COMMUNAL LIVING STANDARDS AND MEMBERSHIP INCENTIVES: THE SHAKERS 1780-1880

DISSERTATION

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By

John Edward Murray, B.A., M.S., M.A.

* * * * *

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Dissertation Committee:

Richard H. Steckel

Donald O. Parsons

Edward John Ray

Approved by

Richard H. Steckel

Advisor

Department of Economics

In utopias conditions are invariably better,
and measurement is unnecessary.

Robert W. Fogel
Without Consent or Contract

To Lynn

without whom not

and

A.M.D.G.

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VITA

9 April 1959.....Born - Cincinnati, Ohio

1977-1978.....Student, Yale University

1981.....B.A., Oberlin College

Summer 1984.....DAAD Fellow, Goethe Institut-
Schwäbisch Hall, Germany

1985.....M.S. in mathematics,
University of Cincinnati

1987.....M.A. in economics,
The Ohio State University

Summer 1990.....Beverly R. Robinson Fellow
Winterthur Museum and Library,
Wilmington, Delaware

Autumn 1991.....Anna M. Dice Fellow,
Department of Economics, The
Ohio State University

PUBLICATIONS

Review of Shaker Communities, Shaker Lives by Priscilla J. Brewer, Communal Societies 11, 1990.

"Stature in a Nineteenth Century American Shaker Commune", Annals of Human Biology, forthcoming.

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FIELDS OF STUDY

Major Field: Economics. Studies in economic history, trade and development.

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CHAPTER I

INTRODUCTION

Who were the Shakers? A religious communal society, once national and numerous, now consisting of two communities in New England, is only part of the answer. As Stein's magnificent new history (1992) makes clear, the Shakers were people, individuals who sought a way to encounter God in their communal life. Our knowledge of the vast number of these Believers is limited. Why would these people leave Worldly pleasures and rights such as family life and private property to take up the Shaker Way of simplicity?

This study proposes that the difference between Shaker and worldly living standards formed a set of incentives to which Believers and prospective Believers responded. To understand this hypothesized phenomenon, a model is proposed to describe community formation and faith requirements, quality of life, and entry and exit behavior. This model is then tested using demographic, epidemiologic, anthropometric, and economic data recovered from Shaker manuscripts. Unfortunately the manuscript records most useful for this study deteriorated severely in quantity over the second half of the nineteenth century. As the Shakers diminished in numbers, they were ever less able to spare members to work as scribes. The extant record

supports, in broad terms, an important implication of the model: The Shakers suffered from qualitative recruiting problems starting even before mid-century.

An economic approach to the arc of Shaker history is reasonable, in part because other theories provide explanations that are ultimately unenlightening. A common reaction of fellow late twentieth century Americans is that the Society was done in by the practice of celibacy. The logical problem with the celibacy explanation is that the Shakers grew from a dozen to nearly 4000 Believers while practicing celibacy, so something else must have changed.

It was not the case that America as a whole became less interested in religion over the nineteenth century. It has been suggested that after the enthusiasms of the Second Great Awakening and the Burned-Over District, Americans began to prefer their religious practices to be more sedate, or at least sedentary. In this view, the extreme spiritualism of the Shakers became passé as American Christianity settled into an uneventful period of senescence. This is not really likely either, as the historical record of American Christianity is not a story of decline from the days of Finney. The research project of Finke and Stark (1986, 1989) includes an attempt to quantify American church membership from the Revolution to the present. They estimate that the proportion of Americans belonging to some church increased steadily (not quite monotonically, but close to it) from a tenth in 1776, to a third in 1850, to a half at the turn of

this century, to nearly two-thirds in 1980. Not only was most of the antebellum growth in "low church" denominations with practices somewhat similar to the Shakers (that is, the Methodists and Baptists), even after mid-century these were the groups whose share of American Protestants grew the most. The decline of the Shakers was independent of developments in the wider sphere of American religious practices.

The role of population in the decline was crucial. Although Shaker manufactures became steadily less viable in the market over the course of the century, the communities were not necessarily impoverished by this, as some commentators imply (Estes 1991). Shaker communities until the very end tended to be land-rich (Stein 1992, 253-256). Anecdotes indicate residual wealth among several communities. Several communities owned substantial positions in a variety of corporations (Stein 1992, 284-286). When Pleasant Hill broke up, trustees gave the community car to two young members who decided to marry rather than retreat to Union Village (Neal 1982). The seven surviving residents at South Union who declined to go East when that community was dissolved were given $10,000 in cash (Stein 1992, 255). Little evidence suggests that the Shakers ran out of resources before they ran out of Believers. To the contrary, it appears that people simply stopped converting to the Gospel Way.

An economic viewpoint can illustrate the questions of how and why communal societies rise and fall. Interesting and feasible questions which can be guided by economic theory include: Who were the

Shakers? What were they like in non-spiritual terms? Had they different levels of human capital from other contemporary Americans? How did they change between 1790 and the end of the nineteenth century? Why did they become Shakers? Why did some choose apostasy and others remain? How well did they live, and how did that affect recruiting and retention?

The dissertation is structured to provide answers to these questions. The first three chapters offer an introduction to the study of the Shakers. Chapter II provides historical background and an economic model which builds a framework for answers. Chapter III evaluates the manuscripts which provide the data for this analysis. The next three chapters lay out a demographic, epidemiologic, and physiological assessment of Shaker living standards. Chapter IV represents a first pass at assessing the quality of Shaker life by confirming a Shaker legend, that Believers lived unusually long lives. The patterns of disease, especially tuberculosis, that contributed to the mortality record are examined in Chapter V. Another biological marker for the quality of life, stature, is analyzed in Chapter VI. The final chapters use an economic approach to study the membership decision. In Chapter VII the relation between human capital in the form of literacy and the decision whether to remain or apostatize are considered. Chapter VIII uses new models of duration analysis to examine the effects on membership duration of individual members' characteristics. Chapter IX concludes with an assessment of the entire project and suggestions for further research.

CHAPTER II

THE SHAKERS IN HISTORICAL PERSPECTIVE

The communal phenomenon

In the nineteenth century alone some 200 communal societies were founded in the U.S. and survived long enough to leave some historical record. Even some of the shorter lived societies have secured a place in American history: Robert Owen's New Harmony, Indiana (1825-1827); Oberlin Colony (1833-1841), which was founded with Oberlin College; and the Transcendentalist presence at Brook Farm (1841-1847) and Fruitlands (1843-1848) are a few examples (Oved 1988). There were also successful eighteenth century societies such as Ephrata (1732-1813), Pennsylvania, which numbered 200 members around 1750, and even the seventeenth century Labadists lasted thirteen years in their Bohemia Manor (1683-1696), Maryland. Some longer lived societies recorded enough data to allow a rough picture of their size, as in Table 1 (Kanter 1972 246-248).

These communal societies had different backgrounds and formed different responses to issues confronting them all (Noyes 1870, Nordhoff 1875, Bestor 1950, Holloway 1951, and Oved 1988). Among those issues were religion, relations with the outside world, and

Table 1

Information on historical communal societies

Name	State	Dates	Population--Date
Shakers	various	1787-present	3800 in 1850
Harmony Society	PA, IN	1804-1904	800 in 1811
Amana	NY, IA	1843-1933	1800 in 1880
Zoar	OH	1817-1898	500 in 1853
St. Nazianz	WI	1854-1896	450 in 1856
Oneida Community	NY, CT	1848-1881	288 in 1880
Jerusalem	NY	1788-1821	250 in 1800
Hopedale	MA	1841-1856	229 in 1853
Bishop Hill	IL	1846-1860	1500 in 1854

sexuality. Less successful communities often failed to deal with either unexpected material gain (Bishop Hill, Hopedale) or the loss of their founder (Jerusalem), or simply never completely organized themselves (New Harmony, the Fourierists, Brook Farm).

Religion or ethnicity played a unifying role for most societies. With the exception of the Catholic St. Nazianz, most were rooted in some kind of Protestant Christianity. Some early communities like Ephrata and the Woman in the Wilderness had roots in German mystical spirituality. Several were initially supported by or descended from Quakers, including the Labadists, the Shakers, Jemima Wilkinson (the Universal Friend), who founded Jerusalem, and Zoar. The Harmonists, the Separatists at Zoar, and the True Inspired of Amana were German sectarian groups. The first two were Quietists who had broken from the Lutheran Church in Wurttemberg. Amana, despite its 1932 reorganization from commune to joint stock corporation, has

maintained its adherence to the German Pietism from which it descends. Bishop Hill was founded by Swedish Pietists. After its dissolution, several members became Shakers at Pleasant Hill. Oneida was only vaguely Christian. The Shakers were the only group to develop an entire theology to explain and support their communal separation, although the German societies also based their practice on the early Christian communities.

At some point these groups restricted interaction with the outside world. Most found rural living a sufficient barrier, although many suffered from mob violence or legal harassment, especially Oneida and the early Shakers. Beyond simply being different, pacifism was a frequent cause of persecution. The Shakers endured muster fines in the Wars of Revolution and 1812 and threats of arson and violence in Kentucky for their abolitionism and refusal to fight in the Civil War. Amana paid for substitutes in the Civil War, later regretting it, and in response to local suspicion of their German customs and pacifism, replaced German with English as their everyday language during the First World War.

Policy toward new members was an obvious point of commune-world interaction. The Shakers recruited, sending members to preach at revivals and taking in orphans. Oneida, no doubt due to the seemingly randy practice of Complex Marriage, did not lack for applicants (Nordhoff 1875, 264). They did not recruit, however, and after 1856 did not accept new members (Foster 1980, 110). Amana accepted new members only from Germany. Zoar based admission on their

need for the applicant's skills. The Harmonists took in very few new members (Holloway 1951, 153; Nixon 1936, 342; Oved 1988, 75).

To remain apart, some adjustment to the traditional nuclear family was necessary.[1] The Shakers simply did away with it all together. Even before coming to America, the small group of the first Shakers practiced celibacy, a custom continued to this day (Giles B. Avery in Whitson, ed. 1983, 164). At the other extreme was Oneida, where the surprisingly effective contraceptive method called "Male Continence" allowed multiple sexual partners and eugenic breeding (Foster 1980, 95). Both the Harmonists and the Zoarites instituted celibacy early in their histories, but after their communities' founding. Zoar then reverted to common family relations after 13 years. Since the Harmonists accepted few new members, their numbers gradually dwindled. Both societies, like the Shakers, adopted communalism only after their founding. Also like the Shakers, the Harmonists interviewed by Nordhoff said they enjoyed adopting children. Amana maintained family relations, although marriage was made a grim affair. Marrying an outsider caused temporary expulsion, with the right to apply for admission in a year; a newly married Inspirationist couple were dropped to the lowest social rank. Women at Amana were excluded from leadership, except for Barbara Heinemann,

1. The great exception being the Hutterites, who live communally and in families, and have grown to number over 20,000 since arriving in the North America in 1874.

one of three founders, and not allowed to vote (Holloway 1951, 173). Both Shaker celibacy and equality present a contrast.

Except for the Sabbathday Lake, Maine Shaker community, none of these exists today as a working commune, although the present day firms at Oneida and Amana descend from those communes. The Shakers were by far the largest and among the most prosperous of those groups living in what was then called communism. The Shakers interacted with many of these communities, both visiting and writing. Shaker influence on the others is best suggested by John Humphrey Noyes, founder of Oneida Community (Bestor 1970, 53):

> It is no more than bare justice to say that we are indebted to the Shakers more than to any or all other Social Architects of modern times. Their success has been the solid capital that has upheld all the paper theories, and counteracted the failures, of the French and English schools. It is very doubtful whether Owenism or Fourierism would have ever existed, or if they had, whether they would have ever moved the practical American nation, if the facts of Shakerism had not existed before them, and gone along with them.

Even today we find Shaker inspiration in things as diverse as Mormon hymnody, Copeland's Appalachian Spring, and furniture design (Chase 1936, Andrews and Andrews 1937). The numbers and longevity of the Shakers, as well as their influence on the communal movement and American society, make the Society a good place to begin the quantitative study of communalism.

Some historical background

Shakerism developed through the ecstatic religion of the French Prophets, the informal nature of Quaker prayer services, and the revivalism of the Great Awakening. Following the Revocation of the Edict of Nantes (1685), a group of radical Calvinists known as Camisards sought refuge in England. By the middle of the eighteenth century, their custom of shaking and shouting during prayer meetings had entered the practice of a small group in Manchester. Among them was Ann Lee (1736-1784), whom Shakers later came to accept as the fulfillment of Christ's promise to return to this world. Following violent acts against the group which culminated in a jail sentence for Ann, she led a group of nine Shakers to New York, arriving in August 1774. Aided by American Quakers, they obtained land in the wilderness near Albany. A blacksmith and a weaver in the group provided income, and Ann returned to New York to work as a washerwoman. A year later the entire colony, with Ann, moved to Niskeyuna, which would become the Shaker community of Watervliet.

Revivalism shaped Shaker location decisions. Spiritual fires ignited by the Great Awakening of the 1740s still smoldered in late eighteenth century New England (Marini 1982). Ann Lee, by now called Mother Ann, chose an excellent time and place to "open the testimony" in Niskeyuna in 1780, for the previous year had seen major New Light revivals at New Lebanon, New York and Hancock, Massachusetts. These revivals were led by two preachers from New Lebanon and Enfield, Connecticut. Both preachers, Samuel Johnson and Joseph Meacham, became leading Shakers, and the three locations, along with Niskeyuna,

were to hold the first four Shaker communities. Mother Ann's preaching mission of 1781-1783 to New England laid the foundation for communities at Harvard, Shirley, and Tyringham, Massachusetts (Stein 1992). Conversions among Free Will Baptists resulted in the New Hampshire communities, and from them came those at Alfred and Sabbathday Lake, Maine (Andrews 1953).

Communalism was first proposed by Father James Whitaker, Mother Ann's co-leader, in the winter of 1782-1783: "The time is come to give up yourselves and your all to God--your substance, your temporal property--to possess as though you possessed not. We shall have one meeting together." (Andrews 1953, 48) Joseph Meacham codified this doctrine in the first community covenant of 1795, signed by 43 Believers. It called for members to give all their worldly property to the "Joint interest of the Church", in which "all should have Just and Equal rights and Privileges, according to their needs...without Any difference being made on account of what any of us brought in." The reason for adopting communalism, however, was not "to gather and lay up an Interest of this World's goods; But what we become possessed of by Honest Industry, more than for our own support, to bestow to Charitable uses...and otherwise as the Gospel might require." (Andrews Collection no. 721; Andrews 1953, 62). Although members then forswore claims against this Joint Interest, in fact, the community provided apostates with the equivalent of what they had entered with (Andrews no. 736; WRHS II:B-98 and II:B-117). In addition, the covenants proved to be effective legal protection for

the Society when apostates sued to recover the increase in community wealth attributible to their labor.

By Shaker tradition, Mother Ann had several times prophesied that the next great expansion would be in the Southwest (White and Taylor 1904, 113; Ham 1962, 36). As it turned out, a giant anti-Calvinist revival in 1801 split eastern Kentucky Methodists and Presbyterians. The New Lebanon Ministry seized the rise of these New Lights as the long-awaited chance to open the Gospel in the West and sent three able missionaries. Their success in converting prominent Presbyterian ministers, who frequently then brought their flocks into the Society, ensured that Mother Ann would be proven right. The best known such converted minister was Richard McNemar, who became the greatest Western Shaker leader (Ham 1962, 46). The villages at Union Village and Watervliet, Ohio and Pleasant Hill and South Union, Kentucky were thus "gathered" in quick succession in 1806 and 1807. An epic journey to the prairie of western Indiana and another huge revival in 1810 gave the Shakers an outpost on the dynamic Western frontier. This was the ill-fated West Union, where ostensibly fruitful farmland became a malarial trap each spring as the flood waters of the Wabash receded.

Beginning in the 1820s both Eastern and Western Shakers attracted large numbers of converts who were by all accounts rather less committed to Shakerism (Brewer 1986; Ham 1962, 67). The resulting crowding led to two new Ohio villages: Whitewater, founded at the site of a Methodist revival in 1824, and North Union, founded on the farm of the large and prosperous Russell family in 1822.

Finally, a mission from New Lebanon to the Burned-over District of western New York resulted in the Sodus Bay community (1826), which later moved 80 miles southwest to Groveland (Wisbey 1982, 3-5; Cross 1950). Sodus Bay-Groveland became the Shaker contribution to a region of nationally known religious activity that included Charles Grandison Finney, violent anti-Masonic agitation, Jemima Wilkinson (the Universal Friend), Joseph Smith and the Book of Mormon, the occult rapping of the Fox sisters, William Miller and the Millerites, and the Oneida Community.

Several such religious and spiritual trends of the day affected the Shakers, despite their attempts to remain separate from the world. Grahamism in the 1830s divided communities, leading to dietary changes and morale problems. The Shaker revival that followed the Graham crisis focused on spiritual manifestations such as visits from George Washington and long dead Shaker leaders. This period, known as "Mother Ann's Work" after one of the spiritual visitors, lasted from 1837 to 1844 and was in some ways similar to the "rapping" phenomena of the young Fox sisters in Rochester, later in the forties (Cross 1950, 345-352). The last great spurt of Society-wide recruiting followed the failure of William Miller to usher in the Millennium in the middle forties. Disappointed Adventists who found the Shakers to be the true Millennial Church numbered perhaps 200 in the West, and in the East entered mostly at Harvard, Canterbury, and Enfield, New Hampshire (Brewer 1986, 153; Andrews 1953, 223).

Neither did the Shakers escape the trauma of the Civil War. The Kentucky societies suffered the most as pacifist abolitionists in

a border state. South Union lay near strategic roads and railroads (Neal 1965). Both villages were frequently occupied by armies Union and Confederate, soldiers of which were equally well fed at great cost to the Society. Further considerable losses to Western societies were the trade routes to the West and South, especially the river route to New Orleans. Eastern communities were also hurt; for example, Enfield, Connecticut's substantial seed trade with the South was lost (Andrews 1953, 228).

The numerical decline of the Shakers has continued since the Civil War. One by one the communities were abandoned to become state prisons, boarding schools, and even a ballpark. The popular image of the Society seems to focus on their chairs (and the prices they fetch at auction) and rather little on the small but growing number of professing Shakers (Stein 1992).

Beliefs, practices, organization, and industries

Shaker beliefs derive from the New Testament, especially Acts of the Apostles and some of Paul's letters, and radical new teachings of Mother Ann (Whitson 1983). The following is a list of seven major Shaker beliefs and practices; note also that the third and the seventh show some similarities between Quakers and the Society: (1) communal ownership of goods, (2) celibacy, (3) pacifism, (4) separation from the world, (5) confession of sins, (6) dual male/female Godhead, (7) equality of sexes and races. Communalism, although not instituted until after the founding of Watervliet, places the Shakers in the tradition of the earliest Christian communities, the great Catholic

monastic orders, and the Anabaptist Hutterites (Acts 4:32-35; Roehl 1968; Hostetler 1974). Although commentators usually connect Shaker celibacy to the traumatic deaths of Ann Lee's four infant children, it too is prominent in New Testament directives (1 Corinthians 7:29). Celibacy also aided their shared community life and sexual equality, the latter because it circumvented the inferior legal status of eighteenth and nineteenth century women. Shaker pacifism was well known; for example, Shaker Revolutionary War veterans failed to collect their pensions, which were worth over $40,000 to the Harvard and Shirley societies alone by 1840 (White and Taylor 1906, 174). Not that the money was lost. By the time of the Civil War draft, Elder Frederick Evans was able to use the $439,000 in uncollected Shaker pensions as leverage when he successfully petitioned President Lincoln for draft exemptions for Shaker men (Andrews 1953, 213).

Mother Ann's unique status as Christ-analog gave the Shakers doctrines of sexual equality more complete than those of any other Christian denomination. God was seen not just as Father, but also as Holy Mother Wisdom. Ann then preached equality of this God's human creatures, which her successors kept as Shaker practice. Shaker writings also assert general equality based on Galatians 3:27-28 (Whitson, ed. 1983, 162). Shaker leadership always included women, who became increasingly responsible for community finances over the course of the nineteenth century (Nickless and Nickless 1987). Work was generally divided along traditional gender lines, but not unequally: Harvard sisters were among the first Americans to have sewing machines (Gordon 1980, 31).

The Society's structure was both cooperative and hierarchical. The hierarchy is relatively easy to describe. At the top were the two Elders and two Eldresses at the Lead Ministry in New Lebanon. Answering to the Lead Ministry were five or six bishoprics, each related geographically and directed by two Bishopric Ministry Elders and Eldresses. Three to six communities constituted a bishopric. Its primary purpose was to see that directives from the Lead Ministry were followed in the communities (Brewer 1986, 49-56).

