Preserving Slave Families for Profit:
Traders' Incentives and Pricing in the New Orleans Slave Market

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I. Introduction

Since the publication of Fogel and Engerman's (1974) *Time on the Cross*, economic historians have been actively debating the validity of one of their central propositions – that slaves were allowed, and encouraged, to maintain family ties because doing so enhanced the value of slaves to their masters. Kotlikoff (1979, 1992) investigated the potential effect of family connections on the value of slaves sold in the New Orleans market at the time of their sale. If preserving family ties enhanced the value of slaves to their masters, as Fogel and Engerman posited, the value of slave family members sold together would be higher. Kotlikoff found that the value of mother-father-child groups – a rare event in the data – was higher than the combined value of the members of the family if they were sold singly. However, other family combinations, in particular, mother-child sales – which are by far the most common form of family sale – suffer substantial discounts when compared to the sales of identical family members sold separately.

Fogel and Engerman (1992: p. 258) argued that this finding could reflect a scale discount associated with slave sales – by selling the slaves as a group rather than singly, the sum of transactions costs would be reduced or equivalently, buyers would realize a scale discount. If the discount outweighed the economic benefits associated with family ties, family members would sell at a discount rather than a premium. If that explanation were correct, it could be confirmed by empirical analysis of two questions: (1) Is there a scale discount for selling slaves irrespective of whether they are family members or not; and (2) Do slave groups of any particular size command higher market prices when the members of the group sold are family members (as opposed to unrelated group members)? To our knowledge, no one has investigated these questions empirically.

A related issue that has emerged in empirical studies of slave sales is the need to consider the potential effect of selectivity bias in the slave sales process. Slaves that are sold are likely not to be a random sample of slaves in the population. In addition, it is possible that slave family members sold together are selected for sale in a different process than slaves sold individually. If that were true, then the family discount observed in the sales of slave family groups might reflect differences in the selection process for sale of families compared to the selection process for the sale of individuals. If selectivity bias explains the family discount, then observed discounts may give a distorted measure of the underlying value (in the broader slave population) to masters of keeping slave families together.

Independent of their owners' economic interests, families would not exist without the active support and participation of the slaves themselves. The family served, among other things, as a form of long-term life insurance against the hardships of slavery. Unlike their supposedly paternalistic owners (who sold them in New Orleans), ailing and infirm slaves could expect care and support from other family members (Gutman, 1976). Owners may have benefited from this mutual dependency by selling family members together rather than singly. Most obviously, if one member of the group were weak or sick, that individual might be sold with another member of his family because the joint value of the two would be greater than their value if sold separately. This form of *negative* selection of family groups would produce a family discount, which is simply indicative of the lower market price attached to the weak or sick member of the family group. Such selectivity may reflect a synergy between the family members sold within the group; for example, a weak sister may be worth more to an owner if paired with a caring and stronger sister. More generally, negative selectivity need not result from illness or below-average value of any member of a family group; as we discuss in the Appendix, negative selectivity will occur whenever the value of preserving a family tie is decreasing in the market value of family members.[1]

Positive selection may occur when slaves are shipped long distances at great expense. When a fixed transport cost is applied to two similar goods, the effect is to lower the relative price of the higher quality good (Alchian and Allen, 1969: pp. 78-79). Because shipment of slaves was costly, the relative price of high-valued slaves was lower in New Orleans, and as a consequence, buyers preferred to purchase relatively more of them (Pritchett and Chamberlain, 1993). Positive selection is likely to have its greatest effect on the attributes of children chosen for market – only the healthiest and most robust would justify the cost of shipment (Pritchett and Freudenberger 1992).

Positive selection (resulting from transport costs) could also affect the price of a mother and child group when compared to the prices of other slaves sold separately. In deciding whether to ship a mother and child to New Orleans, traders consider the attributes of the entire group. A trader might ship a less valuable child if the child was sold with his (more valuable) mother, especially if the marginal cost of shipping a child with a parent was lower than shipping a child without a parent, whereas a single child would be more rigorously selected. According to this view of selectivity bias, family

[1] In the Appendix, we also discuss the potential effects of asymmetric information about slave value (between the slave trader and the slave buyer in New Orleans) on observed family discounts. In the context of our paper, such asymmetric information would produce a lemons discount on stand-alone slave sales (relative to a symmetric-information equilibrium) and thus tend to reduce the size of any observed family discount.

groups sold together may not have contained many weak or sick individuals, and may have had market values similar to the general slave population. If slave traders were more selective in their choices of individual slaves for transport to the New Orleans market, then family discounts may simply reflect a positive bias in stand-alone sales.

Any estimate of the effects of slave family ties on sale prices should try to take into account the potential for selectivity when estimating the effects of transaction size or family groupings. In this paper, we test for scale discounts, and family-ties premia or discounts, using prices for the group sales of slaves in the New Orleans market during the period 1820 through 1860. We distinguish sales of groups that include family and non-family members. We also examine family group sales of different types (those involving small children, and other sales), to investigate how family-ties premia or discounts vary with the structure of the family sold.

Our results from slave price regressions for transactions in New Orleans can be summarized in the following six propositions: (1) There is no scale discount for group sales of slaves. Smaller groups tend to sell at bigger discounts than larger groups, but this apparent scale premium disappears when one controls for the relative number of family members. (2) There is no general family-ties premium (as hypothesized by Fogel and Engerman) for family group sales. Family group prices tend to be less than the sum of the predicted prices based on a stand-alone model of the value of each family member. In fact, (3) family groups sold at a large and statistically significant discount relative to the prices of comparable slaves sold in non-family groups. (4) Family group discounts were especially large for some family groups, namely those containing large proportions of children under the age of 13, or family groups containing older individuals (over 50 years of age). (5) Family groups that included both parents and at least one child sold at reduced discounts compared to other family groups, although the small number of such observations limits the significance of this observed effect. (6) Groups that contained children that were not specifically identified as related to a mother in the group also sold at a discount (although that discount is smaller than the discount associated with the presence of children in family groups) – we believe that this finding reflects the likely presence of unidentified mother-child linkages in some groups.

We argue that family-tie discounts cannot be attributed to childcare costs of children in family groups, for three reasons. (1) Childcare costs should be priced in to stand-alone sales of children as well as family-affiliated group sales including children. (2) Discounts on children are as large for grown children as for toddlers. (3) Discounts on other categories of family members are large, too. Furthermore, we argue that legal restrictions on the sales of children or the elderly on a stand-alone basis cannot fully explain our results, although they probably contributed to the magnitudes of some of the effects we measure.

We conclude from the observed patterns of discounts on slave group sales that selectivity bias is likely to be a crucial factor in explaining family discounts. The patterns of discounts that we identify are unlikely to have been observed in the marketplace in the absence of severe selectivity bias. Because discounts cannot be attributed to either scale discounts, per se, or to childcare costs, it follows that in the absence of selectivity bias there would have been a hugely profitable arbitrage opportunity for slave sellers of family groups to divide their groups prior to sale to substantially increase the overall value of the sale.[2] Stated differently, under the assumption of zero arbitrage profits, the fact that heavily discounted family group sales occurred should be taken as evidence of selectivity bias.

In the case of family groups involving parent-child relationships, it is possible to gauge the potential importance of selectivity bias by examining additional data. We examine data from ship manifests on the heights of slave children during their transport for sale to the New Orleans slave market. We find that children whom we identify as being likely to be traveling to the slave market as members of family groups are substantially shorter (by roughly two inches) than children of the same age and sex that we identify as unlikely to be traveling as members of parent-child groups. We argue that the taller stature of children sold without parents provides further evidence that some form of selectivity by traders explains the family-ties discounts observed in the New Orleans slave market.

Our paper is organized as follows. Section 2 describes the data and estimation method employed in the slave sales regressions. Section 3 reports our findings on group and family-tie discounts or premia. Section 4 reviews the data and estimation method for the analysis of children's heights from the manifests of ships carrying slaves to be sold in the New Orleans slave market. Section 5 presents the results on height differences for children with and without inferred family ties. Section 6 concludes.

2. Modeling Slave Prices from New Orleans Sales: Data and Methodology

[2] As discussed in Section 3 below, there were legal restrictions on the division of some family groups into their component parts, but these restrictions cannot explain observed family group discounts in the absence of selectivity bias.

For our study, we use the New Orleans Slave Sale Sample, originally collected under the direction of Fogel and Engerman (1976), and used previously by Kotlikoff (1979, 1992), Greenwald and Glasspiegel (1983), and Freudenberger and Pritchett (1991). New Orleans was the center of slave trading in the South. Transactions included both local slave sales and sales of imported slaves, often brought by ship from elsewhere in the South. Because of its French legal tradition, all slave sales in Louisiana had to be notarized.[3] The Notarial Archives, which was created in 1867, serves as a depository of the notarial acts and it was from this archive that the Fogel and Engerman sample was drawn. The notarial records are not a complete set of transactions – some notarial records were destroyed in office fires whereas others appear to have been simply lost.[4] Depending on the year of sale, between 2.5 and 5 percent of the extant notarial records comprise the sample of slave sales recorded by Fogel and Engerman.

Summary statistics for these data, for both stand-alone and group sales, are presented in Table 1. The data contain 2,168 usable observations of stand-alone sales of slaves, which we define as transactions in which only one slave was sold. The dataset also contains 684 usable group sale transactions. Typically only the price for the entire group was recorded for group sales. Recorded characteristics of the individuals in the group include their age, sex, and family relationship (although it is possible that family relationships were not always noted). Other data fields include information about the degree of skin darkness, whether the transaction was for cash or credit, and whether the

[3] In a few examples, slave titles were transferred under the private signatures and witnessed by a judge, rather than recorded by a public notary.

[4] The number of missing sales records is unknown. An alternative source of data on slave sales, which to our knowledge has not been fully exploited, is the New Orleans Conveyance Office. For sales made after 1827, brief transactions summaries are available in the Conveyance Office, and to our knowledge, these records appear to be complete.

slaves were sold with a guarantee. Prices are normalized, as in Kotlikoff (1979, 1992), by dividing the observed price by the average price of a male, aged 21 to 38 years, sold in that same year. This procedure avoids the need to control for changes over time in the level of prices.

Before discussing our approach to modeling the factors that affected the pricing of slave groups, it is useful to review some of the differences between the samples of stand-alone and group transactions, and the frequency of different types of groups, which offer important hints about potential selectivity in the determination of whether a slave was included in a group or stand-alone transaction, or a particular type of group transaction.

