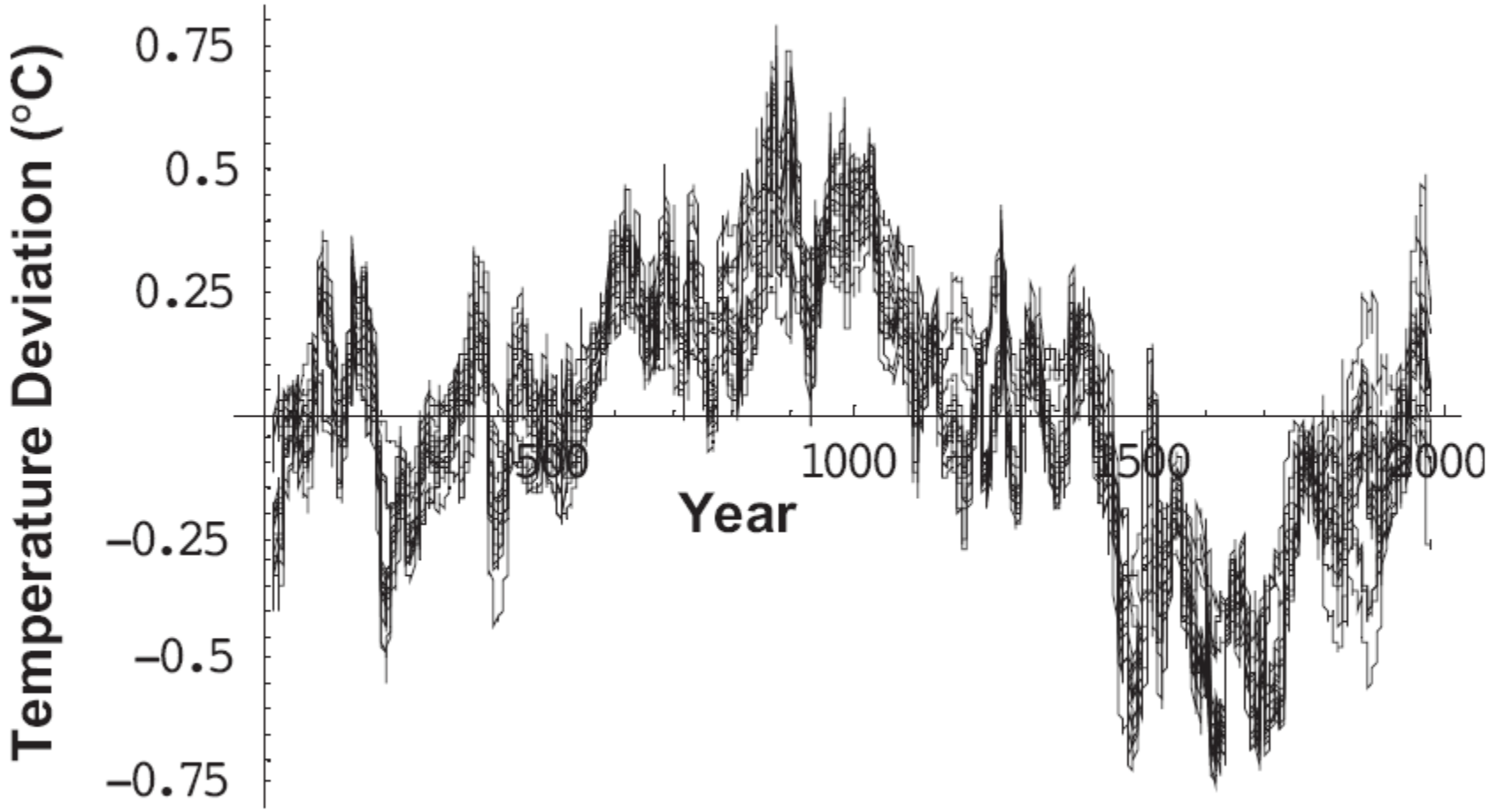


Figure 3. Random selection of 14 data sets at a time without duplicates, repeated 18 times, then overlaid, showing robustness of the pattern.

Demographic Reverses: Climate

- c) **Economic Consequences of Climate Changes:**
- - **negative impact on agriculture:** shortened growing season + lower outputs per acre
- - **increased costs of food + fuel consumption**
- - **effects on fisheries?** not known
- - **increased famines + malnutrition** → reduced resistance to diseases
- - **ecological + biological impact on bacteria + viruses**?? yet to be fully explored

Demographic Crises: Warfare

- 1) **Thirty Years War (1618 – 1648)**: involving most of Germany, Poland, Sweden, Russia, France, the Netherlands, Spain, Italy, and the Low Countries (north & south)
- - **instigating civil wars, anarchy, brigandage, emigration**
- - **evidence of depopulation in Germany + Central Europe:** possibly mass flights of refugees rather than net population decline
- -2) **effect of sustained, chronic warfare:** disrupting food production + distribution; malnutrition; spreading diseases
- - 3) **demographic effects seemed to have delayed consequences:** in generation following 1648 (Peace of Westphalia)

Demographic Crises: Diseases 1

- a) **Bubonic Plagues:** revival 1630s to 1670s
- b) **Syphilis:** '**The French Disease**':
- - from French invasions of Italy: 1494 - 1559
- - Did Columbus (1492) bring it back from the Americas (see lecture notes)?
- - **probable origin: Portuguese slave trade**
- - **from West Africa, from 1440s**: mutation of African yaws

