"The Puzzle of the Antebellum Fertility Decline in the United States: New Evidence and Reconsideration."*

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ABSTRACT

Evidence using child-woman ratios indicates that the fertility of the white population of the United States was declining from at least the year 1800. There is also indication that the free black population was experiencing a fertility transition. This transition was well in advance of every other presently developed nation with the exception of France. Fertility transitions did not commence elsewhere in Europe until at least the 1870s. Therein lies the puzzle.

Work by previous authors has suggested a variety of explanations. A leading candidate has been the land availability hypothesis, which grew out of the observed negative correlation of child-woman ratios with population density at the state level. This has been refined to a correlation with availability of agricultural land with implications for intergenerational transfers and old age insurance. Another explanation involves parents seeking to avoid the risk of child default because of the proximity of other alternatives for children, notably non-agricultural employment, especially in growing urban centers. Still another hypothesis stresses the traditional structural variables (e.g., urbanization, industrialization, increased education, especially of women, increased women's work outside the home, etc.). Finally, there has been interest in the ideational view of fertility transition, which argues that the growing influence of secular values has changed people's willingness to control and plan family size.

This paper will use new data, including revised county-level aggregate data from the population and economic censuses of 1800 to 1860, including new estimates of urbanization and the geographic areas of the counties. The agricultural and manufacturing censuses of 1840-1860 will be used to create some of the structural variables. Data on churches in 1850 and 1860 provide some indications of ideational differences across counties.

INTRODUCTION

The issue of fertility transition is an important one, since no nation which can be characterized as developed has not undergone the demographic transition from high to low levels of fertility and mortality. Most presently developed nations began their fertility transitions in the late nineteenth or early twentieth centuries [Coale and Watkins, 1986, ch. 1]. The United States was a notable exception. Evidence using census-based child-woman ratios indicates that the fertility of the white population of the United States was declining from at least the year 1800. There is also indication that the free black population was experiencing a fertility transition. This transition was well in advance of every other presently developed nation with the exception of France. Therein lies the puzzle.

Classic work on this by Yasuba, Forster and Tucker, Easterlin, and Sundstrom and David has suggested a variety of explanations [Yasuba, 1962; Forster & Tucker, 1972; Easterlin, 1976; Sundstrom & David, 1988]. A leading candidate has been the land availability hypothesis, which grew out of the observed and consistent negative correlation of child-woman ratios with population density at the state level. This was originally proposed by Yasukichi Yasuba [1962] using state-level data. The was refined to a correlation with availability of agricultural land by Forster and Tucker [1972]. Implicit is the concept of intergenerational transfers of real property (that is, actual or potential farm sites) from parents to children in order to keep children near the parents. A further implication is that old age insurance was largely in the form of children to care for and protect aged parents. Easterlin [1976; Easterlin, Alter, and Condran, 1978] further refined the concept and used micro data from the 1860 Northern Farms Sample [Bateman and Foust, 1974] to show that the gradient of fertility from the longest settled areas to the frontier was not monotonic. Children were less valuable on the frontier in clearing land; but, once an area had been settle for a period, family sizes were large. Further confirmation of this was provided by Morton Schapiro [1986]. Marvin McInnis used small area data and micro data from the

manuscripts of the Canadian censuses to demonstrate that the same phenomenon was true in mid-nineteenth century Ontario [McInnis, 1977]. A county-level study was undertaken for the state of Ohio by Don Leet [1976], who found results that supported the land availability hypothesis, although he also noted the importance of sex ratios and educational variables.

Another explanation, not necessarily exclusive of the first, is the proximity of other alternatives for children, notably non-agricultural employment, especially in growing urban centers. This also embodies the notion that parents were seeking to reduce the risk of child default (that is, children moving far enough away so as to be unable to provide old age care). This view was put forward by Sundstrom and David [1986] in the form of an intergenerational bargaining model, which they contrasted to the land availability model as a homeostatic theory of human fertility [Smith, 1977]. They argued that a more favorable ratio of non-agricultural to agricultural wages in a region would lead to a higher risk that children would leave the area close to the parents. A adaptation by the parents would be a larger “bribe” in terms of property, both real and financial, and smaller families would be necessary to achieve that result. Although Sundstrom and David pose this a exclusive alternative to the land availability hypothesis, it does seem a complement rather than a substitute for the traditional theory.