Most obviously, the age distributions are very different for the stand-alone and group samples (Figures 1 and 2). The group sample includes many more children, especially young children. (Children, aged 0 to 10 years, represent 3 percent of the stand-alone sales and nearly 29 percent of the group sales.) Legal restrictions may have reduced the number of children under the age of 10 years sold without their parent. Additional legal restrictions applied to the sale of weak or sick slaves (who are more frequently elderly) without a family member. As we discuss below, the differences in the age distributions may have reflected other influences in addition to legal restrictions, including positive and negative selectivity (as defined above), which may have reflected market valuation consequences of preserving slaves' familial relationships under particular circumstances.

Of the slaves sold in New Orleans, most slaves were not sold with family members and most family members who were sold together were sold in small mother-child groups. For group sales, data on the size distribution and compositions of groups sold are presented in Figures 3-5. Family group members accounted for 45 percent of the total number of slaves sold in groups. Most family group members (87 percent) consisted of mothers and their children, and the most common family group consisted of a mother with children (90 percent). Mother-father-child groups were rare (only 3.6 percent of the total number of family groups). Other adult family affiliations (by which we mean other family groupings in which children age 13 and younger were not included) took the form of husband-wife pairs and sibling groupings.

Because we are investigating how the size and composition of groups affected prices in group transactions, we must begin with a benchmark against which to measure the effects of group size and structure. We construct a model of stand-alone slave sales to serve as our benchmark for group sales. The stand-alone benchmark model can be used to generate predicted values for each group sale by adding together the predicted values of each group member to create a composite predicted value for the group.[5] We then define the log difference of the actual and predicted group price, and construct a model, based on group characteristics, to predict group discounts or premia – that is, deviations of actual group prices from predicted values based on the stand-alone benchmark.

First, we estimate a stand-alone model that regresses observed stand-alone prices on a variety of slave characteristics. This model is a modification of Kotlikoff's pricing model, which includes the regressors listed in Table 2. The differences between our stand-alone model and Kotlikoff's model derive from the fact that we apply the Kotlikoff model only to stand-alone transactions. Kotlikoff included mother-child transactions in his model (which we will model separately in our group transactions analysis). Because we exclude all but stand-alone transactions our model excludes regressors that Kotlikoff

[5] We adjust the predicted values to account for the log normal error variance (Greene 1993, p. 299).

used to capture special features of mother child transactions. In all other respects, however, our model is identical to Kotlikoff's. We experimented with a variety of alternative specifications and found that none of them substantially improved the fit of the stand-alone model.[6]

Table 2 reports the estimation results for our stand-alone version of the Kotlikoff model. The results are familiar. Males are worth more. Light skin has some value for females, but not for males. Guarantees raise prices. Transactions that involve credit require higher prices. The effect of age is estimated by a six-order polynominal, which is graphed for males and females separately in Figure 6. The prices of men and women peak in their early 20s, and values drop dramatically in the late 30s and 40s. Figure 7 plots the residuals from the stand-alone regression against age. The fit of the regression is similar across different ranges of the age profile. In particular – and importantly for our discussion below of groups sales regressions – the regression does not over predict the prices of standalone children or superannuates.

3. Group Sales Regressions

We turn now to the group sales regressions. The dependent variable is the "group premium," defined as the log difference between the actual group price and the sum of the predicted stand-alone prices for the group members, using the coefficients from Table

[6] One variation slightly improved the adjusted R-squared of the stand-alone model by adding to Kotlikoff's age profile specification (which is a six-degree polynomial in age) additional interaction variables that allowed age-sex interactions. The drawback of this innovation is that it produces unrealistic increasing age-sex valuation profiles for ages beyond 60, which is a result of the small number of observations in that age range and the limitations of the six-degree polynomial. One might argue for using this interactive model and truncating the sample at age 60, but this would be problematic for our purposes, since, interestingly, in contrast to the stand-alone sample, there are many group observations that include people older than 60. Using the interactive age-sex polynomial, the results are very similar to those reported below, with the exception of results pertaining to older individuals, who would be excluded from the sample.

2 to generate predicted prices for each group member. We investigate the effects of several potential influences in producing predictable group premia or discounts. Table 3 presents our findings. We present Weighted Least Squares results, weighted by group size. In theory, larger groups should have smaller group error terms because of the law of large numbers. We find, indeed, that larger groups have smaller error terms. Ordinary Least Squares regressions (not reported here) are qualitatively very similar to the results in Table 3.

Scale and Group Discounts

Fogel and Engerman (1992) hypothesized that the size of the group sold may lead to differences in pricing if larger transactions enjoy scale discounts. We investigate this hypothesis by dividing our group sample into three groups by size: groups of two people, groups of three-five people, and groups of more than five people (finer divisions of the sample, or alternative specifications of size effects yield similar results to those reported in Table 3 and are not reported here).

Equation (2) provides the simplest version of a regression testing for scale effects in the group premium. Groups of two people are contained in the intercept, and the other two categories of group size are captured by adding the estimated intercept to either one of two indicator variables (*groupsize3_5* and *groupsize>5*). The three coefficient estimates indicate that statistically significant group discounts averaging 6.7% are present for groups of two people; for groups of three-five people, discounts average 10.2% and are statistically significant, and groups of more than five people display a 1.0% average discount, which is not statistically significantly different from zero at the 10%

significance level. Equation (2), therefore, suggests the opposite of a scale discount for group sales, since larger groups command a lower discount.

Once one controls for other groups aspects – specifically, whether groups contain family members, and the structure of family and non-family groups – the scale premium observed in equation (2) disappears. Equation (3) adds the percentage of group members that are related as family members (*pc_fam*) to the group size indicators, and equations (4) and (5) add variables that capture the structure of family and non-family groups. When these variables are added, the intercept and the two group size indicator variables become small and statistically insignificant. In other words, group size, per se, is not important for determining the group premium. The fact that, in equation (1), a group size of two people is associated with a significant group discount reflects (among other things) the fact that family groups tend to often include only two people (e.g., mother and child).

Families, Group Structure and Group Discounts

We construct several variables to capture the structure of groups, each of which is defined in percentage terms (capturing a group characteristic, expressed as a percentage of group members). This functional form facilitates the interpretation of the regression coefficients. In addition to our family group covariate, *pcfam*, which measures the percentage of the group members who are related as family, we include other variables that capture the structure of groups along other dimensions. Interestingly, we find that the specific structure of the family group is crucial for understanding the size of the family discount.

The proportions of parent-affiliated children in a group of ages 0-10 and 11-13 are captured by *pc_rel_kids0_10* and *pc_rel_kids11_13*, and these variables are included in equations (4) and (5). These variables capture the percentage of group members of these ages whose mothers or fathers are also group members. The coefficients are large and negative, indicating substantial discounts (roughly 40% of the value of an affiliated child included in a family group). This result is consistent with the earlier findings of Kotlikoff (1979, p. 513) and Fogel and Engerman (1992, p. 258), which they interpreted incorrectly as a scale effect.

Possibly some sales records do not record all parent-child affiliations. In our regression, we include measures of the percentages of unrelated children in the group (*pc_unrel_kids0-10*, *pc_unrel_kids11_13*) in order to estimate their effect on the group discount. Suppose that the presence of unrelated children had no effect of the size of the group discount (and *pc_unrel_kids* were zero). If the effect of *pc_rel_kids* is negative, and if many children that are coded as unaffiliated are really affiliated, that could lead us to observe a negative coefficient on *pc_unrel_kids* (which we would expect to be smaller in absolute value than the coefficient on *pc_rel_kids*). This is precisely what we find in equations (4) and (5). The coefficient on unaffiliated children ages 0-10 is -0.193; the coefficient on unaffiliated children ages 11-13, however, is much smaller (-0.11) than the analogous coefficient for related children (-0.42) and is not statistically significant. One interpretation of these results is that many of the children under the age of 11 that were not recognized in the written record of the transaction as affiliated were in fact affiliated, but that this was less likely for children of ages 11-13.

Should one interpret discounts associated with children as reflecting childcare costs? We believe that would not be a proper interpretation of these coefficients, for three reasons. First, observed family discounts were not just on infants or toddlers (those with the highest childcare costs), but are present for children ranging up to 13 years of age, and these discounts are roughly identical for children of all ages within that range; in fact, the estimated coefficients are largest for the 11-13 age range.

Second, young children sold on a stand-alone basis also required significant childcare from someone, and so discounts for childcare costs should have been priced into all child sales, irrespective of whether children were sold on a stand-alone basis or with a relative. Of course, it is certainly conceivable that mothers would have been expected to devote more time to their children than strangers would, but even if mothers would have been expected to provide more care to their own children than other caregivers would have provided, that difference would not be as relevant for older children (say, beyond age 10), and that potential difference cannot plausibly explain the large discounts (as a proportion of the value of the child) and the uniform age pattern of discounts that reflect the presence of children in family groups.

Third, as we explore more fully below, family group sales other than those involving parent-children groupings also display large group discounts, which could not possibly reflect childcare costs. This suggests a more general explanation for family discounts that would apply to discounts associated with children as well as other family members. The most obvious explanation, which we confirm with additional evidence below, is selectivity bias. Children not sold in family groups (a relatively infrequent event) may have been exceptional in their level of physical, emotional, or mental maturity. The relatively exceptional characteristics of stand-alone children could have resulted from either positive or negative selectivity. In Section 6, we consider the relative merits of the two mechanisms for explaining our results.

Only 12 groups in our sample contain an affiliated mother, father, and at least one child. The presence of such a family grouping within a group is captured by *pc_momdadchild*. The total premium effect for such a group would be measured by adding the coefficient on *pc_momdadchild* (0.14) with the properly weighted value of the appropriate coefficient for *pc_relkids*. For example, a family of three sold together, comprised of a father, mother, and a 10-year-old girl, would show the following total group premium effect: (0.14) + (0.33)(-0.37). Interestingly, while the *pc_momdadchild* variable by itself is positive, of a reasonably high magnitude, and statistically significant, the total group premium effect for a group consisting of a father, mother, and 10-year-old girl is essentially zero. We interpret this zero effect as the sum of a negative effect from selectivity bias effect associated with any family group containing children and a positive offsetting effect, which could either reflect Fogel and Engerman's hypothesized value creation from preserving the nuclear family or an alternative form of selectivity bias attached to *momdadchild* events. A difference in selectivity strikes us as a real possibility. *momdadchild* groupings are rare events, and may have only occurred under rare circumstances different from those giving rise to mother-child sales.

The prices of family groups that contain older individuals (where *pc_rel_old* is defined as the percentage of individuals in the group who are above the age of 50 and are affiliated with someone else in the group) were highly discounted (estimated at 70% of the value of a stand-alone older individual per older individual included in the group).

This discount is almost twice the proportional discount associated with children. The positive selectivity interpretation of this finding is that the transportation cost of shipping an older person to market was higher when he was not a member of a family group. The negative selectivity interpretation of this finding is that the value of relatively weak older individuals was especially enhanced by being sold in groups, perhaps because these individuals were especially vulnerable to injury or infirmity. Either interpretation supports the view that family group discounts, in general, reflect selectivity bias in slave sales. Interestingly, and consistent with either positive or negative selectivity, the coefficient on unaffiliated older people (*pc_unrel_old*) is small and statistically insignificant, indicating that family connections were essential for observing discounts on older individuals in groups.