Demographic Crises: Diseases 2

- - **syphilis:** far more virulent and far more contagious (not just sexually) than now: most diseases mutate into milder forms
- c) **small pox**: probably the most virulent killer
- - Spanish conquests of Americas: their small pox wiped out most of the indigenous population (those not killed with guns)
- d) **Others:** **pneumonia, typhus, tuberculosis, amoebic dysentery** (cholera: not till 1820s)

Demographic Crises: Diseases 3

- (d) **Bacteria & water-borne diseases**
- - **bacterial transmission of diseases unknown** before discoveries of **Koch (1876) and Pasteur (1878**)
- - **Miasma theory** held sway for centuries: diseases spread by atmospheric vapours
- - **Koch + Pasteur discoveries** ➔ water purification systems
- e) **alternatives to water & milk as beverages**
- - **medieval**: **beer and wine**
- - **early-modern**: **introduction of tea & coffee (Asian)**
- f) **negative impact of Δ urbanization**: increased urban pollution (water, etc) and contagion: so that urban death rates always exceeded birth rates, before late 19th century

European Marriage Pattern: Fertility Problems 1

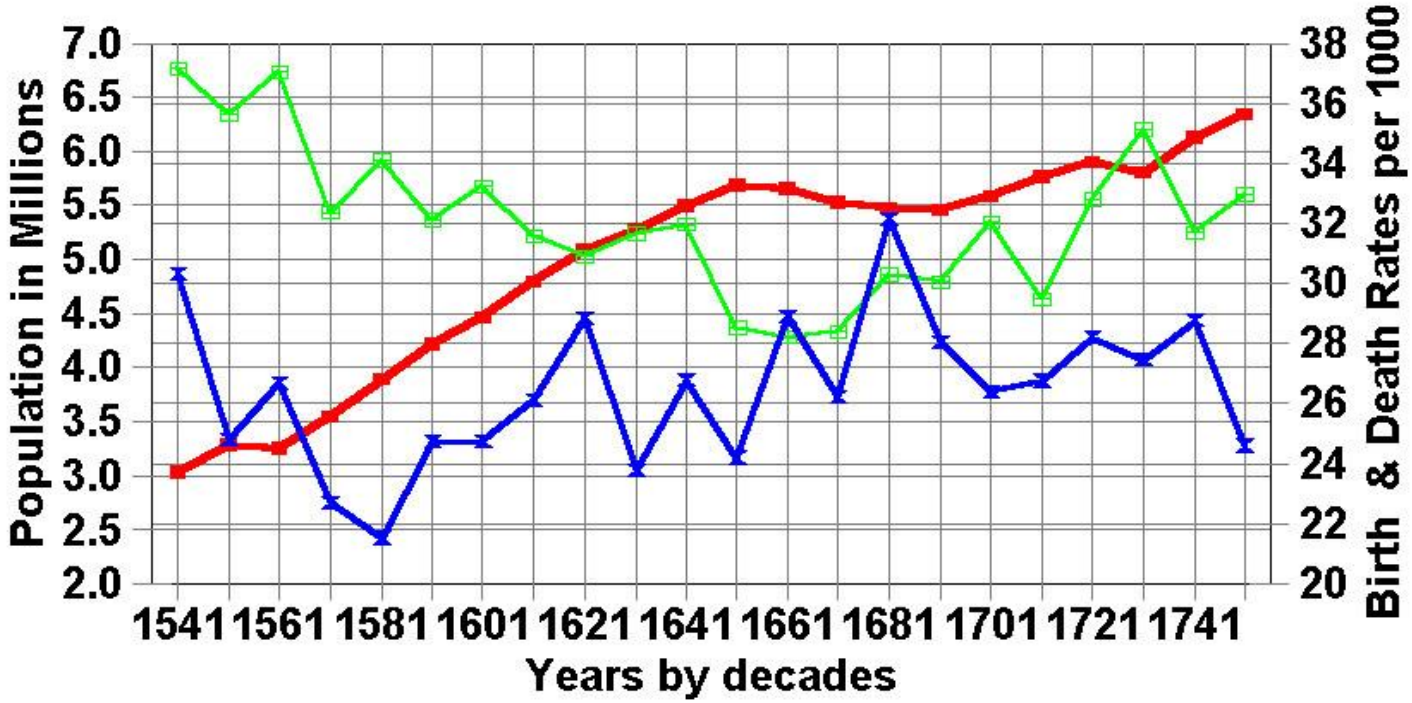
- (1) **Falling Birth Rates: and the EMP**
- - **birth rates fell before death rates rose**
- - **England:** birth rate fell from 37.8/1000 in 1540s to 31.50 in 1590s to 25.74 in 1650s
- (2) **Changes in European Marriage Pattern:**
- - **later age of 1st marriage** → smaller families
- - **increased female celibacy**: higher proportion of women who never married

European Marriage Pattern: Fertility Problems 2

- (3) **Service in Husbandry, EMP, and birth rates:**
- - **agrarian institution:** farmers hired young women as both farm and household labour, as virtual members of the family household (necessarily unmarried)
- - food, board, annual cash payments (later used as dowries)
- - such women often worked to late 20s
- - **hence later average age of first marriage + higher celibacy rates**
- (4) **Industrial Revolution: offering better paid employment** ➔ rapid decline of this institution ➔lower age of 1st marriage ➔ reduced celibacy rates ➔ higher birth rates + larger families

