Volume Title: Long-Term Factors in American Economic Growth

Volume Author/Editor: Stanley L. Engerman and Robert E. Gallman, eds.

Volume Publisher: University of Chicago Press

Volume ISBN: 0-226-20928-8

Volume URL: http://www.nber.org/books/enge86-1

Publication Date: 1986

Chapter Title: Choices, Rents, and Luck: Economic Mobility of Nineteenth-Century Utah Households

Chapter Author: J. R. Kearl, Clayne L. Pope

Chapter URL: http://www.nber.org/chapters/c9682

Chapter pages in book: (p. 215 - 260)

5 Choices, Rents, and Luck: Economic Mobility of Nineteenth-Century Utah Households

J. R. Kearl and Clayne Pope

5.1 Introduction

Is individual poverty permanent or temporary? This question lies at the heart of our interest in economic mobility and its relationship to economic justice. When we speak of the "rich" or the "poor," we imply that there are groups of households that display stability in economic position through time. Moreover, discussion of economic inequality or social mobility often presupposes the existence of classes or barriers to upward movement by individuals or households with certain characteristics. Yet research over the past few decades seems to contradict this assumed view of household immobility. The United States economy seems to be characterized more accurately by cross-sectional distributions of economic rewards that change slowly while many individual households experience substantial social and economic mobility as measured by occupational change or by movement over time of households within these distributions of income and wealth.[1]

The problem of measuring mobility has attracted a good deal of attention from sociologists, primarily, who have generally measured movement within an occupational hierarchy.[2] However, occupational change is not a particularly good measure of mobility if a large share of the labor force works in agriculture since "farming" covers a heterogeneous mixture of economic positions so that movement into or out of farming does not carry any clear signal as to the actual economic mobility of a household. In addition, measurement of economic mo-

J. R. Kearl and Clayne Pope are professors of economics at Brigham Young University and research associates of the National Bureau of Economic Research.

This research has been supported by the College of Social Sciences of Brigham Young University and the National Science Foundation through grant SES8218799NSF.

bility by occupational movement in any economy requires scaling or ordering occupations by economic or social status, that is, imposing a hierarchy on the economy's occupational structure. These imposed normative orderings encounter additional problems when mobility is measured over extended periods of time with changing economic and social status within the mix of occupations. The principal alternative measure is the movement of individuals within distributions of income and wealth.[3] This alternative is used less frequently, however, because of the paucity of panel data with sufficiently long histories.

Post–World War II developments in economic theory and measurement suggest the likelihood of economic mobility measured by movement in either the distribution income or wealth. For example, the permanent income hypothesis, with its focus on permanent and transitory income, suggests that a portion of cross-sectional inequality does not reflect long-term differences in income among individuals.[4] That is, permanent income is more equally distributed than income in a particular year. Consequently, one would expect mobility as measured by transition matrices that trace movement of households from one segment of the income distribution in the initial year to another segment of the distribution in the terminal year or interyear correlations of income. The larger the transitory component of income, the greater the observed mobility. Alternatively, life-cycle theories suggest that concave life cycles of household income and wealth would provide a basis for observed economic mobility in more permanent measures of economic position.[5] The more concave the life cycle of income or wealth, the greater the observed economic mobility for a particular group against a population with a reasonably stable age distribution.

Economic mobility generated by either the transitory component of income or movement along a concave age profile of income excites no great admiration or rush to the conclusion that reality and some egalitarian ideal are synonymous. But such theory does suggest that both cross-sectional inequality and economic mobility must be carefully measured and carefully interpreted.

Human capital models suggest that the paths of income and nonhuman wealth are partially under the control of the individual or household through investments in education, on-the-job training, and other skills.[6] Different household choices about the accumulation of human capital would also contribute to the economic mobility of households. Investment in human capital leads to changes in income or wealth measured by shifts of intercepts and changes in slopes of age-earnings profiles, causing the profiles of households who have made different investment choices to intersect and reverse relative positions, thus generating added measured mobility. If human capital is an important part of general capital accumulation, one should also observe mobility

within the distribution of nonhuman wealth since households will be making portfolio adjustments between human and nonhuman wealth through time.

Many of the theories of the distribution of income are based on stochastic processes that generate inequality.[7] These theories have been stimulated, in part, by a large number of empirical studies attempting to explain earnings or income utilizing household data which have generally been able to account for less than half of the total variance of earnings in most cases.[8] The large unexplained variance in earnings or income may or may not be related to mobility. If this large unexplained residual is due to the omission of unobserved household characteristics, one would not necessarily expect economic mobility because the error terms of the cross-sectional equations would be correlated. On the other hand, if these stochastic elements are uncorrelated through time or distributional position is determined by some type of stochastic process, the observer should find substantial economic mobility.

There are clearly a variety of issues that direct attention to economic mobility. Since the normative importance of mobility is also clear, the measurement of the patterns and trends in economic mobility is of considerable interest. Unfortunately, the data sets that allow extended observation of individual households useful for measuring economic mobility are limited. This paper utilizes one such data set to lay out the patterns of economic mobility in a western frontier state being settled rapidly in the latter half of the nineteenth century. The rich data sources for nineteenth-century Utah have allowed us to create such a panel to measure mobility as movement within cross-sectional distributions over several decades (e.g., movement from a poor decile in one year to a richer decile in another year).[9] Using a variety of measures, we find substantial inequality in cross-sectional distributions and substantial economic mobility in nineteenth-century Utah, although the norm used to determine the level and significance of mobility is unclear. We argue that random economic shocks, decline in rents to permanent household characteristics, and household choice all contribute to this high degree of mobility within a generation. Intergenerational economic mobility is not considered in the analysis reported here.[10] Section 5.2 describes the data. Section 5.3 reviews patterns of household movement within distributions of income and wealth. Section 5.4 divides the elements affecting economic mobility into three categories—stochastic, rents to fixed characteristics of households, and household choices—and assesses the influence of each category on the economic position of households. Section 5.5 attempts to measure the importance of the various influences on economic mobility. The final section brings together the various aspects of mobility, linking occupational and lo-

cational choices, individual household characteristics, and changes in relative positions within cross-sectional distributions of income and wealth.

5.2 The Data Set

The data set was created by linking households in some or all of the following sources: census manuscripts of 1850, 1860, 1870, 1880, and 1900; probate inventories; tax assessment records of 1870, 1880, 1890, and 1900; financial records of the Church of Jesus Christ of Latter-day Saints (Mormons) for 12 years between 1855 and 1900; and "family group sheets" of the Genealogical Library of the Church.

Estimates of wealth were obtained from the census manuscripts of 1850, 1860, and 1870, tax assessment records, and probate inventories, although we have not used probate inventories in this paper. Census wealth estimates and wealth estimates drawn from the tax records overlap for 1870, allowing us to estimate the consistency of the two sources. The mean of tax assessment wealth is 40% lower than the census wealth estimate for the same year. The correlation of the two wealth estimates for 1870 is quite high with ln (census wealth) = 1.99 + .759ln (tax wealth). Both sources give estimates of gross rather than net wealth.

Estimates of income are obtained from the financial records of the LDS Church. Consequently, any statements involving income mobility or the determinants of income are confined to those households who contributed financially to the LDS Church. The records indicate the contribution an individual made to the Church with an understood moral obligation to contribute 10% of one's income. In nine of our 12 sample years, we also have a record of the percentage that an individual's contribution was relative to a full tithe. These assessments of tithing were done at a local level by local Church leaders who personally knew the individual. The individual was also consulted as to the percentage that he or she had paid. Families usually made their contribution under the name of the male spouse if there was one, although some young men also contributed to the Church. The combination of the amount contributed with the percentage that this amount was of a full tithe yields an estimate of income. If percentage of a full tithe is not given, we have used the average percentage paid by that individual and excluded those for whom we have had less than two observations of the percentage contributed.

Occupational data has been collected from the manuscripts of the five censuses listed above. The occupations were transcribed into a three-digit code that combined occupations that were essentially the same, such as lawyer and attorney. These codes were then aggregated

for analysis into five categories. White-collar workers, managers, and proprietors were combined into one classification (W). Farmers, ranchers, dairy owners, and so on, were combined as another (F), as were the crafts (C). Laborers, farm laborers, and any other occupation that appeared unskilled were combined together (L). This left a heterogeneous mixture of occupations that were largely services, such as hotel clerks, policemen, lower-level clerks, and so on, that were classified as service workers (S).[11]

The census and the genealogical records both provide place of birth so that variables on nativity could be formed. If the two sources disagreed, the genealogical record was used. The family group sheets list most vital events for the household. We have used birth and death information as well as some place information from the genealogical records. Each time the household is observed the place information has been retained to provide a record of residence of the household. Internal migration has been measured by movement across county boundaries since the boundaries of towns shifted through time as new communities were formed so that one cannot accurately identify a true move within a county.

The core of the linked sample was formed by linking households from the census manuscripts of 1850, 1860, and 1870. We then added a random sample of the households that could not be found in more than one of these censuses. LDS financial records and tax assessment data were then added to this sample. Obviously, there were households for whom we could add no records as they either were not LDS or were LDS but were not contributing to the Church. While there are over 17,000 households in the sample, fewer households will be represented in any given source such as a particular census year or an income observation. Still fewer households will be represented when two years are linked together for observation of mobility or the formation of particular regressions that require observation at two points in time. To illustrate: of the 17,000 households in the sample, 3,741 and 4,787 households have census records in 1860 and 1870, respectively, while 2,951 households have census records in both years.

A longitudinal sample of this kind has obvious selection biases. Households disappear from the sample or enter the sample after some point of measurement. Further, households may be omitted from observation in one or more of the records. The most serious omissions are probably the lack of income observations from non-Mormons and the omission of households, Mormon and non-Mormon, from a particular census. A large number of individuals making sizable contributions to the Church are not listed as heads of household in the census. Such individuals are largely of two types—young men who have not yet established their own household and parents who live with one of their

children in their elderly years. We have omitted both of these types of individuals from most of our measures of mobility and the regressions used to explain mobility. The effect of this omission is to reduce the overall level of mobility since the omitted individuals tend to change their economic position dramatically as they move to or from head of household. A young man who is not a household member usually has little or no wealth, but he accumulates wealth as he establishes a household. Similarly, the act of retiring or moving to live with married children usually accompanies a decline in wealth and income. Consequently, the focus on household heads will understate the mobility of all individuals within certain age ranges. Specific issues of selection and generality will be addressed throughout the paper.

Perhaps the most important weakness of the data set is the absence of educational data. However, longitudinal data sets of this kind are rare, so this Utah data set represents one of the best opportunities to study economic mobility over an extended time period.

5.3 Patterns of Economic Mobility

The most direct measure of income or wealth mobility uses a transition matrix of the sort illustrated in table 5.1. The values in each cell represent maximum likelihood estimates of the probabilities of moving from one cell to another. For example, the estimated probability of moving from the poorest quintile to the richest over the 1860–70 decade is .09. The probability of dropping out of the richest quintile over the same decade is .47. Such matrices may be constructed for any two years. They are, however, cumbersome and it is useful to have a single summary measure of mobility. A number have been suggested including an index by Shorrocks based on the diagonal of the matrix, $S = (N - \Sigma_{i=1}^{N} r_{ii})/(N - 1)$, where r_{ii} is the stayers of row i and N is the number of categories or divisions in each year.[12] Since the diagonal measures the proportion of stayers in each division, the Shorrocks index measures the movement out of the original division but does not distinguish the distance of the movement. For example, the index would be the same in the case where 80% of each division moved up or down one level as the case where 80% of each division was evenly distributed across the other divisions. The Shorrocks index is but one of several measures of mobility. Tables 5.2 and 5.3 summarize some alternative measures of mobility drawn from transition matrices for income and wealth.