Other family member discounts (*pc_othfam*) is a special category of family relationships we constructed to capture closely related adults in groups that did not include related children (adult siblings or husband-wife pairs). We wanted to explore the extent of family discounts in circumstances where family relationships are close, but where neither young children nor older people were present. In those cases, the estimated coefficient on *pc_othfam* is still significant and negative (-0.19), but not as large as the effects observed for children or older people. We believe that selectivity bias in the sales of these closely related adult family members remains a likely explanation of our findings – i.e., a married couple, or a sibling pair, were more likely to be sold together if one of them was of lower value than the corresponding stand-alone slave sold.

Legal Restrictions vs. Family Preferences

Laws prohibited the division of some family groups into their component parts, but these restrictions cannot explain observed family group discounts in the absence of selectivity bias. There were two sets of relevant legal restrictions. First, with respect to children, according to the Louisiana Black Code, passed in 1806 and enhanced with stiff penalties for violation in 1829, children under the age of 10 could not be sold separately from their mothers unless they were orphans. Second, with respect to older people, Section 8 of the Black Code states that: "…if at a public sale of slaves, there happen to be some who be disabled through old age or otherwise, and who have children, such slaves shall not be sold but with such of his children whom he or she may think proper to go with."[7] In addition, many states prohibited the emancipation of elderly slaves as a means of preventing masters from abandoning older slaves that were injured or sick, thus avoiding the public care of elderly slaves as wards of the state.[8]

The limitation on the separate sale of children under the age of ten does seem to have had an effect on the presence of stand-alone sales of slave children. Table 4 reports data on the sales of stand-alone children before and after the imposition of penalties in 1829 for selling children on a stand-alone basis by falsely identifying them as orphans. It is evident from these data that behavior changed after 1829, and this may be related to the new penalties. [9] Still, legal restrictions cannot explain our results for child-related discounts, since those results hold similarly for children aged 11-13. Thus, voluntary

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[7] An Act Prescribing the Rules and Conduct to be Observed with Respect to Negroes and other Slaves of this Territory," Act of June 7, 1806, Louisiana Territorial Acts, 1806, Sec. 8, p. 154.

[8] Virginia outlawed the manumission of unsupported slaves aged 45 years and older in 1782. The law was upheld in 1824 and 1848 (Savitt 1978, p. 203); Louisiana joined other southern states in outlawing manumission in 1857, after a rise in emancipations throughout the 1850s (Schafer 2003, p. 2).

[9] We test this proposition by combining the first two time periods and the last three and performing a simple Chi-square test. Children aged less than 10 years were significantly less likely to be sold separately after 1829. (Chi-square equals 8.67 (1) – significant at 0.003 level.) For those children aged 10 years or more, there was no significant change. (Chi-square equals 0.908 (1) – significant at .34 level.). For court cases involving the enforcement of the 1829 act, see Schafer (1994: pp. 165-168).

market decisions not to divide discounted families, rather than legal limitations, per se, must be an important factor in explaining our findings.

The Section 8 limitation on the sale of infirm individuals is itself evidence of the probable presence of group selectivity bias. But here, too, it is unlikely that discounts can be explained entirely by the law. Infirmity is subject to judgment and it might be quite difficult to enforce such a rule in many cases. Furthermore, observed adult-family-member discounts applied to young adults (*pc_othfam*), as well as to older adults.

4. Data from Ship Manifests

If selectivity bias explains group discounts on slave sales, that implies that the characteristics of stand-alone slaves sold have superior value on average to those of family-related slaves sold in groups with the same set of characteristics observed in our slave sales database. An ideal test of this proposition would require measuring, for stand-alone and family-affiliated slaves sold in the New Orleans market, relevant observable characteristics (i.e., those related to market value) that are not included in the slave sales database but that would have been observable to the market.

Height would be one such measure. Taller slaves were assessed at higher prices (Margo and Steckel, 1982: p. 531). Heights were not recorded in the slave sales database, but ship manifests did record heights for slaves that were shipped to the New Orleans market by slave traders from other parts of the South. Unfortunately, family affiliations were not recorded in the ship manifests. Nevertheless, we have devised a method for inferring (probabilistically) whether or not a child listed on a ship manifest was traveling with his or her mother on the ship.

The coastwise manifests were mandated by Congress in an effort to prevent the smuggling of foreign slaves into the United States. The Abolition Act of 1807 provided for the coastwise transportation of domestic slaves by requiring duplicate manifests for each shipment of slaves. Each manifest lists slaves by name, along with their age, sex, color and stature, and the names and residences of the shippers. The outward manifest was deposited at the port of embarkation, whereas the inward manifest was deposited at the port of debarkation. We use Richard Steckel's sample of 903 inward coastwise manifests for the port of New Orleans. These manifests list a total of 13,147 slaves.

The coastwise manifests include the records of slave traders and other shippers to New Orleans. In order to identify the manifests belonging to slave traders, Pritchett and Freudenberger (1992: p. 115) compared the names of the shippers listed on the manifests with those of people who sold slaves in New Orleans during the same year. The New Orleans Conveyance Office, which was established by state law in 1827, alphabetized the names of vendors in the city. After consulting approximately 80 volumes in the Conveyance Office, Pritchett and Freudenberger identified 155 manifests and a total of 5,303 slaves where the shipper was a New Orleans slave trader.

We use the order of the slaves listed on the manifests to identify likely family (mother and child) relationships. By convention, children who were shipped with their mothers were listed directly below their mothers on the manifests (Sweig, 1980: p. 8). We infer family status by the presence of a female of childbearing age immediately followed by a child. To be specific, we classify all female slaves, aged 15 years or more, as potential mothers. If she is immediately followed on the manifest by a slave who is 15 to 44 years younger than herself, we identify the slave as her child. Because some mothers were shipped with more than one child, we follow a similar procedure for the next slave listed on the manifest – if the immediate preceding slave is identified as having a mother, and the slave is between 15 and 44 years younger than the potential mother, we identify the slave as her child. We continue this procedure, allowing for a maximum number of eight children being shipped with one particular mother.

Our sample includes the records of 685 children, aged 4 to 13 years, listed on the manifests of identified New Orleans slave traders. Using the method described previously, we estimate that 504 children, or 74 percent of the children shipped by traders, were not shipped with their mothers (see Table 5). The prevalence of these unaffiliated children varied by age. For young children, aged 4 or 5 years, less than 22 percent were identified as orphans. For children aged 10 to 13 years, however, over 88 percent were shipped without their mothers. Interestingly, a similar pattern is also found for the children sold in New Orleans – less than 8 percent of young children, aged 4 or 5 years, were sold without their mothers. In contrast, over 75 percent of the children aged 10 to 13 years were unaffiliated. For both samples, older children were much more likely to be unaffiliated than the younger children. The similarity between these two samples adds credence to our method for identifying children shipped with their mothers.

5. Heights Regressions Measuring Selectivity Bias

In Table 6, we report regression results that compare the heights of children that we identify as affiliated with a mother versus those that are not affiliated, controlling for age and sex. Equations (1)-(3) report that, on average, children that we identify as (likely to have been) shipped with their mothers are roughly 1.6-1.8 inches shorter than children of the same sex and age who are unaffiliated. Equations (4)-(5) interact the "shipped with mother" effect on height with age indicators for children in two age groups, aged more than 10 years and aged 10 years or less. We find that for children aged 10 years of less, the estimated height shortfall of affiliated children is roughly 1.9-2.0 inches. For older affiliated children, the estimated height shortfall is sensitive to the inclusion of the manifest dummies, and ranges from 0.8 inches (and marginally statistically significant) to 1.5 inches (and statistically significant).

We conclude that the data on children's heights from the shipping manifests support the selectivity-bias hypothesis that children shipped to New Orleans for sale with their mothers were significantly different (i.e., shorter, and less valuable) than children shipped without their mothers. The estimated effect is stronger for young children, although the difference between younger and older children is not robustly statistically significant. This finding lends support to the selectivity bias hypothesis for explaining the observed discounts associated with children in family groups, reported in Table 3.

In Table 7, we report additional results including manifests for ships unrelated to the slave trade. These data serve two purposes. First, they provide a control group to test whether height differences measured in Table 6 between affiliated and unaffiliated children being sold can be properly attributed to the effects of selectivity bias in the sale of affiliated children sold with their mothers relative to stand-alone slave sales. If the same result were observed in manifest data unrelated to the slave trade, that would suggest some other causal factor for this difference unrelated to selectivity bias in slave sales. Table 7 shows that the "shipped with mother effect," per se, is zero. The heights of child slaves traveling on non-slave trader ships had similar heights irrespective of whether they were traveling with their mothers. In this larger sample, the indicator variables associated with slave trader vessels continue to show greater heights for children traveling without their mothers, especially for those under the age of 10 years.

A second purpose to analyzing height data from manifests unrelated to the slave trade is their usefulness for gauging the heights of children in the general population, as a point of comparison with the heights of slave children traveling on slave traders' vessels, either traveling separately or with their mothers, en route to the New Orleans slave market. Here the key finding is that slave children traveling on slave traders' ships, whether with their mothers or alone, were taller on average than slave children traveling on non-slave trader vessels. The magnitudes of the height differences for both child groups traveling on slave traders' vessels are large and statistically significant for slave children under the age of 10, although the magnitude of the effect is smaller and not statistically significant for children older than 10 who are traveling on a slave trader's ship with their mothers. We interpret this as evidence in favor of positive selectivity related to transportation cost, which caused the heights even of affiliated children en route for sale in New Orleans to be greater than the mean of the general population (as proxied by the average of children's heights from the non-slave trader manifests).

6. Conclusions

The existence of family discounts on the sales of slave families including children, when compared to stand-alone sales of slaves, has been known for some time (Kotlikoff, 1979). We investigate the determinants of slave family discounts, using Fogel and Engerman's (1976) data from the New Orleans slave market, and consider alternative explanations, including scale discounts for group sales, childcare costs, legal restrictions on sales, and selectivity bias.

We find that slave family discounts occur not only in transactions involving children, but also in transactions involving adults. Scale effects for group sales do not explain family discounts. Family discounts are not entirely attributable to the presence of children. Indeed, the discounts attached to the sales of family-affiliated elderly people are nearly twice those attributable to affiliated children. Other non-child, non-elderly affiliated family members (married couples without children, and adult siblings) also display large family discounts, although those estimated discounts (19-22%) are smaller than the discounts observed for children (roughly 37-42%) and the elderly (70%). Only in the case of family sales involving a mother, a father, and at least one child is the family discount zero; in this case, the total (zero) effect reflects the summation of the standard family discount and a premium reflecting the presence of both parents and a child in the family group.