The structure of a community was somewhat more diffuse. It was directed by two or three trustees, the men called "office deacons" and the women "office sisters". The trustees transacted all business with the world, or authorized Believers to do so, from their own building, which minimized world-community interaction. The basic unit of Shaker life was not so much the community, however, but the Family. A Family numbered 50-150 Believers and was led by two Family Elders and two Family Eldresses. Each community had two to six Families. Families were autonomous in many ways, although not autarkic. They were themselves ordered to some extent, with the most committed Believers in the First, or Center, or Church Family, also called simply the Church, and surrounding them were other families named in relation to the Church Family: Second Family, South Family, etc. Each Family had its own farm land and set of shops for which it was responsible. Certain large scale projects like sawmills, flour mills, and schools were generally operated by one family for the rest of the community.

Also within a community were Orders, which further indicated the level of the member's commitment (Andrews 1953, chap. 4; Andrews and Andrews 1974, 23-27; Gordon 1980, Appendix II; and Ham 1962, 117-122). The Novitiate Order consisted of private families who still managed their own affairs. The Junior or Gathering Order was only conditionally communal, for leavers from it could still reclaim their property. The Senior or Church Order consisted of those who had signed the covenant. Within the New Lebanon Church Family, to be examined more closely later, was a First and Second Order, so named for local historical reasons. All Church Family members were fully covenanted, but it was sufficiently large to be divided into two families, which were called Orders.

Shakers employed cooperative work arrangements. Although work deacons and deaconesses determined what needed to be done on a given day, individual workers were reasonably free to choose their jobs. Shaker explanations of why their cooperative labor scheme worked so well closely resemble current analyses of successful worker participation. Peer pressure effectively prevented slacking, and decision making autonomy apparently encouraged workers to be productive.[2] Shaker theology described work as an act of consecration. The connection between work and worship is described by

2. Compare Green and Wells (1848, 68) to The Economist (1989), on peer pressure, and Andrews and Andrews (1974, 44-45) to Blinder (1989) on the value of worker participation.

a friend of the Shakers in the nineteenth century (Hepworth Dixon quoted in Andrews and Andrews 1974, 52):

> You see that the men who till these fields, who tend these gardens, who bind these sheaves, who train these vines, who plant these apple-trees, have been drawn into putting their love into the daily task; and you hear with no surprise that these toilers, ploughing and planting in their quaint garb, consider their labor on the soil as a part of their ritual, looking upon the earth as a stained and degraded sphere, which they have been called to redeem from corruption and restore to God.

Since it was assumed that a Shaker would work hard as his or her offering to God, no detailed records of labor quality or quantity were kept. If it turns out to be possible to examine the efficiency of Shaker organization cliometrically, the method of Atack (1987), which uses total factor productivity derived from a sample from the Census of Manufactures, may provide such insight. In any case, it was common for Shaker men to be skilled at several trades, and having "a gift in hand labor" was necessary for a Believer to be elevated to a position of leadership.

Division of labor by gender, as noted above, resulted in women working in textile production and food preserving; men worked in the fields and shops farming, tanning, or blacksmithing. Older Brothers and Sisters worked together in seed packaging. Other industries included medicinal herb growing and processing, and manufacturing of brooms, furniture, and oval boxes.

Shakers were quick to adopt useful technology. They were prolific inventors, although they disdained patents until 1828 as unnecessary restrictions of trade. Andrews and Andrews list some 40 Shaker inventions including a circular saw (1813), a thresher (1815),

a fire engine (1822), a silk reeling machine (1837), the clothes-pin (1856), a washing machine (1858), and a sash balance and lock (1870) (Andrews and Andrews 1974, 153 ff). Shaker villages acted as agricultural experiment stations, subscribing to the farm press, experimenting with feeds, crops, and fertilizers, and inviting neighbors to watch field trials of new farm machinery (Ham 1962, 235-237). Their breeding of fruits and livestock alike was famous, and so was their produce (Ham 1962, 234-237; Richmond no. 3280). In fact, in 1823 the American Farmer of Baltimore reported that Shaker cider sold in Boston for one hundred times the price of regular cider: "Such is the difference between good and very good!" (10 January 1823, p. 328).

A more somber benefit of Shaker technology was the capability to substitute machines for Brethren as the latter declined in number. Vadnais (1990) presents a provocative analysis of technology at New Lebanon. In his thesis the causation ran the other way: unregulated Shaker adoption of worldly technology disrupted communal bonds, which then led to community decline. In my opinion, the evidence suggests that causation ran according to the traditional view, that Shaker mechanization was the expression of a capital-for-labor substitution as labor grew scarce.

Genesis of the present study

The first systematic attempt to analyze the success and failure of communal societies in general was by Kanter (1973). It was not economic; it was subtitled "Communes and Utopias in Sociological

Perspective". She collected sociological statistics of 30 communities, which were labelled successful if they had lasted at least 25 years. Using categories like "ecological separation", "crossboundary control", and "institutionalized awe (ideology)", she attempted to find determinants of communal success. She concluded (p. 126):

> Successful nineteenth-century communities built strong commitment through the sacrifices and investments of members on behalf of the community; through renunciation, which discouraged extragroup ties and built a strong family feeling within the community; through mortification, which offered identity changes for members; and through transcendence, which gave meaning and direction to the community by means of ideological systems and authority structures. Such communities involved people instrumentally, emotionally, and morally, thereby building commitment to continued participation, to group cohesiveness, and to social control.

Left unanswered were questions of why people enter communes and why they decide to stay: what is it about a commune, specifically, a Shaker community, that makes it a better life?

Iannaccone (1992) attempted to answer such questions using economic analysis. Because he assumed that religion offers more utility as a group than as an individual activity, he modelled it as a club good with positive returns to "participatory crowding". That is, each member's participation creates positive externalities for all other members. But these externalities create two problems. First, they draw free riders who want to participate at a less than average level while enjoying the collective euphoria. Second, members ignore the externalities, exclusive of free-rider problems, and participate

at suboptimal levels. Iannaccone shows that a third-best solution to the externality problem is to raise the price of alternative non-religious activities. Thus, group determined prohibitions of certain common behaviors make participation in alternative activities more costly, which will mitigate these externality problems. More formally, he derives two propositions: (1.) If the members of a religious club are in a stable, symmetric Nash equilibrium, "increasing the cost of a non-club commodity S_j will increase club members' utility if the cross-price elasticity $\varepsilon_{r\pi_j}$ is sufficiently large relative to the commodity's expenditure share." (2.) In a population with two types of people, one of which participates less and values group quality less than the other, if the lower participation group is a sufficiently large proportion of the population, then "there will exist a signaling equilibrium in which [the high participation] people end up in groups that require their members to sacrifice a valued resource or opportunity and [the low participation] people end up in groups that require no such sacrifice." These propositions explain why the high participation-type Shakers implemented practices of celibacy, communalism, and pacifism, as we have seen above. Such requirements screened out all but the most serious Shakers.

I want to adapt this eminently plausible model to the particular case of the Shakers, 1787-1900. Iannaccone draws out some implications from his model and tests them with cross-sectional data

from California in the early 1960s. I want to incorporate dynamic elements into the model which will account for changing Shaker fortunes over time. I propose that the exogenous non-spiritual factor driving Shaker membership decisions was the changing opportunity cost of being a Shaker.

The model yields an important hypothesis which must be modified in light of an early empirical finding. Applied to the Shakers, the model claims that the Society was "more likely to attract members from among people with low wages and limited secular productivity than from among people with high wages and high secular productivity." (Iannaccone 1989) If the population from which the commune draws its population is relatively homogeneous in income terms, then there is no reason to expect the commune's membership to differ from the greater population. The modified claim is that the Shakers would draw in relatively more low wage and low secular productivity members the more unequal the distribution of resources in the economy. Lindert and Williamson (1980) found a trend toward increased inequality in the Early Republic. There is a substantial debate concerning this result, with opposition led by Soltow (1989). Even Soltow, however, found an increase in the wealth Gini coefficient from 1798 to 1860 (p. 43.) As American income inequality grew between the Revolution and the Civil War, the opportunity cost of being a Shaker grew correspondingly. In the early days of the Shakers, when the difference in quality of material life between Believers and non-Believers was not great, qualitative differences between Believers and the general population

were small also, unlike the unmodified model claim. For example, a study of wills and property records in Massachusetts showed reasonable similarity in wealth between the earliest Harvard Shakers and their townsmen (Marini 1982, 96-97).

To model entry and exit behavior, analysis is based on the hazard function, which, like the survivor function, is characterized by the density of duration lengths. For density $f(t)$ and distribution $F(t)$, the survivor function $S(t)=1-F(t)$ and the hazard function $\lambda(t)=f(t)/S(t)$. Thus the hazard function gives the conditional probability of the duration ending at time $t+dt$, given that it has lasted to time t. Variables representing economic factors in the remain/apostatize decision are included to test the implications of the model. The utility of an economic model of membership incentives communal history is assessed.

CHAPTER III

DATA SOURCES

Introduction

The Shakers left behind a substantial body of written records. These included membership lists, legal documents, business ledgers, diaries and journals, letters, and testimonies or spiritual biographies. This chapter begins by noting some of the more important archives holding these documents. The manuscripts most important for this dissertation are described, including some U.S. Census enumeration schedules. I then outline some Shaker motivations for record keeping.

Archives

The greatest collection of Shaker manuscripts is held by the Western Reserve Historical Society (WRHS), Cleveland. It contains 10,581 individual items, 1876 volumes, and occupies 122 linear feet of shelf space (Pike 1974, Gilreath 1973, and Richmond 1977). Part of this collection is a set of 16,848 alphabetized file cards which contain biographical information on each Shaker mentioned in the WRHS manuscripts (WRHS reel 123). This reel enabled researchers to make the first estimates of the total number of Shakers. However,

more recent detailed studies by Borges (1989) and Chapter VII in this dissertation indicate that the 16,848 figure included some communities that were undercounted by one-half to two-thirds. This collection is especially strong in useful records from the following communities: New Lebanon, Watervliet, New York, Groveland-Sodus Bay, and South Union. It is available on 122 reels of microfilm.

Following the Western Reserve are two smaller collections of similar size. The Library of Congress (LC) Shaker Collection consists of about 400 manuscript groups, about three-fourths of which are from Union Village. Other communities represented include Enfield, Connecticut, New Lebanon, and Canaan, a branch of New Lebanon. This collection is also available on microfilm, in 32 reels, and OSU Libraries also owns a set. The Edward Deming Andrews Memorial Shaker Collection is held by the H.F. du Pont Winterthur Museum. It consists of about 500 manuscript groups and is not available on microfilm. The quality of its manuscripts is, I think, superior to that of the LC, and it has been made much more useful by a sophisticated catalog (McKinstry 1987). I obtained much of the data used in this project while a Robinson Research Fellow at Winterthur, August 1990.

Two large libraries with important but smaller Shaker manuscript collections are available on microfilm. The New York Public Library (NYPL) has several signed covenants from Watervliet and New Lebanon and a six volume Daily Journal of Events covering Watervliet from 1830 to 1890. The New York State Library (NYSL), Albany, has a set of school records, children's indentures, and some

covenants from Watervliet. Most importantly, it has the first volume of Isaac N. Youngs' "Domestic Journal" (1834-1846), which includes detailed population, farm, and industrial data.

Two smaller libraries dedicated to Shakeriana contain substantial manuscript holdings. Neither the Shaker Museum, Old Chatham, New York (OC), nor Hancock Shaker Village, Pittsfield, Massachusetts (HSV), have detailed guides to their manuscripts. In a personal letter, HSV Librarian and former OC Librarian Robert F.W. Meader described the strengths of each collection. "Old Chatham has a fine collection of Shaker deeds; we have almost none at all; the same holds for indentures. Both of us have many covenants, but Old Chatham is the richer. We are well represented in account books, especially of Mt. Lebanon, but no field day books and very few census records."

Finally, in Columbus are the Ohio Historical Society (OHS) and the State Library. The former's collection includes school records, covenants, and novice agreements mostly from North Union, but also from Union Village and Pleasant Hill. The OHS Library also holds microfilm of census enumeration manuscripts, to be used in Chapter VII.

Manuscripts

This section describes manuscripts used in the dissertation. They consist of volumes, whole or parts, individual items, and U.S. Census data.

Five manuscript volumes which are the work of one writer stand out. These are "Names and Ages of those who were gathered into the Church...", "Concise View of the Church of God...", and the three volume "Domestic Journal of Daily Occurrences", all by Isaac N. Youngs. The first of these was updated into the 1880s by John M. Brown, Youngs's successor as New Lebanon Church Family scribe. It provides a number in order (i.e., 1 through 1069); name of the Shaker; birthdate; town, county, and state of birth; date of admission; remarks; and date of death or apostasy. It covers every New Lebanon Church Family member from 1787 to 1881. A typical entry reads: "266...Luther Copley ...Dec. 14,1800...Pittsford, Rutland, Vermont...Dec. 12, 1807...D'd April 8, 1851." "Names and Ages..." has 1069 entries in 210 pages. A copy is in the Andrews Collection at Winterthur, no. 1078.

The "Concise View" (Andrews no. 861) is a history of the Society, written around 1858. It provides detailed descriptions of community industries, Mother Ann's Work, and daily life and practices of Shakerdom's first eight decades. Since nearly every recent Shaker scholar, starting with Andrews himself, has had to consult it, it seems odd that Winterthur has not published it. It appears that the Shakers had at one time planned to do just that, based on the marginalia and the front cover's inscription, "Should not this book be printed in coming years?"

Young's "Domestic Journal" provides additional information to form a population cohort. Thanks to his quinquennial censuses of the

Church Family, we can associate occupations and heights with many of the above names. A typical entry gives name, age, birthday, height, and occupation. Thus, from 1855: "Samuel White...31...July 15...5'7"... horse teamster." From "Names and Ages...", where White is number 387, we know also that he was born in Worcestershire, England; was admitted 5 November 1833 at the age of 9; and died as a Shaker 20 August 1869, at the age of 45. The first volume of "Domestic Journal" is NYSL no. 13500, which I have seen on microfilm and copied. It does indeed have the census information, as Youngs promised in the second volume. That and the third volume are in WRHS, V:B-70 and V:B-71.

We might want to know more about a Shaker like Samuel White. Was he literate? How did he enter--under indenture or with his parents? Another question can be asked of apostates or those who entered as adults: How wealthy were they? Literacy and mode of entry can be determined by two different kinds of documents, indentures and covenants. The latter are discussed in Chapter VII; Samuel White signed the covenant NYPL no. 50 on 30 April 1846. He may also have signed one of the 26 New Lebanon covenants held at OC covering from 1816 to 1910. An indenture was a legally binding agreement between a community's trustees and a child's parents. The Shakers agreed to raise the child and teach him or her an agreed-upon skill. The parents agreed not to try to take the child back. This interesting arrangement is discussed further in Chapter VII. An indenture usually included the following information: Names of parent(s) and child and

town, county, and state of their residence, date, child's birthday, age at release from indenture (18 for girls, 21 for boys), and the trade to be taught. The parent(s) signed or marked, frequently the child signed or marked (usually the latter, of course). There are about 150 New Lebanon indentures in the WRHS and Winterthur collections, and about 400 in total, including those at OHS, NYSL, and the Kentucky Library at Western Kentucky University.

Motivations for record keeping

The Shakers kept records for several reasons. The Millennial Laws were statutes intended to guide Shaker life. They were first codified by Elder Freegift Wells in 1821, and revised for broad distribution in 1845 (Andrews 1953 appendix). Record keeping is an occasional topic. Section IV, number 5 recommends that Deacons and Trustees keep "regular and exact" accounts to "avoid controversies with the world". Numbers 21 and 28 require Trustees to reveal losses and otherwise report on business to their superiors. Interestingly, number 18 allows the Trustees and Deacons to conceal transactions from "common members". This lack of fiduciary responsibility, no doubt, induced the Shakers not to issue standard business reports or to keep standard accounting records, unlike Oneida and the Harmonists, which kept relatively good accounts, but similar to Zoar, which did not (Holloway 1951, 192-194; Flesher and Flesher 1984; Nordhoff 1875, 397). Most of the Millennial Laws were honored, and a few honored in

the breach (VIII.2 forbade grafting of plants, a common experiment). But record keeping orders seem to have been taken seriously.

The desire to "avoid controversies with the world" led directly to the use of certain legal documents. These include covenants, indentures, wills, and discharges as described above. Their effectiveness in court challenges, usually quite good, is outlined in a legal bibliography within Richmond (1977).

Another controversy, perhaps unavoidable, led to an interesting set of stock and output records. Fear of a Shaker landowning "monopoly" induced the New York State legislature to require Shaker trustees to report annually on land holdings, the value of community property, wealth, and output.[1] The results were WRHS II:B-38 for New Lebanon (1839-1864) and II:B-111 for Watervliet (1839-1879). These tell us, for example, that the value of all non real estate wealth in the New Lebanon Church Family was $17,274.06 on 1 January 1839, that of the New Lebanon community was $41,742.85, and real estate of the community totalled 2292 acres worth $68,225 including buildings. Assessing the value of these manuscripts to form time series of wealth is a post-dissertation project. The values, as opposed to quantities of Shaker assets were not reported consistently from year to year.

1. The Shaker experience is eerily similar to anti-Hutterite land laws in South Dakota, Alberta, and Saskatchewan. See Hostetler (1974), pp. 132-136.

Shakers were also aware of the advantages of good public relations. One use of well kept population records was to publicize an unquestionably positive aspect of Shaker life: longevity, which will be discussed in detail in Chapter IV. One Shaker publication which promoted long life with some statistics to back up its claims was Giles B. Avery's "Longevity of Virgin Celibates" (Andrews no. 340, c. 1889). Another means of nineteenth century publicity was the broadside; one example from South Union lists longevity as part of the Shaker good life. Visitors often noted the numbers of older Shakers, which the community could then corroborate with data (Nordhoff 1875, 214; Andrews 1953, 197). Of course, the Shakers may have selectively sampled from their data when choosing ages at death to publicize. The next chapter uses a larger, more representative sample to study this issue.

Another use of population data was to chart the numerical progress of the Society, which, before the Civil War at least, reflected positively upon the Shakers. Green and Wells projected rather expansively: "We are far from feeling a disposition to proclaim our numbers to the world; but the inquiries which are continuously made by strangers, to ascertain our numbers and the local situation of the different Societies in our communion, have induced us to give a statement of these particulars." They exaggerate somewhat and estimate that the membership at their writing in 1848 "exceeds 4000...and the number is gradually increasing" (Green and Wells 1848, 84).

Recording data of all kinds with a near passion beyond the Millennial Laws or publicity was one remarkable man, Isaac N. Youngs (1794-1865). A Shaker scholar summarizes (Sprigg, introduction, in Gifford, ed. 1989):

> Intelligent, articulate, and possessed of many abilities, Youngs was a highly regarded Believer. Brought by his family into the Shakers when he was a baby, Youngs had spent all but the first six months of his life with the Shakers.
>
> Few other Shakers knew the life of the village as well as Youngs. His skill with words and his powers of observation earned him the responsibility of recording the events of daily life in the Church Family Record. He was a prolific writer, devoted to the preservation of knowledge. Isaac Youngs's historical account of his community and his other writings have proved of immense value to scholars. It is not an overstatement to say that if no other Shaker records survived, Youngs's work by itself would present a comprehensive picture of Shaker life.

The best data in this study were recorded by Youngs. He has given us a complete population record of the New Lebanon Church Family in "Names and Ages of those who were gathered into the Church..." At the end of each year in "Domestic Journal of Daily Occurrences" he provides a detailed breakdown of farm stock and output, and some industrial output. Every five years he provides a census of the Church Family, for most members including heights and occupations. The motivation for keeping records in such detail is hard to determine, except for the spiritual desire to consecrate his work as scribe. Perhaps heights were recorded to help guide Family tailors, although tailor records themselves seem to include every measurement but heights (WRHS III:B-9, 10, 24, and 25).

Probably the body of records maintained was even larger, but occasional fires and lack of concern in declining communities resulted in losses of unknown magnitude. An early Shaker scholar, J.P. MacLean, observed that "A wise edict went forth from the New Lebanon Ministry that full records of the different communities should be kept....But nowhere, either directly or indirectly, do I find an injunction that such records shall be preserved." In fact, MacLean charged, Union Village had intentionally burned some records (MacLean 1907). Fortunately, such behavior was not widespread. Nevertheless, Shaker records are a patchwork, with some activities revealed clearly and others not at all.

Biases in Shaker records are do not seem to present a problem. Some potential biases are obvious. Their reporting of the age at death of elderly Shakers is especially suspect, for example. This data was a part of Shaker apologetics, and Shaker publicists had every reason to omit deaths of youthful members. We have good reason to look at the claim of longevity skeptically. Hence, Chapter IV uses the entire population record for several communities to estimate life tables and age adjusted death rates. But this begs the question of the population records' accuracy. A cursory comparison of Believers entered into "Names and ages..." and dates of their supposed entrance in "Domestic journal of important events" reveals no omissions. The independence of these sources is unknown and likely not great, as one scribe like Isaac N. Youngs may have provided the information for both. There is no evidence that the Shakers attempted to minimize the

magnitude of their population decline by, say, omitting the names of apostatizing members. To the contrary, they seem to have saved their choicest invective for "backsliders" and used them as lessons in the results of straying from the Gospel Path.

