Demographic Causes and Consequences of the Interregional Slave Trade: The Slave Breeding Hypothesis[*]

by

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Abstract

The demographic causes and consequences of the interregional slave trade are estimated using a unique micro-data set that enables us to identify the census records of slave sellers. Using published census data, we show that the child-woman ratio was higher in the exporting areas of the U.S. South, a result that is commonly attributed to slave breeding. By comparing the dates of sale and census enumeration, we show that slave sales caused higher child-woman ratios rather than the reverse. For plausible assumptions, we show that the interregional slave trade can fully account for the child-woman ratio observed in the exporting areas.

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"I am from a slave-breeding state—where slaves are reared for the market as horses, sheep, and swine are." – Frederick Douglass (1846)

Slave breeding and the interregional slave trade are closely linked in the historiography of slavery. According to John Cairnes, the slave trade was crucial for the economic survival of the South. Because of soil exhaustion, the Southeast was not suited for the production of staple crops yet her climate was suited for the breeding of slaves. In the Southwest, "the climate was unfavorable to human life spent in severe toil, but the soil was teeming with riches" (Fogel and Engerman 1974, p. 48). Thus according to Cairnes, the slave trade facilitated regional specialization and the interregional transfer of labor. For John Simpson (1863, p. 3), "the prohibition of the African slave trade and … the purchase of Louisiana … made slavery in Virginia again profitable, as a means of breeding slaves for exportation and sale to the South." Frederick Olmstead (1861 p. 57) quotes a letter sent by a slaveholder: "In the States of Maryland, Virginia, North Carolina, Kentucky, Tennessee, and Missouri, as much attention is paid to the breeding and growth of negroes as to that of horses and mules. Further South, we raise them both for use and for market."

Despite extensive research, there are few (if any) documented cases of slaveholders breeding slaves for sale.[1] "It has been said by various anti-slavery spokesmen that many slaveowners systematically bred slaves for the market. They have adduced no shred of supporting evidence however" (Phillips 1918, p. 361). Kenneth Stampp (1956, p. 245) agrees

1 An incomplete literature review includes Weld (1839), Cairnes (1862), Simpson (1863), Collins (1904), Phillips (1918), Gray (1933), Bancroft (1931), Conrad and Meyer (1958), Dumond (1961), Fogel and Engerman (1974, 1992), Engerman (1976), Gutman and Sutch (1976), Sutch (1975, 1988), Lowenthal and Clarke (1977), Fogel (1989), Tadman (1989), Walker (1993), and Sublette and Sublette (2016).

that "evidence of systematic slave breeding is scarce indeed, not only because it is unlikely that many engaged in it but also because written records of such activities would seldom be kept. But if the term is not used with unreasonable literalness, if it means more than owner-coerced matings, numerous shreds of evidence exist which indicate that slaves were reared with an eye to their marketability – that the domestic slave trade was not 'purely casual.'"

Stampp suggests that breeders did not record such practices because of its reprehensible nature. The lack of documentation may also indicate that relatively few slaveholders bred slaves. Because it is unobservable, researchers have looked for circumstantial evidence of slave breeding. Richard Sutch (1975), for example, analyzes slave fertility rates that are too high to have occurred naturally. For this project, I also search for circumstantial evidence of slave breeding. Rather than looking for unusual cases, however, I exploit the close link between slave breeding and slave sales. Assuming that breeders were more likely to sell than other owners, I analyze the demographic characteristics of their holdings and determine whether these characteristics are consistent with slave breeding.

Slave Breeding and the Slave Trade

Between 1790 and 1860, approximately one-million slaves migrated from the southeastern United States to the southwestern frontier.[2] This forced migration took two basic

2 Net migration estimates vary. For 1790 to 1860, Claudia Goldin (Fogel and Engerman 1974b, p. 44) estimates an interregional net migration of 835,000 slaves whereas Michael Tadman (1989, p. 12) estimates a net migration of approximately 1,110,000 slaves. Tadman's estimate is greater than Goldin's because he adjusts for the net migration of young children. To be sure, Tadman could not directly estimate the net migration of children, aged less than 10 years, because they had not yet been born on the enumeration date of the previous decennial census. Instead, Tadman derived his estimate of the number of child migrants from the product of the net-migration of adult women and an assumed child-

forms: the migration of planters (and their slaves) and the interregional slave trade. Migrating planters were basically non-selective and took all of their slaves regardless of their ages or gender. In contrast, traders purchased slaves singly and for these slaves, separations were inevitable. Evidence from the New Orleans slave market indicates that the vast majority of imported slaves were sold without a spouse or a child.[3] Although planter migrations destroyed some marriages and families, the interregional slave trade was clearly more disruptive for the family lives of slaves.

The interregional slave trade also affected the demographic composition of the remaining enslaved population. Unlike planters who migrated with all of their slaves, traders preferred to purchase teenagers and young adults and they avoided the purchase of young children (Pritchett and Chamberlain 1993). Because the children were left behind, the child-woman ratio would have increased in those areas that sold to traders.[4] Table 1 shows that, from 1820 to 1860, the child woman ratios were 6 to 11 percent higher in the exporting areas than the in the South as a whole. In 1870, the child-woman ratio for the freed population was virtually the same in both areas. Although many factors may have affected these ratios, the disappearance of the regional difference after the war suggest that slavery was an underlying cause of the regional difference in the first place.

Higher child-woman ratios may indicate higher fertility rates if not deliberate slave breeding. "Whether systematically bred or not, the natural increase of the slave force was an

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woman ratio.

3 For imported women aged 15 to 49 years, 90 percent were sold without a child and 98 percent were sold without a husband.

4 The states of Virginia, North Carolina, and Maryland are defined as exporting areas because they accounted for 78 percent of the imported slaves sold in New Orleans in 1830.

important, probably the most important, product of the more exhausted soil of the Old South" (Conrad and Meyer 1958, p. 113). Rather than indicating higher fertility, Fogel and Engerman (1974: p. 82) write that the higher child-woman ratio of the exporting areas is a statistical artifact. "A fertility rate, it should be remembered, is a ratio. The denominator consists not only of married women but also of single women. Hence the fertility rate will be higher in the Old South if the share of single women without children in the interregional migration was higher than in the population that remained behind." For Fogel and Engerman, the selective migration of slaves accounts for the higher child-woman ratios in the exporting areas of the South. Because planters migrated with all of their slaves, including both women and children, their migration had little effect on child-woman ratios for the remaining slaves. By implication, it was the mass migration of slaves via the interregional slave trade that increased the child-woman ratios in the exporting areas.

