Recent Issues in Biological Living Standards: From English Pygmies and Habsburg Giants to Obese Americans

John Komlos

Deficiencies of the Conventional Measure of the Standard of Living
(or Why Other Indicators of Well Being are Useful)

1) Problems of Aggregation of Utility a) Among Households b) For Households over time
2) Distribution of Goods within Household is not considered
3) Utility is not measured directly. Income is an input into utility production. It is a proxy measure. Health, happiness, height, mortality are an outcome measure.
4) Real Income information is *often* unavailable or measured inaccurately.
5) Intertemporal substitution of income is possible, but health is not.
6) Interdependent preferences for goods. This is less the case for health
7) Time inconsistency: One can change one's mind about past preferences, but one cannot reverse all health outcomes.
8) Consumption skills vary in the population. Hence, a dollar income can purchase different levels of utility in different people.
9) One does not determine one's own health entirely. Lifetime health is determined to a considerable extent in childhood, hence by parents, not for oneself.
10) Markets do not exist for all aspects of Health a) For example, trade in human organs legally constrained c) Vector of prices do not exist for health. Also, there are no future prices, even if there is insurance.
11) Incomplete knowledge of determinants of health outcomes. Hence, there is uncertainty about outcomes. People unable to judge risk
12) Externalities are disregarded in GNP accounts
13) Pain and Pleasure are not symmetric
14) Human Beings are Sentient, there is a human right to health.

Determinants of Physical Stature by Age in a Population

$$H_x = H_{min} + \int_{age=0}^{x} g[Y_t, Z_t, W_t, D_t, \sigma_t, \theta_t]dt < H_{max}$$

H_x = **Physical stature at age = x ; For x < 25.**

Define:

Y_t = **Real income (Social Status, education, occupation)**

Z_t = **Price of nutrients relative to all other goods** $\{P_f/P_{aog}\}_t$

P_f = **Price of nutrients**

P_{aog} = **Price of all other goods**

W_t = **work effort**

D_t = **epidemiological environment, Medical System**

σ_t = **variance of income over time**

θ_t = **inequality of income over time**

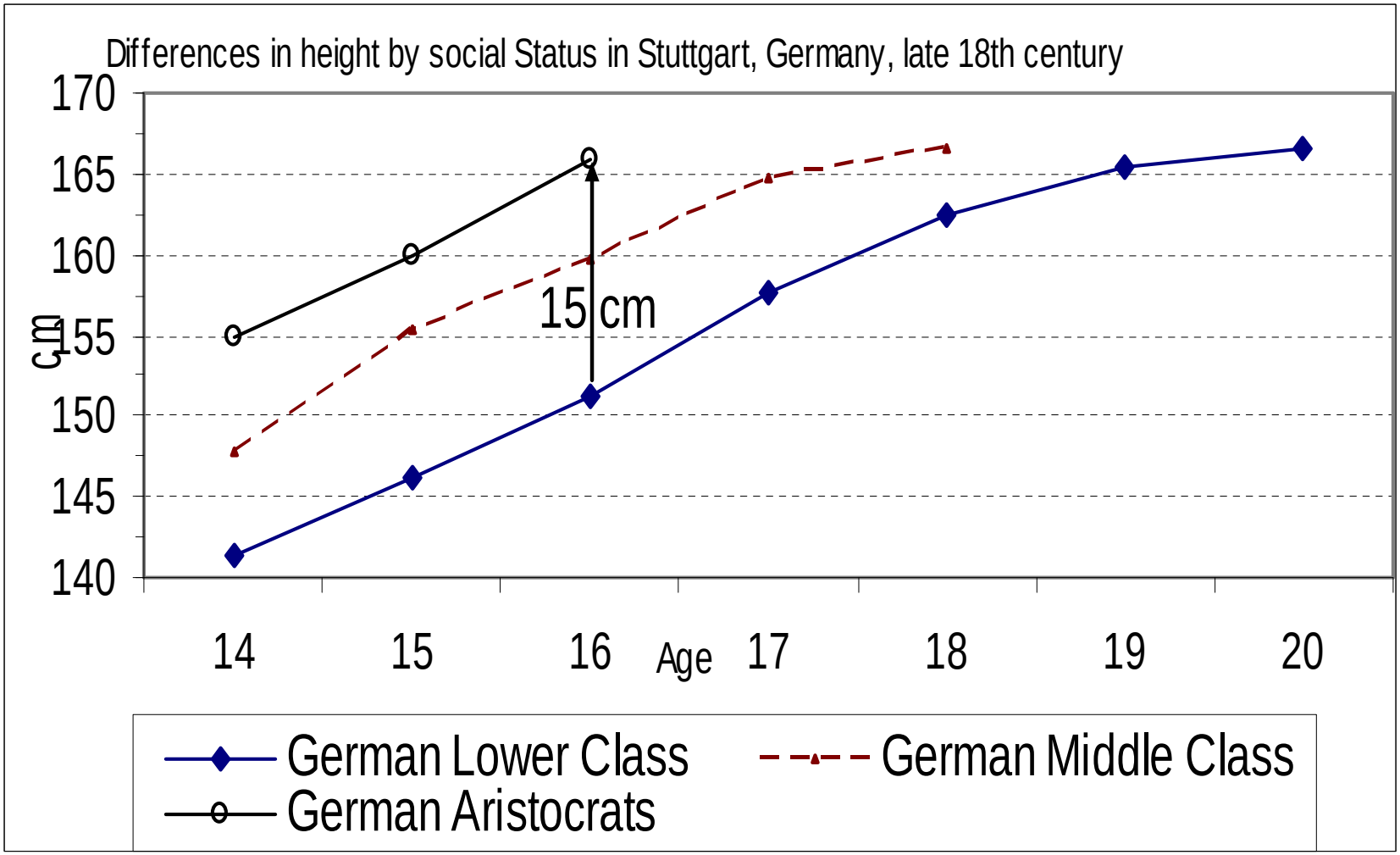
H_{min} **and** H_{max} **are genetically given**

With $\frac{\partial g}{\partial Y} > 0, \frac{\partial g}{\partial Z} < 0, \frac{\partial g}{\partial W} < 0, \frac{\partial g}{\partial D} < 0, \frac{\partial g}{\partial \sigma} < 0, \frac{\partial g}{\partial \theta} < 0$

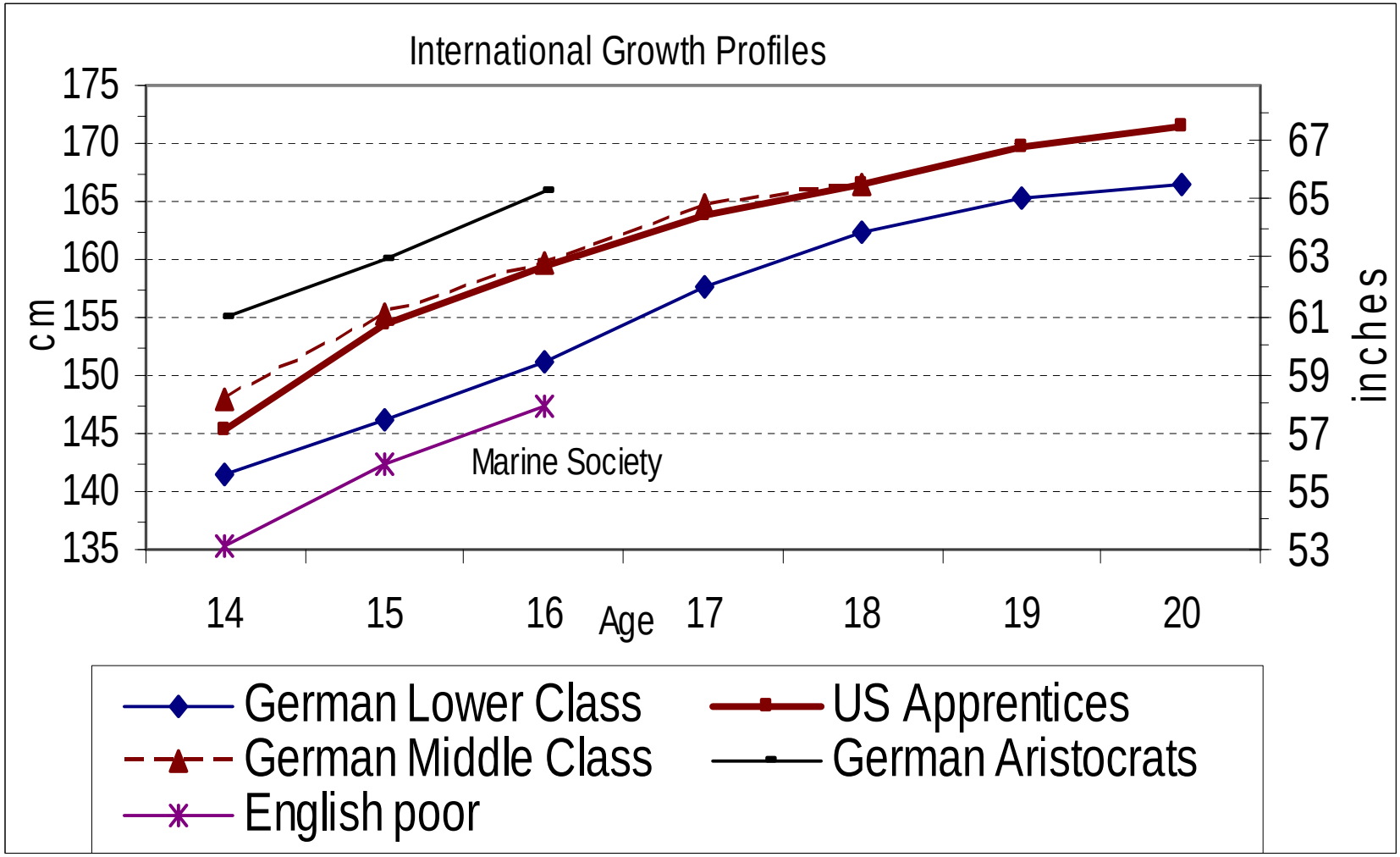
$$\Omega = \int_{age=0}^{x} g[Y_t, Z_t, W_t, D_t, \sigma_t, \theta_t]dt$$

$$\Delta H = H_{t=1} - H_{t=0} = \Omega_{t=1} - \Omega_{t=0}$$

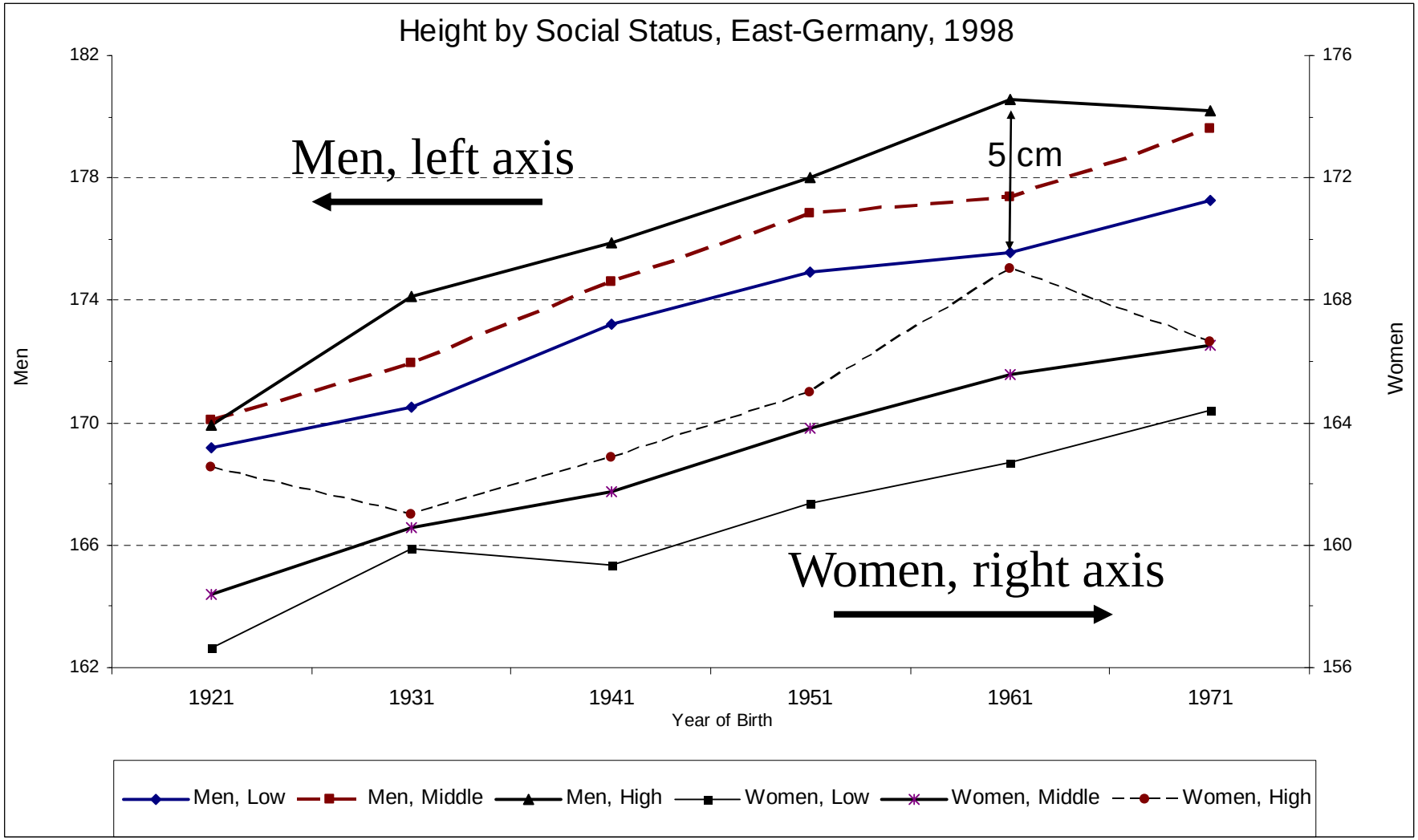
Source: Komlos 1989, p. 29.



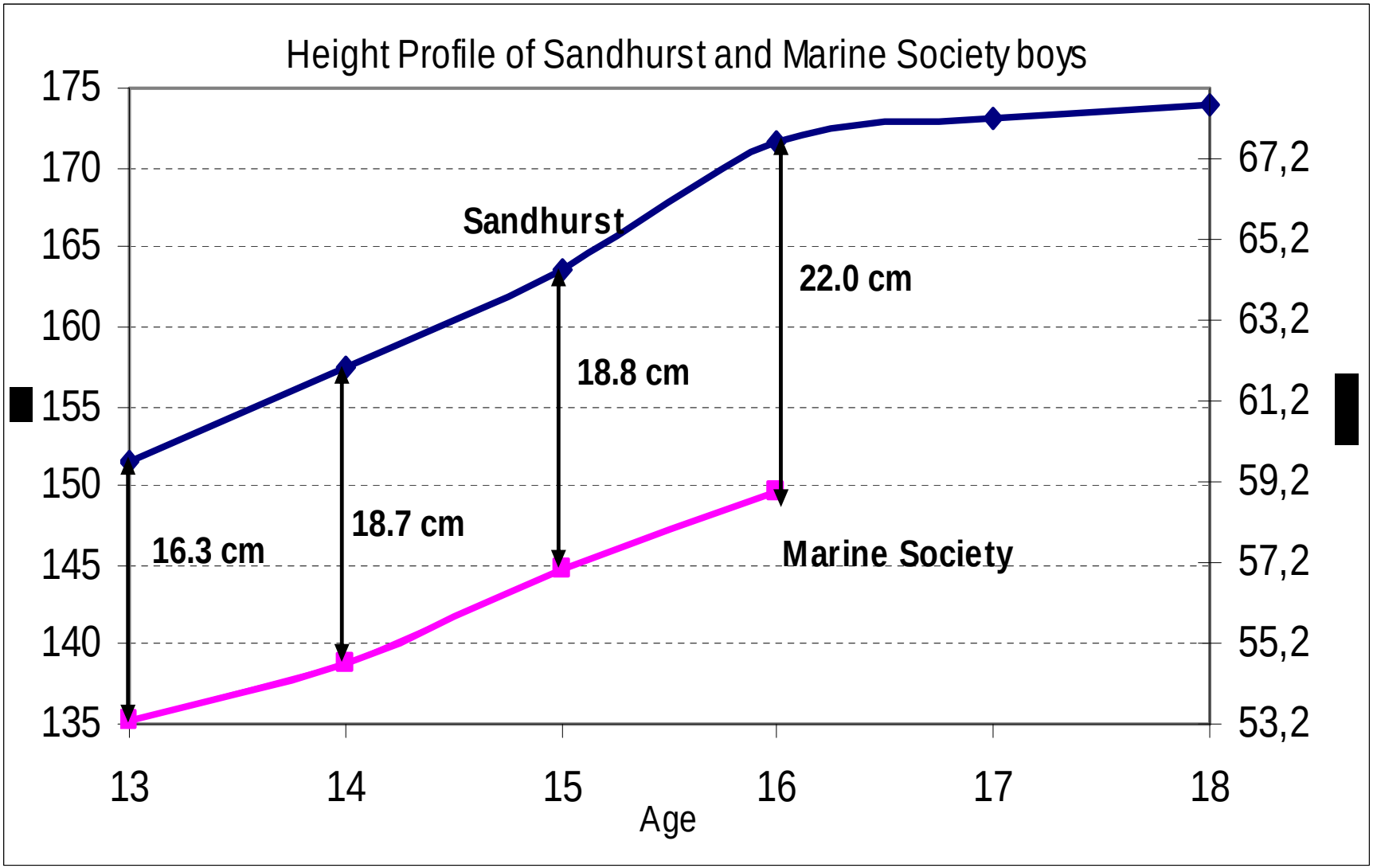
Assertion 1: Always and everywhere class and height are positively correlated. This is true for the 18th c.



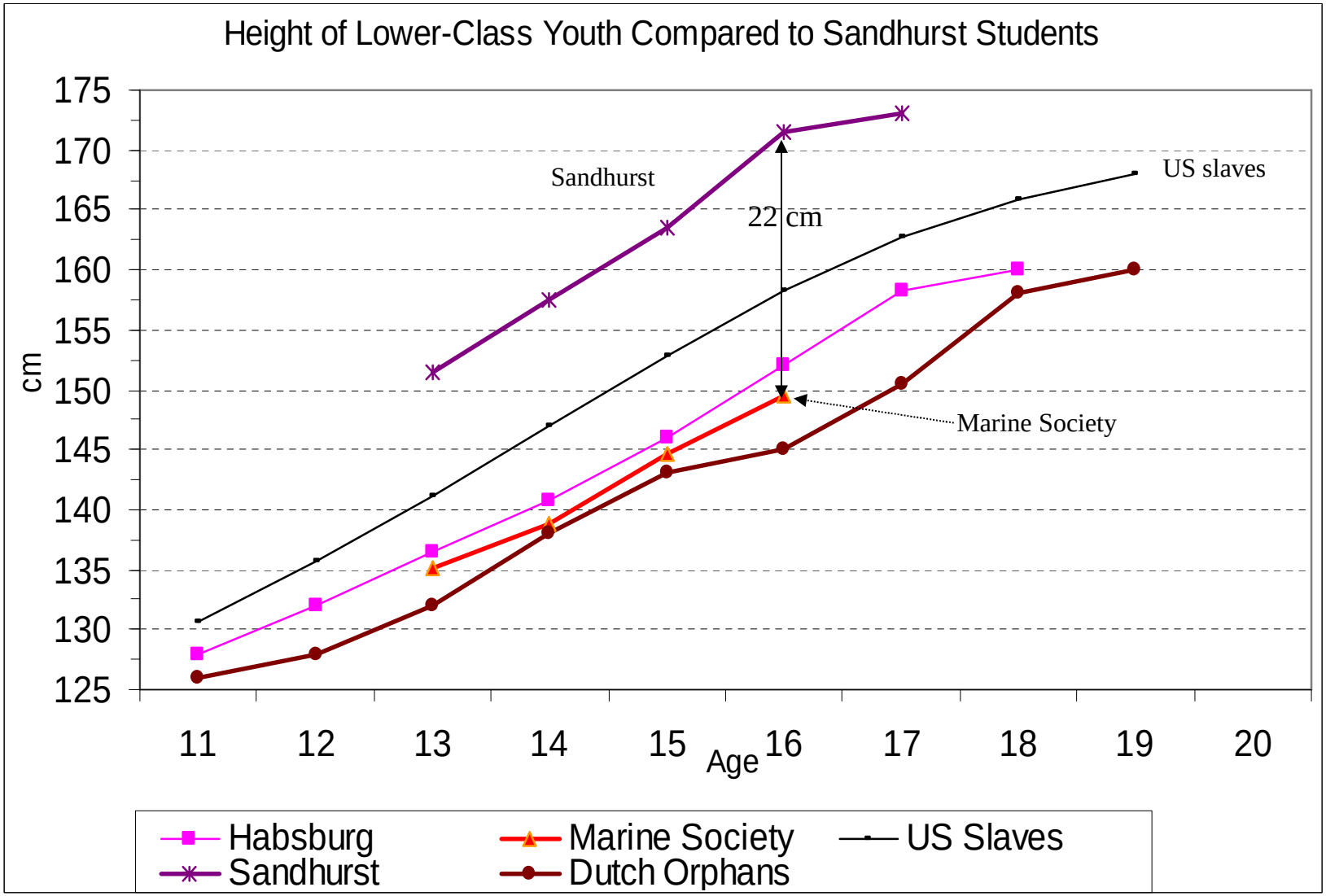
Assertion 1: Always and everywhere class and height are positively correlated. This is true for the 18th c.