POPULATION: ENGLAND & WALES 1541-1741

in millions, by decades



Demographic Profile of Colyton, 1560 - 1837

Period	Average Age of First Marriage for:		Completed Family Size of Women who married under 30	Period	Life Expectancy Both Sexes at Birth
	Males	Females			
1560-1646	27	27	6.4	**1538-1624**	43 years
1647-1719	28	30	4.2	**1625-1699**	37
1720-1769	26	27	4.4	**1700-1774**	42
1770-1837	27	25	5.9		

Sources: E.A. Wrigley, 'Family Limitation in Pre-Industrial England', *Economic History Review*, 2nd ser. 19 (1966), 82-109; E.A. Wrigley, *Population and History* (1969), p. 87.

Marriages, Births, and Deaths in Colyton, Devonshire, 1550 - 1830

Rates per thousand, in nine-year moving averages

E. A. Wrigley, 'Family Limitation in Pre-Industrial England', *Economic History Review*, 2nd ser., 19 (1966).

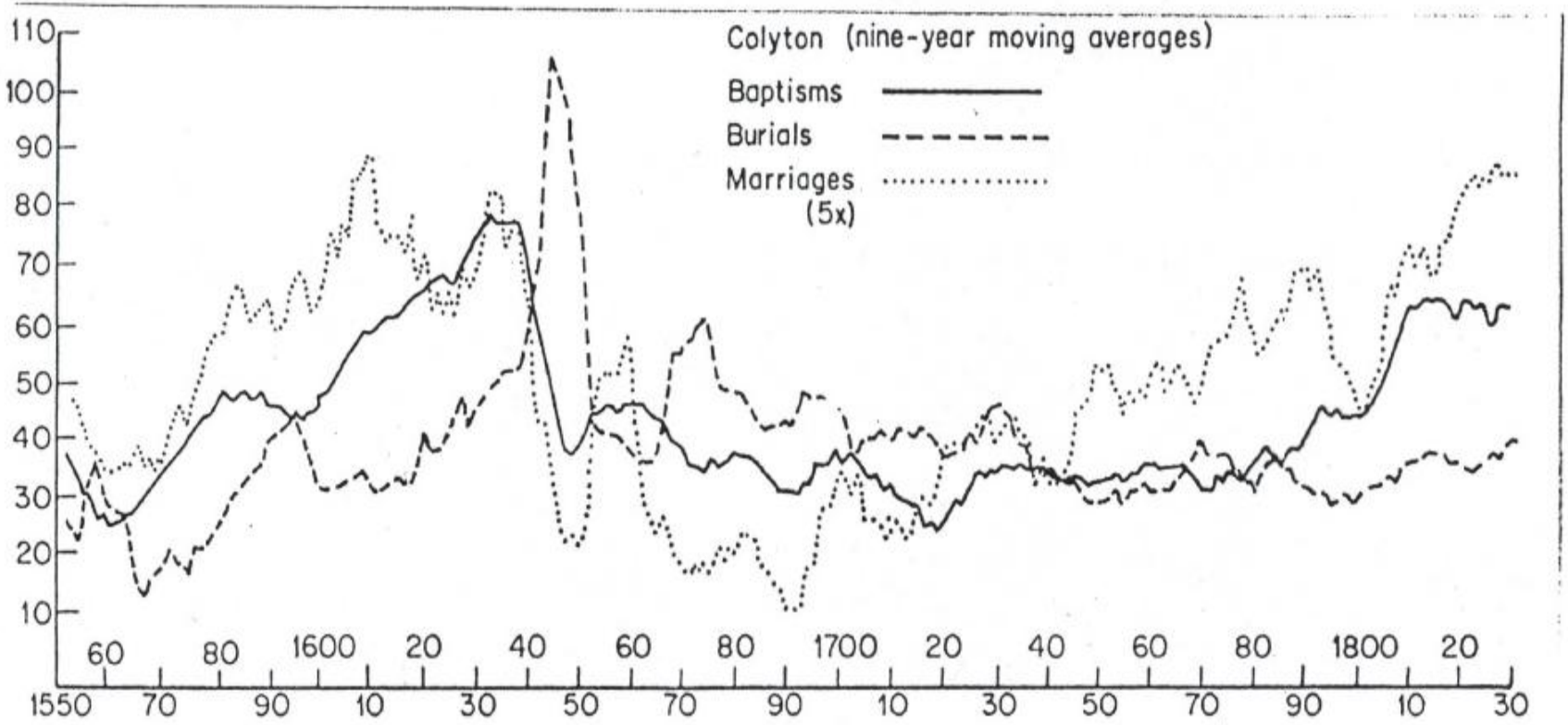


FIGURE I

Changing Demography of Colyton, Devonshire (England)

Average (Mean) Age of First Marriage, 1560-1837

Period	Men	Women
1560 - 99	28.1 years	27.0 years
1600 - 29	27.4	27.3
1630 - 46	25.8	26.5
1647 - 59	26.9	30.0
1660 - 99	27.6	28.8
1700 - 19	28.1	30.7
1720 - 49	26.2	27.2
1750 - 69	25.0	26.3
1770 - 99	27.6	26.4
1800 - 24	25.6	24.9
1825 - 37	25.9	23.3

