PRECEDENCE AND WEALTH: EVIDENCE FROM
NINETEENTH CENTURY UTAH

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ABSTRACT

Earlier work has established a strong positive relationship between a household's wealth and its duration in the local economy. This paper explores the possible connection between the magnitude of this wealth/duration relationship and the community's precedence rate--the percentage of households in a given year (1870) present in the same locale in an earlier year (1860). We hypothesize that a low precedence rate will be associated with a high return to the household's duration in the local economy, controlling for the size of the local population. This hypothesis is tested and tentatively confirmed for the counties of Utah in 1870. We also find that a low precedence rate is associated with increased inequality.

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INTRODUCTION

Persistence rates have been widely used by social historians to study geographic and social mobility.[1] A closely related measure, the precedence rate, has not received as much attention and may prove to be extremely useful for a variety of purposes. This paper will explore one important application of the precedence rate for economic history.[2]

To illustrate the relationship between the persistence rate and the proposed new rate, consider two samples of households drawn from the census manuscripts of 1860 and 1870 for some county or city. In each sample, the households that were present in the other census have been identified. The calculation of the persistence rate would be made using only the households of the 1860 sample in the following way:

$$\text{Persistence rate} = \frac{\text{Households from 1860 sample present in 1870}}{\text{Total number of Households in the 1860 sample}}$$

In other words, a persistence rate is measured through forward linkage and has generally been used to consider the mobility or turnover of the population. Alternatively, one could reverse the process and measure the percentage of households in the 1870 sample present ten years earlier. We will designate this new related measure as the "precedence rate" which is calculated as follows:

$$\text{Precedence rate} = \frac{\text{households from 1870 sample present in 1860}}{\text{Total number of households in the 1870 sample}}$$

The two rates are related since the persistence rate multiplied by the reciprocal of population growth (number of households in the population in 1860/number of households in the population in 1870) yields the precedence rate.[3] Rapid population growth, which often occurred during initial settlement of an area, reduces the precedence rate as does low persistence.

A number of investigations of the correlates of wealth in nineteenth century America have considered duration of residence in a community as a possible determinant of a household's wealth. Several studies have now found a correlation between a household's duration in a community and household wealth.[4] Cross-sectional regressions indicate that increased duration of one year in mid-nineteenth century Utah holding age, birthplace, occupation and rural/urban residence constant was associated with over a 6 percent increase in wealth in 1860 and over 3 percent in 1870. In Chicago, duration had an even stronger relationship to wealth with a year's duration being associated with an increase of more than 7 percent in a household's wealth in 1860 controlling for nativity, occupation and age.[5] The reward for duration suggested by these strong correlations between wealth and time in a community is probably the result of a number of factors including capital gains on real estate and information of local economic conditions.

As yet, there has been no systematic investigation of the determinants of the relationship between wealth and duration. In this paper, we propose the hypothesis that the magnitude of the association between wealth and duration will be inversely related

to the level of precedence, and will be positively related to the size of the community. That is, low precedence rates and large local markets will tend to produce a strong positive correlation between duration and wealth. We will present evidence from nineteenth century Utah on the relationship between the precedence rate and the importance of precedence in wealth accumulation. For the counties of Utah, we find the importance of the relationship between early arrival and wealth was strongly associated with both rate of precedence and population size. We also find that the strength of the association between wealth and early arrival had a significant effect on the level of inequality in the various Utah counties.

DATA SET

The information on wealth, household size, nativity, residence, age and occupation has been retrieved from the census manuscripts for all households in Utah in 1860 and 1870. Wealth, self-reported in the census, was the household's own estimate of gross, rather than net, wealth with holdings below $100 going unrecorded. The wealth figures in the census manuscripts appear to be reasonably accurate estimates of household wealth, even though they may not typically have been based on detailed calculations of household wealth.[6] Individual households that appeared in censuses of Utah in both 1860 and 1870 have been linked together. These linkages have been aided and corroborated by other available records such as church and genealogy records used in the creation of the Utah panel data.[7] Consequently, the

linkages should be fairly complete and accurate.

Table 1 gives basic data for Utah households with a male adult present for 1860 and 1870.[8] Household size fell slightly between 1860 and 1870 while the mean age of the male head rose by a little more than a year. The foreign born represented a larger proportion of the household heads in 1870 because of the large migration from England and Scandinavia during the 1860s. There was increased specialization in the 1860s with a substantial increase in the percentage of the work force who designated themselves as craftsmen and a small increase in the proportion categorized as white collar. Few individuals considered themselves out of the labor force. A 25 percent increase in the mean value of real estate per household was largely offset by a fall in the mean value of personal wealth so that the mean of total gross wealth increased by less than 5 percent. This stagnation in mean total wealth over the decade was largely a result of the in-migration of poor families rather than lack of growth of the wealth of families already established in Utah in 1860.