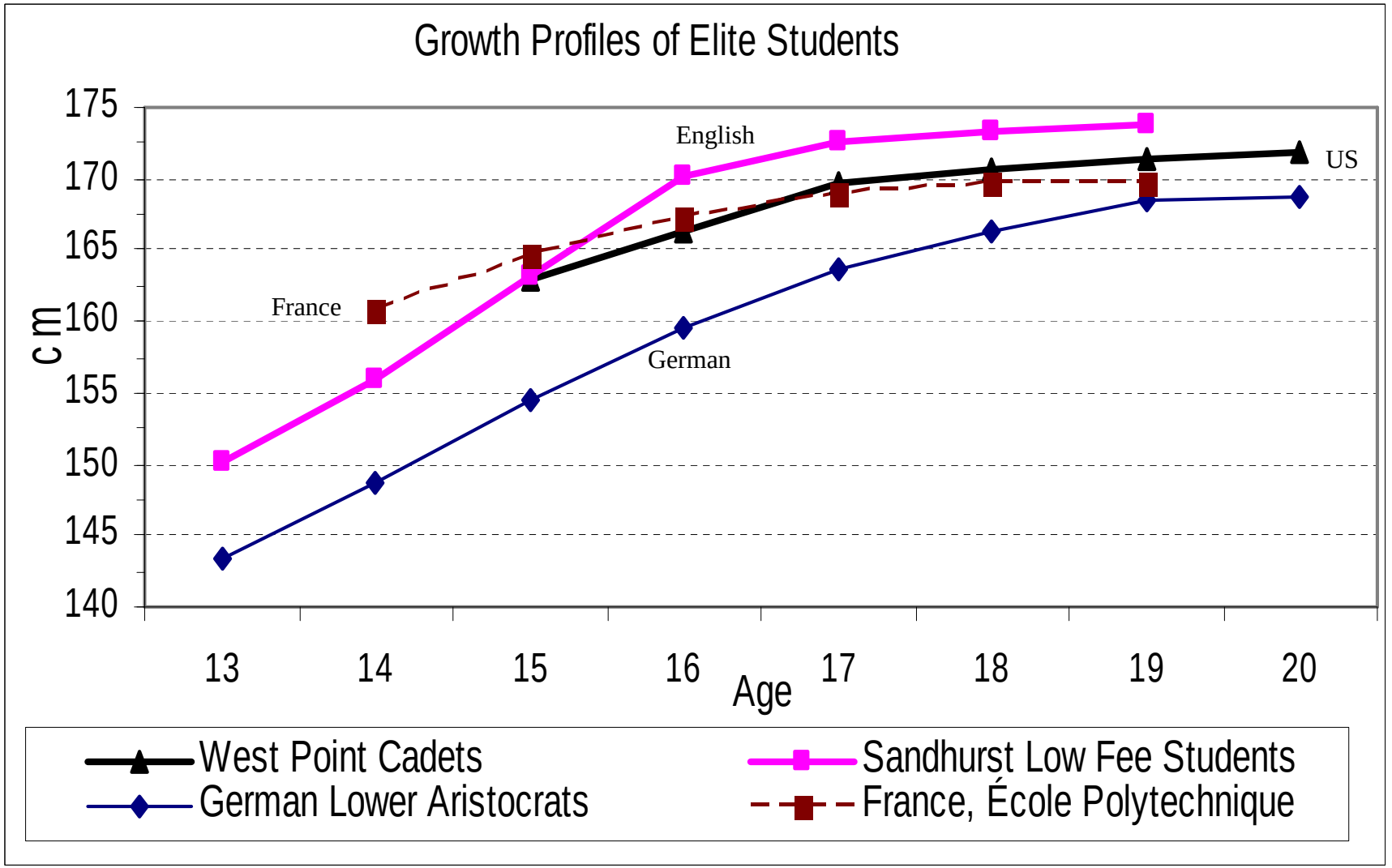


As well as at the end of the 20th c. in the German Democratic Republic where you would perhaps least expect it

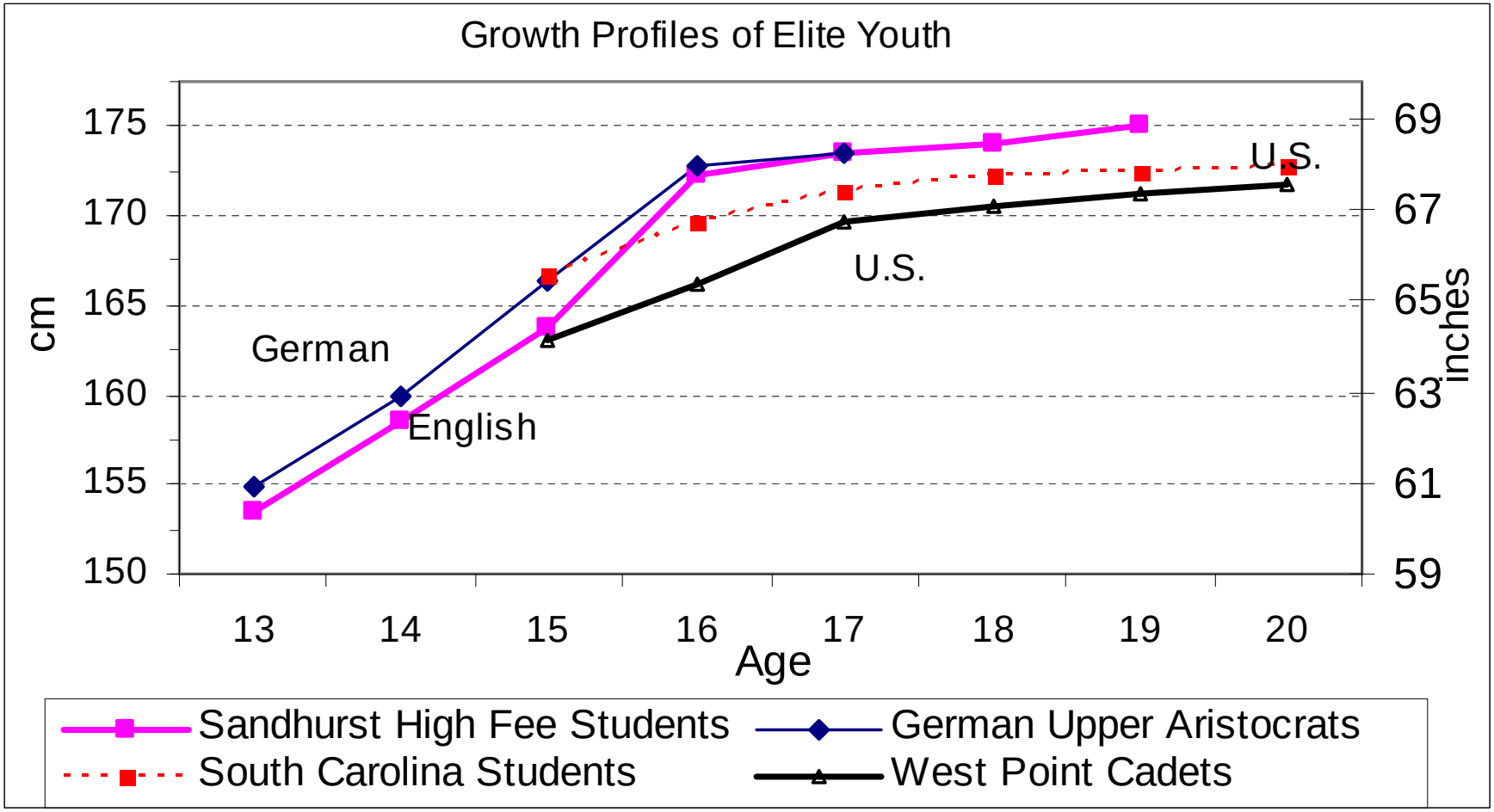


Social inequality in England at the time of the Industrial Revolution is amazing


Height of Lower-Class Youth Compared to Sandhurst Students
175
170
165
160
155
150
145
140
135
130
125
cm
Sandhurst
22 cm
US slaves
Marine Society
11
12
13
14
15
16
17
18
19
20
Age
Habsburg
Marine Society
US Slaves
Sandhurst
Dutch Orphans

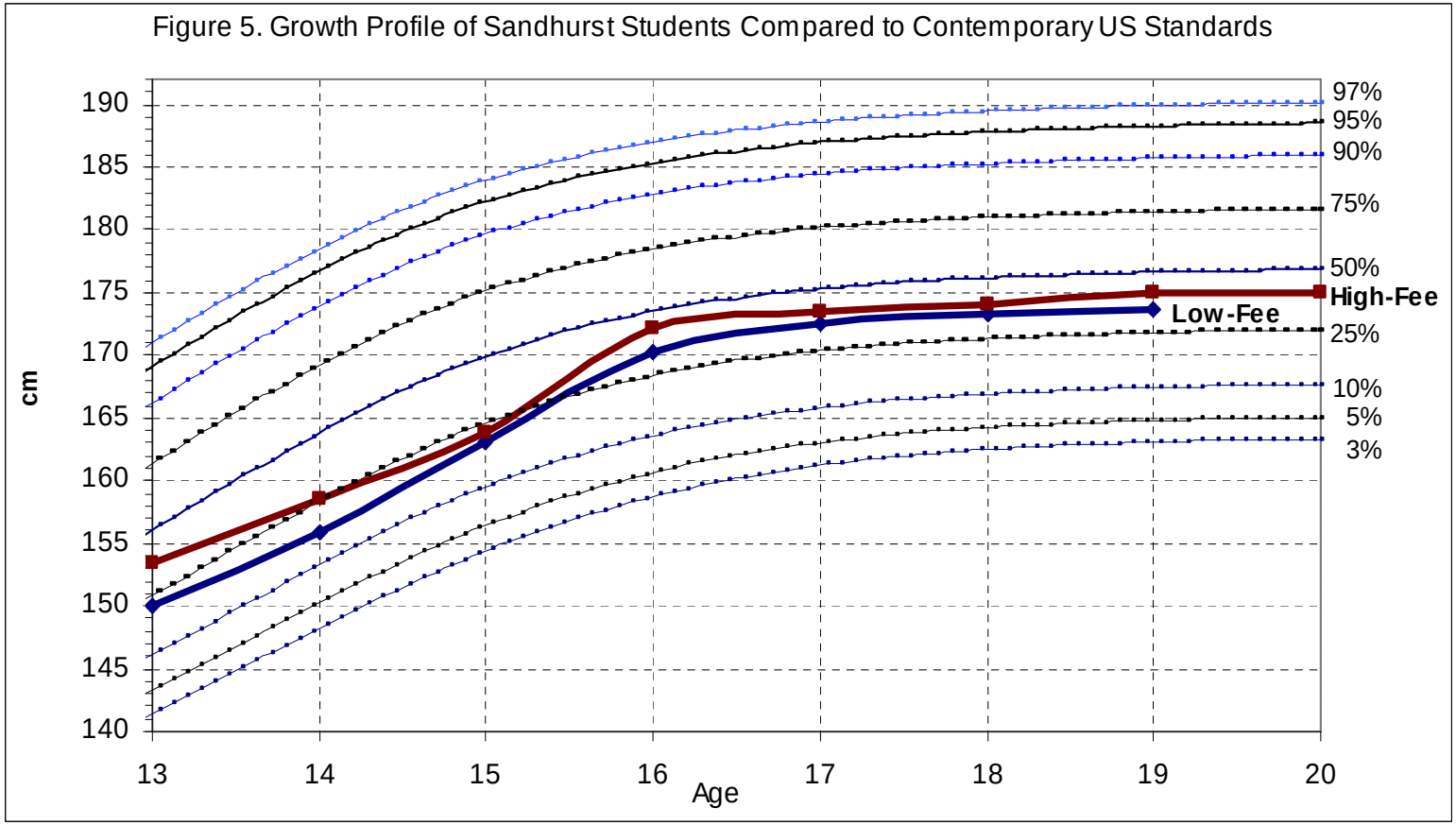


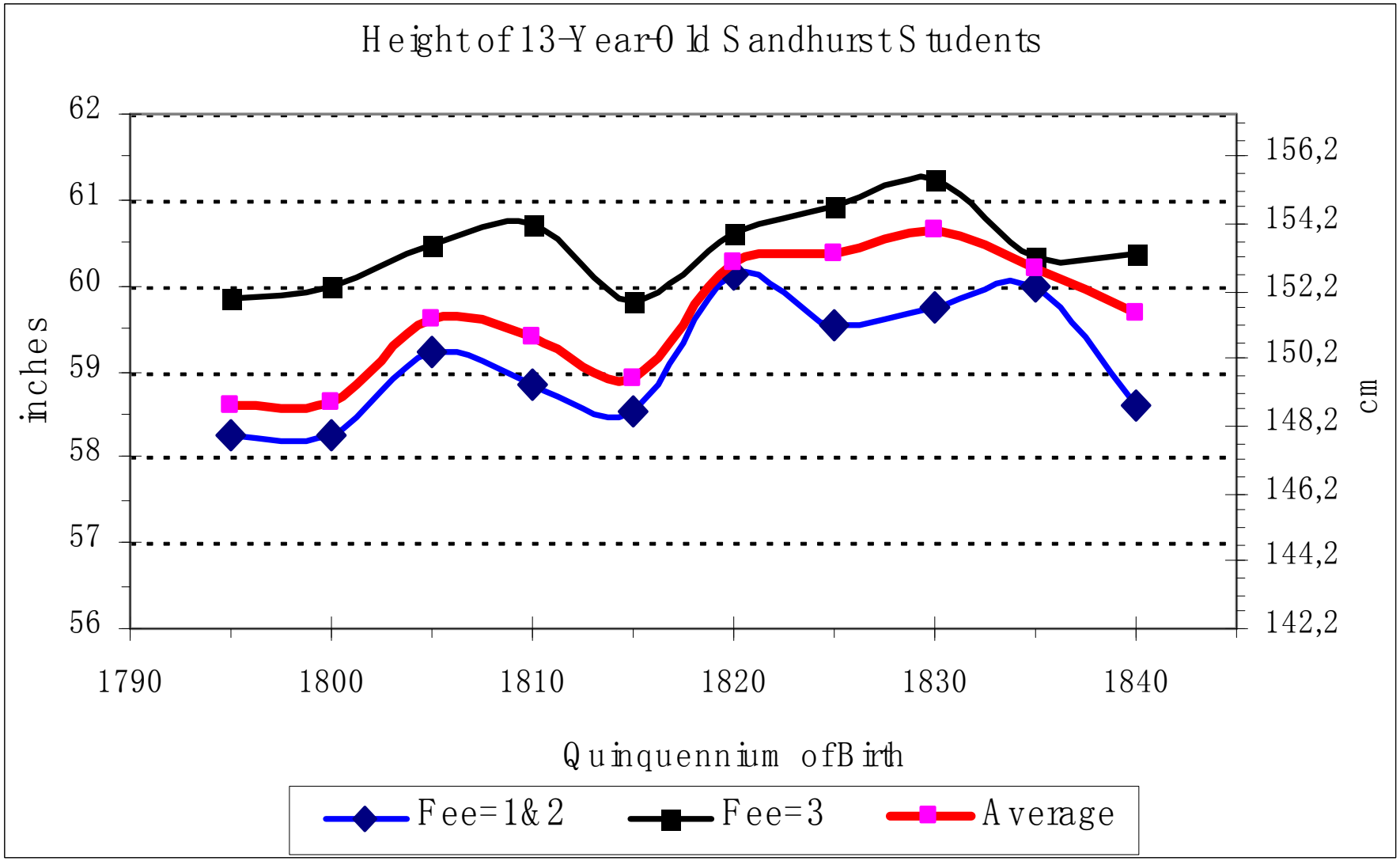
Sandhurst students were tall even among the elites



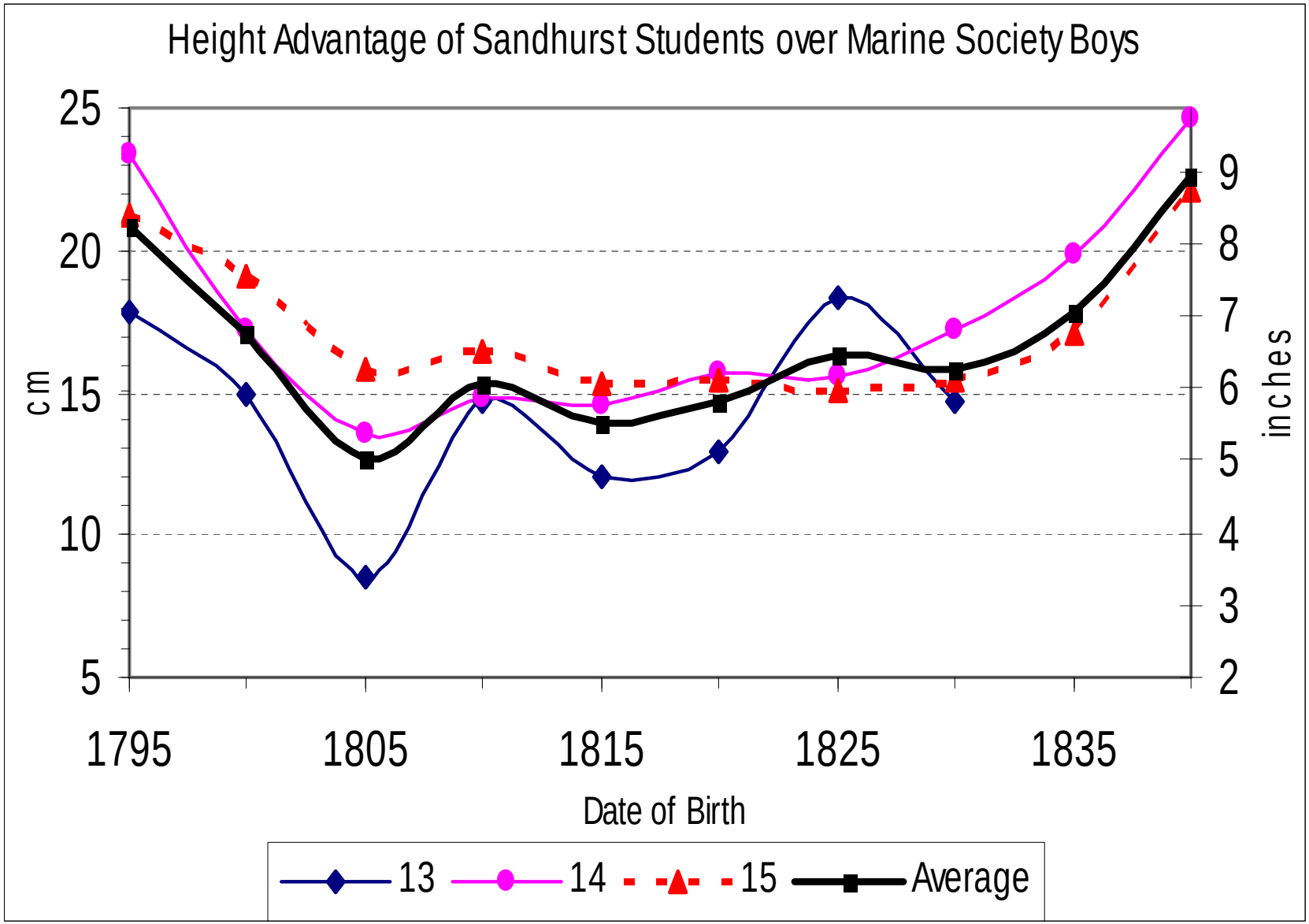
Equaled only by the upper aristocracy of other lands.
Note that US elite is not as tall

