Econ 113: February 17, 2015

- Overview of Northern & Southern Agriculture
- Increasing Productivity, North and South
  - Agricultural Implements
  - Biological Innovation in Cotton Seed
- Slavery
  - Comparison with Logan Family Sharecroppers

Response Paper #1 due tonight (11:59 pm) via bCourses

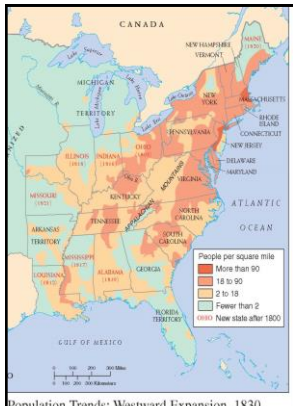
An Agricultural Nation

Table 2.
Labor Force: Agricultural and Non-Agricultural

	Slave	Free Agric	Free Nonag	Total
1800	28 %	53 %	19 %	1.9 m
1830	28 %	50 %	22 %	4.2 m
1860	21 %	37 %	42 %	11.1 m

Source: *Historical Statistics*, Series D167-170.

- Over 50 % of market labor force is in agriculture until early 1880s



Population Trends: Westward Expansion, 1830

U.S. Population and Settlement, 1850

Northern Settlement

Table 3. Northern State Settlement

	Year population >100,000	Year became a state
Ohio	1810	1803
Indiana	1820	1816
Illinois	1830	1818
Missouri	1830	1821
Michigan	1840	1837
Iowa	1850	1846
Wisconsin	1850	1848
Minnesota	1860	1858

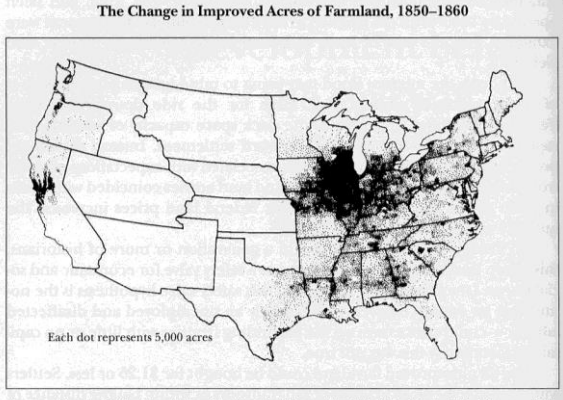
Source: *Historical Statistics*, Series A195-A209.

Northern (midwestern) farms

- Family farms; little hired labor
- Activity: grains, corn, animal husbandry
- Size in 1860
  - Median: 49 acres
  - Mean: 64 acres

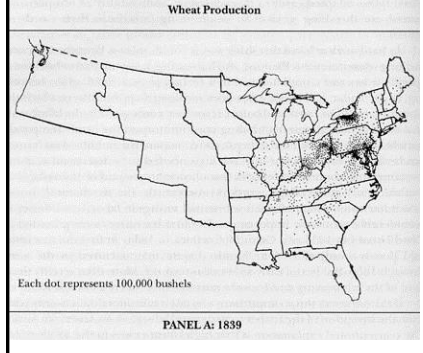
To see maps online, and animated:

- Cotton production, 1839, 1859, 1889, 1919
  - http://dsl.richmond.edu/historicalatlas/142/b/
- Tobacco production, same years
  - http://dsl.richmond.edu/historicalatlas/143/e/
- Wheat production, same years
  - http://dsl.richmond.edu/historicalatlas/143/p/
- Improved Land, 1850 to 1900
  - http://dsl.richmond.edu/historicalatlas/144/c/
- Farm Lands & Buildings, 1850 to 1930
  - http://dsl.richmond.edu/historicalatlas/147/a/

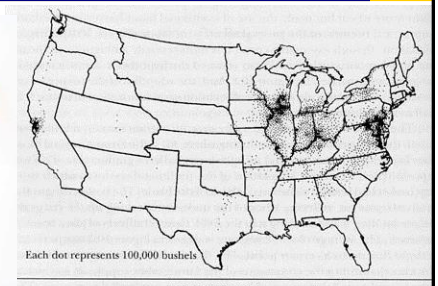


Source: Charles O. Paullin, *Atlas of the Historical Geography of the United States* (Washington, D.C.: Carnegie Institution, 1932): Plate 145D.

Location of Wheat Production. . .