Since Shaker manuscript record was not generally written for public consumption, or even widespread reading within the Society, we can assume that intentional biases were few. Letters with details of epidemics (Chapter V) were meant to inform other communities of local news. Isaac N. Youngs's height measurements seem to have been done simply to satisfy his wide-ranging curiosity (Chapter VI). The probationary forms that were signed or marked by prospective Believers at North Union (Chapter VII) seem to constitute a nearly complete record of members ever resident there. Some very short term members present at dates of U.S. Census did not leave a mark/signature, but these represent no more than two or three percent of members at any one Census date. Other potential biases are discussed in the chapter dealing with those manuscripts.

CHAPTER IV

LIVING STANDARDS: MORTALITY

The Shakers themselves offered one consistent claim as proof of the salubrity of the Shaker Way: they lived longer than non-Shakers (Avery c.1889). This gives us an appropriate beginning for an examination of how well they lived. Mortality records are usually quite reliable, and often offer the only way to quantify the quality of life in a past community. This chapter shows that the Shaker mortality record supports their claim of superior longevity.

Average age at death was a simple statistic that even the Shakers could calculate and publicize, so I take them on their own terms and present age at death for Shakers and some of their neighbors in Table 1. Clearly, these New England Shakers died at later ages than the small sample of contemporary Massachusetts residents obtained by Dethlefsen from cemetery gravestones and town vital records. This is a very helpful first pass. Dethlefsen has reported a mortality measure common in the anthropological literature, and the Shakers turn out to be older at death in each time period. The problem with age at death, and the reason it is so rarely used, is that a simple arithmetic mean will allow high infant mortality to skew the sample

mean to a low number that in some sense does not represent the community's mortality experience.

This shortcoming is magnified when two groups with such different demographic structures as the Shakers and the Massachusetts towns are compared. The Shakers, as a result of their celibacy, had virtually no newborns and few infants or young children residing in their communities, which age groups had very high mortality in the nineteenth century. So perhaps the age at death difference between Shakers and other Americans was not due to mortality, but to their demographic structure.

Table 2 suggests not. To keep the question of infant and child mortality from obscuring relevant mortality differences, I present data on years of expected remaining life for a 20 to 29 year old in several different communities. Many kinds of places that have something in common with Shaker communities are represented, ranging from small New England towns to a big New England city and from another communal society to the entire United States. The results are again consistently in support of the Shaker claim to longevity. Even after leaping past the age groups that formed the greatest demographic difference between the Society and the World, young Shakers could expect to live at least a decade longer than their cohorts in the World.

Of course, as a voluntary society, the Shakers experienced withdrawals or apostasies that were a much larger proportion of their population than any emigration from a national population. For

example, elsewhere I have noted that of the residents of the North Union, Ohio, community present at the 1850 and 1860 censuses, two-fifths would eventually apostatize (see Chapter VII below). Hence, I hesitate to use model life tables based on estimated age group mortality rates, because these require an assumption of stationary population. Smaby (1989) used model life tables in her estimates of longevity among the North Carolina Moravians, because this communal group had a much more stable population than the Shakers. Instead, I estimate abridged longitudinal or epidemiologic life tables (Kahn 1987, 144), in which apostates are treated as right-censored observations. The full tables are presented in Table 3, which shows that the substantial Shaker longevity advantage in young adulthood largely disappears by old age. The results of the life table analysis strongly support the Shaker claim of unusually long lives.

An odd and noteworthy result in Tables 3 and 4 concerns sex-specific longevity differentials. In most human populations, women live longer than men. Among Shakers under 50 years of age, Sisters could expect to live slightly less than Brethren, however. Possible reasons for this difference, which include differing disease and net nutritional environments, are discussed in the following two chapters. Superior male longevity is especially odd in a community of celibates, where women were not at risk of dying in childbirth.

Because the difference in longevity is so great, it is worthwhile to examine the claim from one more perspective, death rates. As with age, two estimates are available, one rather crude and

one which takes into account the demographic differences between the Shakers and the World. The most reliable mortality rates for America at this time are taken from Massachusetts vital statistics register which began in 1842 (Meeker 1972). They are not perfect, but suffice after data from the 1840s are ignored (which appear to be off by as much as half) and the rest are adjusted for undercounting deaths by roughly fifteen percent in 1850, eight percent in 1860, and three to four percent in 1869 (Meeker 1972, Vinovskis 1980).

In Table 5, death rates are given in deaths per 1000 people for Massachusetts and per 1000 person-years for three Shaker communities with well documented mortality statistics (see Chapter VI below). The Shaker communities have higher crude death rates than Massachusetts in each of the three time periods. However, this too may be the result of unusual Shaker demographics, and as the age-adjusted death rate suggests, the higher Shaker death rates are indeed artifacts. The age adjustment was done indirectly and yielded the age-adjusted death rate (AADR). The age group specific death rates in Massachusetts were imposed on the Shaker age group populations yielding the number of expected deaths by age group. The age-adjusted death rate is the sum of these over all the age groups. (The Standardized Mortality Ratio, more common in epidemiologic studies, is the ratio of the age-adjusted to crude death rates.) Again, after adjusting for the unusual Shaker demographic structure, mortality of the Shakers is less than that of a comparable group of Americans. The

only conclusion possible is that Shaker longevity was a real phenomenon.

Shakerdom was not uniformly superior, however; the data at the bottom of Table 4 show that into the 1860s, mortality among young adults was worse for the Shakers than in the World. Since these Shakers, as I noted above, could expect to live longer than most Americans, here is a paradox. The resolution is in the far smaller age specific death rates among those over 30 years of age. Factors behind this differential mortality, namely disease patterns in Shaker communities, deserve a closer look, and it is to that I shall now turn.

CHAPTER V

LIVING STANDARDS: DISEASE

Introduction

To examine the Shakers from an economic point of view assumes some rational choice on the part of Believers, guided by various incentives. It is important to establish the incentives provided by living conditions in the Shaker communities and in the World. Since the usual incentives such as real wages are not really applicable in a commune without wage labor, other measures related to health of members can be useful. These figures take on special interest for communards whose popular image centers on comfortable prosperity. In addition, knowledge of conditions that produced these particular health environments allows the communities to act as a kind of laboratory, to isolate certain conditions that led to certain health outcomes. Hence, this chapter combines techniques of demography and epidemiology to examine the Shaker health environment. A context for the Shaker health and nutritional environment requires reference to disease and medical treatments elsewhere in America, which in turn provides another approach to enter the American standard of living debate.

The previous chapter described superior Shaker longevity. The Shaker mortality record expressed itself in patterns of causes of death. Shakers generally had lower prevalence of the infectious diseases that were technologically preventable. For example, Shaker skill at water provision kept cholera and typhoid at very low levels (Tables 6 and 7). Several communities carefully constructed rather long aqueducts leading from pure underground springs (Wingate 1880). The Shakers themselves were somewhat aware of the health effects of pure water, for example, when Elijah Myrick attributed the decline in scrofula, the lymphatic tuberculosis which is not water borne, at Harvard to its improved water supplies (Horgan 1987). Shaker cleanliness prevented serious problems with typhus, a louse-borne disease associated with poor sanitation. Waste products, including urine for later use in tanning and waste to be recycled as fertilizer, were disposed of at a distance from the dwellings (Andrews and Andrews 1974). Cotton and linen underwear for brothers (drawers) and sisters ("shimmies") were plentiful and frequently washed (Gordon 1980).

The great Shaker disease, as in the World, was tuberculosis. Tuberculosis as a window on past health conditions has in the last four decades generated a rich descriptive and analytic literature. Much of our knowledge of the rise of the disease focuses on the crowded and dirty cities of the late eighteenth through middle nineteenth centuries (Dubos and Dubos 1987, 197-207; Grigg 1958). Explanations of the decline in tuberculosis mortality include improvements of two broad types, living standards and public health

measures. Direct medical treatment is generally not thought to have been a factor since the decline had been under way for some time when Koch discovered the tubercle bacillus in 1882. The living standards side, as presented by McKeown, has proposed that the decline followed broad improvements in the quality of life, especially in nutrition and less crowded housing (McKeown 1979, chapter 4; Fogel 1987). A recent contribution in favor of public health measures countered that segregation of the ill in sanatoria was the prime mover in the mortality decline (Wilson 1991; Livi-Bacci 1991). The Duboses appeared in the middle ground, endorsing the effects of living standards while acknowledging the contributions of the tuberculosis movement (Tomes 1990).

Shaker communal societies of the nineteenth century provide a potential laboratory in which to test these competing claims. The Shakers organized some eighteen communal societies which thrived for several decades, most for over a century, with thousands of members. This chapter examines the surprising phenomenon of the Shakers, who were best known for their music and furniture, dying of tuberculosis at very high rates. The "White Plague" in particular and disease in general offer an important and overlooked means of examining how the Shakers viewed the "World" outside their communes. By illustrating the interaction between tuberculosis and the Shaker communities over time, we can see the effect of changes in crowding and diet on the community's health. Examining changes in Shaker housing, diet, and care of the sick in turn provides a crude but incisive way of

isolating the role of each, thus shedding some light on their relative importance in the greater American disease environment.

Data sources and their reliability

In his history of antebellum health, Cassedy gave the Shakers only passing mention in the section entitled "Demography in Utopia" for good reason (Cassedy 1986, 85). Although some Shaker statistical records were comparable to those of other communal societies, several factors have prevented their scholarly exploitation. Some of these fairly autonomous communities kept very detailed records and some simply did not, and working against the survival of much of these manuscripts was the prolonged decline of the Society. As each community closed, their records were often treated with indifference, some given to local historical societies, some to surviving communities, and some destroyed. As a result, it is difficult to form a full statistical picture of any one community; however, taking those records that have survived as a composite picture of a representative Shaker community, with appropriate caution, yields insights into their disease environment.

Many such writings are extant. Propaganda pamphlets revealed how the Shakers presented their claims of salubrity. More useful are journals and letters never intended to be read by the public, if by anyone at all, which describe epidemics and treatments. Membership books giving birthdates and places, entrance and death dates probably proceeded from the Shaker love of order, as did the most important

sources of data for this essay, three "Obituaries" giving causes of death for about two-thirds of those members who died at three communities. The communities are, in order of founding, Enfield, Connecticut (1790); Tyringham, Massachusetts (1792); and North Union, Ohio (1822) (WRHS III:A-3, III:A-12, and III:B-29). They provide a range of the Shaker experience geographically and a representative sample of both sizes of communities and proportions of Shakers in the East and the West. The patterns of deaths reported by these three are roughly corroborated by a recent study which reported cause of death for nearly all those dying as Shakers at Canterbury, New Hampshire (Borges 1989).

Evaluation of these records' reliability naturally leads to discussion of the Shaker attitude toward the science of medicine, such as it was in antebellum America. Later in the essay I will describe their sectarian tendencies. For the moment it is important to know that they followed health events in the outside world, they provided vaccinations upon hearing of a smallpox outbreak, they occasionally conducted autopsies, and most communities had some members with some medical training.

Shakers followed the development of epidemics outside their communities both great and small. A Harvard correspondent of 1813 observed an epidemic of measles "all around us, but not among us" (WRHS IV:A-21, 5 May 1813). The 1832 nationwide cholera epidemic seems to have passed over Shaker villages. In an entry of 20 June, a New Lebanon journalist recorded the approach of the cholera from

Montreal, which was first known in Albany on Friday 15 June, and by the next day was common knowledge in New York City. He further recorded that Albany had suffered 250 cholera deaths in July alone and that Watervliet had accepted twenty refugees fleeing there from Albany, but mentioned not one case of cholera at either New Lebanon or Watervliet (Rosenberg, 1987, 23, 36; WRHS V:B-60). Even though New York was the hardest hit state in the Union, as the Hudson River and Erie Canal acted as conduits of the disease, journals and letters written at the other two New York communities of Watervliet and Sodus Bay are quiet on the topic. Such memories likely encouraged Elder Frederick Evans to claim in 1874 that "the cholera has never yet touched a Shaker village" (Nordhoff 1875, 160). Actually, in addition to the spring 1835 outbreak at Harvard North Family, the physicians' journal there cites four other cases of cholera.

The Shakers had very little experience with smallpox, as was becoming true of much of the nation. Vaccination with cowpox in America had begun early in the nineteenth century, just after Jenner's discovery became known, and spread steadily. At least some Shakers participated in this trend. At Harvard on 30 December 1839, Lorenzo Dow Grosvenor "vaccinated 17 of this family for the kind pock, in consequence of the small pock being in this country" (WRHS V:B-40). The source and effectiveness of the vaccine are unknown. Although no one reported to the Physician's Office with smallpox in the next four years in which this journal was kept, a 22 year old Irish sister, Margaret McGooden, became sick with "Kine Pox" twelve days later (WRHS

V:B-41, 10 January 1840). Possibly she suffered a reaction to the vaccine.

That Shakers vaccinated some members implies a scientific attitude toward medicine that should reflect well on the quality of their medical information. They also allowed autopsies to be performed on occasion. The death in 1837 of Brother Garret K. Lawrence, the New Lebanon community physician, puzzled Believers. A journalist recorded that Lawrence's "disorder was so singular that it was judged best to open the body for the satisfaction of the physicians and the good of others." Some of the autopsy results are not quite understandable in modern terms, but seem to have shocked the community scribe: "His bowels [had] grown together in one shapeless mass with scarcely any resemblance of the natural form!" A less hyperbolic journalist, Giles B. Avery, noted the removal of an abdominal tumor "about the size of a qt. basin" and a gallstone "about the size of a large walnut" (WRHS IV:A-37, 26 February 1837; WRHS V:B-97, 4 April 1837). Another autopsy quite clearly indicated the cause of death. In March 1837 at Harvard, Abigail Babbitt died at only 22 years of age, after complaining of shortness of breath and coughing attacks. An autopsy performed by a local, non-Shaker doctor found that "her heart case was filled with water...and [her] heart the Dr. said was a third part too large," which suggests congestive heart failure (WRHS V:B-41, 3 March 1837).

Data on congestive heart failure also suggests that the Shaker data are credible. Its symptoms, if untreated, include the gathering

of water in various parts of the body visible on the outside, for example, around the ankles. This water (Greek: hydrops) gave the condition the name by which it was formerly known, dropsy. Dropsy is helpful in making a quantitative check on the reliability of Shaker cause of death records, because standards for its diagnosis were both easy to apply and consistent over time. Further, the proportions of deaths in the United States attributed to dropsy or congestive heart failure have remained in the two to five percent range from the early eighteenth century to the present time (Estes 1986, 143-145). In particular, between 1785 and 1820, the proportion of Shaker deaths attributed to dropsy was 4.1 percent of the 98 deaths at Enfield and Tyringham, and in the entire period covered by the three Obituaries, 3.7 percent of the 507 deaths were attributed to dropsy. At Canterbury, the proportion was 4.6 percent of 304 deaths (Borges 1988, 223). Since the proportion of Shaker dropsy deaths falls within the "normal" range, the credibility of the data is enhanced.

Another source of inference regarding the reliability of these data is the medical background of Shaker physicians. Some Shaker physicians held the M.D. degree, and some at least claimed to. At Canterbury in 1813, Brother Thomas Corbett studied with a physician elsewhere in New Hampshire, and may have attended Harvard Medical School without graduating (Estes 1991, 166). Corbett occasionally visited other Shaker communities as a medical consultant (WRHS V:B-41, 4 April 1840). Barnabas Hinckley, who was Garret Lawrence's successor as New Lebanon's physician, received his M.D. from the Berkshire

Medical College in nearby Pittsfield, Massachusetts (Gifford 1989, 52). Berkshire followed an Eclectic curriculum, which combined teachings of many of the medical sects with some regular practices. What Brother Hinckley's degree added to his practice is questionable, since he received it twenty one years after his appointment as community physician! Many Shaker physicians had no special training. The Harvard physicians' journal of 1834-1843 indicates that for most of those physicians, their job was part of the typical Shaker job rotation, similar to Andrews' description of Elizabeth Lovegrove's time as nurse at New Lebanon (Andrews 1953, 111). At North Union, two novices signed their first covenant as M.D., one in 1861 and one in 1874, one of whom is undoubtedly the unnamed Yale graduate mentioned by MacLean in his history of that community (OHS Collection 119, Box 14; MacLean 1907, 144). Earlier, John Stark, a German immigrant who had practiced medicine before entering North Union, had been a member there between 1836 and 1853 (WRHS V:B-177, 28 July 1836).

To compare the extent of consumption among the Shakers with that in the outside world requires data not just on the disease but also population in both Shakerdom and elsewhere in America. Although some Shaker communities created membership records in great detail, the three that kept the Obituaries did not. Fortunately, the enumeration manucripts of the U.S. Census provide decennial population counts. For Eastern communities these have been tabulated and published, and the data for Ohio can be found directly in the microfilmed manuscripts themselves (Brewer 1986). Census records have

previously helped debunk some old Shaker chestnuts; for example, the peak Shaker population is often incorrectly stated as 6000 (Estes 1991, 181). Actually, the census enumerators in 1850 were charged with estimating the size of religious congregations by counting the number of seats in churches. Shaker meeting halls were built to be spacious in order to accommodate the vigorous worship activities for which the group was named. Thus the enumerators saw room in meeting halls for many more people than the 3842 who actually lived as Shakers at census time, 1850 (Bainbridge 1984).

Consumption mortality data can be found primarily in the Massachusetts vital statistics annuals, the only statewide series from 1850. These did not cover the entire state, but the extent of the mortality undercount has been estimated at 15 percent in 1850, falling to eight percent in 1860, and three to four percent by 1869 (Gutman cited in Meeker 1972 and Vinovskis 1981). Deaths involving tuberculosis were still possibly undercounted, because they were not recognized as such or because survivors wanted to avoid the stigma of consumption. On the other hand, consumption deaths may have been overstated by use of the term as a catch-all (Duffy 1974, 258). In this paper, I will follow the Duboses in treating these data as fairly representative due to the generally identifiable nature of the disease through its symptoms of wasting, coughing up blood, night fevers, and so on, and the counterbalancing nature of the biases mentioned above (Dubos and Dubos 1989, 229).

Mortality results

I have taken some time to establish the reliability of the data because the results are so surprising. As Figure 1 shows, the Shakers suffered from elevated rates of death from consumption. Such rates reflect not at all the popular image of the Shakers, which seems to focus on the artifacts of their material culture. This and the next section of the essay are devoted to rationalizing these numbers, to explaining why it should make sense that tuberculosis was an important part of nineteenth century communes.

It is important to emphasize that overall Shaker mortality was considerably different from that due to consumption. The Shakers themselves claimed to live unusually long lives (Avery c.1889). In fact, as Chapter IV shows, comparisons of age at death, expected remaining years at age 20, and age adjusted mortality rates substantiate the Shaker claim of superior longevity. Tuberculosis did not make Shakerdom a more lethal place overall. It was, however, the great endemic disease of the day, its interactions with the communal environment are enlightening, and it killed Shakers at high rates in interesting patterns.

Three components of these high mortality patterns deserve closer examination. The Shaker consumption death rates were high relative to those in Massachusetts and in America's largest cities, which in turn were probably higher than those elsewhere in the country. Thus the Shaker death rates from consumption were indeed high. Second, Shaker youth died of consumption at greater rates than

young non-Shakers, who themselves died of consumption at rates above those of the general population. Third, Shaker sisters died of consumption at rates higher than Shaker Brethren. Shattuck observed the sexual disparity in Massachusetts consumption deaths; the Shaker difference was even greater (Shattuck 1850, 94-96).

The Shaker tuberculosis death rates exceeded the worldly rates in all but one of the decades in which at least half the Shaker deaths were attributed to some cause. In some years the difference was nearly double. Further, the comparison populations are not control groups that represent the median national consumption experience. They were themselves suspected of having greater than average prevalence of the disease. New York, Boston, and Philadelphia were among the first places in the United States to use bills of mortality to record and tabulate causes of death. As three of the nation's largest cities, they also offered the kind of urban environment in which consumption flourished. Since tuberculosis was a notoriously urban disease, these rates are probably higher than those for the rest of the mostly rural country. Consumption was an important cause of death in rural areas also, including western Massachusetts (Meindl and Swedlund 1977). The Massachusetts rates were probably higher than elsewhere due to the presence of the many textile mills, where crowded dormitory and work conditions combined with increasing numbers of previously unexposed Irish immigrants to produce a high prevalence of the disease (Dubos and Dubos 1989, 199-203). Thus these Shakers died

at higher rates than did some of those Americans who were most likely to suffer from consumption.

The fate of Shaker youth raises the question of the unusual demographic structure of Shaker communities, which tended to have few very young children. Comparing death rates in two populations with different age structures can be misleading, but in this case it is not. Indirectly adjusting for age differences between the larger Massachusetts and the celibate Shaker populations yields a measure of the relative mortality of consumption holding demographic differences constant. This age adjusted death rate may be more recognizable as the denominator in a Standardized Mortality Ratio (Mausner and Kramer 1985, 341-344). Indirect age adjustment involves imposing the Massachusetts age-specific death rates upon the Shaker communities' age structure. The results in Table 9 show that the Shakers were still nearly half again as likely to die of consumption at mid-century as Massachusetts residents, who themselves, as previously noted, were probably more at risk of dying from consumption than other Americans.

