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THE CLIOMETRICS DEBATE

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**ABSTRACT**

This working paper explores the significant contributions to the history of African-American slavery made by the application of the tools of cliometrics. As used here “cliometrics” is defined as a method of scientific analysis marked by the explicit use of economic theory and quantitative methods. American slavery of the late antebellum period [1840-1860] was one of the earliest topics that cliometricians focused on and, arguably, the topic upon which they made the largest impact.

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## African American Slavery and the Cliometric Revolution

No historical topic has been more central to the rise, influence, and refinement of the cliometric approach than African American slavery. The first self-conscious cliometric contribution to American history was a 1957 conference paper, “The Economics of Slavery in the Antebellum South” by Alfred Conrad and John Meyer, which subsequently became an article in the *Journal of Political Economy* [1958]. Many of the academic economists associated with the pioneering decades of the cliometric revolution, including myself, examined slavery equipped with the tools of economic theory and quantitative methodology: Douglass North [1961], Richard Sutch [1965], Peter Temin [1967], William Parker [1970b], Robert Gallman [1970], Gavin Wright [1970], and Robert Fogel and Stanley Engerman [1971b]. We were not alone. *The Bibliography of Historical Economics to 1980* lists no fewer than 96 individual contributors to the examination of the history of slavery [McCloskey and Hersh 1990].

In the midst of this flood of publications an ambitious and contentious book on the topic, provocatively titled *Time on the Cross*, touched off a scholarly whirlwind about the potential, the limitations, and the misuse of the cliometric method [Fogel and Engerman 1974]. The controversy turned into an academic battle on two fronts, the historians against the cliometricians [Herbert Gutman 1975, Kenneth Stampp 1976] and a civil war among the cliometricians [David et al. 1976]. Although the clamor has since died down and the pace of new findings has slowed, the topic continues to fascinate. Cliometric studies periodically feed the appetite for quantitative evidence on the American horror story [recent examples include Wanamaker 2014, Bodenhorn 2015, Olmstead and Rhode 2015, Calomiris and Pritchett 2016, and Pritchett and Hayes 2016].

What explains the original excitement and the sustained attention? First, and I think most important, the Cliometric Revolution really was a revolution. It was so viewed at the time [North 1963: 128]. It appears so in the statistics of the scholarship [Whaples 1991]. Consequentially, the revolution redefined the scope, method, and goals of economic history as a discipline.

Economics departments staffed by professors with degrees in economics commandeered the field

of economic history, which was subsequently abandoned by history departments and professors with degrees in history. Like with all revolutions, the young were in the front lines. Assistant professors and graduate students published papers overturning the interpretations of distinguished full professors and scholars who had been held in high repute for several generations. That was empowering and tended to make true believers of those who joined the revolution. As true believers, they persisted for the long haul.

The first efforts that engaged cliometric methods addressed easy questions and there were many. One of the most enthusiastic advocates of econometric history, Robert Fogel, claimed that any random page from a history book contained “either an explicit or implicit quantitative statement that needed to be measured” [Fogel 1990: 28 (350)]. The economic theory and statistical expertise required was often elementary. The only difficult work was gathering data from the archives. While tedious this required no special talents, but the resulting studies achieved great success. They revised the old consensus interpretation of slavery and swept aside the sentimental (and racist) descriptions of the Old South and its “peculiar institution” seemingly without protest. As Peter Temin has noted, that impact made the topic and even the tedious data collection “an enormous amount of fun” [Temin 1999: 45 (433)].

The topic of slavery held special relevance at the time because the Conrad and Meyer 1957 conference paper appeared during the Civil Rights Era. That year federal troops were sent to enforce school integration in Little Rock. Martin Luther King gave his “I have a Dream” speech at the 1963 March on Washington. The Civil Rights Act of 1964 prohibited discrimination based on race, color, religion, or national origin. In 1965 President Lyndon Johnson gave his “We Shall Overcome” speech to Congress and the Voting Rights Act was passed. In that context, a “new” view of slavery seemed to be required to accompany the movement for racial equality. Many of the first cliometricans were personally committed to the civil rights movement. For example, Gavin Wright’s direct involvement led him to pursue graduate study in economics and to specialize in economic history and the study of slavery [Wright 2013].

Race remains a hot-button topic and any hard look at the history of slavery is controversial; discussions about black slavery are often fraught with emotion. Articles and books on the subject, however dispassionate on their surface and from whatever quarter, still attract close attention and agitated debate [for a recent example see Murray et al. 2015]. My task, however, is not to offer a behind-the-scenes, I-was-there memoir, but to put emphasis on the concrete contribution of cliometrics, quantification, and social science to our knowledge of the history of slavery.

### **Conrad and Meyer**

The pioneering contribution of Conrad and Meyer addressed a simple, straightforward question. Was slavery profitable? Their positive answer directly confronted a view on the economics of slavery then current. Despite the important work of historians such as Lewis Gray [1933] and Kenneth Stampp [1956], it was still widely taken for granted that American slavery had become economically moribund by late antebellum period, the decades of the 1840s and 1850s. The interpretation then prominent in the social sciences had been promulgated by Ulrich Bonnell Phillips in “The Economic Cost of Slaveholding in the Cotton Belt,” a journal article published in 1905 in *Political Science Quarterly*. Phillips was born in Georgia in 1877. Although he was a life-long Southerner, he taught history at the University of Wisconsin from 1902 to 1908. Later he joined the faculty at the University of Michigan and then at Yale University. Phillips was a racist, an apologist for slavery, and (in his time) a distinguished professional historian. Following publication, he emerged as the leader of a now-discredited academic campaign designed to excuse slavery as a positive good, portray the enslaved as largely contented, and celebrate the Confederate cause as noble. Phillips’ belief in the Lost Cause was so strong it led him to change his given name from Ulysses to Ulrich.

Phillips’ principal thesis was that slavery had become an economic burden to the last generation of antebellum planters. Based on his prejudice rather than evidence, Phillips believed that black people were inherently “unintelligent” and were incompetent laborers except under strict guidance and close supervision. Owning slaves, he suggested, had become a losing

business when the price of slaves, driven by speculation, rose rapidly after 1845.<sup>1</sup> The failing system was nevertheless maintained and defended as a means to preserve racial peace. There was a cultural motivation behind the reluctance to end slavery as well. Slavery, in Phillips' eyes, was a civilizing institution made necessary to keep black peoples' "savage instincts from breaking forth" [Phillips 1905: 274-275, 259]. These ideas may seem absurd – shocking – today, but even as late as the mid-1950s, mainstream historians continued to portray black people as simple and carefree and slavery as a benign institution needed to civilize them and maintain social control.

Conrad and Meyer did not attempt to address the questions of the aptitude of black workers or the civilizing influence of the plantation. Instead, they focused on calculating the profitability of slavery. The only quantitative evidence presented by Phillips was the time series of slave prices plotted with a black line in **Figure 1**.<sup>2</sup> Conrad and Meyer, adopting a standard econometric technique, demonstrated that the rising price of slaves was insufficient evidence to conclude that cotton growing was unprofitable. They specified two production functions specifying cotton output as a function of the plantation's inputs of capital, land, and out-of-pocket spending for food, clothing, medical care, taxes, overseers' wages, and cotton marketing expenses. One production function defined the output of cotton produced by male prime field hands. The second function defined the joint outputs of cotton and slave children produced by enslaved women. To put quantitative meat on these bones, Conrad and Meyer assembled data on slave prices (using Phillips' own data), the prices of cotton and land, and the out-of-pocket costs. Combined with estimates of yields per hand, "saleable children" per woman, and longevity (expectation of life at birth) they simulated the annual flow of revenue from an investment in slaves separately for males and females [Conrad and Meyer 1958: tables 9, 10, and 11]. They

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<sup>1</sup> Phillips elaborated on his 1905 argument in Chapter 19 of *American Negro Slavery* [1918].

<sup>2</sup> Phillips published a chart of prices [1918: 371] that he later revised [1929: 177]. Figure 1 is based on visual inspection of the revised chart by Conrad and Meyer [1958: table 17, p. 117]. Time series on typical slave prices have since been further refined. Two alternatives to Phillips's series are also plotted in Figure 1. For these data and a discussion of the sources and methods used to assemble them see Ransom and Sutch [1988: appendix] and Engerman, Sutch, and Wright [2006: table Bb209-214].

calculated the rate of return from these hypothetical purchases and compared those numbers to the yields on various alternative capital investments in the American economy.<sup>3</sup>

An important feature of Conrad and Meyer's approach recognized that each of the variables and parameters needed for their calculation varied over some range, but remained interrelated. Land that generated higher yields of cotton per acre would rent for more than poor land. Cotton prices varied from year to year depending on the yields. Conrad and Meyer made calculations for 12 plausible cases involving different combinations of capital outlays, yields per hand, slave prices, and farm prices for cotton. Their estimates for the rate of return on an investment in males spanned a range: from 4.5 to 6.5 percent for the typical case, as high as 8 percent for somewhat better land, and over 10 percent for the very best land on Mississippi alluvium. For women their estimates ranged from 7 to 8 percent. Since alternative capital investments ranged from 6 to 8 percent or below, they concluded that slavery was profitable – as profitable as plausible alternative undertakings.<sup>4</sup>

Conrad and Meyer demonstrated that more evidence than the rising price of slaves had to be considered to establish, as Phillips thought he had, that owning slaves was an unprofitable undertaking. An important point that Phillips had missed was that the price of a slave woman was justified only in part by the yields of cotton she could help produce but also by the value of the children born to her. This is true whether the children were sold when they reached young adulthood or were kept on the owner's plantation. In the latter case the market value of the

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<sup>3</sup> Of course, these calculations did not measure the actual profitability of a would-be planter who purchased slaves in the mid-1840s or after. With the Civil War and the abolition of slavery slaveowners lost the stream of income from owning slaves.

<sup>4</sup> Conrad and Meyer were not the first to recognize the profitability of slavery. Historians such as Lewis Gray [1933], Thomas Govan [1942], and Kenneth Stamp [1956] had reached the same conclusion. Their work on this and other features of the slave economy had undermined the Phillips thesis to such an extent that it toppled with the final blow delivered by Conrad and Meyer.

owner's holdings – his “portfolio” of enslaved black people – would rise as the enslaved population grew.

Conrad and Meyer concluded that slavery was profitable throughout the South, “the continuing demand for labor in the Cotton Belt ensuring returns to the breeding operation on the less productive land in the seaboard and border states” [Conrad and Meyer 1958: 121]. Phillips had ignored the increase of the enslaved population because he was blinded by his insistence that slaves were not bred for sale [Phillips 1918].

### **Following Conrad and Meyer**

The work on the profitability of slavery begun with Conrad and Meyer soon inspired critics and imitators interested in testing the reliability of their findings, thus underscoring cliometricians' self-image as a true science. New data on the underlying variables and parameters were assembled and alternative specifications for the profit simulations were proposed. This effort at reproducibility supported the conclusion that slavery was profitable. If anything Conrad and Meyer probably underestimated the rate of return from an investment in male slaves. **Table 1** presents some of the alternatives reported in the literature. From today's vantage point the best guess for the mid-range of profits is between 6 and 8 percent as an average for the South as a whole.<sup>5</sup>

An oft repeated claim of the Lost Cause historians was that the Civil War was not about slavery, but about states' rights, or the tariff, or something else. A key argument supporting this claim was the proposition, best articulated by Charles Ramsdell, that slavery was unsustainable

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<sup>5</sup> The most prominent cliometric contribution to argue otherwise was offered by Edward Saraydar who recalculated the Conrad and Meyer estimate for prime field hands and arrived at a rate of return between zero and 1.5 percent [Saraydar 1964: table 1]. For a number of reasons discussed by Sutch [1965], Conrad [in Conrad et al. 1967], and Fogel and Engerman [1971b] his results have been rejected [but see Saraydar 1965].



and would have died out on its own in “a little while – perhaps a generation, probably less” [Ramsdell 1929: 171]. The Civil War, lamented Ramsdell, was tragically unnecessary.<sup>6</sup>

What seems surprising in retrospect is that so much effort had been invested in establishing the profitability of slavery when all contributors to the cliometric research on the topic agreed from the beginning that profitability *per se* was irrelevant to the long-run viability of slavery. Viability was the key issue raised by Phillips and Ramsdell. Economic theory suggests capital values (slave prices) would adjust to expected returns. Thus profitability was “more or less guaranteed,” as Conrad and Meyer noted, “if the proper market mechanisms existed” [Conrad and Meyer 1958: 110]. If Conrad and Meyer’s calculations were wrong and cotton production employing enslaved men and women had become unprofitable, it would not mean that slavery was doomed. If no alternative uses for the labor of enslaved workers could be found, the price of slaves, the price of land, or both would have fallen until owning slaves and growing cotton once again became profitable. Slavery would always be able to compete with free labor through adjustments in the price of slaves [Evans 1962; Sutch 1965; Foust and Swan 1970; Yasuba 1961; Fogel and Engerman 1971b].

Despite the asserted irrelevancy of the profitability research, the initial foray by cliometricians into the economic history of slavery precipitated the collapse of the entire Phillips edifice. It was, of course, ripe for replacement based as it was on the presumed racial inferiority of black people and a whitewashed romanticized portrayal of plantation life.<sup>7</sup> Meanwhile, scholarly attention shifted to several related issues relevant to the economics of slavery: self-sufficiency, slave breeding, and the economic development of the antebellum South.

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<sup>6</sup> For a discussion of the causes of the Civil War see Ransom and Sutch [2001].

<sup>7</sup> An excellent review of the profitability and viability issues raised by Conrad and Meyer is provided by Hugh Aitken’s commentary in his book, *Did Slavery Pay?* [1971]. Aitken reprints the major contributions including those of Phillips, Conrad and Meyer, Yasuba, Evans, Saraydar, and Sutch.

## **Self-Sufficiency of the Plantation**

Douglass North formulated an elegant model of antebellum economic development that proved influential for understanding the economics of slavery [North 1961]. Starting from a theory of regional specialization and export-led growth he had previously formulated, North considered the American economy as if composed of three regional economies. The East specialized in the export of manufactured products (textiles, boots and shoes, locks and clocks, books and combs) as well as financial and commercial services. The West specialized in the export of wheat flour and corn (some considerable fraction of which was transported in the form of corn whiskey and salt pork). The South specialized in the export of cotton, sugar and other staples produced by an enslaved labor force. Each region's economic prosperity, North argued, was tied to the success of its export trade and hence to the demand from other regions for the products of their predominant industry. The staple South imported food stuffs from the agricultural West to provision her enslaved population and relied on the industrial East for cheap cloth and shoes to clothe and shod the slaves as well as for banking, credit, and factorage. The South's cotton was sold to the East where it became raw input for the booming textile industry. The East was also a major consumer of western agricultural products. The West imported manufactures and services from the East. The three interdependent regions were linked by these interregional trade flows, each region pursued its own comparative advantage, and each was more productive than it might have been if walled off and forced to be self-sufficient. The entire national economy, according to North's export-led model, was propelled throughout the antebellum era by the expanding exports of cotton to Europe during the era when England set out to clothe the world with cotton rather than animal skins.

Douglass North's model focused attention on a weak evidential link in Conrad and Meyer's calculations. Cotton output per slave would depend in part on how self-sufficient in food the typical plantation was. Self-sufficiency would imply that some labor effort had to be diverted from the staple crops to food production and home manufacture. North accepted the traditional view that the South depended upon the West "for a *large part* of its food supply and on the East for *the bulk* of its manufactured goods and *very largely* for the conduct of its

commerce and banking.”<sup>8</sup> The highlighted phrases suggest minimal self-sufficiency, at least on the large plantations. But, whatever the extent of the South’s dependence on western food imports, there is an implication for the profitability calculations. An important magnitude required by the production function approach is the magnitude of the out-of-pocket cost for food and clothing. That cost would vary widely depending on the degree of self-sufficiency. Conrad and Meyer considered three alternatives. One case imagined that plantations were almost completely self-sufficient with the annual cost of purchases required for maintaining a prime field hand estimated between \$2.50 and \$3.46. But that low cost would have come at the expense of a lower production of cotton per hand as labor had to be diverted from cotton to food production. Another possibility was that the out-of-pocket costs were between \$7 and \$10 “where some ready-made clothing and meat, fish, and other food ‘delicacies’ were purchased.” And, if all provisions were purchased, the cash cost might be as high as \$25 to \$40 [Conrad and Meyer 1958: table 5]. In that last case, the output of cotton per hand could be maximized. It is important to specify the typical degree of self-sufficiency correctly and then to match that with the appropriate yield of cotton per hand. Conrad and Meyer *assumed* a cost of provisions in the middle range of \$7 to \$10 and then claimed the typical output would range between 3.5 and 4 bales of cotton per slave per year. However, they offered no evidence to justify the relevance of that yield to the assumed cost of purchased food and clothing. North’s work was troubling since it implied the costs for food and clothing imported from outside the South should be higher, perhaps much higher, than the \$7-\$10 claimed.

Albert Fishlow reached a different conclusion about the magnitude of the South’s imports from the West. Assuming that virtually all imports of western products to the South traveled down river to New Orleans, he calculated from port receipts that “imports were truly minute

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<sup>8</sup> The quotation, with my emphasis added, is actually from Louis Schmidt. North quotes this passage with approval [Schmidt 1939: 820, North 1961: 103].

compared with the [South's] production of foodstuffs." "The South was neither a major market for western produce nor in dire need of imported foodstuffs" [Fishlow 1964: 352, 357].

