

THE STRUCTURE OF SLAVE PRICES
IN NEW ORLEANS, 1804 TO 1862

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Comments welcomed!

The Structure of Slave Prices In New Orleans, 1804 To 1862

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This paper analyzes the structure of slave prices in New Orleans from 1804 to 1862. The analysis sheds light on a wide range of issues concerning the nature of American slavery in the 19th century. High on this list of issues is the competitive nature and economic "rationality" of the slave system, the impact of the slave trade on the separation of the slave family, the extent of slave skill formation and its importance to the Southern economy and the personal relationships between owners and slaves.

The analysis is based on the Fogel and Engerman sample of New Orleans slave invoices representing over 5700 slaves sold during the years 1804 to 1862. These invoices contain a rich assortment of information about the characteristics and attributes of slaves sold in the market as well as the particulars of slave transactions. The data is investigated within a regression model which relates the price of slaves sold in the market to their characteristics as well as aspects of the slave sale. After discussing the data and the regression model, the paper presents general results and then focuses on particular questions of interest.

Section I: THE DATA

Certainly the internal slave trade as well as the New Orleans market have long been the subject of historical inquiry; however, traditional historians such as Phillips, Bancroft, and Stephenson have made very limited use of the New Orleans invoices. The neglect of this body of data is attributable to a lack of computer technology available at the time

books such as Bancroft's Slave Trading In The Old South were written.

Over the period 1804-1862 more than 135,000 slaves were brought to market in New Orleans,^{1/} the major slave market in the New South. A majority of these slaves, approximately 3/5 were sold separately; the remainder were purchased in groups ranging in our sample as high as 46 slaves to a single sale. The invoices recording these transactions describe many characteristics of the slave or slaves purchased as well as the particulars of the sale. The slave's sex, age, color, occupation, and the sex and ages of accompanying children were all reported. The number of slaves sold, price quotations, the terms of payment, and the origins of seller and buyer are indicated. Other information available from the invoices is the data of sale, both month and year, and the issue or non-issue of a guarantee at time of purchase. In the case of slaves who were not guaranteed a reason was often stated.

The New Orleans invoices seem to be a highly reliable data source, to quote Fogel and Engerman,

...these records (did not) arise under circumstances or for purposes that were likely to make respondents given false information regarding age, sex, or place of origin of slaves. The records were created by a law requiring the registration of all slave sales in order to give legal force to an owners claim to title.^{2/}

The issue of a guarantee provided itself a strong motivation for both buyer and seller to correctly represent the terms of the sale as well as describe the slave or slaves in question.

The regressions presented below are based on two classifications of the slaves. Slaves sold separately, i.e., one slave with one quoted price, and female slaves sold only with their children will be referred to as

'individual' slaves. Slaves sold in groups excluding mothers sold only with their children will be designated 'group' slaves. 'Group' slaves include observations from invoices containing only one price quotation for all the slaves sold, as well as invoices which specify as many price quotations as there are slaves. A regression explaining the price of slaves sold separately is specified and carried out for the sample of 'individual' slaves. Group sale prices are considered to be aggregations of individual sales and aggregated regressions for this part of the sample are also considered. The exclusion from the 'individual' slaves regression of group slaves when a separate price was listed for each slave was motivated by the following considerations. Many of the invoices of group sales which quoted a price for each slave quoted identical prices for slaves of quite different ages and attributes. Apparently purchasers in these cases offered to buy X number of slaves all for the same price. Inclusion of these observations in our regressions on 'individual' slaves would bias our results.

Section II: THE REGRESSION MODEL

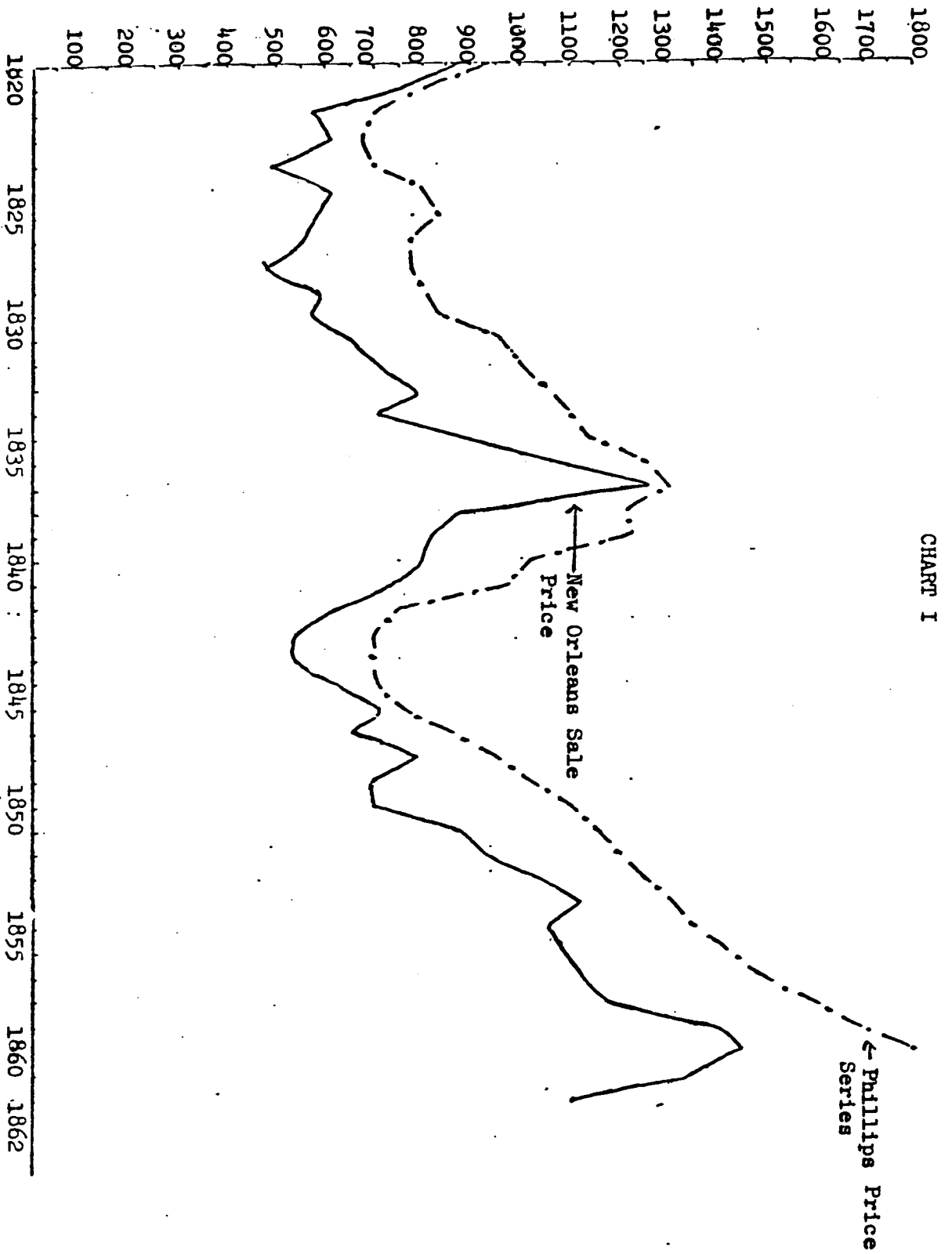
While it is abundantly clear that the level of slave prices varied substantially over the years (see Chart I), our model assumes that the structure of slave prices was invariant over time. To state this more precisely, we assume that the equilibrium marginal rates of transformation and substitution between different slave attributes are independent of time. This is, of course, a testable hypothesis and one which will be considered below. To free the dependent price variable of the general price level, p_{it} , the price of slave i in year t , is deflated by P_{nt} , the mean New Orleans price of male field hands between the ages of 21