…shifts to Midwest & California



PANEL B: 1859

Source: Charles O. Paullin, *Atlas of the Historical Geography of the United States* (Washington, D.C. Carnegie Institution, 1932): Plates 143P and 143Q.

Gini Coefficient

- Measures how evenly something is distributed
  - Equal distribution: Gini = 0
  - Completely unequal distribution (one person owns everything): Gini = 1

Small Northern Farms

Table 4. Improved Acreage Northwest States, 1860

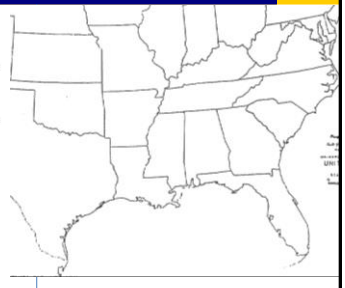
	Mean	Median	Gini
Illinois	92	73	0.46
Ohio	72	65	0.34
Indiana	65	51	0.43
Iowa	63	47	0.43
Wisconsin	54	42	0.40
Minnesota	31	26	0.26
Overall	64	49	0.42

Source: Gavin Wright, *Political Economy of the Cotton South*, Table 2.2

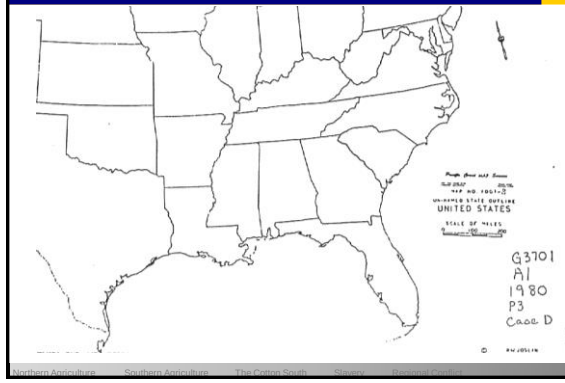
Southern Settlement

Table 21. Southern State Settlement
(* are part of "New South"
Old = one of original 13 colonies
New = statehood after 1790)

	Census Year population >100,000	Year became a state
Kentucky	1800	1792
Tennessee*	1800	1796
Louisiana*	1820	1812
Mississippi*	1830	1817
Alabama*	1820	1819
Arkansas*	1850	1836
Florida*	1860	1845
Texas*	before 1845	1845
West Virginia	1810	1863

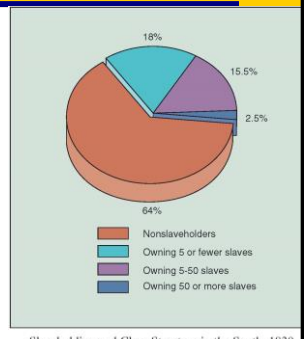


Soil/Climate Regions in the South
https://goo.gl/maps/z2yWE

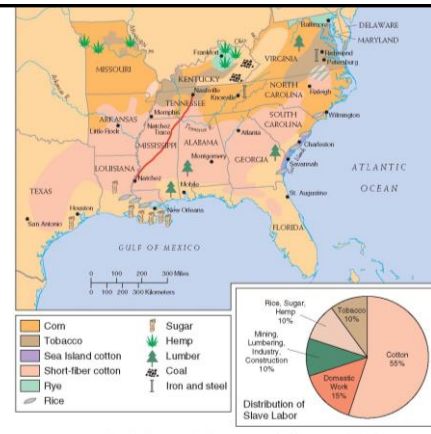


Southern farms

- Some family farms; some large slave plantations
- Activity: cotton, tobacco, corn
- Size, 1860
  - Median: 71 acres
  - Mean: 136 acres



Slaveholding and Class Structure in the South, 1830



Agriculture, Industry, and Slavery, 1850

Southern Farm Size

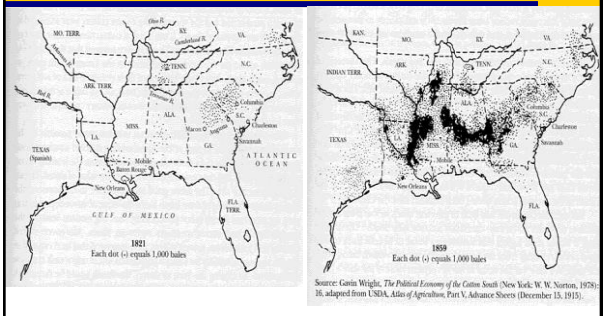
Table 5. Improved Acreage Southern Farms, 1860

	Mean	Median	Gini
Piedmont	158	75	0.58
Alluvial	210	70	0.67
W. Upland	82	50	0.54
Cotton South	136	71	0.60

Source: Wright, Table 2.2

Lots and Lots of Cotton

Cotton Production, 1821 & 1859



Source: Gavin Wright, *The Political Economy of the Cotton South* (New York: W. W. Norton, 1978): 16, adapted from USDA, *Atlas of Agriculture*, Part V, Advance Sheets (December 15, 1915).