Still another hypothesis stresses the traditional structural variables from standard demographic transition theory (e.g., urbanization; industrialization; increased education, especially of women; increased women’s work outside the home, etc.) [Notestein, 1953]. Vinovskis [1976] noted that interstate fertility differentials were well explained by urbanization and literacy in 1850 and 1860 and that the effects of these variables strengthened over the nineteenth century. An earlier, and often overlooked, paper by H. Yuan T’ien proposed that sex ratios (males per 100 females) could be useful in explaining differentials and changes over time

[T'ien, 1958]. The logic here is that a surplus of males would create a more favorable marriage market for females with the effect that a marriage age would fall and the proportions married by age would rise. Since overall fertility was largely a function of marital fertility in the white population of the United States in the nineteenth century (and indeed much of the twentieth century), this would raise fertility, which is based on the female population. This is a conventional demographic explanation, which attempts to get at the problem of separating the effects of marriage and marital fertility.

Finally, there has been interest in the ideational view of fertility transition [e.g., Lestheaghe, 1980, 1983; D.S. Smith, 1987]. This view grew out of the finding that European nations at very different levels os socio-economic development (e.g. levels of urbanization, share of non-agricultural employment in the labor force, levels of literacy) commenced their irreversible fertility transitions within a short period of time in relation to one another (roughly 1870 to 1920) [Knodel and van de Walle, 1979]. This argues that the growing influence of secular values has changed people's willingness to control and plan family size. As an example, Lesthaeghe [1977] found that the best predictors of timing of fertility decline in Belgium were the percentages voting socialist, liberal, and communist in 1919 (positively related to early fertility decline) and the proportion of the population paying Easter dues in the Roman Catholic Church (positively related to early fertility decline). Daniel Scott Smith [1987] has proposed that greater adherence to religious denominations which encouraged greater individualism in the nineteenth century would result in earlier and more rapid fertility declines.

This paper will use new data, including revised county-level aggregate data from the population and economic censuses of 1800 to 1860, including new estimates of urbanization and the geographic areas of the counties, to evaluate a number of thes hypotheses. The agricultural and manufacturing censuses of 1840-1860 will be used to

create some of the structural variables. Data on churches in 1850 and 1860 provide some indications of ideational differences across counties.

DATA

The dat set used here is a compilation of (mostly) published county-level statistics for the United States from 1790 to the present. The starting point was the ICPSR data set 0003 “Historical, Demographic, Economic, and Social Data: The United States, 1790-1970.” To this was added the urban population of each county. These were obtained from the original, unpublished worksheets prepared at the U.S. Bureau of the Census in the 1930s. Also added were county-level areas. Before 1900, county areas only appeared in connection with the 1880 U.S. census. In order to obtain areas at earlier dates, two sources were used. The first is a collection of historical atlases of counties by state, being compiled by John Long at the Newberry Library [Long, 2001]. A total of 21 states and the District of Columbia have been completed. Most of those states were older states east of the Mississippi. The only states not finished in that part of the country are New Jersey, Virginia, and Georgia. John Long kindly furnished the worksheets for New Jersey. West of the Mississippi, only Minnesota and Iowa have been completed. For those states, the atlases were used. For all other states and territories, the “Historical United States County Boundary Files” (HUSCO) constructed by Carville Earle at Louisiana State University [Earle, et al., 1999]. The areas were calculated by ArcView from the HUSCO files.

Other modifications were made to the ICPSR data. All territories were included, as was the District of Columbia. Checks were performed for errors in the data. All the data from the Censuses of Agriculture of 1840-1900 have been added, as has some additional data from the Censuses of Manufactures. The data on churches was merged with all the other data. All of this allowed the creation of the variables used in

this paper.[1]

ANA ANALYSIS OF THE ANTEBELLUM FERTILITY TRANSITION IN THE UNITED STATES

A brief overview of the demographic transition in the United States is given in Table 1. There it may be seen that the fertility transition began from at least around 1800, while the mortality transition only commenced from about the 1870s [Haines, 2000]. Table 2 provides a view of child-woman ratios estimated from census data (children aged 0-4 years per 1,000 women aged 20-44 years) by race, rural-urban residence, and region for the period 1800 to 1860. These data are also depicted in Figures 1 and 2. While it is clear that these ratios suffer from shortcomings as measures of fertility, namely that they are net of child and adult female mortality and that they also reflect relative underenumeration of young children and adult women, they are the best we have for the early nineteenth century. A comprehensive Birth Registration Area (consisting of ten states and the District of Columbia) was not formed until 1915, and it did not cover the whole United States until 1933. We are force to rely on census-based measures, even for the national estimates made by own-children methods [Haines, 1989; Hacker, 2002]. Further, it is not clear what portion of the decline in fertility originated in changes in marital fertility and what portions in the rising age at marriage which was occurring in the nineteenth century [Haines, 1996]. New evidence suggests that much of it was probably due to changes in nuptiality [Hacker, 2002]. But the early nineteenth century census data do not permit these causes to be disentangled. Only the micro data from the IPUMS (Integrated Public Use Census Microsamples) permit this, and they do not begin until 1850.

Several major conclusions arise from looking at Table 2 and Figures 1 and 2.