According to the slave breeding hypothesis, soil exhaustion and declining profit led slaveholders to breed slaves for sale. In other words, high fertility rates caused the interregional trade in slaves. Alternatively, increased labor demands in the Southwest caused the exportation of slaves via the slave trade. Because traders purchased and shipped relatively few children, slave sales increased the child-woman ratio for those slaves left behind. For the selective migration theory, the slave trade caused higher child-woman ratios in the exporting areas.

In this paper, we estimate the effect of slave sales on the demographic composition of the slave population using a sample of holdings from the 1830 census. As evident from New Orleans sales records, the owners of these holdings were directly involved in the interregional slave trade. We establish causation by analyzing the order of events. For those owners who sold

prior to the date of census enumeration, the sale should affect the demographic composition of the slaveholding as recorded in the census records. For those owners who sold after enumeration, the demographic composition of the slaveholding affected the owner's decision to sell. Consistent with Fogel and Engerman's thesis, we find that the sale of a childless woman increased the child-woman ratio among the slaves left behind. We also find that the demographic composition of the slaveholding had relatively little effect on the owner's decision to sell. Overall, these findings suggest that the child-woman ratios observed for the exporting areas were the direct result of slave sales rather than slave breeding.

Description of Data

During the antebellum period, New Orleans was the largest city in the southern United States and the site of its largest slave market. Under Civil Law, Louisiana slave sales were treated as real estate transactions and all sales had to be notarized. Each notarial invoice includes information on the price, name, age, and sex of the slave, as well as the names and residences of the buyers and sellers. The New Orleans Notarial Archive was established in 1867 as the depository for the notarial records and because of the size of the slave market and the quality of the records, it is the best source of information on slave sales in the United States.[5] These notarial records are the primary data source for this study.

For an imported slave sold in 1830, the notarial records include additional information. The Louisiana legislature passed a law in 1829 that required an out-of-state slave be

5 A description on the New Orleans Notarial Archives can be found at the following website: http://www.orleanscivilclerk.com/history.htm

accompanied by a so-called certificate of good moral character made out in the county where the slave was originally purchased. This law was repealed in 1831. Most important for this study, the certificate of good character lists the name of the previous owner of the slave and the date and place of certification. The availability of this information allows us to identify the records of slave sellers as reported in the 1830 decennial census. Because we identify the records of slave sellers, we can estimate the demographic causes and consequences of the interregional slave trade.

Our initial sample includes the extant records of 6,174 slaves sold in New Orleans during 1830. After excluding the records of local slaves (who were sold without certificates), the sample includes the records for 2,289 imported slaves.[6] The names of 24 sellers were not listed on the certificates and 15 slaves were rented or employed by their owners rather than sold. Excluding these records decreases the sample size to 2,250 observations. As illustrated in Figure 1, the imported slaves in our sample originated from 192 different counties across the South. Although their origins were widely dispersed, approximately 78 percent of the slaves were purchased and shipped from the states of Virginia, North Carolina and Maryland (Freudenberger and Pritchett 1991, p. 460).

Traders purchased slaves from a variety of sources. The certificates of good character indicate that traders acquired slaves from sheriffs and the administrators of estates. Some imported slaves were previously owned by their sellers whereas others were sold on consignment

6 Our sample includes records from the following notaries: Carlile Pollock, William Boswell, L. Ferraud, H. Pedesclaux, Felix Pedesclaux, William Christy, L. T. Caire, Theodore Segher, O. De Armas, Charles Janin, Felix De Armas, and A. Mazureau. The notarial records of G. R. Stringer and William Y. Lewis were destroyed in office fires.

(usually by a parent). Overall, traders acquired 109 slaves, or approximately 5 percent of the imported slaves, from these sources. The vast majority of the slaves were purchased from the holdings of ongoing farms and plantations. The professional character of the trade is indicated by the large number of sellers per trader. The sample includes the records of 185 traders who purchased slaves from 1,698 different slaveholders in the exporting areas, or approximately nine sellers per trader. Most likely, the traders and slaveholders were unrelated (as indicated by their different surnames) and most slaveholders (83 percent) sold only one slave. An example of a professional slave trader is James Barnes Diggs, who purchased 115 slaves from 100 different slaveholders. Diggs purchased slaves from many holdings, bundle them in lots, and shipped them to New Orleans for sale.

Interregional traders shipped more males than females to New Orleans. For imported slaves aged 15 years or more, the sex ratio equaled 1.94, or nearly two males for every female. In addition, they shipped relatively few children to this market (see figure 2). Although children, aged 0 to 9 years, comprised 35 percent of the U.S. slave population in 1830, they accounted for less than 4 percent of the imported slaves sold in New Orleans. There are very few examples of intact families in our sample. Most slaves were purchased singly and most were teenagers or young adults. Less than 10 percent of the adult females were sold with a child and the child-woman ratio was 0.11. As seen in Table 1, the contemporary child-woman ratio in the exporting areas was 1.243, or approximately 11 times greater than the ratio for slave sales. The paucity of children sold in New Orleans provides prima facie evidence of the slave trade's effect on child-woman ratios.

Linked Records

The records of imported slaves sold in New Orleans are matched to the 1830 manuscript census using the names of the previous owners and the counties of certification as listed on the certificates of good character.[7] The linking of these records provides information on the holdings of 533 sellers of 731 slaves. The observable characteristics of the linked sample are similar to those for the entire sample of imported slaves. Children account for approximately 4.1 percent of the slaves in the matched sample and the sex ratio for the matched sample is approximately 2. These statistics suggest that the linking process did not systematically remove observations from our working sample.[8]

The linked sample represents approximately 29 percent of the sellers and approximately 28 percent of the imported slaves sold in New Orleans. We could not link the records of some sellers for a variety of reasons. Some names were illegible or abbreviated whereas others were modified by the census marshals or the clerks of court. Because the 1830 census only reports the names of household heads, only sellers who were household heads could be match to census records. We also exclude observations for sellers with multiple holdings in the county of certification (who were few in number). Despite these limitations, the overall match rate appears to be comparable to those found in other historical studies using this methodology.