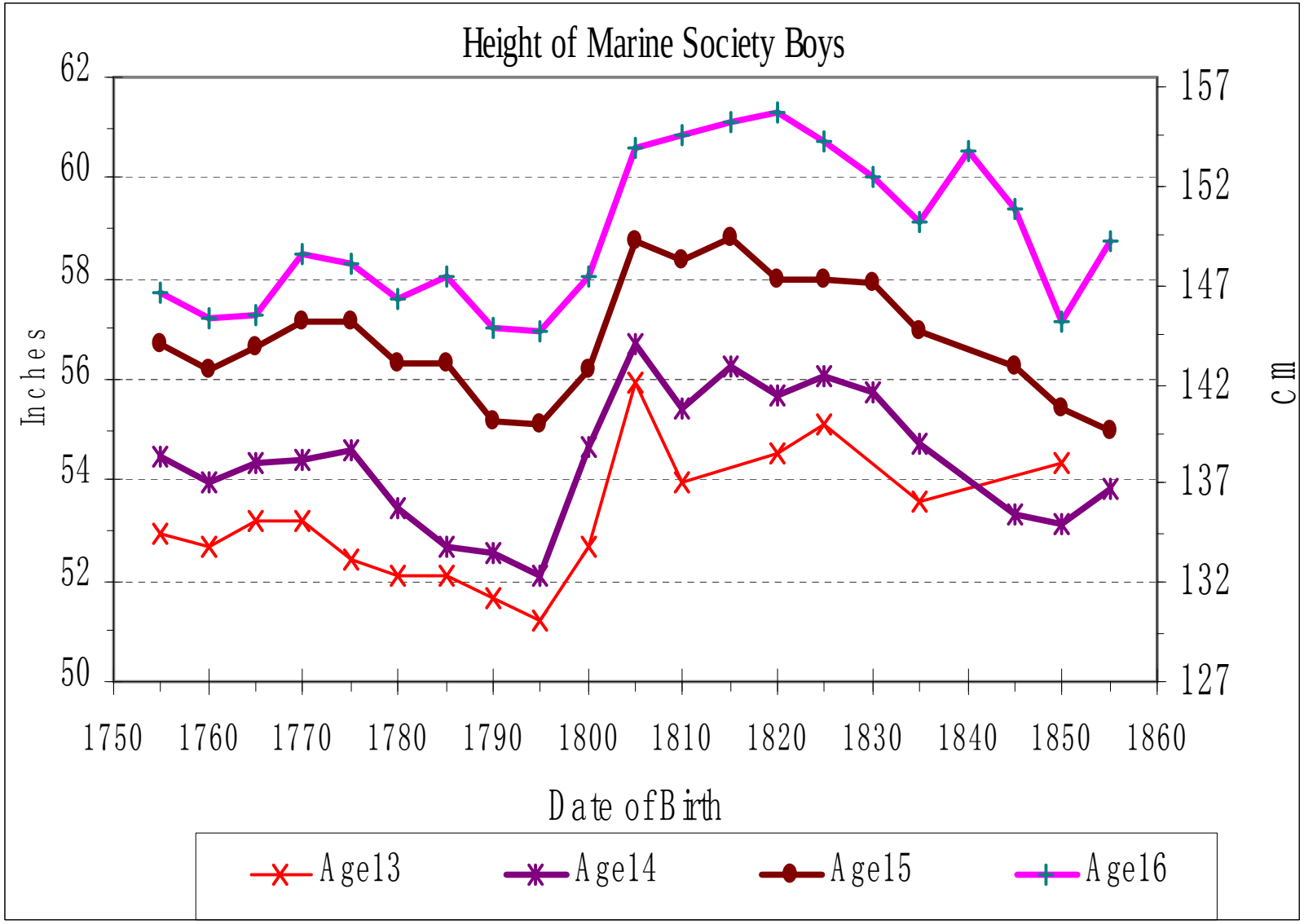
Figure 5. Growth Profile of Sandhurst Students Compared to Contemporary US Standards

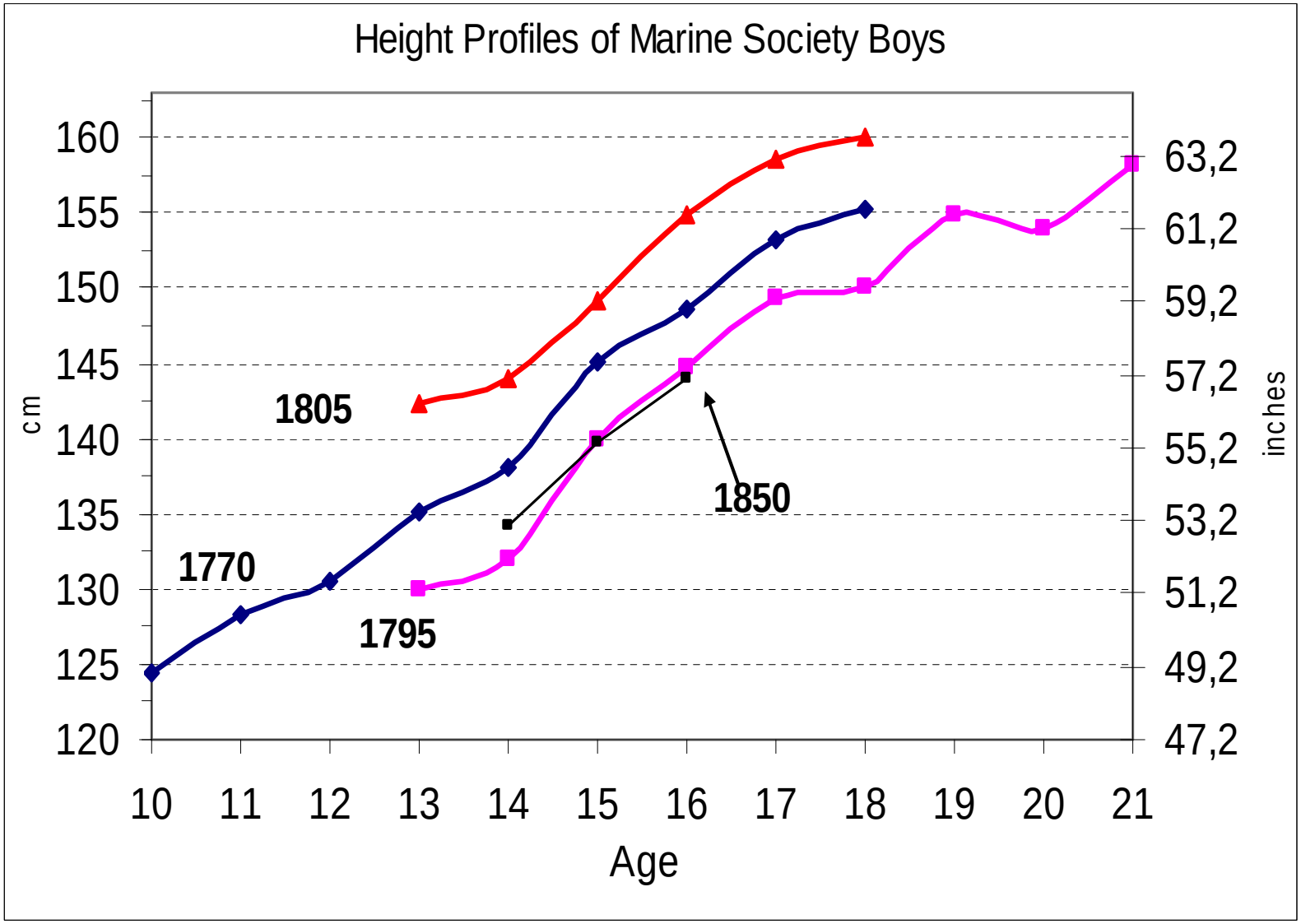




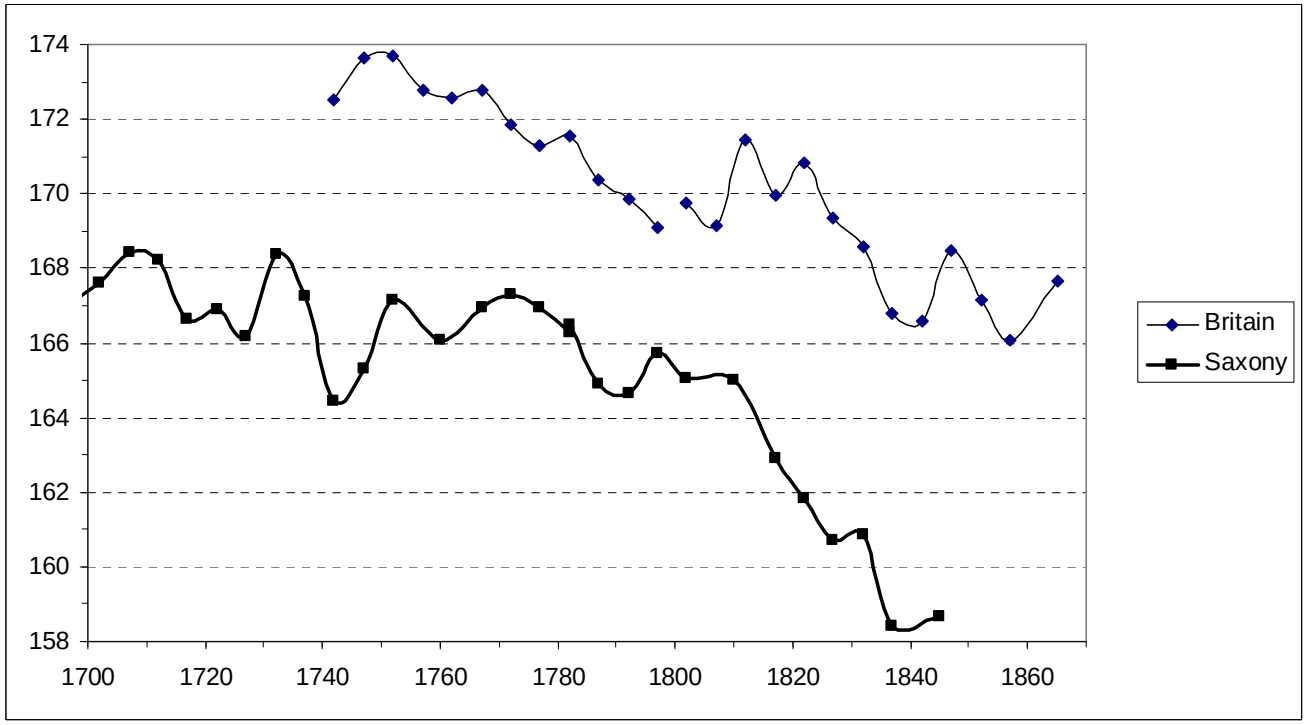
3) Income matters even among the rich

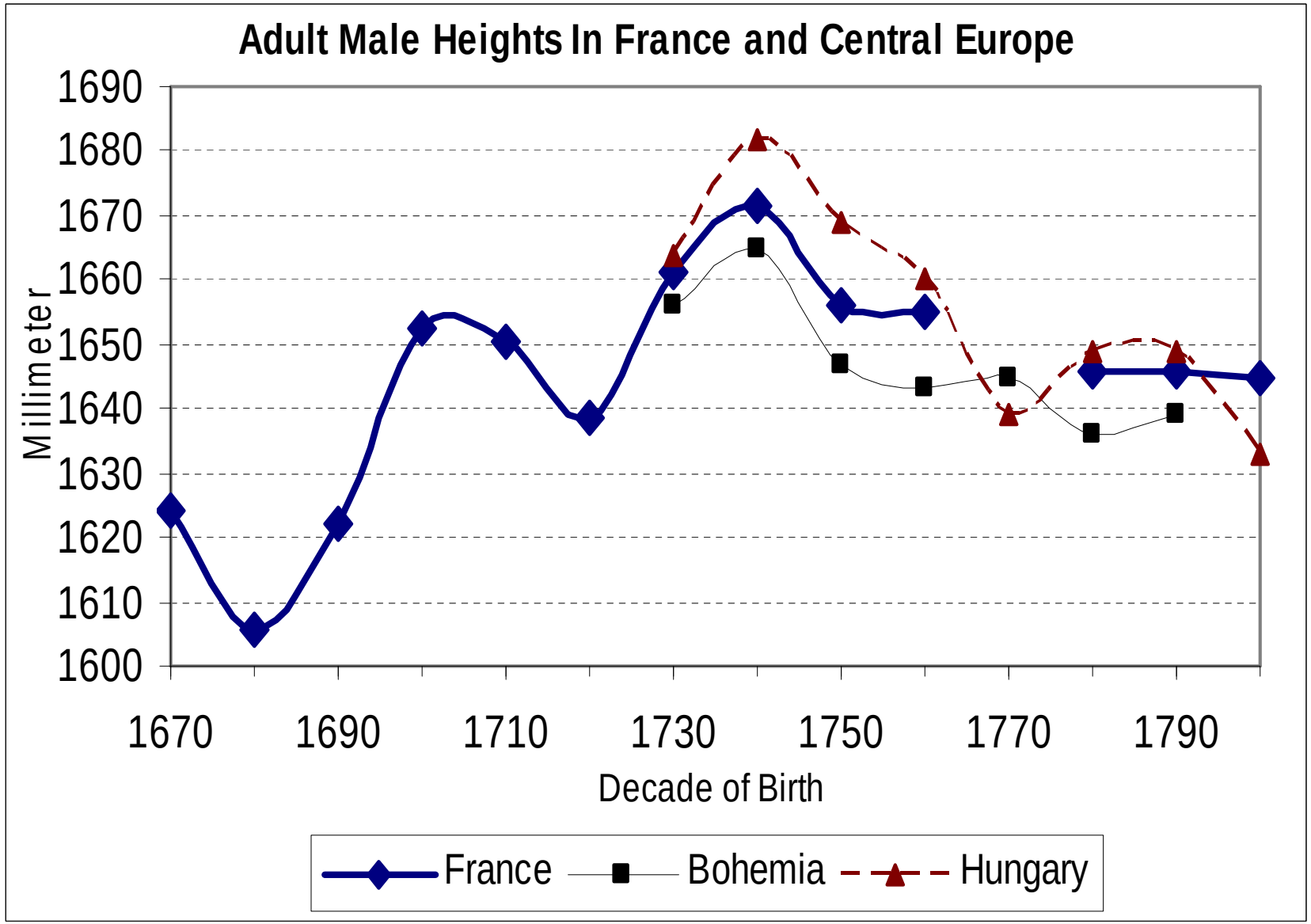

Height Advantage of Sandhurst Students over Marine Society Boys
25
20
15
10
5
cm
9
8
7
6
5
4
3
2
inches
1795
1805
1815
1825
1835
Date of Birth
13
14
15
Average


Height of Marine Society Boys
62
60
58
56
54
52
50
Inches
157
152
147
142
137
132
127
cm
1750
1760
1770
1780
1790
1800
1810
1820
1830
1840
1850
1860
Date of Birth
Age13
Age14
Age15
Age16


Height Profiles of Marine Society Boys
160
155
150
145
140
135
130
125
120
cm
63,2
61,2
59,2
57,2
55,2
53,2
51,2
49,2
47,2
inches
1805
1770
1795
1850
10
11
12
13
14
15
16
17
18
19
20
21
Age

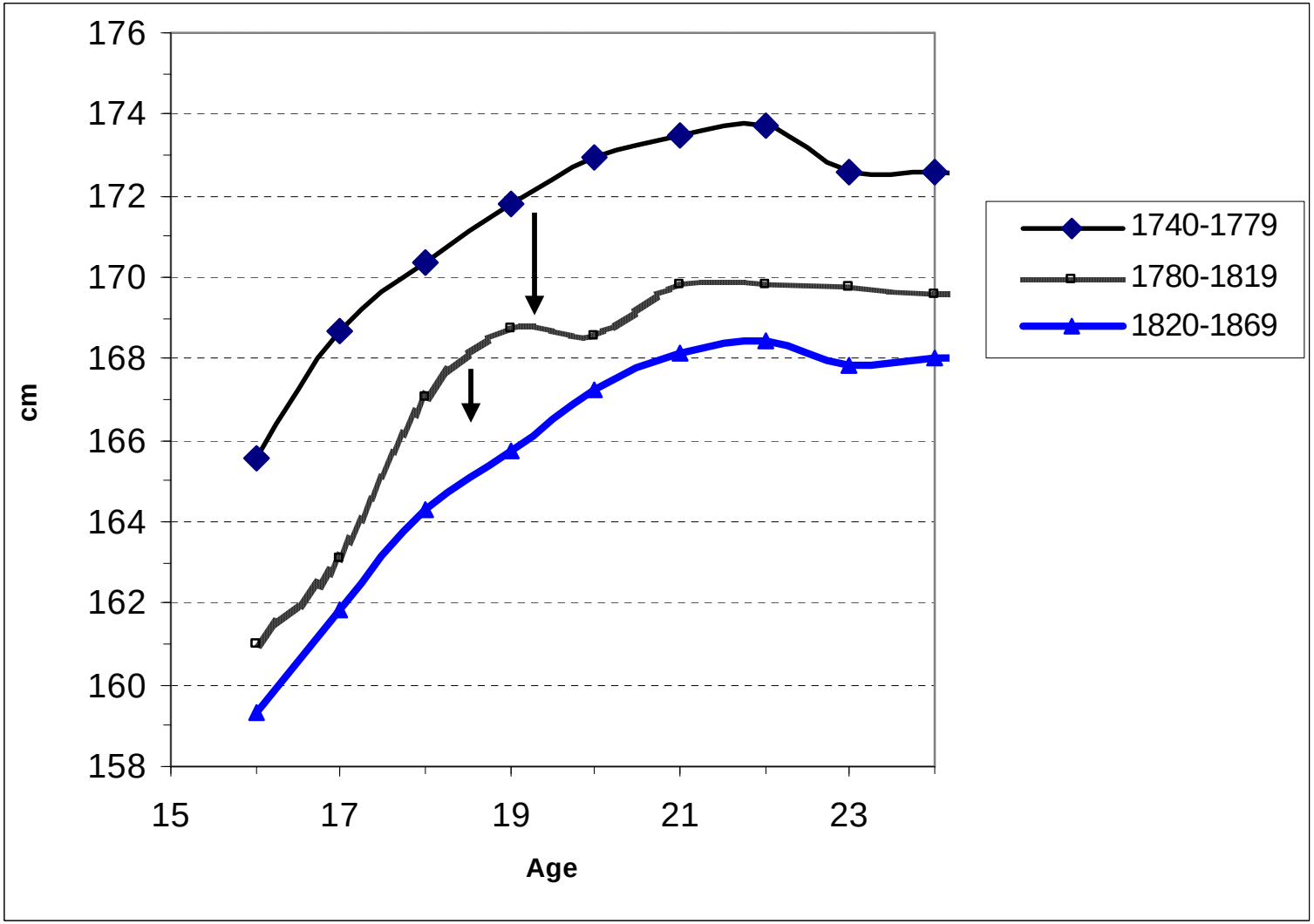
Heights decline everywhere in Europe during the 2nd half of the 18th century



