

From Wilderness to Megalopolis

A Comparative Analysis of County Level Sex Ratios in the United States From 1790 to 1910 Using a Historical GIS

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Using a historical Geographic Information System (GIS) and statistical measures, this research examines the sex ratios of the United States between 1790 and 1910 to determine whether men truly outnumbered women on the American Frontier. We used United States Census data combined with historical digital county maps to calculate male-to-female sex ratios by county and settlement density class. We analyzed these ratios using descriptive statistics, the Games-Howell analysis of variance (ANOVA) test, and comparisons of historical GIS maps. We found that gender ratios on the American Frontier were extremely high throughout the study period and were significantly different from those in more densely populated areas. In addition, sex ratios declined as population density increased in each decade of this study. However, frontier areas still had fairly high gender ratios in 1910, thus showing ongoing significant demographic differences between those sparsely settled counties and more urbanized regions.

Keywords: *United States; frontier; sex ratios; historical GIS*

Near the end of the westward settlement era of the United States, Frederick Jackson Turner defined the frontier as “the point where savagery meets civilization” (Turner, 1894, p. 200). This definition illustrates one cultural view of the frontier’s edge, which could be related to the fact that newly settled areas often exhibited highly unbalanced male/female ratios. Thus, the frontier was not only a continuously shifting geographic phenomenon of newly settled lands, but it was filled with a significantly different population makeup than more established areas. Indeed, the demographic characteristics of people living in all parts of the country varied relative to settlement intensity, from the edge of the frontier to the most highly urbanized cities on the East Coast. This article analyzes the sex-ratio regimes of both frontier and more settled lands from 1790 to 1910 to show both the distinctly male-dominated world of the frontier and the gender ratio equalization that occurred in US counties as they became more populated over the decades.

Upon the arrival of the first Europeans in the New World, the majority of settlements were located on or near the eastern seaboard. The success of the initial settlements of the

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early 17th century acted as a beacon to Europe, encouraging a continual flow of additional American-bound settlers. As time passed, these new immigrants and other Americans began establishing frontier settlements in the open lands to the west. Because of its dynamic nature, the frontier of the United States was never easily definable by simply drawing a line on a map; rather it could contain large expanses or small isolated pockets of frontier land surrounded by more settled districts. In other words, areas of denser settlement may have been surrounded by a hinterland of remote lands that were unexplored and sparsely populated. Because of its unique and continually evolving geographic structure, the frontier could therefore exist in different places and times as either a continuous line of counties or expanding or contracting county clusters.

As immigration and natural population growth fueled the westward expansion, a variety of social and economic reasons brought continued success to this westward movement. Although most migrants moved primarily for economic opportunities such as to claim inexpensive and/or productive tracts of arable lands, forests, and mineral finds, or to fill other work opportunities, many others chose a westward route to escape from what was behind them, and thereby enjoy greater religious and social freedoms. Specific examples of the push and pull factors at work include the Forty-Niners who went west to explore for gold and the others who followed them to sell supplies and to provide other services and agricultural goods; the Mormons who migrated to Utah to escape religious persecution; and the farmers who left the east to settle the fertile lands of the Willamette Valley. Whatever the push or pull, inhabited lands in the United States continued to expand westward, beyond what was once considered the edge of civilization.

Few researchers have examined the male–female ratios that existed among the frontier counties during their settlement phase. A common assumption is that the frontier experienced unbalanced ratios of men and women. Vibrant images of buckskin clothed mountain men often comes to mind when one first thinks about western settlement. Although one would expect these conditions to exist in a frontier, few have focused their research on these ratios in more than a few scattered locales. Of those that have performed these studies, none compared these ratios with those of the remainder of the country, leaving the difference between the “savage” and “civilized” areas unknown. More important, if higher numbers of men settled the frontier, at what point did these ratios begin to equalize?

Although the purpose of this essay is to compare the sex ratios on the frontier with the remainder of the country, it is important to note some of the social and demographic problems that were created because of these ratios being unbalanced. Although fertility is obviously affected by a heavy male surplus such as the one assumed to exist on the frontier, many more troubling social problems tended to arise with this same surplus. The lack of females in the west often led to many psychological and civil problems, such as depression, immorality, and frequent crime. The saying “No Sunday west of Bismarck, and west of Miles City no God” gave a true understanding of what occurs when women are relatively absent from the social fabric (Thompson, 1974, p. 154). Once women came into an area, it has been noted that these social woes quickly abated. A better understanding of the sex ratios of the American Frontier will allow for future research within various disciplines as well as adding a more complete understanding to the history of such a vital period of the United States (Riley, 1996; Thompson, 1974)

Background Literature

Although the factors that prompted the great westward movement have been explored by many scholars, the demographic characteristics of newly settled regions have received far less attention. Some questions that have room for more exploration include: Was the west settled by families? Were these families old or young? Or was the west settled by a mix of mountain men and inexperienced males from the cities of the east or even Europe beyond? Understanding these questions can give a greater insight into the settlement patterns that helped transform a frontier into a flourishing addition to the nation.