and 38 in year t .^{3/} This price series is presented in Chart I and labelled "New Orleans Sale Price". The logarithm of these price relatives are related to 34 exogeneous variables which are described in Table I together with other exogeneous variables used in this paper. The coefficients in the semi-logarithmic specification indicates the percentage increment in slave's price resulting from a unit increment in the exogeneous variable. Certain of the exogeneous variables such as dummies for the month of year presumably affect all slave prices by the same percentage amount, hence the semi-logarithmic form seems appropriate.^{4/}

Chart I presents our New Orleans sale price series (Pnt) for the years 1820 to 1962. In addition Ulrich Phillips' price series from American Negro Slavery, the most widely cited in the literature, is reproduced.^{5/} For many of the years prior to 1820 the number of slaves represented in our Pnt series is less than 10 hence Chart I details prices only for years after 1820.

Although Phillips' price series captures the major trends in slave prices over the decades, it is uniformly too high, overestimating slave prices in some years by as much as four hundred dollars.^{6/} The 1820's and 1840's witnessed depressed slave prices. By 1845 nominal slave prices were trending upward and continued in that direction until the early years of the Civil War.

The New Orleans price series value for 1861 is 1381 and for 1862 it is 1116. Using Lerner's price index for the Confederacy implies that the real price of slaves in New Orleans fell by about 70 percent during the period 1861 to 1862 indicating growing concern about the ultimate outcome of the war.^{7/}



Section III GENERAL FINDINGS

Table II presents regression coefficients for our sample of 3024 individual slaves sold during the years 1804 to 1862. A brief statement of the findings is given here; more detailed examination of the results and modifications of the specification are presented below.

The regression is highly significant explaining close to 50 percent of the variance of the logarithm of slaves relative price. Most of the coefficients are of expected sign and are separately significant. Males sold on average for a 9.1 percent premium relative to females; children at all ages sold with their mothers were positively valued. In Chart II we present the 1804-1862 age coefficient polynomial obtained from the age coefficients of Table II.^{8/} The polynomial peaks slightly beyond age 22. The slope of the polynomial is easily interpreted as the percentage increment to the slave price of an additional year of age. As is clear from the graph, relative price increases occurred most rapidly for the very young; while prices fell after age 22, the rate of decline decreased with age. To obtain predicted price relatives by age one need only subtract the corresponding values of the polynomial and raise e to this difference. Applying this procedure we find that on average slaves reached half their prime age price by age 8. This ratio was again observed on the downside during the slaves' mid-forties. While these findings conformed well with at least this author's priors, the significant valuation of light colored female slaves as well as the marked seasonality of the slave trade are important new findings. Light skin color added over 5.3 percent to the female's price during the period 1804-1862. The t -value for this variable is 2.732. While the coefficient for color M, light colored males,

TABLE I

VARIABLE	DESCRIPTION
AGE 1 AGE 2 AGE 3 AGE 4 AGE 5 AGE 6	Sixth order polynomial in age
MTHCRED	Months of credit extended; MTHCRED takes the value zero if an interest rate was explicitly mentioned on the invoice.
MTD1-MTD8, MTD10-MTD12	Month dummies, September is excluded
SEXM	Dummy for male slave
COLOR F COLOR M	Dummies for light colored slaves, females and males respectively. Light colored slaves are slaves coded either mulatto, griff, creole, yellow, or light on the invoice.
SKLAGE 1 SKLAGE 2 SKLAGE 3 SKLAGE 4	Dummies for ages: 15-25 Artisans: 25-30 30-40 40-60 Artisans are sailmakers, blacksmiths, carpenters, coopers, bricklayers, butchers, slaters, engineers, tailors, shoemakers, and cotton samplers.
SKILL	Dummy for slave artisans
HWF HWM	Dummies for female and male slaves with house-centered occupations: seamstress, cook, washer, ironer, house servant, waiter, domestic, carriage driver, hair dresser, child nurse, baker.
OTHOCC	Dummy for slaves with an occupation who were neither artisans nor had worked in a house related activity. These other occupations listed are: gardner, wood chopper, field hand, axeman & plough, hostler, seller, dray driver, coachman, digger, spinner, and shephard.
GUARF GUARM	Dummies for guaranteed females and males
K12 - K345 K6789 K10+	Continuous variables indicating the number of children ages 1-2, 3-5, 6-9, and 10 and over sold with their mothers.
Jan.-Apr. Oct.-Dec.	Season dummies corresponding to the abbreviated months.

TABLE II

SLAVE PRICE STRUCTURE

REGRESSION COEFFICIENTS, INDIVIDUAL SLAVES

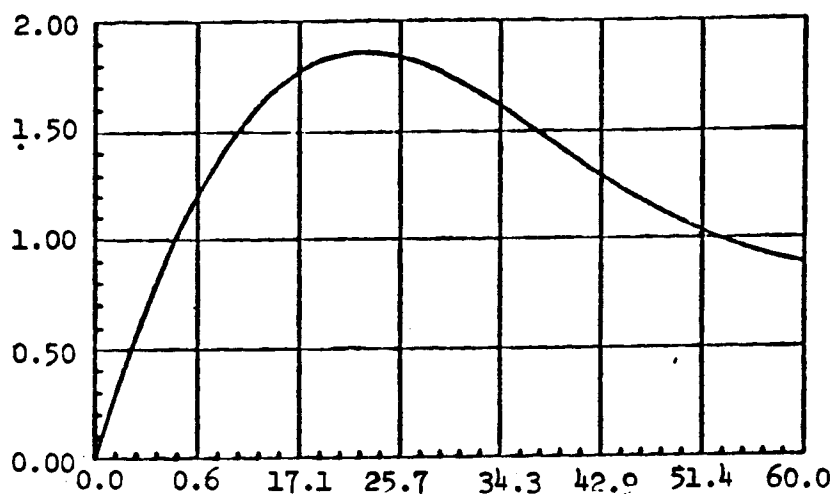
Dependent variable is $\log (P_{it}/P_{nt})$