5.2.1 Income Mobility

Table 5.2 provides a picture of income mobility by comparing cross-sectional distributions and the movement of households within these

Table 5.1 **Transition Matrix as Measure of Mobility**

	1870 Wealth				
1860 Wealth	Poorest Quintile ($0–$400)	Quintile 2 ($401–$750)	Quintile 3 ($751–$1,200)	Quintile 4 ($1,201–$2,300)	Quintile 5 ($2,301–$275,000)
Poorest quintile ($0–$260)	.35	.27	.17	.12	.09
Quintile 2 ($261–$500)	.25	.27	.25	.16	.07
Quintile 3 ($501–$795)	.19	.21	.26	.24	.10
Quintile 4 ($796–$1,390)	.16	.18	.23	.25	.18
Quintile 5 ($1,391–$49,500)	.00	.06	.11	.23	.53

Table 5.2 **Patterns of Mobility within the Distribution of Income**

	1855–61	1861–70	1870–80	1880–90	1890–1900	1861–80	1870–90	1880–1900
Percentage who do not change quintiles								
Poorest quintile	28%	29%	36%	41%	44%	29%	30%	35%
Fourth quintile	21	25	26	29	29	23	24	21
Middle quintile	22	24	23	27	23	24	22	23
Second quintile	17	26	27	25	30	23	24	20
Richest quintile	35	40	47	48	53	38	38	40
All		24	29	32	34	36	27	28
Shorrocks measure	.94	.89	.85	.83	.80	.91	.91	.90
Percentage moving at least two quintiles	43%	35%	32%	29%	26%	39%	38%	37%
Pearson correlation	.26	.37	.35	.49	.56	.32	.31	.45
Number of households	1,519	2,705	2,986	2,924	2,709	2,117	2,052	2,325

Source: Income and Wealth data.

distributions from 1855 to 1900. The quintiles used in table 5.2 are based on boundaries defined by the distributions of income for those households that we find in the two years being compared rather than boundaries defined by the population. Hence, we are observing mobility *within* a sample of households. Thus, for 1870–90, we have selected those households for whom we have an estimate of income in both 1870 and 1890. We then draw quintile boundaries based on that group rather than other households that we may observe in one of the two years but not the other. These boundaries ensure that we should expect 20% of each row or column to be in each cell if the income position of the household in the initial year were independent of its position in the second year.[13] The number of households observed in any two years ranges from 1,519 in the 1855–61 comparison to over 2,000 for all other years. Quintile boundaries differ by reasonable amounts so that a household cannot move through two or more quintiles with an income change of a few dollars. The lower boundary for the richest quintile is usually about five times the upper boundary for the poorest quintile.

The first six rows of table 5.2 report the percentage who stay within the same quintile for the two years being observed. For example, 28% of those in the poorest quintile in 1855 were also in that quintile in 1861. Similarly, 35% of those in the richest quintile in 1855 remained there in 1861, while 24% of those observed in these two years remained in the same quintile in the two years. Each of the transition matrices displays a U-shape in terms of the percent "stayers." That is, the percentage is higher in the tails of the distribution (the first and fifth quintiles) while those in the middle approach 20%—implying that the expected value of a household's later position is independent of its prior position if the household is in the middle of the distribution.

The Shorrocks measure, essentially a normalization of the percentage of stayers, will range from zero with no mobility to one when initial position has no expected effect on final position. This measure, reported in tables 5.2 and 5.3, ranges from .80 to .94. This pattern suggests a slight decline in mobility from 1855 to 1900 when decade intervals are used but essentially a constant level of mobility when two-decade intervals are used. Since income contains a transitory component, it is not surprising that there is considerable movement in terms of a quintile change. Therefore, we have also reported the percentage of the households that move at least two quintiles. About one-third of the households move at least two quintiles over a decade while just under 40% move that much over two decades. Finally, the Pearson correlation coefficient shows the simple correlation of incomes for the two years. While it is clear that there is a correlation in the incomes as measured by the Pearson correlation coefficients, all of which are statistically

significant, these matrices evidence substantial income mobility.[14] However, a household's initial position in the income distribution is importance since the middle quintiles tend to be characterized by greater mobility while the tails display more rigidity. For the entire sample, from 24% to 34% do not change quintiles over a decade.

An interesting aspect of table 5.2 is the rising immobility with time. Most of the measures suggest increasing rigidity within the distribution of income, with the percentage of stayers rising in the tails of the distribution by 50% and the percentage of stayers for the whole matrix exhibiting comparable change. However, the 20-year intervals show no particular increase in rigidity, by any of the measures except the Pearson correlation coefficient. The 20-year intervals also show higher observed mobility as one would expect.

Even though the increases in mobility, comparing one-decade to two-decade measures, are not large, the differences are important because they suggest that the observed mobility is not due merely to transitory changes in income. Rather, a part of the observed mobility reflects more permanent changes in economic position. If all mobility were due to transitory influences, the one-decade and two-decade transition matrices would be virtually the same since it cannot matter when one draws truly random shocks unless there is a very strong autocorrelation in the random component. For example, the decades of the 1880s and 1890s produce Shorrocks measures of .83 and .80 which rise to .90 for the two decades combined. While 29% and 26% of the households move more than two quintiles in the 1880s and 1890s, respectively, 37% make such moves for the two decades combined. Thus, the two-decade measures show an increase in mobility suggesting that the observed mobility is influenced by factors in addition to stochastic shocks. This conclusion, that the observed mobility involves nonstochastic changes, is strengthened by the observed wealth mobility. For if all of the income mobility were due to transitory components, there should be little wealth mobility. Conversely, income mobility due to choice or other factors would also lead to wealth mobility.

Table 5.3 reports the same kind of summary statistics as table 5.2 for wealth rather than income. Wealth estimates come from two different sources. Wealth estimates for 1850 (real estate only), 1860, and 1870 come from the census manuscripts, while estimates for 1870 through 1900 come from the tax assessment rolls. Obviously, these two sources are substantially different. The census is self-declared and has no relation to taxes. Tax assessment was the responsibility of county officials, and estimates may have been less likely to change.

Wealth mobility appears to us, like income mobility, to be substantial.[15] While the Shorrocks measure is generally above .8, there is less mobility in the wealth distribution than in the income distributions.

Table 5.3 **Patterns of Mobility within the Distribution of Wealth**

			1870–80[a]						1870–90		
	1850–60	1860–70	C	Tx	1880–90	1890–1900	1850–70	1860–80	C	Tx	1880–1900
Percentage who do not change quintiles											
Poorest quintile	31%	35%	33%	50%	43%	41%	26%	29%	30%	29%	32%
Fourth quintile	23	27	27	35	31	31	24	21	23	21	21
Middle quintile	23	26	29	31	30	29	17	26	26	20	24
Second quintile	21	25	32	32	33	32	17	27	27	23	27
Richest quintile	45	53	54	61	56	48	43	43	40	45	46
All	28	33	35	42	39	36	25	29	29	28	30
Shorrocks measure	.89	.84	.81	.72	.77	.80	.93	.89	.89	.90	.88
Percentage moving at least two quintiles	36%	29%	29%	19%	27%	26%	37%	34%	36%	39%	32%
Pearson correlation	.44	.45	.35	.70	.43	.39	.31	.41	.26	.15	.39
Number of households	937	2,933	2,168	1,334	1,586	1,432	793	1,504	976	1,080	1.007

[a]In 1870 there are two wealth estimates: census and tax assessment. The first column (C) compares 1870 census wealth with 1880 tax assessment wealth. The second column (Tx) compares tax assessment wealth for 1870 and 1880.

This result is to be expected. As with income, there is more rigidity in the tails of the distribution and more mobility in the middle quintiles. The trend in mobility is difficult to ascertain because of the change in the source of measurement in 1870. Clearly the tax assessment distributions which are used in the last half of the period show much less mobility with Shorrocks measures from .72 to .80. As few as 19% of the households move at least two quintiles. Wealth transition matrices measured over two decades display significantly more mobility than the matrices based on a single decade comparable, once again, to the pattern for income. Adjustment for age or other factors does not substantially reduce this observed wealth mobility.[16] Certainly these comparisons of mobility for income and wealth suggest that the income mobility is not simply due to transitory elements of income alone.

Tables 5.2 and 5.3 present a picture of what appears to us to be substantial movement and change. The transitional matrices of income and wealth display a high degree of economic mobility but with some noticeable rigidity in the tails of the distributions. These patterns are not attributable to age since adjustment for age changes the pattern little. The next section of the paper examines those elements that may generate the observed economic mobility.

5.4 Influences on Economic Mobility

Tables 5.4 and 5.5 report cross-sectional regressions that explore the relationship of the logarithm of wealth and income (LNTW and LNY) and the portion of variance explained by individual characteristics such as occupation, nativity, duration in Utah, residence, and age. A notable feature of the equations is their lack of success in explaining a large part of the variance in economic success. The explained variance of income is never as great as 15% while the explained variance of wealth is never as great as 40%. Why might the explained variance be so low?

5.4.1 Market Adjustment and Measurement of Influences on Income and Wealth

Different economic rewards for different individuals have at least three components: those differences that result from different choices made by individuals (e.g., labor-leisure choices, savings decisions, occupational choices); those differences that result from market rewards for different individual characteristics that cannot be chosen but which an individual "inherits" (examples might, but need not necessarily, include race, gender, genetic traits); and those differences that result from purely stochastic sources (e.g., "luck"). It should be clear that many things that one cannot choose for oneself may have been choices for someone else. Prominent among these individual attributes would

Table 5.4 **Cross-Sectional Regressions on LNTW**

Variables	1860 B	|t|	1870 B	|t|	1880 B	|t|	1890 B	|t|	1900 B	|t|
Age	.022	5.04	.026	5.19	.050	6.62	.064	7.02	.078	6.58
Age^2	−.0002	3.40	−.0002	4.35	−.0005	7.06	−.0006	7.71	−.0007	7.10
W	.617	8.00	.563	10.15	.305	5.56	.292	4.90	.076	.99
C	−.326	8.52	−.160	4.52	−.228	5.59	−.126	2.35	−.43	5.67
S	−.209	2.17	−.097	1.56	−.069	.94	.020	.23	−.26	2.36
L	−.734	18.70	−.591	14.00	−.515	10.20	−.325	5.19	−.455	5.03
FBE	−.284	9.84	−.192	7.39	−.052	1.67	.002	.05	−.010	.19
T	.067	16.31	.033	12.98	.031	13.20	.016	6.26	.008	2.94
R	−.083	2.62	−.526	15.71	−.557	14.99	−.599	12.24	−.126	1.91
Constant	6.04	65.66	6.48	58.39	5.425	30.45	5.87	26.03	4.77	14.54
R^2	.28		.21		.25		.14		.06	
N	4005		4014		2609		2609		2209	

Source: Utah Income and Wealth Project.