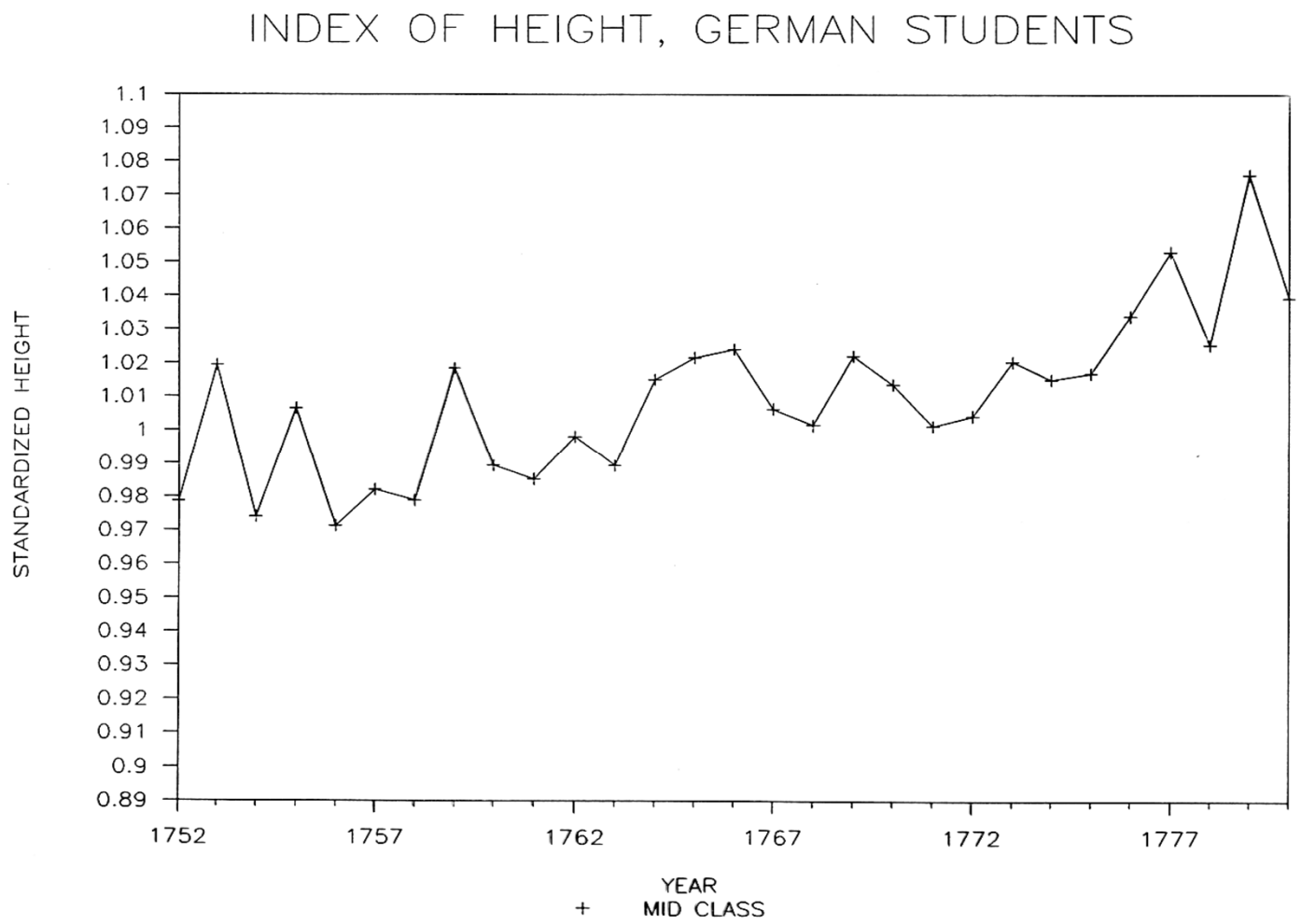


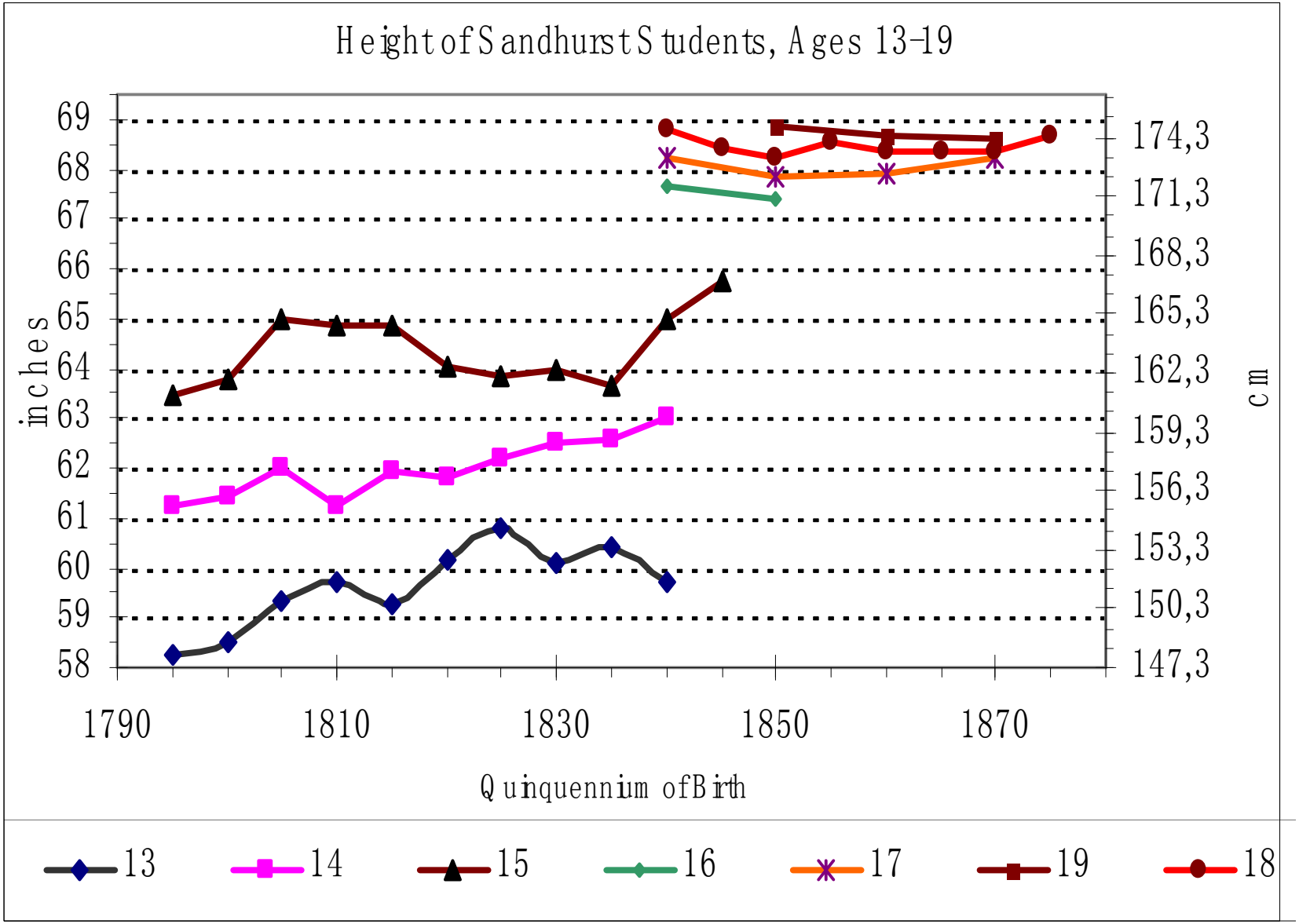
The 17th c. was miserable

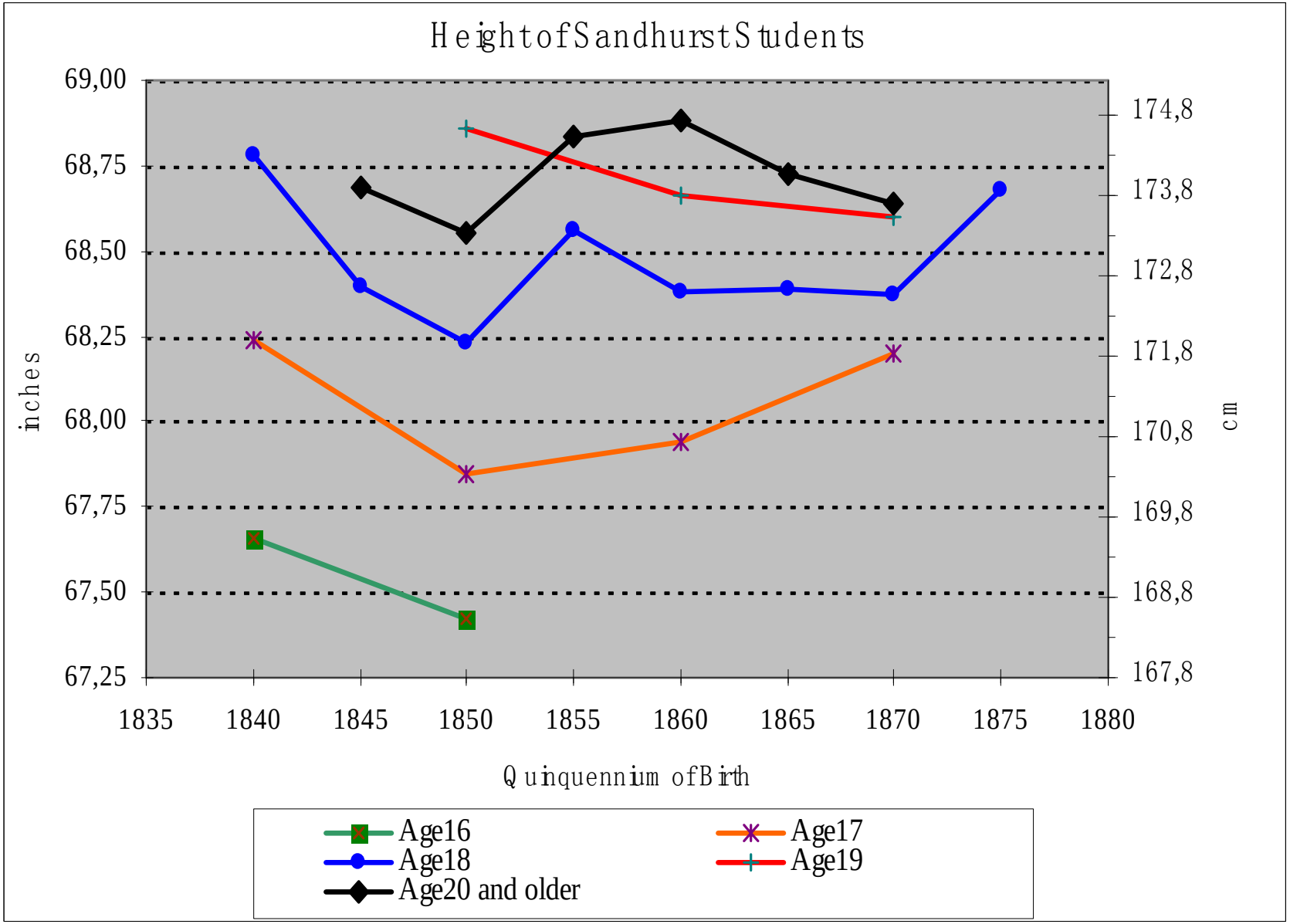
Height Profiles of English Soldiers Shrink during the IR period

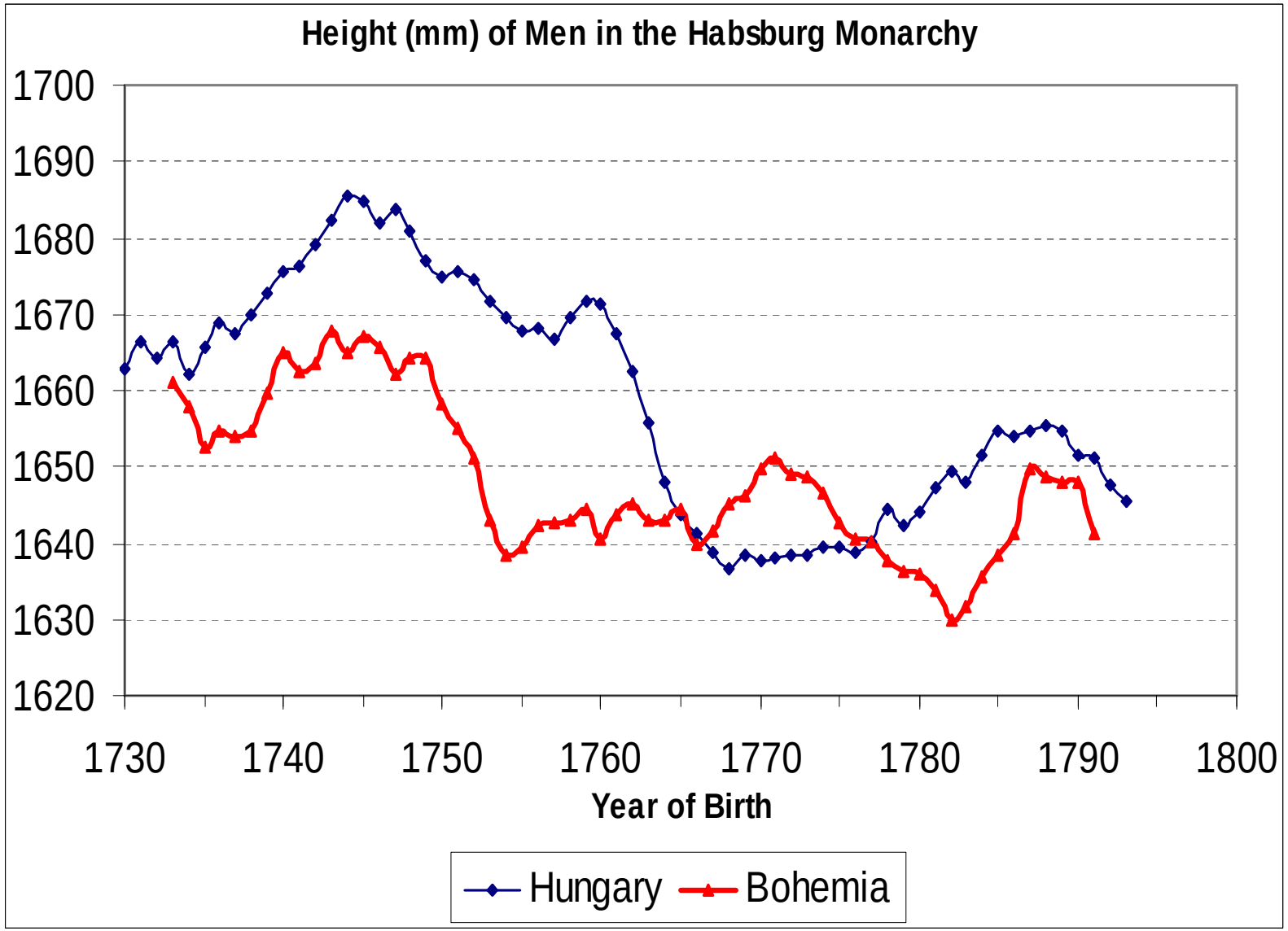


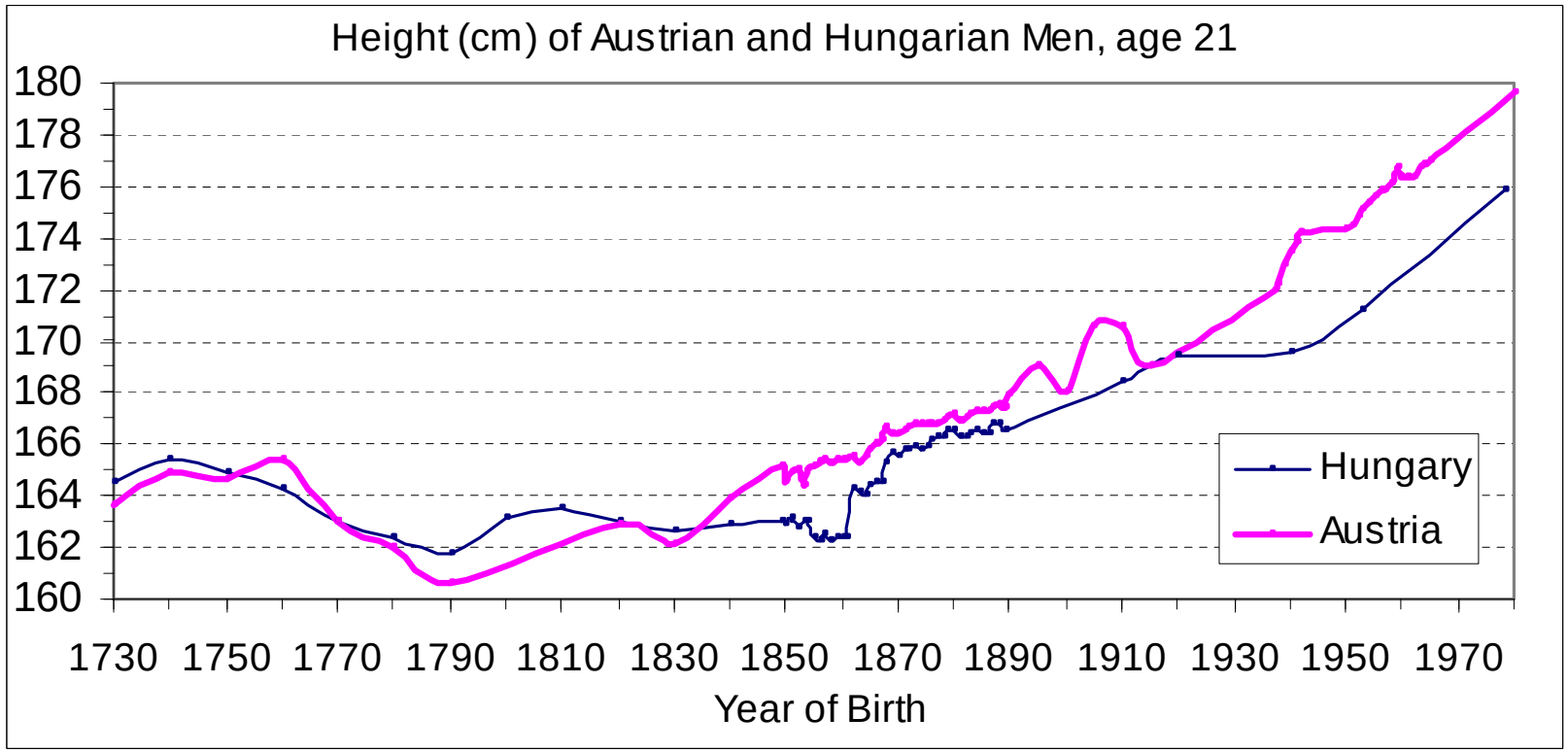
Not surprisingly the well-off are not affected by the adversities
Of the late 18th century




Height of Sandhurst Students, Ages 13-19
69
68
67
66
65
64
63
62
61
60
59
58
inches
174,3
171,3
168,3
165,3
162,3
159,3
156,3
153,3
150,3
147,3
cm
1790
1810
1830
1850
1870
Quinquennium of Birth
13
14
15
16
17
19
18