$R^2 = .479$

<u>Variable</u>	<u>Coefficient</u>	<u>Standard Error</u>
SEXM	.091	.033
COLOR F	.053	.019
COLOR M	.023	.023
GUARM	.319	.025
GUARF	.260	.024
K12	.094	.027
K345	.155	.028
K1789	.308	.028
K10+	.526	.039
MTHCRCD	.015	.001
HWF	.050	.029
HWM	-.004	.057
OTHOC	-.040	.063
SKLAGE1	.236	.103
SKLAGE2	.351	.095
SKLAGE3	.488	.099
SKLAGE4	.447	.122
MTD1	.108	.033
MTD2	.075	.034
MTD3	.075	.033
MTD4	.095	.033
MTD5	.032	.033
MTD6	.030	.035
MTD7	.022	.036
MTD8	.049	.037
MTD10	.049	.037
MTD11	.082	.037
MTD12	.086	.036
AGE1	.181	.041
AGE2	-.450 E-2	.436 E-2
AGE3	-.270 E-4	2.226 E-4
AGE4	.194 E-5	.576 E-5
AGE5	-.209 E-7	-.727 E-7
AGE6	.682 E-10	3.539 E-10

CHART II

AGE COEFFICIENT POLYNOMIAL 1804-1862



is positive, 2.29%, it is insignificant. The true light colored male premium may be zero or it may be equal to the light colored female premium as is indicated by a F value of 1.827 under the null hypothesis that the two coefficients are equal. The $F(1,2989)$ at the five percent level of confidence is 3.84. Hence we can neither reject the hypotheses that the coefficient is zero or that it is 5.3%. The light colored female coefficient represents the first systematic empirical verification that slave owners valued light females above darker females. Although Bancroft^{9/} and others have explained this premium as sexual other explanations may be consistent with the findings and will be entertained below.

The slave trade at New Orleans exhibited a substantial seasonal pattern attested to by the month dummies. The $F(11,2989)$ value under the hypothesis that the month coefficients are all zero equals 2.21 which exceeds the critical value of 1.79 at the 5% level of confidence. Hence the month coefficients are jointly significant and different from zero. (Six of the

eleven coefficients are separately signified). Slave prices were lowest during September, the excluded month, as is evidenced by the positive coefficients on all the included months. Traders and owners could expect to obtain a 10.8% higher price on their slaves if they came to market in January rather than September. Indeed the entire late Fall-Winter period from November through April exhibited slave prices at least 7.5% higher than those in September. The most likely explanation for this seasonality is a substantially higher demand for slaves during these months relative to the rest of the year. During the Spring, Summer, and early Fall planters were preoccupied with planting, cultivating and harvesting their crops.^{10/} The opportunity costs of traveling to New Orleans and purchasing slaves in terms of the planter's or overseer's own managerial time was highest during these months. Equally important is the time needed for slaves to acclimatize themselves to the new setting and to acquire the skills requisite to their newly assigned tasks. Taylor makes this point indirectly in discussing local vs. imported negroes. "Even when a planter bought local slaves about whom he had no personal knowledge, he could take comfort in the fact that they were already acclimated."^{11/}

This view of a seasonally shifting demand curve and a stable supply schedule is reinforced by quantity data. Over the period 1804-1862 36% of all slaves in our sample were sold during the months January to March. From April to June, 32% were sold. July, August and September accounted for 15% of the sales while the fall months of October through December witnessed 18% of all sales. The correlation between the month premia coefficients and the percentage of slaves sold within the month is .509. Traders bringing slaves from the slave exporting Eastern states to New Orleans

were clearly cognizant of the higher winter prices. 81.8 percent of slaves imported from the Eastern slave states were sold during the months of January to June.

The SKLAGE coefficients indicate that skilled slave artisans were highly valued in the southern economy. The premia for skilled artisans range from 23.6% to 48.8% and peak not in the early twenties but between 30 and 40. Each of the SKLAGE coefficients is significant; on the other hand their standard errors are large enough to prevent a rejection of the hypothesis that all the coefficients are equal. The $F(4,2989)$ value is 1.13 well below the cutoff value of 2.21.

If a slave owner could expect a large increase in the value of slaves developing highly specific skills, such was not the case for slaves in other occupations. Female household or house-related servants sold at close to a 5% premium (t value is 1.697 and is significant in a one-tail test), but the male house-related servants and slaves in the remainder of the occupational categories sold for no premium at all. Both coefficients are negative and insignificant.

Although 26% of total transactions in our sample were credit transactions fewer than one in seven credit sales explicitly mentioned an interest rate. The highly significant regression coefficient on months of credit suggests that far from offering credit at a zero interest rate, slave transactions were carefully computing interest and including the interest in the final sale price of the slave. Indeed the coefficient on months of credit may be interpreted as an implicit monthly interest rate, since it is the percentage contribution to the sale price of a month's credit. 1.547 percent a month (t value of 15.22) corresponds to an annual interest rate of 18.56%, comparable to modern rates on charge accounts.^{12/}

That slave purchasers carefully scrutinized their prospective acquisitions is demonstrated by the guarantee coefficients. Eighty-four percent of the individual slaves in our sample were fully warranted for an average period of a year.^{13/} Other slaves were guaranteed fully except for particular medical problems or types of behavior listed in Table III. Some slaves were guaranteed only with respect to the authenticity of their title, i.e., that the seller actually owned the slaves. In other cases no mention of guarantee was made at all. The respective male and female premia for fully guaranteed slaves were 31.9% and 26.0% (respective t values are 12.4 and 10.5).

Changes in the Structure of Slave Prices Over Time

In order to test the hypothesis of a stable slave price structure over time seven additional regressions were run for the time periods 1804-1809, 1810-1819, 1820-1829, 1830-1839, 1840-1849, 1850-1859, 1860-1862. A smaller set of exogeneous variables was chosen to save degrees of freedom. Two seasonal dummies corresponding to the months January-April and October-December replace the eleven month dummies, HWM and OTHOCC were eliminated and GUARM, GUARF, were combined into one guarantee dummy, GUARD. Finally the artisan-age interaction dummies are condensed into one skilled artisan dummy called SKILL. This subset of variables reported in Table IV yields substantially the same amount of explanation for the entire 1804-1862 period as the larger set of coefficients from Table II (see column 8, Table IV). More precisely the $F(15,2989)$ test that the subset of variables is significantly different from the larger set yields a value of .775-below the 5% cutoff F value of 1.665.

TABLE III
EXCEPTIONS TO FULL GUARANTEES
GIVEN ON SLAVES TRADED IN THE
NEW ORLEANS MARKET, 1804-1962

<u>Health</u>	<u>Disposition</u>
Asthma	Run Away, Absconds
Hearing	Absents Herself
Bad Eyes	Addicted to Drink
Rheumatism	Suicidal
Maladies	Heredity Vices
Defect in Leg, Frostbitten Foot	Thief
Sickly	Vices Only
Crippled	Not Worth Much
Swollen Limbs	Does Nothing
One Arm	Giddiness
Slightly Ruptured	Brut
Subject to Falling of Womb	
Limps	
Ulcer-Hand	
Partly Paralyzed	
Crippled on Hand	
Pregnant	
Scrofula	
Pock Knees	
Cancer	
Handicapped	
Falling Womb	
Disease of 'White Flowers'	
Veneral Disease	
Head Would	
Dirt Eater	

Source: Primary data supplied by Fogel and Engerman's documentation of
New Orleans' invoice sample.