Fishlow was challenged by Robert Fogel who countered with the suggestion that "a sizable" volume of western products was shipped through New York and Baltimore and then down the coast to the South Atlantic states. He had no direct evidence of this alternative route but made rough calculations of the 1860 pork and beef consumption in the Southern seaboard states that implied a substantial deficit when compared to domestic production [Fogel 1964]. The exchange between Fishlow and Fogel reached a stalemate however when it bogged down in a disagreement about the relative slaughter weights of western and southern hogs and cattle. Furthermore, the relevance of interregional shipments to the question of the plantation's self-sufficiency was not assured given the possibility that large plantations might have been supplied by local, small-scale, non-slave owning farmers who specialized in grain and meat production.

The debate could not be resolved without new research. This had to wait several years until William Parker and Robert Gallman drew a statistical sample of 5,229 Cotton South farms and plantations from the 1860 census of agriculture. The census enumerators' manuscript returns from these agricultural operations were linked to each farm owner's returns from the population census and also to the slave census returns linked to the owners. The result was a cross-section micro-data sample. William Parker accurately described it as "the best-selected, most comprehensive, and most carefully processed body of statistical evidence which historians have ever employed in the study of history" [Parker 1970a: 2]. Immediately the Parker-Gallman sample was applied to address the question: Did cotton farms grow their own food? The answer was "yes" [Gallman 1970, Battalio and Kagel 1970]. The sample allowed the question to be addressed not in the aggregate, but farm-by-farm and plantation-by-plantation. **Figure 2** presents Gallman's estimates of grain output and grain requirements by farm size. Grain is expressed in corn-equivalent bushels. This measure aggregates corn, wheat, rye, barley, buckwheat, cow peas, and beans weighted by their nutritional contents. Per capita production (represented by the green bars) was significantly higher on the large farms than on small ones. There is no evidence in these findings that small farms were able to supply grains to large plantations.

Grain requirements were estimated by Gallman in the same units by aggregating estimated on-farm consumption by the enslaved and free populations, the work animals, cows, other cattle, sheep, and young animals – but not swine. Allowance was made for seed requirements, poultry, and on-farm waste. To avoid exaggerating self-sufficiency, Gallman made what he considered to be generous estimates of slave rations – “more likely to be too high than too low” [Gallman 1970: 12-19]. As illustrated in Figure 2, farms with 50 acres or more of improved acreage had an estimated output in excess of consumption requirements. The residual was sizable. Gallman recognized that these residuals were likely converted to pork by feeding corn and other grains to swine. He assumed that it took 10 bushels of corn to produce 100 pounds of pork arguing that this would likely underestimate pork production. After considering whether his estimates of the pork produced were reasonable given the count of swine reported in the census and the extensive data he assembled on the slaughter weight of hogs, Gallman stated,

we can have some assurance that the procedures by which claims on grain and output of pork were derived do not *underestimate* plantation demands nor *overstate* plantation production capacities. That is, the check suggests that my original object – to give the self-sufficiency hypothesis a strong test – has been met [Gallman 1970: 16, emphasis in the original].

After estimating the quantities of meat consumed by both the enslaved and the free populations living on the farms, Gallman concluded:

The surplus of all the farms in the cotton South (which the sample represents) would have been large enough to feed all of the slaves and one-sixth of the [free population] living in the South outside the sample universe. The farms of the cotton South, far from being dependent on external sources of basic foods, were in a position to supply food to outsiders on an impressive scale [Gallman 1970: 19].

From an analytical point of view, one of the contributions of Conrad and Meyer was to view the slave owner as a businessman, a capitalist in a competitive business who retained slaves to employ them in a profit-making enterprise. The planter sought to engage the slaves at tasks that would earn a sufficient return to justify their price. That large plantations were self-sufficient in food production is not inconsistent with this view or the proposition that the southern plantation had a strong comparative advantage in cotton production. Ralph Anderson and Robert

Gallman pointed out that a slave was a form of fixed capital. The owner not only had access to the enslaved person's entire labor but was also responsible for his full maintenance [Anderson and Gallman 1977]. The labor requirements of cotton production varied seasonally, heavy during planting season and again during picking season, but relatively light in between requiring only some animal husbandry and cultivating to remove weeds. The slave owner would not want his charges idle during the slack season since he was obliged to pay for their upkeep and since they might prove troublesome if left without work. The principal means by which the slave force was kept busy throughout the year was diversification into corn and pork production. This despite the fact that southern yields per acre in corn were substantially below the yield achieved in the West (about 12.5 bushels per acre versus 32.4 in 1849 and 1859) [Parker and Klein 1966: table 10]. One explanation for the low corn yields per acre was that corn was planted and harvested at dates that did not interfere with those for cotton, but were not optimal for corn. During August when neither crop required much attention, the slaves were set to pulling fodder, stripping the corn stalks of their green leaves. The fodder provided cattle feed but the practice wounded the growing corn plant and reduced grain yield between 10 and 18 percent [Ransom and Sutch 1977: 395-396, n62].

Other research projects provided evidence that sub-regions on the periphery of the South supplied grain and meats to the South's population not living on farms. Kentucky and Texas were both exporters of meat. The Upper South states of Kentucky, Tennessee, Virginia, and North Carolina produced a sizable grain surplus and "engaged in large-scale exportation of both wheat and corn" [Lindstrom 1970: 101]. By implicitly redrawing regional borders and defining "The South" more narrowly and the West more broadly than had Douglass North, this work recovered the importance of interregional trade links that he had emphasized.<sup>9</sup>

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<sup>9</sup> However, the role played by cotton exports to England played in propelling U.S. economic growth has been questioned. Irving Kravis argued that exports were supplementary factors: "handmaidens, not engines, of growth" [Kravis 1972: 405].

## The Interstate Slave Trade and Slave Breeding

It is hard to question the widely-accepted narrative evidence that the interregional slave trade operated by professional slave traders was substantial. The market functioned well and slave prices were flexibly determined. Slaves could be “reared on the poorest of land and then sold to those owning the best” [Conrad and Meyer 1958: 110]. It is also clearly established that the slave traders preferentially selected prime-age slaves for removal to the new South.<sup>10</sup> In other words, the migration of complete plantation populations with their labor force intact including young and old, males and females, infants and children – together with their original owner and his family – was not the only way to transport slaves into the rapidly-filling West. In case there was any doubt, Conrad and Meyer specifically addressed “the old historical question about whether the typical southern gentleman planter could bring himself to indulge in the slave trade” [Meyer and Conrad 1957: 539]. They argued that if a reluctance to sell slaves thwarted trade, the age and sex distribution of the enslaved population would be approximately the same in all states. Yet the census revealed that the “buying” states of the South had a larger proportion of slaves in the prime working ages than the “breeding” states [Conrad and Meyer 1958: 114-115 and table 14].

Richard Sutch carried the argument a step further. He used census data and survival rate methods to calculate the volume of net exports (or imports) for each state by age and sex between 1850 and 1860. The overall export rates for Delaware, the District of Columbia, and Maryland ranged from 20 percent to 33 percent of the population. Six other states (in descending order: Kentucky, South Carolina, Virginia, Tennessee, North Carolina, and Georgia) were also exporters. During the final decade of slavery over ten percent of the enslaved population of these states were forced to take part in this remarkably large migration. **Figure 3** presents Sutch’s estimated exportation rate for each age and sex cohort during the last decade of slavery. This rate

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<sup>10</sup> The narrative literature (as distinct from the cliometric contributions) on the domestic slave trade is enormous. The classic is by Frederick Bancroft [1931]. A modern treatment is by Ned Sublette and Constance Sublette [2016]. Detailed documentary evidence on the trade that transported enslaved men and women from Maryland to New Orleans is provided by Ralph Clayton [2002]. A blend of traditional and cliometric methods is employed by Michael Tadman’s study which also provides detail on exports from South Carolina [1989].

is defined as the number of enslaved persons living in the state in 1850 who were removed from the state over the decade as a percentage of the state's 1850 slave population that would have survived to 1860. The markedly higher rate of export for those 20-29 of age in 1860 (approximately age 15-24 at the time of migration) is strong evidence that many slaves were sold singly into the domestic trade rather than making the move west in the company of their owner and their family members [Sutch 1975a].<sup>11</sup> The precise proportion of slave removals that were transferred by domestic slave traders was debated in the 1970s and 1980s without much progress. However, recent research by Johnathan Pritchett and Michael Tadman seem to have settled the issue with a more sophisticated analysis of the changing age and sex composition of the slave population. Pritchett calculated that approximately 50 percent of slaves transported across state lines had been sold to traders who resold them [Pritchett 2001]. Michael Tadman put the percentage even higher at 60 to 70 percent [Tadman 1989: 29-31 and Appendix 3]. For regions where exports were unusually large, the percentage sold to traders was probably even higher. Slaves shipped from Baltimore, for example, had been sold by their local owners to traders about 80 percent of the time [Clayton 2002: 641].

Despite statistics' matter-of-fact quality, these huge percentages considered together with the sheer enormity of the transplanted population focus attention on the misery and terror wrought by the slave trade. The young men and women sold south were separated from their families (parents, wives, partners), friends, and owner, forcibly transported to a foreign environment, sold to a new master not of their choice, and settled alone on an unfamiliar plantation. The numbers are heart breaking. A teenager in 1850 born and raised in Maryland, for example, had about a 12- to 16-percent chance of being sold to a trader before 1860. Maryland was an extreme case. In Virginia the chances were 11 to 14 percent, in North Carolina 9 to 10 percent, and those born in South Carolina faced an 8 to 11 percent chance.<sup>12</sup> For the exporting

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<sup>11</sup> A similar pattern of exports by age was found by Tadman [1989: Figure 2.4].

<sup>12</sup> Calculated from the net exportation rates for each state [Sutch 1975a: Appendix Table 5] and the assumed probability of being sold to a trader of between 60- and 70-percent [Tadman 1989: 31].



states taken together the median age at sale was 16. Teen-age males were 50 percent more likely than a woman to be sold during the decade. Stephen Crawford extracted reports of the sale of young slaves away from their families from the narratives related by ex-slaves in the 1920s and 1930s. Based on 42 reports, he concluded that “through age sixteen, the slave child faced roughly a 20 percent chance of being sold away from family” [Crawford 1992: 341-342, Table 11.6].

The teenager caught up in this trade would have been sold, perhaps at auction; jailed in a slave-holding pen in Baltimore, Charlestown, or another port city; then chained and marched into the hold of a ship; transported to New Orleans, a voyage of perhaps 30 days; chained again and marched to another “slave hotel;” sold at auction; and then moved to a new home.<sup>13</sup> Not only was the purchased slave uprooted, but those left behind were also devastated and terrified by their own obvious vulnerability. The children remaining behind could only look forward to facing the same brutal odds as they grew to adulthood. These forced travels west have been called, quite appropriately, the “Second Middle Passage.”

No doubt remains about the general picture of a large coerced migration of enslaved black people from the “exporting states” to the “importing states” and the significant role played by professional traders in facilitating the movement. There remains however, some concern about how to label things. Conrad and Meyer called importing regions the “buying states” and the exporting regions “breeding states.” Although they were adopting established terminology, the term “breeding” seems unfortunate in retrospect. This emotionally-charged term offended some, angered others, and led several less-than-careful readers to enormous misunderstandings about what practices constituted slave breeding. Conrad and Meyer’s insight was that the enslaved were not only workers but also capital and, in the case of every child born to an enslaved mother, they were also product – “an intermediate good” in Conrad and Meyer’s words. “Whether systematically bred or not, the natural increase of the slave force was an important,

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<sup>13</sup> For a description of slave trading at the origin of the voyage, see Ralph Clayton’s discussion of Baltimore [2002]. For the receiving end, consult Walter Johnson’s discussion of the New Orleans market [1999]. Johnson also provides a narrative description of the forced journey west.

probably the most important, product of the more exhausted soil of the Old South” [Conrad and Meyer 1958: 96, 113-114].

Richard Sutch sought to bring some quantitative evidence to bear on the “breeding hypothesis.” This is the idea that the existence of the interregional slave trade and the structure of slave prices established in that market gave slave owners an economic incentive to increase the number of children born on their plantations. The hypothesis entails the twin propositions that, (1) the increasing slave population was a byproduct of the agricultural operation – not the main objective; and (2) the slave owner’s incentive was to increase the number of children born for a given investment in working adults – not to maximize female fertility (children born per women of child-bearing age).

Female fertility in the antebellum south was astonishingly high. Sutch used the Parker-Gallman sample to estimate fertility on slave farms. The number of children, 0-14, per thousand woman-years of prime fertility experience was 295; 323 in the exporting states and 260 in the receiving states [Sutch 1975a: table 10]. In South Carolina where the calculated rate was highest, it reached 355. That would be close to the apparent biological maximum of 371 observed in the population with the highest gross reproduction rate ever recorded: the experience of the women of the Cocos-Keeling Islands born between 1873 and 1927.<sup>14</sup> For the exporting states these numbers imply that on average seven surviving children would be born during a woman’s reproductive life. To reach levels of female fertility this high would require early marriage, short lactation periods, and no economic pressure to restrain population growth.

This evidence by itself does not discriminate between two possibilities; that the high fertility on the plantations, like that on the Cocos Islands, was the natural result of ample

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<sup>14</sup> The number of years of “prime fertility experience” is an index of potential fertility. Each year of the woman’s life during the preceding 15 years is weighted by the reproductive experience of the Cocos Island women at the same age. Sutch also presented calculations to suggest that the differences between exporting and importing states could not be explained by selective migration of women without children [Sutch 1975a: Tables 8-10].

resources, good health, and the early timing of first births; or evidence that the planters were interfering in the sexual life of their slaves by encouraging (coercing?) early marriage and abbreviated breast feeding and discouraging abstinence. If the slave population's reproductive rate was "natural," as some slave owners insisted, how could individual planters increase the number of children born on their plantation when female fertility was already near the maximum? This could be done by skewing the sex ratio of adults toward women of child-bearing age. Since women as well as men worked in the fields, agricultural output could be maintained while the number of children born *per adult worker* could be increased.

Before the Parker-Gallman microdata was available, the published census results seemed to undercut this possibility. The sex ratios of slaves, 15 to 39, in the exporting states was not different than that observed in the importing states and both were almost precisely equal to 1.0. The sample of slave farms, however, told a different story. When farms without any women are excluded, the female-to-male ratio in the exporting states was 1.3 (1.2 in the importing states). Slaves employed in non-agricultural occupations were predominantly males, and farmers who owned only one slave had a revealed preference for males.

**Table 2** illustrates the effectiveness of skewed sex ratios on farms with five or more adult women. Since children represent the "output" of a supposed breeding operation and the number of adults represent the "inputs," "productivity," measured as the ratio of children to adults, rises with the ratio of women to men. It is also remarkable that less than 40 percent of the larger farms in the exporting states had rough gender balance.<sup>15</sup> One third had a ratio of women to men greater than 1.5; 17 percent had two or more women per man. Sutch raised the possibility that polygamy or promiscuity might help explain the high birth rates on these farms despite the

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<sup>15</sup> Stanley Engerman suggested in his comments on Sutch that moral influences led this minority of owners to noninterference and encouragement of family stability and that family stability might increase the female fertility rate [Engerman 1975]. There is certainly evidence of that, as female fertility was actually higher on the farms with balanced sex ratios [Sutch 1975a: table 12]. But the breeding hypothesis proposes that it is not female fertility that would matter, but the reproduction rate of the adult population on plantations, counting women and men together.

gender imbalance. On the other hand, enslaved husbands might have resided off the plantation on neighboring farms. Fogel and Engerman asserted that this was “quite common” [1992b: 462]. However, Ann Patton Malone’s thorough study of the slave family and household structure in Louisiana found little evidence of off-plantation marriages. She suggests that the frequency of “abroad marriages” has been exaggerated, “perhaps out of an overabsorption with ... heralding the standard nuclear family” [Malone 1992: 227-228, 262-263]. In any case, the need to sell left many individual farms with more adult women than men.

The large number of children born on plantations with substantially more women than men raises the possibility that some of the women were impregnated by men other than their husbands, with or without their consent. Given the racial and sexual domination inherent in Southern society, enslaved women may have felt they had little choice but to submit to intercourse, particularly when approached by a white man [Steckel 1980, Bodenhorn 2015]. There is some limited evidence that rape by overseers was not uncommon [Malone 1992: 221-222]. These acts would be crimes of passion, not necessarily motivated by the supposedly dispassionate calculations of a slave breeder. However, it is worth noticing that the enslaved woman’s best insurance against sexual abuse by a slave breeder was to marry early and produce many children within that marriage.

### **Economic Growth and Manufacturing Development of the South**

That slavery was profitable and viable did not mean that slavery was compatible with economic growth or development. This point was raised by Douglas Dowd in his comment on Conrad and Meyer, and later became the subject of a famous panel discussion on “Slavery as an Obstacle to Economic Growth” held at the Economic History Association meetings in 1967 [Conrad et al. 1967].<sup>16</sup> As Dowd put it, “slavery and all that it entailed was fundamental in inhibiting industrial capitalism – and economic growth – in the South” [Dowd 1958: 441]. Indeed, there was little

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<sup>16</sup> Panel members: Alfred H. Conrad, Douglas Dowd, Stanley Engerman, Eli Ginzberg, Charles Kelso, John R. Meyer, Harry N. Scheiber, and Richard Sutch. For a colorful, emotional, and hyperbolic description of the discussion that ensued see Robert Fogel and Stanley Engerman [1974, volume 2: 11-19].

doubt in the 1960s that the antebellum Southern economy was backward and lagged behind the North. Northern and Southern observers of the time, abolitionists and slaveholders, all noted the contrast and all agreed that slavery was to blame [for a review see Harold Woodman 1963]. The cliometric literature on the topic opened with a challenge to this view by Stanley Engerman [1967].