Cotton Farming Spread West over Time

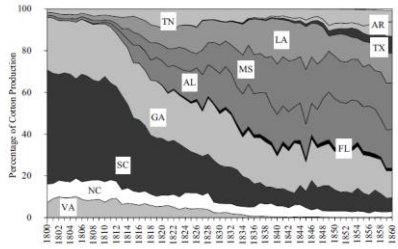
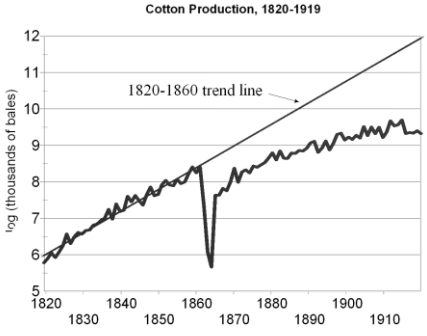


FIGURE 6
REGIONAL DISTRIBUTION OF U.S. COTTON PRODUCTION, 1800–1860

Source: Watkins, *King Cotton*, passim.

Source: Olmstead & Rhode (2008), pg 1156

Fast Growth Before Civil War



Source: Raw data from *Historical Statistics*, Table K554.

Production & Choice of Inputs

- Remember our production function
- Concept: Cost-minimizing input mix when
- And remember law of diminishing marginal returns

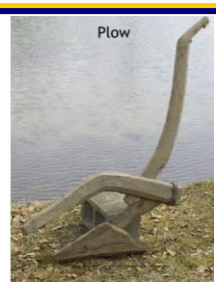
Scarce Labor on Northern Farms

Table 18. Agricultural Productivity

	Hours per 100 bushel (or bale)	Bushels (or Bales) per acre	Hours per Acre before harvest	Hours per Acre at harvest
		WHEAT		
1800	373	15	16	40
1840	233	15	12	23
1880	152	13	8	12
		CORN		
1800	344	25	56	30
1840	276	25	44	25
1880	180	26	28	18

Machinery (Agricultural Implements)

- Plow
  - 1825 metal
  - 1850 steel



- http://www.wmich.edu/isrer/slavedetails/slides/Plow.html and http://search.eb.com/eb/art-15536

Machinery (Agricultural Implements)

- Plow
  - 1825 metal
  - 1850 steel
- Reaper
  - Developed 1833/34
  - Adopted 1850s

Reapers: Hand & Mechanized

- http://www.lib.niu.edu/ipo/1992/ihy921213.html
- Images Copyrighted by Historylink101.com & found at Story of Farming

Thresher

- Plow
  - 1825 metal
  - 1850 steel
- Reaper
  - Developed 1833/34
  - Adopted 1850s
- Thresher
  - Patented 1837
  - Adopted 1850s

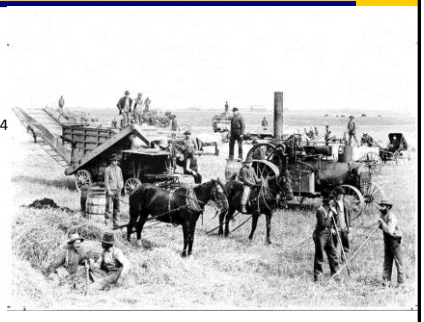


Photo Source: Fred Hultstrand History in Pictures Collection, NDIRS-NDSU, Fargo. http://memory.loc.gov/ammem/award97/ndfahtml/ngphome.html

Result: Increased Labor *Productivity*

Table 18. Agricultural Productivity

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	WHEAT			
1800	373	15	16	40
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1880	152	13	8	12
	CORN			
1800	344	25	56	30
1840	276	25	44	25
1880	180	26	28	18