The most obvious explanation for these family discounts is selectivity bias. In the absence of a scale discount, and in the absence of selectivity bias, a family discount would have created a profit opportunity for slave traders to breakup families. Although few families were sold intact, the fact that traders did not always break up discounted family groups suggests a "no-arbitrage" argument for the importance of selectivity (i.e., that group members and stand-alone slaves differed in their true market value). In other words, selectivity seems necessary to explain the decisions of profit-maximizing slave traders not to divide all discounted families. The fact that family discounts are attributable to adult sales, as well as those involving children, and the fact that they vary in magnitude (very high for the elderly, next highest for children, and lowest for young adults) is suggestive evidence of the importance of taking into account that selectivity bias affected different age groups differently.

Evidence from the manifests of ships carrying slaves from elsewhere in the South to be sold in New Orleans provides direct evidence on the importance of selectivity bias for explaining slave family discounts. Children that we identify as (likely to have been) shipped with their mothers are roughly 1.6-1.8 inches shorter than children of the same sex and age who are unaffiliated. The estimated height shortfall of young mother-affiliated children is roughly 1.9-2.0 inches, and for older mother-affiliated children, the estimated height shortfall ranges from 0.8-1.5 inches. These findings support the selectivity-bias hypothesis that children shipped to New Orleans for sale with their mothers were significantly different (i.e., shorter, and less valuable) than children shipped without their mothers.

We argue that family discounts related to selectivity bias are not attributable to childcare costs or to legal restrictions on the sale of children or the elderly. We hypothesize that selectivity bias itself may result from two mechanisms, which are not mutually exclusive: (1) positive selectivity due to the effects of transportation costs on the actions of slave traders, and (2) negative selectivity due to value-enhancing familial care, which may have caused slave traders to preserve family groupings for slaves with relatively lower stand-alone market value. According to the second explanation, which is explained further in the Appendix, because family members are willing to care for each other, traders profited by bundling family members together when one of them had a sufficiently low stand-alone value. Conversely, the most physically robust individuals (and unusually physically, emotionally, and mentally mature children) may not be as likely to be sold with family members because they are less in need of family care.

By comparing the heights of slave children traveling by ship who were not shipped by slave traders to those who were en route to New Orleans to be sold, we conclude that both children sold as stand-alones and children sold as family group members were taller than the general population of slaves. Thus, we conclude that it would be incorrect to interpret selectivity as resulting from the presence of unusually weak or sickly children in family groups.

Unfortunately, that observation does not help us to distinguish between negative and positive selectivity as mechanisms responsible for family discounts. Indeed, we believe some combination of both mechanisms is likely for explaining our findings. On the one hand, the evidence that children sold in groups were taller than the population average confirms the view that transportation costs resulted in higher average market values for all slaves sold relative to the population. Furthermore, the fact that elderly and child slaves – the groups with lower market value – display higher family discounts is consistent with a positive selectivity mechanism driven by transportation costs. At the same time, transportation costs by themselves do not provide an entirely satisfying explanation for family group discounts, even if it is true that positive selectivity contributed to family discounts.

The positive selectivity story seems incomplete, however, because it does not explain why traders chose to ship some slaves in families rather than singly in the first place. Neither does it explain why families that traveled together to market were sold together once they arrived there. For that reason, in our view, the familial care (negative selectivity) hypothesis, which posits a market advantage from allowing family ties to persist in some cases, has some claim to be a more persuasive explanation for family discounts, or more importantly, why some families were sold together rather than separated.

This seems to us an important conclusion from our study. The empirical literature on slave family discounts began with Fogel and Engerman's (1974) hypothesis that slave family sales should entail a premium, owing to the value of maintaining family ties, which they argued would be reflected in the values of slaves to their masters. While our paper does find some limited support for the existence of a nuclear family premium from the positive partial price effect of combining a mother, father, and child in a family sale, ironically, we think our observations of family *discounts* more generally may provide stronger evidence of a positive price effect from preserving family ties. In our view, family discounts reflect the fact that the market attaches value to keeping some families together, especially in circumstances where one family member is weak, injured, or infirm. That market decision itself depends on preexisting slave family preferences for family ties, which are only selectively permitted by the market. If family members did not care about each other, there would be nothing to be gained by slave traders or masters in selectively maintaining family attachments. In that sense, slave family discounts may have reflected a market decision to occasionally support love, in the interest of value maximization.

Appendix:

Modeling "Negative" Selectivity of Slave Family Group Sales

In this Appendix, we derive a heuristic model of the decision by slave traders to preserve family ties in slave sales in order to maximize their profits. This model is not meant to measure the social value of preserving slave family ties, or the value to slave families of doing so, but rather the value that slave traders would have reaped from selectively deciding to allow family ties to be preserved. We do not claim that this model is a complete theory of selectivity or of value maximization by slave traders. It is designed simply to fix ideas about the conditions under which negative selectivity would have been able to produce results consistent with the propensities to preserve family ties observed in the data, and the results for family group discounts and heights reported in Sections 4 and 5, including variation in group family discounts by age.

Assume for simplicity that, for any age-sex cohort of slaves, the distribution of slave market value for slaves sold on a stand-alone basis is distributed uniformly over an interval [l, h]. In particular, consider three different value intervals, one each for 12-year-old males, 20-year-old males, and 55-year-old males, and assume, consistent with the patterns observed in our dataset for slave sales, that the lower and upper bounds of these three intervals are defined such that:

$l_{20} > l_{12} > l_{55}$ and

$h_{20} > h_{12} > h_{55}$.

We model the decision by slave traders to preserve family ties within family groups at the time of sale, or alternatively, to divide family groups and sell slaves on a stand-alone basis, as determined by a cost-benefit analysis. The benefit of preserving family ties in the model reflects gains that slave traders could capture from the mutual love and care slave family members voluntarily bestowed upon one another.

We assume that there is a cost to slave traders from preserving family groups, which has two parts. First, some or all members of the family group will expend resources caring for each other, and this expenditure of time and energy may reduce their value to their masters. Second, preserving family ties entails a lost option value to the slave trader from foregone flexibility in the market at the time of sale. That is, not all potential buyers of slaves wish to buy multiple slaves, nor are the labor needs of would-be buyers necessarily aligned with the age-sex structure of a particular slave family. Thus, preserving slave families at the time of sale has an expected cost.

We assume for simplicity that the sum of incremental resources expended for care as the result of family ties, plus lost option value cost, takes the form of a fixed constant plus a proportion of the value of the slaves. Imagine four slaves that are related. One is a 36-year-old mother of two sons, aged 12 and 20 years, and she is also the daughter of a 55-year-old man. The slave trader must decide which of these four related people he will sell separately and which, if any, he will allow to be sold in a family group. To simplify the exposition, we will consider this as three separate decisions whether to sell each of the three male family members separately from the woman family member. From the standpoint of a particular male family member (the 12-year old, 20-year-old, and 55-year old males in our example), the cost of allowing that slave to be sold with the 36-year-old woman takes the form:

$$C = a + m V,$$

where C is the total cost from preserving family ties, a and m are positive parameters, and V is the stand-alone market value of the slave under consideration. For simplicity, and without loss of generality, we assume that this cost function is the same for slaves of all ages.

We further assume that the gross benefit, B, of preserving family ties is strictly positive and decreasing in V. This assumption reflects the fact that higher value slaves are also more robust physically, and thus derive less expected benefit from care than slaves with lower market value. We also assume that the benefit of receiving familial love and care varies with the age of the slave receiving it. Holding V constant, we assume that B is highest for elderly slaves, next highest for children, and lowest for young adults. This assumption of a U-shaped age profile for the benefit of preserving family ties reflects age-specific variation in the need for care. Thus:

$$B = b - f V + g(A),$$

where b and f are positive parameters, A is age, and $g' < 0$ and $g'' > 0$.

In deciding whether to preserve a family tie in a sale, a slave trader compares the benefit and the cost of doing so and decides to preserve the family tie if $B>C$. We illustrate the equilibrium decisions made under the above assumptions, for each of three individuals, in Figure 8. The curves, B_{20}, B_{12}, and B_{55}, represent the slave trader's gross benefit from selling the slaves aged 20 years, 12 years, and 55 years, respectively, with their mother/daughter. The curves are negatively sloped, indicating that increased market value reduces the trader's benefit from maintaining family ties. V_{12}^{e} is the equilibrium cutoff point for a 12-year-old male. Those 12-year-old males with market values greater than V_{12}^{e} will be sold as stand-alones, while those with values less than V_{12}^{e} will be sold with their families. Under the assumption of the uniform distribution, the proportion of 12-year-old males sold on a stand-alone basis, $PS_{12,}$, is given by:

$$PS_{12} = (V_{12}^{e} - l_{12}) / (h_{12} - l_{12}) .$$

Analogous values of PS_{20} and PS_{55} can also be defined. Under the realistic parameters assumed to draw the graph:

$$PS_{55} < PS_{12} < PS_{20} .$$

In other words, older people are least likely to be sold as stand-alones, and young adults are most likely to be sold as stand-alones.

The group-family discount associated with any age group varies across age groups and can be derived by comparing the average value of stand-alones and the average value of slaves sold with their families for that age. Note that the value of the 12-year-old male sold with his mother as a two-person group would be the stand-alone value of the mother plus the stand-alone value of the 12-year-old, plus the value of B for that 12-year-old, less the value of C for that 12-year-old. For slaves whose stand-alone values place them to the right of their respective V^e values, they will be sold as stand-alones. Those to the right of V^e will be sold as group members.

This model is a useful heuristic device that explains why the proportion of slaves that retain group family ties varies by age (in particular, why that proportion is U-shaped in age), and why family group discounts also vary by age. The model predicts that the value to masters (and, therefore, to slave traders) of preserving family ties depends on the value of the slave and his or her age. For many slaves (especially young adults of high value) preserving family ties will not be sufficiently valued by the market to overcome the cost (the lost options for flexibility is sale from breaking the family tie); but for other slaves (especially the youngest and oldest being sold) preserving family ties will be worth the foregone option value.

This model is useful for illustrating three things. First, group discounts can vary by age. As depicted in Figure 8, it is easy to construct examples that match the different group discounts observed in our data (that is, 70% for older people, 37% for children, and 20% for young adults). Second, it is easy to construct examples to match another feature of the data, namely that the proportion of slaves in family groups varies greatly by age cohort, with the very old and the very young showing the highest proportions in family groups. Third, nothing in the model requires the mean market value of slaves sold in family groups to be lower than the population mean market value for that cohort. In other words, negative selectivity does not require that family members sold in groups have lower value on average than the average value of the same cohort in the slave population, only that they have lower average value relative to the population of slaves sold as stand-alones. Given that slaves sold on the whole were of higher than average value (Pritchett and Chamberlain, 1993), the fact that group members are predicted to be of lower value than stand-alone members does not determine whether slaves sold in family groups were of higher or lower average value than the corresponding cohort of the slave population.