For the purposes of his reinterpretation, Engerman reworked regional personal income relatives estimated by Richard Easterlin to produce rough estimates of personal income per capita (counting enslaved persons in the population total). His results are presented in **Table 3**.<sup>17</sup> Engerman directed attention to the growth rates he calculated for the global South and North. Between 1840 and 1860, by these measures, the Southern economy grew at the average of 1.45 percent. This is faster than the growth rate of 1.30 for the North.<sup>18</sup> How could the observations of contemporary witnesses and the calculations of cliometrics be so at odds? The answer is the nature of the economic growth experienced by the South was quite unusual. It was not really noticeable locally; it was only manifest at the interregional level. Engerman calculated the rate of economic growth for the South viewed as a whole while the contemporaries were commenting on what could be seen from the perspective of a local observer (“on the ground,” so to speak). Note that the calculated rate of growth for the South (1.45 percent) is higher than the rate of growth in each of the South’s three subregions measured separately (1.21, 1.28, and 0.82

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<sup>17</sup> Table 3 is based on numbers reported by Easterlin [1961: table 1], Engerman [1971], Fogel and Engerman [1971b: 335], and calculations by Ransom and Sutch [1977]. See Ransom and Sutch for details. The states included in each region by Easterlin are: *New England*: Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire, and Maine. *Middle Atlantic*: New York, Pennsylvania, New Jersey, Maryland, and Delaware. *East North Central*: Ohio, Michigan, Indiana, Illinois, and Wisconsin. *West North Central*: Iowa and Missouri. In 1860 Minnesota, Nebraska, and Kansas are also included. *South Atlantic*: Virginia, (including present-day West Virginia), North Carolina, South Carolina, Georgia, and Florida. *East South Central*: Kentucky, Tennessee, Alabama, and Mississippi. *West South Central*: Arkansas and Louisiana.

<sup>18</sup> Engerman, departing from Easterlin, included Texas in the 1860 definition of the West South Central region. This adjustment boosted the South’s growth rate to 1.67 percent [Fogel and Engerman 1971b: 335]. Table 3 reports the figures for the South defined to exclude Texas. Texas was an independent republic in 1840. It became a state in 1845.

percent).<sup>19</sup> This counterintuitive phenomenon arises because the westward migration was away from regions of poor soil and relatively low per capita income to regions with rich soils and relatively high income. Much of the apparent antebellum Southern growth came from territorial expansion onto more productive lands. This extensive growth would not be relevant to anyone who did not move west.

Still, Engerman's point is well taken. The South's slave economy was not stagnant. The transformations however were largely driven by the interregional slave trade and planter migrations. Physical productivity in cotton production rose throughout the antebellum period [Conrad and Meyer 1958]. This was probably true at the local level, even on the "exhausted" soils of the Atlantic coast states. The advance is attributed to improvements in transportation and marketing, the application of guano as a fertilizer, the adoption of new cotton varieties, and improvements in the machinery for ginning and baling cotton. The real price paid for cotton was also rising as advances in technology for manufacturing cotton thread and textiles enabled manufactures to make more effective use of the South's upland cotton varieties. But the growth in the South Atlantic and East South Central regions was modest in comparison to the growth in the economies of New England, the Middle Atlantic states, and the East North Central region.<sup>20</sup> While the planters could reap the benefits of higher prices and the innovations in marketing and production, the slaves did not. In the North, by contrast, the local economies were markedly dynamic, growth was indigenous, intensive, and the benefits were wide spread. Northern

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<sup>19</sup> Engerman's calculations probably exaggerate the progress made in the South's subregions between 1840 and 1860. They are primarily based on the census returns for the crops of 1839 and 1859, but 1859 was an unusually good year for cotton production.

<sup>20</sup> The frontier regions, the West North Central and West South Central, were thinly populated in 1840 with only 2 and 3 percent of the population respectively.

agriculture was transformed, local manufacturing appeared, young women left farms to work in factories, cities grew, and a flood of “Yankee gadgets” were filed with the Patent Office.<sup>21</sup>

A westward migration was common to the histories of both the North and the South. In the North, however, the migration was from the high income regions in the east (New England and the Middle Atlantic States) to regions in the West (primarily the East North Central division) with lower per capita incomes. Northern migration was not produced by individuals giving up high-paying jobs for low income ones. Rather it was primarily a migration out of low-productivity agriculture to the more fertile agriculture of the West. Agricultural income per worker was 25 percent higher in the Old North West than New England in 1840 and 45 percent higher in 1860 [Easterlin 1974: table B.1]. The figures in Table 3 support the notion that the local Southern slave economies were indeed lagging behind the industrial economies of New England and the Mid-Atlantic and behind the new agricultural economy of the East North Central states.<sup>22</sup>

But why should this be? The South’s relative lack of manufacturing, the absence of a connected network of towns and villages, and the non-existent provision of public education for white children and laws actually prohibiting the education of slaves are acknowledged features of the southern landscape.<sup>23</sup> If growth is equated with manufacturing development, urbanization, and education, there was obvious work for cliometricians. Why did the South miss out?

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<sup>21</sup> Technological creativity affected every facet of Northern life. On the transformation of Northern agriculture see Jeremy Atack and Fred Bateman [1987]. On the “rain of gadgets” and the impact on agriculture see Peter McClelland [1997].

<sup>22</sup> A recent reexamination of regional growth in the antebellum period over a longer period confirms that the South lagged far behind the North. Between the benchmark years of 1800 and 1860 Peter Lindert and Jeffrey Williamson calculate a growth rate for the South Atlantic region of 0.9 percent per annum (that is below the rate they consider required for “modern economic growth”). By comparison New England grew at the rate of 1.94 percent and the Middle Atlantic states grew at 1.66 percent [Lindert and Williamson 2016: 101-107 and Figures 5.1 and 5.2].

<sup>23</sup> Despite law and custom, a small minority of slaves did learn to read and write. A non-cliometric history by Heather Andrea Williams tells the story [2003].

The study of southern manufacturing was initiated by Fred Bateman, James Foust, and Thomas Weiss. Based on a sample of manufacturing firms drawn from the manuscript census of 1850 and 1860 they report two findings which, taken together, led them to a surprising conclusion. For the South as a whole, there was a lack of participation by planters in manufacturing enterprises. As the wealthiest members of southern society, slave owners might be expected to have stepped into the role of local entrepreneurs and venture capitalists. But only 6 percent of planters engaged in manufacturing, and yet their investments comprised around 25 percent of all manufacturing capital. “This suggests the South suffered a very conventional but perhaps economically rational fate – a limited transfer of resources from agriculture to manufacturing” [Bateman, Foust, and Weiss 1974: 297]. The low participation is particularly surprising in light of calculations establishing that the rate of return was two to three times higher in Southern manufacturing than in Southern agriculture. Clearly, the region did not live up to its economic potential. The authors describe the situation as one of entrepreneurial failure, “investor irrationality.” Manufacturing opportunities would have been more remunerative, yet planters were unwisely plowing their earnings back into cotton agriculture and the purchase of slaves. “While the South was not nearly so devoid of industry as conventionally believed, it no doubt could have done better. That it did not, largely reflects upon the behavior of Southern investors” [Bateman and Weiss 1976: table 13, pp. 26 and 39].<sup>24</sup>

The scarcity of manufacturing helps explain the South’s low urbanization. Factory workers needed to live near factories and the factories needed to locate at a power source (a mill stream perhaps). In the antebellum North East and North West, urban places grew up around these non-agricultural sources of employment. And these urban enclaves became self-propelling. They fostered a business culture. When technology changed and opportunities emerged homegrown entrepreneurs and lenders of capital were willing to assume the risks [Parker 1970b].

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<sup>24</sup> Bateman and Weiss collect and summarize their work in a book [1981].



Without urban centers, the South lacked self-conscious businessmen and lenders that would provide the dynamics to industrialize.

Claudia Goldin tackled the topic of slavery in the cities. Her concern, however, was not so much with the lack of urbanization as with the relative lack of slaves in the few cities that did exist. In 1850 ten percent of the white population lived in the urban areas of the South, but only four percent of the slaves were city residents [Goldin 1976: table 1]. Goldin also established that urban slavery was on the decline during the 1850s. According to her statistical analysis of the supply and demand for urban slaves, this was almost entirely explained by the “rapid increases in the price of slaves in general, which led urban owners to cash in on their capital gains” [Goldin 1975: 449].

Leaving aside the South’s woeful investments in basic education, which in the case of the enslaved black population was clearly the consequence of slavery, the initial attempts to explain low levels of investment in manufacturing did not directly implicate slavery as the cause. Instead, they attributed the failure of industrialization to the shortage of entrepreneurial imagination. Extending this discussion into questions of distinctive regional character traits, planter irrationality, risk aversion, business culture, and the like would take this essay too far from its assignment. Economic development and its index of success, economic growth, are complex concepts. Questions such as “Why didn’t the South grow faster?” and “Why didn’t she develop a booming and diverse industrial sector?” require a comparative approach. Engerman set out to compare the growth of the South with that of the North. Bateman and Weiss explicitly compared southern manufacturing with northern industrialization. Goldin compared slavery in the cities with slavery in the countryside. Gavin Wright made yet another comparison. He contrasted the economic progress of the Old South before the war to the progress of the New South following the Civil War. Wright saw a “basic change in the principles and directions of entrepreneurial energies.”

When slavery was abolished, investment strategies, entrepreneurial designs, and political schemes whose purpose was to increase the productivity and value of *land* came to the fore.

The real cause of the lack-luster prewar performance, Wright argued, was the lack of saving.

The level of savings is a function of wealth as well as income. By analogy to the burden of the national debt, capitalizing labor satisfies the desire to accumulate wealth over the life cycle, and hence reduces the savings available for investment in physical capital. This model could well explain the evidence recently presented by economists Fred Bateman and Thomas Weiss that rates of return in antebellum southern manufacturing were generally high, yet failed to attract investment on a large scale. [Wright 1986: 19-20 Emphasis in the original].

Wright cited a paper on slave owners' saving by Ransom and Sutch that relied on Franco Modigliani's life-cycle model of saving and its implication for the burden of the national debt [Ransom and Sutch 1988, Modigliani 1961]. Life-cycle models predict the existence of a desired wealth-income ratio that depends upon the worker's expectations about the age profile of income over the life span and the need to build a stock of wealth. The wealth is required both to establish a rainy-day fund and to provide security in old age when earning power is anticipated to be low. Because the saver is indifferent to whether the accumulated wealth is in the form of physical capital or government bonds, an increase in "national debt will tend to displace private tangible capital on a dollar per dollar basis" [Modigliani 1966: 200]. A lower stock of physical capital in the economy reduces the flow of output. If you replace the phrase "national debt" with the words "slave capital" in the preceding quotation you have the essence of Ransom and Sutch's point. Slaves were a form of wealth that took the place of manufacturing capital.

The life-cycle model not only helps explain the lack of Southern manufacturing investment, it also offers a partial explanation for the puzzling upward jump in aggregate savings rates that appeared following the Civil War. With emancipation, a significant fraction of the saleable wealth in the South evaporated. The value of slaves in 1860 was nearly 60 percent of the total capital invested in agriculture and completely overshadowed the physical capital invested in Southern manufacturing [Ransom and Sutch 1977: table 3.5; 1988, table A.1]. When the wealth represented by slaves disappeared, the wealth-income relationship was catapulted far out of equilibrium. In response the savings rate accelerated [Ransom and Sutch 1988]. The quickened pace of capital formation was first brought to the attention of the profession in 1966 when Robert

Gallman published his estimates of Gross National Product for the nineteenth century [Gallman 1966]. Capital formation rates rose from approximately 13 to well over 17 percent of GNP. Subsequent revisions by Gallman of the figures on output and gross saving are presented in **Table 4**. Physical capital formation jumped from less than 15 percent to well over 20 percent according to the revised estimates, and from 16 to 22 percent using the slave-economy concept of gross national product that includes the value of the increase in slave wealth in aggregate capital formation.

Simply put, the slave South did not establish the educational, social, and financial institutions upon which to promote innovation, entrepreneurship, and economic development. The South's impulse to invest and expand the stock of wealth was satisfied by the increase in the slave population. Slavery denied the South even the potential for modern economic growth.<sup>25</sup> Taking the long-term perspective, the South was in peril. Immigrants self-selected the North with its rapidly growing urban centers and her expanding industries as the obvious place to settle. The South provided few jobs for free labor and the entry costs for land and slaves made joining the planter class out of reach for the typical immigrant. As the flow of immigrants swelled the population of the Free States outpacing that of the Slave South, the size of the South's congressional representation *vis-à-vis* the North was threatened. Thus her insistence on the extension of slavery into the west [Ransom and Sutch 2001].

### **The Debate over *Time on the Cross***

The rich outpouring of cliometric research on slavery in the nineteen-sixties and -seventies was further stimulated by the appearance in 1974 of *Time on the Cross* by Robert Fogel and Stanley Engerman. The authors were intentionally provocative. They announced their work as a radical interpretation of the economics of slavery, reporting the findings of “almost a decade and a half”

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<sup>25</sup> A reflection on the economic development of the antebellum South by Gavin Wright takes a refreshing step back from the cliometrics to provide insightful historical and comparative context [Wright 2006].

of methodologically sophisticated research based on “new techniques and hitherto neglected sources” [Fogel and Engerman 1974: volume 1, pp. 4, 226]. Chief among the startling findings was the authors’ claim that the physical and psychological well-being of American slaves was much greater than previously believed. Slaves were provided not just adequate food, clothing, and shelter, but a material standard of living which compared favorably with that of free American workers of the time. Slaveowners used cash rewards and other positive incentives rather than physical punishment to motivate a high level of work effort. Humane treatment secured the willing cooperation of the slaves. Slave breeding and sexual exploitation were abolitionist “myths.” The trade and traffic in human beings did not break many family units. Large plantations were more efficient than free farms of the North because gang labor and economies of scale made them super productive.

After more than four decades, it is difficult to recapture the shock that greeted this work. The surprised reaction was in part the consequence of the book’s brash style and structural eccentricities. There were two volumes. The primary volume, subtitled *The Economics of American Negro Slavery* was intended for the general reader and employed what Deirdre McCloskey would call a forensic style, a rhetoric more reminiscent of the prosecutor’s closing argument than a typical historical narrative with careful footnotes and references to primary sources [McCloskey 1985]. While it claimed to be rigorously scientific, Volume One lacked the careful methodological description, empirical precision, and caveats necessarily associated with the presentation of novel scientific findings. That material, when provided, was left to Volume Two, subtitled *Evidence and Methods, A Supplement*. Volume Two was a collection of “technical notes” filled with algebraic symbols, intricate cross-references, and terse descriptions of statistical results that would certainly be inaccessible to all but a minuscule few of its general readers. Only someone trained in economic theory, the logic and methods of statistical inference, and cliometric analysis could reliably put the two parts of *Time on the Cross* together.

In a sense, Fogel and Engerman were ahead of their time. They wished to convince a large audience of lay readers that “the view that black Americans were without culture, without achievement, and without development” was false [Fogel and Engerman 1974: volume 1, p. 258]

while at the same time persuading their scientific colleagues of the validity of their findings. Their effort to simultaneously address two audiences proved to be a failure not only because the physical and rhetorical separation of findings and meaning was seen as an attempt to overawe readers but because the inferences and many of the technical details had not been vetted through peer review.

The initial shock over the two volumes' intimidating format might have been a temporary distraction had the authors delivered what they promised – novel interpretations derived from reliable findings based on hard data, sophisticated mathematics, and computational technology with the power to digest massive amounts of numerical data. Subsequent scholarship, however, would reveal that the findings were not reliable. When quantitative historians with the necessary experience and credentials began the process of replicating – or attempting to replicate – the cliometrics, they could not, for the most part, do so.<sup>26</sup> The rejections were many and came from multiple quarters. Paul David, Herbert Gutman, Richard Sutch, Peter Temin, and Gavin Wright prepared a compilation of the cliometric corrections and logical critiques of *Time on the Cross*, which they published as a book, *Reckoning with Slavery*, complete with a concordance. The conclusion was blunt.

We have attempted, collaboratively, to reproduce every important statistical manipulation, check every significant citation, reexamine every striking quotation, rethink every critical inference, and question every major conclusion in Fogel and Engerman's book. To our surprise and dismay, we have found that *Time on the Cross* is full of errors. The book embraces errors of mathematics, disregards standard principles of statistical inference, mis-cites sources, takes quotations out of context, distorts the views and findings of other historians and economists, and relies upon dubious and largely unexplicated models of market behavior, economic dynamics, socialization, sexual behavior, fertility determination, and genetics (to name some).

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<sup>26</sup> I was more than a witness of the verification effort. I was a participant [Sutch 1975b].

No work of scholarship, and certainly no work which undertakes to cover so broad a canvas, is unblemished by some errors. *Time on the Cross*, however, is simply shot through with egregious errors. Even more dismaying is the consistent tendency in the mistakes we have uncovered: all seem to work in favor of the particular "radical reinterpretation" of the institution of slavery that has been put forth by Fogel and Engerman. When the faults are corrected and the evidence is re-examined, every striking assertion made in *Time on the Cross* is cast into doubt. The effect in many instances is to restore and reinforce more orthodox conclusions hitherto shared by conventional and quantitatively oriented students of the peculiar institution [David et al. 1976: 339-340].