The dates of certification and census enumeration play important roles in this study. The official date of census enumeration was June 1, 1830. Although marshals might visit households

7 The 1830 census provides valuable demographic information but relatively little information about anything else. The linking was done by hand using published indices authored by Ronald Vern Jackson (1976). The control group of slaveholders includes records from counties where at least one slaveholder sold a slave to a New Orleans trader.

8 The certification dates for the linked records are similar to those for non-linked records (see figure 3).

after June 1, they were instructed to enumerate all family members "whether present or not, and not to include any person whose usual abode was not in the family they are enumerating on the said 1st day of June. They will, of course, include such persons as may have deceased after that day, and will not include in it infants born after that day" (Wright and Hunt 1900, p. 140). Marshals were instructed to record the number of slaves of each sex in age bins of 0 to 9 years, 10 to 23, 24 to 35, 36 to 54, 55 to 99, and 100 years and upward. If a slave was sold after June 1 but prior to the marshal's visit, he was to be enumerated with the household.

We use the date of certification to approximate the date of sale and separation of the slave from the holding.[9] Certifications were highly seasonal and, for most slaves, the date of certification led the date of sale in New Orleans by approximately three months. As seen in figure 3, most slaves were certified during the fall and early winter and relatively few were certified during the months of April to July. Note that relatively few slaves were certified circa June 1, the date of census enumeration.

As seen in figure 3, most slaves were certified prior to the date of census enumeration and for them, the census record provides demographic information about the holding after the slave had been removed from it. We use these records to estimate the effect of slave sales on household composition.[10] For those slaves certified after June 1, the census records provide

9 Freudenberger and Pritchett (1991, p. 467) linked certificates deposited in New Orleans to records of slave sales located in Maryland and find that the recorded dates of sale closely approximated the dates of certification.

10 Tadman (1989, p. 295) suggests that some traders may have purchased and left slaves with their former owners until shortly before the time of departure for the lower South. Because these slaves may have been erroneously enumerated with their previous owners, we exclude those observations for slaves certified within two weeks of June 1. To promote accurate estimates, we also exclude those observations of slaves certified prior to June 1, 1829. These exclusions reduce the sample size from 731 to 714 observations.

information about the holding prior to the sale and separation of the slave. We use these demographic data to analyze the slaveholder's decision to sell slaves.

Our sample consists of all slaveholdings in the exporting areas and we identify the slave sellers using the linked certificates of good character. In rows (1) and (2) of Table 2, we compare descriptive statistics for the holdings of slave sellers and a control group representing the enslaved population of the exporting areas. Descriptive statistics for subsets of the linked sample are presented in rows (3) and (4). A comparison of these rows indicates that the holdings of slave sellers had higher child-woman ratios than other holdings in the exporting areas, a result that is generally consistent with both slave breeding and selective migration. In the following, we use regression analysis to help us compare these two alternative theories.

Demographic Causes of the Interregional Slave Trade

Did slaveholders breed slaves for the market? Because slaveholders were allegedly reluctant to record such practices, we cannot observe slave breeding. Most historians believe, however, that breeders raised slaves for the market.[11] Because slave selling is observable, we can use it as a proxy variable for slave breeding. To be sure, not everyone who sold slaves was a breeder nor, for that matter, did everyone who bred slaves sell them. The choice of an appropriate proxy variable requires it to be correlated with the unobserved variable and

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11 See, for example, Gray (1933, p. 662), Fogel and Engerman (1974, p. 78), Tadman (1989, p. 121), Collins 1904, p. 68) and Phillips (1918, p. 361). Not everyone agrees, however. Whether "slaves were raised for sale for use by their owner does not seem to be relevant to the issue of breeding. Owners could be interest in fostering a high birth rate because they (or their children) would have had use for the labor. No sale need be intended" Gutman and Sutch (1976, p. 155).

uncorrelated with the error term. It is my contention that slaveholders who sold slaves were more likely to be breeders. Using this assumption, we may analyze the demographic factors associated with slave breeding.

For slaveholders who sold after the date of enumeration, census data allows us analyze their decisions. For regression (1) in Table 3, the dependent variable is a dichotomous indicator of selling status and the independent variables include the child-woman ratio, the sex ratio, the size of the holdings, and county fixed effects.[12] If slaveholders bred slaves for the market, we should find that the enslaved women owned by breeders had higher fertility rates than the women owned by others. As seen in regression (1) of Table 3, the estimated coefficient for the child-woman ratio is negative (which is the wrong sign) and not statistically significant. In other words, the females owned by slave sellers were not unusually fertile. Either slave sellers were not slave breeders or, implausibly, the women owned by breeders did not have higher fertility rates.

To maximize profit from slave sales, Richard Sutch suggests that slave breeders manipulated the sex ratios of their holdings. According to Sutch (1975, p. 191), a slave breeder "would not need to have one man for each woman. He could have each man impregnate many women." Consequently, slaveholdings with low sex ratios and high fertility rates could be interpreted as evidence of slave breeding. As seen in regression (1) of Table 3, the estimated coefficients for the sex-ratio covariate is positive (which is the wrong sign) and statistically significant. If slave selling serves as a proxy for slave breeding, then these regression results

12 Logit regression results are presented in Table A1 of the Appendix.

suggest that breeders kept unusually large numbers of males, an implausible result.

We also estimate the probability of selling a male, conditional on selling an adult slave. As seen in Table A2 of the Appendix, the estimated regression coefficient for percent male is positive and statistically significant at the 10 percent level. As expected, slaveholders with relatively more males were more likely to sell males than females. For holdings with equal numbers of adult males and females, we find that slaveholders were almost twice as likely to sell a male as a female. Apparently, slave sellers were not overly concerned about keeping equal numbers of adult males and females in their holdings. Traders wanted males and slaveholders were willing to sell them.[13]

The number of slaves owned by the slaveholder affected the probability of sale and the probability that an individual slave was sold. As seen in regression (1) in Table 3, the estimated coefficient for holdings with less than 16 slaves is negative (and not statistically significant), indicating that small owners were less likely to sell than large owners with more than 50 slaves (the omitted category in the regression). To estimate the probability that an individual slave was sold, we estimate regression (2), where the dependent variable is the proportion of slaves to be sold from the holding. We find that the estimated coefficient for holdings with less than 16 slaves is positive and statistically significant (at the 10 percent level), indicating an increased probability of sale for smaller holdings.

