Notes for 129 Biological Change in small grains (10-01-12)

Goals for the session:

Biology is a technology. It has some common characteristics with other technology.

Agriculture is a composite production process whose aggregate productivity depends on a variety of technologies

But then again the ways in which genetic material is transmitted suggests that subtle differences in biology matter a great deal to the path of change.

What kinds of competition are we dealing with here

1) Induced innovation thesis in agriculture

Side bar: check our definitions endowments, factor endowments, factor prices, and factor proportions.

a. Habakuk
    i. England vs Europe
        1. England has high wages, cheap capital and coal
    ii. England vs US
        1. US has high wages and high capital costs but cheap energy.
b. Hayami-Ruttan
    i. Comparison of US (Wheat, Corn) and Japan (Rice)
    ii. Two sets of possibilities divergence
    iii. Differences in factor intensity
    iv. Differences in biology that makes mechanization of one crop easier than another.
c. Biology vs machines
    i. Biology affect yields per acre
    ii. Machines affects labor productivity
d. Key innovations from the Induced innovation
    i. Horse drawn implements Reaper, Mower, Seed drills

ii. Tractors.
iii. Scratch plow

2) The Problem of measuring productivity growth in agriculture (Parker-Klein Pb)
    a. No productivity growth (yields per acre are constant)
    b. Therefore no innovation
    c. So innovation on the biological side has to wait until the twentieth century

FIGURE 2A
WHEAT PRODUCTION, 1839

Note: Each dot represent 100,000 bushels.
Sources: Paullin, *Atlas,* plate 143P, used by permission.

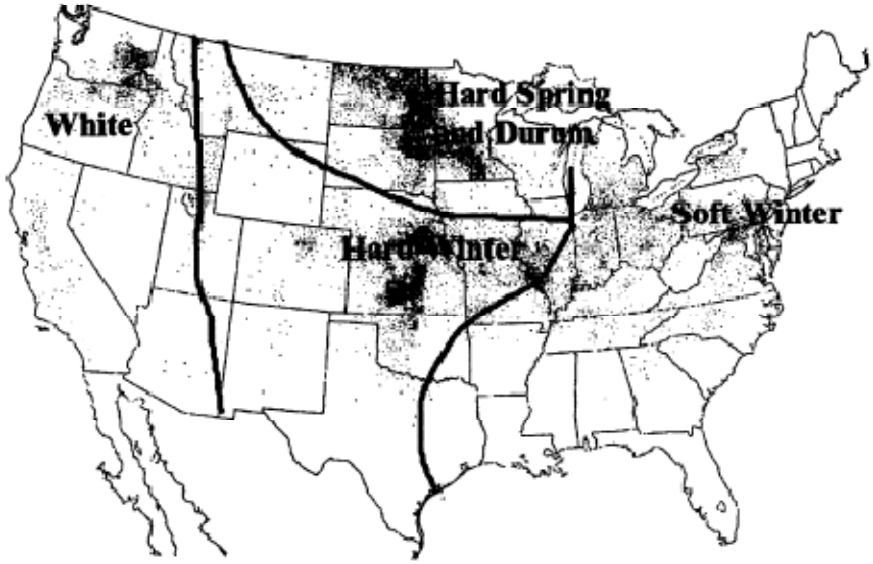


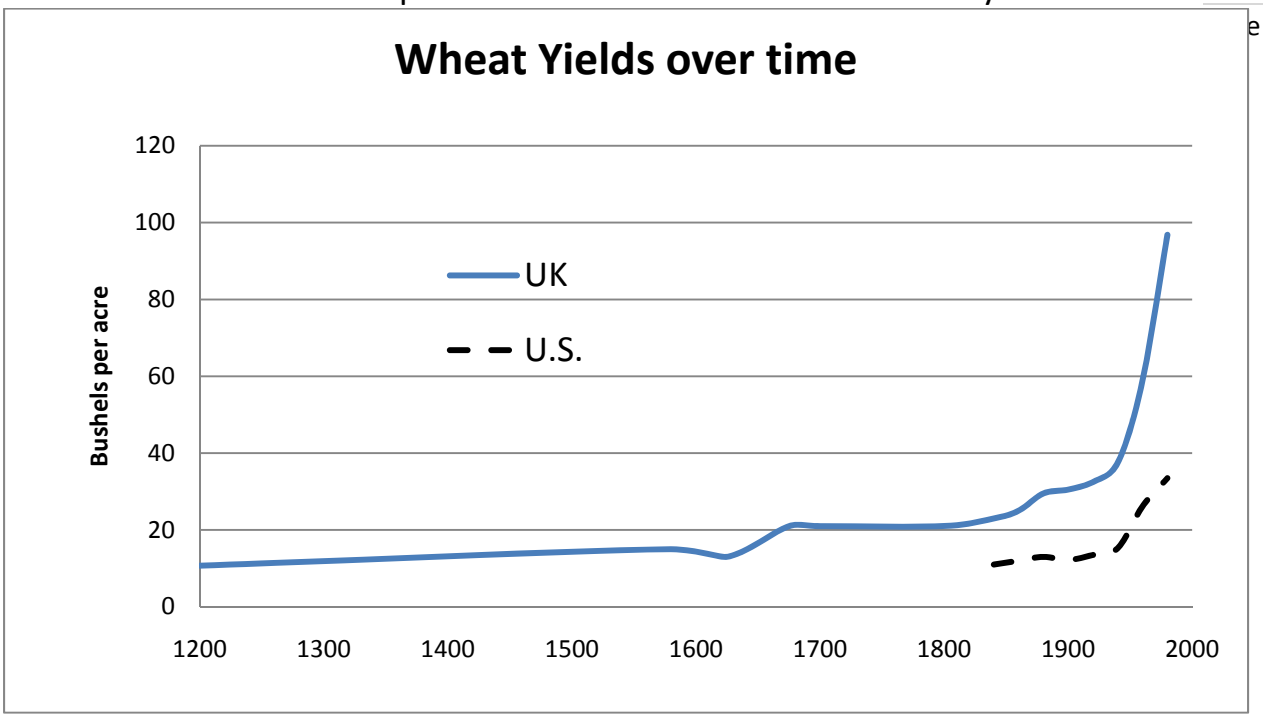
FIGURE 2B

3) Olmstead Rhode's evidence
    a. What is really going on in the data?
        i. Environmental change
        Why the march North and West?

Does it make economic sense to move in more hostile environments?

ii. Biological change

1. Not specific to the U.S. or to the 19th century.



b. Biological change and markets

i. Do larger markets promote biological change?

ii. How

iii. Is there a down side?

4) Contra habakuk version 2 Better Grains and better machines go togehter Reapers and mowers and better plows contribute to higher yields

Different grains are required for mechanized harvesting.

5) Is biology really different?

a. From mechanical invention

i. Knowledge

ii. Can technologies be lost

b. From information intensive processes

i. Software
ii. Viruses

c. Is this more important than induced innovation

6) Bottom line

Change leads to rapid growth in output and once the frontier is closed to decline in importance in economic activity. (actually that was inevitable even if the frontier had not closed). It has to do with the demand side for agricultural output.

The size of the US farm sector after 1900
Note in 1880 Farm population 43% of us population
By 1980 Farm population 2% of us population
Share of output similar.