The objections were not confined to errors of factual detail. The interpretations presented in Volume One, the critics charged, did not follow logically from the cliometric analysis, Fogel and Engerman had warned readers that their findings (presented in Volume Two) and their interpretations (in Volume One) do not stand on the same level of reliability. "Interpretation sometimes involves additional data which are quite fragmentary and assumptions which, though they are plausible, cannot be verified at present. Hence, even when readers accept the validity of one or another of the principle findings, they may disagree with the significance that we attach to it" [1974: volume 1, p. 10]. The objection of the critics, however, was not to the use of additional assumptions or fragmentary data to broaden a finding into a conclusion. Rather the charge was that the interpretations presented with great fanfare in Volume One would not be warranted even if the additional assumptions and fragmentary data are accepted and the cliometric findings in Volume Two were valid. The illogic of Volume One became a major issue.

The forensic style Fogel and Engerman adopted for Volume One intended to leave no room for disagreement, but to meet that standard the "corrections" of the traditional characterization of the slave economy must follow directly from the cliometric findings. Unlike a true forensic investigator who examines all the evidence and then builds a case, it appears to me that Fogel and Engerman decided upon their conclusions and then assembled plausible, supportive evidence after the fact. In the process they left out the logical apparatus that should have connected the interpretation back to the finding.

## The Relative Efficiency of Slavery

Fogel long maintained that the most significant contribution of his work on the economics of slavery was the novel demonstration that slavery was efficient; indeed, more efficient than free labor. According to the numbers Fogel and Engerman reported, Southern agriculture was 35 percent more efficient than Northern farming in 1859 and Southern slave farms were 28 percent more efficient than Southern free farms. *Time on the Cross* described this result as a paradox. Productive efficiency is an important component of American values and often counts as one of the higher virtues of a capitalist economy.<sup>27</sup> By challenging the long-held and seemingly secure belief that slavery was inefficient without a clarifying caveat, Fogel and Engerman needlessly created the “paradox” seemly suggesting that slavery was virtuous and inherently desirable. Of course, they did not think so. In an epilogue they explicitly denied they were trying to “sell slavery” [Fogel and Engerman 1974: volume 1, p. 258]. They acknowledged that the “great power that slavery gave one group of men over another was, in and of itself, sinful.” In brief and scattered observations throughout Volume One they noted that enslaving blacks was also exploitative, expropriative, and racist [Fogel and Engerman 1974: volume 1, p. 159, 144, 153, 215].<sup>28</sup>

If slavery was more efficient than free labor – as Fogel and Engerman maintained – the real implication should have been allowing humans their own agency, as with free labor, comes at the cost of lost output and must be defended on non-economic principles [Wright 1978].

On the efficiency of slavery as on other issues, Fogel and Engerman’s critics questioned virtually every element of their approach – their definition of efficiency, their measurement of output and labor inputs, the evaluation of farm land, the econometrics of production function estimation, and many

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<sup>27</sup> The idea that efficiency is unambiguously desirable is a holdover from the Progressive Era. Historian Samuel Haber wrote, “efficient and good came closer to meaning the same thing in these years than in any other period of American history” [1964: ix]. President Theodore Roosevelt helped cement this view in a message to Congress, “In this stage of the world’s history to be fearless, to be just, and to be efficient are the three great requirements of national life” [1909]. Efficiency also is often thought by neoclassical economists to be a consequence of the pursuit of profits by business owners in a competitive capitalist economy.

<sup>28</sup> Fogel later conceded he had not thought deeply about the moral issues “because they seemed so obvious” and that the scattered observations on the morality of slavery in *Time on the Cross* “did not add up to an adequate statement of the problem.” [Fogel in Fogel et al. 1989-1992: primary volume 1, pp. 391-393]. *Without Consent or Contract* considers the issue at length in an “afterword” [primary volume].

technical details of measurement and inference.<sup>29</sup> The multi-round exchange that took place is worth considering despite its failure to reach a general consensus because it illustrates the problem of audience in cliometric research. The prose in Volume One of *Time on the Cross* left the meaning of “efficiency” to the reader’s sense of common usage. Yet there are several common meanings. A farm that produces a given physical output of cotton with a minimum of wasted expense can be said to be efficient. This concept is known as “technological efficiency.”<sup>30</sup> An individual worker is said to be personally efficient when he or she performs a task in a well-organized and competent way. A productive process is efficient if it avoids the wasteful use of a particular resource, energy for example. This is “resource efficiency.” Calculating any one of these concepts does not provide information on the other two.

By not clarifying their definition of efficiency for the lay reader, Fogel and Engerman allowed a major confusion to enter their exposition. The index of efficiency calculated in *Time on the Cross* corresponded to none of the three common-sense definitions, but was actually a fourth concept, “revenue efficiency.” Southern farms produced cotton (and corn) while Northern farms produced no cotton (but plenty of corn). Since the outputs of the two regions were different, direct comparison of their physical efficiency is not possible. Fogel and Engerman skirted this apples-and-oranges difficulty by calculating the total value of the crops and livestock products reported by the two regions for the crops of 1859 by evaluating each product using a uniform national price. They measured productivity with a “geometric index of total factor productivity,” defined as the ratio of the value of output to a weighted average of the inputs of labor (slave and free), land, and capital. They measured “relative efficiency” by the ratio of the total factor productivity of Southern farms to that of Northern farms [Fogel and Engerman 1974: volume 1, Figure 42, pp. 192-193]. Defined in this way, “productivity” is a measure of *revenue* in 1859 and calculating relative efficiency with this definition of product gives an index of “revenue efficiency” [David and Temin 1974: 775-778]. Despite what many readers of *Time on the Cross* might have assumed,

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<sup>29</sup> The list of back-and-forth responses is long. Gavin Wright provides a concise summary of the main issues but remarked that “this issue [of the relative efficiency of slavery] has been scrutinized so extensively, and along so many dimensions, that an attempt at exhaustive review of the debate would be foolhardy” [2006: 94-121].

<sup>30</sup> Technological efficiency is inherently a physical concept. It is used, for example, to compare the performance of one firm relative to another firm when both produce the same identical product, say pencils, measured in physical terms, the number of pencils produced per day. The firm that produces more pencils given the same quantity of each input is said to be the more technologically-efficient firm.



revenue efficiency is not a measure of physical efficiency nor can it be a standard for assessing resource efficiency, nor can it be taken as a gauge of the workers' proficiency or diligence.

Moreover, in Fogel and Engerman's application, revenue efficiency overstates the superiority of slave plantation agriculture. The crop year 1859 saw unusually high yields of cotton while at the same time cotton prices remained relatively stable. Thus the 1859 revenues from cotton production were extraordinary. Conditions in the North were not unusual, thus using 1859 outputs introduced a bias into the calculation that favored southern farms over northern farms. In fact, "there is no other year which would put the South in a better light in terms of the Fogel-Engerman version of 'efficiency'" [Wright 1976: 313-316; 1979].

When they first presented a relative efficiency calculation in 1971, Fogel and Engerman conjectured that a finding that Southern farms were more efficient than Northern farms might be explained by the "superior entrepreneurship and managerial ability" of Southern farmers [Fogel and Engerman 1971a: 364-365]. In *Time on the Cross* they went a step further. To superior management of planters and overseers, they added the "the superior quality of black labor." In *Time on the Cross* these explanations for the supposed efficiency of slavery were no longer casual conjectures; they were presented as logical inferences from the calculations of revenue productivity [Fogel and Engerman 1974: volume 1, pp. 209-210]. This new interpretation then became the central theme of their book, a motif they emphasized throughout from the introduction to the conclusion. The typical field hand "was harder-working and more efficient than his white counterpart" [p. 5]. Slaves were "diligent and efficient workers" [p. 263]. "All, or nearly all, of the advantage [of plantations] is attributable to the high quality of slave labor, for the main thrust of management was directed at improving the quality of labor" [p. 210].

This inference is not warranted. Paul David and Peter Temin were quick to point out that the relative "quality" of productive factors and the efficiency of alternative production process are two analytically distinct concepts. Even if we accept the validity of the calculations, the comparative analysis of total factor productivity indexes cannot shed light on the comparative performance of the managers and workers operating in different environments [David and Temin 1974; 1979]. Fogel and Engerman later abandoned their claims about the quality and diligence of enslaved labor, but continued to defend their efficiency calculations [Fogel and Engerman 1980]. They allowed their general audience for Volume One

to believe that high revenue efficiency – which is the same as high profitability – was inherently a good thing, both morally acceptable and a felicitous consequence of the capitalistic nature of American slavery.

Fogel and Engerman’s critics did not accept the validity of the productivity calculations and their complaints were not restricted to revenue as the measurement of output. In their view *Time on the Cross* underestimated the labor input on slave farms [David and Temin 1974; Wright 1979]. For their estimates of labor, Fogel and Engerman employed the Parker-Gallman sample, which had first been engaged to investigate the issue of self-sufficiency. The age and sex detail available for the slave population in that database allowed Fogel and Engerman to make a number of adjustments to the labor force estimate not possible with the published census data used in the North-South comparisons [Fogel and Engerman 1974: volume 2]. The full extent of these adjustments was not evident until Engerman and John Olsen outlined the “basic procedures” in 1992 [Engerman and Olson 1992]. Their description is not entirely clear, but it raises a number of questions. Slave labor was measured in “hand-rating” equivalents [Fogel 1989: 73-74 and Figure 13; Engerman and Olson 1992: Table 24.1]. Where these age and sex adjustments came from is not revealed.<sup>31</sup> In any case, Gavin Wright has shown that the hand-rating equivalents for women greatly underestimated their contribution of labor and thus inflated the total factor productivity of slave farms [Wright 2006].

Critics also questioned Fogel and Engerman’s valuation of land. Originally, they measured the input of land by the total acreage in farms (improved plus unimproved) without an adjustment for differences across regions in natural fertility or land use (for crops or pasture) [Fogel and Engerman 1971a]. In *Time on the Cross* a refinement was made to measure land at its cash value [Fogel and Engerman 1974: volume 2]. This would be a poor measure in any case since it does not take account of the different proportions of improved and unimproved acreage. Significantly, though, it would artificially

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<sup>31</sup> Children under ten and slaves 70 and over were assumed to be unemployed. The hand-equivalent measures are further reduced by subtracting a fractional measure of the number of male slaves engaged in non-agricultural pursuits. This adjustment is probably based on a sample of probate records, but that is not explicitly stated]. Inexplicably, farms without male slaves or with “unusual sex ratios” were dropped from the sample. A farm was also dropped, also without explanation, if it was not self-sufficient in grain production. Both of these deletions removed small farms (1 to 15 slaves) almost exclusively and probably distorted the measured productivity of that size class.

depress the apparent efficiency of Northern farms because Northern land values presumably capitalized their greater proximity to governmentally-subsidized railroads [Wright 2006; David and Temin 1974]. In their response to these criticisms Fogel and Engerman attempted to correct for the locational component of land rents with a revised set of calculations [1977]. David and Temin pointed out that the corrections “entirely eliminated land inputs from their production function!” [David and Temin 1979: 216, punctuation as in the original]. Fogel and Engerman responded by charging that it was David and Temin who had called for the correction that had eliminated land [Fogel and Engerman 1980]. Actually, David and Temin had not suggested such a correction. Instead they reasserted their original argument that “the conceptual apparatus [used by Fogel and Engerman] is inappropriate to the task of ascertaining the relative technical efficiency of free and slave agriculture” [1979: 216]. By this point the debate had become mired in the cross purpose of how to properly measure inputs for a conceptual apparatus that the two sides could not agree was appropriate. The message which should be retained, as Thomas Haskel emphasized, is that Fogel and Engerman in the course of the exchange had abandoned the major theme of *Time on the Cross*, their claim that the efficiency calculations established the diligence and willing cooperation of enslaved black labor in the production of agricultural crops [Haskel 1979].<sup>32</sup>

### **Economies of Scale and Gang Labor**

Although they had dropped their claim about the relative quality and diligence of slave labor, Fogel and Engerman continued to insist the productivity advantage of slavery was real and that their measure of revenue efficiency was a meaningful gauge of that advantage. They next asserted the relative efficiency of slave farms was the consequence of economies of scale in slave agriculture, an advantage not available on free family-operated Northern farms and not possible with fewer than 16 slaves. They used the Parker-Gallman sample to calculate revenue efficiency for farms of different size, using the number of slaves owned as the measure of scale [1974: volume 1, Figure 43].

Gavin Wright pointed out again that Fogel and Engerman’s revenue efficiency “is largely a measure of who happened to be growing cotton during the most extraordinary cotton year of the nineteenth century.” And significantly, Wright’s calculations revealed that when “the crop mix is held

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<sup>32</sup> In a baffling retort to Haskel published 13 years later, Fogel and Engerman merely contradicted Haskel without addressing the fundamental point made by David and Temin that the quality of labor could not be inferred from total factor productivity calculations [Fogel and Engerman 1992a].

constant, there is no productivity advantage for slaves and there are no scale economies for slave plantations” [Wright 1976: 317]. Fogel nevertheless continued to emphasize the productivity advantage of scale and he further claimed that a break can be observed when farm size exceeded 15 slaves (or five prime male hands), indicating to him that the source of the gains was the use of the gang system for field work [Fogel et al. 1989-1992, primary volume: 26-29; Fogel 2003: 29-32].

Fogel and Engerman first introduced the idea that the gang system was common, even universal, on large plantations in *Time on the Cross*. They described the system as one in which the slaves were divided into several gangs based on their physical capabilities. The gangs were then driven through the field, one following the other with the lead gang setting the pace. Fogel and Engerman described the gang system in operation during cultivation.

Field hands were divided into two groups: the hoe gang and the plow gang. The hoe hands chopped out the weeds which surrounded the cotton plants as well as excessive sprouts of cotton plants. The plow gangs followed behind, stirring the soil near the rows of cotton plants and tossing it back around the plants. Thus the hoe and plow gangs each put the other under an assembly-line type of pressure. The hoeing had to be completed in time to permit the plow hands to carry out their tasks. At the same time the progress of the hoeing, which entailed lighter labor than plowing, set a pace for the plow gang. The drivers or overseers moved back and forth between the two gangs, exhorting and prodding each to keep up with the pace of the other, as well as inspecting the quality of the work [Fogel and Engerman 1974: volume 1, p. 204].

This vivid portrayal of field work drew freely upon their imagination; it is not based on contemporary evidence. Yet, Fogel and Engerman went on and proposed that assigning slaves to “highly disciplined, interdependent teams capable of maintaining a steady and intense rhythm of work,” was the “crux of the superior efficiency of large-scale operations” [Fogel and Engerman 1974: volume 1, p. 204].

The claim that the gang system was commonly employed on farms with 16 or more slaves is nothing more than conjecture. Fogel and Engerman provided no evidence that the gang system was widely used in the late antebellum period. Immediately following the passage just reproduced, they quote and paraphrase Frederick Law Olmsted’s several contemporary descriptions of “slave driving,” leaving the impression that they referenced the gang system just described, but none of Olmsted’s observations referred to driving gangs. In these passages Olmsted was reporting on the necessity of using beatings or the threat of whipping to compel slaves to work hard. None of his informants worked slaves in gangs

[Olmsted 1856: 84, 205-206, 372-373].<sup>33</sup> Subsequent research on the organization of plantations and the supervision of slaves, has produced only scattered references to the gang system [Metzer 1975]. Gavin Wright warns that plantations exceeding some threshold scale cannot be associated with any particular form of organization. He also builds a case that the gang system was passing out of use by 1840 [Wright 2006: 95-96]. Alan Olmstead and Paul Rhode report that they have “seen almost no slave era testimony extolling the productivity advantages of the gang system (under any name) in any cotton production activity” [Olmstead and Rhode 2008b: 1152]. They also report there is little support for images of “assembly-line” pressure or the metaphor of “factories in the field” [Olmstead and Rhode 2015].

While the debates on relative efficiency, economies of scale, and the gang system left the original interpretations presented in *Time on the Cross* in tatters, it has so far failed to achieve a broad consensus about the technical efficiency of large-scale slave plantations relative to small slave farms, free Southern farms, or Northern farms. There have been a number of contributions attempting to settle the matter employing a variety of statistical techniques (Cobb-Douglas, translog, stochastic frontier, and translog ray frontier production models) with a broad and bewildering scattering of conclusions [Schaefer and Schmitz 1979, Fogel and Engerman 1980, Field 1988, Grabowski and Pasurka 1989 and 1991, Hofler and Folland 1991, Field-Hendry 1995, and Toman 2005]. Given the limitations of the census data, I am tempted to conclude that efforts to reach a satisfactory conclusion about the relative physical efficiency of small versus large slave farms has reached a point of greatly diminished returns. Basically, the question posed was poorly framed from the outset. It too narrowly focused on technical efficiency, a concept that proved difficult if not impossible to measure.

Taking a broader view, slavery is surely inefficient. American slaves were overworked and kept illiterate, denying them the opportunity to reach their full human potential. An investment in literacy and education and the acquisition of human capital have well-documented high rates of return [Goldin 2016]. Bondage meant slaves were not free to allocate their talents and labor time to their best advantage, barring them from contributing to the arts and sciences, barring them from leadership roles in a democratic

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<sup>33</sup> Fogel and Engerman quote Olmsted’s description of a hoe gang working on a Mississippi plantation as evidence of “slave teamwork, coordination, and intensity of effort” [Fogel and Engerman 1974: volume 1, p. 205]. However, they neglected to mention that Olmsted intended his description to illustrate the necessity of the threat of whipping (“the whip was evidently in constant use”) not the typical organization of tasks on a large plantation [Olmsted 1860: 81-82; Gutman and Sutch 1976a].

society. Any economic system that so outrageously misuses its human resources cannot be called efficient.