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[1] At the present time, published census age structures which allow the calculation of child-woman ratios at the county level exist only for 1800 to 1860, and then for 1930 to 1990. There exists now, however, a 100% sample of the 1880 Census of the United States which will allow special tabulations for that date and a similar analysis.

First, there was a fairly consistent overall decline from 1810 onwards, and the decline was consistent from 1800 onwards in most of the regions (see Figure 1). Second, there was a decline in both rural and urban areas (see Figure 2). This, of course, casts some doubt on the comprehensiveness of the land availability hypothesis. Third, there were substantial differences across regions. As expected, the oldest settled regions (New England, Middle Atlantic, and South Atlantic) had child-woman ratios which were the lowest, while areas further west, the East North and South Central regions, had considerably higher fertility ratios. But they too decline with time. Compositional effects (i.e., the mix of frontier and longer settle populations, and rural and urban populations) clearly influenced this, but convergence was taking place.

A list of the variables to be used in the analysis is provided in Table 3. They are all drawn from the Censuses of Population, Agriculture, and Manufacturing. The early censuses lack economic data. Only in 1820 is there some information about the distribution of occupations by sector (broken down only by agriculture, commerce, and manufacturing). In 1840, a greater abundance of economic and social data become available. It should be noted that the child-woman ratio uses is children aged 0-9 years per 1,000 women aged 16-44 years for the censuses of 1800 to 1820, and children aged 0-9 years per 1,000 women aged 15-49 years for the censuses of 1830 to 1860. No effort was made to interpolate the age structures, which varied across the censuses. In neither case are they the same a those given in Table 2, which were estimated by Grabill, Kiser, and Whelpton [1958] and the U.S. Bureau of the Census [1975].

The distribution of variables may be seen in Table 4, which presents the zero-order correlations between the county child-woman ratios and the various explanatory variables. For all the censuses, the white sex ratio, urbanization, density, the percent of the county population which was nonwhite, and the location (region or whether in the South) are available. The other variables, as mentioned, are present

only in the later censuses. The table has two panels, one for all counties and one for rural counties only. The latter are defined as having no population in an incorporated place of 2,500 and over.[2]

The effect of density and urbanization are consistently negatively (and statistically significantly) related to child-woman ratios. This supports several of the hypotheses (land availability, urban labor markets, conventional structural). The sex ratio had a large and positive effect on fertility ratios early on, but the effect weakened over time.[3] This is consistent with a view that adjustment in marriage was important earlier in the nineteenth century, but diminished as marriage ages continued to rise and as sex imbalances in marriage markets became less common through migration. Residence in the South had generally a very small positive effect on fertility, although the presence of larger non-white populations (mostly slaves) seemed to have a damping effect on white fertility. This was more true in rural than in all counties. The explanation is unclear, but it is likely influenced by the large number of slaves in the older, longer settled parts of the South, where fertility was lower. Although this should be taken care of by region dummy variables (in the regression analysis in Table 5), the effect remains.

In terms of the land availability hypothesis, it receives support from the negative correlations between population density and white child-woman ratios, as well as negative correlations with farm value per acre (higher land prices meaning more expensive endowments for children) and a higher percentage of farmland improved (also implying higher land values) in 1850 and 1860. The density variable weakens over time for all counties but remains strong in rural counties. The urban labor market view of

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[2] It is the case that some of these counties had population in minor civil divisions of smaller size that might be considered "urban." It was decided to use the official census definition.

[3] Experiments were done with more refined sex ratios, e.g., males per 100 females in the childbearing years. The results were the same as with the simpler sex ratios.

Sundstrom and David receives support from the consistently large effect of the two urban variables (PCTURB and PCTURB25) and a bit of weak support from the relative wage variable (RELWAGE), which is an effort to replicate a variable used by Sundstrom and David. The variable RELWAGE is, however, only at the state level, since those data on customary wages and board were not published at the county level, and were only available in 1850 and 1860 in any event.

The conventional structural view is supported also by the urbanization variables and also by the illiteracy variable (PCTWHILL) in 1840 and 1850 and by the percent of the labor force in non-agricultural activity (PCTNONAG) in 1820 and 1840. The signs were in the expected direction and the correlations were modest. The variable for the estimated percent of the labor force in manufacturing (PCTMFGLB) is consistent with the structural view, but the correlation is only moderate in 1850. Wealth per free person (WEALTHPC) also has reasonable and expected negative signs in 1850 and 1860. The variable for transport connections (TRANSPOR) for 1840-1860 is reasonably large and negative, reflecting a modernization of the local area — bringing it to closer contact with outside markets and society in general. The influence of a higher proportion of foreign-born population in the county (for 1850 and 1860) had a signficant negative effect in 1850 but no effect in 1860.