We conclude by considering the effects of adding asymmetric information to this simple model. Observationally equivalent slaves will command equivalent prices. If slave traders are better informed than buyers regarding the productivity of their slaves, they may try to mislead buyers to obtain higher prices for some of their slaves (those that cannot be observed to be of low value). Note that there would be no corresponding incentive to sell high productivity slaves via group transactions. Because, in equilibrium, buyers are aware of the incentive of sellers to deceive them, stand-alone sales would suffer a lemons premium, and observed family group discounts would be lower than in the symmetric-information equilibrium (Greenwald and Glasspiegel, 1983).

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Table 1
New Orleans Slave Sales, 1820 to 1860
Descriptive Statistics

	Individual Slaves	
Covariate	Mean	Standard Deviation
Relative Price	0.798	0.318
Male (1=yes, 0=no)	0.470	0.499
Light-colored female (1=yes, 0=no)	0.133	0.339
Light-colored male (1=yes, 0=no)	0.100	0.300
Male sold with guarantee (1=yes, 0=no)	0.377	0.485
Female sold with guarantee (1=yes, 0=no)	0.455	0.498
Months of credit, equals 0 if interest charged	1.804	4.806
Female with household occupation (1=yes, 0=no)	0.052	0.221
Male with household occupation (1=yes, 0=no)	0.014	0.119
Occupation, not artisan or domestic (1=yes, 0=no)	0.010	0.100
Skilled worker, aged 15 to 25 years (1=yes, 0=no)	0.006	0.074
Skilled worker, aged 26 to 30 years (1=yes, 0=no)	0.005	0.071
Skilled worker, aged 31 to 40 years (1=yes, 0=no)	0.003	0.057
Skilled worker, aged 41 to 60 years (1=yes, 0=no)	0.002	0.048
Sold in January (1=yes, 0=no)	0.113	0.316
Sold in February (1=yes, 0=no)	0.096	0.295
Sold in March (1=yes, 0=no)	0.113	0.317
Sold in April (1=yes, 0=no)	0.118	0.322
Sold in May (1=yes, 0=no)	0.116	0.320
Sold in June (1=yes, 0=no)	0.082	0.274
Sold in July (1=yes, 0=no)	0.068	0.252
Sold in August (1=yes, 0=no)	0.058	0.234
Sold in September (1=yes, 0=no)	0.042	0.201
Sold in October (1=yes, 0=no)	0.065	0.247
Sold in November (1=yes, 0=no)	0.061	0.240
Sold in December (1=yes, 0=no)	0.067	0.251
Age in years	24.34	10.23
Number of individuals	2168	
	Group Sales	
Covariate	Mean	Standard Deviation
Percent Group Premium	-0.072	0.302
Percent family members	0.537	0.481
Group size, 3 to 5 slaves (1=yes, 0=no)	0.332	0.471
Group size, more than 5 slaves (1=yes, 0=no)	0.116	0.320
Percent family children, aged 0 to 10 years	0.259	0.277
Percent family children, aged 11 to 13 years	0.017	0.079
Percent unrelated children, aged 0 to 10 years	0.030	0.143
Percent unrelated children, aged 11 to 13 years	0.035	0.136
Percent Nuclear Family: Mother, father, & child	0.020	0.138
Percent Other Family: Adult sibs. or childless couples	0.029	0.164
Percent family adults, aged more than 50 years	0.003	0.045
Percent unrelated adults, aged more than 50 years	0.003	0.029
Number of groups	684	
Number of individuals	2415	

Source: Fogel and Engerman, 1976.

Table 2
Slave Price Structure Regression Coefficients, Individual Sales
New Orleans, 1820 to 1860

Covariate	Regression Coefficient
Intercept	-2.475 (0.142)
Male (1=yes, 0=no)	0.147* (0.037)
Light-colored female (1=yes, 0=no)	0.047* (0.023)
Light-colored male (1=yes, 0=no)	0.023 (0.026)
Male sold with guarantee (1=yes, 0=no)	0.306* (0.027)
Female sold with guarantee (1=yes, 0=no)	0.297* (0.029)
Months of credit extended, equals 0 if interest charged	0.015* (0.002)
Female with household occupation (1=yes, 0=no)	0.044 (0.034)
Male with household occupation (1=yes, 0=no)	0.006 (0.061)
Occupation other than artisan or household work (1=yes, 0=no)	-0.009 (0.073)
Skilled worker, aged 15 to 25 years (1=yes, 0=no)	0.239* (0.098)
Skilled worker, aged 26 to 30 years (1=yes, 0=no)	0.318* (0.102)
Skilled worker, aged 31 to 40 years (1=yes, 0=no)	0.543* (0.128)
Skilled worker, aged 41 to 60 years (1=yes, 0=no)	0.451* (0.154)
Sold in January (1=yes, 0=no)	0.127* (0.041)
Sold in February (1=yes, 0=no)	0.062 (0.042)
Sold in March (1=yes, 0=no)	0.093* (0.041)
Sold in April (1=yes, 0=no)	0.114* (0.041)
Sold in May (1=yes, 0=no)	0.043 (0.041)
Sold in June (1=yes, 0=no)	0.024 (0.043)
Sold in July (1=yes, 0=no)	0.032 (0.045)
Sold in August (1=yes, 0=no)	0.084* (0.046)
Sold in October (1=yes, 0=no)	0.063 (0.045)

Sold in November (1=yes, 0=no)	0.080* (0.046)
Sold in December (1=yes, 0=no)	0.112* (0.045)
Age in years	0.185* (0.038)
$Age^2 \cdot 10^{-2}$	-0.454 (0.428)
$Age^3 \cdot 10^{-3}$	-0.019 (0.225)
$Age^4 \cdot 10^{-4}$	0.012* (0.060)
$Age^5 \cdot 10^{-5}$	-0.0004 (0.0076)
$Age^6 \cdot 10^{-6}$	-0.000045 (0.00037)
Adjusted R^2	0.480
Number of observations	2168

Source: Fogel and Engerman, 1976.
Note: The dependent variable is the logarithm of the slave's price relative to the average annual price of a male slave, aged 21 to 38 years. Sample includes New Orleans slaves sold singly. The omitted variable refers to unguaranteed dark-colored females, without a reported skill, sold for cash in September.
* indicates the regression coefficient is statistically different from zero at the 10 percent level. Standard errors are listed in parentheses.

Table 3

Percent Group Premium, Weighted Least Squares Regression Coefficients

covariate	(1)	(2)	(3)	(4)	(5)
Intercept	0.010 (0.016)	-0.067* (0.019)	0.019 (0.023)	0.026 (0.026)	0.026 (0.026)
pc_fam Percent family members	-0.158* (0.024)		-0.151* (0.025)	0.038 (0.076)	0.042 (0.076)
groupsize3_5 Group size, 3 to 5 slaves (1=yes, 0=no)		-0.036 (0.026)	-0.032 (0.026)	-0.011 (0.028)	-0.012 (0.028)
groupsize>5 Group size, more than 5 slaves (1=yes, 0=no)		0.056 (0.030)	0.004 (0.030)	0.014 (0.032)	0.013 (0.031)
pc_rel_kids0_10 Percent family children, aged 0 to 10 years				-0.367* (0.123)	-0.372* (0.122)
pc_rel_kids11_13 Percent family children, aged 11 to 13 years				-0.419* (0.188)	-0.421* (0.187)
pc_unrel_kids0_10 Percent unrelated children, aged 0 to 10 years				-0.193* (0.086)	-0.193* (0.086)
pc_unrel_kids11_13 Percent unrelated children, aged 11 to 13 years				-0.110 (0.092)	-0.111 (0.092)
pc_momdadchild Percent Nuclear Family: Mother, father, & child				0.129* (0.072)	0.141* (0.072)
pc_othfam Percent Other Family: Adult siblings or married couples without children				-0.216* (0.105)	-0.186* (0.106)
pc_rel_old Percent family adults, aged more than 50 years					-0.703* (0.299)
pc_unrel_old Percent unrelated adults, aged more than 50 years					0.001 (0.362)
Adjusted R^2	0.060	0.011	0.060	0.081	0.086
Number of groups	684	684	684	684	684

Source: Fogel and Engerman, 1976.

Note: The dependent variable equals the logarithm of the quotient of the actual and predicted group price, where the predicted group price equals the sum of the predicted prices for group members, derived from Table 2. Predicted prices are adjusted for the logarithm of the standard error. Observations are weighted by group size. The omitted variable represents a group size of two slaves. The sample includes group sales (of more than one slave), excluding groups with a missing value for the age of an individual. Standard errors listed in parentheses. * indicates that the regression coefficient is statistically different from zero at the 10 percent level.

Table 4
Effect of 1829 Black Code Penalties on Frequency of Children Sold on Stand-Alone Basis as "Orphans"

The sale of orphans in New Orleans, 1810 to 1859		
Time Period	Slaves under 10 years of age sold separately as percentage of slaves sold with mother and those sold without mothers	Slaves 10 to 12 years of age sold separately as percentage of slaves sold with mother and those sold without mothers
1810 – 1819	40.7	66.7
1820 – 1829	19.6	70.4
1830 – 1839	12.8	66.7
1840 – 1849	11.0	73.8
1850 - 1859	10	59.2

Source: Fogel and Engerman (1976).

Note: The Fogel and Engerman sample includes the records of 1145 children, 0 to 12 years of age (aged under 13 years). We can classify these children three ways: (1) 225 children sold singly, (2) 721 children sold with their mothers, and (3) 199 children sold in a group but without an identified mother. For this latter group, 126 children were not sold with a woman, aged 15 years or more – in other words, without a potential mother. In addition, two more children were classified as orphans. We assume that these 128 children were not sold with their mothers, leaving 71 children who might have been sold with their mother. We assume that these 71 children were sold with their mothers.