The critics of *Time on the Cross* prevailed on the broader points since they were able to show that the cliometric results presented in Volume Two do not support the interpretations presented in Volume One, even if the cliometric results are taken at face value. In his “retrospective meditation” on the slavery debates, Fogel ultimately conceded that the efficiency calculations he and Engerman performed did not establish the superior management of planters and the superior quality of black labor. He rejected both the belief he once held that “technological efficiency is inherently good” and the notions entertained by some readers of *Time on the Cross* “that productivity is necessarily virtuous.” Economic forces do not “automatically select moral solutions” [Fogel 2003: 46-47, 69]. What cliometricians can safely conclude from the debate over efficiency is that the world got cheap cotton at the expense of the education, intellectual development, inspiring ambitions, and personal security of its enslaved producers.

### **The Stability of the Black Family**

Fogel and Engerman’s insistence on the efficiency of slavery had misled them into trumpeting the superior quality of slave labor. Their insistence on the personal efficiency of black workers then pushed them to suggest enslaved people were willing collaborators in the production of staple crops. The slaves’ presumed contentment with their status would be plausible, they argued, if one recognized that the black family was the basic unit of social organization under slavery. The security and stability of family life would have been essential to gaining the slave’s compliant acceptance. This chain of inferences allowed Fogel and Engerman to announce one of their principal corrections was to overturn the belief that sexual abuse of slave women had destroyed the black family [Fogel and Engerman 1974: volume 1].

Fogel and Engerman denied that sexual abuse was common. They did this, first, by declaring without evidence that slave breeding was “myth”<sup>34</sup> and then by denying that white

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<sup>34</sup> Fogel and Engerman ignored the evidence that I had presented, which I discuss elsewhere in this chapter [Sutch 1975a]. They argued for a rejection of slave breeding with two conjectures; (1) that interference could have had little effect on the rate of population growth, and (2) that high costs to slave breeding would have eroded away all profit in the business. Gutman and I countered these suppositions by pointing out that the first rested on the fact that the

masters and overseers “ravished black women frequently,” justifying that claim with the assertion that “white men who desired illicit sex had a strong preference for white women.” The only fact offered to support this generalization (and indeed the only evidence that supported the entire house of cards) was “the failure of Nashville’s brothels to employ slave women” [Fogel and Engerman 1974: volume 1, pp. 133-135]. The phrasing is unfortunate. As Martha Hoffman noted in her discussion of the moral issues raised by *Time on the Cross*, the word “failure” implied to some readers that slave women “should have been” prostitutes [1992: 600]. But surely, leaving that point aside, the conclusion that southern white men’s preferences in these matters would protect black women is naïve in the extreme.<sup>35</sup>

One of the first of Fogel and Engerman’s claims in this chain of inferences to fall was the alleged “fact” that enslaved black women were not forced into prostitution. Yet, their source, David Kaser, had clearly noted that the 1860 census did not record the occupations of slaves [Kaser 1964]. Even if Nashville had hundreds of them, they would not have appeared in the records. In the opening pages of *Time on the Cross*, Fogel and Engerman defended the robustness of the facts and findings they would report, saying “when persistent efforts to contradict the unexpected discoveries failed” they were forced to accept a “radical reinterpretation of American slavery” [Fogel and Engerman 1974: volume 1, p. 8]. In the case of the Nashville prostitutes, the vetting could hardly have been persistent or even attentive.

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fertility of the slave population was close to the biological maximum. But those high levels might have been produced by breeding. They should have asked how much the fertility rate would have fallen had breeding been stopped. No evidence was offered to support the second argument other than the supposed loss of the slaves’ willing cooperation in the production process [Gutman and Sutch 1976b].

<sup>35</sup> Fogel and Engerman claimed that the census data on the proportion of the slave children under 10 recorded as mulatto (estimated by Steckel at 10.1 percent in 1860) cannot be used as evidence of frequent impregnations of enslaved women by whites [Fogel and Engerman 1974: volume 1, pp. 131-133]. However, the evidence they provided in volume 2 on this point is totally without scientific creditability [Gutman and Sutch 1976b]. See Steckel [1980] and Malone [1992] for extended discussion of miscegenation.

## After the Controversy

Replication is a normal part of the scientific method. If others cannot confirm reported findings, the new results are declared unproven and the research that produced them is deemed a failure. However, a focus exclusively on Fogel and Engerman's careless handling of their evidence and their arrogant claims of possessing a precise and powerful methodology unavailable to ordinary historians would miss an important lesson. *Time on the Cross* was the product of a system that rewards with lavish attention powerful findings that seemingly offer either an outright rejection or strong support for conclusions the public finds comfortable. Eager to make a splash, Fogel and Engerman let their enthusiasm overwhelm their precautions. Practicing cliometrics, however, does not absolve the practitioner from adhering to the strictures and norms of science. It must be emphasized on the other hand that Stanley Engerman and Robert Fogel generously answered questions and provided raw data to their critics and welcomed the exchange of results and interpretations [Fogel et al., *Technical Papers*, volume 1, 1989, p. xvi]. That openness to criticism and their willingness and eagerness to engage in the debate have now become the hallmarks of first-class cliometrics.

While considering *Time on the Cross* an interpretive failure, I do not want to overlook some of the positive contributions made by Fogel and Engerman. Among these is the valuable archival research that assembled data on slave values by age, gender, and location developed from probate records. **Figure 4** presents the age-value profiles for Louisiana and compares those to the male profile estimated by Laurence Kotlikoff from his analysis of the selling price of slaves in the New Orleans slave market.<sup>36</sup>

An even more significant contribution was Fogel and Engerman's multidisciplinary approach to their subject. This was fairly novel at the time and their example inspired others to

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<sup>36</sup> Fogel and Engerman 1974: volume 1, pp. 72-78, figures 15, 16, and 18; volume 2: 24, 79-82. The data plotted were provided by Stanley Engerman and are reproduced in Engerman, Sutch, and Wright 2006: volume 2, p. 373, tables Bb209-214 and Bb215-218]. The age profile of the New Orleans sale prices for 1850-1859 is based on the coefficients of a sixth-degree polynomial reported by Laurence Kotlikoff 1979: Table 4.



pursue opportunities to push ahead on those fronts. This openness to the perspectives of other disciplines had a profound influence on the cliometric investigation of many topics beyond those raised by slavery in the years that followed. Two examples of uniting disciplines to address the economics of slavery illustrate the importance of this reorientation. Richard Steckel looked at the fertility of slave women using the tools of demography [Steckel 1977]. His exploration into this issue led to the collection of data on the heights of teenage slave women to judge the age of menarche [Trussell and Steckel 1978; Steckel 1979 and 1986a]. That statistic is relevant to judging how early in a woman's life, biologically speaking, was her age at her first birth – how soon after puberty. Ultimately this line of research produced the anthropometric revolution in cliometric research. Steckel and many others collected comparative data on human stature and weight to evaluate the well-being of disparate populations throughout history [for a review consult Komlos and Alecke 1996; and Craig 2016].

Kenneth Kiple and Virginia Kiple's exploration of the mortality of slave children and my effort to critique the analysis of the slave diet in *Time on the Cross* led us to explore the basics of nutritional science [Kiple and Kiple 1977; Sutch 1975b]. There is now an extended literature on the biologic and biomedical history of the black population both during and after slavery [Kiple and King 1981; Steckel 1986a and 1986b; and Troesken 2004]. At the same time, multidisciplinary studies of the nutritional and medical histories of many other populations have applied the methods to a wide range of diverse settings [Steckel and Floud 1997].

*Time on the Cross* advanced the general discussion of slavery by extending it to topics well beyond the viability of the institution and its impact on economic growth. Fogel and Engerman brought cliometric evidence and methods to assess the provision of food, shelter, and clothing; the slave's family life; and punishments, rewards, and expropriation. Their provocative opinions on these topics, even as they were overturned, accelerated the general pace of research on the economics, sociology, and demography of slavery. As Fogel remarked, the public debate "was a debate in which there were no losers" [2003: 32]. The new research and the collection of new data by Fogel and Engerman's critics and defenders greatly enhanced the credibility and acceptance of cliometrics by economists. Yet, there was an unfortunate consequence as well.

This outpouring of new work had little apparent influence on the discussion of slavery among historians. Alan Olmstead and Paul Rhode noted this disconnect.

In the past, historians and economists (sometimes working as a team) collectively advanced the understanding of slavery, southern development, and capitalism. There was a stimulating dialog. That intellectual exchange deteriorated in part because some economists produced increasingly technical work that was sometimes beyond the comprehension of many historians. Some historians were offended by some economists who overly flaunted their findings and methodologies [Olmstead and Rhode 2018: 14].

Apparently the bitterness of the debate over *Time on the Cross*, the far too many factual errors in the book, and the ostentatious, yet imprecise, formalism of Volume Two led some historians to simply ignore the entirety of cliometric literature. Recently two historians of American slavery, Sven Beckert and Seth Rockman, dismiss their own neglect with a single sentence. “The economic history of slavery has labored in the shadows of the interpretative controversies surrounding ... *Time on the Cross*” [2016: 10]. Presumably this excused them from critiquing the cliometric literature and freed them to contribute to and celebrate an alternative economic history of slavery and American economic development. Their loss (and ours) has become glaringly apparent in the recent discussion by cliometricians of what historians have come to call the “New History of Capitalism and Slavery” [Murray et al. 2015, Olmstead and Rhode 2018].

In 1989 Robert Fogel responded to critics of *Time on the Cross* and the “crackling atmosphere” of the debates. This effort took four volumes collectively titled *Without Consent or Contract: The Rise and Fall of American Slavery* [Fogel et al. 1989-1992]. The primary volume, by Fogel alone, begins with a review of several selected issues addressed in the debates. His tone is less polemical and the message less audacious than in the 1974 volumes. The revised portrayal of the slave system is more nuanced, more complex, somewhat subtle, and less contentious [for a review see Clark Nardinelli 1994]. Endnotes were attached. The primary volume also presented evidence relating to slave societies outside of the United States and expanded its attention to address ideological, religious, moral, and political issues. Three companion volumes, which appeared in 1992, provide a mixture of brief research memos together with technical papers,

many of which had already been published years before in the journal literature.<sup>37</sup> Judged by citations, none of the new material on antebellum slavery in the companion volumes attracted rebuttal from the critics or attention from others.<sup>38</sup>

Fogel announced in 1989 that he had written his last words on slavery with the publication of *Without Consent or Contract* [Fogel 1989: 13]. That all but ended the debate over *Time on the Cross*. Most of the participants, like Fogel, moved on to other topics.<sup>39</sup> This finality, unfortunately, left the resolution of the debate – and particularly Fogel and Engerman’s joint view – somewhat muddled.<sup>40</sup> That may have had the effect of discouraging further cliometric research. Apart from the continuing work with anthropometric and biometric evidence already mentioned, the next quarter century produced only a thin list of cliometric contributions on American slavery. There were, however, two exceptions to the general lack of new research that I shall come to shortly. Apart from these contributions, the scholarly interest in slavery by quantitative historians switched away from the late antebellum South to topics like the Atlantic slave trade, colonial slavery, and slavery in the Caribbean, Brazil, and Africa. It is not clear why this should be so. Perhaps the practicing cliometricians had exhausted themselves, if not the

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<sup>37</sup> For some insight into the organization of the “loosely structured” research project that produced both *Time on the Cross* and *Without Consent or Contract*, see Fogel and Engerman’s “General Introduction” to the *Technical Papers* [Fogel et al. 1992: volume 1].

<sup>38</sup> In the primary volume of *Without Consent or Contract* Fogel continued to report total factor productivity calculations like those in *Time on the Cross*, but he reframed the conclusion to claim “the superior efficiency of the big plantations was due not merely to inherent advantages of the gang system but also to the concentration of above-average ability in the ownership of such farms” [Fogel in Fogel et al. 1989-1992: primary volume, figure 14]. Gavin Wright responded by noting that “the ability of the ownership is no more directly observable in census data than the gang labor system itself” [Wright 2006: 96].

<sup>39</sup> There was some continuing work by economic historians to provide quantitative data that might inform the short-lived reparations movement to redress the injustice of slavery [America 1990].

<sup>40</sup> The primary volume of *Without Consent or Contract* was written by Fogel alone. Engerman writing jointly with Kenneth Sokoloff seems to have retreated from *Time on the Cross* and accepted the view that in the years before the Civil War the South “lagged behind the North ... in evolving a set of political institutions that were conducive to broad participation in the commercial economy” [Engerman and Sokoloff 2002: 61].

topic. Perhaps a younger generation of cliometric scholars had learned that the sensitive issues involved had best be avoided given the topic's history of rather acrimonious debate.

### **Group Sales and Price Discounts in the Market for Slaves**

A new issue dealt with after the controversy had died down was the puzzling price discounts for intact slave families when sold on the New Orleans market. Under Louisiana law enslaved blacks were analogous to real estate, and the recording of deeds ensured the title to this form of property. One of the contributions of the Fogel and Engerman project had been the digitization of a large sample of the bill-of-sales recorded for slaves in New Orleans [Fogel and Engerman 1974: volume 2, table B.1 (data set 9)]. Over 5,700 invoices covering the period 1804 to 1862 were recorded (less than five percent of the total number in the archives). Analysis of the structure of the sale prices by Laurence Kotlikoff revealed that a well-functioning (“rational”) market existed. Kotlikoff noted that the hump shape of the age-price profile (see Figure 4), the premium prices paid for males and for warranties of good conduct “all point to careful, calculating transactors operating in a highly developed market in human beings.” In a point that should not be passed over lightly, he also took note of the degrading physical inspections of the men and women by the “careful” and “calculating” potential buyers. Slaves were stripped of all clothing and closely examined to assess muscle development and to discover physical defects such as whipping scars [Kotlikoff 1979].

It was a surprise, however, that the sales records also revealed that very few family groups were sold. Of the 5,785 sales in the sample only 40 involved a husband and wife sold together (in 22 of these cases the couple was accompanied by their child). Another 94 were mothers sold with her accompanying child or children. Seventy-seven percent of the sales were slaves sold individually [Kotlikoff 1979: 513]. There was little apparent regard for preserving enslaved families intact. More surprising was that, except for the 22 husband-wife-child combinations, slaves in family groups sold for deep discounts compared to their value if they had been sold separately. This suggests either that buyers in New Orleans did not place much value on the behavioral benefits in terms of demeanor and submission that Fogel and Engerman

thought would protect family units, or that the families sold at a discount (predominately mother-child pairs) were in less than prime condition when they arrived in the Crescent City.

Jonathan Pritchett, together with several colleagues, undertook a reexamination of the New Orleans sales data to explore the puzzle. He joined with Herman Freudenberger to point out that the slaves sold in New Orleans had been selected by traders for transport to New Orleans because of their high value. They were better able to bear the cost of transport by ship. Not only were the slaves clustered in the prime ages (10 to 30) but they were in prime condition, noticeably taller than slaves transported by their owners. Presumably, they were stronger and in better health than average. This selection bias was particularly noticeable for children and adolescents [Pritchett and Freudenberger 1992]. Pritchett and Richard Chamberlain confirmed this result by comparing the price of slaves in estate sales, which would include both high-valued and other slaves, with the prices in the New Orleans sales records. They found no evidence that adverse selection had put slaves with hidden defects on the New Orleans market [Pritchett and Chamberlain 1993]. Charles Calomiris and Pritchett analyzed the deep discounts for mother-child pairs. Noting the relative rarity of such sales (74 percent of children, 4 to 13, shipped by traders were unaccompanied), they explored the possibility that the typical mother-child unit was not in prime condition. Pritchett and Freudenberger had earlier found that children shipped to New Orleans were taller than other children of the same age and gender but they had not distinguished between those children who were shipped with their mother and those who were unaccompanied. Returning to the ship manifests and identifying likely mother-child pairs, Calomiris and Pritchett discovered that accompanied children were shorter than the unaccompanied by one and one-half inches (for children under 10) confirming the hypothesis that the discounts reflected perceived quality differences [Calomiris and Pritchett 2009: table 4]. The few observations of a mother sold together with a child in New Orleans were likely cases where the child was evidently poorly nourished or in otherwise poor health. The New Orleans data do not support the hypothesis that slaveholders valued and respected the human bonds of

affection and mutual responsibility that define a family. When money was involved many masters seemed willing to break families apart.<sup>41</sup>

### **Biological Innovation and Southern Agricultural Development**

The debates over the rates of antebellum economic growth in the South and North had established that a significant factor in the case of the South was the shift of population from the South Atlantic states to the East South Central states (as demonstrated by the comparison made in Table 3).<sup>42</sup> The advantage of the western states had been attributed to the naturally high fertility of the soil; the black-belt soils of Alabama and the alluvial soils of the Mississippi basin. Alan Olmstead and Paul Rhode, in an important post-controversy contribution, insist that this summary ignores the role biological innovation played in Southern agricultural development. With the move onto virgin land in the west, planters needed to adapt the cotton plant to the local conditions. To this end they experimented with different varieties and selected the most advantageous. Yields were increased, fiber quality was improved, and taller plants, which flowered and formed larger bolls further from the ground, were developed. Since the labor requirement for hand picking was the primary constraint on productivity per slave, the taller, more prolific varieties markedly increased the number of pounds of cotton that a worker could pick in a day. When superior varieties were perfected they spread east and west, north and south, thus increasing productivity throughout the South [Olmstead and Rhode 2008a, 2008b, 2011].

Olmstead and Rhode quantified the advances in productivity by collecting daily records of cotton picking. Plantation overseers recorded the weights of individual worker's pickings to

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<sup>41</sup> The legal historian, Thomas Russell, has assembled convincing evidence that southerners believed that slaves sold separately would bring higher prices. Southern courts ruled that estate executors had a fiduciary duty to break up slave families in order to maximize the sales revenue [Russell 1996]. His study of South Carolina suggests that court-supervised slave sales comprised one-half of all slave sales in that state [Russell 1993].