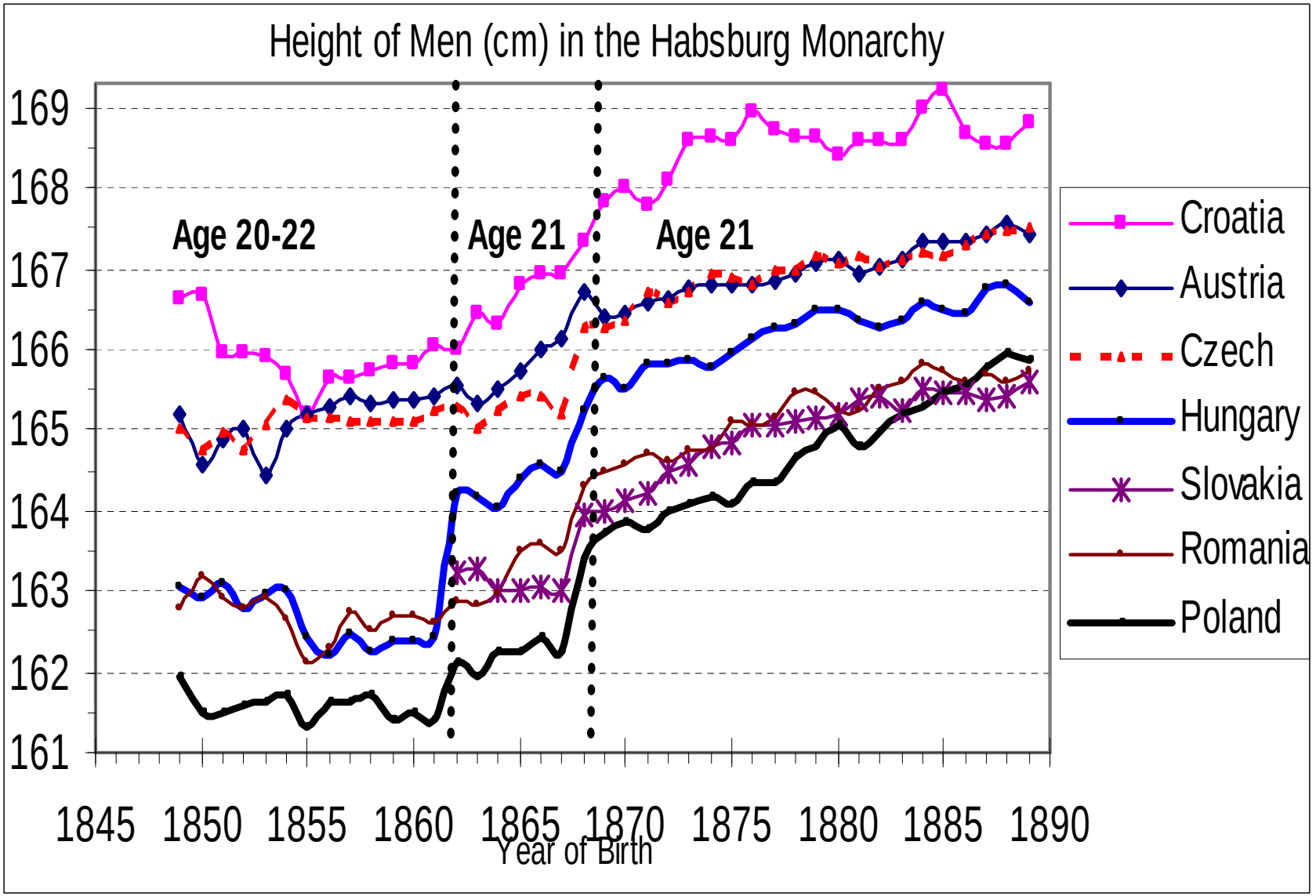

Height of Sandhurst Students
69,00
68,75
68,50
68,25
68,00
67,75
67,50
67,25
inches
174,8
173,8
172,8
171,8
170,8
169,8
168,8
167,8
cm
1835
1840
1845
1850
1855
1860
1865
1870
1875
1880
Quinquennium of Birth
Age16
Age17
Age18
Age19
Age20 and older


Height (mm) of Men in the Habsburg Monarchy
1700
1690
1680
1670
1660
1650
1640
1630
1620
1730
1740
1750
1760
1770
1780
1790
1800
Year of Birth
Hungary
Bohemia

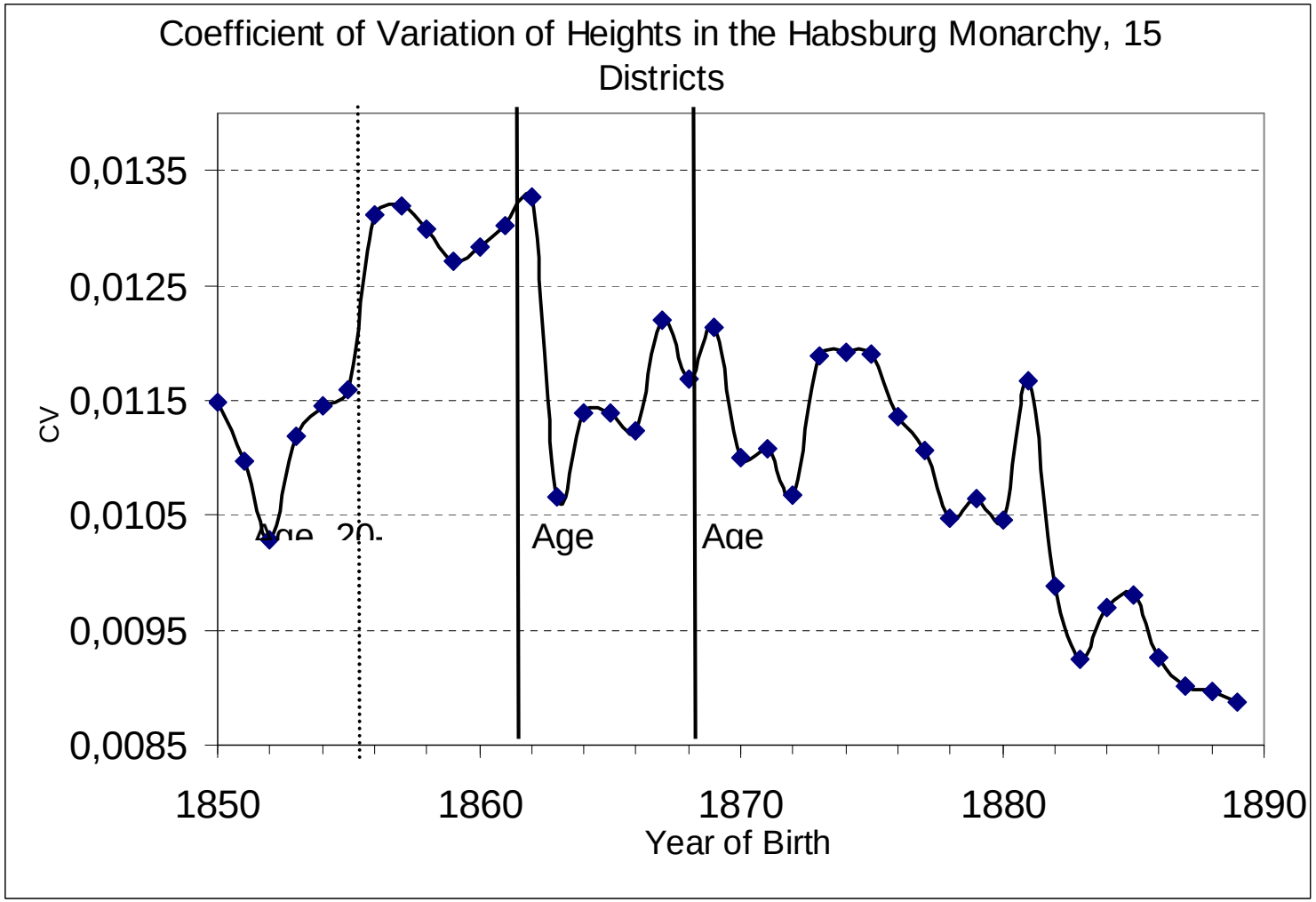


It took a long time to reach 18th c. maximum again. For Hungary it took from 1745 to 1870 or 125 years.

- Convergence in heights in the Habsburg Monarchy in the 2nd half of the 19th century


Height of Men (cm) in the Habsburg Monarchy
169
168
167
166
165
164
163
162
161
Age 20-22
Age 21
Age 21
1845
1850
1855
1860
1865
1870
1875
1880
1885
1890
Year of Birth
Croatia
Austria
Czech
Hungary
Slovakia
Romania
Poland

Spatial Convergence



The second convergence measure is referred to as β-convergence and is given by:

Eq. (1) $\Delta \ln H_{i,t-10} = \ln H_{i,t} - \ln H_{i,t-10} = \alpha + \lambda \ln H_{i,t-10} + \varepsilon_{i,t-10}$

The term "β-convergence" is used in the growth literature, where $\lambda = -(1-e^{-10\beta})$, where β is the rate of convergence per annum:

$$\beta = \frac{-\ln(1+\lambda)}{10}$$

β = 0.014 (1869-1879) → 1.4% of the gap between current height and the final level of height was eliminated annually. about half of the gap would be eliminated in 50 years

→

β = 0.021 (1879-1889) 2.1% of the gap between current height and the final level of height was eliminated annually about 2/3 of the gap would be eliminated in 50 years.[i]

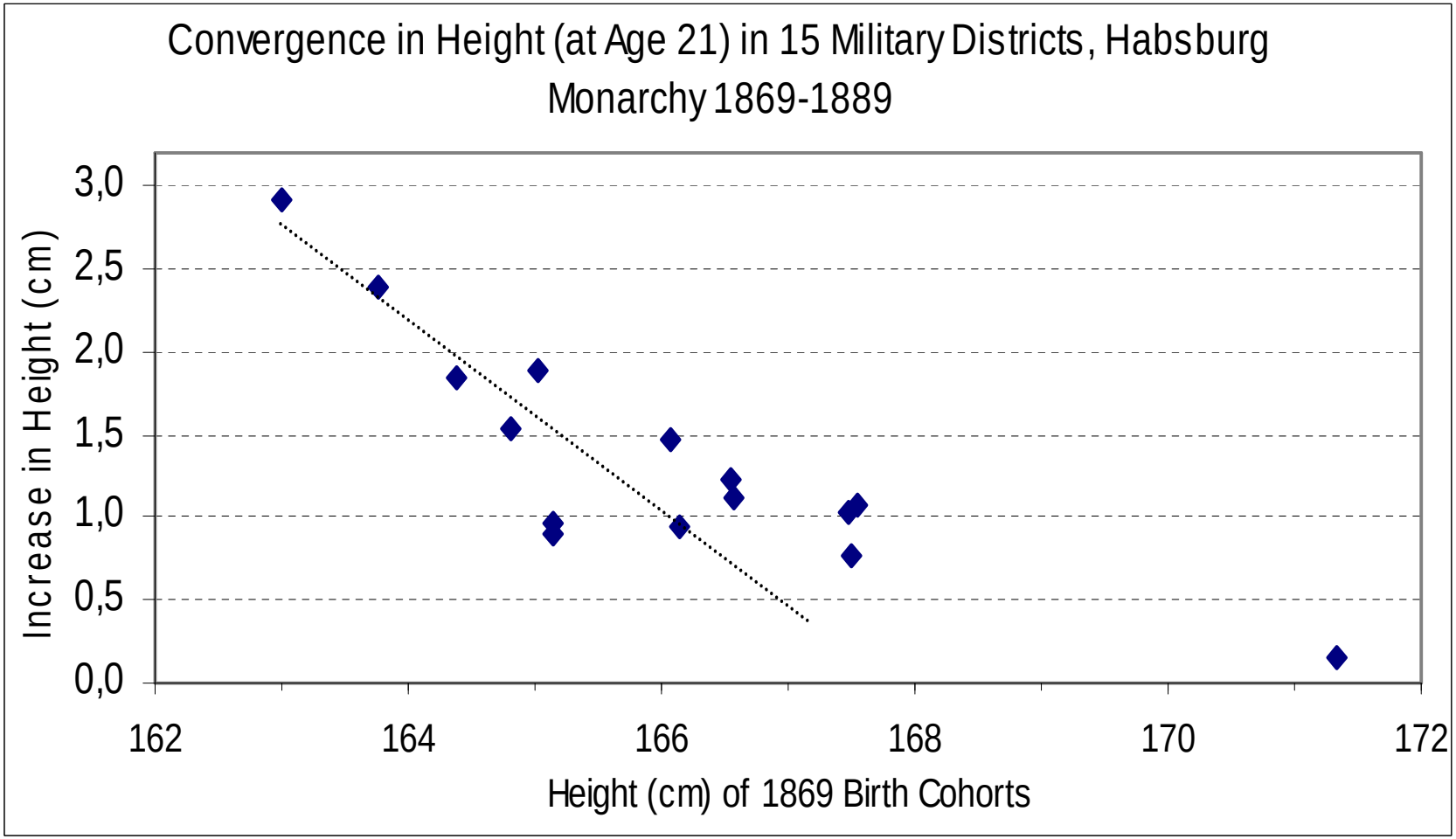
These values are comparable to the β–convergence rate estimated for Japan: 0.022 (1893-1913) (Bassino 2006, 80),
and are somewhat faster than the rate of convergence of income estimated across U.S. states: 0.0101 for 1880-1900 (Barro and Sala-i-Martin 1995, 388).

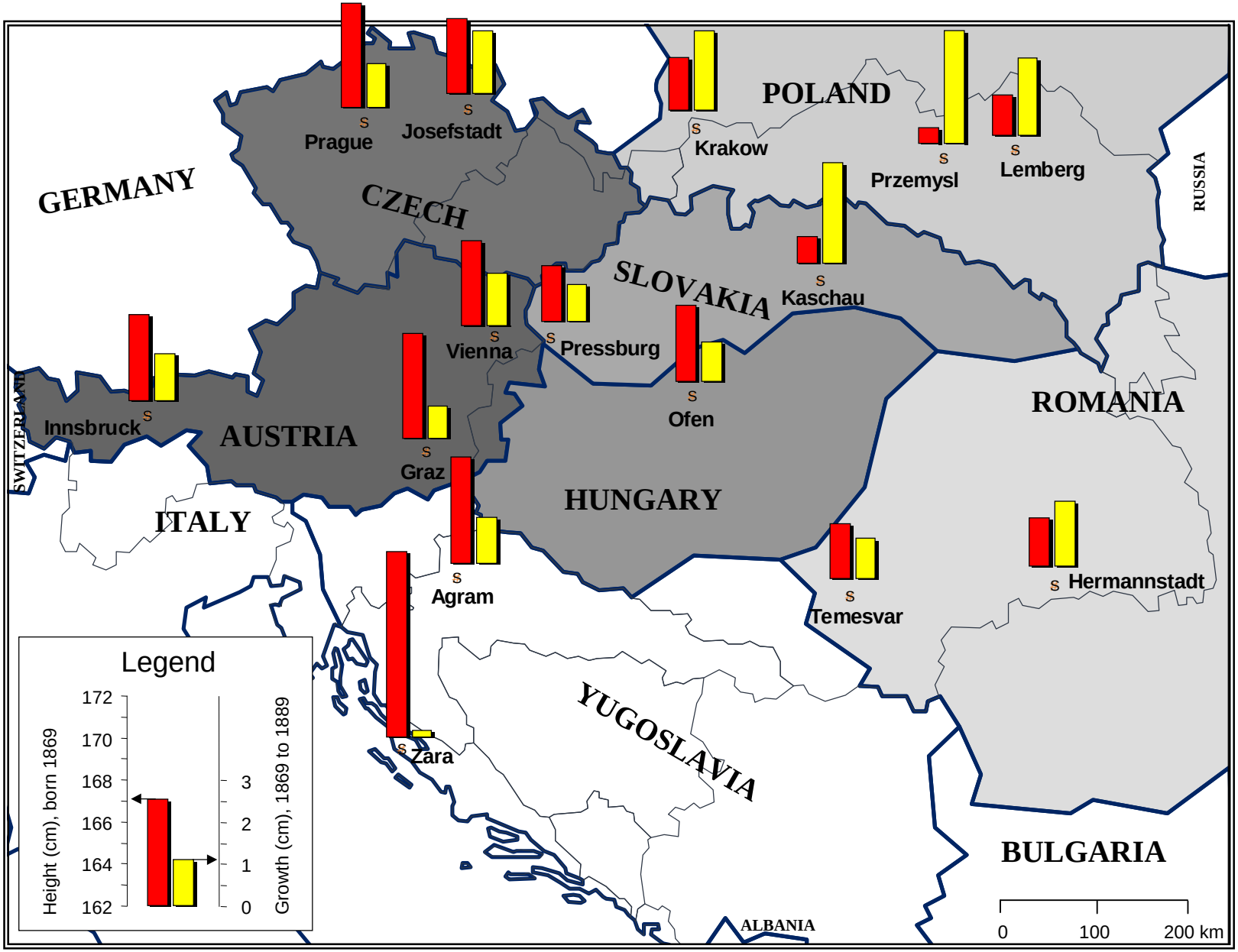
---

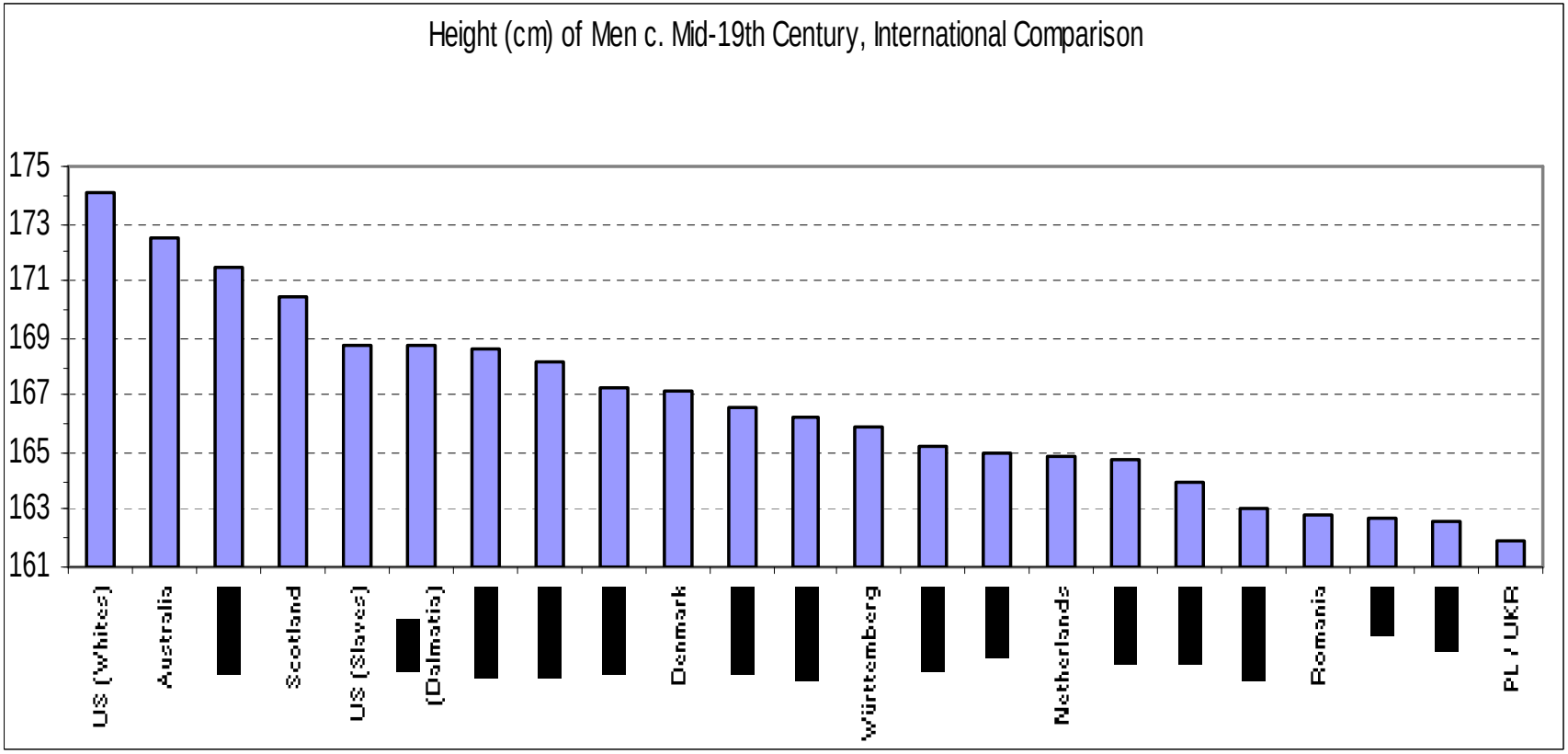
[i] Share of gap not yet eliminated = $100/e^{\beta t}$, or $(\ln(2))/\beta = t$ – t is the time needed to eliminate half the gap

(Barro and Sala-i-Martin, 1992, 230 1995, 387) λ is estimated for a decade.