TABLE IV

THE CHANGING STRUCTURE OF SLAVE PRICES

<u>Variable</u>	<u>1804-1809</u>	<u>1810-1819</u>	<u>1820-1829</u>	<u>1830-1839</u>	<u>1840-1849</u>	<u>1850-1859</u>	<u>1860-1862</u>	<u>1804-1862</u>
	N = 139 R ² = .305	N = 419 R ² = .479	N = 485 R ² = .550	N = 507 R ² = .484	N = 599 R ² = .464	N = 775 R ² = .520	N = 100 R ² = .743	N = 3024 R ² = .466
K12	.172 [*] (.134)	.102 (.068)	.165 (.069)	.004 (.079)	.143 (.059)	.072 (.052)	.023 (.127)	.092 (.028)
K345		.145 (.059)	.268 (.096)	.151 (.081)	.119 (.066)	.149 (.051)	.118 (.162)	.156 (.029)
K6789		.399 (.062)	.259 (.084)	.389 (.080)	.267 (.059)	.246 (.050)	.483 (.173)	.307 (.028)
K10+		.419 (.109)	.558 (.130)	.571 (.105)	.737 (.105)	.522 (.058)	.734 (.268)	.523 (.040)
MTHCRED	.00466 (.00749)	.01561 (.00294)	.01953 (.00234)	.0145 (.0030)	.00906 (.00499)	.00428 (.00326)	-.01315 (.04253)	.01529 (.00130)
SEX	.128 (.066)	.091 (.035)	.184 (.039)	.155 (.037)	.127 (.035)	.159 (.031)	.252 (.092)	.139 (.015)
COLORF	.038 (.118)	.192 (.052)	.132 (.059)	.039 (.047)	.013 (.044)	.030 (.034)	.104 (.093)	.052 (.019)
COLORM	-.124 .143	.028 (.053)	-.025 (.065)	.096 (.053)	.002 (.054)	-.004 (.046)	-.120 (.134)	.025 (.024)
SKILL	.509 (.251)	.519 (.140)	.465 (.169)	.146 (.195)	.370 (.097)	.327 (.046)	.280 .242	.378 (.053)

Table IV (continued)

Variable	<u>1804-1809</u>	<u>1810-1819</u>	<u>1820-1829</u>	<u>1830-1839</u>	<u>1840-1849</u>	<u>1850-1859</u>	<u>1860-1862</u>	<u>1804-1862</u>
GUARD	.072 (.089)	.229 (.055)	.433 (.049)	.269 (.046)	.297 (.039)	.272 (.032)	.264 (.086)	.288 (.018)
JAN.-APR.	.098 (.073)	.076 (.034)	.030 (.036)	.050 (.034)	.066 (.032)	.053 (.027)	.143 (.077)	.062 (.014)
OCT.-DEC.	.156 (.078)	-.016 (.041)	.059 (.047)	.075 (.042)	-.0001 (.041)	.055 (.034)	.206 (.132)	.044 (.018)
HMF	.180 (.154)	.115 (.093)	.104 (.079)	.038 (.059)	.017 (.071)	-.028 (.054)	.080 (.140)	.051 (.029)
AGE1	-.262 E-1 (.372)	-.278 (.125)	.339 (.110)	.322 (.170)	.163 (.115)	.125 (.205)	.299 (.166)	.185 (.042)
AGE2	.215 E-1 (.054)	.499 E-1 (.143 E-1)	-.259 E-1 (.134 E-1)	-.205 E-1 (.204 E-1)	-.355 E-2 (.118 E-1)	.123 E-1 (.209 E-1)	-.161 E-1 (.247 E-1)	-.497 E-2 (.499 E-2)
AGE3	-.195 E-2 (.359 E-2)	-.304 E-2 (.773 E-3)	-.127 E-2 (.777 E-3)	-.926 E-3 (.124 E-2)	-.684 E-4 (.587 E-3)	-.130 E-2 (.106 E-2)	.486 E-3 (.154 E-2)	-.487 E-3 (.227 E-3)
AGE4	.764 E-4 (.120 E-3)	.856 E-4 (.213 E-4)	-.369 E-4 (.227 E-4)	-.283 E-4 (.377 E-4)	.335 E-5 (.148 E-4)	.440 E-4 (.281 E-4)	-.919 E-5 (.460 E-4)	.142 E-5 (.588 E-5)
AGE5	-.138 E-5 (.197 E-5)	-.114 E-5 (.286 E-6)	.536 E-6 (.323 E-6)	.453 E-6 (.565 E-6)	-.453 E-7 (.184 E-6)	-.665 E-6 (.374 E-6)	.883 E-7 (.659 E-6)	-.150 E-7 (.742 E-7)
AGE6	.940 E-8 (.125 E-7)	.574 E-8 (.149 E-8)	-.298 E-8 (.178 E-8)	-.280 E-8 (.330 E-8)	.218 E-9 (.875 E-9)	.378 E-8 (.196 E-8)	-.284 E-9 (.362 E-8)	.418 E-9 (.361 E-9)
CONSTANT	-1.15 (.890)	-.921 (.403)	-2.907 (.349)	-2.807 (.532)	-2.290 (.429)	-2.659 (.780)	-2.628 (.297)	-2.368 (.151)

* Due to collinearity one continuous variable was used for number of children.

N is sample size; standard errors are in parentheses.

Having accepted the reduced model of Table III we now proceed with a Chow test to determine whether the coefficients of the first seven columns of Table III differ significantly from those of the eighth. With 120 and 2884 degrees of freedom the F computed is 2.735 and exceeds the cutoff F value of 1.22. Hence we reject the hypothesis that the structure of price differentials remained fixed throughout the ante-bellum years of the 19th century. In proceeding below with a closer examination of the coefficients we shall discuss the results of Table IV as well as carry out additional tests on the larger (Table II) model based on the entire time span.^{14/}

Section IV: THE ECONOMIC RATIONALITY OF THE SLAVE MARKET SUGGESTED BY THE STRUCTURE OF SLAVE PRICES

The implicit interest rate of 18 percent, the shape of the age price profile, the skill, guarantee and male sex premiums -- all point to shrewd, calculating transactors operating in a highly developed market in human beings. Bancroft describes the degrading close inspection of slaves up for sale:

For nearly a week this gang had been subject to inspection at the mart, but that did not preclude more of it at the sale. To facilitate this, the slaves were arranged as much as possible in a row around the yard of the jail with their backs to the wall. Each slave or mother and infant wore a number that corresponded with one in a printed descriptive 'list' or 'catalogue', giving the age, habitual occupation and any other important fact....Some were stripping and others were dressing, and still others were all but naked, while prospective buyers satisfied themselves that there were no serious whip-scars, no signs of rheumatism, or of more serious diseases....^{15/}