Examination of the effects of tuberculosis at different ages reveals that Shaker youths were much more likely than Worldly youths to die of consumption. The death rate among Shaker 15 to 29 year olds was also much higher than the rate among all Shakers (Table 9), but the disease was well known for attacking young adults especially severely. In the forties and fifties, when the death rate among Massachusetts 15 to 29 year olds was slightly over five per thousand annually, the rate in the three Shaker communities was 9.6 per

thousand, nearly twice as great. This important difference is much greater than in the Massachusetts data, and may represent a key to understanding their numerical decline. Brewer and Bainbridge emphasized specific demographic factors in the decline, as communities retained very old Believers and failed to socialize the young they adopted. It is interesting to speculate that the decline in numbers of young Shakers is related to the extensive consumption prevalence, as the disease both directly diminished the number of young Shaker adults and provided an incentive for the remainder to leave the community for the relatively less tuberculous World. At the same time, although some Believers and prospective members did weigh health conditions in their decisions to join, there is no evidence that apostates actually left communities due to fear of consumption (Stein, ed. 1985). By the 1860s, the Shaker youth consumption death rate began to decline, but the Shaker youth population had been in decline since the 1830s, and the falling death rate benefitted ever fewer young Shakers.

The Shaker doctrine of sexual equality was easier to include in organizational schemes than in health conditions. As noted in the previous chapter, a Shaker Sister under 40 years of age could expect to live two to three years less than a Brother of the same age, although among older Shakers an advantage of about two years belonged to Sisters. One source of the difference for the younger women was early death from consumption. Table 7 shows that the ratio of female to male consumption death rates in the three Shaker communities

covered averaged 1.9 from 1790 to 1870. This ratio was exceptionally high in the 1840s when it nearly reached 4, and was over 3 in the 1790s and 1820s. By contrast, Shattuck estimated the ratio of female to male deaths in Massachusetts at mid-century to be 1.5, and this ratio never exceeded 1.3 for the rest of the century (Shattuck 1850, 95-96; Abbott 1976, 787). (Note that the fluctuating female:male ratios in the Shaker populations makes ratios of deaths misleading, thus requiring a ratio composed of rates.)

The disproportionate death rate among Shaker Sisters presents an interesting contrast with the World, where the elevation of women's consumption deaths was associated with their innate feminine weakness. Proposed sources of women's vulnerability then and now are scarcely applicable to Shaker sisters, since they clearly did not indulge in the "cult of invalidity" nor were they subject to hormonal changes that accompany pregnancy and childbirth (Ehrenreich and English 1973, 15-23). On the contrary, as the century proceeded, the number of Brethren declined and their own business prospered, Shaker Sisters became more assertive and attained greater responsibilities in community life (Nickless and Nickless 1987).

Other evidence suggests that Sisters did in fact suffer from worse health than Brethren. Stature can serve as an indicator of health and nutrition (Tanner 1978, Steckel 1987). As noted in the next chapter, a sample of heights taken in the New Lebanon Church Family between 1840 and 1865 shows that, even relative to modern height standards Sisters were substantially shorter than Brethren.

Further, this was not an effect of composition changes in the Shaker population. Although not conclusive, this is consistent with high levels of a chronic, withering disease such as tuberculosis.

An important question for this essay concerns the extent to which the later Shakers took in people they knew to have the disease, for then we would know if these elevated death rates reflect community living conditions or the health of novices just recently in the World. It seems that the Shakers did accept some "young Believers" whom they knew to be consumptive. No North Union novices were described as consumptive upon entrance, but two men who entered in the 1850s almost certainly were so when they came to North Union. Almanson Dalee died of consumption less than a month after signing the novitiate covenant, and Charles Walker died of consumption within nine months of doing so. Since Dalee was so close to death, he almost certainly showed the symptoms of consumption when the community accepted him without comment. Possibly Walker presented the symptoms also. Elsewhere, a journal from Enfield, Connecticut refers to the entrance of one Amanasa Richardson on 16 November 1852, who is stated to be consumptive (WRHS V:B-13). He did not, however, die at Enfield and probably apostatized. No other entrant of the hundreds I have read about is so described, and at North Union, as mentioned below, the duration between signing the novitiate covenant and death from consumption averaged over ten years. No one else died nearly as quickly as Almanson Dalee. It is more likely that the death rates reflect the consumptive environment of the Shakers.

Care of Shaker consumptives

The high mortality of Shakers due to consumption may in some part have reflected the care given the victim by the community. The Duboses were straightforward in assigning blame for the development of the terrible symptoms of the disease from mere exposure to "some mismanagement of the human machine" (Dubos and Dubos 1989, 153). Shaker medical practice was part of a whole. Treatment of consumptives in the community was influenced by their religious beliefs, their disease experiences, and sectarian trends.

The pragmatic evolution of Shaker attitudes toward medical practice began with the earliest Shakers. These faith healers used their Healing Gifts to cure a range of ailments from dyspepsia and dislocated bones to consumption (White and Taylor 1904, 353). No further details are available.

How long their reliance on the Healing Gift would have continued is uncertain, but Shaker medical doctrine and practice began to change in the difficult years of 1812 and 1813. Illness was spreading in the Western communities. The frontier outpost at Busro, Indiana had to be abandoned in the fall of 1812 due to Indian troubles and endemic malaria in the Wabash valley. Then in the winter of 1812-1813 Believers began falling ill in the Ohio communities to which the Indianans had repaired. Benjamin Seth Youngs, an Elder at South Union, Kentucky, believed he saw a connection between the two events: "[T]he greatest part of the extreme sufferings by reason of so much sickness among the Believers in Ohio during the winter, originated at

Busseron [sic]" (WRHS IV:A-60, 2 May 1813). In fact, mortality at Union Village, the larger of the two Ohio communities, showed a dramatic increase in 1812 and 1813 (OHS manuscript volume 1187).

Later in 1813, throughout New England an epidemic recorded variously as typhus fever or pulmonic fever killed large numbers, especially of adults (Shattuck 1850, 78). A measles epidemic recorded at Harvard may have been a part of this outbreak, which was also known as the "spotted fever". Other communities were not so fortunate to have been mere observers. Enfield, Connecticut reported an outbreak of fever with many sick, but hesitated to complain given New Lebanon's plight (WRHS IV:A-9, 6 May 1813). There, the "pestilence" that was killing twenty people a day in Albany had entered the largest Shaker community. A combination of measles and this spotted fever or "cold plague" had killed 15 Believers in scarcely two months between January and March (WRHS IV:A-32, 20 April 1813). In response, while Mother Lucy Wright attempted to maintain the exclusion of medical "professionals", Father Job Bishop conceded that surgeons could be called to fix broken bones or unusually bad wounds (Andrews 1953, 194). Although it seemed to be but a small concession, never again would the Shakers rely solely on faith healing. From then on they experimented with regular medicine and most of the popular heretical medical sects.

By the 1820s Thomsonian practices became popular among the Shakers, for which they developed a large herbal remedy industry (Estes 1991). The Thomsonian use of emetics, pepper, and sweating

followed from belief in the classical theory of bodily humors, in which bad humors were to be purged from the body one way or another. At New Lebanon, Henry De Witt's journal succinctly describes the Thomsonian response to discomfort (WRHS V:B-97, 4 April 1837):

> In the morning I found my health quite poor. Knowing the quickest way for relief, was to take a vomit, or emetic, which I accordingly gave up about 10 A.M. I took a thorough cleansing; for which I felt much better.

In the thirties and forties Harvard physicians prescribed Thomsonian remedies for a variety of maladies (WRHS V:B-41). For both a Brother with a "humour in his head" and one with a nervous disorder causing his body to twitch, cayenne pepper was ordered. For many discomforts, Shakers were steamed to induce sweating. The most popular remedies were emetics, especially lobelia, a Thomsonian favorite (Cassedy 1991, 36). Lobelia emetics were prescribed for sore eyes, a swollen leg, consumption, and in two cases for accidental poisoning. Luckless Abigail Babbitt, she of the post-mortem, was even given lobelia because she was vomiting "without cessation" (WRHS V:B-41, 18 October 1835). The Shakers were hardly alone in following this school; the Thomsonians were among the most popular of the antebellum medical sects.

The Harvard Shakers pragmatically followed what seemed to them to be appropriate measures and were not ideologically bound to one school. In the case of ten year old Timothy Doliver, they called in a local physician, the Dr. Holman who had performed the autopsy on Abigail Babbitt. Holman, presumably a regular, diagnosed typhus fever

and prescribed a typical heroic regimen (Cassedy 1986, 81; WRHS V:B-41, 8 September 1838):

> Dr ordered leeches to be applied to his stomach and bowels, we had some procured as soon as possible and applied, after they had got their fill and fell off, he bled so profusely that William Leonard was called up to go & inform the Dr of his situation, the Dr ordered a piece of cork to be applied to the place with pressure, this stopped it, he bled about five hours.

Timothy died the next summer.

Some regular medicine as practiced by the Shakers was beneficial. In at least some cases, they treated dropsy with digitalis, one of the greatest contributions to health of regular medicine of the day. They may have learned to do so from reading in the popular medical press. At South Union, the small medical library included among its three titles Ewell's Medical Companion, a popular home medicine text of 1807 which recommended foxglove, the plant from which digitalis is derived, as a treatment for dropsy (WRHS II:B-81; Estes 1986, 199). One South Union remedy for dropsy that included digitalis also included calomel, a widely used mercury based compound with harmful side effects, and squills, which contain a diuretic. The same remedy for dropsy appears in a Hancock medical recipe book, suggesting widespread Shaker interest in this particular concoction (WRHS XI:B-6).

Shaker consumptives received the full range of treatments. On 1 April 1840, Amanda Haines was diagnosed as consumptive by Harvard's consultant, Dr. Holman. In the previous two months she had been given a Thomsonian regimen of steaming and emetics, and after

"failing...very fast" for some weeks died on 25 May at 26 years of age. In the years after Eunice Wilds suffered from "the phthisic [tuberculosis] quite bad," she visited the physician's office often and was given an unspecified emetic, a lobelia emetic, and squills which acted as an emetic (WRHS V:B-41). In an age such as ours, which stresses the importance of rest and aridity in treating tuberculosis, violent vomiting and steaming could hardly seem less helpful.

Some Shaker consumptives participated in treatment promoted by another sect, the hydropaths. Their water cure involved the application of water to the sick body both inside and out, and a regimen of personal cleanliness. North Union was especially enthusiastic about the water cure, having drilled an extra well to get soft water for hydropathic use (WRHS V:B-177 July 1856). Suffering from advanced consumption, North Union Eldress Susannah Sawyer spent the spring and summer of 1862 at a water cure establishment in nearby Mercer County, Pennsylvania. Run by her niece's husband, the clinic was probably similar to many such institutions that arose in the forties and fifties. In his eulogy for her, scribe James Prescott noted approvingly her preference for the water cure over lobelia and other "drug poisons". Although Eldress Susannah's case was too far developed to be helped by the cure, the unnamed Brother and two Sisters who accompanied her, and were also consumptive, were said to have benefitted (WRHS VII:B-219, 219-221).

The extent to which Shaker consumptives were given any kind of treatment is an open question. Long term rest is an important factor

in slowing the appearance of the progressive wasting symptoms (Dubos and Dubos 1987, 152). But the Shaker way was to work, not rest. Although the sick who were unable to work were moved from their dwelling to the infirmary where a nurse could observe them, no consumptives stayed long at the Harvard infirmary, nor was the North Union infirmary often used (MacLean 1907, 144-145). In fact, several Shaker consumptives offer examples of great stress in the months and years before their deaths. At North Union, the consumptive Lewis Bevan was the only Believer praised for his work in a community journal that spanned 78 years. He was "efficient" at quarrying and drawing stone for the Center Family Dwelling beginning in 1826, and died of consumption in 1830, at the age of 32 (WRHS V:B-177).

Not just work, but travelling could be a source of stress for the Shaker consumptive. Milton Robinson was a consumptive member of the South Union, Kentucky community. He was grudgingly given leave to accompany the annual sales trip to New Orleans late in 1831, where he would embark on a sea-cure. His voyage to Philadelphia left him exhausted and gravely ill. Only through luck (or Divine Providence, some Shakers suggested) was he able to reach the New Lebanon community. Although he was initially ordered to return to Kentucky by the New Lebanon Elders, they relented and he was warmly welcomed by his new Brethren and Sisters. He lived out his last days weeding the herb garden and picking berries and died at age 24 in the fall of 1832 (LC item no. 37; Andrews no. 1078; WRHS V:B-60, May 1831).

Shaker consumptives were also given work assignments that may have allowed them to spread the disease. Fidelia Grosvenor complained of coughing and chronic pain in her lungs to the Harvard physician, who further recorded that "she raises froth about all the time, & sometimes it is streaked with blood," which resembles some of the classic symptoms of pulmonary tuberculosis. No bed rest for Sister Fidelia, however; within two months she was caring for patients in the infirmary herself. Such a case helps explain the high prevalence of consumption among the Shakers.

Sources of consumption mortality

Whence the high rate of consumption mortality among Shakers? Except possibly for the lack of rest, it seems that therapy given Shaker consumptives was not very different from that anywhere else in America at that time. Proposed sources of women's vulnerability concerning reproduction or constant lying-in did not apply to Shaker sisters. The living standards argument described in the introduction to this chapter assigned highest priority to nutrition and crowding in the overall consumption mortality decline, while the public health approach proposed that the effect of the organized tuberculosis campaign, in particular isolating victims of the disease, had a greater effect. The Shakers had no organized way of dealing with consumption specifically; in particular, they did not use their infirmaries to isolate consumptives. Yet their consumption mortality still declined after 1850. This rise and decline can be made clearer

in light of the diet and crowding hypotheses. A variation on the theory of insult accumulation has also been proposed, but this is based on the effects of fluctuations in typhoid mortality. However, this disease did not trouble the Shakers, probably for the same reason that cholera did not, namely their clean water supplies (Rosenkrantz, introduction in Dubos and Dubos 1987). Although the effects of dietary changes, when they can be examined alone, seem to drive the mortality trend in the correct direction, the Shaker failure to isolate consumptives and the lag in mortality trends behind changes in population favors, in a careful judgment set in this unusual context, the crowding hypothesis.

Diet did have some effect on Shaker disease patterns. The year 1816 saw not only the "Great Sickness" at Shirley but crop failure throughout northern New England following an extremely cold summer of frosts and snowfalls, which led to memories of "the famine year", "the year of two winters", and "eighteen hundred and froze to death" (WRHS IV:A-21, 25 March 1830; Marini 1982, 29; Russell 1976, 274). That Shirley's "Great Sickness" occurred in a famine year suggests that the Shirley community probably suffered from food shortages also.

A better example is a series of measles outbreaks in 1837, a disease with relatively few long-term effects in modern times. At New Lebanon in January and February 1837, measles broke out of the Children's Order into the young adults and the community as a whole. Complications involving "severe dysentery" and "continual puking" were

widespread and led to the death of one child (WRHS IV:A-37, 1 February-8 February 1837; WRHS V:B-41, 4 April 1837). That March at Shirley, measles followed by influenza affected about a third of the Church Family and "brought several to death's door" (WRHS IV:A-58). Severe complications and death among children following measles suggests a problem of undernourishment. In this case, not crop failure but ideology may have been the determining factor. Less than two years before, the Graham diet had become popular at New Lebanon and elsewhere in the East, which led to a practice of withholding meat from children (Brewer 1986, 108-111; Nordhoff 1875, 166). These youths may have been weakened by lack of protein in their diet. This hypothesis is made more plausible by the results in the next chapter of New Lebanon stature records which shows that children there born in the 1830s and later were unusually short.

Diet may also have played a role in the increase in consumption deaths beginning in the 1830s. The curious lethality of the measles epidemic at New Lebanon and the decline in stature there may also have been a result of the newfound popularity of the vegetarian Graham diet among many Shakers. Some evidence points to vegetarianism as a factor in tuberculosis mortality (Dubos and Dubos 1987, 140-141). Growth in stature and resistance to tuberculosis are both closely related to protein intake and meat consumption in particular. The benefit to humans of eating meat is the ease of acquiring necessary proteins in an appropriate balance. An important consideration for vegetarians is to consume the correct proportions of

dairy products, nuts, legumes, and grains to obtain appropriate quantities of their distinctive proteins (Linder 1991, 89-90; Livi-Bacci 1991, 30). In the Graham diet, consuming whole grain Graham bread was emphasized, while in Shaker practice no cheese and few other dairy products were consumed and milk was watered down by half (Nissenbaum 1980, 5-9; Brewer 1986, 108; Youngs 1856, 291). Consumption death rates at North Union, where the Graham diet was not adopted, did not rise in the 1830s and 1840s. Perhaps Grahamism did not appeal to Western Shakers because the era of the Graham controversy in the East was one of reconstruction in the West following a series of leadership crises in the 1820s and early 1830s. Additionally, the rebuilding of the exhausted Western bishopric was entrusted to Freegift Wells, a man of mediocre talent who was a dedicated anti-Grahamite (Ham 1962, chapter 5; Brewer 1986, 111).

The extent of Grahamism even among the Eastern Shakers is not clear; at its height perhaps half the Believers in communities affected by the controversy followed the diet. In some dining rooms two tables were set out, one for Grahamists and one for traditionalists, which was soon abandoned due to the extra labor required of kitchen workers. The timing and location of the measles outbreaks made Grahamism a plausible culprit in their extent. As for consumption, though, interest in Grahamism petered out in the 1840s and Brethren and Sisters returned to a diet rather rich in protein, while rates of consumption mortality climbed upward.

Crowding is left as the likely determinant of high Shaker consumption mortality. Figure 2 shows why this is so reasonable. Both population in the three villages under examination and the consumption death rate follow a parabolic arc, but the population peaked in the decade before the highest death rate. If the population curve were lagged (that is, moved to the right) one decade, the population curve after 1820 and the consumption death rate curve would be virtually superimposed. This is consistent with the hypothesis that crowding caused the high consumption mortality rates, and becomes more persuasive with an examination of just how densely populated Shaker communities were.

I consider North Union due to the relative completeness of these community records. The North Union Shakers were probably affected by tuberculosis from very near the start of the community, if mortality among the several founding families is any indication. The community was founded in 1822 by six families, led by Ralph, Elijah, Elisha, and Return Russell; Chester Risley; Benjamin Sawyer; and Riley Honey, who was single. Linking the North Union "Obituary" to community histories published and in manuscript shows that four of Elijah Russell's seven children died of consumption before 1845, and other victims included Chester Risley and his wife, and two of Benjamin Sawyer's four children (WRHS V:B-176). Other families of the 1820s and 1830s were as tuberculous: all four Bevins who signed the 1828 covenant and three of five Andrewses died of tuberculosis. Altogether, nearly a third (31 percent) of the 1828 covenant signers

who died as Shakers died of consumption, which is a high proportion relative to proportions of the era (Shattuck 1850, 94). Among the covenant signers of 1829-1842, consumption accounts for an extremely high proportion of Shaker mortality: nearly half (47 percent).

Thus it appears that the disease was present from virtually the founding of the community. Transmission of the infection required long-term exposure, and many Believers lived in the community for sufficiently long durations. I assembled a sample of North Union residents which includes all those who died there plus all those who signed or marked a document while living at North Union. Since these documents include covenants or novice agreements for nearly the entire life of the community, this is a reasonably complete list of adults who lived there for more than a few days. The sample numbers 798 people, nearly twice as many as the only other estimate of total population ever resident there (Andrews 1953, 291). Since we know how many Shakers died at North Union, how many moved to other Shaker communities, and how many remained when it closed, the remainder of the sample must have apostatized. Linking the sample to Census manuscript enumeration schedules indicates that the proportions of life members among all adult members in 1850 and 1860 were .60 and .57 respectively. Thus, at these points in time, the census "snapshot" of North Union shows that three-fifths of the adult residents were life members.

The census also provides average adult population levels through the 1830-1880 period, which makes it possible to estimate how

long the average life member and the average apostate stayed. Assuming that at any one time, 60 percent of adult members were in for life, the durations are roughly 18 years and just over three years respectively. But the distribution of the apostate durations is severely skewed, since it has a lower bound of 0 and a mean of 3.2, and members like the previously mentioned John Stark, who were Shakers longer than a decade before leaving, were not uncommon. Those who stayed briefly may have been lucky, having escaped long term exposure to the tubercle bacilli present at North Union. Using dates of signing novitiate covenants and dates of death, it is possible to estimate a lower bound on the duration of each dead consumptive's membership; its mean is 10.8 years, which suggests that long term members probably were sufficiently exposed to the disease. It also suggests that few dying consumptives came to North Union as a residence of last resort.

The crowded nature of communal life must have helped maintain the lethality of consumption throughout the antebellum era. Just as urbanization multiplied opportunities for transmission of the bacillus, communal housing allowed an infectious Shaker to share meals and sleeping quarters with many other Shakers. Certainly crowding was common in early Shaker history. At Hancock, Massachusetts, Rebecca Clark wrote in 1791 of sharing her bedroom with thirteen other Sisters, many three to a bed (Andrews 1953, 199).