The analysis in this paper is conducted primarily at the county level so some attention must be paid to the economic importance of county boundaries. If the counties of Utah represented different markets, then those differences may be exploited to test the hypotheses concerning the effect of size of an economy and the precedence rate on the wealth/early arrival correlation.[9] We believe that the counties of Utah were sufficiently isolated from each other that they may be treated as

separate economic entities. As seen in table 2, most of the counties were quite large in area although much of the land was desert or mountains and not suitable for farming. Water for irrigation and household use was the most important constraining resource in the settlement of Utah. Consequently early settlement was confined in valleys, often quite far apart, with sufficient arable land that could be irrigated by rivers or mountain streams.[10] For example, the earliest settlements in Utah were in Salt Lake County irrigated by the Jordan river and several large canyon streams, Weber County with the Ogden river, Davis County between Ogden and Salt Lake irrigated by canyon streams, and Utah County irrigated by three small rivers--the Provo, Spanish Fork and American Fork. Each of these counties was about one day's journey from the contiguous county with rather well-defined physical boundaries, except in the case of Davis and Weber counties. Within two years, two more counties were created in central and southern Utah, several days' journey from the nearest county. Once again communities were organized around available water sources. Counties or communities settled still later in the period were generally distinct from other counties.[11] Since local railroads were not built in Utah until after completion of the transcontinental railroad in 1869, transportation between counties was by wagon. Transportation over mountain passes was arduous and expensive, and this contributed to the isolation of some of the early counties.

The percentages of the labor force in different occupations

given in table 2 provide evidence that the counties differed from one another in economic structure. Some of the counties such as Cache, Millard and Tooele were predominantly agricultural. Other counties such as Salt Lake and Box Elder had relatively few farmers. Yet each county had a significant number of craftsmen and at least some white collar (includes merchants and proprietors) workers, evidence that each county provided services and simple manufactured goods locally.

Early Utah Mormon leaders advocated settlement in villages or communities rather than random settlement on individual farms. Most settlement followed the village pattern of residence, with even farmers living in the village and traveling to their farms during the day.[12]   As new land within an existing county was brought into cultivation, new villages or towns were created, but county division normally took place only when a somewhat distant area was settled. New counties were generally formed around newly settled valleys. Consequently, very few settled areas were shifted from one county to another as new counties were formed. In a few cases, communities in southern Utah were shifted from one county to another between 1860 and 1870. In these instances, adjustments were made in the data set so that persons living in such communities would be treated as if they had not shifted residence from one county to another.

In most cases, the county forms a reasonably good unit of analysis for a local economy. All of the counties were connected to some degree economically, yet generally their geographic

separation was sufficient that their economies were distinct. Land rents differed across counties. Each county tended to have its own water resources and transportation linkage to the rest of Utah.

One cannot automatically assume, however, that a county is an appropriate unit for analysis, for one county might include several local economies. Washington County in the southwest corner of Utah provides illustration of this point. In 1860, Washington County contained some small, rather unsuccessful, settlements in the northeast corner of the county that were shifted to Kane County when it was created in 1864. In 1861 motivated by concerns over the availability of cotton goods from the South, Brigham Young "called" about 300 families to leave Salt Lake and Utah counties and settle entirely new areas in the southwestern part of Washington County to attempt cotton production.[13] Some of these households were quite wealthy by Utah standards. Virtually none of the households present in Washington County in the 1860 census moved to these new settlements, which became one of the economic centers of Southern Utah even though the cotton production failed. Of the 573 families in Washington County in 1870, 105 families had been in either Salt Lake or Utah County in 1860. Consequently, a variable measuring presence in Washington County in 1860 would not measure early arrival into the economy that existed in 1870 in Washington County. Indeed, the Washington County of 1870 was not really started until 1861.

Although the issue of identifying local economies is critical for the purposes of a study like this one, cases like Washington

County were exceptional in nineteenth century Utah. The normal pattern was one in which the economy of a county grew up around a center, typically located at the point of initial settlement.[14]

MIGRATION TO AND WITHIN UTAH

As shown in table 1. there were 6975 households with male heads in 1860 and 16064 in 1870. This obviously high rate of population growth of almost 9 percent per year was not unusual for frontier settlements. Many states experienced very rapid population growth during peak settlement periods.[15] Of the 6975 households in Utah in 1860, 2849 were still there in 1870, giving a persistence rate of 40.9 percent and a precedence rate of 17.7 percent for the state as a whole.[16] Thus, 13,215 of the 16,064 households of 1870 were either migrants to the state or had been formed by couples married since 1860. The preponderance of the households were migrants to Utah since less than 25 percent of the households heads of 1870 were under age thirty and less than 2 percent born in Utah.[17]

These migrants to Utah between 1860 and 1870 were drawn from a wide variety of origins because of the proselytizing activity of the LDS Church. Converts to the Church from the United Kingdom and Scandinavia accounted for approximately 70 percent of those households enumerated in the 1870 census that had not appeared in the 1860 census of Utah. Other parts of Europe accounted for roughly 5 percent of the new households with the balance coming from other states within the U.S. There was relatively little movement within Utah by households already settled there. Slightly

over 66 percent of the households present in both censuses did not change their county of residence between 1860 and 1870. The movement that did occur was drawn proportionately from the settled counties according to their population. Most of the movement of households within Utah that did occur was consequently from the earliest settled and larger counties to outlying settlements. Salt Lake County and the three counties close to it (Davis, Utah and Weber) comprised 65 percent of the 1860 population and 68 percent of the households migrating within Utah between 1860 and 1870 came from these counties.