Mean Age of First Marriage, i.e., in Bachelor-Spinster Marriages

in England (various counties, over time), in ten-year intervals

DECADE	MALES	FEMALES
1590 - 99	29.30	25.60
1600 - 09	28.30	25.70
1610 - 19	27.50	25.60
1620 - 29	27.60	25.20
1630 - 39	27.30	25.20
1640 - 49	27.40	25.70
1650 - 59	27.50	25.60
1660 - 69	27.40	25.90
1670 - 79	28.00	26.20
1680 - 89	27.70	25.80
1690 - 99	27.10	25.90
1700 - 09	27.40	26.00
1710 - 19	27.30	26.30
1720 - 29	27.00	25.90
1730 - 39	26.90	25.50
1740 - 49	26.50	24.80
1750 - 59	26.10	25.00
1760 - 69	25.90	24.50

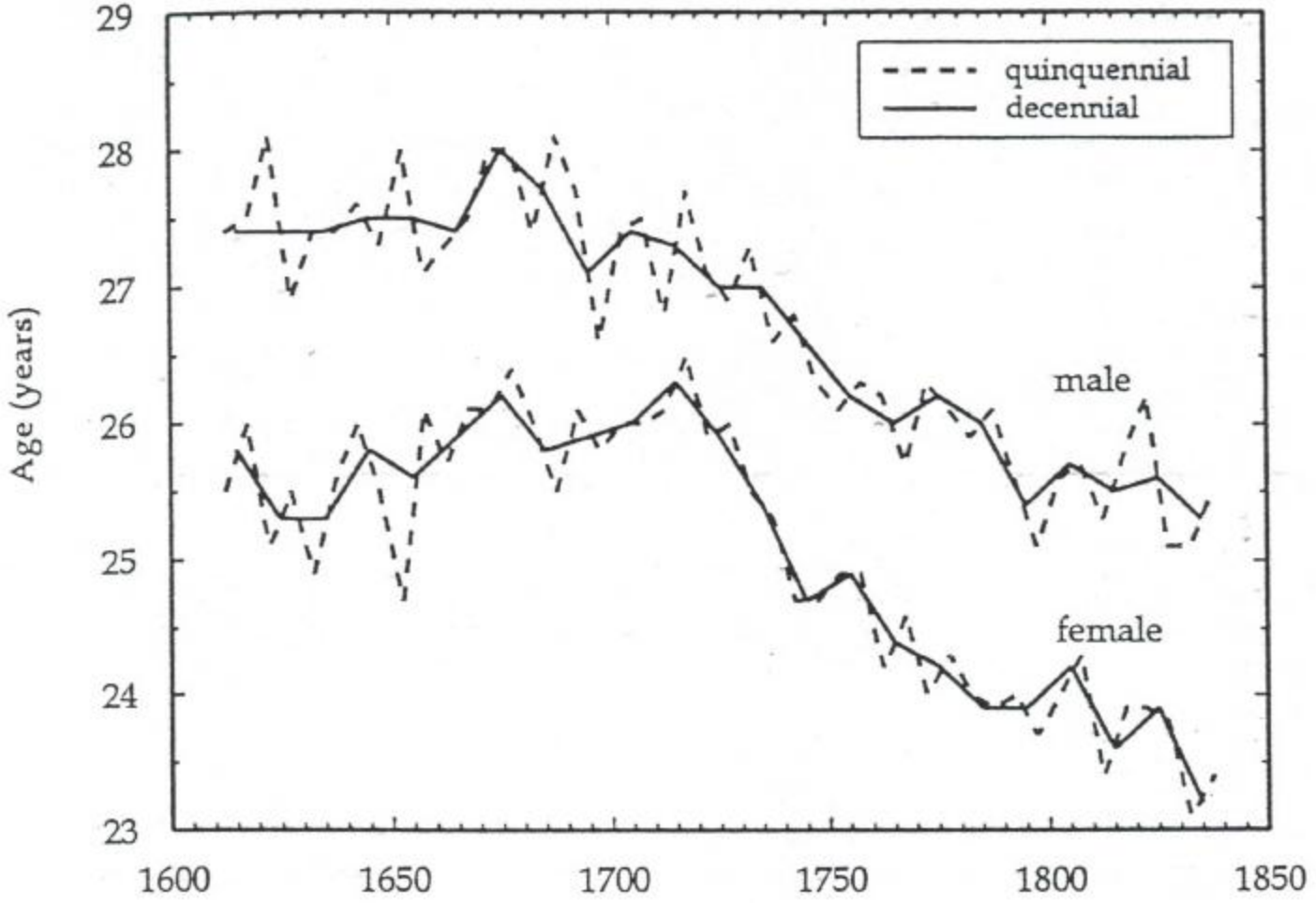


Figure 5.2 *Mean age at first marriage: bachelor/spinster marriages (quinquennial and decennial data)*

Note: each reading refers to the decade or quinquennium beginning in the year indicated: thus the 1620 reading refers to 1620–5 or 1620–9 as appropriate.