Housing conditions at North Union can be broadly outlined. We lack the finely detailed knowledge which we have of conditions at

other communities, in part because the buildings themselves were destroyed sometime before the area became the Cleveland suburb of Shaker Heights. Between 1826 and 1831 at North Union, the two storey Center Family house was built with a foundation measuring 30 by 46 feet. Until the Mill Family Dwelling was built in 1838, it was the main residence for a community numbering 86 in 1830 and 192 in 1840. So at the time of the 1840 census, the greater part of the 109 Center Family members and the 44 Mill Family members lived in two buildings. Fortunately, Shaker housing stock was reasonably uniform, and conditions at other communities are very well known. The interiors of the North Union dwellings were probably similar to those of the Great House of New Lebanon's First Order, built in 1832. There eighty one Believers shared sixteen bedrooms, some as densely as nine to a room. In fact, of the eighty one, sixty five lived in bedrooms of five or more to a room, fifty in bedrooms of six or more, and thirty two in bedrooms of seven or more (WRHS V:B-60, 5 September 1832).

In part because of this crowding, Shaker structures were designed to be well ventilated. Writing in 1858, Elder Frederick Evans listed some principles of right living, including "Breathe pure air. Every room of the home should be of equal temperature. Ventilation of bedrooms important" (Andrews 1953, 195). Interiors of surviving Shaker buildings today provide mute witness to the practice of this principle. Unfortunately, this emphasis on ventilation in dwelling designs seems not to have counteracted the actual crowding of these houses.

The custom of an entire Shaker Family of several dozen people taking its meals together increased the risk of tuberculosis infection. Besides crowding at meal times, manners created health problems. Andrews quotes an undated table monitor that urges, "If you are obliged to sneeze or cough, don't bespatter the victuals, make use of your handkerchief," thus indicating that sneezing and coughing over food was enough of a problem to warrant telling Believers not to do so (Andrews 1953, 183). On the same page is an illustration of thirty Believers in a dining hall, windows shut. For an airborne disease like tuberculosis, coughing and sneezing in roomfuls of people is an ideal transmission mechanism.

Other evidence suggests that in fact many Shakers spent most of their time in rooms full of people. Not only sleeping and eating environments but praying and working spaces also involved crowding. Andrews provides several illustrations which show the energetic Shaker worship practices taking place (Andrews 1953, 139-148). In each, several dozen Believers stand and dance and sing densely grouped together in their meeting halls, which resemble open gymnasia. All the windows in each picture are closed.

Workplace crowding likely affected women more than men. Where men were more likely to work out in the fields or in small groups in shops, women's work tended to require groups of women working together on textile production or herb processing. Another illustration in Andrews shows nine Sisters preparing herbs in a room, albeit with open windows. At North Union men worked in the grist mill and the saw

mill, the tannery and the blacksmith shop. Women worked together spinning and weaving in the Center Family woolen mill, and making clothing such as stockings, mittens, socks, and palm-leaf bonnets. The high female:male consumption death ratio which itself was higher among Shakers than in the World, may have been the result of more consistently crowded conditions for Sisters than for Brethren.

The extent of crowding in Shaker communities has been made harder to imagine by the immaculate restorations on view today. In the first half of the nineteenth century these villages held hundreds of people, many of whom were consumptive. They slept, ate, worshipped, and especially for women, worked closely with their fellow Shakers, many of whom were actively spreading the tubercle bacillus, and from whom daily life offered no escape.

Other views of the Shaker consumptive

The life of a Shaker consumptive, surrounded though he or she was by sympathetic fellow Shakers, could not have been easy. Leaders looked askance at victims of chronic disease. Part of their distinctive belief system interpreted disease as a manifestation of one's troubled relation with God. Writing late in the century in The Manifesto, Paul Tyner maintained still that "all the ills that flesh is heir to, all the vices and crimes that affect humanity, disease and death itself, may be traced to selfishness and...lust" (Whitson 1983, 137). Since the point of Shaker life was to live perfectly, asserting a relation between original sin and disease would naturally lead to a feeling

that disease must be out there in the World and not in the Gardens of Zion. Thus in the midst of the 1832 cholera epidemic, Matthew Houston could write from North Union that they had heard "much alarm about cholera morbus in Cleveland," but within the community "we have enjoyed unusual health here except some dissenteries [sic] and pukings &c. I wonder if right faithfull Believers can be overtaken by such plagues" (WRHS IV:A-51, 10 August 1832). Right faithful or not, on occasion they were overtaken by Worldly plagues. And once so overtaken, how unfortunate they were, for in the eyes of the prominent Elder Frederick Evans, they had only themselves to blame (Nordhoff 1875, 160):

> We look for a testimony against disease, and even now I hold that no man who lives as we do has a right to be ill before he is sixty; if he suffer from disease before that, he is in fault.

Belief in their own immunity, or shame at being ill, may have kept many Shakers from pondering more appropriate responses to disease, especially consumption.

Perhaps due to their theology, and perhaps to their skill at avoiding the worst of the famous cholera epidemics, the Shakers rarely reflected on the unusual disease environments of their villages. They seem only vaguely aware of endemic tuberculosis within their communities. James S. Prescott did record in a North Union journal a summary of their mortality statistics, noting that "the <u>consumption</u>" caused 32 of 98 deaths (LC item no. 287, February 1864). This use of underlining for emphasis is the closest thing to an example of Shaker comment on the disease I have found.

Their visitors, however, recorded images of residents who at least appeared to be consumptive. George Combe, a Scottish phrenologist, inferred after visiting in the late 1830s that "their pale faces...and flabby condition indicated...a low state of health." Benjamin Silliman, the eminent Yale scientist, observed in 1819 that "the females look remarkably pale and sallow," while Harriet Martineau found the Sisters she saw eighteen years later to be "pallid, thin, and withered" (Andrews 1953, 196). We of the late twentieth century have tended to recall later evaluations, such as Charles Nordhoff's in 1874 that at North Union, "the health of the society has been very good," and that at Harvard, "the health of this society has always been very good" (Nordhoff 1875, 192, 204). But such was not the case.

And the better for those who wish to disentangle the complex strands of social causes and effects of tuberculosis. The prevalence of the disease was substantial in an environment thought to be quaintly salubrious. Theories proposed to explain high levels of the disease elsewhere can be usefully tested against the Shaker experience. That crowding of Shaker residents seems to have played the crucial role in the rise and fall of Shaker consumption is especially relevant for the historian who wishes to connect the past to the present. As outbreaks of tuberculosis continue to occur with unfortunate regularity in crowded prisons and homeless shelters, knowledge of the disease's behavior in similar circumstances in the past can only become more valuable in determining solutions to current public health problems. In examining the Shaker disease environment

and their response, we find an aspect of Shakerdom formed by the peculiarities of communal life in nineteenth century America. It is a part of the Shaker way we must understand if we are to appreciate the full range of the Shaker experience.

CHAPTER VI

LIVING STANDARDS: STATURE

Introduction

It is well known that in sub-optimal conditions, stature can be a quantitative measure of living standards. Most historical studies of heights use samples of students, soldiers, or slaves (Fogel 1986, Steckel 1987). While these groups may have been similar to the general population, for example if school attendance or military service had been compulsory and universal, we cannot know with certainty how representative these samples are without reference to the general population. Further, while soldiers may have been representative of the male population in question, few studies have examined stature among free adult females. This chapter describes findings of levels of stature and changes over time in the New Lebanon, New York Shaker community. Because the Shakers practiced celibacy, individual members entered from outside the communities; very few were born as Shakers or belonged from infancy (Sprigg 1989). Since members were part of a flow from the outside world, their stature was a function of conditions not only within the communes, but of living standards elsewhere in America as well.

Materials and methods

In many ways the Shakers were similar to others who lived in northern antebellum America. A study of members' wealth concluded that they constituted "a representative cross section of rural New England society" (Marini 1986). One finding reported in Chapter VII is that Shaker literacy, at 95-100 percent of adult members, was slightly higher than that of men and much higher than that of women outside the community, and that the proportion of urban-born adult members was similar to that in the northeast United States.

The Church Family scribe, Isaac N. Youngs, measured the height of each Family member on 1 January every five years between 1840 and 1865. The measures are recorded to eighths of an inch. Apparently each person stood against a white wall in the Church Family Dwelling, the top of his or her head was marked on the wall, and the mark was then measured with a yardstick, for a Church Family Dwelling House wall to this day carries marks and measurements in pencil. Youngs then recorded the results in his "Domestic Journal of Daily Occurrences", which he maintained between 1834 and 1865. The journal is in three bound manuscript volumes, item number 13500 of the New York State Library Shaker Collection, Albany, and volumes V:B-70 and V:B-71 in the Western Reserve Historical Society Shaker Collection. In addition, scattered throughout these volumes between 1837 and 1863 are entries describing stature, weight, and age of thirty three children on the day of their entrance into the community.

Although Youngs's motivation for measuring his fellow Shakers is unknown, his precision was probably good. He was also a superb clockmaker, and it is claimed that his corpus of manuscripts constitutes a nearly complete record of Shaker life in and of itself (Sprigg 1989). The date and place of birth of each member of the sample was found in another Youngs manuscript, "Names and ages of those who have been gathered...", which is item number 1078 in the Edward Deming Andrews Memorial Shaker Collection, Winterthur Museum and Library, Winterthur, Delaware. Such precise age at measurement data helped to prevent problems of age heaping.

One adjustment to the raw data was necessary. Unfortunately, the Shaker being measured kept his or her shoes on; however, Youngs noted that all Shakers did so, and the uniformity of the Shaker costume allows a simple correction for shoe heels. Youngs noted that men's shoes added one-half to three-quarters of an inch to heights; thus, I subtracted five-eighths of an inch, or 1.6 cm, from all men's heights. Youngs estimated the heels of women's shoes at 1.25 inches, and other Shakers measured women's heels at one and a half to two inches (Gordon 1980); I subtracted 1.5 inches, or 3.8 cm from women's measured heights. Also based on Youngs's comments on children's shoes, I subtracted one-half inch, or 1.3 cm from children's heights up to age sixteen, at which age members left the Children's Order for adult life. Those children who were weighed and measured at entrance apparently were examined while wearing clothes and shoes, since Youngs

did not record to the contrary. For reasons mentioned below, these data were not adjusted.

Results

Table 9 shows the heights of adult Shakers in comparison with some roughly contemporary American adults. Shaker adults are defined as men between 21 and 50 years of age and women between 19 and 50 years of age. Shaker men were about as tall as male slaves and shorter than Union Army soldiers. The nearly 4 cm difference between Shakers and soldiers may reflect inferior Shaker net nutrition. It may reflect a problem of Shaker selectivity or be a result of the small samples. Alternatively, it may reflect inferior net nutrition on the outside, thus calling into question the suitability of inferring nutritional status in the general population from military samples. All three groups of Americans were taller than men in contemporary French, Italian, British, Swedish and Austro-Hungarian samples (Fogel 1989, Sandberg and Steckel 1987, Komlos 1989). According to centiles of modern standards (Tanner, Whitehouse, and Takaishi 1966), Shaker women were noticeably shorter than female slaves, and in relative terms were much shorter than Shaker men. This is somewhat surprising, and can be explored further in Table 10.

Table 10 shows the heights of adult Shakers grouped by sex and decade of birth. The pattern of men's heights is somewhat similar to height trends in the Union Army (Fogel 1986, Margo and Steckel 1983): a shallow U-shaped trend between the late eighteenth century and the

1830s, followed by a decline. The range in the U-shape is less than 3 cm. The change in proportions of neither the foreign born nor urban born affect average height of men. The post 1830s decline in military heights has been attributed variously to a broad decline in nutritional status, an increasingly unequal income distribution, urbanization, and spread of disease through migration and trade (Komlos 1987, Steckel forthcoming). Based on these previous studies, the Shakers seem to have been affected by the same net nutritional trends as the outside world.

If the Shakers are indeed representative of free white antebellum Americans, then the trend for women is very interesting: a long, if interrupted, decline throughout the first half of the century. The range of the decline is fully 9.0 cm. This trend does not seem to be the result of uninteresting artifacts. The proportion of foreign born among the Shakers is not related to height trends, and in any case the mean heights of the foreign born in this sample are only 1.1 and 0.7 cm less than those for the American born Sisters and Brethren, respectively. In particular, in the extremely short 1840s birth cohort for women, the mean height of the four foreign born Sisters was actually greater than that of the American born Sisters. This decline does not seem to be the result of Shaker selectivity problems. Quantitatively, Shaker recruiting did not suffer during this period, as the number of new entrants rose for men over this time and, after the 1820s, was roughly stable for women (Brewer 1986). The decline in height was due to an increase in the proportion of urban born women:

the mean height of the nine American urban born women in the 1840s cohort was only 146.4 cm, at the 0.4 centile of modern standards. This extremely short cohort may hint at dire health and nutrition problems of mid-century city life in America.

Table 11 presents children's heights after smoothing according to Preece-Baines Model 1 (Preece and Baines 1978). Centiles of modern standards can be used to compare Shaker children with samples of children in 1875 Boston and 1881 Milwaukee (Steckel 1987). Both Shaker boys and girls are consistently shorter than children in these nearly contemporary samples. In addition, Shaker boys in their late teens are consistently shorter than contemporary cadets of the same age at the United States Military Academy (Komlos 1987). Shaker girls present an odd profile, attaining near-adult height near the early age of fifteen. This could be the result of the small sample, or it could reflect a harsher disease environment among females, the evidence for which is suggested by much higher female than male youth tuberculosis death rates in other Shaker villages.

Evidence suggests that the sexual differences and the gap in stature between Shaker children and their contemporaries did not stem from much inferior net nutritional treatment before they became Shakers. Since the Shakers accepted some children whose parents who did not intend to become members themselves, a question arises concerning possible abandonment of children by parents unable to feed them. Figures 3 and 4 address the question of the nutritional status of entering Shaker children. In addition to the height-for-age data,

the weighing of a small group of boys and girls provided a weight-for-height record somewhat independent of the height-for-age information. Although the children were apparently fully clothed and shod when weighed, both of these biases tend to cancel out when comparing weight-for-height to modern standards. The Figures are based on American standards for pre-pubescent children, which are slightly different from the (British) standards used in height-for-age analysis above (Tanner 1978). They include girls ages 10 and under and boys ages 12 and under. At entrance, few children were below the 25th centile. Especially for boys, the data points seem to cluster around the curve of the 50th centile. In terms of weight-for-height, the children entering this Shaker community do not seem to have been undernourished.

An attempt to control for some possible confounding factors is given in Table 12. Regressions which included variables for birth date and location, duration of Shaker childhood, and age at measurement were run on all sample members under 50 years of age. As might be expected, the dummy variables for age were all correctly signed and statistically significant and therefore were unreported. Dummy variables to control for changes in height over time show that the pattern among adults described by Table 10 essentially held among all members even after controlling for adult status and age of children at measurement. In particular, the decline of stature among females was not a result of composition effects, nor was the peak of male height in the 1830s an artifact. Most interesting is the only

variable with a significant coefficient in both regressions, years of youth as a Shaker. For both males and females, a Shaker upbringing resulted in significantly taller stature, which suggests a better net nutritional environment within the community than outside it. Each year of Shaker childhood added nearly half centimeter to male height and a quarter centimeter to female height. Foreign birth, which in this sample meant nativity in Great Britain, is generally thought to have a negative effect on stature (Steckel 1987), but here has no statistically significant effect. Neither New York or New England birth has a significant effect, nor did urban birth on men's height. Urban birth cost women over two centimeters in stature, which reinforces the claim of the difficulty of urban life in antebellum America.

Discussion

The Shaker stature record presents some paradoxical results. Shaker adults were short, the men shorter than soldiers and the women shorter than slaves. Similarly, Shaker children were shorter than the few samples of other contemporary children. Four explanations can rationalize this difference. Possibly the small sample sizes in this study have produced misleading anthropometric estimates. Secondly, net nutritional conditions within this Shaker commune may have been inferior to such conditions elsewhere in America. Thirdly, the selectivity problem, if any, may have been with the army, which may

have attracted men larger and stronger than the American average. Finally, the Shakers may have attracted undernourished people to their communes.

The second explanation seems inadequate. Results of the regression analysis show that stature for both sexes increased with duration of Shaker childhood, holding everything else constant, which indicates that the Shaker net nutritional environment may have been superior to that on the outside. Overall superiority of the Shaker environment is further suggested by some of Chapter IV's results, that Shaker longevity was much greater than that of the general American population.

This study cannot evaluate the third possibility, that stature of soldiers was not representative of the country as a whole. Such a judgement must await reporting of other samples of the antebellum civilian population, if any exist, which might also obviate the small sample problem. This explanation would, however, explain how people who were relatively robust upon entrance and who grew taller than those who entered the commune later could still end up so much shorter than people in the military sample, which has been taken to be representative of American men at the time.

Figures 3 and 4, which describe the relative robustness of the small sample of entering children, suggest that the last explanation accounted for a relatively small number of new Shaker children. Adults may be another matter. The regression results compare those raised as Shakers with those who entered as adults; but who were those

adult entrants and what brought them to New Lebanon? We know they were extremely short. It is still not feasible to reject the hypothesis that the Shakers suffered from selectivity problems in their recruiting. Although numbers of entrants remained constant over this period, the next two chapters indicate that these entrants were less likely to have the human capital to live on their own in the World. In terms of literacy and skills, these new Shakers may have been people not so much attracted by the Shaker Way as rejected by the World.

Possible sources of the relative sexual difference in stature, as reflected in the higher men's than women's centiles of modern height standards, are the subject of further current research. Shaker nutrition, and sexual differences in food intake and work, have not been studied intensively; it has been implied that the Shaker diet by the early nineteenth century was adequate (Brewer 1986). Disease claims may have been a factor as prevalence of tuberculosis among women was much greater in other Shaker communities than elsewhere in America. Again, it may be that the difference reflected events in the larger population. If so, the nutritional status of free women in antebellum America may have been inferior to that of men, and worsening.

CHAPTER VII

ECONOMIC MODELS: LITERACY

Introduction

The material success of the many communal societies in the nineteenth century United States should provoke more interest among economic historians than it has. With few of the institutions we usually consider necessary for economic survival, such as wages and private property, many communes thrived for decades. The Shakers were among the most prominent of these groups. They developed entire communal economies based on agriculture and light manufacturing of products ranging from clothing to medicine to farm implements. Their remarkable growth came in the face of rather strict membership requirements: celibacy, which precluded the usual family life, and communal ownership of one's property. After joining, one "consecrated" one's labor to the community and received the same return to labor as everyone else: food, clothing, and shelter. But not only such worldly goods: the member also received the satisfaction of living as close to God as possible, in a community of like-minded people.

To the extent that religious benefits and worldly well-being represent a trade-off facing a rational chooser, economic principles

can guide an analysis of such a community. Using an economic model of religious behavior, this chapter suggests characteristics of those who would initially be attracted to a Shaker community and how the composition of converts should change over time. The model predicts patterns of human capital accumulation among members which can then be tested using data recorded by Shakers and U.S. Census enumerators. I discuss the effects of changing human capital among members on a community whose competitive success in external markets was largely based on its collective human capital.

North Union, Ohio, was one of the last long-lived Shaker communities to be founded (Piercy 1951, MacLean 1907). Its "gathering" in 1822 was part of a remarkable Western expansion for the sect, which found the "burned-over" Western Reserve a fertile place for its millenialist teachings (Cross 1950). By 1840 the population at North Union had reached 192 souls, and the community was prospering by operating, among other enterprises, mills supported by Shaker built dams, which ground local grain and sawed local lumber. Other products of the early North Union Shakers included maple sugar and dairy goods. Later products included cooperware, woolens, palm leaf bonnets, brooms, and some processed foods such as apple butter and dried fruit. As in all Shaker communities, North Union was divided into "Families" of 50 to 75 Believers: the Mill Family located near the eponymous mill, the Church Family for the most committed members, and the East or Gathering Family for novices. Novices signed a Novitiate Covenant, simply agreeing not to claim a return for any labor contribution they

might make to the community (OHS Collection 119, boxes 13 and 14). Fully covenanted members in the Church additionally surrendered all their private property to the community upon signing the covenant. Most of those entering provided for non-Shaker family members before consecrating the remainder to the community, and in practice Shakers tended to give apostatizing members cash and tools at their departure, so the initial "donation" may not, strictly speaking, have been a sunk cost. Ham, however, notes (p. 150) that Western communities tended to be stingier on this count than Eastern communities.