Control group: United States–born farmers in Salt Lake County.

Table 5.5 Cross-Sectional Regressions on Income

	LNY55		LNY61		LNY66		LNY70		LN75	
Variables	B	$\|t\|$	B	$\|t\|$	B	$\|t\|$	B	$\|t\|$	B	$\|t\|$
Age	.047	5.07	.058	7.93	.078	8.00	.070	7.34	.052	5.77
Age^2	−.00053	4.69	−.00067	8.06	−.00086	8.23	−.00076	7.82	−.0006	6.88
FBE	.084	2.56	−.027	1.01	−.0071	.21	.085	2.51	.065	1.96
T	.024	3.67	.034	8.32	.018	4.19	.026	7.00	.030	10.03
W	.032	.33	.064	.97	.236	3.22	.238	3.31	.319	4.77
C	.05	1.11	−.121	3.38	−.070	1.51	−.037	.80	.023	.51
S	−.159	1.20	−.136	1.42	.103	1.02	−.046	.44	−.012	.13
L	−.144	2.57	−.222	5.59	−.212	3.79	−.173	3.15	−.255	4.91
R	−.032	.95	−.057	1.87	−.236	5.44	−.150	2.97	−.189	4.33
Constant	5.27	29.10	4.94	33.27	4.708	22.839	4.30	20.60	4.72	23.70
R^2	.05		.08		.06		.07		.10	
N	1448		3160		2891		2854		2959	

Source: Income and Wealth Project.

Control group: United States–born farmers of Salt Lake County.

be those associated with one's family (e.g., parental choices about early home environment, child spacing, location, family size).

Individuals have some characteristics such as occupation and residence that can be acquired and affect one's economic rewards and, hence, relative position in the distribution of those rewards across a population. Since acquisition is generally costly, such choices have many of the characteristics of an investment decision—an individual incurs a cost at the time of change with the expectation that the future path will be superior to the path without the change. Costs of change may vary because of the nature of one's human and nonhuman capital.[17] If rewards are perceived to be correlated with acquirable characteristics, and if individuals pursue maximizing strategies, individuals will tend to acquire those characteristics necessary for participation in the relatively high return activities. Maximizing choices, the acquisition of a higher expected relative return characteristic, will arbitrage return differences causing a decline in the relative return to the higher return activities as more and more households acquire such characteristics. Acquisition of attractive market characteristics should continue until the cost of acquiring the associated characteristic equals the difference between the return in the current activity and the return to the activity requiring that characteristic. This arbitrage process will narrow the distribution of returns to the distribution of the costs of acquiring beneficial characteristics (assuming no stochastic shocks).

Obviously, if individuals do acquire characteristics consistent with differential returns across activities, attempting to maximize returns, those doing less well in any current activity are more likely to choose

LN80		LN85		LNY90		LNY95		LNY00	
B	$\|t\|$	B	$\|t\|$	B	$\|t\|$	B	$\|t\|$	B	$\|t\|$
.063	8.29	.049	7.20	.047	6.03	.044	4.29	.030	3.39
−.00070	9.57	−.00055	8.96	−.00054	7.65	−.00046	5.30	−.00033	4.60
.047	1.55	.055	1.93	.032	.978	.086	2.13	−.012	.325
.016	6.87	.013	6.36	.012	5.63	.0065	2.56	.00083	.405
.378	7.02	.29	5.93	.593	11.09	.56	9.12	.600	10.63
.005	.14	−.07	1.70	.017	.39	−.086	1.51	−.026	.52
−.131	1.80	−.14	2.07	.107	1.35	.111	1.16	−.238	2.73
−.274	5.34	−.300	6.00	.209	3.95	−.147	2.07	−.294	4.96
−.336	8.89	−.354	8.52	−.52	11.82	−.369	7.09	−.400	8.64
4.68	27.29	5.14	32.05	5.20	26.86	4.83	17.93	5.61	22.75
.11		.10		.14		.09		.13	
4004		3325		2826		2327		2382	

alternative characteristics consistent with higher return activities. Thus, the percentages of individuals in low-income or low-wealth groups changing activities or acquiring characteristics are likely to be greater than for those finding themselves in more attractive positions.

Since characteristic acquisition is comparable to an investment decision, there should also be a systematic correlation between changes in acquirable characteristics and the age of the individual. That is, if choices are costly, with costs uncorrelated or positively correlated with age, older individuals, who have shorter time horizons over which to exploit the investment, will be less likely to acquire different characteristics. Thus, one would expect the following patterns relative to our current data:

1. More occupational change and residential change for younger age groups.
2. Higher probabilities of movement for those with lower wealth and/or income.
3. Less movement among those households holding "specific" human capital.

While these effects follow from an arbitrage model of market choices, the market also acts as a filter, making the observation of these very effects difficult. Assume, for present purposes, that the costs of acquiring a relatively attractive characteristic are low and essentially the same for all individuals. Suppose further that market adjustments create, at some moment, a spread of different returns across activities. If all high return characteristics may be acquired, then rapid market adjustment would arbitrage these differences in returns. This implies, however, that the observed distributional outcome, after choices about characteristics have been made, would be an egalitarian one, net of the

random disturbances that affected economic rewards. This means that a cross-sectional regression would have little explanatory power since the market adjustments narrowed or eliminated the original systematic differences that stimulated the choices made by households. If acquisition costs differ for individuals, market responses would level to these differences but such differences would be, in general, indistinguishable from stochastic influences. More generally, this argument suggests that the choice-market response mechanism per se is a leveling or egalitarian mechanism so long as the individual characteristics associated with differential returns are matters of choice. Clearly this leveling process would be more pronounced the lower the costs of characteristic acquisition for all individuals. Hence, if adjustment is rapid, there will be little ex post facto correlation between characteristics and rewards even though it is precisely the ex ante correlation to which individuals respond when making choices. One would have to observe the adjustment process, not the final result, in order to measure the effects of choice.

This argument suggests that there will be difficulties in testing for a choice-market response mechanism using ex post outcomes unless the choice-market response mechanism has some residual effect that can be identified in the observable outcome. If acquisition costs are low and adjustment rapid, it would be difficult to find evidence of the influence of choice. Moreover, finding little or no correlation between individual characteristics *does not* allow one to infer that "nothing matters" or "nothing matters very much."[18] Finally, it should be noted that market and individual characteristics may be of considerable importance and stochastic elements of less importance, but the stochastic element dominates in observed outcomes by virtue of the market filtering process.

5.4.2 Ricardian Elements

Markets may also reward individual characteristics that are not volitional and that therefore cannot evoke the choice-market-response leveling process just outlined. Individuals possess characteristics such as race, gender, birthplace, age, or physical characteristics that might be rewarded, for whatever reason, with a higher income or wealth. These characteristics may not be a matter of choice for the individual and hence cannot be changed or acquired regardless of the associated relative return or penalty. We think of these characteristics as "Ricardian" since they have in common the essential element that land possessed in Ricardo's classic model of distribution, namely, inelastic supply. Since the essential element of the choice-market-response leveling process is characteristic acquisition in response to differential returns, if acquisition is precluded because the characteristics are nonvolitional,

there is no reason to expect that rewarded or penalized Ricardian characteristics will be subject to either the leveling or filtering processes suggested earlier. Hence, Ricardian characteristics that have importance in the market will always be correlated with ex post observable outcomes.[19]

Indeed, if acquisition costs are low for any characteristics that can be acquired so that the choice-market-response filtering process works well, Ricardian characteristics will be the only identifiable characteristics from observed distributions of economic rewards—the only mechanism for generating systematic individual differences is Ricardian. This does not suggest, obviously, that the Ricardian mechanism is the only or even dominant mechanism responsible for the distribution of economic rewards; rather, Ricardian characteristics will dominate the explainable variance in the distribution.

Individuals may overcome the effect of Ricardian characteristics by labor/leisure or savings/consumption choices even though they cannot change the characteristic or its market reward. Moreover, there is an important sense in which choice itself has Ricardian aspects—the history of some group or some individual with an attractive characteristic cannot be chosen. For example, if the return to some characteristic, say a particular occupation, is relatively high, others will acquire that characteristic, driving down the return. However, there will be individuals who will have had that particular characteristic for differing lengths of time. The one thing that cannot be acquired is the characteristic yesterday or, more generally, a history for oneself that includes the high-valued choices (ex post) at each moment of time. Hence some choice paths will be more attractive, ex post, than others in the specific sense that such choice paths will be correlated with observed outcomes. Not all people currently farming, for example, are the same. Some were farming earlier; others just chose to become farmers. Moreover, among those who chose to become farmers, some came from one occupation, some from a different occupation.

The Ricardian nature of choice paths suggests that these paths should have an observable correlation within the distribution. Thus it is possible to test, in a different way, the importance of certain choices that individuals can make (or could have made) on the distribution of rewards. Moreover, if choice paths are important, there will be a heterogeneity for any observable individual characteristic that will account for part of the variance of outcomes within that characteristic class. This affect is more likely to be more pronounced for wealth than for income for the following reason. Assume that some characteristic is particularly attractive. Those not having that characteristic will acquire it, driving down the return to that characteristic. Hence, assuming no taste differences (particularly over

leisure-labor choices), the incomes of those holding the characteristic, both newly acquired and historical, will tend to be equalized. However, unless adjustment is instantaneous, those already having the attractive characteristic will gain the benefit of the higher-than-average return until entry has moved it toward the average, and this will be reflected in wealth positions. The market-response mechanism cannot level wealth, a stock, in the same way that it can income, a flow. Hence, we should observe a smaller effect of choice paths on income than on wealth. Indeed, with wealth, choice paths could matter a good deal since that market signals desired adjustments in an economy by changing returns, but those already in the desired or attractive area benefit from that market mechanism. This suggests that the distributions of wealth and income are likely to be quite different even if one could appropriately adjust for the life-cycle effects. More precisely, the distribution of income should be less dispersed than that for wealth. The determinants of income and wealth distributions may also differ as a consequence of the effect described above. For example, a characteristic could be positively associated with wealth and negatively associated with income.

The stochastic element of the regression reflects the combined influence of true stochastic elements and unobserved individual characteristics, including differences in the costs of acquiring different characteristics. For reasons discussed above, the true stochastic elements are likely to dominate the cross-sectional regressions even though they may not dominate the process by which income or wealth is generated. The influence of the unobserved characteristics may also be important if they are characteristics such as IQ or education that are costly or difficult to acquire.

A cross-sectional regression could be specified in the following way for the *i*th individual.

$$\text{LNTW}_i \text{ or } \text{LNY}_i = \alpha_0 + \sum_{j=1}^{n} \beta_j X_j + \sum_{k=1} \gamma_k Z_k + \epsilon_i + \mu_i,$$

where the X_j are the characteristics that may be acquired, such as occupation or place of residence; the Z_k are the characteristics that may not be acquired; ϵ_i represents the variance due to the unobserved characteristics of the household, while μ_i represents the true stochastic variance.[20] The market mechanism should reduce the returns to the X_j so the β_j reflects the costs of acquisition in equilibrium. The γ_k will rise or fall as the returns to particular fixed characteristics are changed by movement in the economy.