Male Premia

More evidence of the careful calculations involved in the pricing of slaves results from considering the differential pricing of males and

females by age. To allow for an age sex interaction in the regression the single SEXM dummy for males and the age polynomial were replaced by two six order age polynomials, one for males and one for females. Chart III gives the predicted ratio of the male to the female price by age holding other attributes constant. Chart IV reports the predicted price relatives of males and females by age. Far from exhibiting a constant 9.1 percent male premium, Chart III shows that female prices actually exceeded male prices for young slaves. The maximum male premium of 18% occurs at about age 32. The higher prices of young slave girls relative to young slave boys may be explained by earlier female maturation. Records of the cotton picking rates of 321 slaves age 4-12 on the Leah Plantation from 1841-1860 indicate that girls were 4 percent more productive in picking than boys in this age group. For ages 13-16 (sample size of 131) girls were 8% more productive than boys in cotton picking. At the age 16 the productivity advantage shifted to the males.^{16/} Unfortunately no comparable evidence is available for sugar and other plantation activities.

The transactors in the slave market paid peak prices for males at age 25; for females the peak price occurred at age 22. The difference in the positioning of the price relatives of Chart IV probably reflects the value of the female's child bearing capacity. Assuming the value of an age zero new born infant exceeded the opportunity costs of the mother's time in giving birth, these additional net returns from owning females would be concentrated in the child bearing years between 15 and 35. Hence even if males and females had identical field productivities after age 15, one would expect to observe the price relative of females skewed to the left of that for males reflecting expected discounting of both the field production and child bearing income streams.^{17/}

CHART III
PREDICTED RATIO OF MALE PRICE TO FEMALE PRICE
1804-1863

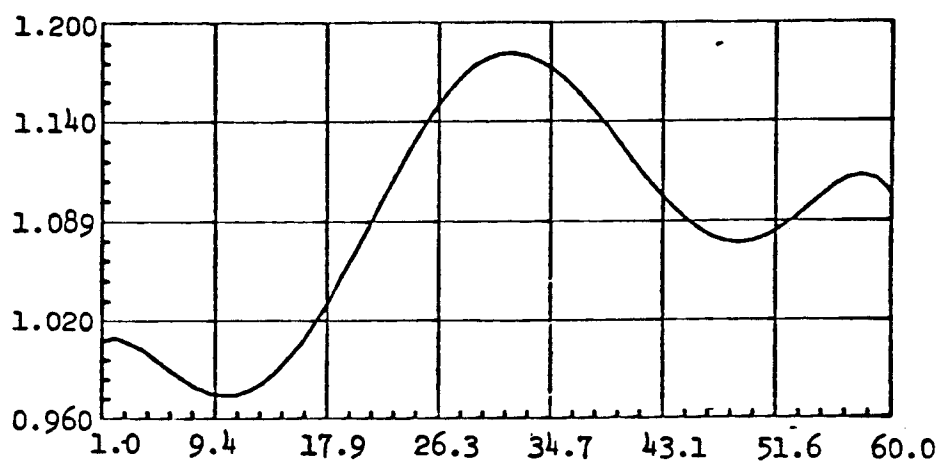
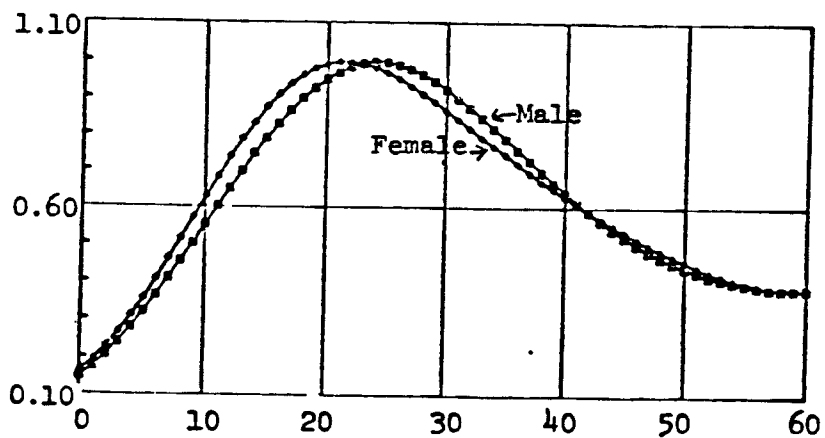


CHART IV
MALE AND FEMALE PREDICTED RELATIVE PRICES
1804-1862



Length of Credit

We stated above that the MTHCRED variable yields an implicit interest rate. One caveat to this assertion is the possibility that the coefficient encompasses a transactions cost component as well as interest charges. In addition the rate of interest may depend on the length of credit. These hypotheses were tested by replacing MTHCRED by three new continuous variables M1-M3. M1 measures the influence of the first four months of credit on the slave price, while M2 captures months 5-12, and M3 months 13 and beyond. The construction of these variables is best illustrated with two examples. An invoice indicating 9 months of credit implies a value of 4 for M1, 5 for M2, and zero for M3. A 22 month credit extension was parameterized with M1 = 4, M2 = 7, and M3 = 11. Each variable captures then the increment to the sale price of an additional month's credit for particular months. If transactions costs were indeed an important element in the MTHCRED result one would expect the coefficient on M1 to exceed those of M2 and M3 by exactly the transactions component.

The coefficients obtained are 1.8998% for M1, 1.3124% for M2, and 1.5769% for M3. Each coefficient was separately significant; while a simultaneous test at the 1% level of significance (three separate confidence intervals were constructed) prevents a statistical assertion of difference in their magnitudes, the transaction theory is supported. The interpretation here is of a transactions premium of about .6% as well as a short-long differential of roughly .3%. Short term credit was extended at a 15.7% annual interest rate, while long term credit (1 year or more) meant paying a higher 18.9% yearly rate.

Starting in 1804 Table III reports increasing finance charges up to the 1820's with a steady decline thereafter. Rates were much higher during the 1810-1839 period than either before or after. The decline in the coefficient from the 1830's 1.45% to a .9% figure in the 1840's accords well with the general economic depression in the South during the latter decade. The rates given are nominal; all are positive except for the insignificant 1800-1862 - 1.3%.