<sup>42</sup> Another factor was the extraordinary growth of the demand for cotton emphasized by Gavin Wright [1975].

monitor each slave's performance, reward high effort, and discipline slackers.<sup>43</sup> Their data collection totaled 704,800 individual daily reports covering 6,200 slaves working on 142 plantations. These data when plotted and averaged reveal a three-fold improvement in productivity in the western states between 1811 and 1860 and a doubling of productivity for the Atlantic Coast states. The time trends are plotted in **Figure 5**.<sup>44</sup> A statistical analysis of the data by region revealed that the dynamics of Southern development were driven by the interaction of biological innovations with the western movement to alluvial soils.

Most of the new cotton varieties were invented in the West, and they were undoubtedly best suited for the area where they first evolved thereby enhancing the West's comparative advantage. The new varieties gradually were adapted to displace older varieties in a wide spectrum of geoclimatic conditions, but the new technologies were particularly suited for more fertile lands. The large plantation regions of the West had better soils to start with, but in a sense biological innovation made these soils even better [Olmstead and Rhode 2008b: 1156-1157].

Olmstead and Rhode consulted an extensive set of primary sources to support and contextualize their statistical findings. Newspaper accounts, agricultural journals, letters from planters and overseers, and treatises on plant biology and scientific farming established that the biological advances were the work of slave-owning planters who molded the cotton plant to their geoclimatic conditions, soil types, and the evolving requirements of textile manufacturers. Earlier characterizations of slave owners as “uninventive” rested on the planters’ failure to experiment with mechanical inventions. A broader view of invention challenges this view.

### **An Assessment**

American slavery was a brutally cruel and highly exploitive system. It was also a racist institution. No whites were slaves and the presumptive status of every black person was slave.

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<sup>43</sup> “Discipline” may be a euphemism here, slaves were not infrequently whipped for below par performance [Olmstead and Rhode 2008b: 1143].

<sup>44</sup> The four Atlantic coast states are Georgia, North and South Carolina, and Virginia. The Seven western states are Alabama, Arkansas, Florida, Louisiana, Mississippi, Tennessee, and Texas.

Those facts are disturbing. They make it impossible to regard American history as one of unblemished freedom, equality, and democratic community. After a 60-year-long investigation of the economics of slavery by economists and cliometricians, it is also impossible to deny the complicity of America's economic system based on the inviolability of private property, strict contract enforcement, and an unregulated labor market in propelling and sustaining the slave regime.

The southern planter was a capitalist – a capital owner, who made decisions to buy or sell slaves and to employ them at one task or another guided by a profit motive and the constant pressure of competition. The major contribution of cliometrics to the economic history of slavery was to view the planter as a capitalist. Only the slave owner willing to employ his slaves in the most efficient manner would earn a return sufficient to justify their price. Achieving high output required that workers be engaged in intensively hard work for long hours under the constant threat of corporal punishment [as acknowledged by Fogel in Fogel et al. 1989-1992, primary volume: p. 34]. Each slave owner had to replicate those features on his own plot of land to remain in business. If maintaining a profitable enterprise necessitated the disrespect of marital status and family bonds, few planters could afford more empathetic treatment. Those unwilling to contenance the inhumanity of the system left the business to those who could. To those who became and remained masters, a blind-eyed belief in racial inferiority served to excuse and justify racial degradation and brutal treatment. The absence of contrary voices in the South allowed the racism to fester and intensify. Racism poisoned antebellum society and, as we know all too well, it still poisons American culture today. The true burden of slavery defies quantification.



## References

- Aitken, Hugh G. J., editor (1971). *Did Slavery Pay? Readings in the Economics of Black Slavery in the United States*, Houghton Mifflin, 1971.
- America, Richard F., editor (1990). *The Wealth of Races: The Present Value of Benefits from Past Injustices*, Greenwood Press, 1990.
- Anderson, Ralph V., and Robert E. Gallman (1977). "Slaves as Fixed Capital: Slave Labor and Southern Economic Development," *Journal of American History* 64 (1) June 1977: 24-46.
- Atack, Jeremy, and Fred Bateman (1987). *To Their Own Soil: Agriculture in the Antebellum North*, Iowa State University Press, 1987.
- Bancroft, Frederic (1931). *Slave-Trading in the Old South*, J. H. Furst, 1931.
- Bateman, Fred, and Thomas Weiss (1976). "Manufacturing in the Antebellum South," *Research in Economic History* 1 (1976): 1-44.
- Bateman, Fred, and Thomas Weiss (1981). *A Deplorable Scarcity: The Failure of Industrialization in the Slave Economy*, University of North Carolina Press, 1981.
- Bateman, Fred; James Foust; and Thomas Weiss (1974). "The Participation of Planters in Manufacturing in the Antebellum South," *Agricultural History* 48 (2) April 1974: 277-297.
- Battalio, Raymond C., and John Kagel (1970). "The Structure of Antebellum Southern Agriculture: South Carolina, A Case Study," *Agricultural History* 44 (1) January 1970: 25-37.
- Beckert, Sven, and Seth Rockman (2016). *Slavery's Capitalism: A New History of American Economic Development*, University of Pennsylvania Press, 2016.
- Bodenhorn, Howard (2015). *The Color Factor: The Economics of African-American Well-Being in the Nineteenth-Century South*, Oxford University Press, 2015.
- Calomiris, Charles W., and Jonathan B. Pritchett (2009). "Preserving Slave Families for Profit: Traders' Incentives and Pricing in the New Orleans Slave Market," *Journal of Economic History* 69 (4) December 2009: 986-1011.
- Calomiris, Charles W., and Jonathan B. Pritchett (2016). "Betting on Secession: Quantifying Political Events Surrounding Slavery and the Civil War," *American Economic Review* 106 (1) January 2016: 1-23.
- Carter, Susan B.; Scott Sigmund Gartner; Michael R. Haines; Alan L. Olmstead; Richard Sutch; and Gavin Wright, editors (2006). *Historical Statistics of the United States: Earliest Times to the Present*, Millennial Edition, Five volumes, Cambridge University Press, 2006.
- Clayton, Ralph (2002). *Cash for Blood: The Baltimore to New Orleans Domestic Slave Trade*, Heritage Books, 2002.

- Conrad, Alfred H., and John R. Meyer (1958). "The Economics of Slavery in the Antebellum South," *Journal of Political Economy* 66 (2) April 1958: 95-130. Reprinted in their book, *The Economics of Slavery and Other Studies in Econometric History*, Aldine, 1964: 43-92.
- Conrad, Alfred H.; Douglas Dowd; Stanley Engerman; Eli Ginzberg; Charles Kels; John R. Meyer; Harry N. Scheiber; and Richard Sutch (1967). "Slavery as an Obstacle to Economic Growth in the United States: A Panel Discussion," *Journal of Economic History* 27 (4) December 1967: 518-560.
- Craig, Lee A. (2016). "Nutrition, the Biological Standard of Living, and Cliometrics," in Claude Diebolt and Michael Hauptert, editors, *Handbook of Cliometrics*, Springer Reference, 2016: 113-130.
- Crawford, Stephen (1992). "The Slave Family: A View from the Slave Narratives," in Claudia Goldin and Hugh Rockoff, editors. *Strategic Factors in Nineteenth Century American Economic History: A Volume to Honor Robert W. Fogel*, University of Chicago Press, 1992: 331-350.
- David, Paul A., and Peter Temin (1974). "Slavery: The Progressive Institution?" *Journal of Economic History* 34 (3) September 1974: 729-783. Reprinted with changes in David et al. [1976: 165-230].
- David, Paul A., and Peter Temin (1979). "Explaining the Relative Efficiency of Slave Agriculture in the Antebellum South: Comment," *American Economic Review* 69 (1) March 1979: 213-218.
- David, Paul A.; Herbert G. Gutman; Richard Sutch; Peter Temin; and Gavin Wright (1976). *Reckoning with Slavery: A Critical Study in the Quantitative History of American Negro Slavery*, Oxford University Press, 1976: 134-164.
- Diebolt, Claude, and Michael Hauptert (2016). "An Introduction to the *Handbook of Cliometrics*," in Claude Diebolt and Michael Hauptert, editors, *Handbook of Cliometrics*, Springer Reference, 2016: v-xiv.
- Dowd, Douglas F. (1958). "The Economics of Slavery in the Ante Bellum South: A Comment," *Journal of Political Economy* 66 (5) October 1958: 440-442.
- Easterlin, Richard A. (1961). "Regional Income Trends, 1840-1950," in Seymour E. Harris, editor, *American Economic History*, McGraw-Hill, 1961: 525-547.
- Easterlin, Richard A. (1974). "Farm Production and Incomes in Old and New Areas at Mid-Century," in David C. Klingaman and Richard K. Vedder, editors, *Essays in Nineteenth Century Economic History: The Old North West*, Ohio University Press, 1974: 77-117.
- Engerman, Stanley L. (1967). "The Effects of Slavery upon the Southern Economy: A Review of the Recent Debate," *Explorations in Entrepreneurial History*, Second Series 4 (2) Winter 1967: 71-97.
- Engerman, Stanley L. (1971). "Some Economic Factors in Southern Backwardness in the Nineteenth Century," in John F. Kain and John R. Meyer, editors, *Essays in Regional Economics*, Harvard University Press, 1971: 279-306.
- Engerman, Stanley L. (1975). "Comments on the Study of Race and Slavery," in Stanley L. Engerman and Eugene D. Genovese, editors. *Race and Slavery in the Western Hemisphere: Quantitative Studies*. Princeton University Press, 1975: 495-530.

- Engerman, Stanley L., and John F. Olson (1992). "Basic Procedures for the Computation of Outputs and Inputs from the Parker-Gallman Sample, Including a Procedure for the Elimination of Defective Observations," in Robert W. Fogel, Ralph A. Galantine, and Richard L. Manning, editors, *Without Consent of Contract: Evidence and Methods*, W. W. Norton, 1992: 205-209.
- Engerman, Stanley L., and Kenneth L. Sokoloff (2002). "Factor Endowments, Inequality, and Paths of Development Among New World Economies," *Economía* 3 (1) Fall 2002: 41-109.
- Engerman, Stanley L.; Richard Sutch; and Gavin Wright (2006). "Slavery," Chapter Bb in Carter et al., *Historical Statistics of the United States*, volume 2, Cambridge University Press, 2006: 369-386.
- Evans, Robert, Jr. (1962). "The Economics of American Negro Slavery, 1830-1860," *Aspects of Labor Economics*, Princeton University Press, 1962: 221-227.
- Field, Elizabeth (1988). "The Relative Efficiency of Slavery Revisited: A Translog Production Function Approach," *American Economic Review* 78 (3) June 1988: 543-549.
- Field-Hendry, Elizabeth (1995). "Application of a Stochastic Production Frontier to Slave Agriculture: An Extension," *Applied Economics* 27 (4) April 1995: 363-368.
- Fishlow, Albert (1964). "Antebellum Interregional Trade Reconsidered," *American Economic Review* 54 (3) May 1964: 352-364.
- Fogel, Robert William (1964). "Discussion [A Provisional View of the 'New Economic History']," *American Economic Review* 54 (3) May 1964: 377-389.
- Fogel, Robert William (1990). Interview conducted by Samuel H. Williamson and John S. Lyons, *Newsletter of the Cliometric Society* 5 (3) July 1990: 3-8, 20-29. Reprinted with changes in John S. Lyons, Louis P. Cain, and Samuel H. Williamson, editors. *Reflections on the Cliometric Revolution: Conversations with Economic Historians*, Routledge 2008: 332-353.
- Fogel, Robert William (2003). *The Slavery Debates, 1952–1990: A Retrospective*. Louisiana State University Press, 2003.
- Fogel, Robert William, and Stanley L. Engerman (1971a). "The Relative Efficiency of Slavery: A Comparison of Northern and Southern Agriculture in 1860," *Explorations in Economic History* 8 (3) Spring 1971: 353-367.
- Fogel, Robert William, and Stanley L. Engerman (1971b). "The Economics of Slavery," in Robert William Fogel and Stanley L. Engerman, editors, *The Reinterpretation of American Economic History*, Harper & Row, 1971: 311-341.
- Fogel, Robert William, and Stanley L. Engerman (1974). *Time on the Cross*, volume 1, *The Economics of American Negro Slavery*; volume 2, *Evidence and Methods—A Supplement*, Little, Brown, 1971.
- Fogel, Robert William, and Stanley L. Engerman (1977). "Explaining the Relative Efficiency of Slave Agriculture in the Antebellum South," *American Economic Review* 67 (3) June 1977: 275-296.
- Fogel, Robert William, and Stanley L. Engerman (1980). "Explaining the Relative Efficiency of Slave Agriculture in the Antebellum South: Reply," *American Economic Review* 70 (4) September 1980: 672-690.

- Fogel, Robert William, and Stanley L. Engerman (1992a). "Reply to Haskel," in Robert W. Fogel and Stanley L. Engerman, editors, *Without Consent or Contract: Technical Papers*, Volume 1, *Markets and Production*, W. W. Norton, 1992: 293.
- Fogel, Robert William, and Stanley L. Engerman (1992b). "The Slave Breeding Thesis," in Robert W. Fogel and Stanley L. Engerman, editors, *Without Consent or Contract: Technical Papers*, Volume 2, *Conditions of Slave Life and the Transition to Freedom*, W. W. Norton, 1992: 455-472.
- Fogel, Robert William, et al. (1989-1992). *Without Consent or Contract: The Rise and Fall of American Slavery*, four volumes: Robert W. Fogel, [primary volume] 1989; Robert W. Fogel, Ralph A. Galantine, and Richard L. Manning, editors, *Evidence and Methods*, 1992; and Robert William Fogel and Stanley L. Engerman, editors, *Markets and Production, Technical Papers*, volume 1, 1992, and *Conditions of Slave Life and the Transition to Freedom, Technical Papers*, volume 2; W.W. Norton 1992.
- Foust, James D., and Dale E. Swan (1970). "Productivity and Profitability of Antebellum Slave Labor: A Micro-Approach," *Agricultural History* 44 (1) January 1970: 39-62.
- Gallman, Robert E. (1966). "Gross National Product in the United States, 1834-1909," in Dorothy Brady, editor, *Output, Employment, and Productivity in the United States After 1800*, Columbia University Press, 1966: 3-90.
- Gallman, Robert E. (1970). "Self-Sufficiency in the Cotton Economy of the Antebellum South," *Agricultural History* 44 (1) January 1970: 5-23.
- Goldin, Claudia D. (1975). "A Model to Explain the Relative Decline of Urban Slavery: Empirical Results," in Stanley L. Engerman and Eugene D. Genovese, editors, *Race and Slavery in the Western Hemisphere: Quantitative Studies*, Princeton University Press, 1975: 427-450.
- Goldin, Claudia D. (1976). *Urban Slavery in the American South. 1820-1860: A Quantitative History*. University of Chicago Press, 1976.
- Goldin, Claudia D. (2016). "Human Capital," in Claude Diebolt and Michael Hauptert, editors, *Handbook of Cliometrics*, Springer Reference, 2016: 55-86.
- Govan, Thomas P. (1942). "Was Plantation Slavery Profitable?" *Journal of Southern History* 8 (4) November 1942: 515-536.
- Grabowski, Richard, and Carl Pasurka (1989). "The Relative Efficiency of Slave Agriculture: An Application of a Stochastic Frontier," *Applied Economics* 21 (5) May 1989: 587-595.
- Grabowski, Richard, and Carl Pasurka (1991). "The Relative Efficiency of Slave Agriculture: A Reply," *Applied Economics* 23 (5) May 1991: 869-870.
- Gray, Lewis Cecil (1933). *History of Agriculture in the Southern United States to 1860*, two volumes, Carnegie Institution of Washington, 1933.
- Gutman, Herbert G. (1975). "The World Two Cliometricians Made: A Review Essay of  $F+E = T/C$ ," *Journal of Negro History* 60 (1) January 1975: 53-227. Reprinted as *Slavery and the Numbers Game: A Critique of Time on the Cross*, University of Illinois Press, 1975.

- Gutman, Herbert, and Richard Sutch (1976a). "Sambo Makes Good, por Were Slaves Imbued with the Protestant Work Ethic?" in Paul A. David et. al., *Reckoning with Slavery*, W.W. Norton, 1976: 55-93.
- Gutman, Herbert, and Richard Sutch (1976b). "Victorians All? The Sexual Mores and CONduct of Slaves and their Masters," in Paul A. David et. al., *Reckoning with Slavery*, W.W. Norton, 1976: 134-162.
- Haber, Samuel (1964). *Efficiency and Uplift: Scientific Management in the Progressive Era, 1890–1920*, University of Chicago Press, 1964.
- Haskell, Thomas L. (1979). "Explaining the Relative Efficiency of Slave Agriculture in the Antebellum South: A Reply to Fogel and Engerman," *American Economic Review* 69 (1) March 1979: 206-207.
- Hoffman, Martha K. (1992). "Thoughts on the Treatment of Moral Issues in *Time on the Cross*," in Robert William Fogel, Ralph A. Galantine, and Richard L. Manning, editors, *Without Consent or Contract: Evidence and Methods*, W.W. Norton.1992: 599-603.
- Hofler, Richard, and Sherman Folland (1991). "The Relative Efficiency of Slave Agriculture: A Comment," *Applied Economics* 23 (5) May 1991: 861-868.
- Johnson, Walter (1999). *Soul by Soul: Life Inside the Antebellum Slave Market*, Harvard University Press, 1999.
- Kaser, David (1964). "Nashville's Women of Pleasure in 1860," *Tennessee Historical Quarterly* 23 (4) December 1964: 379-382.
- Kiple, Kenneth F., and Virginia Himmelsteb King (1981). *Another Dimension to the Black Diaspora: Diet, Disease, and Racism*, Cambridge University Press, 1981.
- Kiple, Kenneth F., and Virginia Kiple (1977). "Slave Child Mortality: Some Nutritional Answers to a Perennial Puzzle," *Journal of Social History* 10 (3) Spring 1977: 284-309.
- Komlos, John, and Bjorn Alecke (1996). "The Economics of Antebellum Slave Heights Reconsidered," *Journal of Interdisciplinary History* 26 (3) Winter 1996): 437-457.
- Kotlikoff, Laurence J. (1979). "The Structure of Slave Prices in New Orleans, 1804 to 1862," *Economic Inquiry* 17 (4) October 1979: 496-517.
- Kravis, Irving B. (1972). "The Role of Exports in Nineteenth-Century United States Growth," *Economic Development and Cultural Change* 20 (3) April 1972: 387–405.
- Lindert, Peter H., and Jeffrey G. Williamson (2016). *Unequal Gains: American Growth and Inequality Since 1700*, Princeton University Press, 2016.
- Lindstrom, Diane (1970). "Southern Dependence upon Interregional Grain Supplies: A Review of the Trade Flows, 1840-1860," *Agricultural History* 44 (1) January 1970: 101-113.
- Malone, Ann Patton (1992). *Sweet Chariot: Slave Family and Household Structure in Nineteenth-Century Louisiana*, University of North Carolina Press: 1992.