Persistence rates, reported in Table 3, do not appear to vary systematically by county size, period of settlement or other characteristics. Some of the outlying counties such as Iron. Summit and Sanpete had low rates of persistence, all above 10 percent, while other "frontier" counties such as Beaver, Juab and Millard had higher rates of persistence, all above 30 percent. The larger and more developed counties had persistence rates ranging from 23 percent to 29 percent.[18]

Persistence rates have typically been found to have a limited range. The variation in population growth rates adds variance to precedence rates compared to the variation in the persistence rates. As shown in table 3, the ratio of 1870 population to 1860 population varied across counties from 1.37 to 11.31. Precedence rates also had substantial variation, ranging from 1 percent in Summit County to 21 percent in Utah County. Of the three counties with lowest precedence rates, Box Elder and Summit had low rates

because of rapid population growth, while the low precedence rate of Iron County was due to an unusually low persistence rate. Utah County, which had the highest precedence rate had a relatively high persistence rate (29 percent) combined with the lowest rate of population growth of any county.

RELATIONSHIP OF DURATION TO WEALTH

As discussed earlier, a household's duration within a local economy has been found to have been strongly correlated with household wealth in a variety of places and circumstances in nineteenth century America. Table 4 presents a series of cross-sectional regressions for individual counties relating the natural logarithm of wealth reported by the household in the 1870 census to age and its square, foreign birth, four occupational classes and a binary variable that assumes the value of 1 if the household was present in the 1860 census of the county. The regressions, confined to households with a male adult present, are based on native farmers as the control group.

The peaks in the age-wealth profiles for the individual counties were quite similar ranging from age 43 in Cache County to age 52 in Salt Lake County. The slopes of county age-wealth profiles display considerable variation. The disadvantage of the foreign born varied widely by county and the correlation was not always statistically significant. In two counties, there was actually positive correlation between foreign birth and wealth in two counties--Box Elder and Juab.

Laborers, which includes both farm laborers and semi-skilled

service workers as well as laborers, held very little wealth. Craftsmen were slightly richer than the unskilled, but less wealthy than farmers. The wealth of the white collar classification, which included low white collar such as bookkeepers and bank clerks as well as proprietors and higher white collar, was similar to that of farmers with both positive and negative coefficients usually not statistically significant.

Presence in the county in 1860 was positively correlated with wealth in all of the counties except Sanpete. The association was statistically significant at the .05 level in eight of the counties. The relationship was not statistically significant in Davis or Tooele Counties and was marginally significant in Iron, Juab and Summit Counties. Disregarding Sanpete County, the coefficient for presence in the county ten years earlier varies from .43 in Davis County to 3.10 in Summit County.[19] The ratio of the wealth of preceders to that of non-preceders varies from 1.54 in Juab County to 22.2 in Summit County. Clearly, precedence is strongly, though variably, associated with higher wealth in most of the counties.

It might appear tempting to interpret the coefficient relating a measure of duration or precedence to wealth (such as the coefficient in column 9 of table 4) as a return to duration. However, such an interpretation has difficulties and the coefficients for duration should not be interpreted as an adequate measure of the return to duration in that particular county.

One potentially important bias would suggest that the

coefficients estimated by the regressions in table 4 are an overestimate of the actual return to duration. The bias is created by the higher propensity of poorer people to migrate out of a county as compared to wealthier people. The group of households with longer duration (in the case here, presence in the county in 1860) will have a higher proportion of richer people than the group of shorter duration not necessarily because time in the county increased wealth, but perhaps because wealth enabled people to stay in the county. Thus, a sample selection bias may create the illusion that there is a return to early arrival in a county when there may not be one in fact. The strength of this bias will depend on the extent to which wealth influences the propensity to remain in a county.

Table 5 reports logit regressions that measure the effect of wealth on the likelihood that households will persist in the same county over the ten years from 1860 to 1870. Once again, the effects of age, foreign birth and occupational class are controlled in these county-specific regressions. The final column of table 5 gives the marginal effect of changes in wealth on county persistence holding age and birthplace constant. In all cases, wealth has a positive effect on the probability that a household will still be in the county in 1870; this effect was statistically significant at the .10 level in six of the thirteen counties. In Salt Lake County, the effect of wealth on persistence was moderate. The estimated probability of persistence for a 40 year old native farmer with $500 of wealth is .25 compared to a probability of .30

for a 40 year old native with $2000. The log specification of wealth combined with a positive coefficient on that variable ensures that the effects of moving from no wealth to some wealth (say $500) will have a larger estimated effect on the probability of persistence that moving from some wealth to substantial wealth.[20] The size of the wealth correlation with persistence is almost non-existent four counties--Beaver, Box Elder, Davis, and Utah. In each of these counties, an increase in wealth from $500 to $2000 increases the probability of persistence by less than 1.4 percentage points compared to mean persistence in those counties of 26 percent. The effect of wealth on persistence is relatively large in Cache and Juab counties. An increase in wealth from $500 to $2000 in each of these areas will increase the probability of persistence by 9.6 and 6.0 percentage points respectively compared to persistence rates of 32 percent in Cache and 42 percent in Juab County.

The logit equations of table 5 indicate that wealth did have an effect on persistence, but that its effect was not dramatic. The moderate impact of wealth on persistence is not particularly surprising, for migration to the state was the result of religious belief in most cases. Since about two-thirds of households in Utah in 1860 and 1870 did not change counties, most decisions to move were decisions to stay in Utah or exit the state. It seems likely that the decision to leave Utah was connected to a change in religious belief in many cases rather than a decision to migrate for economic benefit. If wealth played a marginal role in

persistence, this source of bias in the estimation of the relationship between duration and wealth would also be marginal.