Mobility within the distributions of income and wealth would depend upon any of the following:

1. Stochastic variance (μ_i). Given the market filtering argument this should be a primary source of mobility within the two distributions.
2. Choices (acquiring X_j with high returns). The extent of their contributions to mobility will be difficult to measure because the market process changes the return to choices and masks the influence of such returns (β_j).
3. Changing returns to Ricardian characteristics (γ_k).

The distribution of Ricardian characteristics (Z_k) and the variance due to unobserved household characteristics (ϵ_i) stand as the primary barriers to economic mobility. The following section considers their relative contribution to the mobility observed in the nineteenth-century Utah economy.

5.5 Household Characteristics, Stochastic Elements, and Mobility

While it is easy to categorize characteristics conceptually, the separation of the variables in the regressions of tables 5.4 and 5.5 into choice variables and fixed or Ricardian characteristics is arbitrary to some degree. Age and nativity (FBE) are obviously fixed characteristics. The unique settlement pattern of Utah suggests that duration in Utah (T) is also a Ricardian characteristic since most households in Utah were converts to the LDS faith who migrated to Utah shortly after conversion. Hence, while there is a clear choice component to duration in most economies, the reason individuals came to this economy when they did suggests that duration is more properly considered a fixed characteristic in this context. Occupation and residence are considered as choice variables.

Several patterns in these cross-sectional regressions on income and wealth are worth noting.[21] The ordering of the effects of occupation on wealth is quite uniform through time. We should note that we did not use either wealth or income to determine occupational categories as is often done when creating indices of occupational status. (It is possible that individuals self-classify depending on their wealth or income.) Households with a white-collar classification consistently have a higher level of wealth and income. In most years this advantage is substantial. While there is some tendency for the wealth advantage of the white-collar group relative to the control group (farmers) to decline over time (a 60% advantage in 1860, dropping to a 30% advantage in 1890 with no statistically significant advantage in 1900), the income advantage of the white-collar households shows no such tendency. Indeed, the income advantage of the white-collar households increases through time. One would suspect that farmers were making capital gains that increased their wealth, but which they did not consider as income. Craftsmen consistently had lower wealth than farmers ceteris

paribus, but their income was not significantly different from that of farmers. The service classification is a collection of very heterogeneous occupations (as well as a small subset of the total), and the difference between this group and the control group is rarely statistically significant although the sign is usually negative. Unskilled laborers held lower wealth than the other occupational classifications, with perhaps a slight tendency for their wealth disadvantage to decline with time. Laborers also had lower incomes than farmers, the control group, but their income disadvantage was relatively less than their wealth disadvantage.

Those households residing outside Salt Lake County (R) had both lower wealth and lower income. The income disadvantage grew through time from 6% in 1861 to a high of 52% in 1890, dropping to 40% in 1900. The wealth disadvantage shows no strong trend but does have an anomalous decline in 1900 to 13%.

These cross-sectional regressions suggest that a household could improve its position through choice by acquiring higher return characteristics such as residence in Salt Lake County or the occupations of white-collar worker or farmer. (We return to the measurement of this choice process later.) Certainly these characteristics that we have labeled as choice variables did matter. However, an examination of the low explained variance of these regressions suggests that such choices are not the dominant observed determinants of income or wealth. In general, the variables explain more of the variance of wealth than of income. This would be expected if transitory elements were important and relatively larger for income than wealth.

For those variables that are considered as fixed characteristics, there are persistent effects for both foreign birth (FBE) and duration in Utah (T) on wealth. However, the effect of both characteristics declines through time. Foreign birth reduced wealth by 36% in 1860, but only 5% in 1880, and it was not significant as a determinant of wealth in 1890 or 1900. Foreign birth had a much different effect on income. By 1870, this characteristic was positively associated with income, and this correlation persisted until the latter part of the century. Migration from Northern Europe to Utah reduced the nonhuman wealth for many households to zero. Lower wealth may have induced a higher labor/leisure ratio that produced higher income in spite of the low wealth.[22] There may also have been a selection process at work among the foreign born selecting out individuals with higher levels of ambition, etcetera, who were willing to migrate to the American West as well as to adopt an unusual religion. Clearly by the end of the century, any economic disadvantage that the foreign born may have had was eliminated, in part because individuals could make decisions that changed the effect of the fixed characteristic of birthplace.

There were rents to early entry into the Utah economy in terms of both income and wealth. This rent was substantial from initial settlement and persisted throughout the period. For example, entry into Utah in 1850 increased wealth in 1860 by 68%, 72% in 1870, and 93% in 1880. By 1900, the effect of early entry declined to 42%. The effects of duration on income were lower but impressive. Entry in 1850 increased income in 1861 by 34% ceteris paribus, 52% in 1870, 75% by 1875. The effect declines after 1875 and is not significant after 1890. The rent per year of duration declines steadily through time. This fact does not mean that the total effect of duration will decline for particular households since T may be increasing faster than the decline in rent per year duration. While the rent to United States birth becomes relatively unimportant through time, the rent to duration continues to play a role until the very late years in the sample.

The concave age patterns are quite robust for both income and wealth. The peaks in the age profiles for income are at earlier ages than those for wealth, a relationship explored elsewhere.[23] While the life-cycle pattern could explain mobility against a population with a relatively stable age distribution, the samples used in tables 5.2 and 5.3 are composed of fixed groups of people whose age relationships are constant. Therefore, only concavity contributes to mobility.

In summary, the decline in the effect of nativity on wealth would generate some wealth mobility, while nativity must have been relatively unimportant as a source of income mobility. Duration remains an important barrier to mobility since the rents to duration persist and cannot be acquired. The concave age pattern generates a modest amount of mobility.

The cross-sectional regressions of tables 5.4 and 5.5 provide reference points for a closer examination of each of the three elements that generate mobility—stochastic variance, returns to choice, and changes in the rents to fixed characteristics. But the cross-sectional regressions mask many of the important issues. Such equations tell us the average return to a characteristic, not the return for acquiring the characteristic. Fortunately, longitudinal data allow us to gain richer insights into the very issues that are elusive with cross-sectional data.

At first glance, the explained variance of the regressions of tables 5.4 and 5.5 implies that much of the mobility in income and wealth observed in nineteenth-century Utah was due to stochastic processes, since R^2 on the income regressions never exceeds .14 while the explained variance of the wealth regressions is never above .28. However, these low explained variances are underestimates of the actual amount of the variance in income and wealth that is patterned or potentially explainable for two reasons. As noted earlier, the market adjustment processes amplify the relative importance of stochastic variance and

dampens the relative importance of choice in observable outcomes. Also the regressions estimated in tables 5.4 and 5.5 confound the stochastic elements and the variance due to unobserved variables in the error term. We can estimate the variance explained by unobserved individual characteristics which are time invariant by correlating the household-specific residuals of cross-sectional regressions between different years. If the residual calculated by subtracting the predicted value of a household's wealth (given age, nativity, occupation, residence, and duration) from actual wealth was low for both 1860 and 1870, it would suggest that there were unobserved individual or household characteristics that were correlated with wealth. The measure being used, called the intraclass correlation, is defined as

$$r = \frac{2\sigma_{12}}{\sigma_1^2 + \sigma_2^2},$$

where σ_{12} is the covariance of the residuals for years 1 and 2 and σ_1^2 is the variance of the residuals in year i.[24] The intraclass correlation is also a measure of the percentage of the unexplained variance of the cross-section attributable to unobserved characteristics.

The unobserved household-specific effect on both income and wealth have been measured for a number of pairs of years and summarized in table 5.6. There are large and significant correlations in these residuals

Table 5.6 **Intraclass Correlations for Selected Pairs of Years**

Years	Correlation
Wealth	
1860–70	.37
1870–80	.35
1880–90	.42
1890–1900	.36
Income	
1855–61	.14
1861–70	.32
1870–80	.43
1880–90	.37
1890–1900	.45

Source: Utah Income and Wealth Project.

Note: This correlation coefficient is estimated by estimating lnTW or Y as a function of Age, Age^2, FBE, T, R, W, C, S, and L for the two years indicated. Then the residuals of the regressions are "stacked." If U_{60} is the residual for 1860 and U_{70} for 1870, two variables are formed:

$$N_1 = \begin{pmatrix} U_{60} \\ U_{70} \end{pmatrix} \quad \text{and} \quad N_2 = \begin{pmatrix} U_{70} \\ U_{60} \end{pmatrix}.$$

Then N_1 is correlated with N_2. The correlation is the covariance of the residuals divided by the sum of the variances.

suggesting that there are unobserved individual effects of importance. It appears that about a third of the unexplained variance in the wealth distribution is due to unobserved fixed characteristics that the household possessed. The unobserved characteristics might include ability, work ethic, or education (as long as there was no change in education between observations). Thus, the variance of income or wealth can be broken down into components:

	LNTW1860	LNY1880
A. Variable explained by the variables of the regression	28%	11%
B. Variance accounted for by unobserved variables	37%	37%–43%
C. Stochastic variance	35%	46%–52%

This procedure estimates stochastic variance as about 50% total variance for income with higher estimates for early years. The estimate of stochastic variance for wealth is somewhat lower. Thus, stochastic variance continues to play a dominant role in generating mobility within the distribution of income and wealth. On the other hand, the influence of both observed and unobserved individual or household characteristics accounts for 40–60% of total variance which reduces stochastic variance well below the unexplained variance of the cross-sectional regressions. One should, of course, expect higher income mobility since income is likely to have a relatively larger transitory component.

5.5.1 Patterns of Occupational and Residential Choice

Table 5.7 summarizes some interesting aspects of occupational and residential change as observed in each of the censuses from which we have drawn data. It should be reemphasized that the data set under analysis here is not a random sample of the census population for each of the noted years. Rather, the sample consists of those households that have been traced through several records so that longitudinal analysis of the household was possible. The percentages reported in Table 5.7 are based on those who were "at risk" for the indicated change. For example, 7% of the rural population of 1850 had moved to Salt Lake County (our classification as an urban area) by 1860.

About two-fifths of the households shifted from one occupational class to another within any of our census decades. Obviously, finer classification of occupations would produce a considerable increase in occupational change. Forty-seven percent of those observed in 1860 and 1870 made an occupational change where a change represents substantial change in occupation (white-collar to farmer, laborer to farmer, etc.) rather than small changes in arbitrary naming such as

Table 5.7 **Patterns of Occupational and Residential Change**

	1850–60	1860–70	1870–80	1850–70	1860–80	1880–1900
Number of households[a]	937	2,933	2,168	793	1,504	1,007
Occupation						
Percentage who change occupation[b]	42%	40%	37%	45%	43%	39%
Percentage of farmers shifting out of farming	18	25	25	25	27	32
Percentage of nonfarmers entering farming	54	35	33	47	41	41
Percentage of unskilled laborers who remain unskilled laborers	16	23	15	18	13	12
Percentage of unskilled laborers who become farmers	65	49	49	58	55	64
Percentage of unskilled laborers who become craftsmen	15	13	17	10	17	9
Percentage of nonlaborers who become laborers	6	9	7	9	6	8
Residence						
Percentage who change county of residence	39	34	17	57	27	20
Percentage moving to an urban area (SL County)	7	4	5	8	3	3
Percentage moving to a rural area	37	34	9	56	45	13
Combined						
Percentage who change county of residence and occupation	16	15	8	25	18	8
Percentage who change county of residence but not occupation	23	18	7	32	21	9
Percentage who change occupation but not county of residence	25	24	29	20	24	30
Percentage who change neither	36	42	56	24	37	53

Source: Utah Income and Wealth Project.

