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
<table>
<thead>
<tr>
<th>Week no., Wednesday Dates, and Suggested Readings</th>
<th>Lecture No.</th>
<th>LECTURE TOPICS to be covered</th>
</tr>
</thead>
</table>
| 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?  
*[Mid-year voluntary take-home test: due on 18 January 2012]* |
MAJOR ECONOMIC & DEMOGRAPHIC TRENDS

A. THE MEDIEVAL ‘COMMERCIAL REVOLUTION’ ERA: RAPID POPULATION GROWTH:

c.a. 1100 - c.a. 1320 (Phase A)

B. LATE MEDIEVAL ‘GREAT DEPRESSION’: DEMOGRAPHIC CATASTROPHE

c.a. 1320 - c.a. 1460 (strong Phase B)

C. ECONOMIC AND DEMOGRAPHIC RECOVERIES

c.a. 1460 - c.a. 1520 (mild Phase A)

D. THE ‘PRICE REVOLUTION’ ERA: STRONG DEMOGRAPHIC GROWTH

c.a. 1520 - c.a. 1640 (strong Phase A)

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

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

F. THE INDUSTRIAL AND DEMOGRAPHIC (‘VITAL’) REVOLUTIONS

c.a. 1740 - c.a. 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 14\(^\text{th}\) & 15\(^\text{th}\) centuries
- **causes of that decline involved both mortality & fertility** -- and not just the Black Death
- (3) **did recovery begin in mid-15\(^\text{th}\) 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)

<table>
<thead>
<tr>
<th>Date</th>
<th>Estimated Urban Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1300</td>
<td>120,000</td>
</tr>
<tr>
<td>1349</td>
<td>36,000?</td>
</tr>
<tr>
<td>1352</td>
<td>41,600</td>
</tr>
<tr>
<td>1390</td>
<td>60,000</td>
</tr>
<tr>
<td>1427</td>
<td>37,144</td>
</tr>
<tr>
<td>1459</td>
<td>37,369</td>
</tr>
<tr>
<td>1469</td>
<td>40,332</td>
</tr>
<tr>
<td>1488</td>
<td>42,000</td>
</tr>
<tr>
<td>1526 (plague year)</td>
<td>70,000</td>
</tr>
</tbody>
</table>
The Population of Europe

1300 - 1800, in millions
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
Population Decline and Poverty in the Duchy of Brabant, 1437 - 1496
Number of Family Hearth (Households) and Percentage of Total Hearth without Taxable Income (`Poor Hearth`): 1437, 1480, and 1496

<table>
<thead>
<tr>
<th>Area of Census</th>
<th>1437: no. of hearths in census</th>
<th>1437: percent poor hearths</th>
<th>1480: no. of hearths in census</th>
<th>1480: percent poor hearths</th>
<th>1496: no. of hearths in census</th>
<th>1496: no. of poor hearths</th>
<th>Percent Change from 1437 to 1496</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brussels</td>
<td>6,376</td>
<td>10.5</td>
<td>7,414</td>
<td>7.9</td>
<td>5,750</td>
<td>17.1</td>
<td>-9.82%</td>
</tr>
<tr>
<td>Antwerp</td>
<td>3,440</td>
<td>13.5</td>
<td>5,450</td>
<td>10.5</td>
<td>6,586</td>
<td>12.5</td>
<td>91.45%</td>
</tr>
<tr>
<td>Leuven</td>
<td>3,579</td>
<td>7.6</td>
<td>3,933</td>
<td>18.3</td>
<td>3,069</td>
<td>n.a.</td>
<td>-14.25%</td>
</tr>
<tr>
<td><code>s</code>Hertogenbosch</td>
<td>2,883</td>
<td>10.4</td>
<td>2,930</td>
<td>7.9</td>
<td>3,456</td>
<td>n.a.</td>
<td>19.88%</td>
</tr>
<tr>
<td>Sub-total Large Towns</td>
<td>16,278</td>
<td>10.5</td>
<td>19,727</td>
<td>14.8</td>
<td>18,861</td>
<td>n.a.</td>
<td>15.87%</td>
</tr>
<tr>
<td>Small Towns</td>
<td>14,159</td>
<td>9.2</td>
<td>12,216</td>
<td>28.1</td>
<td>10,600</td>
<td>n.a.</td>
<td>-25.14%</td>
</tr>
<tr>
<td>Villages</td>
<td>62,301</td>
<td>29.7</td>
<td>54,540</td>
<td>31.6</td>
<td>45,882</td>
<td>n.a.</td>
<td>-26.35%</td>
</tr>
<tr>
<td>Total Duchy</td>
<td>92,738</td>
<td>23.4</td>
<td>86,483</td>
<td>27.3</td>
<td>75,343</td>
<td>n.a.</td>
<td>-18.76%</td>
</tr>
<tr>
<td>Percentage Change from 1437</td>
<td>-6.74%</td>
<td></td>
<td>-18.76%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
EUROPEAN POPULATION DISTRIBUTIONS, 1000 - 1450 A.D.