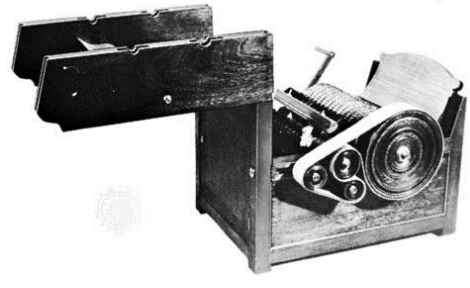
- Using production function:

Cotton

- Cotton boll

Cotton Gin (1793)

- Separates seeds from fiber



Input Choice: L not K

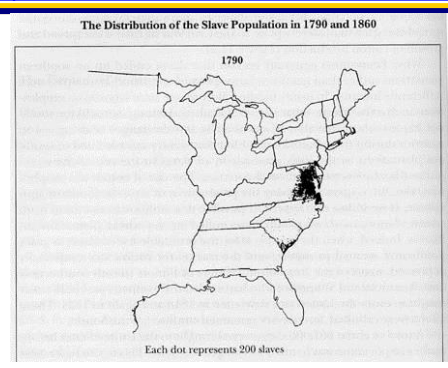
- Little use of machinery in the South
  - Picking (harvesting) season lasts weeks, not days
  - Price of one more hour of Labor very low

Table 8. Agricultural Productivity: Cotton

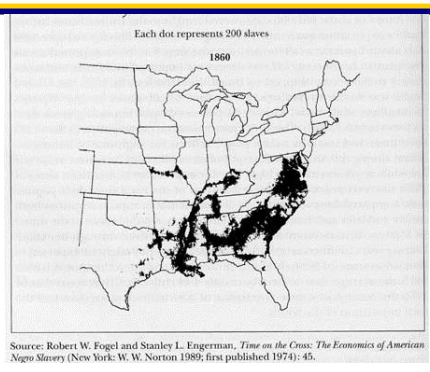
	Pounds per acre	Hours per bale
1800	147	601
1840	147	438
1880	188	303
2000	632	

Source: *Historical Statistics*, Series K445-K459. *2002 Statistical Abstract*, Table 813 (cotton).

Slave Population, 1790 -- animated at http://dsl.richmond.edu/historicalatlas/67/b/

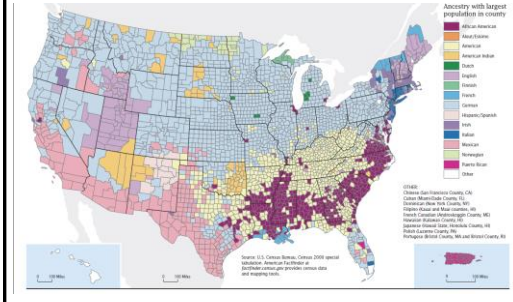


Slave Population, 1860



Source: Robert W. Fogel and Stanley L. Engerman, *Time on the Cross: The Economics of American Negro Slavery* (New York: W. W. Norton 1989; first published 1974): 45.

Compare with Population in 2000



Extent of slave holding, 1860

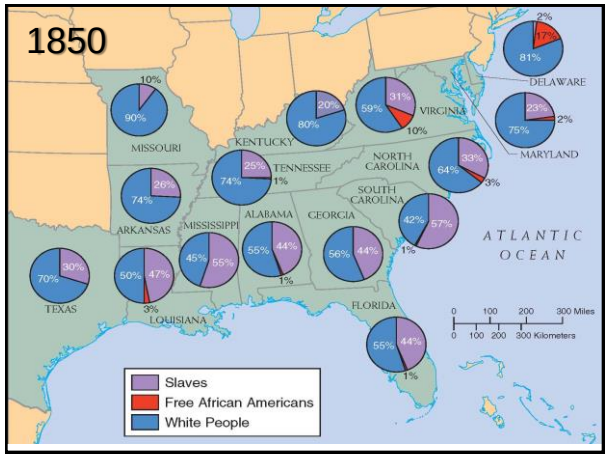
Table 6. Slave holding, 1860

	0 slaves	1-15 slaves	16-50 slaves	51+ slaves
Western Upland	61 %	13 %	18 %	8 %
Alluvial	36 %	4 %	17 %	43 %
Piedmont	43 %	15 %	28 %	13 %
Cotton South	48 %	12 %	23 %	18 %

Source: Gavin Wright, *Political Economy of the Cotton South*, p. 31.