Finally, the ideational hypothesis about fertility transition and differentials does get some validation from the variable PRELNEW, which is the proportion of total church accommodations which were Congregationalist, Presbyterian, Unitarian, and Universalist. We must make do with data on churches, since the U.S. Census has never asked a question of individuals on religion because of issues of separation of church and state. In any event, counties with a greater proportion of these religious groups (albeit imperfectly measured) also had lower fertility. I this proxy does, in some way, gauge the spread of individualism and greater willingness to assume control of one's own life decisions, then there is room to support this particular approach to

the issues of differential fertility and fertility decline.

In terms of regional results, there are no surprises. The older areas, the New England, South Atlantic, and Middle Atlantic regions had a negative relationship to child-woman ratios, while western areas, the Midwest (East and West North central regions) and the western South (East and West South Central regions) generally had a positive relationship. This is in accord with the general west to east gradient in fertility ratios. Being in the South had a weak positive relationship for all counties, but an ambiguous one for rural counties. Those coefficients were statistically insignificant, in any event. So higher rural white Southern fertility did not appear to be as large an effect before the Civil War as it was later [U.S. Bureau of the Census, 1975, Series B 67-98].

These variables were placed in a set of straightforward OLS multivariate regressions to account for differences in child-woman ratios across counties from 1800 to 1860. These results are reported in Table 5. The regressions did well in explaining the variation in fertility ratios across counties, accounting for more than 50 percent of variation in all but one case (rural counties in 1860). The results observed in the correlations are generally confirmed with some interesting differences. Urbanization was consistently and negatively (and statistically signficantly) related to fertility ratios. When density was in the same equation (first panel of Table 5), density was not significant. It was if the urbanization variable was omitted from the equation. In the equations for rural counties, the density coefficient remained negative and significant throughout. These results tend to give great support to the labor market view of Sundstrom and David rather than the land availability hypothesis. Other variables in the regressions, however, provide some support for the land availability view. Average farm values per acre and the percent of farmland which was improved both had negative and significant coefficients in 1850 and 1860 for all counties, consistent with higher land values and more settled

agriculture creating incentives to reduce family size. In 1850, however, the coefficient on value per acre was positive in rural counties, and the same coefficient was statistically insignificant in 1860. On the other hand, the labor market hypothesis, as well as the conventional structural view, receive some backing from the negative and significant coefficients on the percent of the labor force in non-agricultural activities (1820 and 1840) and the strong effect of the transportation variable (1840, 1850, and 1860). The positive and significant coefficients on adult white illiteracy (1840 and 1850) are also supportive of the structuralist perspective. The relative wage variable provides no confirmation of the labor force theory, and indeed is even positive (the opposite to expected sign) and significant in 1860. It is, however, a state-level variable.

The sex ratio, a proxy for the marriage market, showed the expected positive and significant effects early in the nineteenth century, but that effect gradually diminished and even became negative by 1840. Thus there some support for the view that adjustments in nuptiality played an important role in the fertility transition at least in the early stages, a more purely demographic perspective on the issue.

The ideational hypothesis also finds some confirmation. The religion variable (PRELGNEW) remains negative and significant in the multivariate framework. Counties with a higher proportion of the increasingly liberal and individualistic denominations were more likely to have lower fertility, holding region and economic and demographic structure constant.

Finally, the level of wealth per free person seemed to have little impact on fertility ratios. But the percent of foreign born by county did have a negative and significant relation to fertility ratios, even holding urbanization constant. This is puzzling, given the finding that the foreign born often had higher birth rates [Spengler, 1930], but the early stages of the mass migrations from Europe in the 1840s and 1850s undoubtedly had some disruptive effects.

CONCLUDING COMMENTS

This paper is a first pass at a new analysis of the early fertility transition for the white population of the United States in the nineteenth century. It uses aggregate county-level data, which have not been much exploited for this purpose. New variables have been created from other data sources for this end, namely the urban populations of the counties from 1790 onwards as well as county areas, which allow calculations of density. More will need to be done, including analysis of changes over decades and fixed effects models.

While analysis of change over time using a time series of cross sections is not perfect, some useful results have appeared. The major competing hypotheses concerning the early American fertility transition are: the land availability hypothesis, the local labor market/child default hypothesis, the conventional structuralist view, and the ideational hypothesis. All receive some support from the data here, although the land availability view is weakened by the finding that, when population density and percent urban are both in the regression models, urbanization dominates. This lends more credence to the local labor market/child default hypothesis. But structural variables (illiteracy, urbanization, transport) also demonstrate some power in explaining cross sectional variation. The ideational view also finds support, using a variable on religion in 1850 and 1860. But these different perspectives are not necessarily mutually exclusive. More likely, a number of processes were underway, all of which contributed to the unusual early fertility transition in the United States.

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TABLE 1. FERTILITY AND MORTALITY IN THE UNITED STATES. 1800-1998.