Some studies have examined population characteristics of frontier immigrant origins and migration trajectories (Knowles, 1995) or the development of ethnic settlements on the frontier. Historical demographers and geographers have studied relevant population characteristics of past peoples in various areas of the world. They have used various methods and a variety of data sources, from church records to censuses that may span a few years or a few centuries. Many of the questions posed tend to address questions about fertility, morbidity, family formation, and sex ratios. Because of the limited availability of reliable records, research typically takes place within the past 500 years. An example of this literature includes Telford's (1992) research on age of marriage for Chinese men, using Chinese lineage records as his source. Some other examples of historical demography are Knodel (1970) who focused on the demographic history of an entire Bavarian Village for 250 years, and Vincent (1947) who examined the demographic qualities of France in the 18th century.

The historical demography of the American Frontier has received a great deal of attention. Frederick Jackson Turner (1894) examined the social and political ramifications of America's, but he did not delve into the examination of demographic patterns. Turner did analyze some of the population density patterns of the west, but he did not focus on basic demographic statistics. Since his time, many researchers have branched off into a variety of topics related to the American Frontier. Of the demographic researchers, some have focused on variables such as fertility levels (Mineau, Bean, & Anderton, 1989) and morbidity (Elman & Myers, 1999). Modell (1971) examined Indiana's sex structure and fertility in 1820, when it was considered the frontier. Smith (1928) looked at how Wisconsin was settled and who first lived there, while Easterlin (1976) examined how changes in population affected future farm settlement. Meyer (2000) focused on the settlement patterns that were prominent in Illinois during the early 19th century.

Many researchers have examined small areas of the United States frontier hoping to explain settlement patterns as well as understand who was doing the settling. Modell (1971) studied Indiana's sex structure and fertility in 1820, when it was considered the frontier. Smith (1928) looked at how Wisconsin was settled and who first lived there, while Easterlin (1976) touched on how changes in population affected future farm settlement. Meyer (2000) highlighted the settlement patterns that were prominent in Illinois during the early 19th century. Although none of these researchers directed all of their efforts toward the sex ratio problem, several touched on migration patterns, specifically in relation to gender.

Several researchers have centered their attention on the issue of sex ratios in the early United States, some looking at small communities established shortly after European settlement while others focusing on the entire United States (Bowen, 1978; Eblen, 1965; Modell, 1971). The term frontier, while loosely defined, has itself been a topic of study for

many of these researchers, as all of what we today call the United States was once a “frontier” for European settlers. For decades, popular belief stood behind the theory that men outnumbered women in the first few decades of colonial settlement in the New World, as well as on the American Frontier. Moller (1945) found that passenger lists from Europe as well as census records from the 1600s contained more men than women, supporting this theory. Thompson (1974) confirmed this belief by providing an additional analysis, showing that men did outnumber women in some parts of the colonies. Others have chosen to test theories on smaller geographic areas. Demos (1968) examined Bristol, Rhode Island during colonial rule and Smith (1928) chose to study the family in the early United States. Although their findings suggested that sex ratios were higher in certain locales than what would be considered normal by today’s standards, the imbalance was not found to be a universal fact.

In 1965, Eblen was apparently the first to address the American West as a whole region. Eblen used a variety of methods to analyze multiple counties of the American Frontier, finding that men outnumbered women as much as 2 to 1. However, Eblen’s (1965) methods only focused on several counties of the American West in a period of three decades, leaving the remainder of the history of sex ratios in the west as well as the rest of the United States unknown. Thus, Eblen’s findings cannot be applied to the entire American West as there may have been other areas that he did not study that exhibited far different sex ratios.

Since 1965, others have looked at smaller areas, such as Bowen (1978) and Williams (1969) who examined sex ratios in both Oregon and the Peters Colony of Texas, respectively. Others have done similar small-scale studies, finding that men did outnumber women in most cases, but in varying degrees. Although these studies found that males outnumbered females in sections of the American Frontier at particular times, a clear picture of the overall sex ratios of the American West throughout its early history remains unknown.

Sex ratios that are greatly unbalanced, with too many males or females, can portend underlying social problems. Suicide and social unrest were common in areas populated primarily by men, as a feeling of “nobody cares” prevailed (Riley, 1996; Thompson, 1974). Knowing the sex ratios of the American West as well as that of the entire United States during the 19th century provides a better understanding of both the social and demographic climates that prevailed and their consequences on an area’s future. A further knowledge of the gender ratio historical geography of the early American West compared with the rest of the United States can be a valuable asset to researchers interested in the demographic history in the country. Some have already based their findings off of previous sex ratio studies, such as Riley (1996) who used Eblen’s (1965) research to explain the difficulties of men finding wives in the American West. Although Eblen’s (1965) work offers important conclusions, our study includes a spatial and temporal cross-comparison of all counties of the United States throughout the existence of the frontier (from 1790 to 1910). This analysis gives a more complete picture of the spatial variations of historical gender balances while putting previous sex-ratio studies in a comparable context.

Data and Methodology

In this essay, we analyze three related hypotheses. We hypothesize that during the frontier period there were significantly higher ratios of men to women in frontier regions.

Table 1
Population Settlement Categories

Category Definition	Density (per square mile)
1. Wilderness	.01–1.99
2. Sparsely Settled Frontier “Sparse”	2–5.99
3. Farm-Beginning	6–17.99
4. Farm-Successful	18–44.99
5. Suburban	45–89.99
6. Low Density Urban	90–179.99
7. Super-Urban	180+

Additionally, we believe that sex ratios became more equal in more densely populated counties. Furthermore, we hypothesize that frontier sex ratios dropped over time as the ending of the settlement of the west approached. To test these hypotheses, we developed a countrywide framework of county sex ratios for each of the 13 censuses.