Other Demographic Factors

- (4) **Contraception**: more significant in 17th century? – condoms from sheep membranes
- (5) **English Emigration**: especially to North American + Caribbean colonies
- - **Wrigley**: emigration was the major factor in population dip of the 1670s
- (6) **Dutch Emigration to East Indies:** VOC – high proportion of Dutch sailors died also

End of the Plague Era: 1

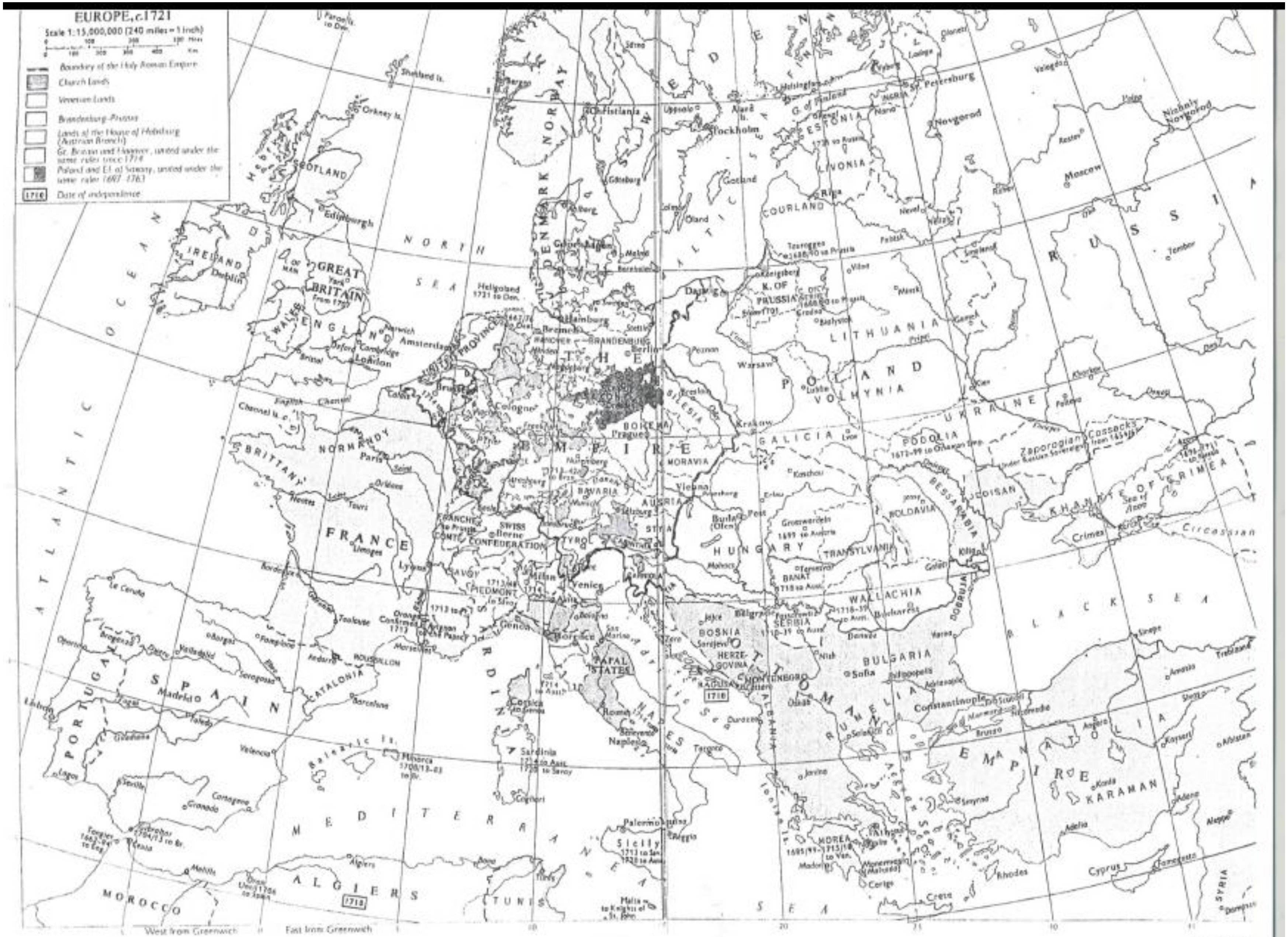
- (1) **The End of the Bubonic Plague:**
- a) **last outbreaks:**
- - **England:** 1665: London plague
- - **France**: 1720: Marseilles plague
- - **Italy**: 1733: Messina plague (NE Sicily)
- - **Ottoman Turkish & Russian Empires**: plague remained endemic to 1820s: ended there by quarantine measures