North Union, then, was a prosperous little commune for several decades. That this was known in nearby Cleveland is indicated by the observations of a local judge in 1870, that the Shakers honored their contracts promptly and faithfully (MacLean 1907, 188), and always paid in cash (Wheeler 1988, 98). How the Shakers became so rich is beyond the scope of this dissertation, but it is reasonable to suppose that part of the answer is related to their technological skill. North Union Shakers invented Babbitt metal (a type of solder) and were among the first Western Reserve dairymen to import cattle for breeding purposes. Other businesses also required astute market-related judgements, especially concerning dairy or textile products that were taken into Cleveland to be sold. The relation between technological and business skills and the human capital of members is as clear for Shakers as for other Americans of the day (Stevens 1990). Shaker wealth probably derived from their high levels of human capital, which

in turn is evident from the extraordinarily high levels of signature literacy among the earliest members.

To address the question of why a generally well-educated group would forsake the world to embrace Shaker communal ideals, I invoke and modify a model developed by Laurence Iannaccone (1988, 1992). The implications are not surprising: the earliest Shakers joined because the benefits outweighed the costs. Over time, as income distribution within the American economy became more unequal (Lindert and Williamson 1980), people with less human capital became more attracted to Shaker life; again, the model predicts this as the result of changing cost-benefit differentials. In the end the attraction to this way of life can be seen as a result of rational choice among active and prospective Believers. Perhaps only an economist would fail to be surprised at the success of the model: a priori, the business acumen, design skills, and theological development of the Shakers might have directed a casual observer to a different conclusion.

For the community, the burden of illiterate members grew to destroy what had been a Shaker advantage over Worldly competitors in human capital. By the 1880s, the North Union Shakers were reduced to hiring laborers who signed away their right to be paid and accepted room and board: they could only attract people with virtually no

opportunity cost of being in the community.[1] In 1889, the remaining 34 members departed North Union for Shaker communities near Dayton and Lebanon, Ohio. By early this century, the buildings of North Union had all but disappeared, their place taken by another attempt to escape urbanizing America: the suburb of Shaker Heights.

The model

In a pair of recent papers, Laurence Iannaccone applies microeconomic theory to analyze religious behavior (Iannaccone 1988, 1992). I will use his model to study the North Union Shakers with a few very minor adjustments. Where his model emphasized a static means of differentiating church and sect, I use its implications in a dynamic sense to rationalize in economic terms the path of a Shaker community's rise and decline. The model provides a standard microeconomic story of maximizing utility subject to constraints, and once the existence of an optimum is established, varying the human capital level of the subject results in the comparative static results described above. A neat aspect of the current study is the more

1. Ohio Historical Society Shaker Collection 119, box 14. The contracts read, "Whereas my lot, being cast for the present among the Society or people called 'Shakers' residing in Warrensville, Cuyahoga County and State of Ohio, and as they do not wish to hire but would prefer consecrated labor, Therefore, I hereby promise and agree, never to bring any charge, debt, damage, or demand against said people, or Society, or any member thereof, for any labor or service I have rendered them, or may hereafter render them, beyond what I may receive in food, clothing, mending and such articles of clothing, as they, the 'Shakers' may see fit to give me."

appropriate empirical measures used compared to Iannaccone's original papers: this paper uses a literacy variable to measure human capital, whereas income in the original proxied for human capital. The ultimate conclusions, however, are quite similar.

Especially after the middle of the nineteenth century, the Shakers suffered from adverse selection. Table 14 indicates that, although illiteracy among Shaker entrants was declining throughout the century, as elsewhere in Ohio, in the rest of the state it was declining faster. Entering Shakers were thus becoming relatively less literate. A simple model of adverse selection would predict this. A community that pays out a real wage (in the form of goods and services) worth a member's average rather than marginal product creates an incentive for those with low marginal products (MP<AP) to join. Such a simple model fails to account for the initially high level of Shaker literacy. The following model is designed to account for such dynamic differences. In it, the factor driving qualitative Shaker membership decline is the difference between Shaker and worldly living standards. That is, ultimately, the opportunity cost of becoming Shaker became too high for large numbers to find it the optimal choice.

Assume that an individual derives utility from the consumption of two goods, religious (R) and secular (Z). The former represents salvation, fellowship, spiritual growth, and the like, and the latter good subsumes food, clothing, and shelter into a one dimensional quantity. Further, in the Shaker case, R includes some close

substitutes for certain secular goods, namely, the dormitory style housing, the fairly standard dress, and, in the mid-1830s, the Graham diet. Thus the individual's problem is to maximize $U = U(R,Z)$, where U is subject to the usual requirements of differentiability and convexity. Each of R and Z is created by a person according to the following production functions

$$R = R(S_R, C) \tag{6}$$

and

$$Z = Z(S_Z, C), \tag{7}$$

where S_R and S_Z represent human capital specific to each endeavor and C describes one's conduct. In each case, the greater the specific human capital level, the more of each good one can make. Conduct describes one's position along a continuum of behavior addressed by religious and secular ideals, which for present purposes might include ownership of private property, being married, and other behaviors related to Shaker beliefs in pacifism, sexual and racial equality, and confession of sins to elders and eldresses. Since one can choose one kind of conduct along this hypothesized continuum, it is not subscripted. It will simplify matters to consider R and Z as separable in the two variables, and the positive effect of human capital as a simple factor. Thus

$$R = S_R \, \phi_R(C) \tag{8}$$

and

$$Z = S_Z \, \phi_Z(C) \tag{9}$$

are the two production functions. For each good there is a norm of conduct, labelled C_i which maximizes each function ϕ_i. Without loss of generality, let $C_Z < C_R$. As the individual deviates from this norm, the rewards (R or Z) fall, producing bell-shaped R(C) and Z(C) curves. Both are bounded from below, assume by zero, since the religious experience is voluntary and negative secular rewards are limited by law to exclude torture or Poor Law-type penalties. The Shaker's more precise problem, then, is to choose the optimal C* that will maximize U[R(C),Z(C)].

This decision can be made finer by establishing two groups, those deciding between Z and a common religious good R_C, and those deciding between Z and the Shaker good, R_S. R_C represents the religious good resulting from participation in an ordinary church, while as noted, R_S includes some close substitutes for worldly food, clothing, and shelter. The strictness of the Shaker demands is captured by requiring

$$C_{R_C} < C_{R_S} . \qquad (10)$$

Assuming symmetry of the ϕ functions about C_R and C_Z provides that C* will lie between C_Z and either C_{R_C} or C_{R_S}, for the following reasons. It is fairly easy to see that the first order condition is

$$\frac{\partial U/\partial Z}{\partial U/\partial R} = \frac{\partial R/\partial C}{\partial Z/\partial C} . \qquad (11)$$

By the usual assumptions about U, the left hand side is negative; hence the right hand side is also negative. But for the right hand side to have numerator and denominator of opposite signs, by the bell-shaped assumptions on R and Z, the C* in question must lie between C_Z and C_R. For reasons discussed shortly, C* will not in either case lie between C_{R_C} and C_{R_S}.

Based on these requirements, Figure 5 presents profiles of Z, R_C, and R_S as a function of C, that is, holding the human capital variables constant. Figure 5 also shows on the right hand side production possibility frontiers derived from the left hand side of Figure 5. As Iannaccone notes, the farther the Shaker ideal is from the secular ideal, the more likely it is that the Z-R production possibility frontier will be convex. For the common religion, with ideals differing less from those of the secular world, the PPF is concave between (a,b) and (c,d). The relative convexity of the two is easiest to see along the 45 degree line in Figure 5. Points g and h show equality of the secular Z function with the respective church and Shaker R functions. Since g is "taller" than h, when the points are transferred into Z-R space in 1b, g is farther out along the 45 degree line than h. Hence, the pictured concavity and convexity. As a result, those deciding between a common church and the secular world show a continuum of behavior between a C_Z and C_{R_C}, while Shakers exhibit an all-or-nothing behavior near either C_Z or C_{R_S}.

Since the Shakers made greater demands upon their members, they had to provide more religious support to Believers to replace the forgone secular goods. That is, since

$$C^*_C < C^*_S \Rightarrow Z(C^*_C) > Z(C^*_S) \qquad (12)$$

(Z(C) decreasing over this range by assumption), $R_S(C)$ must present a taller profile than $R_C(C)$. Not only is this theoretically reasonable, as Figure 5 shows that otherwise a reasonable set of indifference curves would generate choosing the common church every time, but it fits the Shaker experience, in which the community provided a virtual round-the-clock religious experience unlike any other church. Further, as noted previously, the R_S profile is increased by Shaker provision of close substitutes for worldly food, clothing, and shelter. Thus in Figure 6, the R_S graph is sufficiently high in Figure 2a that the person in Figure 2b is indifferent between church and Shaker membership.

I claim that Figure 6 provides a reasonable model for the early nineteenth century Shakers in the United States. Since income distribution was more equal earlier in the century than later (Soltow 1989, 43, 164; Lindert and Williamson 1980, 67-75) only one Z profile is plotted to represent the relative homogeneity of the population. As a result, the representative member pictured in Figure 6 is quite close to preferring Shaker membership, which would indicate that the earliest Shakers should have been similar to their neighbors in Z-type characteristics such as income, wealth, and literacy. That this was

so in New England is shown later in this paper and elsewhere (Marini 1982). For the present purposes, I propose that if the Shaker R_S profile is much higher than the alternative Z profile, then Shaker membership would be preferred by some high human capital (S_Z) people. The membership of such people in the Ohio Shaker communities is discussed in the next section.

Over time, income distribution in the United States became more unequal. Lindert and Williamson (1980) found a trend toward increased inequality in the Early Republic. There is a substantial debate concerning this result, with opposition led by Soltow (1989). Even he, however, found an increase in the wealth Gini coefficient from 1798 to 1860 (p. 43.) Importantly, there is evidence that wealth distribution in Ohio became more unequal around the middle third of the nineteenth century (Newell 1980). Associated with this was a dispersion in levels of human capital among Americans. The model captures this by allowing two levels of secular human capital, S_{Z_H} and S_{Z_L}. Thus the low human capital Z profile is just shorter and proportional to the high human capital Z profile.

Figure 7 shows these differences. In Figure 7 the production information on the left is translated into Z-R space where the solid curves represent church-secular production (concave) and Shaker-secular production (convex) for high-human capital people and the dotted curves represent the same for low-human capital people. In this case, church membership is optimal for high-human capital people

and Shaker membership for low-human capital people. The model indicates that the Shakers should have attracted people with less human capital than those who stayed in the world, after the development of the two levels of human capital. The rest of the paper discusses the trends described in Figures 6 and 7: high Shaker human capital initially, and the attraction of those with less human capital over time. An immediate concern is how to measure human capital of those long dead.

Human capital, education, and literacy

Signature literacy offers a reasonable approximation of the minimum ability to read and write. Some of those who signed could write but not read, while some who failed to sign could read but not write, and the common scholarly assumption is that the two biases likely cancelled each other out (Lockridge 1974, Gallman 1988, Graff 1991). Since a major claim of the model is that entering members should have ever less human capital over time and the ability of a Shaker to sign or mark soon after entrance is a reasonable proxy for human capital at entrance, Shaker records provide appropriate signature/mark data to examine the model's claims in terms of human capital.

North Union is an especially good community to examine because of the completeness of its records. Its novice agreements that were signed/marked by the entering Shaker and two or three community officials date from early in the community's history, starting in the 1830s. Since North Union was one of the last Shaker communities

founded, the result is a nearly complete set of signatures/marks of all adults who ever lived there. This sample is not quite complete; some names occur in Census enumeration schedules for which no signature/mark survives. But comparing N in Tables 14 and 17 suggests that the rate of missing signatures is quite low. In addition, the sample size is far beyond the only previous estimate of the total number of North Union Shakers; the sample numbers some 725 individuals while Andrews (1953) supplied a Western Reserve Historical Society estimate of 407 members.

In the analysis that follows, unless stated otherwise all rates and ratios are expressed as

literacy rate = # people who signed/(# who signed + # who marked)

or

illiteracy rate = # who marked/(# who signed + # who marked).

This is worth mentioning because some studies, mainly of European literacy, provide illiteracy rates expressed as

1 - (# who <u>fail to sign</u>/ # in relevant group),

where the group is all those "signing" wills, marriage registers, deeds, etc. In the interest of accuracy, and to maintain some kind comparability with the American studies of Soltow and Stevens, Gallman, and Gilmore, I infer illiteracy only in the presence of a

mark. A document lacking a signature or mark is simply deleted from both the numerator and denominator. The number of entrance agreements this affects is fewer than one in a hundred; covenants are affected not at all.

According to the earliest covenants from every Shaker community so far investigated, human capital as proxied by signature literacy was very high. In rural New England at the close of the eighteenth century, worldly signature literacy was between 90 and 98 percent for men and between 50 and 80 percent for women (Lockridge 1974, 40; Gilmore 1989, 122-123). Among the Shakers, signature literacy was 100 percent for both sexes on the first covenant of 1795, from New Lebanon, New York, a mile or so from Massachusetts, on a second New Lebanon covenant of 1796, and on a covenant of 1800 from Harvard, Massachusetts (Andrews no. 721; WRHS I:A-9, Meader 1970, 52). Rates of 95-100 percent literacy can be obtained from other contemporary Shaker covenants (WRHS I:A). The rough equality of literacy rates among men may reflect the rough equality of living standards in the Northeast Worldly and Shaker communities (Marini 1982 99). The superiority of Shaker Sisters' literacy may be a result of the greater attractiveness of Shaker life, in which women were treated as equals, for even slightly educated women.

Ohio Shakers followed the same pattern. At the largest Ohio community, Union Village, a covenant was first signed in 1812. All 66 men and all but one of the 93 women signed. On the revised covenant of 1829, every one of the 79 men and 127 women signed (WRHS I:B-67,

I:B-70). These were remarkably high levels. In adjoining Butler County, William Newell's study of inheritance patterns showed signature literacy rates of 77 percent for men (n=98) and 14 percent for women (n=7) in the 1810s, and 76 percent for men (n=120) and 56 percent for women (n=9) in the 1820s. Unfortunately, the original North Union covenant of 1828 has not survived, but many copies which include the names of the signers have survived. Later documents such as letters or memorials provide evidence of the literacy of most of the 34 original signers. Of the 15 men, 12 signed and 3 left no further record; of the 19 women, 10 signed, two marked, and 7 left no further record. Those who were underage in 1828 or joined the community thereafter signed the same document until a revised covenant was issued in 1843. These later signers were also nearly all literate; only one of 15 men and one of 24 women were known through later documents to be unable to sign. The earliest North Union Shakers, like the earliest Shakers elsewhere, were much more literate than their neighbors.

This comparison is biased in two ways that tend to work against the model and one that favors it. First, it is likely that there was an age difference between the two groups. As Lockridge observes, in an era of rising educational levels, literacy levels on wills, which were written by older people, are likely to be lower than that of the general population, because the wills reflect the past, presumably inferior, educational regime. Thus, if the testators were older than the entering Shakers, and as the ages of the Shakers cannot

be determined from existing documents, then illiteracy among the testators may be higher than that of most Ohioans. Second, literacy in Northern and Southern Ohio may have differed due to different settlement patterns in the two areas. Much of Northern Ohio, including the area around North Union, was settled as the Western Reserve of Connecticut, and into mid-century newcomers were predominantly part of the Yankee diaspora. Southern Ohio, including Butler County, was originally a series of land grants for Virginia veterans of the Revolutionary War. Ohio's population maintained a sharp North-South dichotomy in terms of residents' birthplaces through mid-century (Wilhelm cited in Shortridge 1989, 105). Further, we know that the former New Englanders in Northern Ohio were more likely to be literate than the former Virginians in Southern Ohio through 1850 (Leet 1977). This suggests that the Butler Countians may have been less literate than the neighbors of North Union. So the rough equality of signature literacy rates may actually show that North Union's entrants were in fact on average less literate than most of their Northern Ohio neighbors. On the other hand, a common problem of estimating literacy from wills is that testators tend to be richer and more literate than those dying intestate. Hence, the Butler County sample may be more literate than most Ohioans. However, Lockridge indicates that this may not be a great problem.

Shakers took advantage of their human capital advantages. They enjoyed general aspects such as flexibility in responding to dynamic markets and experienced Shaker specific advantages such as the

ability to organize large communes. A good example of the former was their highly successful pharmaceutical industry. Although we tend to look down at folk remedies nowadays, Shaker medicines were highly respected in the nineteenth century and formed a large part of many communities' incomes (Estes 1991). In fact, technically too, the Shakers were pioneers in the sterile mass production of high quality medicines (Lee 1959). Profitability in this market required knowledge of sales trends, the ability to exploit the Shaker brand name, and the technical skills to produce most of their own inputs, the medicinal plants, and to manufacture medicines of consistent quality levels.

According to the model, over time the Shaker human capital advantage should decline. Tables 14 and 15 show this decline. In fact the literacy differential must have disappeared almost immediately in the following sense. Once past the earliest signers of the 1820s, Shaker entrants were just as illiterate as the most reasonable control group available, the Butler County testators. As a result, Tables 14 and 15 show that the community lost its literacy advantage perhaps as early as 1850, as the U.S. Census reported that the Ohio illiteracy rate was only 6 percent in 1840 (Soltow and Stevens 1981, 159). Although the Census figure is undoubtedly too low, as it was obtained simply by asking the head of the household how many of those 20 and older in the house were unable either to read or write, it provides a crude estimate of illiteracy in the surrounding population. By North Union's final two decades, its illiteracy was

quite high; beginning its final years a quarter of its men were illiterate and a fifth of the women.

The dynamic similarities among men in the Shaker and Butler County groups are worth noting. In the 1830s and 1840s, a little over a fifth of men in both groups were unable to write their names. This proportion fell by half among the Shakers and a third among the testators in the 1850s, and remained stable through the 1860s. Possibly this decline in illiteracy was due to the rise of the common school system in Ohio, as school attendance soared from 10.2 percent of school aged children in 1841 to 69.8 percent in 1850 (Soltow and Stevens 1981, 105). One would expect the schooling effect to show up later, but the simultaneity is interesting.

Very striking is the effect, or lack thereof, of a decade plus (1830-1842) of entrance of men just as illiterate as the comparison group of Ohioans on the literacy of the community (Tables 14 and 15). In 1842, the community signed a revised covenant which replaced the 1828 covenant (LC item 266). Literacy among the community remained as high as at the beginning: over 95 percent for men, nearly 90 percent for women. Believers signing this covenant numbered 117; according to the 1840 U.S. Census, North Union had 112 adult residents in 1840, so the covenant must have been signed by nearly every adult. Thus even after these years of inflows of men at least as proportionally illiterate as those in the World, literacy in the community remained quite high. It must have been the case that illiterates tended not to remain long in the community. The crucial aspect of these tables for

the model is the steady, if interrupted, rise of illiteracy within the North Union community. From near complete literacy at its founding, by mid-century its members were likely as illiterate as most other Ohioans, and indeed by 1870 its proportion of illiterates was perhaps twice that of the World.

Less surprising is the relatively high literacy rate among entering Shaker sisters. Their illiteracy rates were well below those in Butler County, by a factor of roughly one-half, and were declining, unlike the Worldly rates. The proportion of illiterate resident Shaker sisters in each census snapshot is quite stable (Table 14), and far below the proportion of illiterate female testators. The attraction of a Shaker community to women with relatively high levels of human capital is not hard to find. Shaker ideology and theology provided for sexual equality; the sect was founded by a woman believed by her followers to be the fulfillment of Christ's promise to return. For some, this doctrine likely compared favorably with a World where women did not have the franchise and held the legal status of property of their husbands or fathers. Further, and more congenial to the model, even literate women likely had limited economic opportunities outside the Shaker community. This could be pictured with a graph similar to Figure 6, in which taller R_S and lower Z profiles for women than for men make the Shakers the optimal choice for women with rather high levels of human capital. This could illustrate that the opportunity cost effect of the model that encouraged literate men to leave likely had less an effect on women.

By 1880, Sisters were more literate than Brethren (Table 15), which may have had a profound effect on the community. The office of Trustee, which was responsible for the community's financial affairs, was hitherto solely staffed by a board of four Brethren. In 1880, North Union became the first Shaker community to assign the job of Trustee to Sisters when it dissolved its board of four men and replaced it with one of two men and two women (Nickless and Nickless 1987). Although their announcement in the Shaker publication The Manifesto attributed the change to a desire to remain consistent with the doctrine of sexual equality, Nickless and Nickless suggest that it was a part of the gradual growth in power of the Sisters, perhaps due to the relative increase in their numbers or the success of their industries. The growing superiority of Sisters in human capital stocks provides another explanation for the shift in community decision making power toward women.

Shaker investments in educational human capital centered on children. As celibates, the only way they could continue or expand was through admission of new members. The North Union Shakers practiced a mixture of proselytizing in the Cleveland area (WRHS V:B-177, 1 August 1835) and, like every other Shaker community, taking in children. Some communities took in orphans, some rather large numbers of children indentured by their parents to learn a trade, and all took children of adult converts. North Union concentrated on the third (Nordhoff 1875), but also accepted indentured children. I suggest that by restricting the number of indentured children of non-members,

the North Union Shakers took in children with better educational potential; that is, their children required somewhat less investment than those they would have admitted otherwise.