APPROX. DATE	BIRTHRATE(a)		CHILD-WOMAN RATIO(b)		TOTAL FERTILITY RATE(c)		EXPECTATION OF LIFE(d)		INFANT MORTALITY RATE(e)	
	WHITE	BLACK(f)	WHITE	BLACK	WHITE	BLACK(f)	WHITE	BLACK(f)	WHITE	BLACK(f)
1800	55.0		1342		7.04					
1810	54.3		1358		6.92					
1820	52.8		1295	1191	6.73					
1830	51.4		1145	1220	6.55					
1840	48.3		1085	1154	6.14					
1850	43.3		892	1087	5.42		39.5	23.0	216.8	340.0
		58.6 (g)				7.90 (g)				
1860	41.4		905	1072	5.21		43.6		181.3	
		55.0 (h)				7.58 (h)				
1870	38.3		814	997	4.55		45.2		175.5	
		55.4 (i)				7.69 (i)				
1880	35.2		780	1090	4.24		40.5		214.8	
		51.9 (j)				7.26 (j)				
1890	31.5	48.1	685	930	3.87	6.56	46.8		150.7	
1900	30.1	44.4	666	845	3.56	5.61	51.8 (k)	41.8 (k)	110.8 (k)	170.3 (k)
1910	29.2	38.5	631	736	3.42	4.61	54.6 (l)	46.8 (l)	96.5 (l)	142.6 (l)
1920	26.9	35.0	604	608	3.17	3.64	57.4	47.0	82.1	131.7
1930	20.6	27.5	506	554	2.45	2.98	60.9	48.5	60.1	99.9
1940	18.6	26.7	419	513	2.22	2.87	64.9	53.9	43.2	73.8
1950	23.0	33.3	580	663	2.98	3.93	69.0	60.7	26.8	44.5
1960	22.7	32.1	717	895	3.53	4.52	70.7	63.9	22.9	43.2
1970	17.4	25.1	507	689	2.39	3.07	71.6	64.1	17.8	30.9
1980	15.1	21.3	300	367	1.77	2.18	74.5	68.5	10.9	22.2
1990	15.8	22.4	298	359	2.00	2.48	76.1	69.1	7.6	18.0
1998	14.0	17.7			2.04	2.17	77.3	71.2	6.0	14.3

TABLE 1 (cont.)

(a) Births per 1000 population per annum.
(b) Children aged 0-4 per 1000 women aged 20-44. Taken from U.S. Bureau of the Census [1975], Series 67-68 for 1800-1970. For the black population 1820-1840, Thompson and Whelpton [1933], Table 74, adjusted upward 47% for relative under-enumeration of black children aged 0-4 for the censuses of 1820-1840.
(c) Total number of births per woman if she experienced the current period age-specific fertility rates throughout her life.
(d) Expectation of life at birth for both sexes combined.
(e) Infant deaths per 1000 live births per annum.
(f) Black and other population for CBR (1920-1970), TFR (1940-1990), e(0) (1950-1960), IMR (1920-
(g) Average for 1850-59.
(h) Average for 1860-69.
(i) Average for 1870-79.
(j) Average for 1880-84.
(k) Approximately 1895.
(l) Approximately 1904.

Source: U.S. Bureau of the Census [1975, 1985, 1997, 2001]. Coale and Zelnik [1960]. Coale and Rives [1973]. Haines [1998]. Preston and Haines [1991]. Steckel [1986].

TABLE 2. Number of Children Under 5 Years Old per 1,000 Women Aged 20-44 Years, by Race, Residence, and Region. United States, 1800-1860.

Region, Residence, Race	Year 1800	1810	1820	1830	1840	1850	1860
United States, white population, adjusted	1342	1358	1295	1145	1085	892	905
United States, black population, adjusted	-----	-----	-----	-----	-----	1087	1072
United States, white population	1281	1290	1236	1134	1070	877	886
United States, urban white population	845	900	831	708	701	-----	-----
United States, rural white population	1319	1329	1276	1189	1134	-----	-----
New England, white population	1098	1052	930	812	752	621	622
New England, urban white population	827	845	764	614	592	-----	-----
New England, rural white population	1126	1079	952	851	800	-----	-----
Middle Atlantic, white population	1279	1289	1183	1036	940	763	767
Middle Atlantic, urban white population	852	924	842	722	711	-----	-----
Middle Atlantic, rural white population	1339	1344	1235	1100	1006	-----	-----
East North Central, white population	1840	1702	1608	1467	1270	1022	999
East North Central, urban white population	-----	1256	1059	910	841	-----	-----
East North Central, rural white population	1840	1706	1616	1484	1291	-----	-----
West North Central, white population	-----	1810	1685	1678	1445	1114	1105
West North Central, urban white population	-----	-----	-----	1181	705	-----	-----
West North Central, rural white population	-----	1810	1685	1703	1481	-----	-----
South Atlantic, white population	1345	1325	1280	1174	1140	937	918
South Atlantic, urban white population	861	936	881	767	770	-----	-----
South Atlantic, rural white population	1365	1347	1310	1209	1185	-----	-----
East South Central, white population	1799	1700	1631	1519	1408	1099	1039
East South Central, urban white population	-----	1348	1089	863	859	-----	-----
East South Central, rural white population	1799	1701	1635	1529	1424	-----	-----

Table 2 (cont.)