Table 5
Children, Aged 4 to 13 Years, Shipped by Traders
Descriptive Statistics: Means and Standard Deviations

Covariate	All Children	Shipped with Mothers	Shipped without Mothers
Male	0.476 (0.500)	0.392 (0.490)	0.506 (0.500)
Age 4	0.061 (0.240)	0.182 (0.387)	0.018 (0.133)
Age 5	0.067 (0.250)	0.199 (0.400)	0.020 (0.140)
Age 6	0.048 (0.214)	0.099 (0.300)	0.030 (0.170)
Age 7	0.055 (0.229)	0.088 (0.285)	0.044 (0.205)
Age 8	0.091 (0.287)	0.088 (0.285)	0.091 (0.288)
Age 9	0.088 (0.283)	0.088 (0.285)	0.087 (0.283)
Age 10	0.128 (0.335)	0.061 (0.240)	0.153 (0.360)
Age 11	0.102 (0.303)	0.050 (0.218)	0.121 (0.326)
Age 12	0.197 (0.398)	0.072 (0.259)	0.242 (0.429)
Age 13	0.162 (0.369)	0.072 (0.259)	0.194 (0.396)
Shipped with mother (1=yes, 0=no)	0.264 (0.441)	1	0
Number of children	685	181	504

Source: Inward coastwise manifests, New Orleans, LA
Note: Sample includes 120 manifests of slave traders identified from the New Orleans Conveyance Records. For the identification of children sold with mothers, see the text. Standard deviations are listed in parentheses.

Table 6
Heights of Children, Aged 4 to 13 Years, Shipped by New Orleans Slave Traders
Ordinary Least Squares Regression Results

Covariate	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	37.78 (0.63)	37.62 (0.75)	37.26 (3.06)	38.06 (0.66)	37.90 (0.77)	37.37 (3.07)
Male (1=yes, 0=no)	0.19 (0.28)	0.70 (1.13)	0.73 (1.03)	0.21 (0.28)	0.72 (1.13)	0.73 (1.03)
Age 5 (1=yes, 0=no)	3.89* (0.76)	3.22* (0.92)	4.22* (0.85)	3.89* (0.76)	3.22* (0.92)	4.22* (0.85)
Age 6 (1=yes, 0=no)	5.96* (0.83)	6.41* (1.18)	6.72* (1.05)	5.87* (0.83)	6.34* (1.18)	6.70* (1.05)
Age 7 (1=yes, 0=no)	8.90* (0.81)	9.10* (1.06)	8.82* (0.95)	8.77* (0.81)	8.98* (1.06)	8.79* (0.96)
Age 8 (1=yes, 0=no)	9.89* (0.73)	10.11* (0.94)	10.87* (0.85)	9.70* (0.75)	9.91* (0.95)	10.81* (0.85)
Age 9 (1=yes, 0=no)	11.32* (0.74)	11.62* (0.93)	12.62* (0.83)	11.13* (0.75)	11.44* (0.94)	12.56* (0.84)
Age 10 (1=yes, 0=no)	14.10* (0.71)	14.50* (0.92)	14.95* (0.84)	13.86* (0.73)	14.28* (0.93)	14.88* (0.85)
Age 11 (1=yes, 0=no)	16.17* (0.73)	16.37* (0.98)	17.22* (0.90)	15.78* (0.78)	16.01* (1.01)	17.09* (0.93)
Age 12 (1=yes, 0=no)	17.00* (0.67)	17.13* (0.85)	18.06* (0.76)	16.64* (0.72)	16.74* (0.89)	17.92* (0.81)
Age 13 (1=yes, 0=no)	18.83* (0.69)	19.29* (0.87)	20.28* (0.79)	18.46* (0.73)	18.88* (0.91)	20.13* (0.84)
Shipped with mother (1=yes, 0=no)	-1.60* (0.36)	-1.65* (0.36)	-1.77* (0.38)	_____	_____	_____
Shipped with mother and younger than 10 years (1=yes, 0=no)	_____	_____	_____	-1.96* (0.44)	-2.02* (0.44)	-1.89* (0.44)
Shipped with mother and older than 10 years (1=yes, 0=no)	_____	_____	_____	-0.83 (0.64)	-0.86 (0.64)	-1.50* (0.62)
Interacts age dummies with male dummy	No	Yes	Yes	No	Yes	Yes
Includes 119 manifest dummies	No	No	Yes	No	No	Yes
Number of children	685	685	685	685	685	685
Adjusted R^2	0.733	0.733	0.815	0.733	0.733	0.815

Source: Inward coastwise manifests, New Orleans, LA
Note: The dependent variable is the height of slaves in inches. The omitted variable represents a female slave, aged four years, shipped without her mother. Sample includes 120 manifests of slave traders identified from the New Orleans Conveyance Records. For the identification of children sold with mothers, see the text. Standard errors are in parentheses. * indicates the covariate is significantly different from zero at the 10 percent level.

Table 7
Heights of Children, Aged 4 to 13 Years, Shipped by Traders and Non-Traders
Regression Results

Covariate	(1)	(2)	(3)	(4)
Intercept	34.54 (0.55)	34.13 (0.67)	34.32 (0.57)	33.94 (0.69)
Male (1=yes, 0=no)	0.63* (0.25)	1.43 (0.97)	0.65* (0.25)	1.46 (0.97)
Age 5 (1=yes, 0=no)	3.83* (0.70)	3.40* (0.89)	3.79* (0.70)	3.34* (0.89)
Age 6 (1=yes, 0=no)	5.20* (0.68)	4.58* (0.91)	5.20* (0.68)	4.61* (0.91)
Age 7 (1=yes, 0=no)	8.67* (0.69)	9.33* (0.89)	8.60* (0.69)	9.30* (0.89)
Age 8 (1=yes, 0=no)	10.38* (0.64)	11.29* (0.84)	10.24* (0.64)	11.14* (0.85)
Age 9 (1=yes, 0=no)	12.47* (0.64)	12.99* (0.84)	12.35* (0.64)	12.86* (0.84)
Age 10 (1=yes, 0=no)	14.62* (0.60)	15.13* (0.81)	14.47* (0.61)	15.00* (0.82)
Age 11 (1=yes, 0=no)	16.68* (0.66)	17.73* (0.89)	17.38* (0.75)	18.36* (0.95)
Age 12 (1=yes, 0=no)	17.93* (0.59)	17.66* (0.77)	18.61* (0.68)	18.32* (0.85)
Age 13 (1=yes, 0=no)	19.63* (0.61)	20.46* (0.78)	20.33* (0.70)	21.06* (0.85)
Shipped with mother (1=yes, 0=no)	-0.24 (0.44)	-0.16 (0.45)	-0.13 (0.45)	-0.07 (0.45)
Shipped by slave trader and without mother (1=yes, 0=no)	2.39* (0.31)	2.47* (0.31)	_____	_____
Shipped by slave trader, without mother, and younger than 10 year (1=yes, 0=no)	_____	_____	3.02* (0.41)	3.05* (0.41)
Shipped by slave trader, without mother, and older than 10 year (1=yes, 0=no)	_____	_____	1.64* (0.44)	1.78* (0.44)
Shipped by slave trader and with mother (1=yes, 0=no)	1.50* (0.48)	1.54* (0.48)	_____	_____
Shipped by slave trader, with mother and younger than 10 year (1=yes, 0=no)	_____	_____	1.61* (0.52)	1.63* (0.52)
Shipped by slave trader, with mother and older than 10 year (1=yes, 0=no)	_____	_____	1.03 (0.85)	1.17 (0.85)
Interacts age dummies with male dummy	No	Yes	No	Yes
Number of children	1084	1084	1084	1084
Adjusted R^2	0.703	0.707	0.705	0.708

Source: Inward coastwise manifests, New Orleans, LA
Note: The dependent variable is the height of slaves in inches. The omitted variable represents a female slave, aged four years, shipped without her mother by someone other than a slave trader. Sample includes 274 manifests, slave traders identified from the New Orleans Conveyance Records. For the identification of children sold with mothers, see the text. Standard errors are in parentheses. * indicates the covariate is significantly different from zero at the 5 percent level.

Figure 1

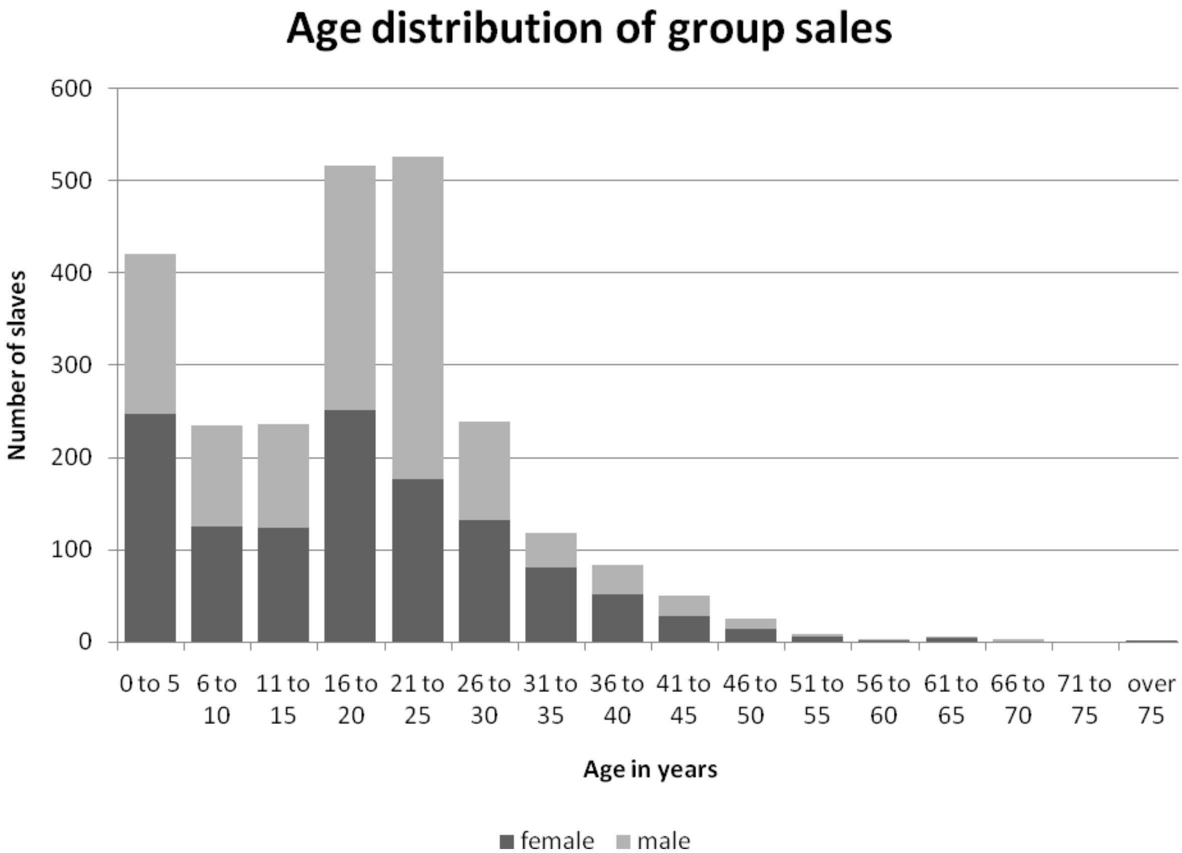

Age distribution of group sales
Number of slaves
600
500
400
300
200
100
0
0 to 5
6 to 10
11 to 15
16 to 20
21 to 25
26 to 30
31 to 35
36 to 40
41 to 45
46 to 50
51 to 55
56 to 60
61 to 65
66 to 70
71 to 75
over 75
Age in years
female
male