- However, the rate of convergence among the peripheral districts was faster: 1869-89 of 10.7%; that means that at that rate the half-life of the gap would have been only 6.5 years


Convergence in Height (at Age 21) in 15 Military Districts, Habsburg Monarchy 1869-1889
Increase in Height (cm)
3,0
2,5
2,0
1,5
1,0
0,5
0,0
162
164
166
168
170
172
Height (cm) of 1869 Birth Cohorts

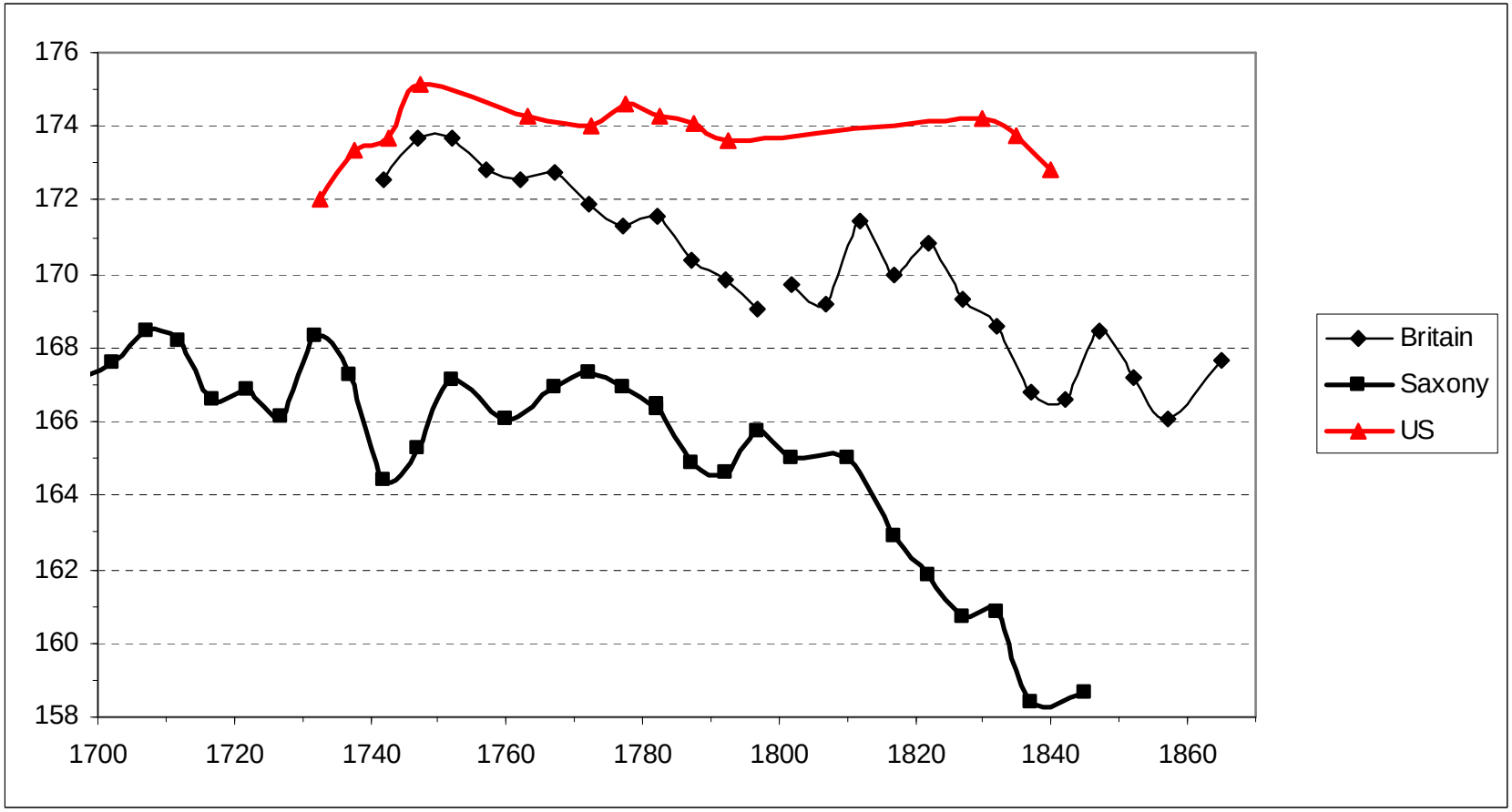

GERMANY
CZECH
POLAND
SLOVAKIA
AUSTRIA
HUNGARY
ROMANIA
ITALY
YUGOSLAVIA
BULGARIA
ALBANIA
SWITZERLAND
RUSSIA
Prague
Josefstadt
Krakow
Przemysl
Lemberg
Kaschau
Vienna
Pressburg
Ofen
Innsbruck
Graz
Agram
Temesvar
Hermannstadt
Zara
Legend
Height (cm), born 1869
172
170
168
166
164
162
Growth (cm), 1869 to 1889
3
2
1
0
0
100
200 km

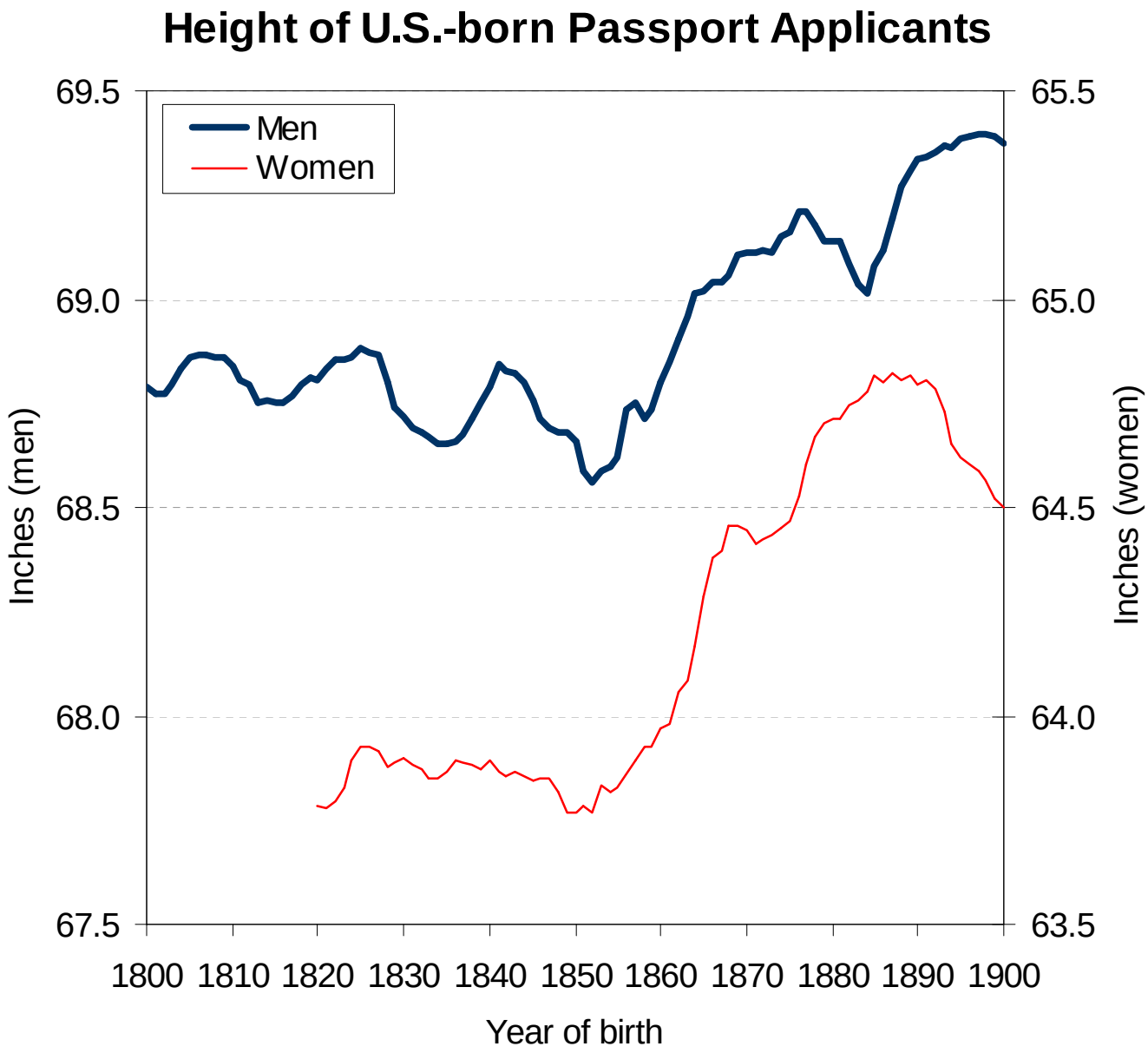

Height (cm) of Men c. Mid-19th Century, International Comparison
175
173
171
169
167
165
163
161
US (Whites)
Australia
Scotland
US (Slaves)
(Dalmatia)
Denmark
Württemberg
Netherlands
Romania
PL / UKR

Part III:

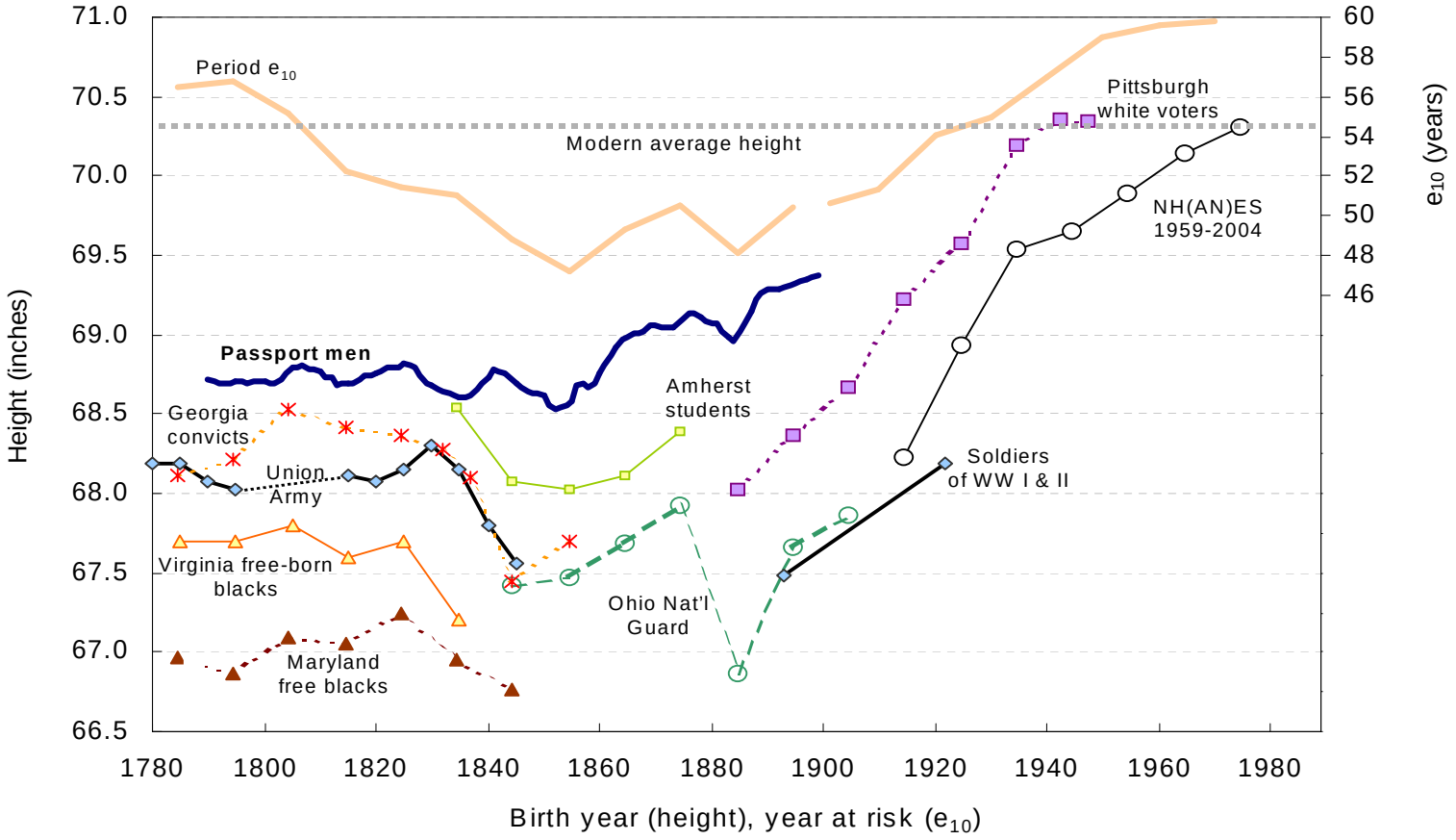
From the Tallest to one of the Fattest,

the fate of the American Population in the 20th c.

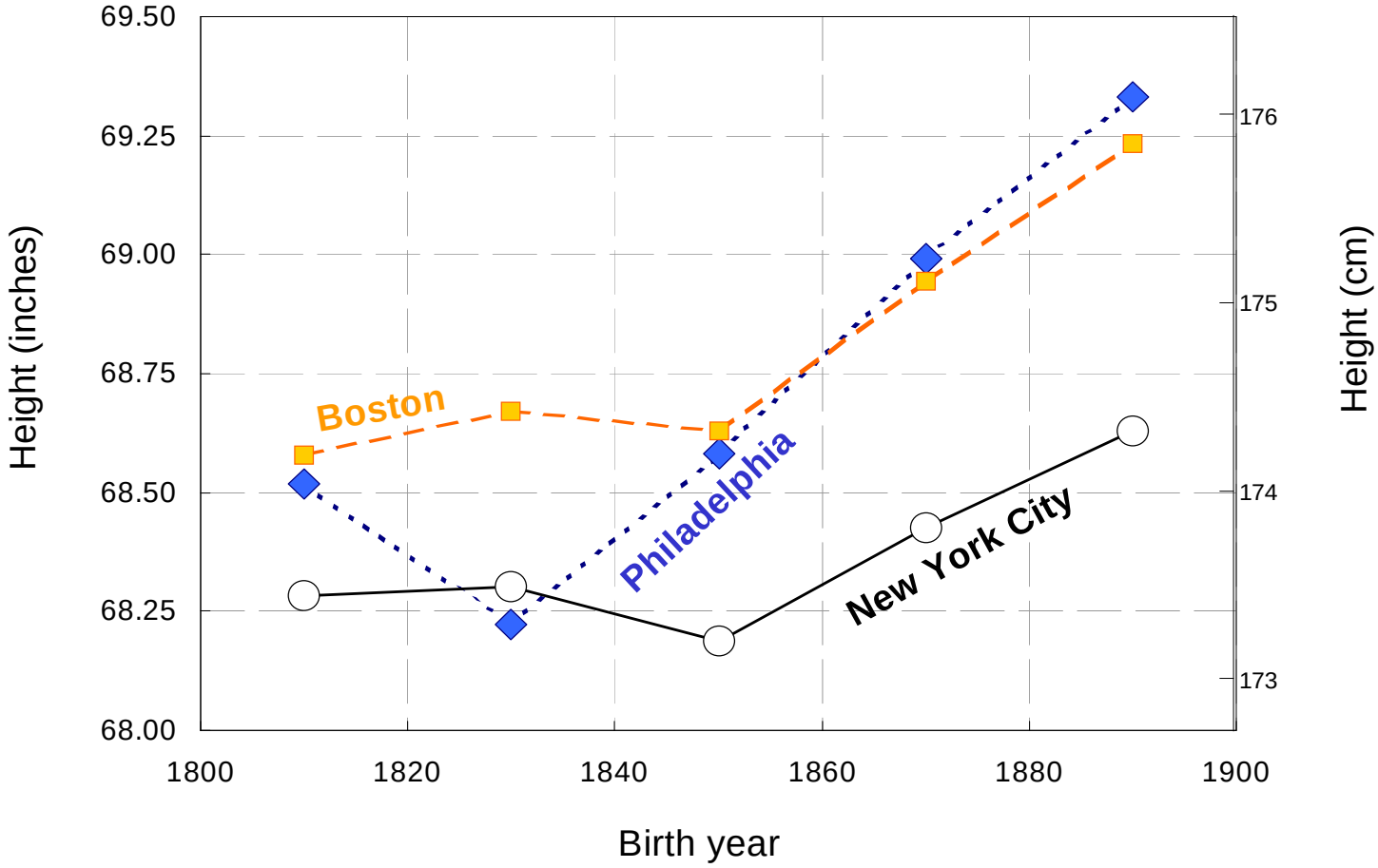



Height of U.S.-born Passport Applicants
Men
Women
69.5
69.0
68.5
68.0
67.5
65.5
65.0
64.5
64.0
63.5
Inches (men)
Inches (women)
1800 1810 1820 1830 1840 1850 1860 1870 1880 1890 1900
Year of birth

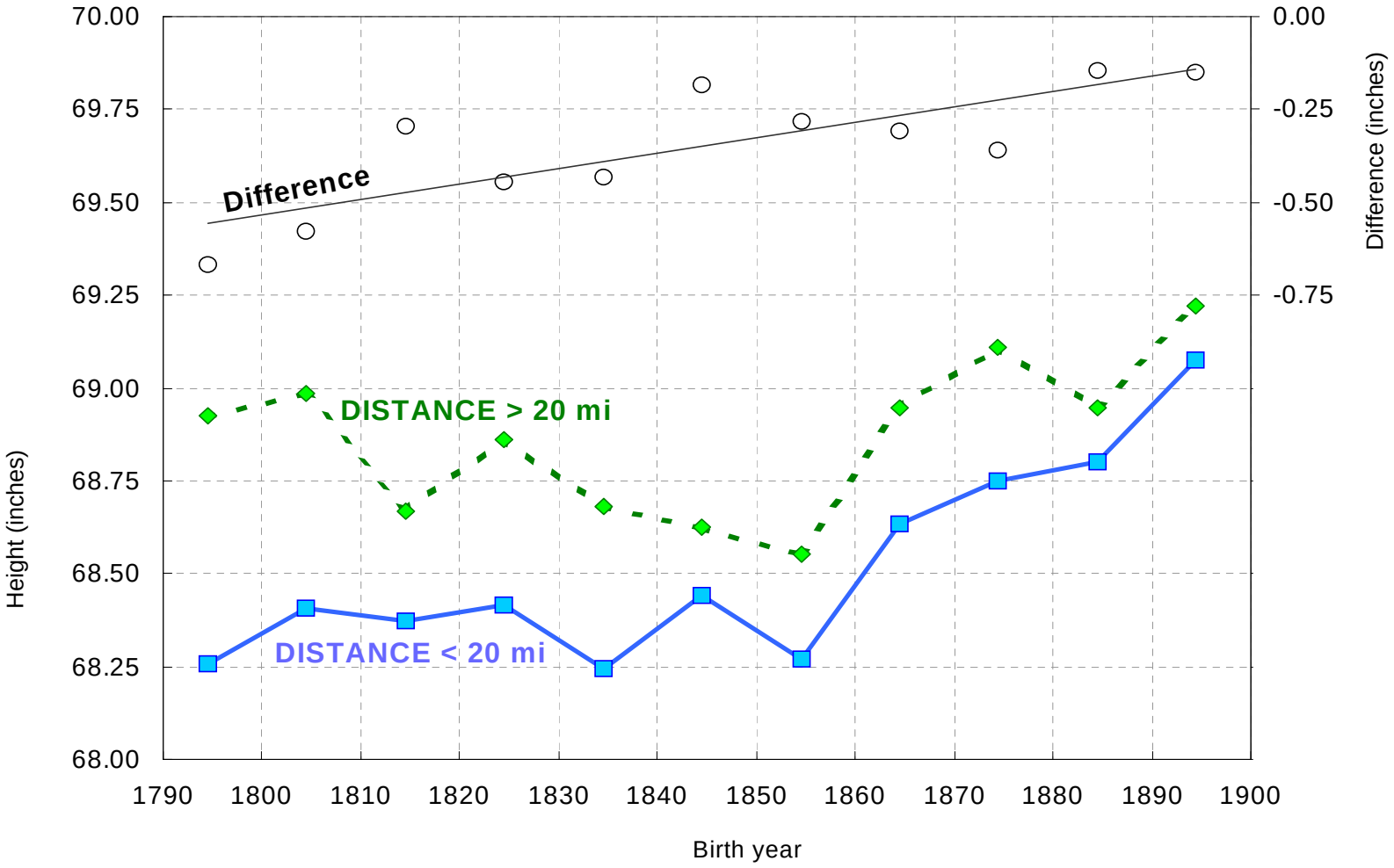
The antebellum puzzle: Height of men by birth cohort and male life expectancy at age 10.