Region, Residence, Race	Year 1800	1810	1820	1830	1840	1850	1860
West South Central, white population	-----	1383	1418	1359	1297	1046	1084
West South Central, urban white population	-----	727	866	877	846	-----	-----
West South Central, rural white population	-----	1557	1522	1463	1495	-----	-----
Mountain, white population	-----	-----	-----	-----	-----	886	1051
Mountain, urban white population	-----	-----	-----	-----	-----	-----	-----
Mountain, rural white population	-----	-----	-----	-----	-----	-----	-----
Pacific, white population	-----	-----	-----	-----	-----	901	1026
Pacific, urban white population	-----	-----	-----	-----	-----	-----	-----
Pacific, rural white population	-----	-----	-----	-----	-----	-----	-----

Source: U.S. Bureau of the Census [1975], Series B 67-98.

(a) Adjusted data standardized for age of women, and allowance made for undercount in censuses; see text.

TABLE 3. Variable Names and Descriptions.

VARIABLE	DESCRIPTION
WHCWRAT	Child-woman ratio, white population: 1800-1820: children aged 0-9 years per 1,000 women aged 16-44 years. 1830-1860: children aged 0-9 years per 1,000 women aged 15-49 years.
WHSEXRAT	Sex ratio, white population: White males per 100 white females (all ages).
DENSITY	Population density: Persons per square mile.
PCTURB	Percent urban (in places 2,500 and over).
PCTURB25	Percent of population in places 25,000 and over.
PCTNW	Percent of total population non-white.
PCTNONAG	Estimated percent of the labor force in non-agricultural activity.
PCTWHILL	Percent of white population aged 20 and over who were unable to read and write.
PCTFOR	Percent of the total population foreign born.
PCTMFGLB	Estimated percent of the white population aged 15-69 employed in manufacturing.
PRELGNEW	Percent of all church accommodations Congregationalist, Presbyterian, Unitarian, and Universalist.
RELWAGE	Ratio of estimated monthly wages of a common laborer with board to the monthly wages of a farmhand with board. (States only).
TRANSPOR	Variable=1 if the county was on a canal, river, or other navigable waterway in 1840. Otherwise=0. For 1850 and 1860, variable =1 if county on a railroad or navigable waterway. Otherwise=0.

WEALTHPC	1850: Value of real estate per free person. 1860: Value of real and personal estate per free person.
FARVALAC	Average value of farm per acre (improved and unimproved).
PCTACIMP	Percent of farm acres improved.

Source: See text.

Table 4. Zero-Order Correlations with White Child-Woman Ratios. Counties. Unites States, 1800-1860.

	YEAR:						
VARIABLE	1800	1810	1820	1830	1840	1850	1860
ALL COUNTIES							
WHSEXRAT	0.495	0.285	0.190	0.227	0.022	-0.137	0.126
DENSITY	-0.202	-0.168	-0.164	-0.150	-0.122	-0.101	-0.079
PCTURB	-0.288	-0.296	-0.320	-0.328	-0.381	-0.332	-0.362
PCTURB25	-0.147	-0.163	-0.169	-0.157	-0.169	-0.193	-0.178
PCTNW	-0.426	-0.404	-0.288	-0.284	-0.100	-0.122	-0.169
SOUTH	0.097	0.015	0.066	0.005	0.172	0.158	0.066
TRANSPOR					-0.363	-0.383	-0.411
PCTFOR						-0.273	0.012
PCTNONAG			-0.387		-0.499		
PCTWHILL					0.382	0.309	
PCTMFGLB						-0.402	-0.246
WEALTHPC						-0.185	-0.200
FARVALAC						-0.187	-0.106
PCTACIMP						-0.402	-0.487
PRELGNEW						-0.283	-0.359
RELWAGE						-0.168	-0.060
REGIONS:							
New England	-0.237	-0.312	-0.410	-0.398	-0.384	-0.345	-0.343
Middle Atlantic	0.027	-0.004	-0.140	-0.228	-0.310	-0.282	-0.277
East North Central	0.127	0.270	0.295	0.321	0.114	0.048	-0.060
West North Central		0.100	0.121	0.207	0.184	0.216	0.216
South Atlantic	-0.268	-0.334	-0.272	-0.311	-0.193	-0.168	-0.143
East South Central	0.503	0.420	0.368	0.300	0.317	0.095	0.030
West South Central		0.053	0.060	0.108	0.181	0.245	0.260
Mountain						-0.068	0.137
Pacific						0.012	0.153
N	417	571	753	982	1235	1926	2011
RURAL COUNTIES							