Indentured children were dropped off by their parents, often parent in the singular, and bound by written agreement to the community until 18 if a girl or 21 if a boy. The document was signed by one or both parents or guardians, Shaker trustees, and oddly, the child as well. Many agreements include a scrawled X surrounded by the name of a two or three year old. Based on family names and identification of the signing adult it is easy to see that a high proportion of youths came from broken homes. It is also easy to see the proportion of illiterates among these parents or those acting in their stead.

To show the difference between a community that more regularly took in children from any parents who wanted to leave them and a North Union that preferred to take in children whose parents entered with them, see Table 16. At Watervliet, near Dayton, Ohio, children were accepted with little regard to their origin (Maclean 1907, 211-214), which was more typical of Shaker practice. A small set of 23 signed indentures (OHS Collection 119, box 14) shows an extremely high rate of illiteracy: 55 percent among fathers (n=11) and 71 percent among mothers (n=17). In only five of the twenty three did both a father and mother sign, suggesting a high level of marriage instability, and in only one of those did both write their names.

The literacy rates may be compared to literacy rates among testators in neighboring Butler County. Over the same time there, only 18 percent of men marked their will (n=658) while 50 percent of women marked their will (n=111). At North Union, by contrast, which preferred to admit children of adult members, parental illiteracy was 9 percent for fathers and 31 percent for mothers. To the extent that one's parents influenced one's receptivity to education, or that parental illiteracy thwarted home education, North Union's children would have been easier to educate. Conversely, and in line with the model, Watervliet, by failing to restrict entrance of children, accepted those with lower human capital receptivity levels.

An empirical synthesis

North Union, like any American community, experienced ebbs and flows in its population. Some of those who entered stayed on for the balance of their lives, some left in a matter of weeks, and many stayed an intermediate time. In previous demographic studies, concentration on Shaker apostasy rates has distorted estimates stability of their communities, as I describe below (Brewer 1986, Bainbridge 1982). I propose a more accurate picture by concentrating on population structure at a given point in time, namely, the day the U.S. Census enumerator visited and counted North Union residents. Consider the sample I have drawn of North Union Shakers. Since it is virtually complete, and we know which Shakers died at North Union, who moved to other Shaker communities, and who remained when it closed,

the remainder of the sample must have apostatized. By linking the sample to Census manuscript enumeration schedules, I have found that the proportions of life members among all adult members in 1850 and 1860 were .60 and .57 respectively. Thus, at these points in time, the census "snapshot" of North Union shows that three-fifths of the adult residents were life members.

This method suggests a more stable community than does the method of Bainbridge, whose estimated "retention rate" equalled .44 for North Union in the 1850s (Bainbridge 1984, 25-28). His source of census records for the whole Society failed to distinguish between those who apostatized and those who died in the faith. This retention rate for North Union is higher than the retention rates in a number of American communities. According to numerous 1850-1860 retention studies, in Chicago it was .14, in Boston and Milwaukee .39, in Philadelphia .32; in two rural Iowa counties .29 and .31, and rural Illinois .38 (Galenson 1991). Bainbridge interpreted Shaker retention rates as quite low, but compared to the World, Shaker communities might in fact have seemed fairly stable.

Another misleading turnover estimate which indicates an unstable community is Brewer's method of dividing apostasies by number of members ever present in a time period, which yields an "apostasy rate" of approximately .62, implying a paltry remaining rate of .38 for North Union in the 1850s (Brewer 1984, 37). Using this method, a community that numbered 11 at any one time, 10 life members and a series of 10 eventual apostates who stayed one year each, would have

an "apostasy rate" of .50 in a decade (10 apostates, 20 total members), even though at any given time in the decade 91 percent (10/11) of the residents would be lifetime members. This is a crucial caveat. In the 1850s North Union took in 219 novices, of whom only 30 did not apostatize. Yet North Union was likely not overwhelmed with these temporary Shakers, because they formed a flow right through the community, at any given moment were outnumbered by the lifetime Shakers, and in any case were mostly segregated in the Gathering Order (the separate residence for prospective members).

The census also provides average adult population levels through the 1830-1880 period, which makes it possible to estimate how long the average life member and the average apostate stayed. Assuming that at any one time, 60 percent of adult members were in for life, the durations are roughly eighteen years and just over three years respectively. But the distribution of the apostate durations is severely skewed, since it has a lower bound of 0 and a mean of 3.2, and members who were Shakers longer than a decade before leaving were not uncommon. Many temporary Shakers must have been in the community for a period of a few months. What factors influenced a member's decision to apostatize and return to the World versus remaining a Shaker?

The population sample studied here presents opportunities to question which factors led a Shaker to remain in the community for his or her life, and which tended to encourage apostasy. Guided by the model (and constrained by data availability), reasonable covariates of

the membership/apostasy decision can be suggested, and a testable model specified, fitted, and examined.

The logit regression results are presented in Table 18. In each case the dependent variable is set to zero for the Shaker who apostatized and left the community, and to one for a Shaker who died at North Union, transferred to another Shaker community, or was present at the dissolution of North Union in 1889. Note that adult population reached its peak in 1860. Thus, comparison of all three census years allow a view of some of the factors in the rise and fall of the community.

The most interesting result is the strength of the literacy variable, LIT. It confirms the model's hypothesis about human capital levels of members. Reasonably to strongly significant in all three equations, its negative effect on the probability of being a lifetime member grew in magnitude over time, which suggests the increasing power of illiteracy to constrain one's opportunities in the outside world. As the decades passed, literacy increased the probability ever more that a Shaker would eventually leave. Although Table 14 shows that from 1830 to 1879 new Shakers were ever more literate, this decline in illiteracy was not as steep as the decline in the rest of Ohio. In these relative terms, prospective Shakers were becoming more illiterate. Then, over time as illiteracy made one more likely to be a lifetime Shaker (Table 18), the composition of the community gradually changed until in its last decades the proportion of illiterates at North Union was perhaps twice that in the rest of the

state. Any advantage the Shakers may have derived from having a well-educated labor force was lost.

As an effort to control for general and job-specific human capital, the occupational variables did not tell a consistent story. In 1850, as expected, the skilled coefficient (OCC2) is more negative than the farm coefficient (OCC1), and highly significant, indicating that those with skills to use in the World were, in fact, more likely to go there. However, in 1860 and 1870, both variables become statistically indistinguishable from zero. Only in the 1870 census was it possible to control for women's skill types, but here again, the variable for women's craft work, OCC3, is insignificant and positive. The indeterminate performance of these variables is less surprising when considering the Shaker schemes of job rotation. Even skilled craftsmen were likely to work outside their craft at times, which was known to puzzle the U.S. Census enumerators charged with recording residents' occupations (Andrews 1953, 103ff; Brewer 1986, 81).

The remaining variables control for regional and age differences. The age variable is positive and highly significant, suggesting that the older the Shaker, the less likely he or she was to leave. This idea will be subjected to more rigorous testing in Chapter VIII when I use proportional hazard models to study more complete population data from New Lebanon, New York.

Ham proposed that an advantage of the Shakers over many contemporary communal societies was the indigenous nature of each

Shaker community's population (p. 89). Certainly Western dependence upon the East for leadership led to severe problems at times (Stein 1988). Recruitment prospects and results among local people can be examined here with the variable ORI1, indicating Ohio birth. Its steady growth over time in magnitude and significance shows that at North Union, Ohio birth was an increasingly important and positive factor in one's dedication to the Society. Interestingly, New England birth (ORI2), although associated with large, if declining, p-values, became an ever greater factor tending toward apostasy. Ham's claim seems to describe North Union well, even though it was founded by New Englanders in the heavily New England influenced Western Reserve. Finally, foreign birth tended consistently to increase the probability of apostasy.

Model and literacy summary

The rise and decline of a communal society in a capitalist, hierarchical world is a complex phenomenon. One explanation is provided by the interaction of club theory and human capital theory. The earliest days of the Shakers saw a gathering of almost completely literate Believers brought together by the positive externalities of communal worship. Over time, their material success attracted newer members who were less literate in absolute (Table 15) and relative (Table 14) terms, and as such, less able to achieve Worldly independence. In turn, these people were less put off by the rather strict membership requirements of communal property and celibacy. An

earlier chapter showed that North Union suffered from excessive tuberculosis mortality, and likely morbidity as well, especially among its young members who would otherwise have been among the most productive. The decline in membership quality and productivity must have represented a substantial burden to the community's economic health. Following the economic principles in this paper, it seems likely that the loss of the Shaker human capital advantage over the world was an inevitable result of Shaker wealth and provision of a reasonably secure life.

CHAPTER VIII

ECONOMIC MODELS: DURATION ANALYSIS OF MEMBERSHIP

Introduction

The previous chapter presented an economic model of membership patterns in a communal society. The data set used to test the model was unusually rich because it contained direct evidence of human capital for each member: whether the Shaker marked or signed an entrance form. Due to limitations of the decennial census enumeration manuscripts and the North Union death list, the variable summarizing each Shaker's membership experience was a simple binary dummy variable which described life membership or eventual apostasy. Even for a one-dimensional summary of a complex life experience, this is somewhat restrictive. Fortunately, improvements are possible. Some Shaker communities kept detailed population records in which birthdates and dates of entrance and death or apostasy were noted. Thus, rather than describe the Shaker's membership with a 0/1 variable based on apostasy or death, this chapter uses the duration of one's membership. A growing literature in the econometric study of duration analysis makes such study of this data feasible. This chapter focuses on the New Lebanon Church Family and identifies characteristics of individual Shakers that made them more or less likely to persist as members.

Data

The sources of the data are two Shaker manuscripts. Isaac Newton Youngs was the author of both "Names and ages of those...", which is Andrews collection number 1078, and "Domestic journal of daily events", which is in three bound volumes, the first of which is item number 13500 in the New York State Library and the second and third of which are items V:B-70 and V:B-71 in the Western Reserve Historical Society Shaker Collection. The availability of extensive occupational data in the first volume makes the New Lebanon Church Family the best unit of the Shakers to study. "Names and ages..." provides the name of each Shaker who lived in the New Lebanon Church Family; a non-unique identification number; the date of birth; the town, county, and state of birth; the date of entrance; some remarks, for example, the entering Shaker's hometown; and the date of "departure" and whether it was due to death, apostasy, being taken away by parents, or being asked to leave.

The "Domestic journal" is primarily a journal of Youngs's and the community's daily experiences. At the end of each year, Youngs recorded some production statistics for the various Shaker industries, for example, the quantities of saddles, seed packets, or apples produced that year. Every five years he took a census of the community, recording each Church Family member's name, age, height, and job. The height and associated identification data formed the data set for Chapter VI. The occupational information will be useful

in examining the influences on membership duration, after linking to the "Names and ages..." data.

A quick review of related literature

Econometric use of duration models has become widespread in labor economics, and has just recently been introduced into the economic history literature. Kiefer (1988) has presented a very useful overview aimed at most economists while Lancaster (1990), one of the pioneers in the method's use, provided a firm formal basis for these models in his book. A non-technical overview for historians is Shpayer-Makov (1991), which presents duration models in the context of broader measures of labor turnover.

The debut of hazard functions in the economic history literature narrowly defined was Carter and Savoca's (1990) study of job tenure in 1892 San Francisco. They demonstrated the method's power by estimating a much longer job tenure than previous students of turn of the century American labor markets had suspected--tenure similar to labor markets of the present day. Their Explorations article that followed (Carter and Savoca 1991) was similar in methodology and results, examining differential tenure for men and women. The Carter and Savoca methodology drew a detailed response soon after publication. Jacoby and Sharma (1992) asserted that an unusual ethnic distribution and high unemployment within the 1892 San Francisco labor market made it too dissimilar from the rest of the United States to allow national inferences about tenure. Further,

they claimed, this failure of the steady-state assumption invalidated the use of proportional hazard models with cross-sectional data.

These objections are noteworthy because they illustrate the pitfalls of cross-sectional data. Sampling a cross-section of a population at a given point in time introduces two problems. First, one observes only uncompleted spells. For example, Carter and Savoca observed only workers whose current spells were still in progress in 1892, and could not know when the current employment spell ended. This characteristic of the data is called right-censoring, since the right end of an interval giving the beginning and end of the spell is unknown. A solution to the problem of censoring is to assume a steady state: if the distribution of the survey timing over any given spell is uniform, then a completed spell is on average twice as long as the tenure to date (Carter and Savoca 1990). In addition, sampling at one point in time produces length-biased sampling. Longer spells are more likely to enter the sample than briefer ones. The steady-state assumption of constant entry allows for an accounting of the unsampled shorter spells' effects (Jacoby and Sharma 1992). Failure of these crucial assumptions, however, invalidates the model and its parameter estimates. The solution, rare in historical studies, is longitudinal data. The available Shaker records circumvent the problems of the restrictive steady-state assumptions that have been the subject of scholarly debate.

Students of the Shakers have thus far used simple descriptive statistics analysis to analyze Shaker membership records. As noted in

the previous chapter, Bainbridge (1984) estimated a kind of turnover statistic after linking records of the Shakers in U.S. Census enumeration schedules. He proposed a retention rate at mid-century of 54.5 per cent per decade for women and 40.5 per cent for men. I have proposed that he somewhat underestimates community stability, because he lumps those dying in the faith with those apostatizing.

Brewer (1986) provides mean duration of membership of all New Lebanon Church Family members by decade of entry and sex. Her results are biased downward a bit, which would fit the pessimistic tenor of her book, because she assigned a value of zero to all spells lasting less than a year. By my calculations, which involve only Shaker adults and cover a different time period from hers, such spells account for less than two percent of women's spells and less than four percent of men's. However, such spells were concentrated among children who left or were taken before adulthood, and these people were in her sample and not in mine, so my results may understate the problem. In any case, Brewer lets these estimates pass with little comment other than to propose an earlier date, perhaps even the 1820s, as the beginning of the Shaker decline.

Bainbridge (1984) further refers to "a reasonable sociological principle" which had been refuted in a study of modern urban communes by Zablocki: "the longer an individual stays at a commune, the greater that person's commitment is likely to be, and the more apt that person is to remain a member." Zablocki claimed that there was no relation between duration and probability of immediate apostasy. Bainbridge

tests this through crude but effective separation into veteran and neophyte Shaker status based on appearance in the previous census. He finds what could be appropriately called negative duration dependence: the longer one is a Shaker, the lower the probability of apostasy. Conveniently, a proportional hazards model with a baseline Weibull hazard produces an estimate of the parameter α, which measures duration dependence. Here is an example of a well defined social science hypothesis which can be appropriately tested with available data and software. The results are reported later in this chapter.

Models

The distribution of durations can be characterized in a mathematical sense by several functions; that is, specification of one uniquely defines the others. The most familiar are the probability distribution function f(t) and the cumulative distribution function F(t). Two other useful characterizations are the survival function $S(t)=1-F(t)$ and the hazard function $\lambda(t)=f(t)/S(t)$. The survival function gives the probability that a spell will last longer than t, and the hazard function gives the conditional probability that a spell will end in period t, given that the spell has continued up to period t. The hazard function clearly gives information that is of considerable interest in the study of durations. The probability that a spell will last exactly a certain length of time is not only complicated to calculate, but economically uninteresting. More often, we are interested in questions such as: given that the phenomenon has

occurred up to a certain time, what is the probability that it will end just after that time? In other words, what is the value of the hazard function?

Particular functional forms are commonly assumed for the hazard. Familiar distributions like the normal and lognormal are not often used in duration analysis because the hazard functions generated from these are quite complicated. Some distributions yield a constant hazard (i.e., no duration dependence) as an easily derived special case and thus a convenient null hypothesis (Kiefer 1988). In particular, if the density is assumed to be Weibull, a common assumption in practice, the hazard is given by

$$S(t)=\gamma\alpha t^{\alpha-1} \qquad (13)$$

where γ can depend on explanatory variables. Duration dependence is given by α, where $\alpha>1$ ($\alpha=1$, $\alpha<1$) indicates positive (no, negative) duration dependence.

To introduce explanatory variables requires defining

$$\gamma=\exp(X\beta) \qquad (14)$$

where X is a vector of exogenous variables that influence the Shaker's decision to stay or leave.

A simple economic model similar to the one presented in the previous chapter can provide guidance for expected signs of the available variables. The model simply states the following. The operation of the community as a cooperative entailed that all members were "paid" equally for their labor, since each received about the same quantities and qualities of room, board, and clothing. Thus each

Shaker was paid his or her average product rather than marginal product. Prospective (current) members whose marginal product was less than the average product would then have an incentive to join (stay) and receive more than they produced. This is compatible with the model presented previously but is somewhat more general since it excludes religious considerations. Although sub-average product members may have had incentives to stay, there is no evidence to suggest that shirking members were common. In fact, available Shaker evidence indicates that would-be shirkers, the bogeymen of current anti-cooperative writers, were badgered by fellow Shakers into working at an acceptable level, just as they are today (Jensen and Meckling 1979, Holmstrom 1982, Bonin, et al. forthcoming, Stein 1992, Andrews 1982).

The available variables include urban/rural birthplace; birth in Columbia County, New York, the location of the New Lebanon community, or an adjacent county; birth elsewhere in the northeast United States; birth in Europe; and number of years of the person's youth that were spent in a Shaker community. Some observations include the Believer's current occupation.

Consider the role of the level of entrants' human capital. The variables here do not measure the level of the entrant's human capital, but one variable can describe the kind of human capital the entrant was likely to have had. Whether the new Shaker was born in a city or a rural area can act as a proxy for the farm-specific human capital needed by the rural Shaker community. Presumably, a rural

person would enter the community with skills more easily applicable to the Shaker environment. An urban-born prospective member would be more likely to contribute a below-average marginal product to a rural commune. Thus, we might expect that entrants born in urban areas would become a larger proportion of entrants over time. If they were indeed badgered into working harder than they would have liked, perhaps they also would have briefer spells of membership than the rural-born.

A Shaker's occupation is valuable but ambiguous information. Occupation is somewhat endogenous, because it reflects some of the Shaker investment in their younger members. If members were more likely to learn such skills the longer they were in the community, or if leaders were unusually prescient at assigning children who would become long term members (e.g., those who as children were more cooperative) to training at such skills, knowledge of a trade may be associated with longer membership durations. It is also possible that, as at North Union in the previous chapter, the Shaker practice of job rotation diminished the amount of useful information in a one-word occupation description. On the other hand, presumably members with skills such as weaving or blacksmithing could more easily fend for themselves in the World than less skilled Believers. The model suggests that high marginal-product, skilled members would be more likely to apostatize.

The variable which measures years of youth as a Shaker, that is, number of years the person spent in the community before age 18,

also is affected by endogeneity. The model might be interpreted to suggest that the Shakers took in ever younger people over time, which occurred in the New Lebanon Church Family (Brewer 1986). Certainly most writers attribute the Shaker practice of adopting orphans and accepting indentured children to a kind of desperate desire to find new members almost anywhere (Brewer 1986). Some Shakers said that adoption was an act of charity, as it began after the 1849 cholera epidemic (Ham 1962); some simply that they liked having children around (Nordhoff 1966). Whether the Shakers gained or lost through this practice is questionable; most writers who see the practice as a period of socialization to prepare the child for Shaker life describe it as an exercise in futility, since so few children remained for long (Brewer 1986). But Northeastern farm children were surprisingly productive (Craig 1991), so the Shakers likely benefitted in economic terms from raising their charges. Further, even if few children remained into adulthood, these were much more likely to become adult Shakers than were other, Worldly children. Adoption may thus have played an important role in allowing for the continuance of the society. If the Shakers were successful at socializing the children, this variable should induce longer membership durations, ceteris paribus. However, if adults who made a conscious decision to become Shakers became longer term members, then years of youth as a Shaker should be associated with shorter membership durations.

For estimation purposes, the model assumed by SAS for the duration is

$$y=\mathbf{X}\beta+\sigma\varepsilon \qquad (15)$$

where y is the log of the duration, X is a matrix of independent variables, β is the vector of parameters to be estimated, σ is a scale parameter, and ε is a vector of errors. Since the effect of the independent variables is to scale the baseline distribution of duration times, such a model is also called an accelerated failure time model. If the baseline distribution is assumed to have a Weibull probability density function, then the model is both an accelerated failure time and proportional hazards model (SAS Institute 1985). If there are n observations, then $\mathbf{X}$ is an n x k matrix of independent variables, $\mathbf{y}$ a vector of logs of endogenous duration times, and ε a vector of errors with survival distribution S and density f. Thus $S(e)=Pr(\varepsilon>e)$ and $f(e)=-\delta S(e)/\delta e$. Define

$$\delta_i = \begin{cases} 1 \text{ if i not censored} \\ 0 \text{ if right-censored.} \end{cases} \qquad (16)$$

The log-likelihood function to be maximized is then, according to the method of Kalbfleisch and Prentice (1980), a sum of weighted averages

$$L = \Sigma_{i=1}^{n} \delta_i \log(f(w_i)/\sigma) + (1-\delta_i)\log(S(w_i)) \qquad (17)$$

where $w_i = (y_i - \mathbf{x}_i'\beta)/\sigma$ (see also Kiefer 1988). Under the assumption of a Weibull baseline hazard, then the baseline survival S and pdf f for duration time t are, respectively,

$$S(t) = \exp(-\alpha t^{\gamma}) \qquad (18)$$

$$f(t) = \gamma\alpha t^{\gamma-1}\exp(-\alpha t^{\gamma}). \qquad (19)$$

Results

The SAS procedure LIFETEST estimates survival functions. The estimator is the nonparametric Kaplan-Meier or product-limit estimator and can be stratified by sex or beginning time of spell. The Kaplan-Meier estimator is given by

$$\hat{S}(t_i) = \prod_{j<i}[1-(d_j/r_j)] \qquad (20)$$

(Cox and Oakes 1984), where d_j is the number of completed spells of duration t_j, and r_j is the number of spells neither completed nor censored before duration t_j. The estimated survival curves for Shaker men and women are given in Figures 8 and 9. These curves, as with all the present results, exclude those who apostatized before reaching adulthood. Having excluded those who as children were taken from the community by their parents, this study uses only those Shakers who chose to remain in or leave the community. Each curve represents the survival function for a cohort of Shakers entering in given 20 year periods. The two decade long period was necessary to balance sample size with figure readability. Recall that the survival function gives the probability that a spell will last at least a certain length of time. Thus, for example, the probability that a male entering between 1820 and 1840 would be a Shaker for at least 15 years was around .50. In fact, where S(t) = .50 yields the median spell, similar to the mean given by decade by Brewer (1986).