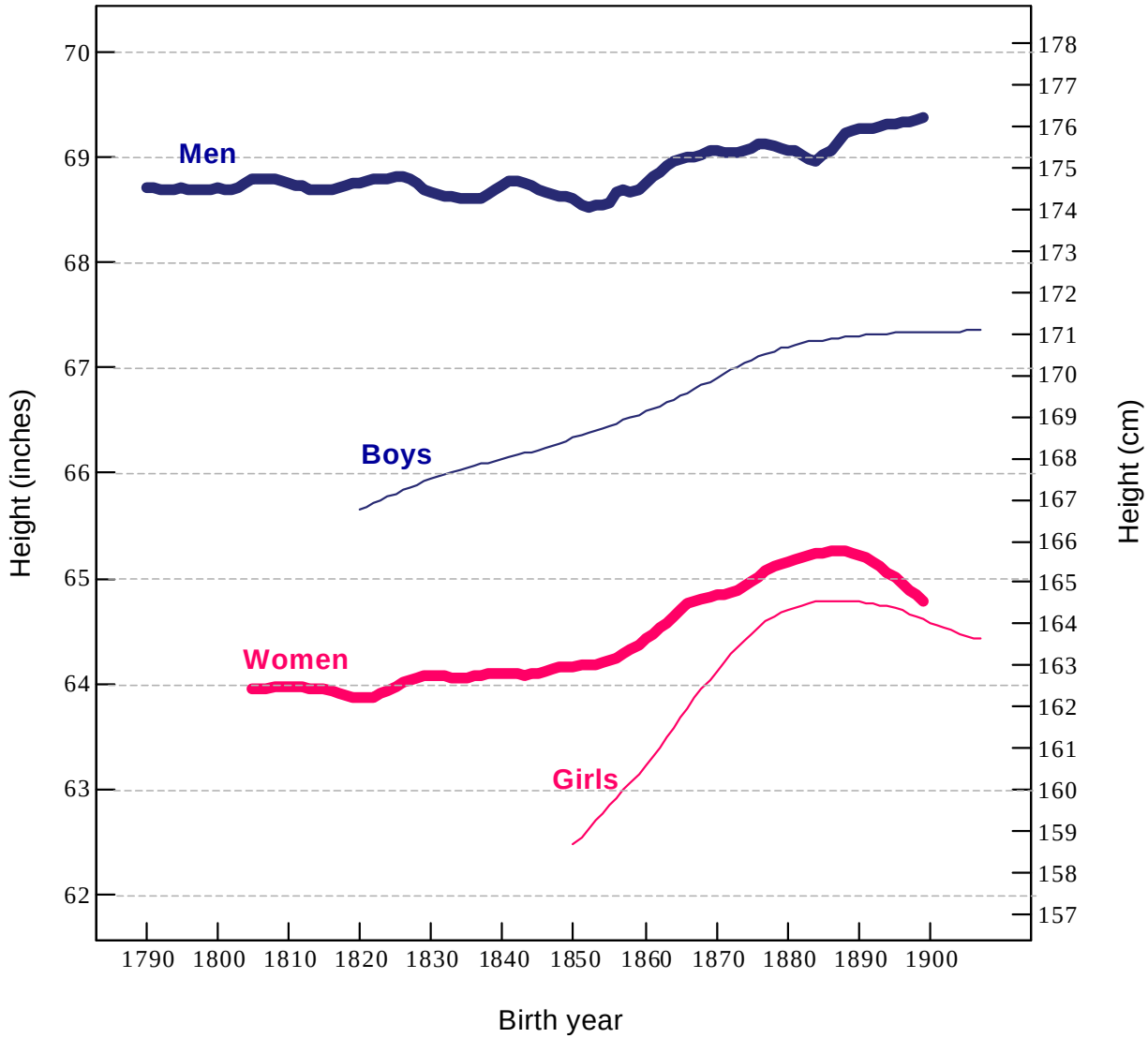
Height of male passport applicants in selected cities.

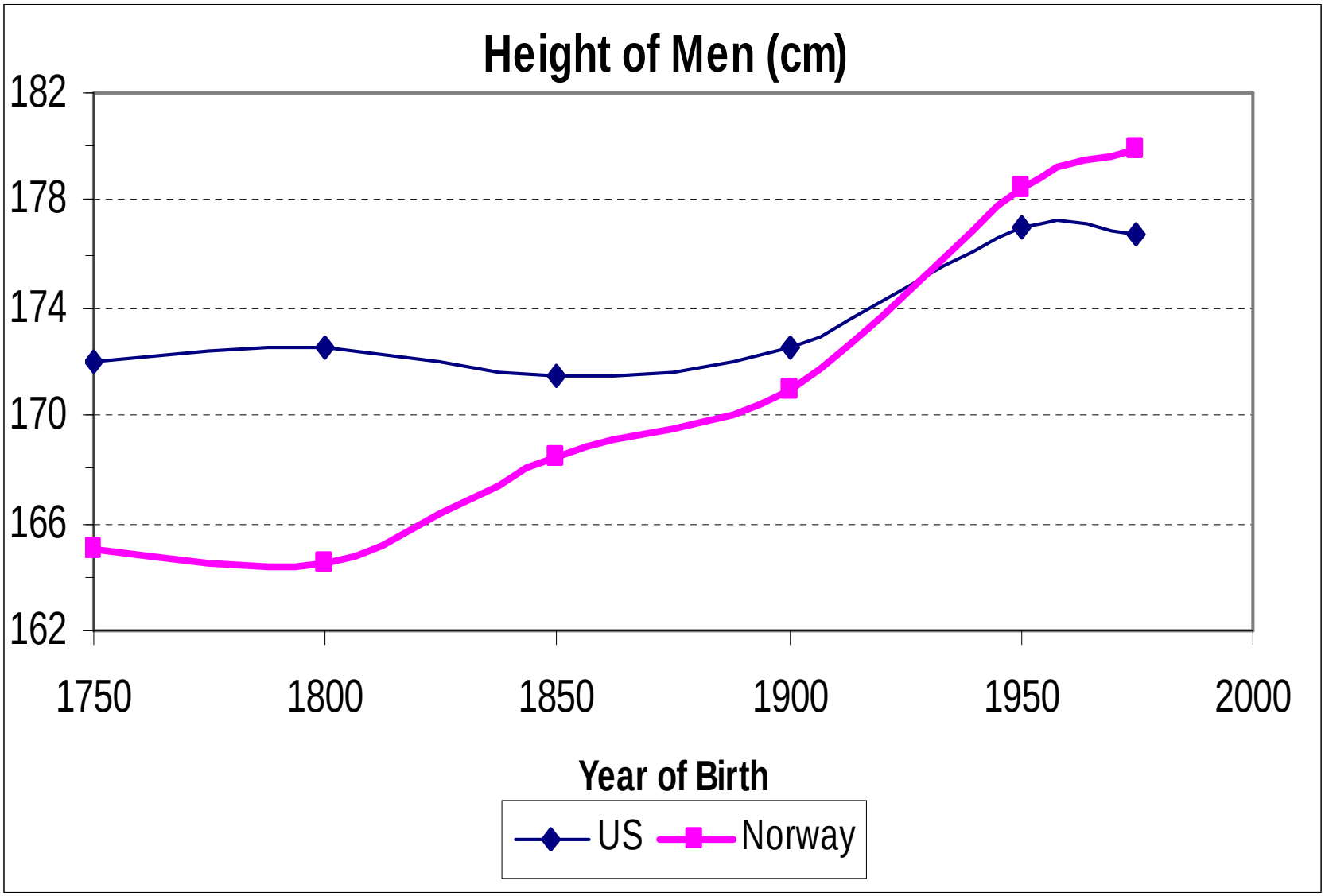


Height of male passport applicants by distance to major cities.

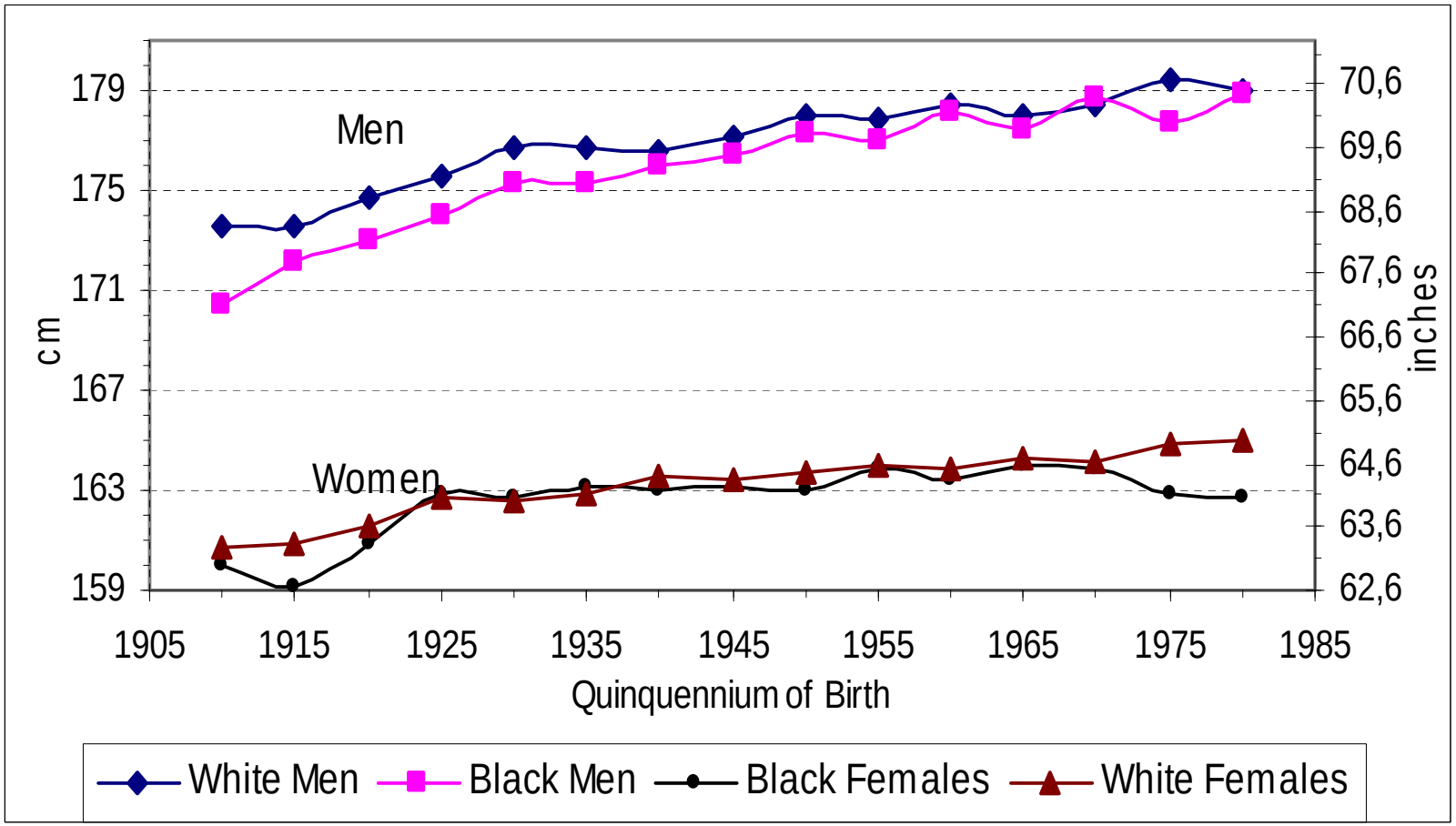


Comparison of trends in height of passport applicants.

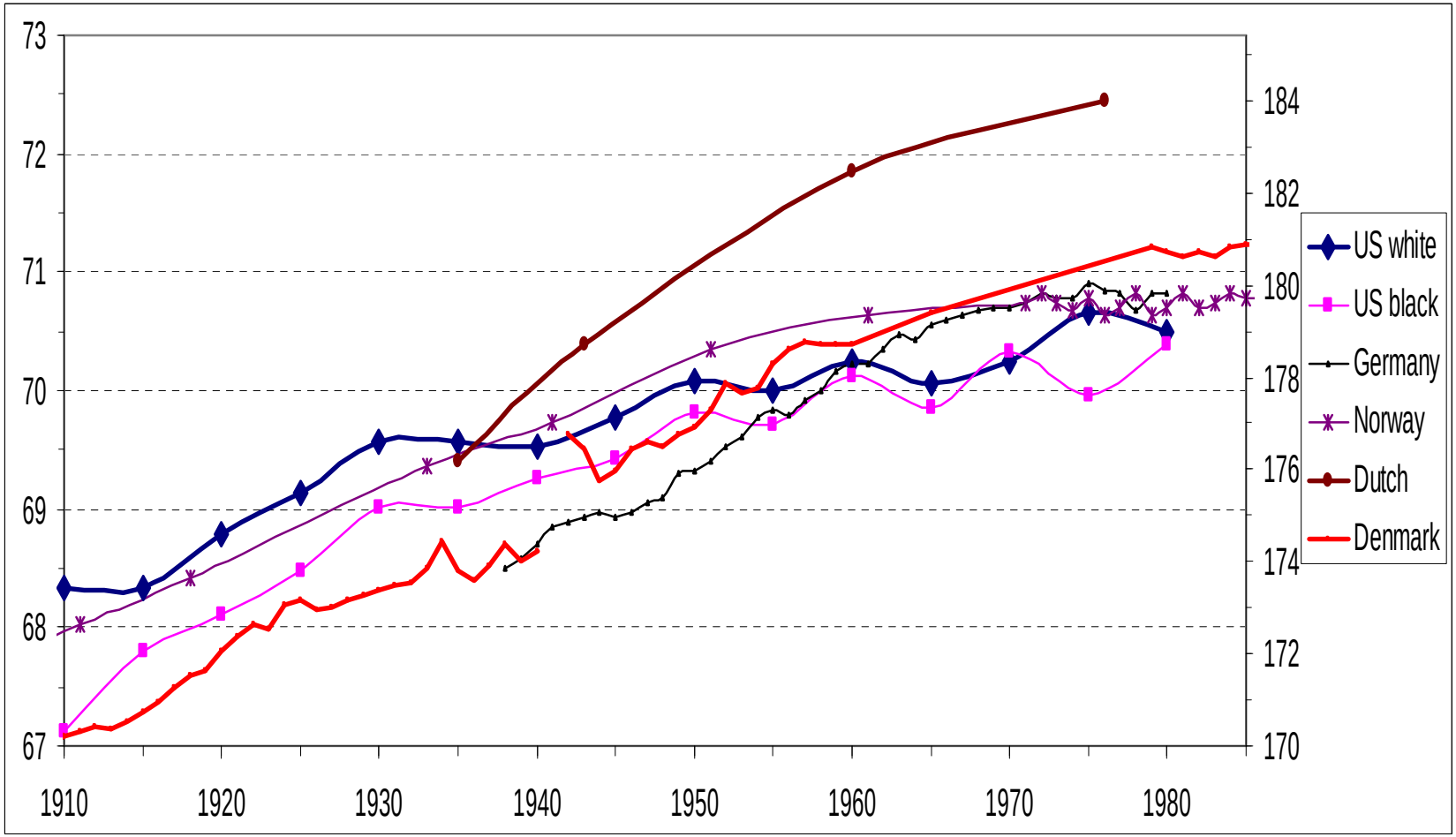


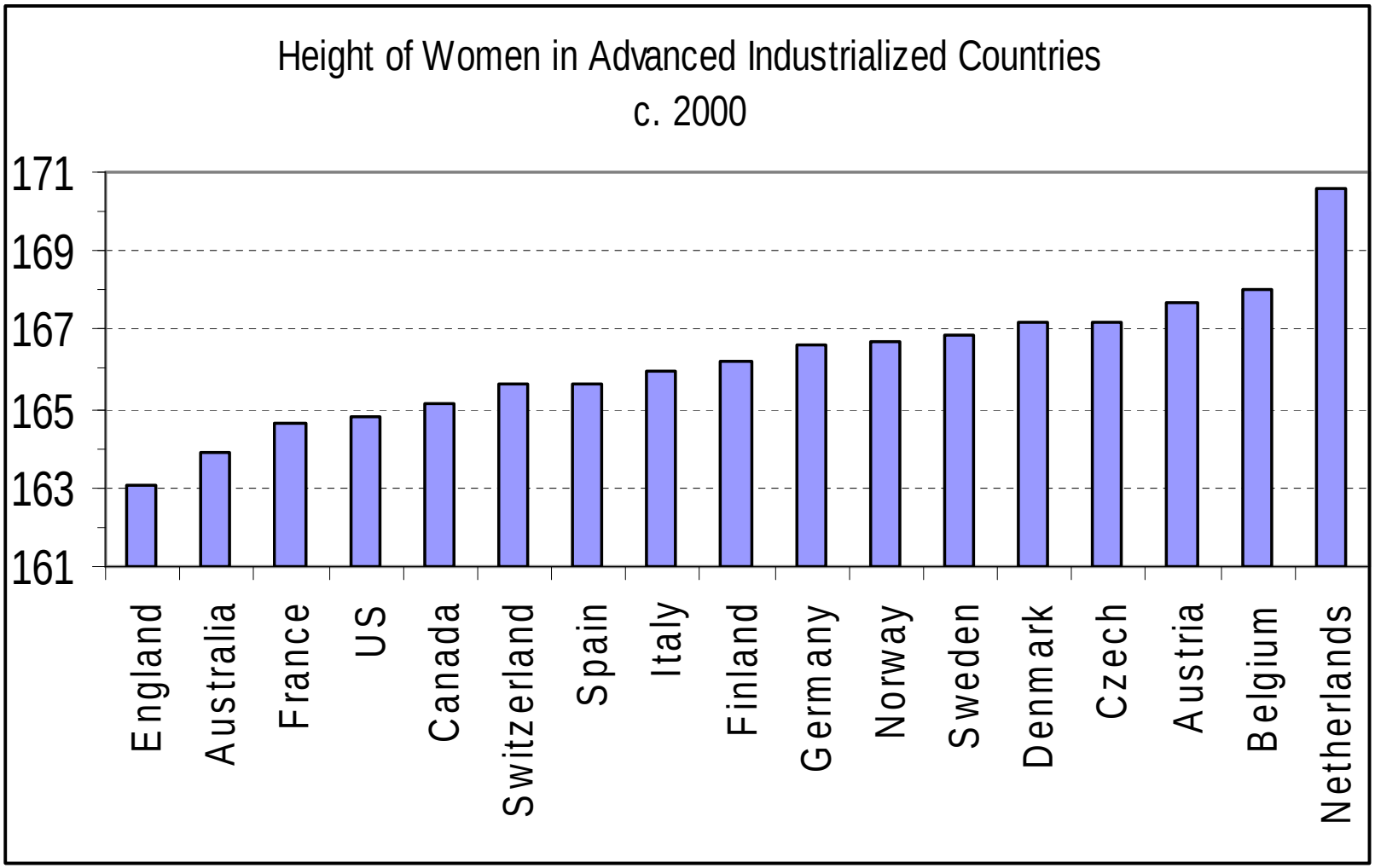

Height of Men (cm)
182
178
174
170
166
162
1750
1800
1850
1900
1950
2000
Year of Birth
US
Norway