WHSEXRAT	0.496	0.284	0.171	0.200	-0.004	-0.151	0.102
DENSITY	-0.559	-0.564	-0.556	-0.614	-0.526	-0.510	-0.495
PCTNW	-0.495	-0.470	-0.349	-0.350	-0.152	-0.198	-0.261
SOUTH	0.029	-0.061	0.004	-0.064	0.126	0.059	-0.024
TRANSPOR					-0.314	-0.326	-0.349
PCTFOR						-0.193	0.120
PCTNONAG			-0.264		-0.379		
PCTWHILL					0.336	0.264	
PCTMFGLB						-0.265	-0.089
WEALTHPC						-0.209	-0.230
FARVALAC						-0.389	-0.404
PCTACIMP						-0.338	-0.409
PRELGNEW						-0.222	-0.277
RELWAGE						-0.149	0.037

Table 4 (cont.)

VARIABLE	YEAR: 1800	1810	1820	1830	1840	1850	1860
REGIONS:							
New England	-0.160	-0.239	-0.347	-0.321	-0.289	-0.239	-0.240
Middle Atlantic	0.035	0.015	-0.129	-0.221	-0.311	-0.269	-0.235
East North Central	0.123	0.267	0.284	0.310	0.075	0.040	-0.072
West North Central		0.099	0.118	0.213	0.180	0.211	0.190
South Atlantic	-0.343	-0.413	-0.333	-0.375	-0.246	-0.219	-0.214
East South Central	0.505	0.424	0.359	0.290	0.310	0.060	-0.009
West South Central		0.067	0.059	0.102	0.180	0.233	0.252
Mountain						-0.077	0.141
Pacific						0.011	0.153
N	396	540	709	919	1137	1737	1721

Source: See text.

Table 5. Regression Results. White Child-Woman Ratios as the Dependent Variable. Counties. United States, 1800-1860.

VARIABLE	YEAR: 1800 (coef)	(signi)	1810 (coef)	(signi)	1820 (coef)	(signi)	1830 (coef)	(signi)	1840 (coef)	(signi)	1850 (coef)	(signi)	1860 (coef)	(signi)
ALL COUNTIES														
CONSTANT	448.665	***	1472.231	***	1502.751	***	1094.992	***	1310.230	***	1326.081	***	798.979	***
WHSEXRAT	13.186	***	2.243	***	1.371	***	0.979	**	-0.028	---	-0.205	***	-0.167	**
DENSITY	-0.072	---	-0.018	---	0.017	---	-0.009	---	0.006	---	0.104	***	0.086	***
PCTURB	-5.997	***	-6.219	***	-2.322	**	-5.748	***	-2.703	***	-2.181	***	-3.579	***
PCTNW	-11.794	***	-10.433	***	-9.104	***	-7.890	***	-4.378	***	-2.820	***	-3.266	***
PCTNONAG					-6.568	***			-4.283	***				
TRANSPOR									-84.107	***	-77.279		-48.160	***
PCTFOR											-6.256	***	-0.576	---
PCTWHILL									2.788	***	1.130	***		
PCTMFGLB											-1.567	*	1.010	---
WEALTHPC											-0.025	---	-0.007	---
FARVALAC											-1.418	***	-0.568	***
PCTACIMP											-2.003	***	-2.710	***
PRELGNEW											-2.053	***	-2.154	***
RELWAGE											22.761	---	334.290	***
REGIONS:														
New England	NI		NI		NI		NI		NI		NI			
Middle Atlantic	171.475	***	320.719	***	358.403	***	295.984	***	215.754	***	207.634	***	186.287	***
East North Cent.	165.523	*	576.659	***	606.578	***	665.590	***	416.531	***	376.863	***	362.070	***
West North Cent.			753.566	***	767.102	***	962.821	***	592.177	***	463.428	***	414.136	***
South Atlantic	464.658	***	547.060	***	576.073	***	621.370	***	376.142	***	243.053	***	349.429	***
East South Cent.	727.827	***	782.528	***	779.338	***	841.779	***	588.406	***	343.256	***	429.966	***
West South Cent.			73.471	---	791.707	***	904.731	***	704.285	***	459.291	***	527.138	***
Mountain											86.067	*	660.481	***
Pacific											469.824	***	548.132	***
Adjusted R-sq.	0.6542		0.6129		0.6134		0.6147		0.6160		0.5692		0.5383	
F-ratio	99.39	***	91.25	***	109.48	***	157.48	***	153.29	***	122.97	***	118.17	***
N	417		571		753		982		1235		1926		2011	

Table 5 (cont.)