Population data were obtained from the thirteen United States decennial censuses between 1790 and 1910. It should be noted that the Federal Census, as with any survey, is susceptible to and contains errors whether during tabulation or collection. Despite these errors, the data contained within the census provide demographers with some of the best and most comprehensive views of the population characteristics of the United States at each time it was taken. The questions asked by enumerators during these years provided an invaluable demographic resource, providing both an age structure and total population of each county.

To compare the sex ratios between different settlement types, we classified all counties according to their total population density. To do this, we obtained the areas of each county from HUSCO [Historical United States boundary files for CD-ROM] (Earle, Otterstrom, & Heppen, 1999) and the county total population figures came from the said US censuses. The availability of these historical digital maps and their attendant area estimates was critical to the feasibility and success of our study. After calculating the population density for all counties between 1790 and 1910, we assigned them into a number of population density settlement type categories (Table 1). We considered the least dense regions, the “Wilderness” and the “Sparsely Settled” categories, as being the areas most likely to have had frontier characteristics (see Otterstrom & Earle, 2002).

After classifying the counties for each census by their population density, we calculated the overall sex ratios in each of these areas. Sex ratios were figured by dividing the number of males by the number of females in each county. Using the resulting male/female ratios from each county, we derived descriptive statistics to summarize the gender ratio characteristics of the different settlement categories by year. We then considered the usefulness of analyzing the categories with inferential statistics.

Although the United States Census is intended to be a complete survey of the population of the United States each 10 years, research has shown that numerous enumeration errors have made historical censuses, in reality, an incomplete population count (King & Magnuson, 1995). Because of the undercounts that may have occurred in some counties in each census year and for the purpose of performing some statistical analyses, we treated the data

as if they were samples rather than complete population counts. To determine whether the differences between density categories in this study were significant, an analysis of variance (ANOVA) test was used. Also, we applied both a Levene's test and Kolomgorov-Smirnov (K-S) test on each data set to ensure homogeneity and normality. Although running the statistical analyses, it became clear that the above named tests would not yield accurate results as the variance and sample size of the data sets were not equal. Because of this finding, we replaced the K-S test with the Games-Howell post hoc test as it is considered to be a more viable method for comparing group means with unequal variances and unequal sample size.

Because of the time period of this study, we decided to focus only on Caucasian populations in each county from 1790 to 1860. We felt that including the African American population data during this time period could create a false representation of the population of all density categories. This is because Blacks were usually limited in their movements because of slavery before the Civil War and rarely had the choice of where to live. However, we did bring African American population statistics from the census data sets into our analysis from 1870 to 1910.

In addition to the statistical results, we include a series of maps created from a historical Geographic Information System (GIS) of counties comparing population densities and gender ratios. The figures show the geographic patterns of both balanced and imbalanced sex ratios in 1790, 1820, 1850, 1880, and 1910. These visual aids provide a better understanding of how sex ratios were distributed in terms of geographic locations. In addition, adding the population density maps illustrates both the correlations and in many cases local regional divergences between gender ratios and density across the nation.

Results

To better summarize our findings, we have divided the results section of this article into three related sections. First, the results of the simple statistics for each population density class are briefly discussed. Second, a brief synopsis of the results of the ANOVA tests will be given to show the significance of the categorical differences in sex ratios. Finally, we use the historical GIS maps to illustrate the patterns in density and gender ratios that evolved over the study period.

Gender Ratios by Density Class

The historical settlement of the frontier of the United States has frequently been attributed to men. The image of buckskin clad mountain men blazing western trails and setting up new towns, followed by women, is one that has often been portrayed in historical literature about the settlement of the west. Although these images have been molded, many times without statistical data to justify the stereotype, the simple statistics result from the data set showed that men, on average, did indeed outnumber women in counties with low population densities. The results of the simple statistics for the complete data set are shown in Table 2.

These statistics show the variability of gender ratios across settlement classes and time in United States. Generally, as population density increased, male-to-female gender ratios

Table 2
Mean Male/Female Ratios by Decade by Settlement Category

Density Class	1790	1800	1810	1820	1830	1840	1850	1860	1870	1880	1890	1900	1910
Wilderness	1.2	1.18	1.19	1.24	1.24	1.68	2.57	1.78	2.21	2.64	1.72	1.56	1.56
Sparse	1.09	1.13	1.1	1.14	1.12	1.18	1.98	1.2	1.18	1.34	1.34	1.28	1.28
Farm-Beginning	1.06	1.06	1.06	1.12	1.09	1.1	1.18	1.17	1.08	1.13	1.17	1.17	1.17
Farm-Successful	1.03	1.03	1.03	1.08	1.03	1.05	1.05	1.06	1.03	1.05	1.06	1.06	1.06
Suburban	0.98	1.01	1.00	1.09	1.02	1.03	1.04	1.03	1.02	1.03	1.03	1.04	1.04
Low-Urban	0.95	0.95	0.97	0.98	1.00	1.01	1.03	1.00	0.99	1	1.03	1.02	1.02
Super-Urban	0.95	0.96	0.97	0.96	1.05	0.94	1.02	1.00	0.97	0.98	1.02	1.01	1.01

decreased until the numbers of the sexes within counties were nearly equal. As hypothesized, the “frontier” areas did indeed experience greater sex ratios throughout the study period. The Wilderness category, which contained the counties with the lowest population densities throughout the entire United States, also had gender ratios with the greatest degree of imbalance. Wilderness counties were often remotely located, both in the eastern portions of the country as well as on the vast expanses of the western frontier. These counties, throughout each decade in this study, contained gender ratios that were imbalanced greater than in any other category. The Sparsely Settled Frontier (“Sparse”) category, much like the Wilderness category, was made up of counties with low population densities and imbalanced gender ratios. Although the Sparse category did not contain the lowest population densities in the study, the counties there were also often on the edge of civilization and contained few, if any, urban centers.