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

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)
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

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

The Population of Europe

1300 - 1800, in millions

- 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 – 300,000
- **Venice and Milan:** about 150,000: **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 100,000, 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.
<table>
<thead>
<tr>
<th>YEAR</th>
<th>50,000-100,000</th>
<th>100,000-400,000</th>
<th>Over 400,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>1300</td>
<td>4</td>
<td>3 - 4</td>
<td>0</td>
</tr>
<tr>
<td>1500</td>
<td>5</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>1650</td>
<td>14</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>1750</td>
<td>512</td>
<td>43</td>
<td>4</td>
</tr>
</tbody>
</table>
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
POPULATION: ENGLAND & WALES 1541-1741

in millions, by decades

Years by decades

Population in Millions

Birth & Death Rates per 1000

- Population in Millions
- Birth Rate per 1000
- Death Rate per 1000
Fig. 1 Real Wages, Prices, and Population in England and Wales, 1541-1913

\[
RWI = \frac{NWI}{CPI}
\]

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

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 Price Indexes, 1451-1750
grain, livestock, industrial, composite

PB&H Composite Price Index

quinquennial means: 1451-75=100

Composite Price Index 1451-75=100  Grain Price Indices
Meat & Fish price indices  Industrial Prices
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

Alsace & S. England: 11 yr moving average of annual data
France: Average of each 25 yrs
Brabant: Price Indexes, 1451-1700
grain, livestock, industrial, composite

Composite Index, 1451-75=100

quinquennial means (1451-75=100)

Grain Price Index
meat & fish price index
Industrial price index
Composite Index 1451-75=100
Brabant: Price Indexes, 1451-1700

grain, livestock, industrial, composite

Composite Index, 1451-75=100

quinquennial means (1451-75=100)

- Grain Price Index
- meat & fish price index
- Industrial price index
- Composite Index 1451-75=100
England: Prices & Wages, 1501-1675
5 yr means: 1501-10=100

Composite and Industrial Prices

Real Wage Indices (harmonic)

Doughty Wage:IndPrice Ratio
England Composite Price Index
Real Wage Index (harmonic)
PBH Ind Price Index
PBH Money Wage:Ind Price Ratio
Doughty Ind Price Index
Prices and Wages in England, 1451-1750
Quinquennial means: 1451-75=100

Composite Price Index 1451-75=100
Builders' Money Wage Index
Builders' Real Wage Index
Prices and Wages in Brabant, 1451-1670
5 yr means: mean 1451-75=100

Nominal Wage Index
Consumer Price Index (1451-75=100)
Real Wage Index (harmonic means)
Masons' Real Wages: Antwerp & England
real wages: consumer baskets 1401-1670

Quinquennial means, 1401-05 to 1666-70

Antwerp Masons: real wage
SE England Masons: real wages
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 $\Delta$ increased productivity $\rightarrow$ 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
Kuznets Curve

Environmental degradation (pollution)

Pre-industrial economies

Industrial economies

Turning point

Post-industrial economies (service economy)

Stage of economic development

Income per capita (growth)
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 17\textsuperscript{th} 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

Years by decades

Population in Millions

Birth & Death Rates per 1000

- Population in Millions
- Birth Rate per 1000
- Death Rate per 1000
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 $\rightarrow$ famines $\rightarrow$ 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’?
Corrected Global Temperature Reconstruction, 95% CI

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 1\textsuperscript{st} 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
Demographic Profile of Colyton, 1560 - 1837

<table>
<thead>
<tr>
<th>Period</th>
<th>Average Age of First Marriage for:</th>
<th>Completed Family Size of Women who married under 30</th>
<th>Period</th>
<th>Life Expectancy Both Sexes at Birth</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
<td>Females</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1560-1646</td>
<td>27</td>
<td>27</td>
<td>6.4</td>
<td>1538-1624</td>
</tr>
<tr>
<td>1647-1719</td>
<td>28</td>
<td>30</td>
<td>4.2</td>
<td>1625-1699</td>
</tr>
<tr>
<td>1720-1769</td>
<td>26</td>
<td>27</td>
<td>4.4</td>
<td>1700-1774</td>
</tr>
<tr>
<td>1770-1837</td>
<td>27</td>
<td>25</td>
<td>5.9</td>
<td></td>
</tr>
</tbody>
</table>