There are other potential sources of bias that should be investigated and removed before one would have an acceptable measure of the return to duration. It is possible that immigrants at different times are of different quality, so that the measured duration effect is confounded with changes in the quality of the in-migrants.[21] To measure these returns more accurately would require observation on wealth at the point of entry into and out of the county.

INFLUENCES UPON THE CORRELATION BETWEEN PRECEDENCE AND WEALTH

The correlation between wealth and duration reported in table 4 in the local economy shows considerable variation across the thirteen counties. The hypothesis offered here proposes that there is an inverse relationship between the precedence rate and the coefficient relating wealth and duration, and a positive association between county population and that coefficient.

The reasoning behind this hypothesis is straightforward. If lengthy duration in a place were in short supply, duration would potentially command a premium.[22] If long duration were commonplace, it should receive a relatively small return. The size of the return should also depend on the size of the community. A favorable niche in a large economy would be expected to have greater value than a comparable advantage in a small community.

This relationship between wealth and duration is worked out through a variety of economic mechanisms. Early arrival may give

access to the best locations. In Utah, locational advantage was tightly connected to good and certain access to water. In other situations, locational advantage would be linked to locations close to the center of economic activity. As more and more people enter an economy, wealth based on locational advantages secured by early arrivers may grow faster than the wealth of those at the periphery. Differential capital gains on land may be an important source of the return to duration. Equally, early arrivers may use time and experience to gain valuable information about the local economy which they ultimately translate into higher wealth. They may also develop economic relationships with other people that confer an advantage. The precedence rate is a direct measure of the fraction of the population that has any or all of these advantages and is an indirect measure of the value of such advantages.

A first test of our hypothesis may be made by relating the coefficients on early arrival in table 4 to the precedence rates in table 3 for the thirteen counties and the population of those counties. A regression with the coefficient relating early arrival to wealth as the dependent variable and the precedence rate and the number of male-headed households in the county in 1870 as independent variables produces the following result:

Coefficient = 1.99 + .00051 County Size -12.69 Precedence Rate
            (5.45)   (2.78)   (3.91)

$N = 13$ $R^2 = .47$ () values are absolute t values.

Coefficients of the independent variables are significant at levels better than 0.05. Addition of a quadratic term on size does not materially improve the estimated equation. Elimination of the size

variable reduces the coefficient on the precedence rate by about a third but does not change the sign or eliminate statistical significance.

The regression provides evidence that the effect of the precedence rate on the correlation between wealth and early arrival was important in early Utah. A decline in the precedence rate of 1 percentage point will increase the ratio of the wealth of early arrivers to that of others by 13.5 percent.[23] Consequently, a substantial difference in precedence rates will result in a substantial difference in wealth of early arrivers relative to others.[24] For the Utah counties, an increase of 500 households in a county increases the ratio of the wealth of early arrivers to the wealth of others by about 30 percent. The estimated equation provides support for the hypothesis that the magnitude of the relation between duration and wealth depended on both the precedence rate and the size of the community.

PRECEDENCE AND INEQUALITY

When one considers the whole state of Utah in 1870, 12 percent of the households were present in the same county ten years earlier. Moreover, the ratio of the mean wealth of those early-arriving households to the mean wealth of the households who had migrated into the county since 1860 (holding other characteristics constant) is 3.16. This substantial difference in the wealth of these two types of households could be an important source of inequality. If the posited relationship between the early arrival/wealth correlation and the precedence rate holds true, then

the contribution of precedence to inequality will be somewhat
mitigated by the interplay between the precedence rate and the
strength of the wealth/duration relationship. That is, low
precedence rates (meaning few households contain the characteristic
of value) would imply a higher wealth effect associated with early
arrival. A high precedence rate implies that more people have the
advantageous characteristic of early arrival, but the size of the
advantage would be smaller. Nevertheless, duration or early
arrival would contribute some inequality to the distribution of
wealth.

Table 6 summarizes the wealth distributions in 1860 and 1870
for the Utah counties. Inequality rose in every county except
Sanpete between 1860 and 1870, with the largest increases in
inequality coming in two counties with very strong correlations
between wealth and early entry into the economy--Box Elder and
Summit.

The extent of inequality would appear to be related to the
strength of the association between wealth and duration.
Considering either the Gini coefficients for 1870 wealth or the
percentages of wealth held by the richest 5 or 10 percent, counties
with high inequality--Salt Lake, Summit and Box Elder--were
counties with high coefficients for the regression of wealth on
presence in the county in 1860.[25] Alternatively, Sanpete County
and Juab County were counties with both low levels of inequality
and low or negligible association between wealth and early arrival.
A regression with the Gini coefficient as a dependent variable with

the magnitude of the estimated relationship between wealth and presence in 1860 (column 9 of table 4) as the independent variable produces the following results:

Gini Coefficient = .54 + 0.12*Wealth/Early Arrival Coefficient
                   (17.16) (5.15)
          N = 13 R^2=.62 Values in () are t values.

On average, a unit increase in the wealth/early arrival coefficient increased the Gini coefficient by .12 or about 18 percent for the mean value of the Gini coefficient in the Utah counties. The association between wealth and early arrival is clearly not the only important influence upon local inequality. Nevertheless, these results suggest that this association does play a role in the creation and maintenance of inequality in an economy.