The Wilderness and Sparsely Settled counties were the categories with the greatest surplus of males by far, and the categories we classified as the “frontier.” The average ratios in Wilderness counties actually increased from 1790 at about 1.2 males per each female to 1.68 in 1840 and to 2.57 in 1850 then with the recent opening of the Far West. These numbers vacillated until 1880 when the ratio hit its nadir of 2.64. What is noteworthy here is that the Wilderness average ratio was still quite high (1.56) in 1910, indicating that even as the frontier period was winding down there were still some pockets with very uneven sex ratios. The Sparsely Settled Frontier did not have as great of a jump in relative numbers of males as settlement spread westward, but there was still a sizeable increase from 1790 to 1850 when it reached its most unbalanced level. Extremes in the mining counties of the Gold Rush, such as Calaveras County with some 62 males for every female, pushed up the average ratios across the board in this part of the frontier. However, even long after the Gold Rush had waned, the Sparsely Settled Frontier still was a place of male surpluses (ratio of 1.28 in 1910).

The general trend of decreasing gender ratios with increasing population settlement intensities is quite noteworthy, while at the same time the fact that this arrangement persisted throughout the study period (although being less pronounced by 1910) is also important. Because the sex ratios in the two lowest density categories were still high in 1910, it points to a later convergence of numbers of males and female across the country, which was unexpected. The next most dense category, Farm-Beginning also experienced an increase in its ratios to highs in 1850 and around the turn of the 20th century. The four other categories generally contained an equal composition of males and females. Even so, it is

Table 3
Game-Howell ANOVA Significant Differences Between Wilderness Counties and Urban Counties in Gender Ratios

Year	Suburban	Urban	Super-Urban
1790	Yes	No	Yes
1800	Yes	No	Yes
1810	Yes	Yes	No
1820	Yes	Yes	Yes
1830	Yes	Yes	Yes
1840	Yes	Yes	Yes
1850	Yes	Yes	Yes
1860	Yes	Yes	Yes
1870	Yes	Yes	Yes
1880	Yes	Yes	Yes
1890	Yes	Yes	Yes
1900	Yes	Yes	Yes
1910	Yes	Yes	Yes

Note: ANOVA = analysis of variance.

important to note that in the urbanized counties, men were often outnumbered by women, where “on the farm” males still were a little more common. In essence, it was not just the frontier that had distinct male/female mixes, but this was true in all types of settled areas.

ANOVA Results

As stated, the data sets for this study are being treated as a sample population as opposed to a complete population tabulation. To determine whether gender ratios in low-density counties significantly differed from those in high-density counties, a Games-Howell ANOVA test was performed. This test was performed on each data set and resulted in a direct analysis of the difference that existed between the means of each subcategory, making it possible to determine whether the density classes differed significantly from one another. A 95% confidence interval was used for each statistical analysis. The resulting F score for each census year in this study showed that significant differences existed between subcategorical means. Of greater interest is the comparison between subcategories that details significant differences between two independent groups. The results of the ANOVA tests comparing both the Wilderness and Sparsely Settled Frontier counties with the three most densely populated categories are given below. A “Yes” indicates that there was a significant difference in the sex ratios between the two counties.

Overall, both the Wilderness and Sparsely Settled categories were significantly different in gender ratios from urban counties for most censuses. The nonsignificant differences shown between 1790 and 1820 were probably the result of a low sample size for high-density categories. Additionally, although not shown in Tables 3 or 4, the Games-Howell test confirmed that the rest of the other categories were generally significantly different from each other. The results of the Games-Howell analysis, then confirms the categorical

Table 4
Game-Howell ANOVA Significant Differences Between Sparsely Settled
Counties and Urban Counties in Gender Ratios

Year	Suburban	Urban	Super-Urban
1790	Yes	No	Yes
1800	Yes	No	No
1810	Yes	Yes	No
1820	Yes	Yes	No
1830	Yes	Yes	Yes
1840	Yes	Yes	Yes
1850	Yes	Yes	Yes
1860	Yes	Yes	Yes
1870	Yes	Yes	Yes
1880	Yes	Yes	Yes
1890	Yes	Yes	Yes
1900	Yes	Yes	Yes
1910	Yes	Yes	Yes

Note: ANOVA = analysis of variance.

demographic distinctiveness among counties of various densities across the country throughout our study period.