Figure 2

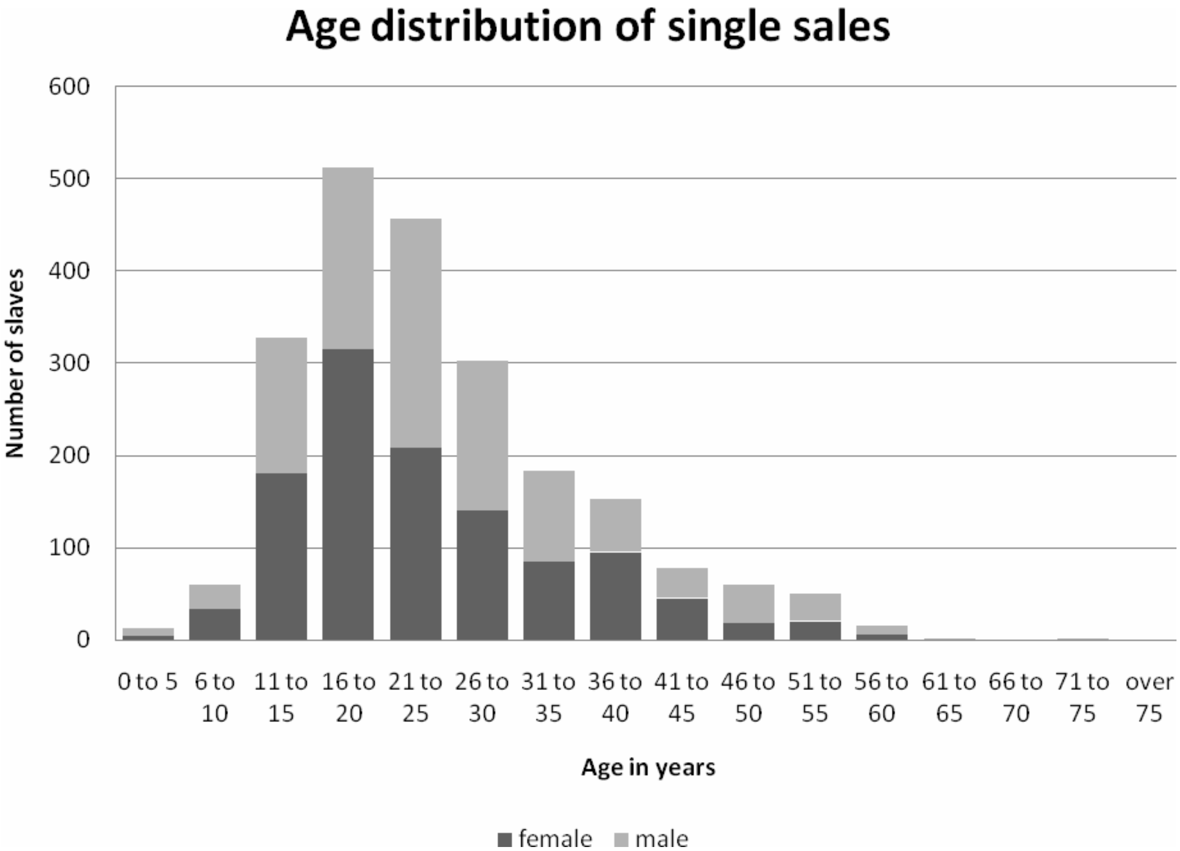
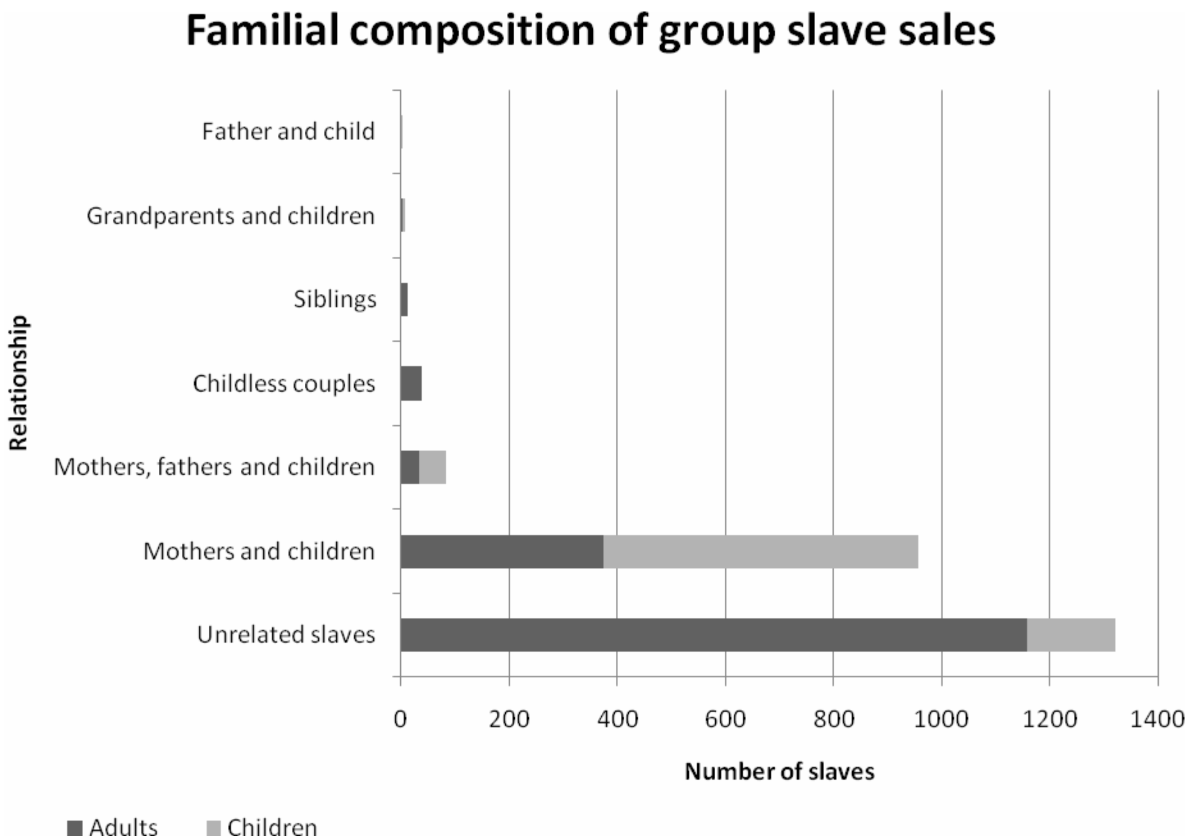

Age distribution of single sales
Number of slaves
600
500
400
300
200
100
0
0 to 5
6 to 10
11 to 15
16 to 20
21 to 25
26 to 30
31 to 35
36 to 40
41 to 45
46 to 50
51 to 55
56 to 60
61 to 65
66 to 70
71 to 75
over 75
Age in years
female
male

Figure 3



Familial composition of group slave sales
Relationship
Father and child
Grandparents and children
Siblings
Childless couples
Mothers, fathers and children
Mothers and children
Unrelated slaves
0
200
400
600
800
1000
1200
1400
Number of slaves
Adults
Children

Figure 4

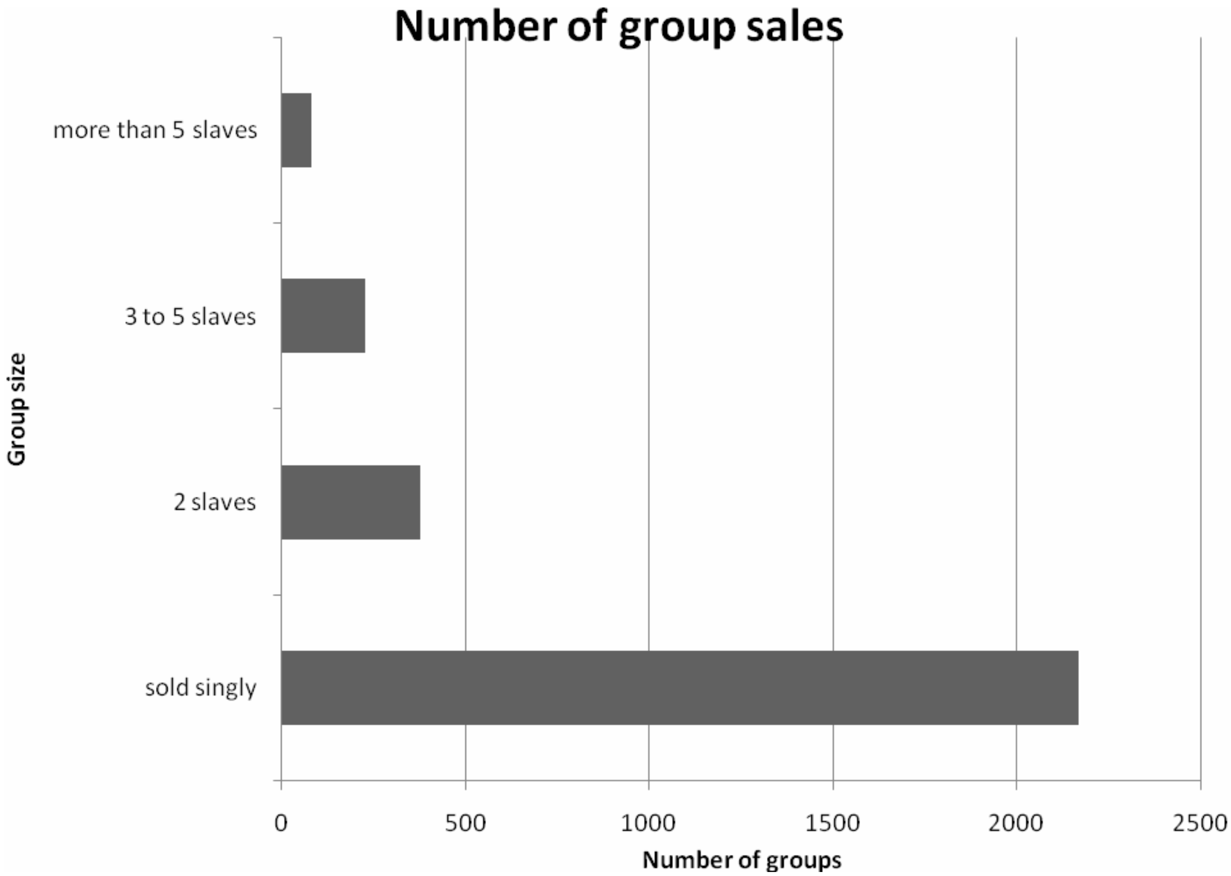

Number of group sales
more than 5 slaves
3 to 5 slaves
2 slaves
sold singly
Group size
0
500
1000
1500
2000
2500
Number of groups