This relationship between the apparent reward to early arrival and inequality provides one reason why equality on the frontier may have been non-existent, or at best short-lived. As any frontier community developed to the point of economic success, an influx of migrants pushed up the value of precedence or early arrival. This increase in the wealth/early arrival relationship, in turn, contributed to an increasing inequality.[26]

CONCLUSION

This paper has explored the relationship between the precedence rate, as defined above, and the oft-observed relationship between high levels of wealth and early arrival. County level data for Utah in the nineteenth century yield a clear relationship between early arrival and higher wealth levels. The level of this correlation is inversely correlated with the

precedence rate for the county and positively with the size of the county. Moreover, the level of these correlations is directly related to the extent of inequality in the county.

These results are a first step in understanding the connection between precedence and wealth accumulation. Research along these lines for other economies would be interesting and valuable for a firmer establishment of the relationship between the precedence rate and the correlates of wealth as well as the resultant impact on inequality. Yet, these results for nineteenth century Utah clearly show sufficient promise to justify serious exploration of the role of the precedence rate in generating inequality in the course of economic development.

NOTES

1.   Stephan Thernstrom, <u>The Other Bostonians: Poverty and Progress in the American Metropolis, 1880-1970</u>, (Cambridge, 1973) pp. 221-32 summarizes most of the persistence studies up to that time. For other studies, see David W. Galenson and Clayne L. Pope, "Economic and Geographic Mobility on the Farming Frontier: Evidence from Appanoose County, Iowa, 1850-1870," 39 <u>Journal of Economic History</u>, 49 (September, 1989) pp. 635-656.

2.   Precedence plays a central role in Kenneth Winkle's study of voting behavior and office holding in Ohio. See Kenneth J. Winkle, <u>The Politics of Community: Migration and Politics in Antebellum Ohio</u>, (Cambridge, 1988).

3.   This relationship between the precedence rate and the persistence rate is useful when cross-checking the validity of different samples. A linkage of households sampled from the 1860 census to the 1870 census gives a direct estimate of a persistence rate just as a linkage of a sample from the 1870 census backward to the 1860 census gives a direct measure of the precedence rate. The persistence rate calculated from the forward linkage may be combined with the population growth rate to calculate an independent estimate of the precedence rate, and the precedence rate calculated from the backward linkage may be used to calculate an independent estimate of persistence. For an illustration see David W. Galenson, "Economic Opportunity on the Urban Frontier: Nativity, Work and Wealth in Early Chicago" unpublished manuscript, University of Chicago, 1990.

4.   See Merle Curti et. al. <u>The Making of an American Community: A Case Study of Democracy in a Frontier County</u>, (Stanford, 1959) p. 141ff; J. R. Kearl, Clayne L Pope, and Larry T. Wimmer, "Household Wealth in a Settlement Economy," <u>Journal of Economic History</u>, 40 (September, 1980) pp. 477-96; Donald F. Schaefer, "A Model of Migration and Wealth Accumulation: Farmers at the Antebellum Southern Frontier," <u>Explorations in Economic History</u>, 24 (April, 1987), pp. 130-157; Galenson and Pope, "Economic and Geographic Mobility on the Farming Frontier."

5.   J. R. Kearl and Clayne L Pope, "Choices, Rents and Luck: Economic Mobility of Nineteenth-Century Utah Households," in Stanley L. Engerman and Robert Gallman, eds., <u>Long-Term Factors in American Economic Growth</u>. Vol. 51: Studies in Income and Wealth (Chicago, 1986), pp. 215-255); Galenson, "Economic Opportunity on the Urban Frontier."

6.   A comparison of wealth reported in the census to wealth reported in local tax rolls for a sample of households in 1870 shows a high simple correlation (.66) between wealth estimates from the two sources. That is, Ln(census wealth) = 1.77 + .79 (tax roll wealth) with an R of .44 and N=1568. The mean of the natural logarithm is 6.7 for wealth from the tax rolls and 7.04 from the census manuscripts. In Utah, the census marshals followed the instruction to leave wealth below $100 unrecorded. In 1870, only three households out of 19,187 were recorded with wealth below $100.

7.   The Utah data consists of linked observations on household heads used to create a panel of households that are followed for as long as they are in Utah for the period from 1850 to 1900. For a fuller discussion of the panel data see J. R. Kearl and Clayne L. Pope, "Unobservable Family and Individual contributions to the Distributions of Income and Wealth," Journal of Labor Economics, 4 (July 1986) pp. S53-S56.

8.   Households headed by females have been excluded from the analysis since many of these households were actually part of polygynous households in which case the households and wealth have been combined with other recorded households of the husband or they were households with a husband who was absent for a year or two doing missionary or other service for the LDS Church. There were few households in Utah in this period who were headed by females without husbands.

9.   The use of county level data here is similar to the use by Butler, Heckman and Payner in their study of the effect of government regulation on discrimination in South Carolina. See Richard J. Butler et. al., "The Impact of the Economy and the State on the Economic Status of Blacks: a Study of South Carolina," in David W. Galenson ed., Markets in History: Economic Studies of the Past, (Cambridge, 1989) p. 306ff.

10. For an overview of the settlement of Utah, see Leonard J. Arrington, Great Basin Kingdom: Economic History of the Latter-Day Saints, 1830-1900, (Cambridge, 1958).