[a]This is the number of households with occupations in the indicated years. County residence is observed on some households not in census.

[b]There are five occupational classes: (1) white collar, consisting of professionals, owners, and managers; (2) craftsmen; (3) service workers; (4) unskilled laborers including farm laborers; (5) farmers (those who owned farms).

carpenter to woodworker or physician to doctor. The most difficult change to interpret is that from farm laborer to farmer since it is not clear that this is a substantial change in occupation. Such a change has been classified as a shift from unskilled laborer to farmer. While such changes in occupation (farm laborer to farmer) are important in the Utah economy, they are by no means the bulk of the occupational changes. Eliminating all such movements would reduce occupational change by less than 15% in the seven years considered here. There are substantial movements of individuals from farmers to crafts, or white-collar employment, or vice versa. There are also substantial movements among the nonfarm occupations. For example, only one-third of the households classified as having a white-collar occupation in 1870 were so classified in 1860. In fact, more of the households that were classified as white-collar in 1870 were classified as farm than as white-collar in 1860. Over 40% of craftsmen in the 1870 sample were classified in some other category in 1860. It seems reasonable to conclude that there is substantial movement among occupations when one considers the rather broad categories that are used here to define occupational change.[25]

It is of interest to know how much of this occupational movement is simply a response to the life cycle. Perhaps one starts as a laborer, shifts to farming or crafts during middle age, and then shifts back to some sort of semiretired position with advancing years. (Persons who designated themselves as retired from an occupation were classified in that occupation in our fivefold classification scheme.) Occupational mobility does vary somewhat by age, but the general pattern of movement remains. Those under the age of 30 change occupations about 15% more than the total sample, while those over 50 change occupation classification very slightly more than does the total sample. In general, the age effect is present but not a dominating factor.

There are two other aspects worth noting about the percentage who change occupations. The proportion changing occupation seems to decline through time as the economy matures. In 1850, Utah is definitely a frontier area being settled rapidly by immigration largely from Europe. At the end of the period, the large migration has ended and the arable land was largely under cultivation. Perhaps the decline in opportunities to shift into farming combined with the maturing of the economy outweigh the factors we would expect to increase the opportunities for occupational change—more education, increased specialization in the economy, and structural shifts in the labor force toward crafts and white-collar employment. The second interesting characteristic concerns the very small increase in the percentage changing occupation when the occupations are observed over two decades rather than one. The increase is never more than 3%. This result suggests that occupational change is confined to a subset of the population. Longer in-

tervals between observation increases the percentage slightly, but there appears to be a substantial percentage of the population that never changes occupation. For the households traced through three censuses (1860, 1870, 1880), just over half did not change occupational class. Of the remaining households, a substantial number (36%) changed occupation twice.

The proportion of farmers who shift into other occupations rises as the economy matures from 18% in the 1850–60 decade to 25% between 1870 to 1880. This is consistent with general trends in the economy as more nonfarm opportunities become available. Similarly, the fraction of the nonfarmers moving into farming declines from 54% to 33% as the economy matures. (The 20-year intervals show the same general patterns.) These movements into and out of farming highlight the difficulty of assigning status change to occupational movements. Farming represents a heterogeneous occupation associated with a wide variance of income and wealth such that unskilled labor is the only definitive case of lower economic status than farmer, and yet only white-collar occupation has unambiguously higher status than farming (assuming that wealth and income are closely associated with status).

The movement of unskilled workers is of special interest since normative judgments are often premised upon some barrier to upward mobility for this group. In nineteenth-century Utah, most unskilled workers were able to move into other occupational classifications. At most, less than one-fourth of the unskilled stayed in that classification between any two censuses. The majority moved into farming with another sizable group moving into the crafts. For the two-decade comparisons (1850–70, 1860–80, 1880–1900), those trapped as unskilled laborers declined slightly as the economy matured. Those moving from the higher status occupations into the unskilled labor classification showed no trend, being less than 10% throughout.

Residential mobility shows a pronounced tendency to decline with time. The percentage choosing to change counties declines quite dramatically from 57% in the initial two decades to levels around 20% at the end of the century. (A small part of the initial county change, especially in the 1850–60 period, is spurious due to the realignment and formation of new counties.) It should be emphasized that all migration observed here is being conducted by household heads so that the initial move of leaving home is not being measured. Moreover, virtually all the males who "headed" households were married, so that the migration would undoubtedly be larger for the general population in contrast to the particular households in our sample. In spite of this selection bias, there was substantial movement across county lines in the Utah economy.

In spite of the fact that the individuals in the urban area of Salt Lake County (6,157 persons in 1850, 19,337 in 1870, and 77,725 in 1900)

enjoyed higher wealths and incomes, migratory flows were largely from rural counties to other rural counties and from Salt Lake County to rural counties. However, the movement from Salt Lake County to the rural areas sharply declines over time. It is likely that this type of migration was associated with desires for land ownership that might gradually lead to more wealth accumulation. The movement from a rural county to Salt Lake County was quite small throughout the period.

The interaction of residential and occupational change reported at the bottom of table 5.7 shows that a significant share of the population (24% in the 1850–70 period rising to 53% in the 1880–1900 period) made neither residential nor occupational change. The next largest category tends to be those who change occupation but not county of residence. Like those who change neither, this category tends to rise through time as one might expect with the increased population allowing more extensive specialization. The percentage of those who change both county of residence and occupation falls through time as does the percentage of those shifting counties but not occupation. As will be seen later, there is a relationship between occupational and residential changes, but the changes do occur separately more often than together.

Table 5.7 exhibits a pattern of substantial occupational and residential change as measured by one-decade intervals. The rates of change in both areas show tendencies to decline as this frontier economy matures. Selection biases in the sample probably lead to an understatement in both the rate of occupational and residential change. However, the gradual increase in the average age of this sample contributes somewhat to the observed decline in occupational and residential change. If one considers only those age 50 in the initial census, the trends are very similar. For those below the age of 30, the patterns of decline are less noticeable.

5.5.2 Determinants and Consequences of Occupational and Residential Change

Table 5.8 reports probit regressions estimating the effects of various influences on the probability of changing occupational class as defined by the fivefold classification. Wealth (interacting with occupation), age, and initial occupations influence the probability of changing occupation. While the coefficients of a probit regression are not marginal effects, the significance and relative importance of each variable may be assessed from the equations reported here (the results were very similar with a logit specification). In table 5.8, age has a flattened U effect upon the probability of changing occupation, with a higher probability of change in younger years, a decline in probability to about age 50, and a slight increase in later years as individuals retire or shift to lighter work. Lower wealth increases the probability of occupational change. The effect is statistically significant and fairly large in mag-

Table 5.8 **Probit Regressions on Change in Occupation**

	1860–70				1870–80			
Variables	B	$\|t\|$	B	$\|t\|$	B	$\|t\|$	B	$\|t\|$
Age	−.023	2.25	−.019	1.78	−.051	3.47	−.053	3.41
Age^2	.00026	2.14	.00024	1.89	.0004	3.10	.0004	3.03
LNTW	−.069	5.19	−.008	.52	−.071	3.96	−.005	.25
T	−.013	1.91	.005	.67	−.0001	.02	.008	1.19
FBE	.044	.87	.007	.14	.049	.80	.08	1.17
R	−.086	1.67	.16	2.85	−.094	1.13	.19	2.05
W	—	—	.66	5.12	—	—	.46	3.43
C	—	—	.57	8.42	—	—	.42	4.77
S	—	—	.28	1.75	—	—	1.17	6.66
L	—	—	1.41	18.99	—	—	1.79	14.94
Constant	.717	3.39	−.427	1.88	1.54	3.94	.408	.97
N	2903		2903		1894		1894	

Source: Income and Wealth Project.

Control group: United States–born farmers in Salt Lake County.

nitude relative to the other variables in the regression. The effects of both age and wealth on occupation are consistent with the investment view of occupational change outlined earlier. Duration in the Utah economy (T) reduces the probability of changing occupation but is not significant in the 1870–80 regression. Foreign birth has no effect on occupational change while rural residence has a statistically marginal effect in the 1860–70 regression.

When occupations are added to the regression, wealth loses its statistical significance. The nonfarm occupational classes have higher probabilities of changing occupation than farmers when other characteristics are controlled. The addition of the occupational classes to the regression also produces a positive effect of rural residence on the probability of changing occupational class.

Table 5.9 with estimates of the probability of moving as measured by changing the county of residence is quite similar to table 5.8. However, the probability of changing county of residence tends to decline with age. The wealth of the household again has an inverse relationship to the probability of change. Duration is marginally important at best. The major difference in the determinants of the probability of changing occupations or residence is the effect of foreign birth on residence change. Clearly, the foreign born are reluctant to shift their residence. The effect is relatively large and robust under a variety of specifications. The foreign born were apparently more likely to live near others of similar nationality for perhaps cultural and informational reasons—a settlement pattern comparable to the immigrant experience elsewhere.[26] Perhaps this reluctance to move to new economic opportunities explains some of the early disadvantages in wealth holdings that the foreign born apparently had in the Utah economy. This effect of foreign birth on choice illustrates another aspect of interaction of Ricardian and choice variables.

The introduction of initial occupations into the probit regression does not eliminate the effect of wealth on the probability of moving in contrast to the interaction of occupation and wealth in determining occupational change. In an alternative specification not detailed in table 5.9, change of occupation was added to the regression predicting change of residence. Occupational change increases the probability of moving, but wealth still reduces the probability of moving independent of the occupational change. Thus, being poor influences occupational change, but it also influences residential change independent of the occupational effect.

The equations in tables 5.8 and 5.9 confirm the importance of wealth, ex ante occupation, and age as influences on the occupational choice and the influence of age, wealth, and foreign birth on residential choice. The patterns of coefficients are consistent with maximizing strategies.

Table 5.9 **Probability of Changing County of Residence (Probit Regression)**

	1860–70				1870–80			
Variables	B	$\|t\|$	B	$\|t\|$	B	$\|t\|$	B	$\|t\|$
Age	−.0068	.63	−.0066	.61	−.036	2.6	−.035	2.07
Age^2	−.00007	.55	−.00008	.58	.0002	1.72	−.0002	1.33
Ln TW (Initial year)	−.028	2.10	−.029	2.04	−.056	2.98	−.066	3.03
T	−.01	1.45	−.011	1.51	.010	1.56	.005	.65
FBE	−.21	3.99	−.218	4.18	−.129	1.94	−.154	1.90
R	−.08	1.56	−.076	1.34	−.116	1.40	−.119	1.09
W	—	—	−.21	1.54	—	—	.056	.31
C	—	—	.10	1.42	—	—	.253	2.31
S	—	—	−.185	1.12	—	—	.320	1.56
L	—	—	−.009	.13	—	—	.335	2.79
Constant	.316	1.45	.314	1.39	.574	1.55	.358	.77
N	2903		2903		1894		1894	

Source: Income and Wealth Project.