Figure 5

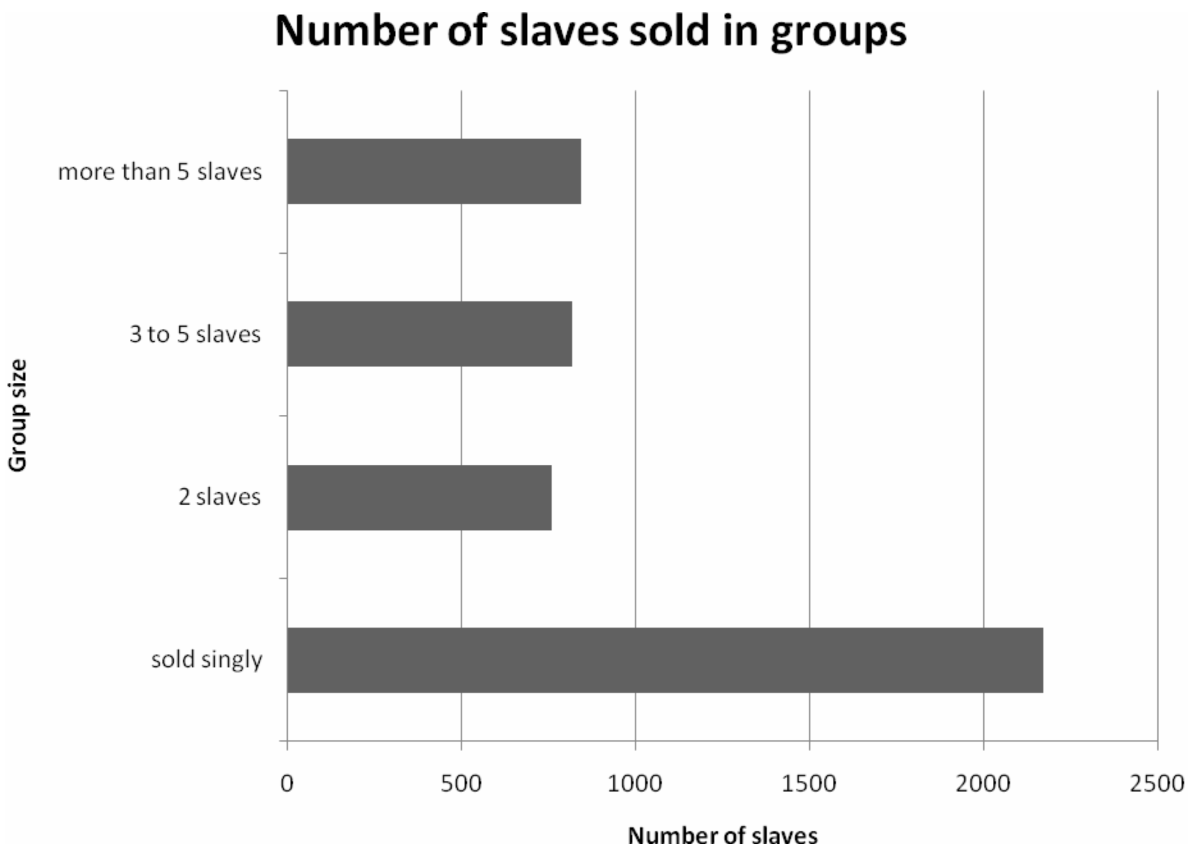

Number of slaves sold in groups
more than 5 slaves
3 to 5 slaves
2 slaves
sold singly
Group size
0
500
1000
1500
2000
2500
Number of slaves

Figure 6

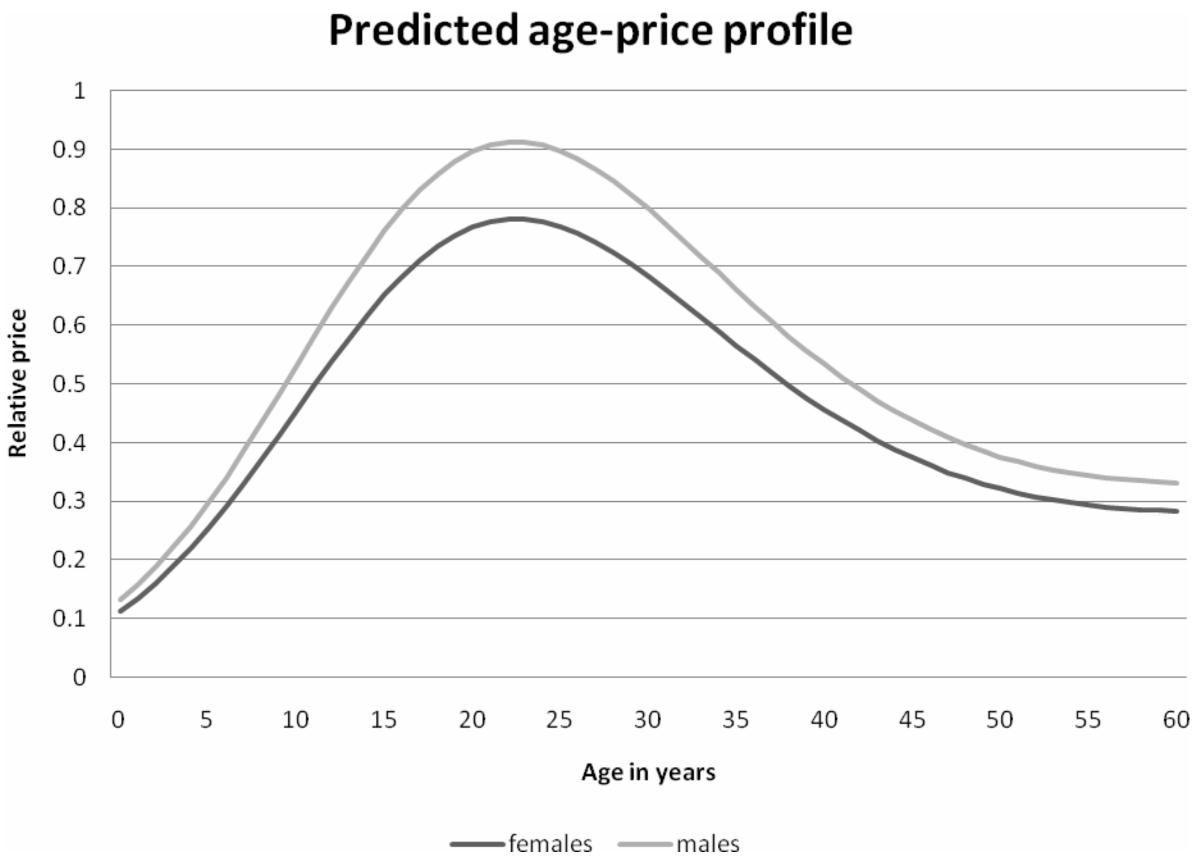
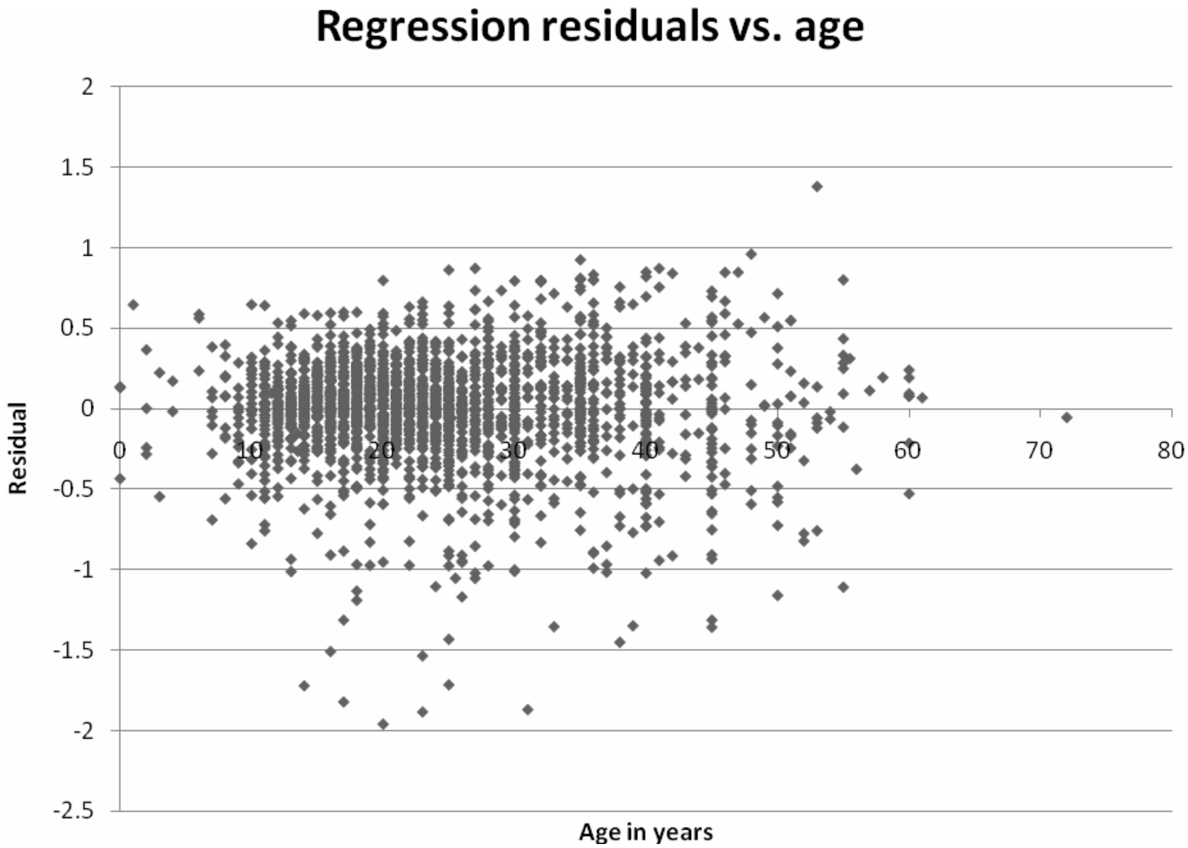

Predicted age-price profile
Relative price
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
5
10
15
20
25
30
35
40
45
50
55
60
Age in years
females
males

Figure 7



Regression residuals vs. age
2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
-2.5
Residual
0
10
20
30
40
50
60
70
80
Age in years

Figure 8

Age, Market Value, and the Decision to Preserve Family Ties