To summarize, the regression results indicate that the adult females owned by sellers

13 According to Tadman (1989, p. 124), the "male bias in the trade is explained, not by any Upper South concern to retain a surplus of female slaves, but by the special demand for males in the sugar area of Louisiana."

were not unusually fertile. In addition, slave sellers had relatively more males than females. Although large slaveholders were more likely to sell than other owners, individual slaves living in small holding were more likely to be sold. In the next section, we explore the demographic consequences of these slave sales.

Demographic Consequences of the Interregional Slave Trade

How did slave sales affect the demographic characteristics of slave holdings? Fogel and Engerman (1992, p. 458) propose that the number of children can be expressed as a function of the number of men and women residing on a farm. In the following equation, we modify Fogel and Engerman's function to include not only the men and women on the farm, but also the men and women who were recently sold:

$$C^R = f(W^R, M^R, W^S, M^S), \tag{1}$$

where C, W, and M indicate the number of children, women, and men respectively and the superscripts R and S indicate remaining slaves and sold slaves. Assuming the function is homogeneous of degree one, we divide both sides of equation (1) by the number of remaining women to yield the child-woman ratio:

$$\frac{C^R}{W^R} = f\left(1, \frac{M^R}{W^R}, \frac{W^S}{W^R}, \frac{M^S}{W^R}\right). \tag{2}$$

We estimate a linear approximation of equation (2) using regression analysis:

(3) $$\frac{C^R}{W^R} = \alpha + \beta_1 \frac{M^R}{W^R} + \beta_2 \frac{W^S}{W^R} + \beta_3 \frac{M^S}{W^R} + \varepsilon.$$

For those slaveholdings who sold prior to the enumeration date, we estimate the effect of the sale on the child-woman ratio. Regression results are presented in Table 4, where the dependent variable is the child-woman ratio of the remaining slaves. In addition to the sex ratio of the remaining slaves, we include covariates for the women and men recently sold as indicated by New Orleans sales records. As seen in regression (1), the estimated coefficient for the sex ratio is both large and statistically significant. Consistent with Fogel and Engerman (1992: p. 459), holdings with higher sex ratios had higher fertility rates. We also find that holdings that sold childless women had significantly higher child-woman ratios than other holdings. The estimated regression coefficient for the number of women sold is both statistically and numerically significant. If, for example, half of the women on a farm had been recently sold, then the child-woman ratio of the remaining women is predicted to rise by 0.5, or approximately 44 percent.

Relatively few mothers were sold with their children. For those who were, the sale had the opposite effect on the child-woman ratio. As indicated by the negative sign of the regression coefficient, the sale of mothers with children lowered the child-woman ratio of the remaining slaves (a result that is statistically significant at the 10 percent level). Finally, the sale of men did not have a statistically significant effect on the remaining child-woman ratio. In conclusion, it was the sale of childless women (and not the sale of slaves in general) that increased the child-woman ratios found on these farms.

The size of the holding also affected the fertility rate. Using county-level data, Steckel

(1985: pp. 220-232) finds the child-woman ratio is negatively correlated with the median plantation size. Other things equal, the reduced availability of potential marriage partners should have lowered the fertility rates on smaller farms. Steckel argues, however, that small slaveholders had little choice but to allow cross-plantation marriages, thus resulting in higher fertility rates on these farms. Consistent with his predictions, the regression results indicate that holdings with more than fifty slaves had significantly lower child-woman ratios than holdings with 16 to 50 slaves. Surprisingly, smaller holdings, with 15 slaves or less, also had lower child-woman ratios, which suggests a need for additional research on the fertility of slaves residing on smaller farms.

Some slaveholders in the control group may have sold slaves to traders from other markets. Because we misclassify these holdings, the results presented in regression (1) of Table 4 may be affected by measurement error. In regression (2), we re-estimate the model and omit the control observations. Restricting the sample to observed slave sellers has little effect on our empirical results. The sign and magnitudes of the regression coefficients are qualitatively the same. Once again, we find that the sale of a childless woman increases the child-woman ratio of the remaining slaves and that the sale of a mother with children has the opposite effect. This suggests that measurement error, and more specifically an undercount of slave sales, does not bias our regression results.

As a potential falsification test, we designate separate covariates for those holdings that sold before and after the date of census enumeration. As seen in Table A3 of the Appendix, sales that occurred after the data of census enumeration had no effect on the observed child-woman ratio. Consistent with the regression results presented in Table 4, the sale of a childless woman

increased the child-woman ratio when the sale occurred prior to date of census enumeration. If the sale of the childless woman occurred after the census enumeration, the sale had no effect on the ratio. Selective sales, and not slave breeding, increased the child-woman ratios of these holdings.

Slave sales and interregional fertility

Table 1 shows that the child-woman ratio was higher in the exporting areas of the South. Could slave sales account for this result? Do higher child-woman ratios necessarily imply higher fertility rates? The answer to these questions depends on a few assumptions and the relative size of the interregional slave trade. Assuming a closed enslaved population of the South, we use the decennial census to estimate survival rates for different cohorts of slaves. The number of surviving slaves from an area equals the product of the base-year population and the cohort survival rate.[14] The number of children from an area equals the sum of the emigrating children and the remaining children:

$$C = C^E + C^R, \tag{4}$$

where C indicates the number of children and the superscripts E and R indicate emigrating and remaining slaves. If we divide equation (4) by the number of women, the child-woman ratio can be expressed as follows:

14 We cannot estimate survival rates for children under 10 years of age because they had not yet been born at the base year. Instead we estimate the number of child migrants using the child-woman ratios for female migrants.