Guarantee Premiums

The nature of the guarantee information is the following. Most slaves, 84.3 percent, were fully guaranteed. For 8.2 percent of the slaves only the title was guaranteed. Another 5.2% were guaranteed fully except for particular medical or disciplinary problems listed in Table III. In the remaining 2.3 percent of the cases nothing was mentioned concerning guarantees. In the case of slaves guaranteed fully except for a particular medical problem or physical defect the reduction in price relative to a fully guaranteed slave presumably reflects lower actual physical capabilities rather than a risk premium for potential medical problems. In general the guarantee premia reflect, then, both a risk premium for buying a slave who appears healthy and well disciplined but may in fact be neither, as well as a discount for slaves who are clearly ill or poorly disciplined. Most of the slaves guaranteed except for a medical problem or physical defect were above age 30. Of the 55 slaves guaranteed except for "run away" none exceeded 40 years old and 14% were younger than 16.^{18/} The guarantee of the title only occurred five times more often for groups of ten or more slaves sold together than for single slave transactions. These large slave sales may have been associated with the sale of entire plantations at perhaps the

death or at least departure of the owner. The difficulty in these cases of returning slaves and recovering the sale price would explain the failure to fully guarantee.

To sort out the various factors influencing the fully guaranteed premia of Table II the regression was respecified with additional guarantee variables. Taking title-only guaranteed slaves as the reference point, fully guaranteed males sold for a 39% premium and fully guaranteed females for a 34% premium. Run away males and females sold for 15% more than title-only guaranteed slaves while slaves with medical problems sold for 7% more. Other slaves with disciplining problems sold for 15% more than the reference group.

If we take the title-only guaranteed slaves as differing from fully guaranteed slaves only in terms of the guarantee then the pure risk premium ranged between 34 and 39%. This seems too high since the risk premium for run aways was only 19% to 24%. However, standard errors are too large to really press this point very hard. The GUARD values of Table III are with two exceptions between 22% and 30%. The smallest value 7.2% (1804-1810) is insignificant: the largest value 43.3% occurred in the 1820's.

Section V: THE MARKET VALUATION OF THE SLAVE FAMILY

Southern planters may have valued the slave family for its role as an administrative and organizational unit, as an instrument of education, as an enforcer of discipline and as a producer and protector of new slave offspring.^{19/} Thus the slave planter may have had a strong economic incentive not to disrupt the slave family through the separate sale of family members. If these economic factors were important one would expect to see infrequent breakup of families in the slave market as well as premia paid for slaves sold in family groups relative to slaves separated from

their families. The New Orleans sample of slave invoices provides some quantity as well as price information relating to the economic valuation of the slave family, however, one must proceed with considerable caution in making inferences from the data since only very limited pieces of information about family ties are provided. Of the 5,785 slaves in our sample, 1341, 23 percent were reported as being sold together with one or more relatives. Ninety-two percent of these cases represent children sold with their mothers. There are 18 instances of husbands being sold with wives and another 22 cases of husband and wives sold together with their children. In twelve instances siblings were sold together and in 2 cases grandmothers and granddaughters were jointly sold. Unfortunately there is no way of telling the extent to which family relationships were simply not reported on the invoices.

From the information available there is clearly no proclivity on the part of slave transactors to sell entire slave families together. By the term "slave family" I mean slaves related as husbands and wives, brothers and sisters, sons and daughters, as well as grandchildren. Surely the majority of the 77 percent of slaves not sold with a relative had some close relative who was still living and hence they were separated from their family. Apparently the economic gains from separating family members exceeded the economic costs in the great majority of cases. While the market separation of slaves from one or more close family members appears commonplace the breakup of certain types of family relationships may have been less prevalent. For example, the data indicates that the majority (60%) of slave children 13 years old and younger were sold together with their mothers. Whether the remaining 40% of children were primarily orphans

is unclear. Fogel and Engerman indicate that about 16 percent of slave children under thirteen were orphans during this period, and they could account for the great majority of children sold with no parents.^{20/} There is also some evidence provided by Fogel and Engerman that the sale of unmarried slaves was about four times more common than the sale of married slaves.^{21/}

To determine whether particular slave relationships were valued in the market we can compare the price paid for the joint purchase of mother and child, husband and wife, brother and sister, etc., to the price that would have been paid for the slaves had they been sold separately. A comparison of the children coefficients of Table II with Chart IV and permits an analysis of possible premia for children sold with their mothers. There are, however, two opposing economic forces to be considered in this comparison. The first is the argument for a premium; viz., maintaining mother and child together surely improved the psychological if not physical health of both; presumably the mother would, as a result, be a more productive servant, and the risk of infant or child mortality would decline. The second is that the joint sale of mother and child reduced transactions costs and permitted the seller to lower the price for the joint sale. Our results indicate that the latter effect dominated the former. The Table II coefficients for K12, K345, and K6789 may be expressed as percentage increments to the mother's price of an additional child in the particular age range, they are 10.4%, 18.4% and 44.5% respectively. These values lie uniformly beneath the female price relatives of Chart IV.^{22/} If there was an economic gain to maintaining the mother child relationship it appears to have been small, smaller than transaction costs involved in selling a slave child.

To investigate whether other family relationships were more highly valued when sold jointly than when sold separately the data on slaves sold in groups was aggregated and a regression was formulated relating the logarithm of the average price of a slave in the group to the average characteristics of slaves in the group.^{23/} In general, group equation yielded coefficients similar to those of Table II.^{24/} A dummy variable for childless husbands sold together with wives indicated no significant premium (the coefficient is $-.053$ $T = -1.416$). On the other hand when husbands were sold together with wives and children the joint price was a significant 7.65 percent higher ($t = 2.318$). Siblings sold together did not bring a higher price.

To summarize the regression findings indicate that premia were paid only in the case of sale of husband and wives together with children. No premia are indicated for other combinations of relatives.

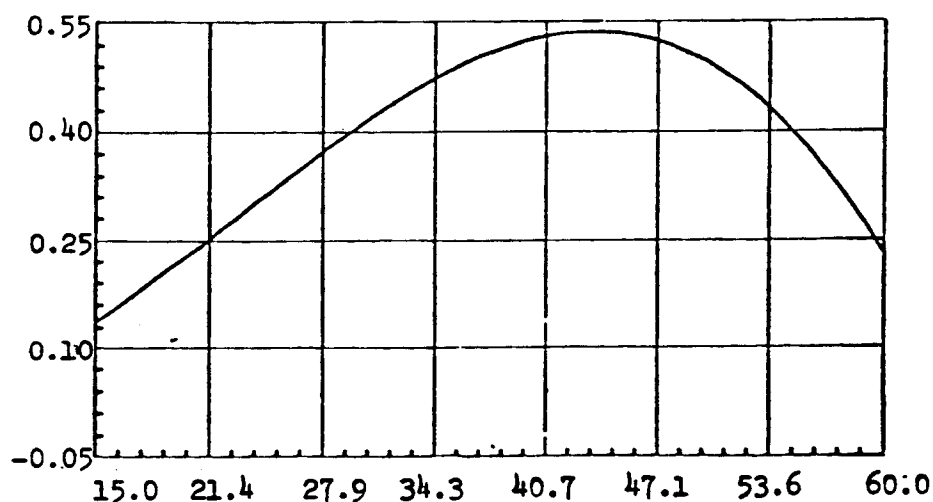
Section VI: SLAVE SKILL FORMATION AND PREMIA

Artisans represent 3.33% of males age 16 and older in the New Orleans invoice sample. The percentages increase with age, viz., 1.88% for ages 16-25, 4.96% for ages 21-30, 6.38% for ages 31-40 and 5.4% for slaves between 41 and 60. This figure may be compared with Fogel and Engerman's finding using Probate data that 11.9 percent of all adult males were skilled craftsmen.^{25/} Apparently many skills were plantation specific and hence would not have been reported in the New Orleans market.