11. The dates of formation of counties may be found in George B. Everton, Sr., The Handy Book for Genealogists, (Logan, Utah, 1962) pp. 170-172 while information on early settlements of Utah and changes in county boundaries may be found in David E. Miller, Utah History Atlas, (Salt Lake City, 1968).

12. See Lowry Nelson, <u>The Mormon Village: A Pattern and Technique of Land Settlement</u>, (Salt Lake City, 1952).

13. Arrington, <u>Great Basin Kingdom</u>, p. 216.

14. The county that fits least well into the model of a county with a dominant town and surrounding villages is Sanpete County. Several small communities were started there within three years of each other. None achieved predominance and the county, beset by Indian conflicts, poor weather and unstable water supplies, languished after 1870.

15. Wisconsin increased its population more than ten-fold between 1840 and 1850. Texas population increased three fold between 1850 and 1860. Minnesota has a population of a little over 6,000 in 1850 and over 170,000 in 1860. It was not uncommon for counties to grow from a few hundred residents in one census to tens of thousands a decade later.

16. There are not other state persistence rates to compare with this rate. The county rates reported by Thernstrom, <u>The Other Bostonians</u>, p. 226 bracket this rate. One would expect the persistence rate for a state to be higher than that for most of the counties within that state because of intrastate migration. Winkle, <u>The Politics of Community</u>, p. 19 concludes that there was substantial migration within Ohio from the countryside to the cities. In Utah, the migration is out of Salt Lake City to the countryside for most of the nineteenth century.

17. Some of those born outside of Utah would be children of earlier migrants born in other states. We have been able to identify less than 800 household heads in the census of 1870 whose fathers were also in the 1870 census as household heads.

18. Frontier areas have relatively low persistence rates. James Malin, "The Turnover of Farm Population in Kansas," <u>Kansas Historical Quarterly</u>, 4 (1935) pp. 339-372 found high rates for farm operators in Kansas, 26 to 59 percent throughout the nineteenth century, but note that his sample did not include groups more likely to move. The rates for counties in Utah are quite similar to those in Trempealeau County, Wisconsin, Wapello County Iowa and below those of East Central Kansas. Curti et. al., <u>The Making of a Democratic Community</u>, found rates of 25 percent (1860-1870) and 29 percent (1870-1880) for Trempealeau County, Wisconsin. Mildred Throne, "A Population Study of an Iowa County in 1850," <u>Iowa Journal of History</u>, 57 (1959), pp. found a rate of 30 percent for Wapello County, Iowa. Peter J. Coleman, "Restless Grant

County: Americans on the Move," <u>Wisconsin Magazine of History</u>, 66 (Autumn 1966) pp. 16-20 found a rate of 21 percent for Grant County, Wisconsin.   William G. Robbins, "Opportunity and Persistence in the Pacific Northwest: A Quantitative Study of Early Roseburg, Oregon," <u>Pacific Historical Review</u>, 39 (1970) pp. 279-296 found a persistence rate of 34 percent between 1870 and 1880.

19. The equations in Table 4 are of the form Wealth= $e^{\beta X + \delta P}$ where P=1 if the household was present in the county in 1860 and 0 if not present and X represents a vector of the other characteristics. The ratio of the wealth of households present in the county in 1860 to the wealth of households not present then is equal to $e^{\beta X + \delta} P / e^{\beta X}$ or e^{δ}. For example, the coefficient of 2.00 on the dummy for presence in 1860 in Salt Lake County implies that the ratio of the wealth of precedes to the wealth of non-precedes is equal to $e^{2.14}$ or 7.39 for Salt Lake County holding the other characteristics fixed.

20. The natural log of $1 is 0, of $500 is 6.2, and of $5000 is 8.5. Consequently, the logit regressions with Ln of wealth as a independent variable will show bigger changes in the probability of persisting for households with 0 wealth compared to wealth of $500 than for households with $500 in wealth compared to those with $5000.

21. George J. Borjas, "Self-Selection and the Earnings of Immigrants," <u>American Economic Review</u>, 77 (September 1987) pp. 531-553 discusses the possibilities of changes in the quality of immigrants over time.

22. Note that this proposed hypothesis need not be true by definition. Early arrival could be a mistake. Scarcity alone does not create value. Iron County may be such example. The precedence rate is low because of low persistence. Other households did migrate into the county at a modest rate, but the correlation between wealth and early arrival is not very high.   The Iron County example illustrates the important influence of population growth on the return to duration.

23. The ratio changes by $e^{.1269} = 1.1353$.

24. Box Elder County and Cache County, contiguous counties in northern Utah of nearly the same size, provide a good example of the effect of the precedence rate on the wealth of early arrivers relative to others. Box Elder had an influx of migrants between 1860 and 1870 partially in response to the building of the

transcontinental railroad. (The golden spike joining the railroad from the east with the railroad from the west was driven in Box Elder County.) There was less growth in Cache County though the persistence rate was higher. Consequently, Cache County had a precedence rate of 11 percent and Box Elder a rate of 4 percent. The ratio of the wealth of those present in 1860 to those not present ceteris paribus was 1.93 for Cache County. For Box Elder County, the ratio was 7.24.