(5) $$\frac{C}{W} = \frac{C^E}{W^E}\frac{W^E}{W} + \frac{C^R}{W^R}\frac{W^R}{W}.$$

Slaves migrated via the interregional slave trade or planter migrations. The number of emigrating children equals the sum of traded children and the children migrating with planters.

(6) $$C^E = C^S + C^P,$$

where the superscripts S and P indicate sold slaves and slaves migrating with planters respectively. Substituting for the number of emigrating children, we rewrite equation (6) as follows:

(7) $$\frac{C}{W} = \left(\frac{C^S}{W^S}\gamma + \frac{C^P}{W^P}(1-\gamma)\right)\frac{W^E}{W} + \frac{C^R}{W^R}\frac{W^R}{W},$$

where γ indicates the proportion of adult women shipped via the slave trade.

Table 5 shows estimates for the parameters used in equation (7). If we assume that migrating planters took all of their slaves with them, then the child-woman ratio for their slaves equals that for the entire South. Table 1 presents the child-woman ratios for the remaining slaves in the exporting areas and for all slaves in the South. The child-woman ratio for the slaves sold to traders is calculated from the certificates of good character. Finally, we estimate the net emigration rate for adult women, aged 10 to 54 years, using census data from 1820 and 1830. Substituting these values into equation (7) and solving for γ yields a value of 69 percent. In other words, if the shipments of slave traders accounted for 69 percent of the adult women migrants, then fertility rates in the exporting areas would have equaled those found elsewhere in

the South.

Unfortunately, we do not have accurate estimates of the relative size of the interregional slave trade. Fogel and Engerman (1974, p. 48) estimate that 16 percent of all migrants were shipped by traders, Tadman (1989, p. 247) estimates that the slave trade accounted for 60 to 70 percent of the out migration, and Pritchett (2001, p. 471) estimates that sales accounted for "approximately one-half" of the forced migration of slaves. Variation in the presumed child-woman ratios of emigrants could also affect our estimates. If, for example, planters migrated with fewer enslaved children, then the required value for γ would be less. In summary, the plausibility of these results depends on our prior beliefs. For those scholars who think that the interregional slave trade was relatively large, the trade can fully account for the higher fertility rates observed in the exporting areas.

Discussion and Conclusion

For Fogel and Engerman (1974, p. 82), the sale of a childless woman increased the share of married women and the child-woman ratio of the slaves left behind. The sale of a childless woman may also indicate the separation of a mother from her child. Did traders buy slaves without regard to their marital status? As seen in figure 2, interregional traders purchased very few children. Indeed, they may have purchased mothers and left their less-marketable children behind in the holdings of their former owners.

Although the Louisiana Civil Code (1806, section 9) expressly prohibited the separate sale of children under the age of 10 years from their mothers, this law provided scant protection for the slaves living in other states. Anecdotal evidence suggests that some traders separated

mothers from children.[15] Ethan Allen Andrews recorded the following conversation he had with a trader, whom he identified as N.

> In selling his slaves, N. assures me that he never separates families, but that in purchasing them he is often compelled to do so, for that "his business is to purchase, and he must take such as are in the market!" "Do you often buy the wife without the husband?" "Yes, very often; and frequently, too, they sell me the mother while they keep the children. I have often known them take away the infant from the mother's breast, and keep it while they sold her." (Andrews, 1836: p. 147)

Retaining children who were separated from their mothers would have raised the apparent fertility rate for the women left behind. Indeed, the child-woman ratios observed in exporting areas may be the result of such separations.

I conclude by summarizing what I have and have not accomplished in this paper. To be sure, I do not deny the existence of slave breeding. "Any historical dispute that remains over the question no longer concerns the existence of slave breeding, but rather the matter of degree" (Sutch 1988, p. 84). In addition, I do not show that the fertility rate in the exporting areas was equal to the southern fertility rate. I would need more information, and in particular comprehensive birth registrations, to address this question. For this project, I use a unique

15For other citations of mothers separated from children, see Bancroft (1931: 197-221), Andrews (1836: p. 50, 105, 165), Weld (1969: pp. 46-48, 166) and Rawick (1972: pp. 44-45).

micro-dataset to identify the holdings of slave sellers as recorded in the 1830 decennial census. I establish causation by comparing the census enumeration date with probable sale dates. Regression results indicate that adult females owned by slave sellers had normal fertility rates and that the sale of a childless woman resulted in a higher child-woman ratio for the slaves left behind. Under a plausible set of assumptions, I show that the interregional slave trade can fully account for the child-woman ratios observed in the exporting areas. Finally, I note that most young women sold in New Orleans were sold without a husband or a child. Because I do not observe their marital status prior to their purchase by an interregional trader, I cannot show that these sales resulted in the separation of mothers from their children.

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Table 1
Child-woman ratios, 1820 - 1870

	Census year	Child-Woman definition	Exporting areas	Entire South	Exporting / South Ratio
(1)	1820	$\frac{enslaved\ children, 0-13\ years}{enslaved\ women, 14-44\ years}$	2.088	1.882	1.109
(2)	1830	$\frac{enslaved\ children, 0-9\ years}{enslaved\ women, 10-54\ years}$	1.243	1.156	1.075
(3)	1840	$\frac{enslaved\ children, 0-4\ years}{enslaved\ women, 10-44\ years}$	1.178	1.097	1.074
(4)	1850	$\frac{enslaved\ children, 0-4\ years}{enslaved\ women, 15-49\ years}$	0.768	0.718	1.070
(5)	1860	$\frac{enslaved\ children, 0-4\ years}{enslaved\ women, 15-49\ years}$	0.745	0.702	1.061
(6)	1870	$\frac{free\ black\ children, 0-4\ years}{free\ black\ women, 15-49\ years}$	0.647	0.660	0.981

Source: U.S. decennial census
Note: Exporting areas are defined as the states of Maryland, North Carolina, and Virginia.

Table 2
Descriptive statistics of slaveholdings linked to New Orleans slave sales

Type of Holding	Child-Woman ratio	Sex ratio	Slaves per holding	Slaves sold	Number of holdings
(1) All Slaveholdings (161 exporting counties)	1.15	1.02	3.55	n.a.	260245
(2) All Linked Holdings	1.22	1.26	17.83	704	510
(3) Linked Holdings Slaves Certified after Enumeration	1.21	1.35	16.60	135	93
(4) Linked Holdings Slaves Certified before Enumeration	1.22	1.24	18.15	569	420

Source: Controls: 1830 decennial census -- IPUMS. Linked records: 1830 decennial census and New Orleans Notarial Archives.
Note: n.a. indicates data are not available. Exporting counties supplied slaves to New Orleans, as indicated by Certificates of Good Character.