Control group: United States–born farmers in Salt Lake County.

5.5.3 Occupational Change and Economic Mobility

Occupational mobility is usually studied independently of income or wealth mobility. The model of choice discussed earlier implies that the two types of mobility are intertwined. The importance of the path of choices taken may be explored by forming variables representing the alternative paths taken and regressing wealth on such variables. There are three ways of examining the data. Choice paths (occupational paths such as farmer to white-collar or residential paths such as urban to rural) may be correlated with ex ante wealth in order to see the relationship of wealth or income to subsequent occupational or residential movement. For example, one could use the correlation of occupational choice paths taken from 1860 to 1870 as observed in the census with 1860 wealth to analyze who took such paths. One may then reverse the process to examine the consequence of a particular path on subsequent wealth by regressing ex post wealth on the paths taken. Finally, one may examine the effect of choice paths on the rate of wealth accumulation between two years observed, testing whether changes in occupation and residence enhanced economic mobility.

If individual characteristics determine the rate of growth of wealth, R, then

$$W_{70} = e^{Rt} W_{60} \tag{2}$$

where t represents time and the subscripts indicate the census year. Taking logarithms and transforming, we have

$$\ln(W_{70}) - \ln(W_{60}) = Rt. \tag{3}$$

The left-hand expression is the dependent variable for some of the behavioral regressions that we consider. We assume, given our earlier arguments, that R is a function of choice, Ricardian, and random elements.[27]

The number of potential paths with two observations is equal to N^2 where N is the number of available choices. Thus, with five occupational alternatives and two residential alternatives, there are 49 possible choice paths. Even a large data set does not make this kind of specification particularly useful or productive. Consequently, the variable set will be shortened in different ways to try to illustrate some of the important results of choices on wealth.

Table 5.10 starts with the simplest possible specification, looking at the effect of change versus no change. The control group is composed of households who change neither occupational category nor county of residence. The regression on ex ante wealth (1860) confirms the results of the previous analysis. It is the poorer households that choose to change occupations and residence holding the effects of age, duration, and birthplace.

Table 5.10 **General Effects of Occupational and Residential Change on Wealth (1860–70)**

Variables	LNTW1860	LNTW1870	ΔLNTW from 1860 to 1870
Age	.046	.032	−.014
Age²	−.00043	−.00039	.00004
FBE	−.408	−.194	.214
T	.080	.053	−.027
ChgRes	−.106	−.330	−.224
ChgOcp	−.194	−.076	.118
Constant	5.43	6.46	1.03
R^2	.23	.10	—
N	2,534	2,534	

Note: All coefficients significant at the .05 level.

Column 2 of table 5.10 gives the effects of the choices on subsequent wealth. Once again, note that the effect of foreign birth and duration decline in influence on the cross-section of the 1870 regression relative to the regression of 1860 shown in table 5.4. The reason for decline is clear in table 5.10. Households with a foreign-born head have less wealth, but they enjoy higher rates of wealth accumulation, while those with longer duration in the economy have more wealth but lower rates of wealth accumulation. Changing residence is costly and reduces the rate of wealth accumulation relative to those who do not change. (No counterfactual statement about the paths of the two groups—those who change and those who do not—is intended here.) Those who change occupation enjoy higher rates of growth of wealth relative to the control group. These results highlight a finding that is consistent through different years and different specifications. That is, recovery and gain from occupational change occur more quickly than recovery and gain from residence change.

In table 5.11 the possible choices are expanded by considering the following paths: (1) Those who change neither occupation nor county of residence—the control group; (2) those who change their residence classification from urban to rural or vice versa—ChgResCl; (3) those who change occupation in a narrow sense within a classification but do not shift out of the occupational class—ChgOcpS; (4) those who change their occupational class—ChgCl; and (5) those who change their county of residence within the rural sector—ChgRRes.

Those who move from urban to rural, or vice versa, are poorer than the control group in 1860, with wealth holdings 16% below the wealth of the control group ceteris paribus. The relative position changes little by 1870 with their wealth now 17% below the average so that their rate of wealth accumulation over the decade is essentially the same as that

Table 5.11 **General Effects of Occupational and Residential Change on Wealth (1860–70)**

Variables	LNTW60	LNTW70	ΔLNTW from 1860 to 1870
Age	.046	.032	−.014
Age^2	−.00043	−.00039	.00004
FBE	−.401	−.202	.199
T	.080	.052	−.208
ChgResCl	−.159	−.169	−.010
ChgRRes	−.069*	−.433	−.364
ChgOcpS	.023*	.164	.141
ChgCl	−.232	−.136	.096
Constant	5.43	6.46	1.03
R^2	.23	.10	—
N	2,534	2,534	

*Not significant at .05 level.

of the control group. Those changing county of residence within the rural sector are different from those making an urban-rural shift. Moreover, their wealth is not statistically different from the wealth of the control group in 1860 but is 43% below that group in 1870. Their rate of wealth accumulation is the lowest of any of these possible general paths.

Those changing occupation *within a general class* are not statistically different in 1860 wealth holdings from those who make no change. However, they do enjoy a higher rate of wealth accumulation ending the period with wealth holdings 14% larger than those of the control group, ceteris paribus. The causation of this pattern is not clear. Occupational change could be a name change to ratify the increased wealth position, or it could reflect choice that led to a higher return. However, those changing occupational *classifications* obviously are poorer than others with wealth holdings 23% below the control group. It seems clear that the change across classes is fundamentally different from the changes within classes; for those changing classes enjoyed a high rate of growth or wealth making up nearly half of the disadvantage by 1870 that they suffered in 1860.

The regressions of table 5.12 are designed to look backward from 1870 occupational classifications and demonstrate the heterogeneity that exists in any cross-sectional classification because of the different paths by which individuals have reached a particular position. These regressions also show the Ricardian nature of different paths even though individuals have arrived at the same occupation or place of residence by a certain date. In each occupational class except laborers, those households in other occupations choosing to shift into an oc-

Table 5.12 **Consequence of Choice on Wealth (Same Terminal Occupations)**

Variables	LNTW60	LNTW70	ΔLNTW from 60 to 70
Age	.042	.012	−.03
Age^2	−.00038	−.00007	.00031
WW	.649	1.188	.539
OW	−.025*	.386	.411
CC	−.318	−.158	.160
OC	−.264	−.327	.063
SS	.149*	.098*	−.051
OS	−.337	−.356	−.019
LL	−.886	−.890	−.004
OL	−.314	−.688	−.374
OF	−.448	−.116	.332
FBE	−.379	−.201	.178
T	.074	.045	−.029
RR	−.113	−.571	−.458
UR	−.228	−.576	−.348
RU	−.030*	−.302	−.272
Constant	5.68	7.05	1.37
R^2	.28	.21	—
N	2,534	2,534	

Control group: Native farmers in Salt Lake County (in both 1860 and 1870).
*Not significant at .05 level.

cupation tended to have lower wealth, ceteris paribus, than those already in that occupation in 1860. For example, the farmers, craftsmen, service workers, and laborers shifting to white-collar occupations (collected together as OW) had about the same wealth as the control group of households who remained farmers in both census years. The white-collar workers from whom they were taking cues (W60) were doing significantly better than the control group in 1860. This result holds for white-collar and service occupations and farmers. The pattern described above is also true of those in the urban area choosing to move to the rural area. Not only were they doing more poorly than other households of Salt Lake County when they chose to move, they also were worse off than rural households. On the other hand, rural households choosing to move to the urban area of Salt Lake County were richer than those choosing to remain in the outlying counties. The choices seem consistent with a set of cues drawn from the economy. Households choosing a characteristic, generally, were poorer than those who possessed the characteristic. Thus, households tried to acquire characteristics with high return.

We now come to the question of whether or not they could expect to attain the position of those they emulated. The answer is clearly

no in the short run. The middle column of table 5.12 once again illustrates the importance of duration. In every case except laborers, those who moved to an occupation were less well off than those who had been in the occupation at least 10 years. Some of those choosing to change were able to narrow the gap through increased growth rates, such as those moving into farming, but not even this narrowing occurred for the other occupations. All residence choices except staying in the urban county produced disappointing growth in wealth. Notably, those households moving to the urban area had lower growth rates of wealth than households in the urban area in both censuses but higher than households staying in a rural county or moving to the rural counties. Table 5.12 also illustrates the difficulties of interpretation of cross-sectional regressions such as those in tables 5.4 and 5.5 that appear to show strategies for increasing income or wealth. Choosing a characteristic is not the same as having it. Households could not acquire an advantageous earlier position such as urban in 1860 or white-collar occupation in 1860. The only choices in 1860 were ones given occupation and county of residence in 1860. We turn to table 5.13 for an examination of this type of choice process.

Table 5.13 is designed to help answer two basic questions about occupational and residential choices. Given each occupation or place of residence, who chooses to change? If a change is made, how does

Table 5.13 **Impacts of Occupational and Residential Change on Wealth and Income (Same Initial Occupations)**

Variables	LNTW60	LNY60	LNTW70	LNY70	Growth of TW	Growth of Y
WW	.68	−.03*	1.04	.38*	.36	.41
WO	.47	−.83	.39*	.26*	−.08	1.09
CC	−.28	−.19	−.19	−.05*	.09	.14
CO	−.36	−.38	−.11*	−.40	.25	−.02
SS	2.79	.40*	3.31	1.47*	.52	1.07
SO	−.30*	−.10*	.25*	−.30*	.55	−.20
FO	.05*	−.24	−.13*	−.19*	−.18	.05
LL	−.98	−.66	−.85	−.12	.13	.54
LO	−.59	−.41	−.24	−.18	.35	.23
RR	−.20	−.16*	−.51	−.25	.31	−.09
RU	−.17*	−.25*	.17*	.21*	.34	.46
UR	−.23	−.33	−.58	.04*	−.35	.37
R^2	.39	.11	.21	.06		
N	1,213		1,213			

Control group: United States–born farmers living in Salt Lake County who make no changes.

*Not significant at .05 level.

the growth rate of those who change compare with those starting from the same position who did not change?

In the analysis summarized in table 5.12, those who converged to the same occupation or residence can be analyzed by the paths they had chosen to reach that position. Table 5.13 reverses the perspective of table 5.12 by examining individuals who start with ostensibly the same characteristics and subsequently choose different paths. Table 5.13 also reports regressions on the log of income in addition to those for wealth. The table is limited to the choice variables since the parameter specifications for the other variables are largely independent of the choice specification. The patterns of table 5.13 are generally consistent with the market adjustment model suggested earlier. Those with lower income and wealth in each class (such as WW compared to WO) tend to be those who move to other occupations or residence, with the exception of the unskilled laborers where those doing best are also those likely to move. Shifting occupation or residence has some cost associated with it, so that wealth in 1870 or the rate of growth of wealth may at first be adversely affected by movement. Income, however, adjusts more quickly so that choices, in general, improve the income position of those who change relative to others.