25. For the U.S. as a whole, Lee Soltow, Men and Wealth in the United States, 1850-1870, (New Haven, 1975) pp. 99-103 finds that richest 5 percent of households owned 54 percent of the aggregate wealth in 1870 and the richest 10 percent owned 70 percent of the wealth. He estimates the Gini coefficient on total wealth to be .83 for the U.S. Only Box Elder, Salt Lake and Summit counties are near the U.S. level of inequality. Rural counties tend to have more equal distributions of wealth. Curti et. al., The Making of an American Democratic Community, found that the richest 10 percent held 39.3 percent of the wealth in Trempealeau County, Wisconsin and 37.6 percent of the wealth in a sample of eleven Vermont townships.

26. A comparison of the distributions for Trempealeau County for 1860 and 1870 shows a slight increase in inequality between 1860 and 1870. Curti et. al., The Making of an American Democratic Community, p. 78.

TABLE 1

CHARACTERISTICS OF UTAH HOUSEHOLDS WITH HUSBAND PRESENT

	1860	1870
Population	36,417	74,638
Households	6975	16,064
Mean Household Size	5.2	4.6
Household Heads		
Foreign Born	57%	65%
Farmers	53%	43%
White Collar	5%	6%
Craftsmen	18%	25%
Laborers	24%	26%
Not in Labor Force	<1%	<1%
Mean Real Estate Wealth	$510	$636
Mean Personal Wealth	$471	$391
Mean Total Wealth	$982	$1027

Source: Census Manuscripts of 1860 and 1870

TABLE 2

CHARACTERISTICS OF PRIMARY UTAH COUNTIES OF 1870

County[a]	Square miles[c]	Households	Occupations				Mean Wealth
			Farmers	Craftsmen	White Collar[b]	Laborers	
Beaver	2586	308	51%	26%	4%	19%	$ 915
Box Elder	5614	1157	24	33	14	29	754
Cache	1171	1387	64	16	4	15	624
Davis	299	722	42	19	3	36	1210
Iron	3302	390	43	26	2	29	777
Juab	3396	359	40	11	2	47	908
Millard	6818	512	68	12	3	16	916
Salt Lake	756	3553	19	39	12	30	1735
Sanpete	1586	1165	54	18	3	26	937
Summit	1865	509	33	23	5	39	566
Tooele	6919	411	58	20	2	20	968
Utah	2018	2146	47	16	3	33	742
Washington	2422	573	50	25	3	22	1126
Weber	566	1582	43	20	10	26	854

Sources: Statistical Abstract of Utah, Bureau of Economics and Business Research, University of Utah, June 1987
     Census Manuscript of Utah for 1870

Notes: a. Only the counties with significant population in 1860 are listed in this table.
       b. White collar occupational category includes merchants and proprietors
       c. As a frame of reference for the size of the counties, Rhode Island has a land area of 1055 square miles and Connecticut 4872 square miles.

TABLE 3

PERSISTENCE, PRECEDENCE AND WEALTH BY COUNTY

County	Persistence Rate	Precedence Rate	Population Growth[a]
Beaver	31%	14%	2.28
Box Elder	20	4	4.63
Cache	32	11	2.91
Davis	23	14	1.69
Iron	14	6	2.34
Juab	42	15	2.92
Millard	48	11	4.41
Salt Lake	29	16	1.80
Sanpete	19	12	1.59
Summit	10	1	11.31
Tooele	29	11	2.67
Utah	29	21	1.37
Weber	28	11	2.52

Source: Utah Income and Wealth Project

Note: a.   Population growth is the ratio of 1870 population to 1860 population.

TABLE 4

REGRESSIONS EXPLAINING HOUSEHOLD WEALTH

County	Intercept	Age	Age2	Foreign Birth	White Collar	Craftsmen	Laborers	Present in 1860	R^2
Beaver	.72	.26	-.0026	-.70	-.50	-.93	-.81	.90	.15
	(.63)	(4.61)	(4.09)	(2.81)	(.66)	(3.12)	(2.57)	(2.28)	
Box Elder	.10	.26	-.0027	.28	-.02	-3.15	-3.60	1.98	.33
	(.13)	(6.68)	(5.88)	(1.72)	(.05)	(13.59)	(17.14)	(3.99)	
Cache	2.74	.18	-.0021	-.41	.29	-1.25	-2.50	.66	.27
	(5.41)	(7.60)	(7.96)	(3.57)	(.99)	(8.74)	(17.70)	(3.54)	
Davis	2.17	.22	-.0022	-.93	-.26	-.80	-3.08	.43	.28
	(2.59)	(5.78)	(5.57)	(4.44)	(.38)	(2.88)	(13.01)	(1.11)	
Iron	-.75	.32	-.0034	-.20	-3.67	-.27	-1.20	.85	.24
	(.71)	(6.31)	(6.23)	(.64)	(2.97)	(.70)	(3.21)	(1.62)	
Juab	-1.55	.35	-.0036	.05	.79	-.49	-.61	.48	.32
	(2.11)	(10.83)	(10.36)	(.24)	(1.09)	(1.49)	(2.88)	(1.60)	
Millard	3.67	.13	-.0015	-.09	.83	-1.35	-4.29	1.25	.55
	(5.73)	(4.29)	(4.35)	(.58)	(1.72)	(5.71)	(21.39)	(4.77)	
Salt Lake	-1.58	.30	-.0029	-.31	.16	-1.13	-1.72	2.00	.18
	(3.41)	(13.81)	(12.14)	(2.69)	(.77)	(8.07)	(11.67)	(12.04)	
Sanpete	5.42	.065	-.0007	-.17	.19	-.18	-.56	-.04	.13
	(24.2)	(6.25)	(5.91)	(3.02)	(1.08)	(2.88)	(10.34)	(.50)	
Summit	3.53	.13	-.0013	-.69	-1.56	-4.37	-4.79	3.10	.49
	(3.27)	(2.44)	(2.14)	(2.95)	(2.53)	(13.61)	(18.65)	(1.84)	
Tooele	-1.63	.35	-.0038	-.31	.25	-1.89	-2.29	.57	.23
	(1.31)	(5.94)	(5.65)	(1.05)	(.19)	(5.58)	(6.57)	(1.17)	
Utah	1.35	.23	-.0024	-.32	-1.11	-1.61	-3.67	.84	.42
	(2.97)	(10.74)	(10.26)	(3.17)	(3.41)	(10.92)	(31.12)	(5.80)	
Weber	.48	.24	-.0024	-.26	-.52	-1.34	-3.23	1.42	.29
	(.79)	(8.43)	(7.76)	(1.76)	(1.89)	(6.54)	(18.33)	(5.24)	