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

Rates per thousand, in nine-year moving averages

Changing Demography of Colyton, Devonshire (England)

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

<table>
<thead>
<tr>
<th>Period</th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td>1560 - 99</td>
<td>28.1 years</td>
<td>27.0 years</td>
</tr>
<tr>
<td>1600 - 29</td>
<td>27.4</td>
<td>27.3</td>
</tr>
<tr>
<td>1630 - 46</td>
<td>25.8</td>
<td>26.5</td>
</tr>
<tr>
<td>1647 - 59</td>
<td>26.9</td>
<td>30.0</td>
</tr>
<tr>
<td>1660 - 99</td>
<td>27.6</td>
<td>28.8</td>
</tr>
<tr>
<td>1700 - 19</td>
<td>28.1</td>
<td>30.7</td>
</tr>
<tr>
<td>1720 - 49</td>
<td>26.2</td>
<td>27.2</td>
</tr>
<tr>
<td>1750 - 69</td>
<td>25.0</td>
<td>26.3</td>
</tr>
<tr>
<td>1770 - 99</td>
<td>27.6</td>
<td>26.4</td>
</tr>
<tr>
<td>1800 - 24</td>
<td>25.6</td>
<td>24.9</td>
</tr>
<tr>
<td>1825 - 37</td>
<td>25.9</td>
<td>23.3</td>
</tr>
</tbody>
</table>
Mean Age of First Marriage, i.e., in Bachelor-Spinster Marriages

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

<table>
<thead>
<tr>
<th>DECADE</th>
<th>MALES</th>
<th>FEMALES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1590 - 99</td>
<td>29.30</td>
<td>25.60</td>
</tr>
<tr>
<td>1600 - 09</td>
<td>28.30</td>
<td>25.70</td>
</tr>
<tr>
<td>1610 - 19</td>
<td>27.50</td>
<td>25.60</td>
</tr>
<tr>
<td>1620 - 29</td>
<td>27.60</td>
<td>25.20</td>
</tr>
<tr>
<td>1630 - 39</td>
<td>27.30</td>
<td>25.20</td>
</tr>
<tr>
<td>1640 - 49</td>
<td>27.40</td>
<td>25.70</td>
</tr>
<tr>
<td>1650 - 59</td>
<td>27.50</td>
<td>25.60</td>
</tr>
<tr>
<td>1660 - 69</td>
<td>27.40</td>
<td>25.90</td>
</tr>
<tr>
<td>1670 - 79</td>
<td>28.00</td>
<td>26.20</td>
</tr>
<tr>
<td>1680 - 89</td>
<td>27.70</td>
<td>25.80</td>
</tr>
<tr>
<td>1690 - 99</td>
<td>27.10</td>
<td>25.90</td>
</tr>
<tr>
<td>1700 - 09</td>
<td>27.40</td>
<td>26.00</td>
</tr>
<tr>
<td>1710 - 19</td>
<td>27.30</td>
<td>26.30</td>
</tr>
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<td>1750 - 59</td>
<td>26.10</td>
<td>25.00</td>
</tr>
<tr>
<td>1760 - 69</td>
<td>25.90</td>
<td>24.50</td>
</tr>
</tbody>
</table>
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 17\textsuperscript{th} 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
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 17\(^{th}\) century
- **British failed in using quarantines in 20\(^{th}\)-century India (1896-1947)**: where penicillin proved effective after WWII (today: major drug is tetracycline)
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:**

<table>
<thead>
<tr>
<th>Year</th>
<th>England and Wales</th>
<th>England only</th>
<th>France</th>
<th>England as % of France</th>
</tr>
</thead>
<tbody>
<tr>
<td>1681</td>
<td>5.28</td>
<td>4.93</td>
<td>22.4</td>
<td>22%</td>
</tr>
<tr>
<td>1821</td>
<td>12.31</td>
<td>11.49</td>
<td>30.2</td>
<td>38%</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Country</th>
<th>% per annum</th>
<th>Overall % growth</th>
</tr>
</thead>
<tbody>
<tr>
<td>England</td>
<td>0.95%</td>
<td>133%</td>
</tr>
<tr>
<td>France</td>
<td>0.28%</td>
<td>39%</td>
</tr>
<tr>
<td>Netherlands</td>
<td>0.06%</td>
<td>8%</td>
</tr>
</tbody>
</table>
CRUDE BIRTH RATES IN FRANCE AND ENGLAND, 1740-1869

Figure 2
Figure 3
Crude Death Rates in France and England, 1740-1869