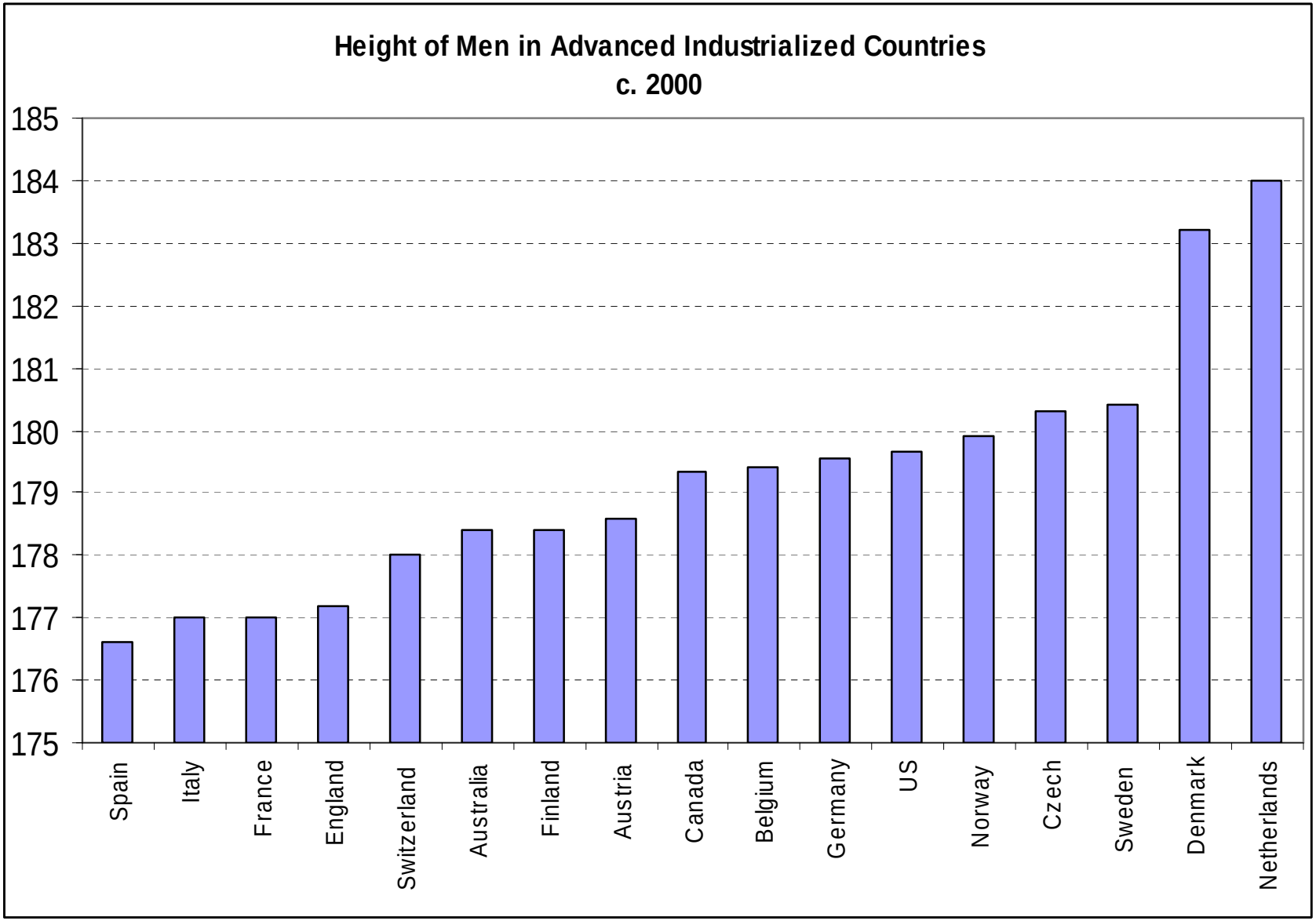
Height by birth cohort for U.S. born adults

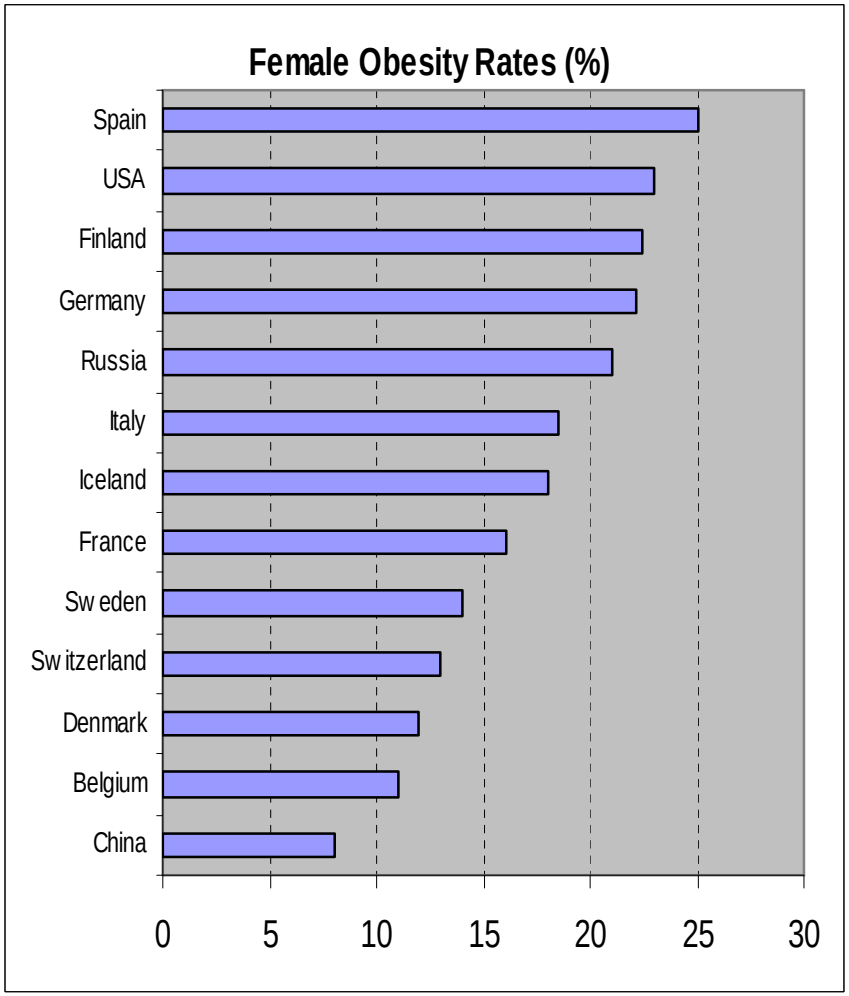


Americans were the tallest in the world for two centuries
They are now shorter than most Western- and Northern European populations




Height of Women in Advanced Industrialized Countries
c. 2000
171
169
167
165
163
161
England
Australia
France
US
Canada
Switzerland
Spain
Italy
Finland
Germany
Norway
Sweden
Denmark
Czech
Austria
Belgium
Netherlands


Height of Men in Advanced Industrialized Countries
c. 2000
185
184
183
182
181
180
179
178
177
176
175
Spain
Italy
France
England
Switzerland
Australia
Finland
Austria
Canada
Belgium
Germany
US
Norway
Czech
Sweden
Denmark
Netherlands


Female Obesity Rates (%)
Spain
USA
Finland
Germany
Russia
Italy
Iceland
France
Sweden
Switzerland
Denmark
Belgium
China
0
5
10
15
20
25
30

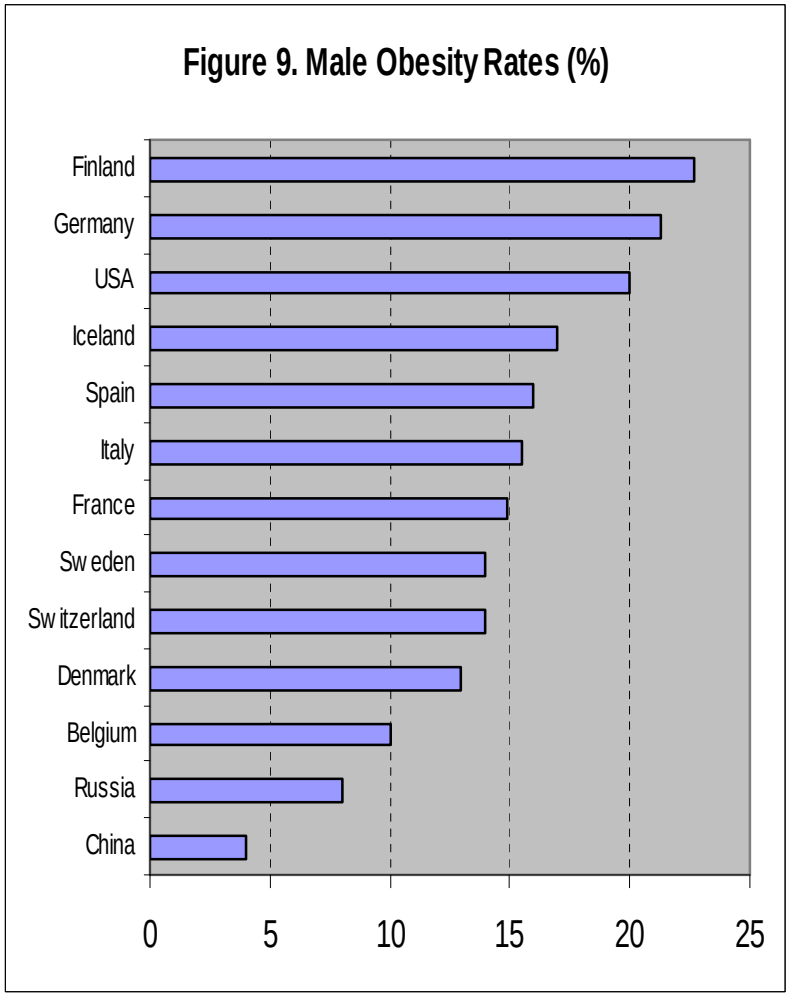
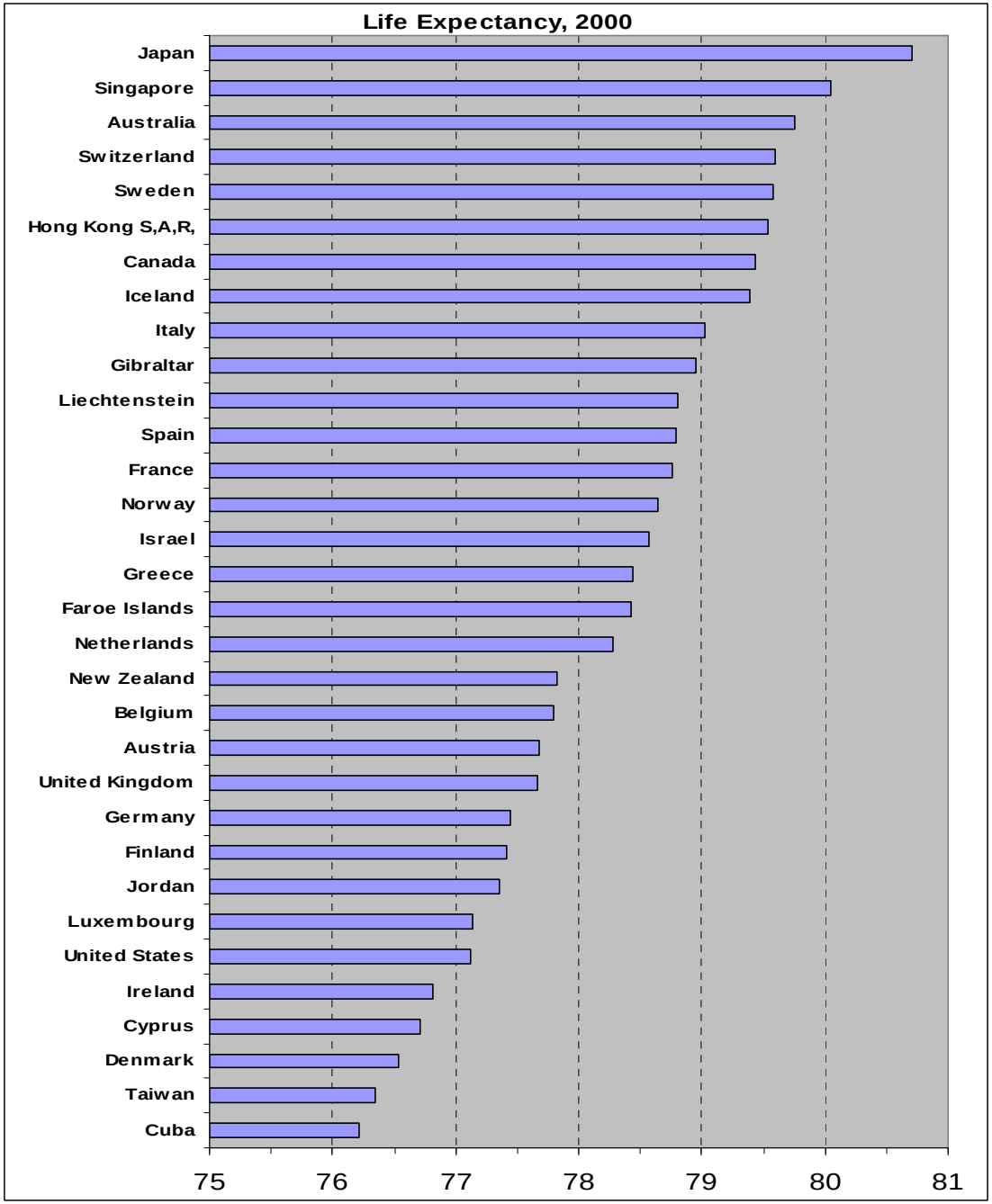
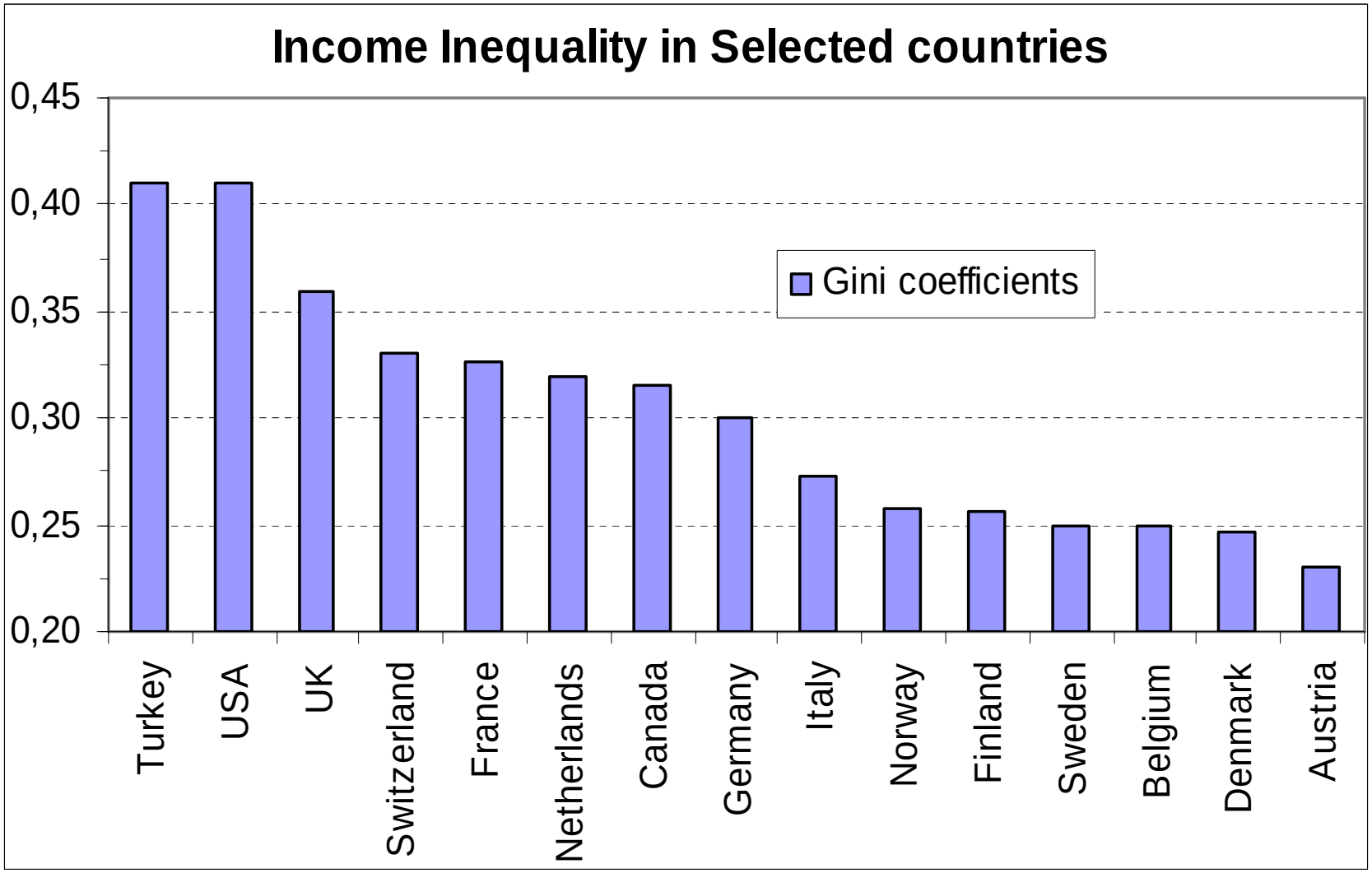


Figure 9. Male Obesity Rates (%)
Finland
Germany
USA
Iceland
Spain
Italy
France
Sweden
Switzerland
Denmark
Belgium
Russia
China
0
5
10
15
20
25


Life Expectancy, 2000
Japan
Singapore
Australia
Switzerland
Sweden
Hong Kong S,A,R,
Canada
Iceland
Italy
Gibraltar
Liechtenstein
Spain
France
Norway
Israel
Greece
Faroe Islands
Netherlands
New Zealand
Belgium
Austria
United Kingdom
Germany
Finland
Jordan
Luxembourg
United States
Ireland
Cyprus
Denmark
Taiwan
Cuba
75
76
77
78
79
80
81


Income Inequality in Selected countries
0,45
0,40
0,35
0,30
0,25
0,20
Gini coefficients
Turkey
USA
UK
Switzerland
France
Netherlands
Canada
Germany
Italy
Norway
Finland
Sweden
Belgium
Denmark
Austria