Source: Data from Utah Income and Wealth Project
Notes: The dependent variable is LN of Total Wealth. The number of observations is given in column 3 of table 2. The value in parentheses is the absolute t value. The control group is native farmers.

TABLE 5

LOGIT REGRESSIONS ON THE PROBABILITY OF COUNTY-LEVEL PERSISTENCE

County	Intercept	Age	Age²	Foreign Birth	White Collar	Craftsmen	Laborers	Ln Wealth	Marginal Effect of Wealth
Beaver	-11.67 (.99)	.10 (.37)	-.0009 (.49)	.05 (.79)	7.60 (.99)	.66 (.23)	-.08 (.80)	.002 (.98)	.000
Box Elder	-12.97 (.98)	.25 (.003)	.003 (.06)	.41 (.05)	5.44 (.99)	.42 (.28)	.43 (.22)	.04 (.84)	.004
Cache	-4.26 (.01)	.04 (.54)	.0006 (.57)	-.05 (.69)	---	-.19 (.45)	-.10 (.56)	.39 (.03)	.069
Davis	-12.50 (.97)	.14 (.15)	-.0016 (.17)	.33 (.03)	7.13 (.98)	.14 (.59)	.05 (.80)	.07 (.59)	.008
Iron	-10.79 (.99)	.02 (.88)	-.0003 (.86)	.21 (.42)	-.56 (.38)	8.07 (.99)	-.27 (.56)	.20 (.22)	.019
Juab	-10.4 (.99)	-.01 (.94)	-.00002 (.99)	-.13 (.55)	.21 (.74)	.12 (.68)	8.75 (.99)	.19 (.25)	.043
Millard	-6.40 (.99)	-.21 (.12)	.003 (.11)	-.30 (.17)	8.18 (.99)	.68 (.22)	.93 (.02)	.09 (.28)	.021
Salt Lake	-2.92 (.01)	.03 (.30)	-.0003 (.38)	-.20 (.01)	-.12 (.22)	-.07 (.29)	.03 (.69)	.18 (.01)	.030
Sanpete	-4.30 (.01)	.07 (.26)	-.001 (.16)	-.22 (.06)	-.04 (.93)	.25 (.14)	.01 (.95)	.20 (.01)	.026
Tooele	-3.48 (.18)	-.004 (.97)	-.002 (.90)	-.19 (.37)	---	.14 (.73)	-.44 (.22)	.44 (.04)	.073
Utah	-3.63 (.01)	.10 (.01)	-.001 (.01)	-.17 (.01)	.03 (.85)	-.07 (.43)	.19 (.04)	.06 (.06)	.010
Weber	-4.85 (.01)	.10 (.13)	-.001 (.08)	.15 (.17)	.02 (.96)	-.08 (.65)	.50 (.01)	.24 (.03)	.038

Source: Data from the Utah Income and Wealth Project

Notes: The regression for Summit County did not converge to a solution. Value in parenthesis is significance level. White collar occupation created singularities in Tooele and Cache Counties.

TABLE 6

WEALTH INEQUALITY FOR UTAH COUNTIES

County	1860			1870		
	Richest 5 %	Richest 10 %	Gini	Richest 5 %	Richest 10 %	Gini
Beaver	21%	32%	.46	42%	53%	.67
Box Elder	20	31	.41	53	67	.82
Cache	17	27	.37	28	40	.59
Davis	27	40	.57	31	43	.66
Iron	27	39	.52	32	51	.66
Juab	18	30	.44	35	45	.57
Millard	26	41	.58	43	54	.67
Salt Lake	45	59	.72	60	74	.85
Sanpete	34	43	.53	24	33	.39
Summit	20	32	.43	56	69	.83
Tooele	34	46	.56	42	56	.72
Utah	34	44	.58	35	50	.68
Weber	23	34	.48	30	43	.66
All	38	49	.62	46	59	.73

Gini is a common index of inequality which measures the ratio of the area between a Lorenz curve and the 45° line to the area under the 45° line. A Gini coefficient of 1 is absolute inequality while 0 is total equality.5