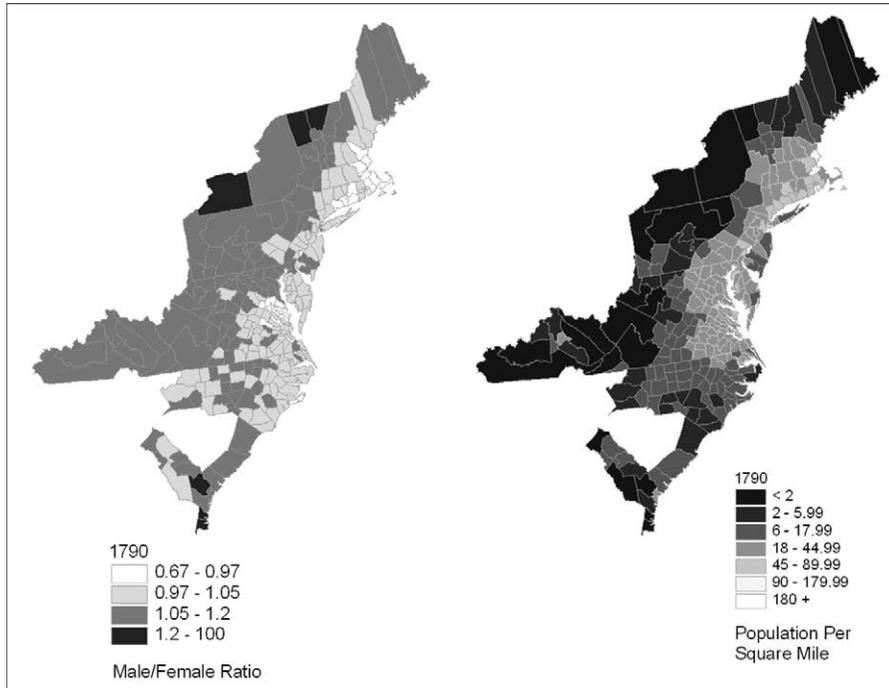
Historical GIS View of Gender Ratios

Viewing the geography of historical gender ratios elicits the observation that with the east to west general gradient of sex ratios, there were also important local patterns that were influenced by the peculiar geographies of the time (see Figures 1-5). The maps are set up to show a relationship between low population density and high gender (more males) ratios and vice versa. (The settlement category density limits correspond to Table 1 and the gender ratio map uses white to show a decided women majority, while the lightest grey category comprises ratios that show nearly even gender ratios.) For example, in 1790, the Boston area of eastern Massachusetts as well as parts of Connecticut and northern Virginia and southern Maryland near the Chesapeake were places of quite low relative male numbers. These were among the oldest settled places in the United States, and the low ratios there may reflect an aging population (and one, perhaps, affected by deaths from the Revolutionary War). There were not many counties with a great majority of males at that time.

In subsequent years, one can see the visual correlation of the gender and density maps. By 1820, most of the counties west of the coast had gender ratios that were above 1.05, showing the surplus of men, and thus possibly more frontier characteristics. New England (minus upper Maine) and the Carolinas/Virginia area were notable areas of generally even sex ratios.

California, as a new state in 1850 that followed on the heels of the Gold Rush, was very unbalanced in its gender ratios, especially in the gold fields that were teaming with men who were either single or who had left their wives in a state or country far away. Western Texas, northern Michigan and Wisconsin, and southern Florida were also on the edge of the

Figure 1
Comparisons Between Gender Ratios and Population Densities by County for 1790

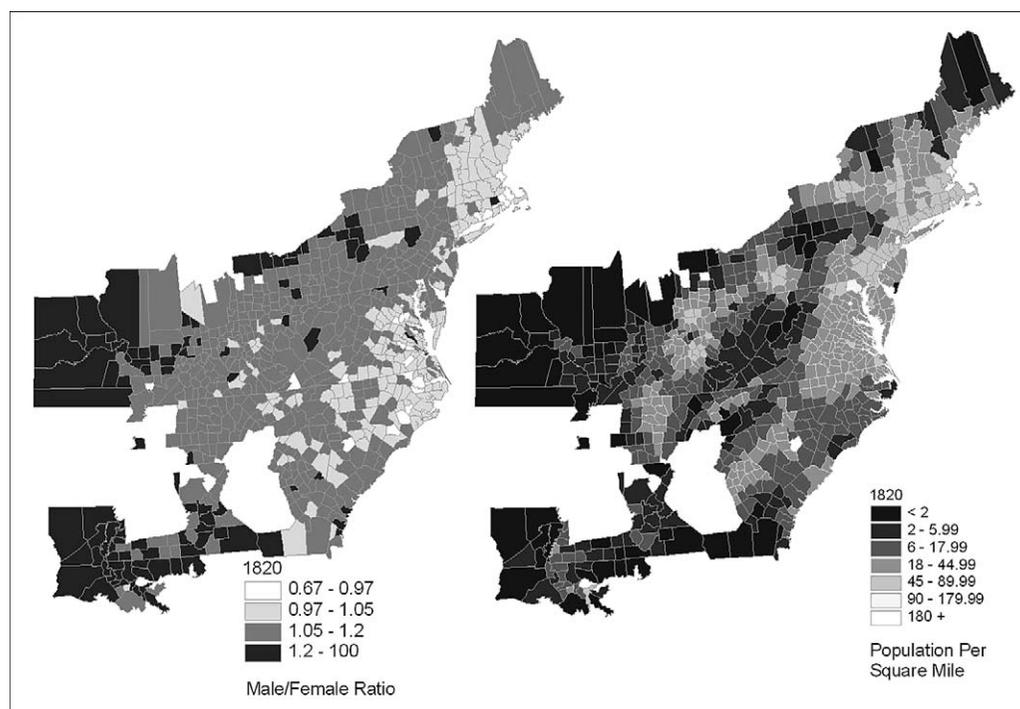


“settled” world according to gender and population density ratios. Interestingly, the lower Mississippi River region had higher male ratios as well. North Carolina and Virginia had large surpluses of women in many counties (more than in 1820).