VARIABLE	YEAR: 1800 (coef)	(signi)	1810 (coef)	(signi)	1820 (coef)	(signi)	1830 (coef)	(signi)	1840 (coef)	(signi)	1850 (coef)	(signi)	1860 (coef)	(signi)
RURAL COUNTIES														
CONSTANT	964.166	***	1775.454	***	1728.668	***	1550.457	***	1450.343	***	1374.770	***	807.353	***
WHSEXRAT	9.822	***	1.597	***	0.392	---	-0.801	**	-0.329	**	-0.203	***	-0.183	**
DENSITY	-5.438	***	-6.516	***	-5.277	***	-7.202	***	-4.082	***	-5.378	***	-2.429	***
PCTNW	-9.973	***	-8.271	***	-7.439	***	-5.963	***	3.715	***	-2.646	***	-3.445	***
TRANSPOR									-71.712	***	-60.546	***	-33.910	***
PCTFOR											-7.086	***	-1.093	**
PCTNONAG					-4.058	***			-3.536	***				
PCTWHILL									2.136	***	0.528	*		
PCTMFGLB											-1.026	---	0.733	---
WEALTHPC											-0.043	**	-0.003	---
FARVALAC											2.452	***	-0.948	---
PCTACIMP											-1.110	***	-1.521	***
PRELGNEW											-1.619	***	-2.074	***
RELWAGE											16.999	---	330.356	***
REGIONS:														
New England	NI		NI		NI		NI		NI		NI			
Middle Atlantic	137.887	***	234.900	***	330.997	***	281.106	***	241.849	***	231.897	***	210.490	***
East North Cent.	85.960	---	396.357	***	525.587	***	515.321	***	376.269	***	387.792	***	373.051	***
West North Cent.			497.595	***	626.466	***	717.227	***	508.558	***	423.825	***	409.339	***
South Atlantic	338.108	***	353.766	***	479.301	***	425.473	***	328.030	***	263.158	***	366.284	***
East South Cent.	609.344	***	595.117	***	680.179	***	647.410	***	539.973	***	364.148	***	442.452	***
West South Cent.			-23.765	---	633.979	***	632.418	***	594.604	***	410.134	***	532.102	***
Mountain											24.289	---	607.589	***
Pacific											389.195	***	531.107	***
Adjusted R-sq.	0.6578		0.6384		0.6054		0.6612		0.5826		0.5371		0.4618	
F-ratio	109.46	***	106.74	***	109.62	***	200.09	***	133.15	***	101.72	***	78.67	***
N	396		540		709		919		1137		1737		1721	

Table 5 (cont.)

Source: See text.

*** = significant at least at a 1% level
** = significant at least at a 5% level
* = significant at least at a 10% level
--- = not significant at least at a 10% level

Fig. 1. Child-Woman Ratios.
By Rural-Urban. U.S. 1800-1840.

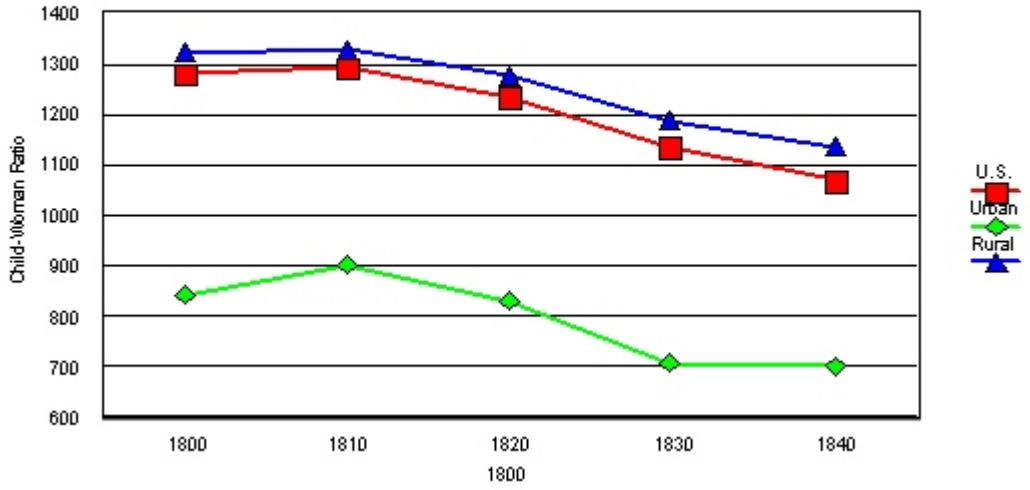

Fig. 2. Child-Woman Ratios.
By Region. U.S. 1800-1860.