Table 3
Demographic causes of slave sales
Linear Probability Model

Covariate	Regression (1) Dependent Variable: Will Sell Slaves	Regression (2) Dependent Variable: Proportion Sold	Mean
Will Sell Slaves (1=yes, 0=no)			0.0025 (0.0501)
Slaves to be sold / slaves in holding			0.0004171 (0.0127570)
Intercept	0.00623* (0.00357)	0.0001142 (0.0003092)	1
Children, 0-9 years / Women, 10-54 years	-0.00006 (0.00018)	-0.0000499 (0.0000443)	1.124 (1.156)
Men, 10-54 years / Women, 10-54 years	0.00078** (0.00035)	0.0001032** (0.0000485)	0.911 (1.266)
Holding Size: 1 to 15 slaves (1=yes, 0=no)	-0.00437 (0.00299)	0.0001777* (0.0001029)	0.836 (0.370)
Holding Size: 16 to 50 slaves (1=yes, 0=no)	-0.00076 (0.00319)	0.0001028 (0.0001119)	0.142 (0.349)
Controls (Non-sellers)	Yes	Yes	
County Fixed Effects	Yes	Yes	
Observations	30553	30553	30553
F value	1.86***	1.05	
R^2	0.0029	0.0017	

Source: New Orleans Notarial Archives and 1830 Decennial Census Schedules.
Note: The unit of observation is the slaveholding prior to the date of certification. The dependent variable equals one if the slaveholder will sell a slave, and zero otherwise. The omitted category is holdings with more than fifty slaves. The sample includes holdings with women as of June 1, 1830. Robust standard errors are reported in parentheses.
*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Table 4
Demographic consequences of slave sales on the child-woman ratios of slave sellers
OLS regressions

Covariate	Regression (1)	Regression (2)	Mean
Children, 0-9 years / Women, 10-54 years			1.139 (1.151)
Intercept	1.014*** (0.024)	0.980*** (0.126)	1.000 (0.000)
Men remaining, 10-54 years / Women remaining, 10-54 years	0.174*** (0.013)	0.188*** (0.056)	0.902 (1.222)
Women sold, 10-54 years / Women remaining, 10-54 years	0.501*** (0.189)	0.544*** (0.170)	0.001 (0.026)
Mothers sold, 10-54 years / Women remaining, 10-54 years	-1.673* (0.903)	-1.613* (0.962)	0.000 (0.003)
Men sold, 10-54 years / Women remaining, 10-54 years	-0.036 (0.144)	0.062 (0.183)	0.001 (0.029)
Holding Size: 1 to 15 slaves (1=yes, 0=no)	-0.052*** (0.019)	-0.112 (0.139)	0.839 (0.368)
Holding Size: 16 to 50 slaves (1=yes, 0=no)	0.194*** (0.022)	0.133 (0.123)	0.144 (0.352)
Controls (Non-sellers)	Yes	No	Yes
County Fixed Effects	Yes	No	
Observations	92915	378	92915
F value	49***	8.57***	
R^2	0.075	0.122	

Source: New Orleans Notarial Archives and 1830 Decennial Census Schedules.
Note: The dependent variable is the child-woman ratio as recorded in the decennial census. Sample includes holdings with women as of June 1, 1830. Robust standard errors are reported in parentheses.
*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Table 5
Estimates of the Slave Trade's Effect on the Child-Woman Ratio
Exporting areas in 1830

Parameter	Description	Estimate	Source
C/W	Southern child-woman ratio	1.156	Table 1, row (2)
C^S/W^S	Child-woman ratio, slaves sold to traders	0.110	Certificates of good character, New Orleans notarial archives
C^P/W^P	Child-woman ratio, slaves migrating with planters	1.156	By assumption
C^R/W^R	Child-woman ratio, slaves remaining in exporting areas	1.243	Table 1, row (2)
W^E/W	Net emigration rate, women aged 10 to 54 years	0.108	Projected population equals the product of 1820 cohort and the survival rate. Emigrants equal difference of projected population remaining population, as reported in 1830 decennial census
W^R/W	Proportion remaining in exporting areas, women aged 10 to 54 years	0.892	Projected population equals the product of 1820 cohort and the survival rate. Remaining population reported in 1830 decennial census
γ	Relative size of slave trade, women aged 10 to 54 years	0.687	By calculation (see text)

Note: Exporting areas are defined as the states of Maryland, North Carolina, and Virginia.