By 1880, the east/west gender gradient was well defined. The highest imbalances continued to be in the west (over 1.2–120 males per 100 females) with a more moderate male majority in parts of the Great Plains and other areas west of the Mississippi River, and the particularly high numbers of men along the lower reaches of that river had all but disappeared. The visual correspondence between the least dense counties (Wilderness, Sparsely Settled Frontier, and some of the Farm Beginning counties) and the high male sex ratios is striking for this year.

The 1910 maps give one the realization that although much of the west had been settled by that time, the sex imbalance was still fairly high (i.e., at least 20% more males than females in all the darkest shaded counties in the gender ratios map). Parts of Utah, with its Mormon religious base, showed more even ratios than surrounding areas, while the lower Mississippi River (possibly related to jobs in river trade) turned up as a more male area again, notwithstanding its higher population densities. Parts of the coal mining regions of West Virginia and western Pennsylvania also had more men, most likely because of the main economy there. These maps both support our statistical analysis concerning the

Figure 2
Comparisons Between Gender Ratios and Population Densities by County for 1820



differences in sex ratios in the wilderness and frontier compared with other parts of the country and highlight important clusters of counties that had high gender ratios but were not in particularly low density areas, requiring other explanations for their existence.

Conclusions

Reassessing the validity of our three hypotheses helps summarize our findings. First, we hypothesized that the sex ratios of frontier populations differed significantly from those found among established populations at the same time. Through both simple and inferential statistics, data throughout the time period of 1790 and 1910 showed that on average men did outnumber women in greater numbers on the frontier (Wilderness and Sparsely Settled Frontier counties) than in any other type of county in the country. Even with the removal of outliers from the data sets (such as some of the mining counties of California in 1850), significant differences still existed among these areas. Second, there was indeed a basic decline in male sex ratios down the line of settlement density categories. Thus, urban areas generally had more women than men, or at least near equal numbers, while Farming counties were in the middle range with lower density Farm-Beginning areas showing the first

Figure 3
Comparisons Between Gender Ratios and Population Densities by County for 1850