To determine more precisely how the artisan premia vary with age the polynomial fitting technique was applied. Chart V reports the results. Premia for skilled artisans peaked in the mid-forties, over twenty years beyond the simple age premium peak. Older artisans sold for more than

one and one half times the amount of unskilled slaves of the same age. Although the absolute dollar premium as a fraction of the unskilled slave price peaks in the mid-forties, the absolute dollar premium itself peaks at about age 35. This late peaking of the absolute dollar premium paid for artisans suggests that artisans maintained their productivity longer than field hands; indeed the absolute productivity of artisans may actually have increased with age reflecting on-the-job experience. If we assume that all artisans in the sample began their training at about the same age and were equally skilled initially then the fact that absolute prices paid for artisans between the ages of 25 to 30 stayed roughly constant must reflect increased productivity of artisans as they age. If artisan productivity remained constant or fell with age, artisan prices at age 30 would be lower than those at age 25 reflecting the shorter expected life span of 30 year olds.

CHART V
ARTISAN AGE COEFFICIENT POLYNOMIAL



Section VII: PLANTER AND SLAVE RELATIONSHIPS: THE LIGHT COLORED FEMALE PREMIUM

The Light Color Premium

Bancroft's explanation for the light color female premium is best illustrated by the following passage of a letter he quotes written by a certain Mrs. Bremer touring the South:

In another 'jail' were kept the so-called 'fancy girls' for fancy purchasers. They were handsome fair mulattoes. Some of them almost white girls...one girl of twelve was so white, that I should have supposed her to belong to the white race; her features, too, were those of the whites. The slave keeper told us that the day before, another girl, still fairer and handsomer, had been sold for \$1500. These white children of slavery become, for the most part, victims of crime, and sink to the deepest degradation.^{26/}

Sex is only one explanation; another possibility is that slave owners preferred light colored female house servants. Among light 'individual' colored females 11.32% were identified as household or house-related servants. The corresponding proportion for all other individual females was 8.61%. A test based on the normal distribution that these proportions differ significantly yielded a value of 1.671. The one tail 5% normal value is 1.645; hence we accept the hypothesis that light colored females were preferred to darker females as household servants. Note that the variable HWF in the Table II and III regressions would not capture this preference since it is the interaction between female house worker and light color which is important.

A third possible explanation for the light colored female premium is that Southern planters simply preferred lighter slaves, perhaps as a matter of prestige, if such was the extent of their racism. However, the smaller and insignificant light male dummy argues against such a simple explanation. To test these different possibilities the light female dummy was replaced

by three dummies corresponding to light females age 0-11, 12-35, and 36 and over. Certainly one would expect a higher coefficient for the 13-35 year old group relative to the others if sex was the major influence. In addition an interaction dummy variable COLFHW was used which took the value 1 for light colored female house servants. Surprisingly the coefficients for the younger and older light females were higher than that of the middle group. 9.86%, 4.63% and 8.23% are the respective values, although small cell sizes in the tail groups prevent us from asserting that the coefficients are statistically different from one another. The COLFHW coefficient was small (.00137) and insignificant ($t = .021$) indicating that the female color premium is not solely a derivation of the planters' preference for light house servants. The COLFHW coefficient represents the extent to which light females brought a higher price for their training as house servants above and beyond the color premium (note also that HWF is still in the regression). The small, insignificant COLFHW coefficient implies that light females sold for approximately the same amount regardless of whether they were house servants, after taking into account the normal house servant premium; the light female premium is not explained by preference for light female house servants. The magnitude of the age-light female interaction dummies lends little support to a sexual explanation, although the male-female light colored differential does.

One final approach at resolving this issue was taken.^{27/} We predicted the prices of light colored slaves, males and females, from a regression on the darker slaves alone. The distribution of residuals from prediction were then examined for males and females separately. Given the above mentioned results one would expect these distributions to be centered around

a positive value; a positive second tail peak in the female distribution would be indicative of a prostitution market. Such a tail peak does occur in the female distribution representing 11 light colored female slaves whose actual prices exceeded their predicted prices by 90% or more. A closer examination of these eleven females reveals that only six were between the ages 12-35; three were over 40, and two were under age eleven. At this time no inference on a separate and significant prostitution market can be made.

The premium on light colored female varied considerably over the decades. In Table III we see that all the coefficients are positive and range in value from 1.3% in the 1840's to 19.2% in the 1810's. Focusing on the period 1810-1859 for which we have larger samples it appears that the light colored female premium was much higher from 1810-1829, then from 1830-1859. During the early 1800's free blacks in New Orleans represented a substantial factor in the market for slaves. In 1830 one in every seven New Orleans slaves was owned by a free black.^{28/} Free blacks during this period were heavily engaged in the purchase and subsequent emancipation of slaves.^{29/} The large light colored female premia during this period may reflect the purchase by free blacks of potential wives and/or relatives who would later be emancipated.

Section VIII: CONCLUSION

Summarizing the results of this paper, we have demonstrated how the final sale price of a slave can be traced to his or her characteristics as well as features of the transaction itself. The extent and magnitude of these various premia is of historical interest; they shed light on such diffuse questions as sexual exploitation of slaves and the transactions costs of securing a loan. A richer picture of the Southern slave market has

emerged. The pricing of slaves reflects high competitive and economically "rational" slave transactors. There is no evidence that the slave market valued the integrity of the entire slave family although some evidence that the market valued particular relationships within the family. Slave artisans were highly valued by the Southern economy selling for substantial premia over unskilled slaves. The premium for light colored females may reflect sexual exploitation of slave women by white planters but the evidence in the New Orleans data only raises the question; it does not answer it.

FOOTNOTES

*/ I am deeply indebted to Robert Fogel and Stanley Engerman for their encouragement and valuable comments and for their efforts in producing the unique data set analyzed in this paper. I wish to thank Scott Cardell, Mark Hopkins, Claudia Goldin, John Olson, Tony Pellechio, Sebastian Pinera, Joseph Reid and innumerable workshop participants for very helpful comments. Support was provided by NSF Grants GS-3262 and GS-27262 and the National Bureau of Economic Research.

1/ This estimate is based on the ratio of invoices in our sample to the total number of invoices in the New Orleans archives. Fogel and Engerman sampled 2.5% or 5% of New Orleans sale invoices for the years 1804-1962 depending on the specific year.

2/ Fogel and Engerman, Time on the Cross, Vol. I, p. 52.