Slavery

- Constitution prohibits *importation* effective 1808
- Slavery prohibited in Northwest Territory (until 1857)
- Southern states allowed slavery
- Not all people of African descent were enslaved



Economics & the Slavery Debate

- Positive vs. Normative
- "Old" (pre-1960) view
  - Slavery irrational, based on prejudice, "backward," inefficient, unprofitable
- "New" (post-1974) view
  - Slavery profitable, efficient, economically "rational"
- But not moral, just, or ethical

- Profit-maximization is *not* a value.
  Behavior can be profit-maximizing and unethical.

Profitability

- Old belief
  - slavery unprofitable
- Conrad & Meyer (1958)
  - Argued purchase of a slave was profitable choice
  - Used standard Price of Capital equation

Time on the Cross

- Bob Fogel & Stan Engerman (1974)
- Addressed prevailing myths and stereotypes of late 1960s
- Widely criticized on methodological grounds
- But changed prevailing views of economics of slavery

Efficiency

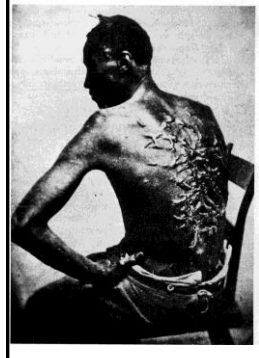
- Stereotype
  - slaves lazy
- Fogel & Engerman:
  - slave labor more efficient than free (white) labor
    - But not on small farms (1-15 slaves)

Table 7. Efficiency on Southern Farms (Free Southern farms = 100)

# of slaves	output per unit of total input
0	100
1-15	101
16-50	133
51 +	148

Source: Walton & Rockoff, Table 13-4.

But why was efficiency higher?

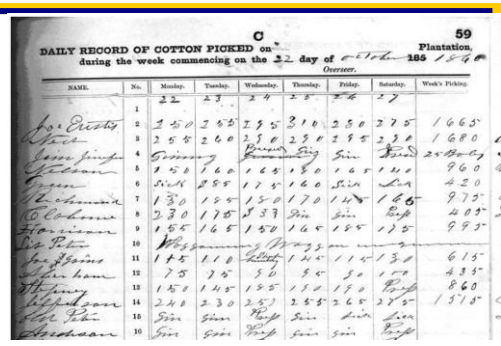


- Gang system?
  - No evidence to support
    - Daily picking rates not higher with more pickers
- Economies of scale?
  - Management system
  - Again, no evidence
- The lash?
  - Slaveowners' records note slaves would be whipped for insufficient picking
  - Public whippings have external effects

Westward Movement & Cotton Seed

- Olmstead & Rhode
  - Development & spread of higher productivity cotton seed
  - Records from 142 plantations (records)
- Sea Island Cotton
  - Long seed, grows along coasts of GA, SC, FL but wouldn't grow inland
- Upland cotton varieties (also called "Mexican cotton")
  - Short seed, grown inland
  - Farmers bred seeds, creating hybrids (ad)
    - Developed seeds that were easy to pick, had long & strong fibers, were resistant to bugs, and had high ratio of cotton lint (fibers) to seeds
- Next

Recordkeeping on Cotton Plantations



DAILY RECORD OF COTTON PICKED on C during the week commencing on the 22 day of October 185 59 Plantation, Overseer.

NAME.	No.	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.	Week's Picking.
	1	22	23	24	25	26	27	
Joe Eustis	2	250	255	235	210	250	275	1665
Stute	3	255	260	230	230	295	230	1680
Lina Jinga	4	Growing		Picking	Sick	Sick	Sick	2 Bales
Gibson	5	150	160	165	180	165	140	960
Jane	6	Sick	285	175	160	Sick	Sick	420
Richmond	7	130	155	150	170	145	165	975
C. Coburn	8	230	175	183	Sick	Sick	Sick	408
Harrison	9	155	165	150	165	155	175	995
Da Peter	10	Picking	Growing	Picking				
Joe Jones	11	145	110	Sick	145	115	130	615
Sue Ann	12	75	75	50	85	50	100	435
Henry	13	150	145	155	150	150	Sick	860
Lilpedson	14	240	230	253	255	265	230	1573
Ike Tate	15	Sick	Sick	Sick	Sick	Sick	Sick	
Freeman	16	Sick	Sick	Sick	Sick	Sick	Sick	

back

HIGHLY IMPROVED COTTON!
Boyd's Extra Prolific!

CERTIFICATES!

AGENTS.