White-collar households provide a good illustration of the basic pattern postulated. White-collar households who shift to other occupations have lower wealth in 1860 than those who remain white collar. Their income is also significantly lower. This pattern holds for craftsmen, farmers, and service workers (perhaps), but not laborers. Those shifting out of white-collar employment did not improve their wealth position in 1870 relative to the control group or those remaining in that occupation. This was also true of those households shifting out of farming. But the shift in occupation did help the income position of both groups (WO, FO), moving them from well below the control group to a position of at least equality or perhaps above. This difference between the effect of choice on income and wealth seems to be strong evidence supporting the investment explanation of choice. It also suggests an important explanation for the differences between wealth and income mobility that does not rest on the relative importance of transitory elements.

Do the paths taken tend to produce convergence in the income and wealth distributions in and of themselves? Obviously many other factors such as the stochastic elements of the distribution will keep inequality and economic mobility high. But do choices tend to at least ameliorate the inequality and generate added economic mobility? The results of table 5.13 suggest that choice ameliorates inequality with some exceptions. The white-collar workers who remain in their occupation have higher wealth in 1860 and the same income level ceteris paribus. Since

the growth profile of their wealth between 1860 and 1870 is steeper than those of the control group, inequality is increased in terms of both income and wealth. This result suggests that there may be barriers to successful penetration of the highest return occupations and that these barriers create inequality and prevent some mobility. Both those craftsmen who change and those remaining in the occupation have low wealth in 1860 but steep growth profiles producing some wealth convergence. Most important, both laboring groups enjoy wealth and income profiles that are steeper than the control group. Since their wealth and incomes were well below those of the control group in 1860, this effect produces convergence. The group shifting out of farming suffers a wealth loss, producing some divergence in the wealth distribution although their income gain moves the income distribution in the other direction. (The service sector is too heterogeneous and small to give consistent results.) Those changing residential classification enjoy high gains in income and start from a position below the control group so that some convergence occurs. Those moving from Salt Lake County to the rural area lose in terms of wealth growth but gain a high rate of income growth. The most important changes involve laborers who move to other occupations. This group clearly benefits from their choices. Since this group is rather large, their gains in income and wealth are important sources of economic mobility. In sum, the choices produce convergence in the distribution of income with less effect on wealth. The total effect of all such change would be marginal.

5.6 Conclusion

We have considered economic mobility from a variety of vantage points including movements within the income and wealth distributions as well as residential and occupational change. Measurement from these different viewpoints leads to several conclusions about mobility in this nineteenth-century enconomy:

1. The Utah economy was characterized by substantial mobility within the income distribution with only slightly less mobility within the wealth distribution. (See tables 5.2 and 5.3.) Both wealth and income distributions evidence substantial cross-sectional inequality. There is no well-defined reference point against which to measure this economic mobility. Nevertheless, movement of at least two quintiles within the income distribution by over one-third of all households seems convincing evidence of mobility. This conclusion is not meant to imply that there was no rigidity or inertia within the income or wealth distribution. Clearly, initial position in either tail of the distributions greatly influenced the future income or wealth of the household. Mobility appears to decline somewhat over the 50-year period.

2. The stochastic elements in the determination of income and wealth contribute significantly to economic mobility, but the unexplained variance of the cross-sectional regressions of tables 5.4 and 5.5 overestimates the actual stochastic influence. The unobserved, but patterned, component of the variance of income and wealth may be estimated using the intraclass correlations of table 5.6. The combination of these intraclass correlations with the cross-sectional regressions leaves a stochastic residual of 35–40% for wealth and about 50% for income. No doubt these large stochastic elements contribute a large share of the observed mobility. This remaining stochastic element is also an overestimate of the relative importance of pure chance in determining outcomes because market adjustments filter other elements. A substantial stochastic element probably remains, even accounting for this measurement problem.

3. Occupational and residential changes were common in the economy. In most cases, more than half of the households observed over a decade or two decades changed occupation, county of residence, or both. (See table 5.7.) The probability of both occupational and residential change decreased with wealth, while the foreign born were more reluctant to change residence. (See tables 5.8 and 5.9.)

4. Those households acquiring a particularly attractive characteristic such as an occupation or county of residence did not quickly acquire income or wealth equivalent to those who acquired the characteristic earlier. (See table 5.12.) That is, the path of choice-making matters. This is not a surprising result, but it does emphasize the point that cross-sectional regressions overstate the gain from acquiring characteristics that appear to yield a high marginal return. In addition, there will be considerable heterogeneity within any occupation because of the paths individuals chose in acquiring the occupation.

5. Occupational change, especially from laborer to other categories, was positively correlated with the rate of growth of income and wealth. On balance, occupational change contributed to mobility within income and wealth distributions.

6. Residential change was negatively correlated with both wealth and the rate of wealth accumulation. (See tables 5.10, 5.11, and 5.12.) This suggests that residential change was costly, requiring some loss of capital. However, residential change improved income quite rapidly. (See table 5.13.) Presumably, these income gains eventually lead to wealth accumulation.

7. Rents on fixed characteristics such as nativity and duration in Utah declined through the nineteenth century. This produced some economic mobility. In particular, the foreign born overcame their disadvantage in income very early and were able to eliminate their wealth disadvantage by the end of the century through higher incomes

and faster rates of wealth accumulation. (See tables 5.4, 5.5, and 5.12.)

These conclusions as well as others detailed in the paper suggest an economy with high mobility within the distributions of income and wealth. This mobility, generated by luck, choices, and changes in rents, must have made inequality more palatable. To go from homespun clothing, if not rags, to modest riches was within the reach of many households, even though the extremes of success eulogized by Horatio Alger were less likely. Social stratification was not an apt description of this large sample drawn from a frontier state.

How general are these results? What of those households who enter and disappear within the sample? Are they fundamentally different from those studied, so that the sample presents a distorted view of mobility within the Utah population? We have no reason to believe that the selection processes operating were such as to invalidate the basic findings of this paper. Because of the religious nature of the settlement, relatively few households migrated out of Utah. Those who did migrate in and out of the state often had not intended permanent settlement (e.g., soldiers). A few households migrated from Utah to Mormon settlements in surrounding states, although the settlements in California, Nevada, Arizona, and Idaho tended to be settled by Mormons with only a temporary or no stay in Utah. Households omitted from the census are also omitted from much of the analysis. Of the 1891 individuals of whom we have record in Utah in 1859 and again in 1861 in our sample, approximately 224 were not found by us in the census of 1860. It is possible that name resemblance is slight so that the individual has been missed. Some individuals may have left the state temporarily. A sample of these households ommitted from the census had an average income of $740 compared with $710 for the households found in the 1860 and 1870 census. The only other important group likely to be underrepresented in our sample would be disaffected Mormons who had stopped paying contributions to the Church and left Utah. We have no information about this group. Thus, we have no evidence that the sample is biased in a way that distorts the results.

Will these results generalize for the United States in general in the nineteenth century? It would seem likely that frontier states like Utah offered increased economic mobility. This is what made the frontier attractive. There is no particular reason to believe that Utah was unusual for a frontier state other than the cultural or religious milieu. Most of the forces we have examined such as occupational or residential choice, decline in rents to fixed characteristics and stochastic influences are not greatly influenced by the cultural and religious context. It remains to be seen if more settled states to the east had different patterns of economic mobility.

Appendix
Definition of Variables

Occupations and Occupation Paths

There are five occupational categories:

W—White-collar and self-employed professionals
F—Farmers and ranchers
C—Craftsmen
S—Service workers
L—Unskilled laborers

When occupational paths are observed, they are formed as two letters. The first letter is the occupational class in the initial year and the second letter the class of the second year. For example, WF would be a dummy variable equal to one if the occupation is white-collar initially with a change to farmer in the second period. Most times we have aggregated changes such as WO (white-collar and a change to any other occupation).

Residence

We have just two classifications:

U—Urban - Salt Lake County
R—Rural - All other counties

Paths are formed in the same way as occupations (i.e., UU, UR, RU, RR).

Other Variables

FBE—Foreign birth
T—Duration in Utah calculated as year of the dependent variable (e.g., 1870TW) less year of first observation in Utah
ChgRes—Dummy variable equal to one if initial county not equal to terminal county
ChgOcp—Dummy variable equal to one if initial occupation (not necessarily occupational class) not equal to terminal occupation
ChgResCl—Dummy variable equal to one if residential class changes (i.e., UR or RU = 1)
ChgOcpS—Dummy variable equal to one if occupation changes but not occupational class
ChgCl—Dummy variable equal to one if occupational class changes
ChgRRes—Dummy variable equal to one if household moves from one rural county to another

Y_{60} or $_{70}$ etc.—Income calculated on tithing paid, adjusted for percentage tithing paid was of a full tithe (10% of income)

$TW_{60,70,80}$ etc.—Total gross wealth from either the census or tax assessments.

Notes

1. See McCall (1973), Hart (1976), Lillard and Willis (1978), and Klevmarken and Lybeck (1980), for studies on contemporary mobility, and Blinder (1980) for a summary of contemporary United States income inequality.
2. For examples, see Lipset and Bendix (1963) or Blau and Duncan (1967).
3. Most historical studies of income or wealth mobility concentrate on wealth; see Curti (1959), Pessen (1973), and Doherty (1977). Contemporary studies usually focus on income; see McCall (1973), Lillard and Willis (1978), Shorrocks (1976), and Schiller (1977).
4. See Kearl and Pope (1983a, 1984a).
5. We have analyzed intergenerational effects in Kearl and Pope (1984b).
6. See Friedman (1957).
7. See Modigliani and Ando (1957), Miller (1965), and Lilliard and Weiss (1979).
8. See Mincer (1974).
9. For a survey see Sahota (1978).
10. For surveys see Mincer (1970) and Blaug (1976).
11. All symbols are defined in table 5.1.
12. See Shorrocks (1978).
13. In fact, quintile boundaries are drawn in a way that does not divide the sample into five groups of equal size. There is heaping on values such as $500 or $1,000 so that boundaries would normally fall on such values. The boundaries are adjusted up or down so that all persons with the same wealth or income are in the same quintile. That procedure yields groupings that deviate from 20% of the sample.
14. This mobility can be compared to the income mobility found in McCall (1973), p. 78. When the Utah data are rendered "comparable" to McCall's data, there appears to be more mobility in Utah. Schiller (1977, p. 932, table 1) suggests that there is much less contemporary mobility. We have found no nineteenth-century data with which to compare.
15. Again, there are few sources with which to compare. Fragmentary evidence may be drawn from Pessen (1973), Curti (1959), and Doherty (1977). The mobility in Utah seems to exceed the norm, although there is little evidence about income or wealth mobility.
16. The effect of such adjustments is reported in Kearl and Pope (1984b).
17. These issues are explored extensively in the literature. For examples, see Sjaastad (1962) and Becker (1967).
18. Jencks et al. make such an inference in chap. 1 and 9 of *Inequality* (1972).
19. This correlation was emphasized in Kearl et al. (1980).
20. This is a variant of an error-component model. See Judge et al. (1980, pp. 328–59).
21. The regressions may be compared to those in Soltow (1975, p. 80) Atack and Bateman (1981).
22. Chiswick (1978) finds higher income after 13 years for immigrants in contemporary data.
23. The life-cycle patterns have been analyzed in Kearl and Pope (1983b).
24. See Haggard (1958).
25. Unfortunately, most historical studies (e.g., Thernstrom, 1973; Griffen and Griffen, 1978) have focused on more urban economies. Utah certainly displays more occupational

mobility than most of the other historical studies with so much shifting between farming and other occupations. See Thernstrom (1973, p. 234, table 9.4). Contemporary studies such as Lipset and Bendix (1963, pp. 165–81) suggest less occupational change.