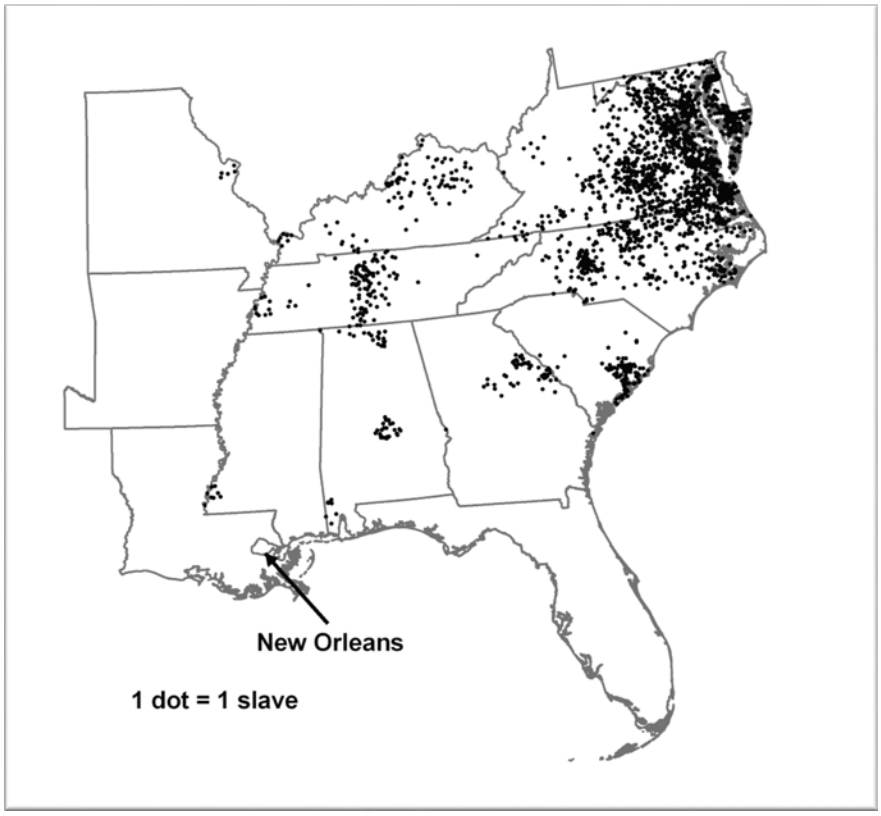

Figure 1 -- Origins of imported slaves sold in New Orleans, 1830
Source: Certificates of Good Character, New Orleans Notarial Archives and Mason (2017).

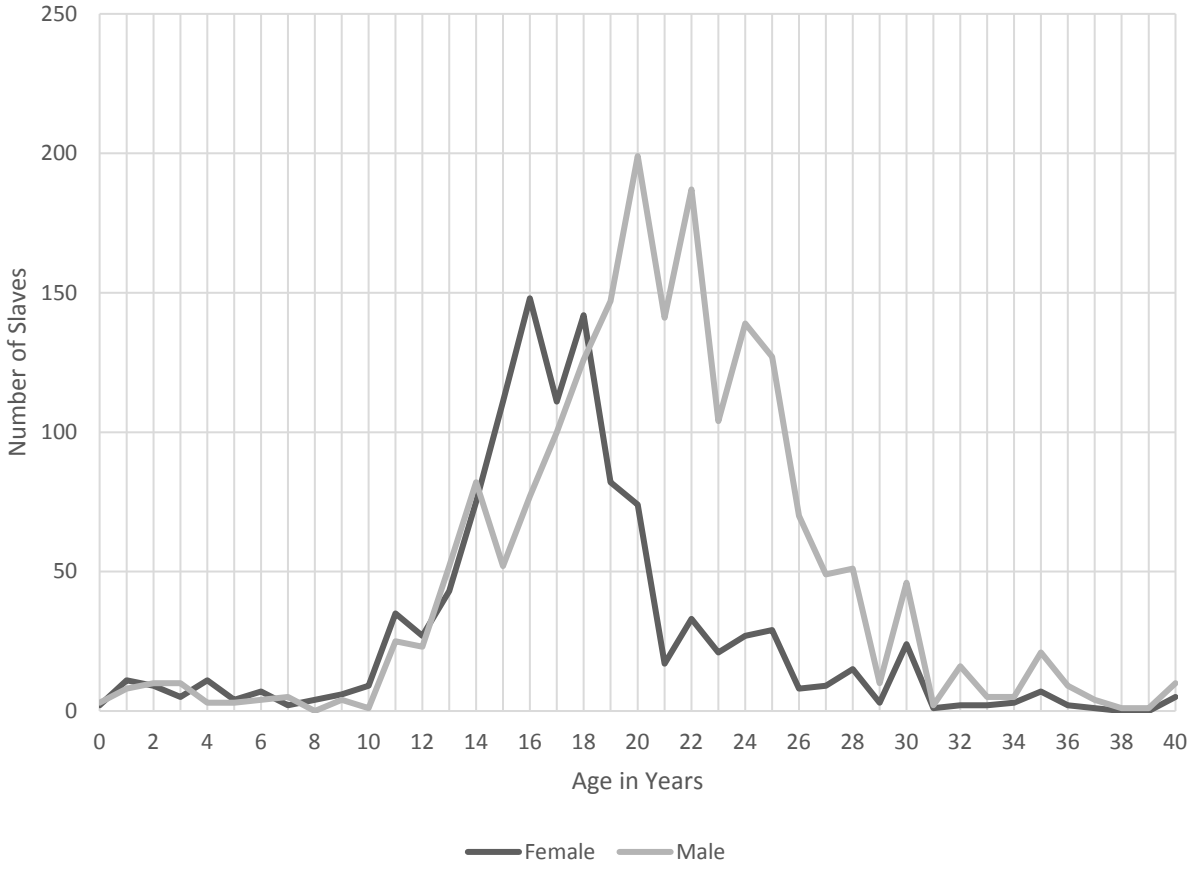

Figure 2 -- Age distribution of imported slaves sold in New Orleans, 1830
Source: Certificates of Good Character, New Orleans Notarial Archives