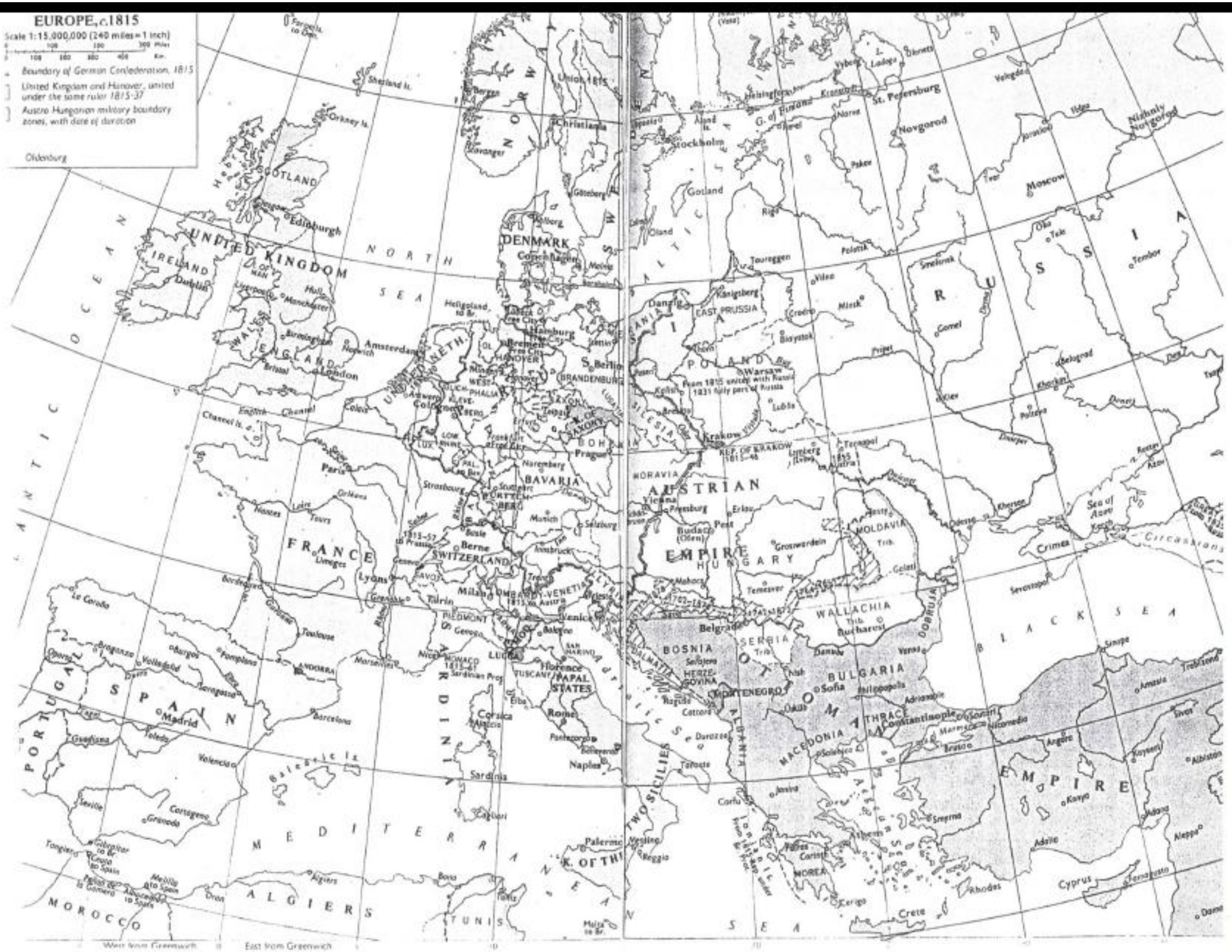
End of the Plague Era: 2

- 2) **End of the Plague: Helleiner's rat theory** (CEH, IV)
- - **arrival of a newcomer, the brown (*Rattus* norvegicus) rat displaced the black rat (*Rattus rattus)***, the traditional culprit: in carrying the plague-bearing fleas (bacillus: *Yersinia pestis*)
- - **that brown rat was 'ecologically superior'** and did not host plague fleas
- 3) **Problems with this theory: for the brown rats**
- (a) **brown rat came too late**: not till 1720s & 1730s in England & France
- (b) **did not displace black rats**: cohabited with them
- (c) **they also hosted the rat fleas with Yersinia pestis**

End of the Plague Era: 3

- 4) **Quarantine Measures?**
- - **strict medical isolation of travellers for 40 days** (with *cordon sanitaire* at frontiers)
- - **supposedly ended plagues in France, Russian, and Turkish Empires**
- - **but not used for London plague of 1665**: not effective till 17th century
- - **British failed in using quarantines in 20th-century India (1896-1947):** where penicillin proved effective after WWII (today: major drug is **tetracycline**)


EUROPE, c.1721
Scale 1:15,000,000 (240 miles = 1 inch)
Boundary of the Holy Roman Empire
Church Lands
Venetian Lands
Brandenburg-Prussia
Lands of the House of Habsburg (Austrian Branch)
Gr. Britain and Hanover, united under the same ruler since 1714
Poland and El. of Saxony, united under the same ruler 1697-1763
Date of independence
ATLANTIC OCEAN
NORTH SEA
SCOTLAND
IRELAND
Dublin
GREAT BRITAIN
ENGLAND
WALES
London
Edinburgh
NORWAY
DENMARK
SWEDEN
Stockholm
St. Petersburg
Moscow
RUSSIA
COURLAND
LIVONIA
ESTONIA
K. OF PRUSSIA
LITHUANIA
POLAND
Warsaw
VOLHYNIA
UKRAINE
PODOLIA
GALICIA
Berlin
BRANDENBURG
Hamburg
Amsterdam
Cologne
Prague
BOHEMIA
SILESIA
MORAVIA
THE EMPIRE
BAVARIA
Vienna
AUSTRIA
HUNGARY
TRANSYLVANIA
MOLDAVIA
WALLACHIA
BESSARABIA
KHANATE OF CRIMEA
BLACK SEA
Paris
NORMANDY
BRITTANY
FRANCE
SWISS CONFEDERATION
SAVOY
PIEDMONT
Milan
Venice
Genoa
Florence
PAPAL STATES
Rome
Naples
Corsica
Sardinia
Sicily
SPAIN
Madrid
PORTUGAL
Lisbon
CATALONIA
Barcelona
MEDITERRANEAN SEA
ALGIERS
MOROCCO
TUNIS
BOSNIA
SERBIA
BULGARIA
OTTOMAN EMPIRE
Constantinople
ANATOLIA
KARAMAN
MOREA
Crete
Cyprus
Rhodes
SYRIA
West from Greenwich
East from Greenwich