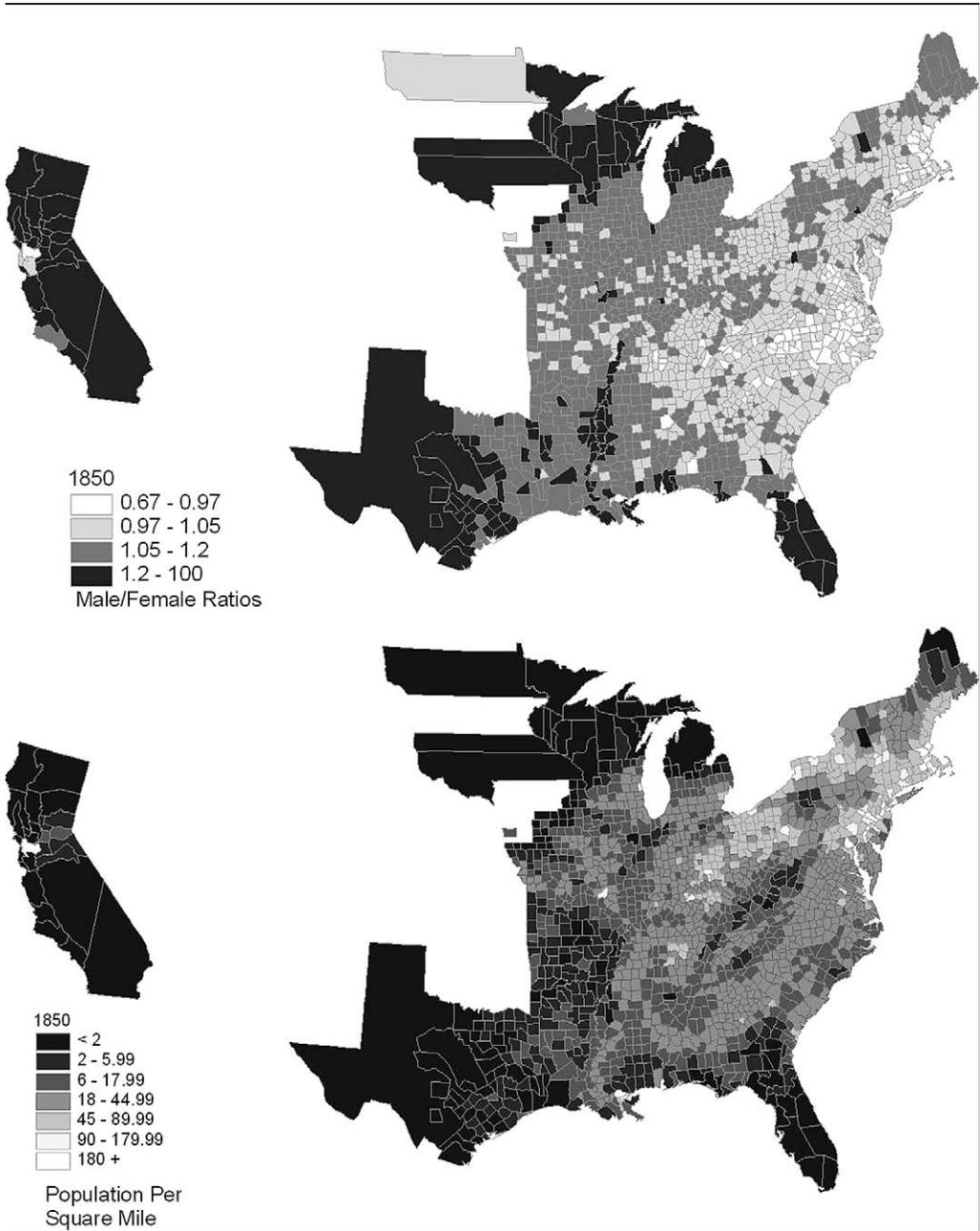


Figure 4
Comparisons Between Gender Ratios and Population Densities by County for 1880

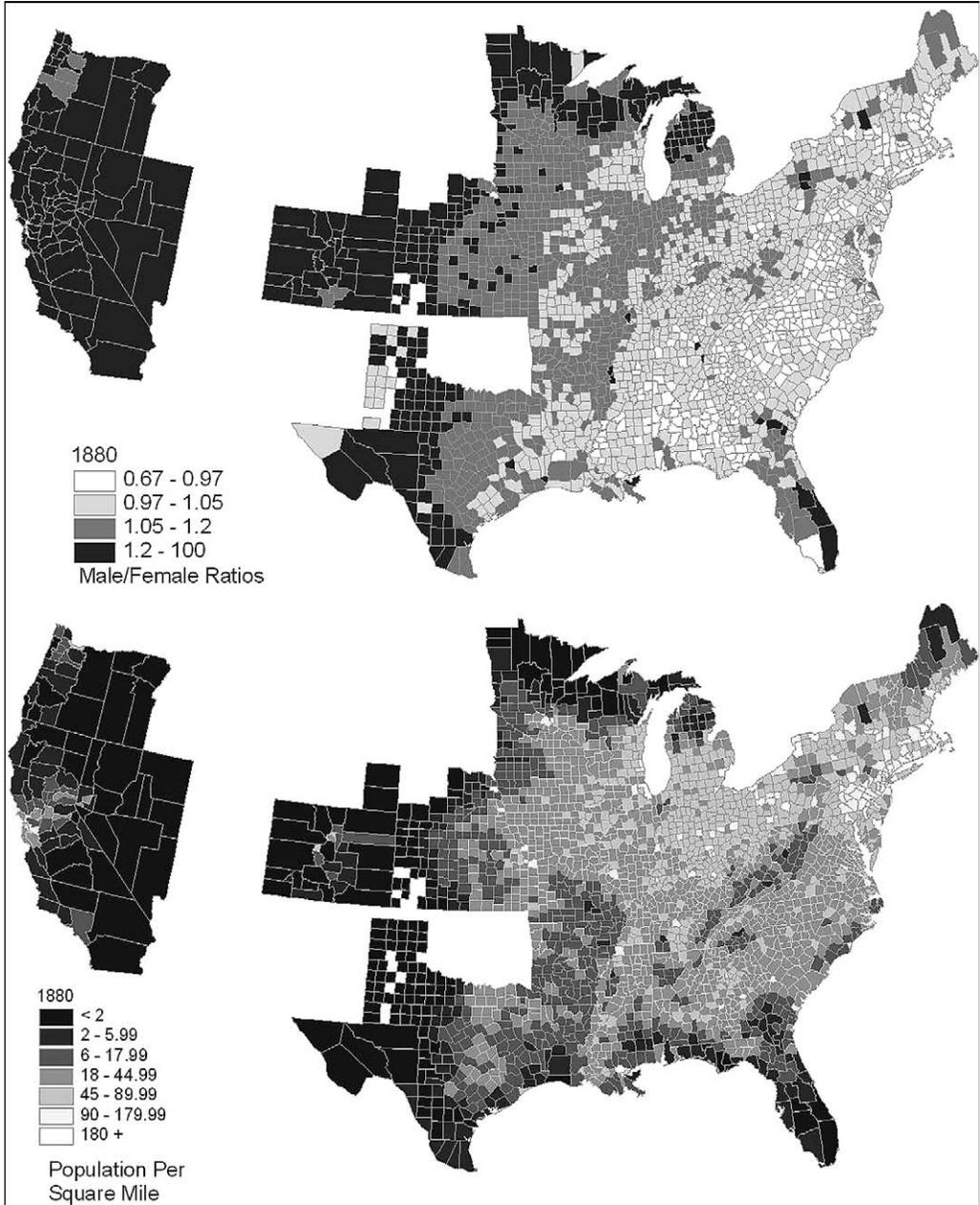
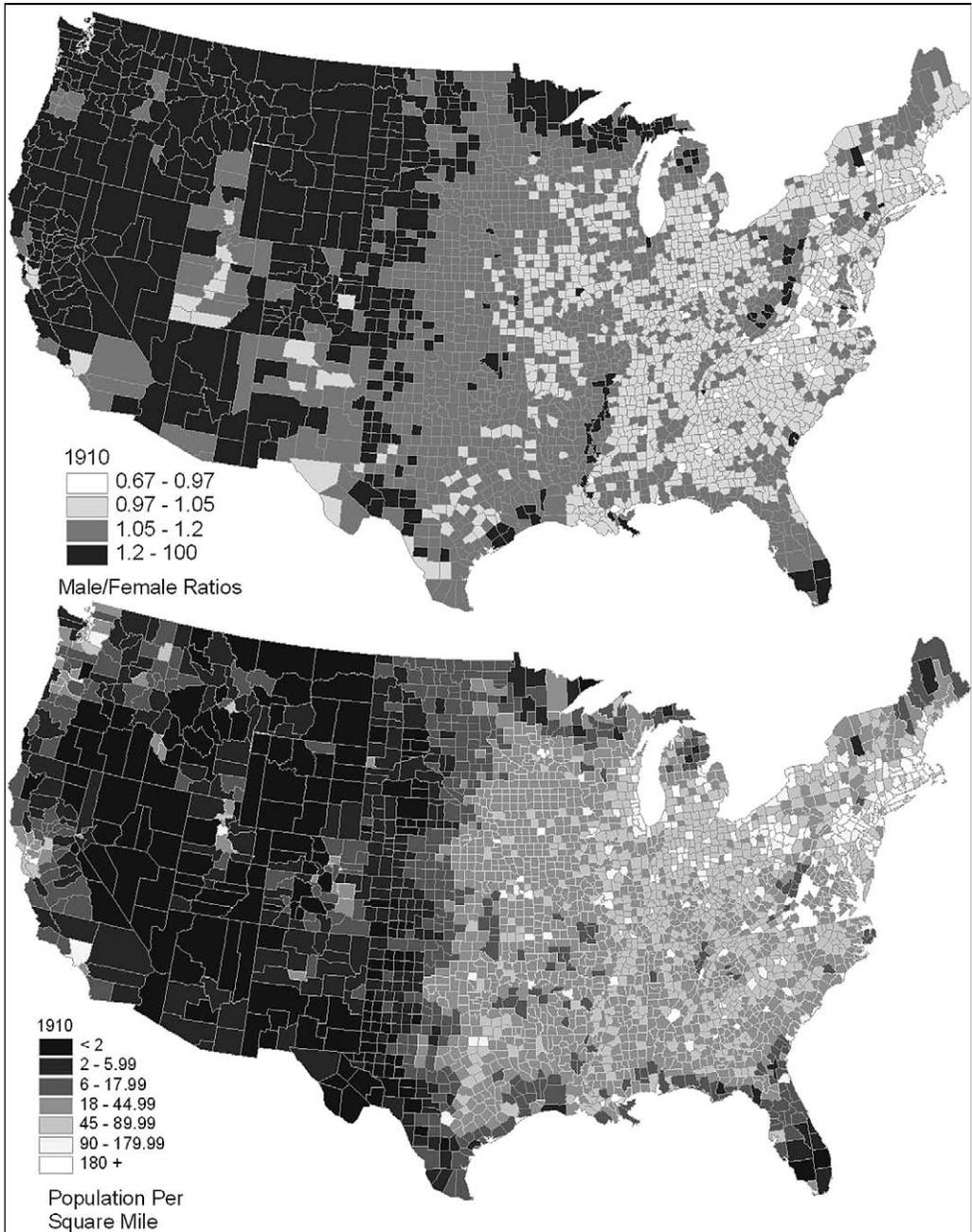