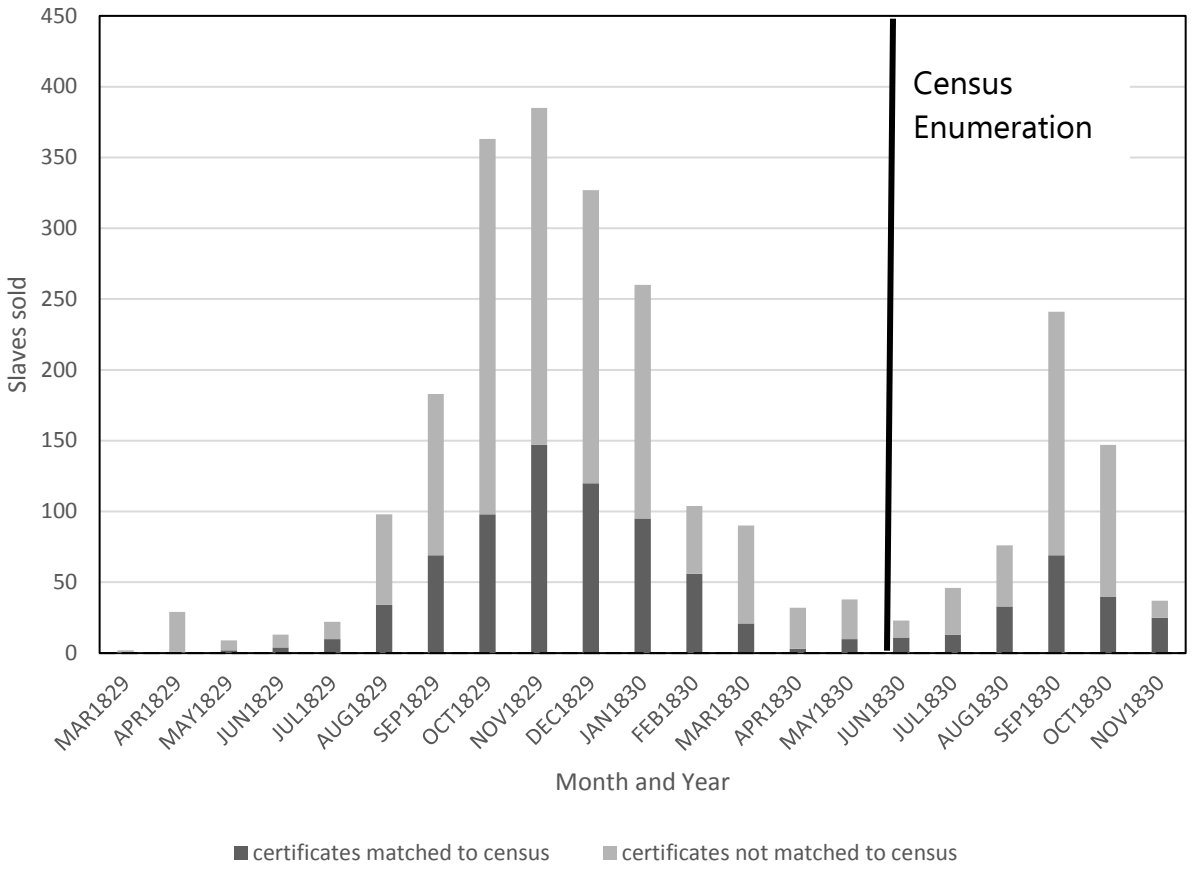

Figure 3 -- Month of Sale in New Orleans and Certification in Exporting Areas
Source: Certificates of Good Character, New Orleans Notarial Archives

Table A1
Demographic causes of slave sales – Logit regressions

Covariate	Regression (1)	Odds Ratio	Regression (2)	Odds Ratio	Means
Will Sell Slaves (1=yes, 0=no)					0.0025 (0.0501)
Intercept	-5.343 (0.544)	0.005	-4.723 (0.893)	0.009	1
Children, 0-9 years / women, 10-54 years	0.036 (0.087)	1.036	0.015 (0.093)	1.015	1.124 (1.156)
Men, 10-54 years / Women, 10-54 years	0.054** (0.024)	1.055	0.054** (0.027)	1.056	0.911 (1.266)
Holding Size: 1 to 15 slaves	-1.017* (0.548)	0.362	-1.436** (0.566)	0.238	0.836 (0.370)
Holding Size: 16 to 50 slaves	0.062 (0.562)	1.064	-0.275 (0.570)	0.759	0.142 (0.349)
Controls (Non-sellers)	Yes		Yes		
County Fixed Effects	No		Yes		
Observations	30553		30553		30553
McFadden's R^2	0.021		0.062		

Source: New Orleans Notarial Archives and 1830 Decennial Census Schedules.
Note: The unit of observation is the slaveholding prior to the date of certification. For regressions (1) and (2), the dependent variable equals one if slaveholder will sell a slave, and zero otherwise. For regression (3) and (4), the dependent variable equals the number of slaves to the sold divided by the number of slaves in holding. Sample includes holdings with women as of June 1, 1830. Robust standard errors are reported in parentheses.
*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Table A2
Probability of selling male, conditional on selling a slave
Linear Probability Model

Covariate	Regression (1)	Mean
Will Sell Male, 10-54 years (1=yes, 0=no)		0.662 (0.477)
Intercept	0.358 (0.165)	1.000
Men, 10-54 years / Slaves, 10-54 years	0.586* (0.304)	0.517 (0.190)
Observations	65	
F value	3.65*	
R^2	0.055	

Source: New Orleans Notarial Archives and 1830 Decennial Census Schedules.
Note: The unit of observation is the slaveholding prior to the date of certification. The dependent variable equals one if the slaveholder will sell a male, and zero otherwise. Robust standard errors are reported in parentheses.
*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.

Table A3
Demographic consequences of slave sales on the child-woman ratio of slave sellers
OLS regressions -- Falsification test

Covariate	Regression (1)	Regression (2)	Mean
Children / women			1.139
			(1.150)
Intercept	0.972***	1.015***	1.000
	(0.020)	(0.024)	(0.000)
Men, 10-54	0.178***	0.174***	0.902
/ women, 10-54	(0.014)	(0.013)	(1.222)
Women sold before census	0.517***	0.507***	0.001
/ women, 10-54	(0.189)	(0.190)	(0.026)
Mothers sold before	-1.758*	-1.680*	0.000
census / women	(0.928)	(0.904)	(0.003)
Men sold before census	-0.004	-0.030	0.001
/ women, 10-54	(0.142)	(0.145)	(0.029)
Women sold after census	-0.035	-0.071	0.000
/ women, 10-54	(0.437)	(0.414)	(0.011)
Mothers sold after census	0.010	0.108	0.000
/ women, 10-54	(0.574)	(0.531)	(0.004)
Men sold after census	0.307	0.266	0.000
/ women, 10-54	(0.223)	(0.208)	(0.014)
Holding size:	-0.036*	-0.053***	0.838
1 to 15 slaves	(0.019)	(0.019)	(0.368)
Holding size:	0.252***	0.193***	0.145
16 to 50 slaves	(0.023)	(0.022)	(0.352)
Controls (Non-sellers)	Yes	Yes	
County Fixed Effects	No	Yes	
Observations	92992	92992	92992
F value	957.42***	48.08***	
R^2	0.049	0.075	

Source: New Orleans Notarial Archives and 1830 Decennial Census Schedules.
Note: The dependent variable is the child-woman ratio.
*** Significant at the 1 percent level.
** Significant at the 5 percent level.
* Significant at the 10 percent level.