EUROPE, c.1815
Scale 1:15,000,000 (240 miles = 1 inch)
Boundary of German Confederation, 1815
United Kingdom and Hanover, united under the same ruler 1815-37
Austro Hungarian military boundary zones, with date of duration
Oldenburg
Faroe Is. to Den.
Shetland Is.
Orkney Is.
SCOTLAND
Edinburgh
UNITED KINGDOM
IRELAND
Dublin
I. OF MAN
Liverpool
Manchester
Hull
Birmingham
Norwich
WALES
ENGLAND
Bristol
London
English Channel
Channel Is.
NORTH SEA
ATLANTIC OCEAN
Heligoland to Br.
Amsterdam
UNITED NETH.
Antwerp
Cologne
Calais
Paris
Orleans
Nantes
Loire
Tours
FRANCE
Limoges
Lyons
Grenoble
Bordeaux
Garonne
Toulouse
Marseilles
ANDORRA
Strasbourg
Basle
Berne
SWITZERLAND
Geneva
SAVOY
Turin
PIEDMONT
Genoa
Nice
MONACO
Milan
LOMBARDY-VENETIA
1815 to Austria
Venice
Trieste
ILLYRIA
Bologna
SAN MARINO
LUCCA
Florence
TUSCANY
PAPAL STATES
Elba
Corsica
Ajaccio
Rome
Naples
Sardinia
Cagliari
SARDINIA
Palermo
Messina
Reggio
K. OF THE TWO SICILIES
Taranto
Malta to Br.
TUNIS
Tunis
Bona
ALGIERS
Algiers
Oran
MOROCCO
Tangiers
Gibraltar to Br.
Ceuta to Spain
Melilla to Spain
MEDITERRANEAN SEA
Balearic Is.
Barcelona
Valencia
Cartagena
Granada
Seville
SPAIN
Madrid
Toledo
Tagus
Guadiana
Douro
Valladolid
Burgos
Pamplona
Saragossa
Ebro
La Coruña
Braganza
Oporto
PORTUGAL
NORWAY
Bergen
Christiania
Stavanger
Union 1815
SWEDEN
Göteborg
Stockholm
Uppsala
Åland Is.
Gotland
Öland
DENMARK
Copenhagen
Malmö
Bornholm
Lübeck Free City
Hamburg Free City
Bremen Free City
HANOVER
WESTPHALIA
KLEVE-BERG
LUX.
Frankfurt
Stuttgart
WÜRTTEMBERG
BAVARIA
Nuremberg
Munich
Salzburg
Innsbruck
SAXONY
Leipzig
BOHEMIA
Prague
Berlin
BRANDENBURG
Stettin
POMERANIA
SILESIA
Breslau
Danzig
Königsberg
EAST PRUSSIA
PRUSSIA
Thorn
POLAND
Warsaw
From 1815 united with Russia
1831 fully part of Russia
Kalisz
Lublin
Bialystok
Grodno
Krakow
REP. OF KRAKOW 1815-46
Lemberg (Lvov)
Tarnopol
1845 to Austria
MORAVIA
AUSTRIAN EMPIRE
Vienna
Pressburg
Buda
Pest
Erlau
HUNGARY
Grosswardein
Temesvar
Belgrade
SERBIA
BOSNIA
Sarajevo
HERZEGOVINA
DALMATIA
Ragusa
Cattaro
MONTENEGRO
ALBANIA
Durazzo
Corfu
Ionian Is.
Janina
OTTOMAN EMPIRE
MOLDAVIA
Jassy
WALLACHIA
Bucharest
Galatz
DOBRUJA
Danube
Varna
BULGARIA
Sofia
Philippopolis
Adrianople
THRACE
Constantinople
MACEDONIA
Salonica
Athens
Patras
Corinth
MOREA
Cerigo
Crete
Rhodes
Smyrna
Brussa
Nicomedia
Angora
Konya
Adalia
Adana
Aleppo
Cyprus
Famagusta
Damascus
Kayseri
Sivas
Amasia
Trebizond
Sinope
Albistan
BLACK SEA
Crimea
Sevastopol
Kherson
Odessa
Dniester
Sea of Azov
Kerch
Azov
Rostov
Circassians
Riga
Tauroggen
Vilna
Minsk
Polotsk
Pskov
Narva
Reval
G. of Finland
Helsingfors
Kronstadt
Vyborg
L. Ladoga
Olonets
St. Petersburg
Novgorod
Vologda
Yaroslavl
Volga
Nizhniy Novgorod
Tver
Moscow
Oka
Tula
Tambov
Smolensk
RUSSIA
Gomel
Pripet
Kiev
Dnieper
Belgorod
Kharkov
Poltava
Donets
Don
West from Greenwich
East from Greenwich

End of the Plague Era: 4

- 5) **Appleby's Biological-Genetic Theory:**
- - **that surviving rats developed an immunity to plague**:
- - perhaps because of genetic changes in plague bacillus or in the fleas
- - so that rat fleas did not desert their hosts to sub-optimize by feeding on humans
- - **Appleby never explained clearly how this worked: no real proof**