- McClelland, Peter D. (1997). *Sowing Modernity: America's First Agricultural Revolution*, Cornell University Press, 1997.
- McCloskey, Donald [Deirdre] N. (1985). "The Problem of Audience in Historical Economics: Rhetorical Thoughts on a Text by Robert Fogel," *History and Theory* 24 (1) February 1985: 1-22. Reprinted with revisions as "The Problem of Audience in Historical Economics: Robert Fogel as Rhetor," in McCloskey, *The Rhetoric of Economics*, University of Wisconsin Press, 1985: 113-137.
- McCloskey, Donald [Deirdre] N., and George K. Hersh, Jr. (1990). *A Bibliography of Historical Economics to 1980*, Cambridge University Press, 1990.
- Metzer, Jacob (1975). "Rational Management, Modern Business Practices, and Economies of Scale in the Antebellum Southern Plantations," *Explorations in Economic History* 12 (2), April 1975: 123-150.
- Meyer, John R., and Alfred H. Conrad (1957). "Economic Theory, Statistical Inference, and Economic History," *Journal of Economic History* 17 (4) December 1957: 524-544.
- Modigliani, Franco (1966). "The Life Cycle Hypothesis of Savings, the Demand for Wealth and the Supply of Capital," *Social Research* 33 (2) Summer 1966: 160-217.
- Modigliani, Franco (1961). "Long-run Implications of Alternative Fiscal Policies and the Burden of the National Debt," *Economic Journal* 71 (284) December 1961: 730-755.
- Murray, John E.; Alan L. Olmstead; Trevon D. Logan; Johnathan B. Pritchett; and Peter L. Rousseau (2015). "Roundtable of Reviews for *The Half Has Never Been Told: Slavery and the Making of American Capitalism* [by Edward E. Baptist]," *Journal of Economic History* 75 (3) September 2015: 919-931.
- Nardinelli, Clark (1994). "Fogel's Farewell to Slavery: A Review Essay," *Historical Methods: A Journal of Quantitative and Interdisciplinary History* 27 (3) Summer 1994: 133-139.
- North, Douglass C. (1961). *The Economic Growth of the United States, 1790-1860*, Prentice-Hall, 1961.
- North, Douglass C. (1963). "Quantitative Research in American Economic History," *American Economic Review* 53 (1) Part 1 March 1963: 128-130.
- Olmstead, Alan L., and Paul W. Rhode (2008a). *Creating Abundance: Biological Innovation and American Agricultural Development*, Cambridge University Press, 2008.
- Olmstead, Alan L., and Paul W. Rhode (2008b). "Biological Innovation and Productivity Growth in the Antebellum Cotton Economy," *Journal of Economic History* 68 (4) December 2008: 1123-1171.
- Olmstead, Alan L., and Paul W. Rhode (2011). "Productivity Growth and the Regional Dynamics of Antebellum Southern Development," Paul W. Rhode, Joshua L. Rosenbloom, and David F. Weiman, editors, *Economic Evolution and Revolution in Historical Time*, Stanford University Press, 2011: 180-213.
- Olmstead, Alan L., and Paul W. Rhode (2015). "Were Antebellum Cotton Plantations Factories in the Field?" in William J. Collins and Robert A. Margo, editors, *Enterprising America: Businesses, Banks, and Credit Markets in Historical Perspective*, University of Chicago Press 2015: 245-276.

- Olmstead, Alan L., and Paul W. Rhode (2018). "Cotton, Slavery, and the New History of Capitalism," *Explorations in Economic History* 67 (1) January 2018: 1-17.
- Olmsted, Frederick Law (1856). *A Journey in the Seaboard Slave States; With Remarks on Their Economy*, Dix and Edwards, 1856.
- Olmsted, Frederick Law (1860). *A Journey in the Back Country*, Mason Brothers, 1860.
- Parker, William N. (1970a). "Introduction: The Cotton Economy of the Antebellum South," in William N. Parker, editor. *The Structure of the Cotton Economy of the Antebellum South*, Agricultural History Society, 1970: 1-4.
- Parker, William N. (1970b). "Slavery and Southern Economic Development: An Hypothesis and Some Evidence," *Agricultural History* 44 (1) January 1970: 115-125.
- Parker, William N., and Judith L. V. Klein (1966). "Productivity Growth in Grain Production in the United States, 1840-60 and 1900-10," in Dorothy S. Brady, editor, *Output, Employment, and Productivity in the United States After 1800*, Columbia University Press, 1966: 523-580.
- Phillips, Ulrich Bonnell (1905). "The Economic Cost of Slaveholding in the Cotton Belt," *Political Science Quarterly* 20 (2) June 1905: 257-275.
- Phillips, Ulrich Bonnell (1918). *American Negro Slavery: A Survey of the Supply, Employment and Control of Negro Labor as Determined by the Plantation Regime*, Appleton, 1918.
- Phillips, Ulrich Bonnell (1929). *Life and Labor in the Old South*, Little, Brown, 1929.
- Pritchett, Jonathan B. (2001). "Quantitative Estimates of the United States Interregional Slave Trade, 1820-1860," *Journal of Economic History* 61 (2) June 2001: 467-475.
- Pritchett, Jonathan B., and Herman Freudenberger (1992). "A Peculiar Sample: The Selection of Slaves for the New Orleans Market," *Journal of Economic History* 52 (1) March 1992: 109-127.
- Pritchett, Jonathan B., and Richard M. Chamberlain (1993). "Selection in the Market for Slaves: New Orleans, 1830-1860," *Quarterly Journal of Economics* 108 (2) May 1993: 461-473.
- Pritchett, Jonathan, and Jessica Hayes (2016). "The Occupations of Slaves Sold in New Orleans: Missing Values, Cheap Talk, Or Informative Advertising?" *Cliometrica* 10 (2) May 2016: 181-195.
- Ramsdell, Charles W. (1929). "The Natural Limits of Slavery Expansion," *Mississippi Valley Historical Review* 16 (2) September 1929: 151-171.
- Ransom, Roger L., and Richard Sutch (1977). *One Kind of Freedom: The Economic Consequences of Emancipation*, Cambridge University Press, First Edition 1977, Second Edition 2001.
- Ransom, Roger L., and Richard Sutch (1988). "Capitalists Without Capital: The Burden of Slavery and the Impact of Emancipation," *Agricultural History* 62 (3) Summer 1988: 133-160.

- Ransom, Roger L., and Richard Sutch (2001). "Conflicting Visions: The American Civil War as a Revolutionary Event," *Research in Economic History* 20 (2001): 249-301.
- Rhode, Paul W., and Richard Sutch (2006). "Estimates of National Product before 1929," in Susan Carter et al., editors, *Historical Statistics of the United States: Earliest Times to the Present*, Millennial Edition, volume 3, Cambridge University Press, 2006: 12-20.
- Roosevelt, Theodore (1909). Special Message to the Senate and House of Representatives: January 22, 1909. Online at Gerhard Peters and John T. Woolley, The American Presidency Project. <http://www.presidency.ucsb.edu/ws/?pid=69658>.
- Russell, Thomas D. (1993). "South Carolina's Largest Slave Auctioneering Firm," *Chicago-Kent Law Review* 68 (3) 1993:1241-1282.
- Russell, Thomas D. (1996). "Articles Sell Best Singly: The Disruption of Slave Families at Court Sales," *Utah Law Review* 1996, number 4:1161-1209.
- Saraydar, Edward (1964). "A Note on the Profitability of Ante Bellum Slavery," *Southern Economic Journal* 30 (4) April 1964: 325-332.
- Saraydar, Edward (1965). "The Profitability of Ante Bellum Slavery – A Reply [to Sutch]," *Southern Economic Journal* 31 (4) April 1965: 377-383.
- Schaefer, Donald F., and Mark D. Schmitz (1979). "The Relative Efficiency of Slave Agriculture: A Comment," *American Economic Review* 69 (1) March 1979: 208-212.
- Schmidt, Louis Bernard (1939). "Internal Commerce and the Development of National Economy before 1860," *Journal of Political Economy* 47 (6) December 1939: 798-822.
- Stampp, Kenneth M. (1956). *The Peculiar Institution: Slavery in the Ante-Bellum South*, Vintage Books, 1956.
- Stampp, Kenneth M. (1976). "A Humanistic Perspective," in Paul A. David, et al., *Reckoning with Slavery: A Critical Study in the Quantitative History of American Negro Slavery*, Oxford University Press, 1976: 1-30.
- Steckel, Richard H. (1977 [1985]). *The Economics of U.S. Slave and Southern White Fertility*, PhD dissertation, University of Chicago 1977, published by Garland Publishing, 1985.
- Steckel, Richard H. (1979). "Slave Height Profiles from Coastwise Manifests," *Explorations in Economic History* 16 (October 1979): 363-380.
- Steckel, Richard H. (1980). "Miscegenation and the American Slave Schedules," *Journal of Interdisciplinary History* 11 (2) Autumn 1980: 251-263.
- Steckel, Richard H. (1986a). "A Peculiar Population: The Nutrition, Health, and Mortality of American Slaves from Childhood to Maturity," *Journal of Economic History* 46 (3) September 1986: 721-741.
- Steckel, Richard H. (1986b). "A Dreadful Childhood: The Excess Mortality of American Slaves," *Social Science History* 10 (4) Winter 1986: 427-465.



- Steckel, Richard H., and Roderick Floud, editors (1997). *Health and Welfare during Industrialization*, University of Chicago Press, 1997.
- Sublette, Ned, and Constance Sublette (2016), *The American Slave Coast: A History of the Slave-Breeding Industry*. Lawrence Hill Books, 2016.
- Sutch, Richard (1965), "The Profitability of Ante Bellum Slavery – Revisited," *Southern Economic Journal* 31 (4) April 1965: 365-377.
- Sutch, Richard (1975a). "The Breeding of Slaves for Sale and the Westward Expansion of Slavery, 1850-1860," In Stanley L. Engerman and Eugene D. Genovese, editors. *Race and Slavery in the Western Hemisphere: Quantitative Studies*, Princeton University Press, 1975: 173-210.
- Sutch, Richard (1975b). "The Treatment Received by American Slaves: A Critical Review of the Evidence Presented in *Time on the Cross*," *Explorations in Economic History* 12 (October 1975): 335-435.
- Tadman, Michael (1989). *Speculators and Slaves: Masters, Traders, and Slaves in the Old South*, University of Wisconsin Press, 1989.
- Temin, Peter (1967). "The Causes of Cotton-Price Fluctuations in the 1830's," *Review of Economics and Statistics* 49 (4) November 1967: 463-470.
- Temin, Peter (1999 [2008]). Interview conducted by John Brown, *Newsletter of the Cliometric Society* 14 (3) October 1999: 3-6, 41-45. Reprinted with changes in John S. Lyons, Louis P. Cain, and Samuel H. Williamson, editors. *Reflections on the Cliometric Revolution: Conversations with Economic Historians*, Routledge 2008: 421-435.
- Toman, Jane T. (2005). "The Gang System and Comparative Advantage," *Explorations in Economic History* 42 (2) April 2005: 310-323.
- Troesken, Werner (2004). *Water, Race, and Disease*, MIT Press, 2004.
- Trussell, James, and Richard H. Steckel (1978). "The Age of Slaves at Menarche and Their First Birth," *Journal of Interdisciplinary History* 8 (3) Winter 1978: 477-505.
- Wanamaker, Marianne H. (2014). "Fertility and the Price of Children: Evidence from Slavery and Slave Emancipation," *Journal of Economic History* 74 (4) December 2014: 1045-1071.
- Whaples, Robert (1991). "A Quantitative History of the *Journal of Economic History* and the Cliometric Revolution," *Journal of Economic History* 51 (2) June 1991: 289-301.
- Williams, Heather Andrea (2003). *Self-Taught: African American Education in Slavery and Freedom*, University of North Carolina Press, 2003.
- Woodman, Harold D. (1963). "The Profitability of Slavery: A Historical Perennial," *Journal of Southern History* 29 (3) August 1963: 303-325.
- Wright, Gavin (1970). "'Economic Democracy' and the Concentration of Wealth in the Cotton South, 1850-1860," *Agricultural History* 44 (1) January 1970: 63-99.

- Wright, Gavin (1975). "Slavery and the Cotton Boom," *Explorations in Economic History* 12 (4) October 1975: 439-452.
- Wright, Gavin (1976). "Prosperity, Progress, and American Slavery," in Paul A. David et. al., *Reckoning with Slavery*, W.W. Norton, 1976: 302-336.
- Wright, Gavin (1978). *The Political Economy of the Cotton South: Households, Markets, and Wealth in the Nineteenth Century*, W. W. Norton, 1978.
- Wright, Gavin (1979). "The Efficiency of Slavery: Another Interpretation," *American Economic Review* 69 (1) March 1979: 219-226.
- Wright, Gavin (1986). *Old South, New South: Revolutions in the Southern Economy Since the Civil War*. Basic Books, 1986.
- Wright, Gavin (2006). *Slavery and American Economic Development*, Louisiana State University Press, 2006.
- Wright, Gavin (2013). *Sharing the Prize: The Economics of the Civil Rights Revolution in the American South*, Harvard University Press, 2013.
- Yasuba, Yasukichi (1961). "The Profitability and Viability of Plantation Slavery in the United States," *Economic Studies Quarterly* 12 (1) September 1961: 60-67.

**Table 1. Alternative Estimates of the Rate of Return to Slavery**  
Average for the South, various years

	<u>Date</u>	<u>Rate (%)</u>	<u>Source reference</u>
Conrad and Meyer [1958]			
prime field hands <sup>a</sup>	1846-1850	4.5-6.5	Table 9: p. 107
prime field wench	1846-1850	7.1-8.1	P. 109
Evans [1962]			Table 21, p. 217
	1846-1850	12.6-17.0	
	1856-1860	9.5-10.3	
Sutch [1965]			Table 7, p. 376
	1849	5.7-6.4	
	1859	5.8-6.3	
Foust and Swan [1970]			Table 6, p. 55
	1849	9.3	
	1859	6.9	
Fogel and Engerman [1974]	1860	10	Volume 2: p. 78
Ransom and Sutch [1977]	1859	6.3-8.0	Pp. 212-214

a. Fogel and Engerman present evidence that Conrad and Meyer underestimated the productivity of prime-age males [1971: 327-328].

**Table 2. Sex Distribution and Child-Adult Ratios,  
Exporting States, 1860**

Parker-Gallman Sample  
Farms with five or more women

R = Number of women per man, 15- 44	Ratio of children, 0-14, to adults, 15-44	Farms with five or more women	
		Number	Percent
R > 2.0 *	1.36	41	16.5
1.5 < R ≤ 2.0	1.27	42	16.9
1.1 < R ≤ 1.5	1.14	66	26.6
R ≤ 1.1	1.00	99	39.9

\* Includes farms with no men.

Source: Sutch 1975a, Table 12, p. 193.

**Table 3. Personal Income Per Capita by Geographic Divisions, 1840 and 1860**

1860 prices

Geographic division	Personal income (\$)		Annual rate of growth (%)	Population weights (US=1)	
	1840	1860		1840	1860
<b>North</b>	<b>109</b>	<b>141</b>	<b>1.30</b>	<b>0.62</b>	<b>0.65</b>
New England	126	186	1.97	0.13	0.10
Middle Atlantic	130	178	1.58	0.30	0.26
East North Central	64	90	1.72	0.17	0.22
West North Central	72	86	0.89	0.02	0.07
<b>South</b>	<b>72</b>	<b>96</b>	<b>1.45</b>	<b>0.38</b>	<b>0.33</b>
South Atlantic	66	84	1.21	0.20	0.14
East South Central	69	89	1.28	0.15	0.13
West South Central*	140	165	0.82	0.03	0.06

\* Excludes Texas. See footnote 17.

Source: Ransom and Sutch 1977: table F.6, p. 267. Population weights from Easterlin 1961: table 3, p. 535.