3/ This age interval was chosen on the basis of an Old South male slave age price profile presented in Fogel and Engerman, "The Market Evaluation of Human Capital: The Case of Slavery." While inclusion of one slave-one price group observations in the individual regression sample would be inappropriate, these observations were included in generating the New Orleans price series P_{nt} . Since it appears that the majority of the "x slaves for \$y each" group observations are prime age males, we expect pricing errors here to cancel. We trade off here some small pricing error for the much larger sample size underlying P_{nt} .

4/ While we do not report regressions run on the absolute value of the price relative, the results using this dependent variable are quite similar. The semi-logrithmic specification outperformed the absolute value specification

in a nonparametric χ^2 test. The test, described by Rao and Miller, for choosing between a logged and unlogged model yielded a χ^2 value of 75.6 implying a significantly better fit with the semi-logarithmic formulation.

^{5/}See for example "The Economics of Slavery in the Ante-bellum South," Alfred H. Conrad and John R. Meyer, in The Reinterpretation of American Economic History, Robert Fogel and Stanley Engerman (eds.), pp. 342-362.

^{6/}Phillips describes his procedure:

The only market grade, in fact, for which basic price tabulations can be made with any confidence is that of young male prime field hands,....The method here is to select in the group of bills for any time and place such maximum quotations for males as occur with any noticeable degree of frequency.

-- American Negro Slavery, p. 370.

While the use of maximum rather than average values for unskilled prime age male field hands may explain some of the discrepancy, Stanley Engerman (in an unpublished mimeo) has attempted to replicate the Phillips series using higher than average values from the New Orleans sample and still finds Phillips too high. After examining Phillips' papers on deposit at Yale University, Engerman suggests that Phillips may simply have jacked up his middle Georgia price series by about \$100 to arrive at the New Orleans series. Engerman finds very few New Orleans prices in Phillips' papers and those that he finds are much lower than those reported by Phillips.

^{7/}Lerner, "Inflation in the Confederacy, 1861-65," p. 171. The average price indices for 1861 and 1862 are used in this calculation.

^{8/}Chart II graphs the sum of the age variables times their coefficients.

The graph is extended only up to age 60 beyond which the paucity of data precludes extrapolation.

^{9/} Bancroft, Frederick, Slave Trading in the Old South, pp. 328-29.

^{10/} Records of seasonal labor usage on Kollock's Georgia Plantation indicates that cotton picking was concentrated in the September, October, November months. Similarly the busiest season in sugar growing was the October through December period (Metzer, p. 129). In addition to purchasing slaves, planters may have used the winter trip to New Orleans to sell newly harvested crops, purchase tools, and enjoy leisure. While the summer months of July and August also appear to be slack periods of labor requirement for cotton and sugar they were not convenient for these other activities.

^{11/} Taylor, Negro Slavery in Louisiana, p. 23.

^{12/} MTHCRED is set to zero if an interest rate was explicitly mentioned on the invoice. This procedure was adopted after running the model on the subset of individual slaves for whom an interest rate was explicitly quoted. The coefficient for MTHCRED turned out to be -.000123 and insignificant ($t = -.017$). Where an interest rate was mentioned it appears that the sale price was exclusive of interest payments, otherwise the sale price included interest payments. The finding that only 26% of all transactions were for credit is at variance with Taylor's statement that "seldom were slave sales cash transactions," (Taylor, op. cit., p. 27). It is possible that some of the other 74% of slave purchases were financed through banks with information on that financial arrangement not appearing in our data. Ten percent appears to be the long term lending rate implicit in the pricing of slaves (Time on the Cross, p. 70) and may be compared with the 18% short term borrowing rate found here.

^{13/} This figure was given by Stanley Engerman who administered the collection and processing of the data. Stephenson in Isaac Franklin, Slave Trader and Planter, pp. 78-84 discusses the guarantees relating a number of cases in which Franklin fulfilled the guarantee either by paying back the full price of the slave or by providing another slave at a reduced price. The shortest length of warranty mentioned by Stephenson is sixty days.

^{14/} This F test is not entirely valid due to the use of one continuous child variable for the 1804-1809 time period. Additional tests on the larger model are carried out by replacing an existing variable or set of variables with a more refined specification. All additional variables were highly orthogonal to other maintained variables. Hence we report only coefficients for new variables.

^{15/} Bancroft, p. 317.

^{16/} Metzer, p. 136. Fogel and Engerman used probate slave prices and found roughly equal prices for males and females at young ages. However, they examined ratios of average male to female 1838-1860 probate prices by age while our analysis examines the partial affect of age holding constant other non-age price determinants. Fogel and Engerman were the first to suggest earlier female maturation as a factor in explaining the ratio of male to female prices at early ages. See Time on the Cross, vol. 1, pp. 74-77.

^{17/} A useful reference here is Time on the Cross, pp. 78-86.

^{18/} These 47 runaways between 16 and 40 represent 1.22% of slaves sold in that age group.

^{19/} See Time on the Cross, vol. I, pp. 126-144 for a detailed discussion of the role of the slave family in the southern economy.

^{20/}Ibid., p. 50.

^{21/}Time on the Cross, vol. II, p. 49. Fogel and Engerman assume that females are never sold apart from their children and take the presence of a mother sold with a child as evidence of a slave marriage. They find that although "about half of women age 20-24 had one or more children...among slaves traded in New Orleans only 20 percent of women aged 20-24 had one or more children." Unfortunately Fogel and Engerman aren't able to apply this ingenious estimating procedure to older age groups, hence it is not known whether the under-representation of married slaves in the market extends to older slaves as well.

^{22/}This does not appear to be due to a poor fit in the tails since the simple average ratio of the prices of children sold separately to the mean prime age female price for the three age groups, 1-2, 3-5, 6-9 are .295, .356, and .544. In addition the average residuals by age group indicate an under-prediction for slaves 5 years and younger and a very slight over-prediction for the 6-9 age group.

^{23/}This specification required due to single group pricing is not a simple aggregation of the Section II model since the sum of logarithms does not equal the logarithm of a sum. The specification used here differs from the correct aggregation of the Section II model by a term reflecting the variance of the logarithm of slaves' prices within the group. It is not a priori clear in which direction this omitted variable biases particular coefficients. The simple average price of slaves sold in a group was also used as a dependent variable and yielded quite similar results.

^{24/}The major difference in the group price regression results from those on individual slaves is the failure to find a significant seasonal

pattern to the price of slaves. The premia for fully guaranteed slaves is about 15% smaller for slaves sold in groups than for slaves sold individually. There is also no significant premium paid for light colored females. The sample size in the group price regression is 464.

^{25/}Time on the Cross, p. 39.

^{26/}Slave Trading in the Old South, p. 329.

^{27/}This approach was suggested by Robert Fogel.

^{28/}See Woodson, Free Negro Owners of Slaves in the United States in 1830, pp. 6-15 and U.S. Census (1830). Haskin presents an interesting description of the creoles population in New Orleans.

^{29/}See "The Manumission of Slaves in New Orleans, 1827-1846."

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