26. For examples, see Handlin (1941) Schnore and Knights (1969), and Chudacoff (1972).

27. The three specifications on initial wealth, terminal wealth, and the rate of growth are not independent. Any two equations will yield the coefficient estimates of the third. That is, $b_{70} = (X'X)^{-1}X'\ln(W_{70})$ and $b_{60} = (X'X)^{-1}X'\ln(W_{60})$ while $B = (X'X)^{-1}X'[(\ln W_{70}) - (\ln W_{60})] = b_{70} - b_{60}$.

Comment

Lee Soltow

Certainly Kearl and Pope are to be admired for this fascinating study of the Mormon population from 1850 to 1900. Their ability to trace given individuals for 10 or 20 years, or longer, considering their wealth, income, age, occupations, residence, urbanity, and length of residence in Utah in any decade generates a dynamic dimension not otherwise available to those of us who try to unravel the mysteries of economic growth and the constancy or change in income and wealth inequality. The tracing of individuals from one census to the next is an exacting and frustrating task because the paths of so many persons become lost from view. Kearl and Pope tell, with admirable candor, that only 2,951 households, or about 17% of the 17,000 in the Mormon sample can be found in the two federal censuses of 1860 and 1870 and that some of their tables dealing with income changes involve samples of less than 2,000. In this work, I am afraid that there is also a tendency to eliminate extremes from distributions—the young men and parents who are not heads of households and often those with zero wealth—perhaps in an attempt to be conservative in reporting results. Those who find themselves uncomfortable with tables of data limited to Mormons in Utah must understand that the Mormon sets and subsets may be our best general information source concerning the poor and rich, and they may be our only source for individual incomes in a broad spectrum of a population in the United States in the nineteenth century.

First Kearl and Pope present transition matrices for wealth and income for quintile groups that demonstrate considerable mobility from 1860 to 1870 (see table 5.1); household heads in the narrow middle range for wealth in 1860 were not often found in the same range in 1870. This middle range unfortunately has a small class interval, I suspect. The poor in the lowest quintile range were more likely to linger, and the rich in the highest range were even more likely to

Lee Soltow is professor of economics at Ohio University.

maintain their position. The overall immobility index produced a U-shaped pattern, a form generally found in data for both income and wealth from 1850 to 1900. This pattern certainly would be predicted if distributions are unimodal, with two tails, and it is unfortunate that none of the characteristics of the 10 precious income distributions are given so that we might better understand changes in relative dispersion for various ranges of the distribution in a given year as well as changes from year to year.

The paper's second major analysis deals with cross-sectional regressions, that is, with wealth or income in a specified year, related to census variables: age, occupation (considering five broad classes), nativity, years of residence, and urbanity in that year. The amazing aspect of this analysis is that the explained variation of the logarithms is, at most, 28% in the case of wealth in five separate years, and 14% in the case of income, for the ten precious income years in the half-century (table 5.5). Income variation, explained by occupation, might have doubled, with 10 or 20 occupations (as is the case with present-day distributions), but there is one undeniable conclusion: a theory of income distribution based on occupations or on noncompeting occupational groups is indeed weak as it pertains to Utah development. It would be exceedingly interesting to have access to tables like those of Kearl and Pope for some European country to see if those counterparts to our census variables had more explanatory power. Right now, I would settle for a glimpse at Kearl and Pope's income distributions for laborers, white-collar workers, and so on. Measures of dispersion for each occupation and the extent of overlap would be most revealing.

What is not properly understood is the dispersion within occupational or age groups. Consider some reasons offered by Mormon officials in 1857 for low incomes: "Been sickly nearly all the time." "Been sick since he came into the valley." "Aged and sick 2 months." "Sickly consumptive." "A very small man in a small business." "Lost 5 acres of grain by grasshoppers." "Affected seriously with rheumatism for two years." "5 acres destroyed by frost." "Crop destroyed by frost." "Old and feeble" (Soltow and May 1979).

Most of these hardships could have occurred within any occupation or age group. Some are in the nature of irregularities that might not occur in future years, but others could be permanent.

One of the great findings reported in the paper is the tendency for an individual to maintain his relative position, above or below the average, from decade to decade, in a fashion that must be due to factors outside of the census variables in a given year. By correlating residuals in one year with those in another, it was determined that explained variation can be increased to as much as 50% for income, and to even

a little more for wealth. These increases might be explained in part by education, inheritance, wealth of parents, and so on. It is strange that these authors do not state the effect of wealth on income or of income on wealth in some multiple regression form. Kearl and Pope offer only tantalizing statements—that income does not properly reflect capital gains, or that the relationship between the two choice variables may be weak.

Census variables for the constrained Utah set explain 25% of total variation. Previous wealth or income explains another 25%. The authors attempt to resolve the balance of unexplained variation by investigating the dynamic variable changes in occupation and changes in residence of household heads from decade to decade. It is difficult to determine to what degree these changes enhance explained variaton in wealth, in comparing tables 5.4 and 5.12. Nevertheless, there are several noteworthy findings: laborers who changed occupations benefited in terms of both income and wealth; changes in occupations and residence tended to "ameliorate" inequality.

What is more clearly shown from the matching of names is the degree of mobility enjoyed by the population. About 40% of households heads in the matched subset had different occupations, broadly defined, in 1860 than in 1850, and this ratio dropped slightly later in the century. The percentage changing county of residence started at 39% but dropped after 1870. Unmeasured interstate movement would only enhance this strong degree of mobility.

Finally, we must face the possibility that the Utah group is exceptionally homogeneous, particularly the matched household subset. I do wish there were some brief cross-classifications of characteristics for matched and unmatched Mormon groups. Even more, I wish that Kearl and Pope in some way might ferret out a subset of the Mormons, perhaps a random sample of 100, who moved from Utah to Washington or California or elsewhere so that we could better understand interstate movement, the characteristics of these restless people.

Nevertheless, we must recognize the beauty of the Mormon records. I can't help but admire these meticulous, glorious, columns of ascertained facts from the past. The best is still to come from our indefatigable searchers as they study the numbers of children in families as well as father-son and father-daughter relationships. These will help shed light on the more permanent aspects of transition matrices. Kearl and Pope find, from their residual analysis and their transition matrices, that there is a fair degree of permanence in the position of an individual from one decade to the next. Will they find that this permanence persists from one generation to the next, or will they find the great mobility found in studies of present-day generations?

References

Atack, Jeremy, and Bateman, Fred. 1981. Egalitarianism, inequality, and age: The rural North in 1860. *Journal of Economic History* 41:85–93.

Becker, Gary S. 1967. *Human capital and the personal distribution.* Ann Arbor.

Blau, Peter M., and Duncan, Otis D. 1967. *The American occupational structure.* New York.

Blaug, Mark. 1976. The empirical status of human capital theory: A slightly jaundiced survey. *Journal of Economic Literature* 14:827–55.

Blinder, Alan. 1980. The level and distribution of economic well-being. In *The American economy in transition,* ed. Martin Feldstein. Chicago: University of Chicago Press (for NBER).

Chiswick, Barry R. 1978. The effect of Americanization on earnings of foreign-born men. *Journal of Political Economy* 86:897–922.

Chudacoff, Howard P. 1972. *Mobile Americans: Residential and social mobility in Omaha, 1880–1920.* New York.

Curti, Merle. 1959. *The making of an American community.* Stanford, Calif.

Doherty, Robert. 1977. *Society and power.* Amherst, Mass.

Friedman, Milton. 1957. *A theory of the consumption function.* Princeton: Princeton University Press.

Griffen, Clyde, and Griffen, Sally. 1978. *Natives and newcomers.* Cambridge: Harvard University Press.

Haggard, Ernest A. 1958. *Intraclass correlation and the analysis of variance.* New York.

Handlin, Oscar. 1941. *Boston's immigrants: A study in acculturation.* Cambridge.

Hart, P. E. 1976. The dynamics of earnings, 1963–1973. *Economic Journal* 86:551–65.

Jencks, Christopher, et al. *Inequality.* New York.

Judge, George C., et al. 1980. *The theory and practice of econometrics.* New York.

Kearl, J. R., and Pope, Clayne L. 1983a. Wealth mobility: The missing element. *Journal of Interdisciplinary History* 13:461–88.

———. 1983b. Life cycle patterns in income and wealth. NBER Working Paper.

———. 1984a. Mobility and distribution. *Review of Economics and Statistics* 66:192–99.

———. 1984b. Unobservable family and individual contributions to the distribution of income and wealth. NBER Working Paper no. 1425.

Kearl, J. R., et al. 1980. Household wealth in a settlement economy. *Journal of Economic History* 40:477–96.

Klevmarken, N. Anders, and Lybeck, John A., eds. 1980.*The statistics and dynamics of income*. Clevedon, G. B.

Lillard, L. A., and Weiss, Y. 1979. Components of variation in panel earnings data: American scientists, 1960–70. *Econometrics* 47:437–54.

Lillard, Lee A., and Willis, Robert J. 1978. Dynamic aspects of earning mobility. *Econometrica* 46:985–1012.

Lipset, Seymour M., and Bendix, Reinhard. 1963. *Social mobility in industrial society*. Berkeley: University of California Press.

McCall, John J. 1973. *Income mobility, racial discrimination and economic growth*. Lexington, Mass.: D. C. Heath.

Miller, H. P. 1965. Lifetime income and economic growth. *American Economic Review* 55:834–43.

Mincer, Jacob. 1970. The distribution of labor incomes: A survey with special reference to the human capital approach. *Journal of Economic Literature* 8:1–26.

———. 1974. *Schooling, experience and earnings*. New York.

Modigliani, F., and Ando, A. 1957. Tests of the life cycle hypothesis of savings. *Bulletin of the Oxford Institute of Economics and Statistics* 19:99–124.

Pessen, Edward. 1973. *Riches, class and power before the Civil War*. Lexington, Mass.: D. C. Heath.

Sahota, Gian S. 1978. Theories of personal income distribution: A survey. *Journal of Economic Literature* 16:1–55.

Schiller, B. R. 1977. Relative earnings mobility in the United States. *American Economic Review* 67:926–41.

Schnore, Leo F., and Knights, Peter R. 1969. Residence and social structure: Boston in the antebellum period. In *Nineteenth-century cities*, ed. Stephan Thernstrom and Richard Sennett. New York.

Shorrocks, A. F. 1976. Income mobility and the Markov assumption. *Economic Journal* 86:566–78.

———. 1978. The measurement of mobility. *Econometrica* 46:1013–24.

Sjaastad, L. A. 1962. The costs and returns of human migration. *Journal of Political Economy*. 70:80–93.

Soltow, Lee. 1975. *Men and wealth in the United States, 1850–1870*. New Haven: Yale University Press.

Soltow, Lee and May, Dean L. 1979. The distribution of Mormon wealth and income in 1857. *Explorations in Economic History* 16:151–62.

Thernstrom, Stephan. 1973. *The other Bostonians*. Cambridge: Harvard University Press.