D. DICKSON.

MESSENGER PRINT, COVINGTON, GA.

back

FIGURE 2
DAVID DICKSON'S 1854 SEED ADVERTISEMENT

Olmstead & Rhode results

- Rapid growth in cotton picking
  - Especially in New South
    - Alabama, Arkansas, Florida, Louisiana, Mississippi, Tennessee, or Texas
- Westward movement & seed development account for high slave labor productivity

Table 9. Cotton Picking Rates, 1801-1862
Dependent variable: ln(mean picking)

	Upland Cotton	Old South	New South
constant	4.387 (0.032)	3.961 (0.061)	4.478 (0.030)
Year - 1830	0.0245 (0.0016)	0.0156 (0.0013)	0.0283 (0.0026)
(Year-1830)^2	-0.000416 (0.00008)	-0.000025 (0.00010)	-0.00054 (0.00010)
Implied annual rate of growth			
1810	4.1 %	1.7 %	5.0 %
1830	2.5 %	1.6 %	2.8 %
1850	0.8 %	1.5 %	0.7%
R^2	0.25	0.37	0.30
N	474	103	371

Controlling for plantation

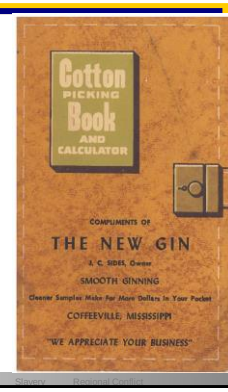
- Fixed effects by plantation captures differences in climate, soil quality, management practices

Table 22. Cotton Picking Rates, 1801-1862
with fixed effects by plantation
Dependent variable: ln(mean picking)

	Upland Cotton	Old South	New South
constant	4.359 (0.047)	3.879 (0.098)	4.478 (0.636)
Year - 1830	0.0174 (0.0038)	0.0197 (0.0044)	0.0167 (0.0075)
(Year-1830)^2	-0.000074 (0.00010)	0.000005 (0.00012)	-0.000083 (0.00020)
Fixed Effects by Plantation?	Yes	Yes	Yes
Implied annual rate of growth			
1810	2.0 %	1.9 %	2.0 %
1830	1.7 %	2.0 %	1.7 %
1850	1.4 %	2.0 %	1.3%
R^2	0.85	0.79	0.82
N	428	88	340

100 years later: Logan Family

- Trevon Logan's article (reader #2)
- Logan family, sharecroppers, Mississippi, 1950s & 1960s
- How do cotton picking rates compare?



Logan, Table 1

Table 1: The Productivity of Logan Children, 1952-1965, and Slave Children, 1850-1860. Measured by Pounds of Cotton Picked Per Day.

	Logans			Slaves		
Age	All	Females	Males	All	Females	Males
5	16.98	14.78	19.20	18.74	17.15	20.42
6	21.02	18.23	24.86	23.93	22.08	25.97
7	27.75	26.04	30.19	29.98	27.87	32.45
8	35.85	33.75	36.82	36.90	34.51	39.83
9	43.46	42.16	45.25	44.64	41.95	48.09
10	51.88	50.16	52.86	53.13	50.11	57.12
11	60.46	59.94	60.95	62.24	58.86	66.80
12	68.16	67.86	69.25	71.81	68.04	76.97
13	80.54	79.21	82.47	81.66	77.46	87.42
14	89.78	88.35	92.15	91.60	86.93	97.95
15	99.48	98.15	101.49	101.41	96.23	108.32
16	108.86	107.45	108.27	110.87	105.16	118.32
17	118.82	118.12	119.16	119.81	113.53	127.73
18	124.62	122.49	125.95	128.04	121.19	136.36

Logan Teen Girls Picked More Than Slaves

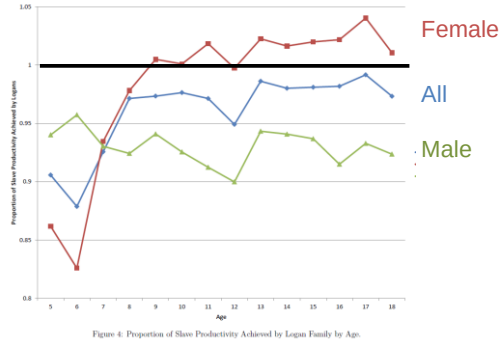


Figure 4: Proportion of Slave Productivity Achieved by Logan Family by Age.

Studying Slavery: The Important Lesson

Profit-maximization
and ethical behavior
are not necessarily consistent!