End of the Plague Era: 5

- 6) **disappearance of bubonic plague (2nd Pandemic): remains a mystery – not yet fully explained**
- 7) **But disappearance of plagues is important:**
- **meant that changes in birth rates now became the more important demographic variable**
- **even if other diseases and other mortality factors** cannot be discounted – as Wrigley does (ECO 303Y)

English and French Population, 1681 - 1821 in millions:

Year	England and Wales	England only	France	England as % of France
1681	5.28	4.93	22.4	22%
1821	12.31	11.49	30.2	38%

Growth Rates of English, French, and Dutch Populations from 1681 to 1821 (% per annum)

Country	% per annum	Overall % growth
England	0.95%	133%
France	0.28%	39%
Netherlands	0.06%	8%

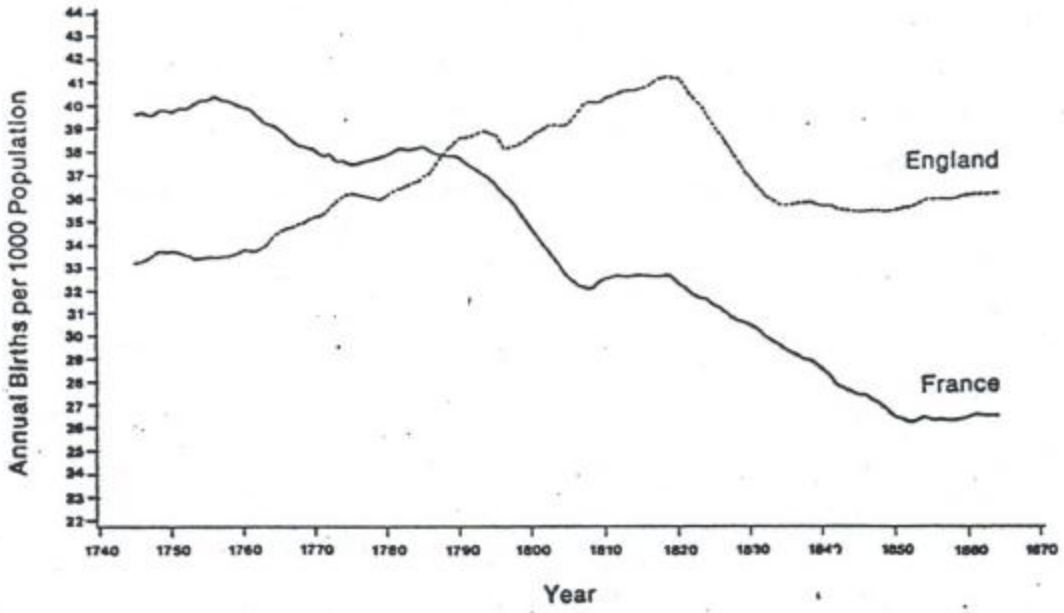


FIGURE 2
CRUDE BIRTH RATES IN FRANCE AND ENGLAND, 1740–1869

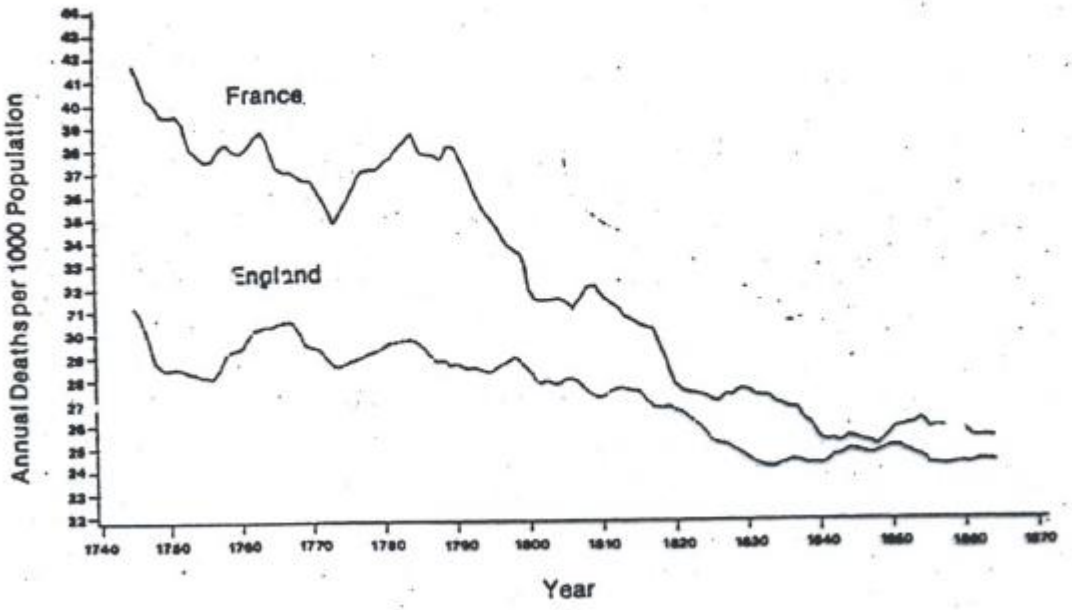


FIGURE 3
CRUDE DEATH RATES IN FRANCE AND ENGLAND, 1740–1869