Figure 5
Comparisons Between Gender Ratios and Population Densities by County for 1910



large statistical step higher in gender ratios, and Frontier had the highest relative numbers of males. In other words, counties with fewer than 18 people per square mile (in the Farm-Beginning or less dense categories) were much more likely to have surpluses of males throughout the study period.

Our final hypothesis, that male sex ratios dropped as the frontier closed, was not as well supported. What actually occurred in the Wilderness and Sparsely Settled Frontier was that ratios increased (rather than decreased) after 1790, and then, especially starting in the 1840 to 1850 time period, they jumped up with the settlement of the Far West. The ratios did drop after 1880 in the Wilderness while staying fairly steady, after an 1850 spike, in the Sparse counties from 1860 to 1910 (in the 1.2 to 1.3 range). The surprising point, however, was that the frontier still had fairly high sex ratios in 1910, indicating that they had not equalized by that point. Thus, a follow-up to this study should be to continue this analysis past 1910 to determine when the western pattern of high male ratios showed a more general subsidence.

As we have shown, population settlement intensity was a good predictor of male sex ratios across the United States from 1790 to 1910 across the country. This supports much of the more localized and less temporally inclusive research that has been done on this subject over the years. Using a historical GIS has allowed for this detail of analysis and the maps of gender ratios could actually act as a fairly accurate surrogate depiction of the limits of the frontier (instead of using the traditional population density maps). Additionally, even though most of the country was “settled” by 1910 with at least two people per square mile within counties, the imbalance of males that still existed tempts one to declare that the “frontier” had not really closed by 1890 or 1910, by reason of the continuing lack of women in wide swaths of the still “Wild,” or at least male-dominated, West.

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