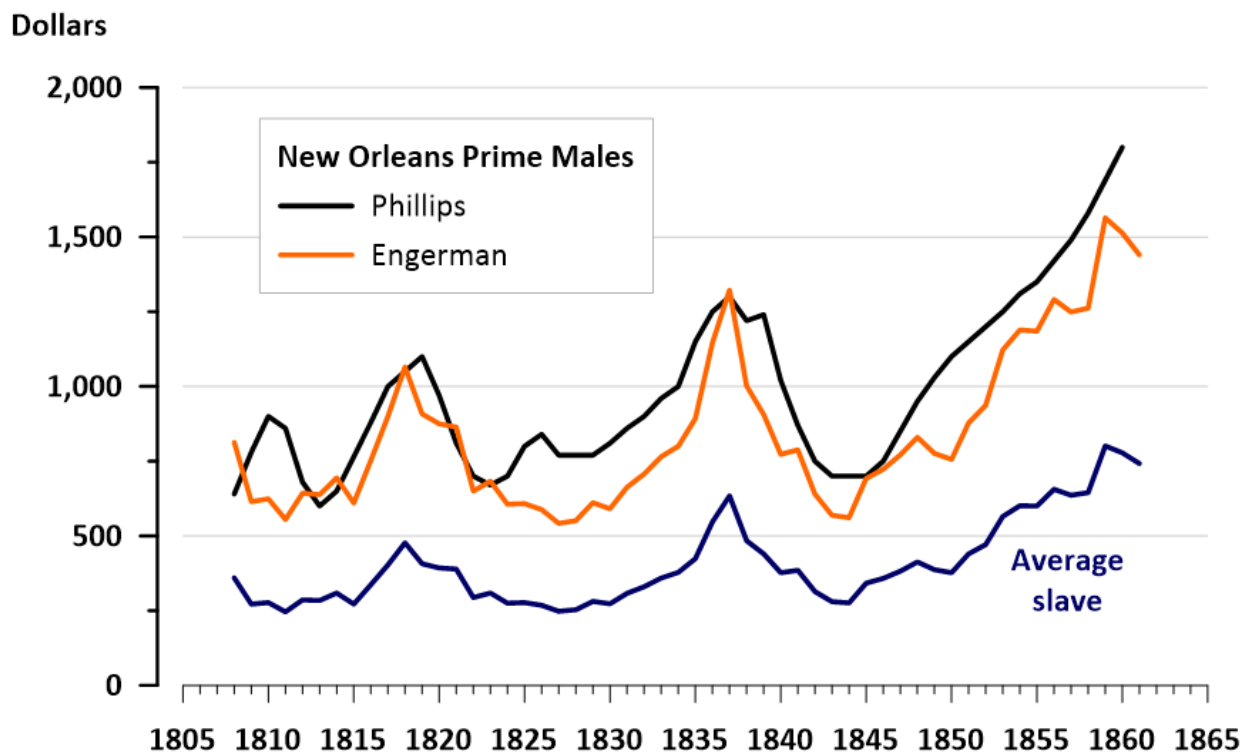
**Table 4. Share of Gross Capital Formation in  
Gross National Product, United States**

Gallman's estimates and slave-economy GNP  
Decade averages, 1839-1888

Decade	Gallman's estimates excluding the increase in slave wealth		Revised estimates, slave- economy concept
	1966	Revised 2006	
1839-1849	11.5	10.8	14.0
1844-1854	12.9	13.0	14.9
1849-1859	13.3	14.7	16.2
1869-1878	17.4	22.1	22.1
1874-1883	17.3	20.8	20.8
1879-1888	18.9	23.5	23.5

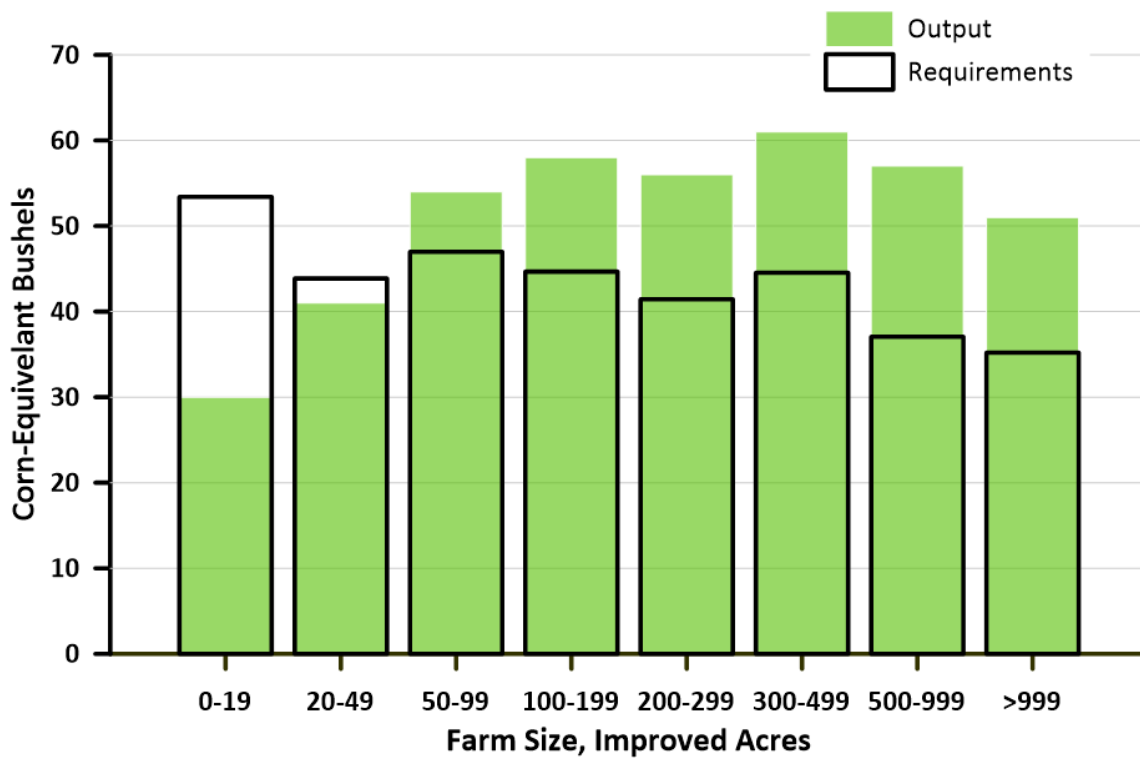
Sources: Gallman's 1966 estimates computed from the underlying sources by Ransom and Sutch [1988: table 4: 149] using methods described by Gallman [1966: 10-14]. Revised Gallman-estimates are calculated as averages of annual data presented in Carter et al. [2006: tables Ca192-207 (for 1869-1888) and Ca219-232 (for 1839-1858)]. The pre-Civil War shares based on the slave-economy concept are calculated from the same source [table Ca233-240]. See Paul Rhode and Richard Sutch for a discussion of the slave-economy gross national product [2006: 16].

**Figure 1. Slave Prices - Prime Male Field Hands Sold in New Orleans and a U.S. Average of All Slaves: 1808-1861**



Sources: *New Orleans Prime Males*: Phillips 1929: 177; Engerman, Sutch, and Wright 2006: series Bb210. *Average slave*: Ransom and Sutch 1988: table A-1 (column 4), pp. 150-151.

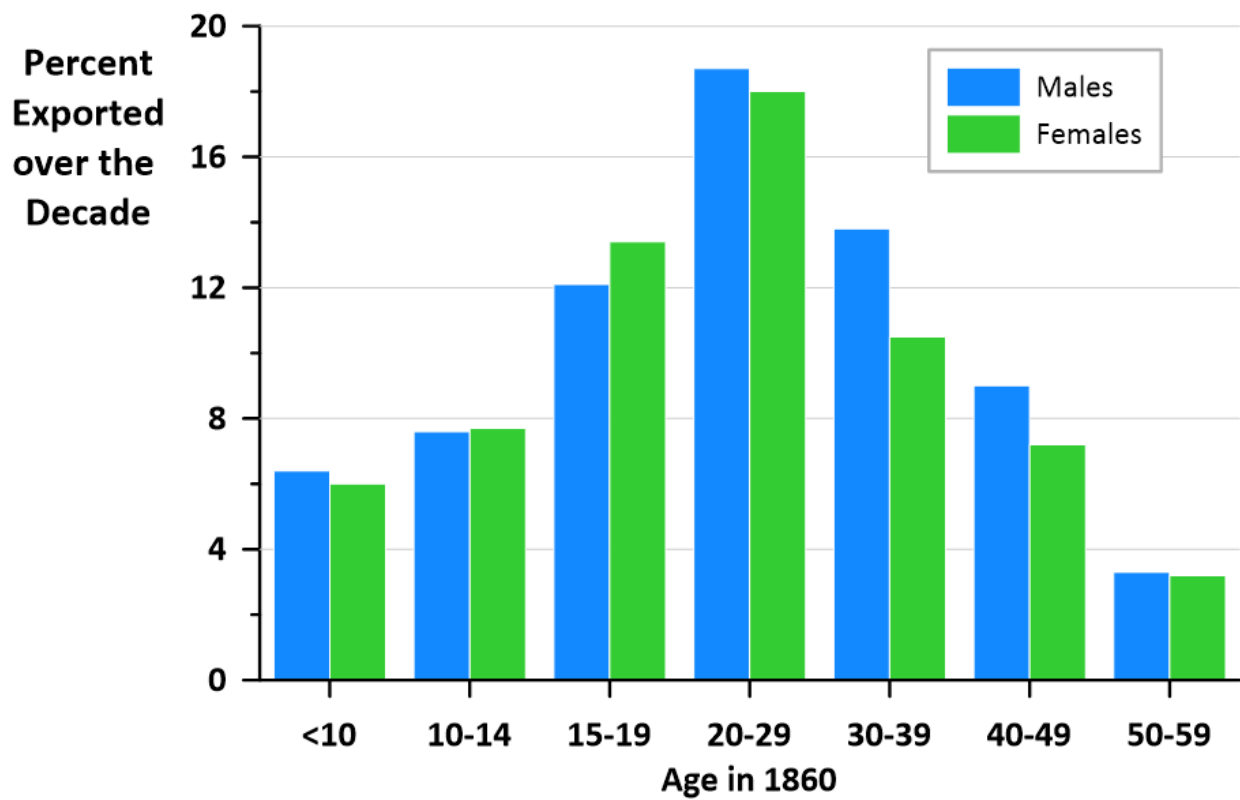
**Figure 2. Per Capita Production of Grain, Parker-Gallman Sample, 1860**



Source: Gallman 1970: tables 1 and 2.

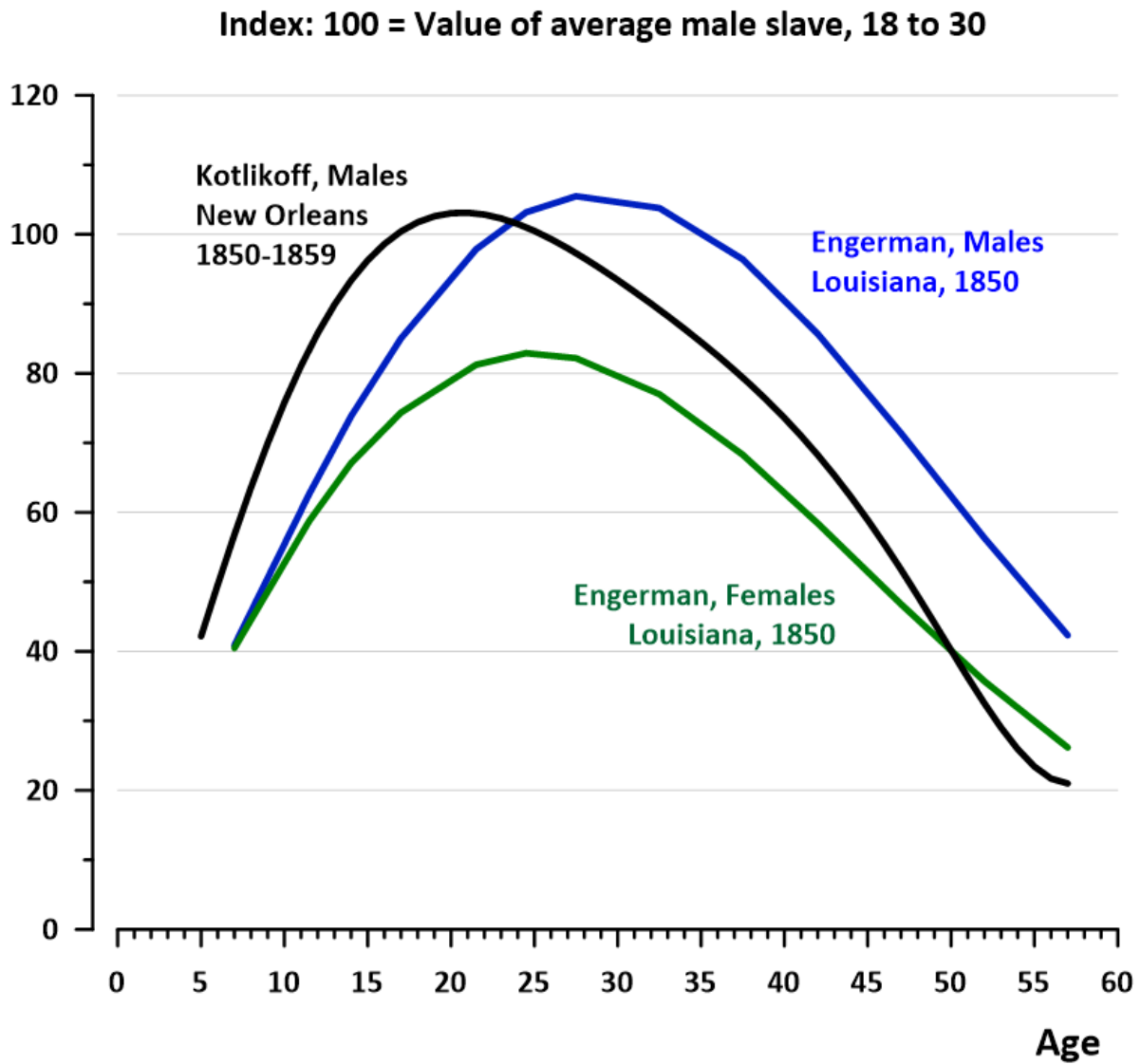


**Figure 3. Exportation Rate, by Age and Sex of Slave**  
**Selling States, 1850-1860**



Source: Sutch 1975b: table 5, p. 181.

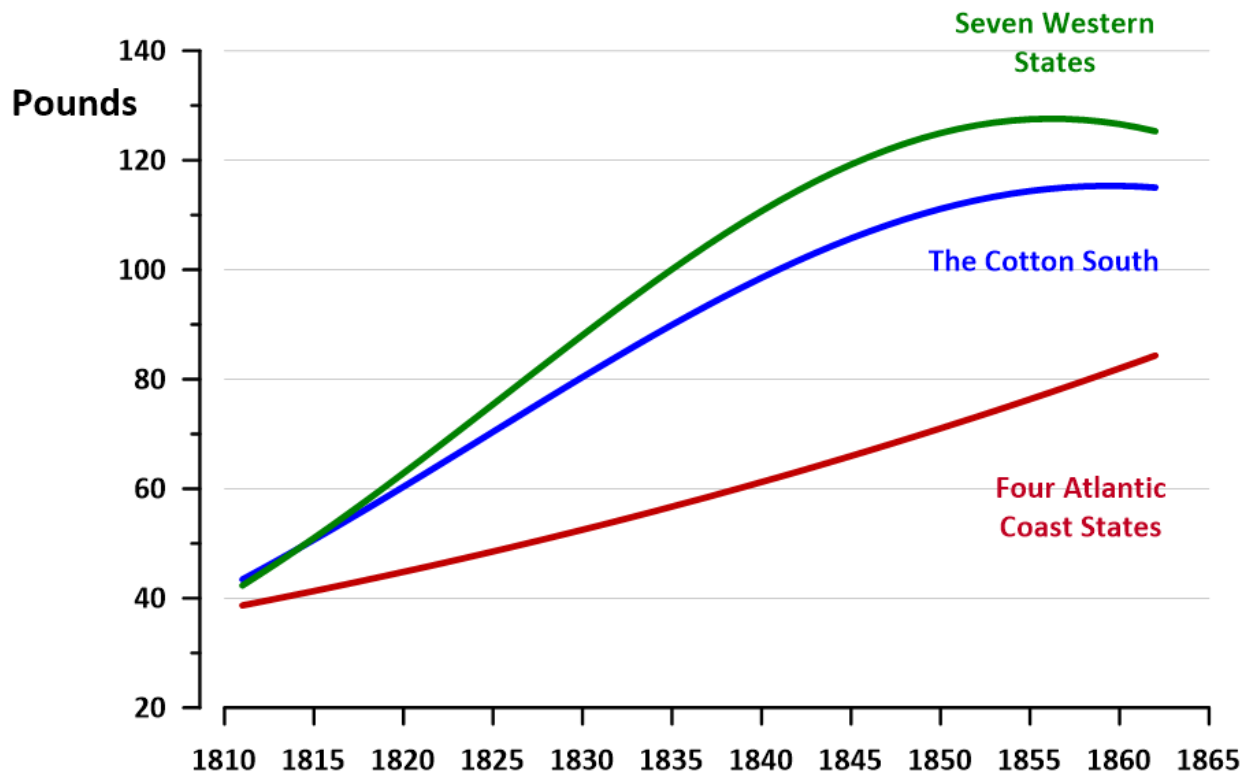
**Figure 4. Age Profile of Slave Values by Sex, Louisiana 1850s**



Sources: *Males and Females, Louisiana, 1850*: Engerman, Sutch, and Wright 2006: series Bb217-Bb218. *Males, New Orleans, 1850-1860*: Kotlikoff 1979: table 4.

**Figure 5. Daily Cotton Picking Rates, 1811-1862**

Mean pounds harvested per worker per day



Source: Olmstead and Rhode 2008b: tables 2 and 4, equation 1.