The curves illustrate different duration structures for the sexes. The median spell for Brethren declined continuously from over 30 years for those entering in the early years to around six years for those entering after 1860. For Sisters, in the crude sense of membership duration, dedication of entering women actually increased up to 1840, and only then deteriorated. In fact, the entire spell structure as given by survival curves, and not just the median spell, follows more or less this pattern. For women, the survival curve moved to the right for the cohort entering in this second period, and the curve for the third cohort, while to the left of the second, shows these Sisters to have had a higher probability of staying at each duration length than the original Sisters (Figure 9). The first two cohorts of men generated almost indistinguishable survival curves, and then the succeeding cohorts' curves moved steadily to the left, indicating lower probabilities of remaining in the community at all duration lengths (Figure 8). There may be some merit to Brewer's pessimistic claim that the decline of the Shakers may have begun as early as the 1820s.

Many factors influenced the duration of membership. Not least was that membership for adults could end in two different outcomes, death or apostasy. Fortunately the proportional hazards model described above can handle such differences. It can handle censored observations, although to be sure, the fewer the better. Since this research is to investigate the influences on members' decisions to stay or leave, I define a completed spell of membership as one that

ends in apostasy, and one that ends in the death of the member as censored. The censored observations are included in the entire sample, so no information is lost, but the effects of the independent variables are on duration of chosen membership, not on length of life.

A picture of the New Lebanon Church Family through the period of "Names and ages..." is given in Tables 19-22. The mean membership durations for all those who were in the community as adults up to 1883 were over 20 years for men and over 30 years for women. Around a fifth of all these Shakers had been born in urban areas and a similar proportion had been born locally, either in Columbia County or an adjacent county. Over half were born elsewhere in the Northeast United States, and less than a tenth came from Europe. The average Brother in this sample entered at age 14 and the average Sister entered at age 13. About two-thirds of all Sisters were members for life, while only about 44 percent of Brethren died in the faith.

Breaking the data down by entrance outcome reveals interesting differences between life members and apostates (Table 20). Not surprisingly, for both sexes life members' duration was four times longer than that of apostates. Apostates spent about twice as much of their youth as Shakers as did life members. Less than a tenth of life members had been born in cities, while over a third of apostates were urban-born. The proportion of lifers who were locals was greater than that of apostates, while the proportion of apostates who were from Europe was the greater. In fact, for all these variables, differences between the sexes were quite small compared to differences between

life members and apostates, which were statistically significant in seven out of eight comparisons. Life members and apostates seem to have come from different groups of people.

The pooled proportional hazard regressions for all the New Lebanon Church Family Shakers show several interesting patterns that begin to test the economic model of membership (Table 22). Most prominent is the effect of urban birth. A Brother born in an urban area was 75 percent more likely to leave than one from a rural area.[1] The apostasy rate for Sisters born in urban areas was half again as much as that for rural-born Sisters. Even though these city people were much more likely to leave soon than rural-born Shakers, the population of the Church Family was being profoundly affected by the changing composition of entrants. Because the proportion of urban-born entrants was exploding, their proportion in the population of the Church Family was growing. Table 19 shows the proportion of urban-born entrants to the Church Family increasing from 6 percent in the

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1. The effect of a coefficient on the dependent variable in a proportional hazards model is given by exponentiating the coefficient. Having assumed a Weibull density gives a hazard of

$$S(t,X)=\exp(X\beta)\alpha t^{\alpha-1}, \qquad (21)$$

as in equations (13) and (14). Thus,

$$\partial \ln S(t,X)/\partial X = \beta \qquad (22)$$

so that the proportional effect on the hazard of a one unit change in X is β. If X is a dummy variable, its effect on the hazard itself is $\exp(\beta)$. Here for men the highly significant coefficient of urban birth is 0.56. Exponentiation gives exp(.56)=1.75. For urban born Sisters, a coefficient of 0.40 yields 1.49, or an apostasy rate 149% that of the rural born. See also Kiefer (1988) and Carter and Savoca (1990).

1820s to 50 percent in the 1860s. This growth is even greater than the urbanizing trend in the Northeast, where the proportion of urban residents rose from 11 percent in 1820 to 36 percent in 1860 (U.S. Department of Commerce 1975). Although these people were at increased risk of apostasy, their sheer numbers were so great that the proportion of the Family that was urban born, as viewed in a single day census snapshot, grew from 10 percent at the end of 1840 to 25 percent at the end of 1865.

Birth in the Northeastern United States, including the counties around New Lebanon, was associated with longer membership. This may show the effects of a geographical information gradient: locals who joined knew what they were getting into and thus were more committed to membership. Although the effect of a Shaker upbringing was negligible, and occupation information was not available for everyone in this sample, their effects will be examined in some sub-samples shortly. The persistence by decade of entrance is shown with a series of dummy variables. Persistence of men was stable up to the entering cohort of the 1820s, and then declined steadily in groups of two-decade cohorts, consistent with the survival function graphs in Figure 7. The pattern among women is also consistent with Figure 8. Noting the small number of entrants in the 1800s, clearly the most persistent cohort entered in the 1820s, and duration declined steadily thereafter. The estimate of the parameter α is close to a weak level of significance. It suggests yet a third kind of duration dependence, different from both Bainbridge's (negative duration dependence) and

Zablocki's (no duration dependence) studies: the New Lebanon Church Family Shakers displayed positive duration dependence, the probability of leaving increasing as their membership duration grew longer. I must say that I can find no intuitive reason for this; I would have expected Bainbridge to have been upheld.

There are two advantages to focusing on decade long cross-sections of the Church Family (Tables 23-30). First, unlike an instantaneous snapshot that includes all the members on a given day or year, a decade long view will include all the short term membership spells that, for example, the Carter-Sutch sample in Carter and Savoca (1990) missed. Second, we get a dynamic view of changes in the power of the independent variables to influence a Believer's stay/leave situation. Occupations are not known for every one in each decade; since they were listed only for those present at the local census every five years, those who were short term members between censuses would not have occupations listed. The people in these samples were residents of and not entrants to the Church Family, so that some people are in several consecutive samples. However, in many decades the entrant sample was too small for regression analysis.

The data in Tables 23 and 24 describe one aspect of the decline in mean membership duration. From the 1820s to the 1870s, length of the mean spell fell (nearly) monotonically for both sexes. (There is a slight blip at the end for women.) It was not the case that all members were staying more briefly in the community. Note that the mean duration of membership for life members is virtually

constant for men and slightly increasing for women, in the fifty-plus year range. At each decade, the mean duration of the eventual apostates is roughly constant in the range of ten to seventeen years. The persistence of the apostates did not really change over time, and neither did that of the life members. What did change is the proportion of each, which is readily confirmed in Tables 25-30. The decline in mean duration was caused by an increase in the proportion of short-term members. This provides further confirmation of the model which proposed two different kinds of people and an increasing proportion of temporary members over time.

Other changes in the composition of a decade's Shakers appear in Tables 23 and 24. The proportion of urban born members increased monotonically for both sexes, peaking at over a third of Brethren and over a quarter of Sisters in the 1870s. The proportion of members born nearby declined steadily from a quarter of Brethren and a third of Sisters. The number of years of youth as a Shaker increased up to the 1860s, consistent with a declining age at entrance over this time (Brewer 1986), again confirming the model.

Some factors affected membership length as early as the 1820s for men, while the influence of others did not emerge until later. Even by the 1820s, urban born Brethren were four and a half times more likely to leave the community than rural born men, and this variable remained significantly negative in its effect on duration throughout this period. Further, the apostasy rate among males with the mean number of years of youth as a Shaker was two-thirds higher than that

for Brethren who had entered as adults. For Sisters, the small proportion of short term members during the 1820s and 1830s (3 percent and 11 percent, respectively) result in large standard errors for the coefficient estimates, and few significant coefficients. As time progressed, urban birth and years of youth as a Shaker continued to shorten Believers' membership duration. And as the proportion of members who were urban born grew, as an economic model suggests, an urban background became an ever greater factor in the turnover of members within this community.

An explanation for the well-known numerical decline of Shaker Brethren relative to Sisters is offered in Tables 20-22. Brothers born near New Lebanon were nearly 40 percent less likely to apostatize than those born elsewhere. After 1830 the proportion of these relatively hardy members declined steadily. Thus the decline of Shaker Brethren was in part due to an increasing inability to draw in local men. Perhaps this reflects local knowledge of declining Shaker material fortunes, or it may reflect local knowledge of other changing conditions at New Lebanon. Vadnais (1990) has documented the increasingly technological demands which burdened Shaker Brethren at this time, and gives technology a central role in the community's decline.

The next set of regressions (Tables 31-38) provide a series of one day long cross-sections of Shaker life, based on Youngs's end of year census taken every five years. The mean membership duration is higher than the corresponding mean in the decade long cross-section

just as common sense informs us--the decade long sample includes the briefer spells missed by the one day in five years sample. This data set includes information on occupations. The proportion of members who had worked at some skilled craft declined monotonically for both sexes over this period, from nearly a half of men to a third, and from a third of women to a quarter. The proportion of members with unskilled or farm related occupations grew steadily over this time. Other categories are similar to the decade long cross-sections.

The coefficient of the skilled variable provides an interesting view into the behavior of Shakers who could provide for themselves in the World if they had so chosen. I separated the clearly skilled occupations from the others, lumping farm related jobs in with semi- or unskilled ones like "laborer", in order to see the effect of the ability to earn one's keep away from the commune. No comment is implied or intended on the skill level of farmers; the skill category describes people who could easily take their skills with them and make a living outside the community. The results are surprising. For both sexes, possession of a skill significantly lowered the conditional probability of apostasy. For example, for men in 1840, the skilled were 61 percent less likely to leave than the unskilled. Skilled women in 1860 (the most common skill for women was weaving) were 80 percent less likely to leave than unskilled. Recall that in the logit regression for 1850 in the previous chapter, skill made a Shaker less likely to be a lifetime member. These conflicting

results may reflect the inaccuracies inherent in a one-dimensional description of the complex Shaker job rotation process.

The positive relation between skill and persistence may not be as surprising as at first glance. Shaker furniture and handicrafts had a very good reputation even in the nineteenth century, and probably could not have been viable industries without long-term, skilled members. Further, the implied higher apostasy rates among the unskilled and farm workers fits neatly with the principles of Shaker population stocks and flows which I have presented in the current and previous chapters. Throughout the century, a large proportion of the New Lebanon Church Family population was composed of life members. These people had the skills needed to organize and run large scale communal societies, but they did not constitute the entire community. Even in the Church Family, at any given time a substantial minority of Believers were eventual apostates. They were more likely to be city people who perhaps never did quite fit into the rural life, and tended not to know skills that would enable them to settle down. Although these eventual apostates added up to a large number of people over a decade or so (cf. Chapter VII, Tables 30-35, and Brewer 1986), they remained a minority because they formed a flow that went right through the community. They disrupted community life only when several left simultaneously, and even then the reaction was commonly a greater resolve on the part of those remaining to be faithful to the Shaker Way (Stein 1992). That the skilled among the remaining tended to

remain in the community longer is perhaps a testament to the strength of their faith.

Conclusions

The economic model of Shaker membership can explain some but not all of the ebb and flow of Shaker population. Membership among adults shifted over time from one of almost exclusively life members to ever growing proportions of temporary members. At the same time, the average length of membership for each group changed very little, consistent with the model's use of two types of people, the dedicated and the wavering. The model suggested that entrants with ever less appropriate human capital would find Shaker life comfortable over time. Assuming that rural birth is a suitable proxy for the rural human capital most needed by a rural commune, the empirical work showed that not only were entrants ever more likely to be urban natives, but also that urban birth was increasingly associated with shorter membership durations.

The empirical work presented here also addresses two sociological questions. First, duration dependence was found to be positive and significant, indicating that the probability of apostasy increased with duration of membership. This counterintuitive result must be taken into account when assessing Bainbridge's (1984) and Zablocki's (Bainbridge 1984) claims of negative and neutral duration dependence, respectively. Also, a Shaker upbringing was associated with a higher probability of apostasy. Either the Shakers did not

socialize the children they raised effectively, or Believers who joined as adults simply proved to have firmer convictions in their vocation than those who as children were adopted by or indentured to the Shakers.

The catch in the economic explanation was the lower apostasy rate among skilled Shakers. These members undoubtedly contributed to the community with higher marginal productivity than the community's average product. They could have received more in material terms outside the community. Yet their persistence was greater than that of less skilled members. This phenomenon may simply be a case of individuals choosing less material wealth over more, or choosing religious wealth over material wealth.

CHAPTER IX

CONCLUSIONS AND SUGGESTIONS FOR FURTHER RESEARCH

Summary

The purpose of this dissertation was twofold. First, I wanted to establish quantitative measures of living standards in an unusual setting: Shaker communal societies. Second, I wanted to apply an economic model of communal membership to the Shaker experience, using some of the living standard measures to explain variations in membership trends. This chapter summarizes the results.

The chapters describing Shaker living standards were successful in quantifying new measures. Ever since Edward Deming Andrews in the 1950s, scholarly interest in the Shakers has grown exponentially. Yet few studies looked behind Shaker expository writings and material artifacts to examine their quality of life, and not just Shaker claims concerning their way of life. The findings in this study indicate that Shaker self-promotion regarding longevity was in fact legitimate. Shaker longevity, no matter how measured, was a real phenomenon.

On the other hand, the health of Shakers was not better in every way than their contemporaries. The famous infectious diseases of the nineteenth century such as cholera and typhus were prevented

through Shaker ingenuity and cleanliness. The greatest disease of the era, however, the "white plague" of pulmonary tuberculosis, found Shaker communities an accommodating environment. The extent and mortality of "consumption" was as great in Shaker villages as in the hardest hit parts of the country. Women and youths, who suffered the most in the World, were even more affected in Shakerdom. Shaker treatments changed over time, as Believers sought to synthesize their spiritualism with developments in their disease environment. Faith healing gave way to irregular medicine, first Thomsonianism and later hydropathy, and occasional consultations with regular physicians. Throughout the period, influential Shakers believed that the Shaker Way was sufficient protection from disease, despite evidence suggesting otherwise. The spotless restorations and the absence of the topic from the literature notwithstanding, their health history is an unusually clear window on Shakerdom.

Stature is a measure of living standards growing in popularity in the historical literature. Thanks to Brother Isaac Newton Youngs's indefatigable efforts to record large amounts of information about his beloved Church Family, Shaker stature is now part of the historical record. Shaker men were only as tall as male slaves and much shorter than U.S. soldiers, surprising, given (again) the Society's image of bucolic prosperity. Even more surprising was the short stature of Sisters, much shorter than slave women and reaching only the eleventh percentile of modern standards. That women were relatively shorter than men may have been the result of their greater suffering from tuberculosis, as noted above. Shaker children were shorter than later

groups of American children, although the few who were weighed at entrance proved to be quite normal in modern weight-for-height terms. Both men and women benefitted in stature terms from a Shaker upbringing, men more so. Since the additional height is relative to those who entered as adults, here is a piece of evidence suggesting a decline in the quality of Shaker recruits. Children were brought to the community, but adults entered on their own, and these entering adults were unusually short. The data on Shaker sisters represents the only height record of free antebellum American women of which I am aware.

The inferior health status of Shaker Sisters was an important and unexpected finding. The data on longevity, death due to consumption in particular, and stature suggest that Brethren lived markedly healthier lives than Sisters. That on average Sisters were members of the Society longer than were Brethren may suggest the depth of their spirituality, or their relative lack of outside opportunities. The high consumption death rates and short stature tell a consistent story of a relatively poor net nutritional environment for women. Even so, that Sisters lived longer than most American women may indicate the adaptability of the human body. That is, the body spends available nutritional resources on maintenance before height without affecting health in a meaningful sense. This is similar to the adaptation argument put forth by Livi-Bacci (1991) to explain the lack of correlation between nutrition and mortality.

The second part of the dissertation introduced the economic model which promised to make sense of the Shaker data. The point of

the model was that communal membership can be the result of a rational choice process. The religious experience--transcendence, fellowship, hope of eternal life--was modelled as a club good with positive returns to participatory crowding. Externalities could have been mitigated through a third best scheme that avoided the chagrin of charging admission for church services. The sunk entrance costs of surrendering worldly goods and continuing burden (if it was that) of celibacy and communal property as described in the model fit the Shakers very well. The burden of these costs will draw in members with low opportunity costs, that is, those with little worldly wealth and low stocks of human capital, unless the population from which the members are drawn is homogeneous in wealth and human capital terms. The earliest Shakers, in fact, were similar to their neighbors in wealth and human capital terms. Shaker men at least were similar--Sisters were always much more literate than most groups of American women, even in New England, the most literate part of America. As the Lindert and Williamson (1980) story of increasing nineteenth century inequality unfolded, differences in human capital endowments within the population made Shaker membership more attractive to those with less human capital. And in fact, in the community studied, both the proportion of members who were illiterate and the influence of illiteracy on the eventual decision to apostatize grew. For a community whose business success was based on skillful adaptation to changing markets, for example through exploitation of the Shaker brand name on its medicinal and garden seed products, the increasing inferiority of Shaker human capital was a substantial problem.

The same questions about changing stocks of human capital in light of the economic model were asked of a data set with a richer dependent variable. Rather than assessing the effect of these human capital variables on the ultimate binary stay/leave decision, hazard models admit of the conditional-probabilistic question: given that a Believer has stayed until a certain point, what is the probability of imminent apostasy? As the model suggested, ever greater numbers of poorly prepared urbanites came to the New Lebanon Church Family over the course of the nineteenth century. Worse for the community, these proved to be fickle Believers, urban-born men having been three-fourths again as likely to leave as rural-born men, and urban-born women half again as likely. Shakers who knew a skill, however, were less likely to apostatize. These were the people who organized and ran the commune, and were responsible for the high level of craftsmanship in Shaker products sold to the World. They seem to have chosen religious wealth over material wealth.

Endogeneity may have characterized the dynamic relation between Shaker living standards and membership patterns. Assume that communal living standards enter rationally into the utility function of someone deciding whether to dedicate one's life to such a religious community. At the same time the community's ability to make itself an attractive option for living may decline if the quality of membership declines. In the absence of letters or journal entries explicitly stating that such was the case, I feel unable to claim that prospective Shakers were repulsed by widespread tuberculosis or that they were drawn in by net nutritional conditions that added to

members' physical growth. Simply establishing that consumption was widespread in Shaker communities, and that Shakers (especially Sisters) were unusually short in stature is a major contribution of this dissertation. Certainly some Believers and some who considered joining a Shaker community took into account health conditions in the community when deciding whether to join (Stein 1985). But the narrative evidence for this claim is not strong.

I do submit a similar claim, that the Shakers drew in members ever less suited for the life of a rural communard as the nineteenth century passed. These were the less literate and city people. Both became ever larger proportions of the Society's population over time. Simultaneously, the work of Brethren became ever more mechanized as the Shakers substituted capital for their shrinking pool of skilled labor. The less literate and urbanites were probably less productive than the average Shaker, and their greater numbers represented an increasing burden to the community. Their role in the Society's decline is now recognized.

Suggestions for further research

Economic research on the Shakers can be extended in several directions. First, the results in the last two chapters were based on studies of only two communities. It would be worthwhile to do similar studies on other communities. The literacy data from North Union is probably unique among Shaker communities in its completeness. However, data similar to that for the New Lebanon Church Family exists

for other communities and would bear close examination. In particular, a family with a better mix of extreme short term members (recall that even the apostates in the Church Family spent on average a dozen or so years as a Shaker) and life members may give more representative results.

The change in a physically active communal prayer life seems intimately related to the physical ability of community members. To what extent did an aging membership and more conventional religious services create a feedback loop that discouraged younger and more creative members?

A crucial question in the decline of the group concerns their choice of technology. The famous Shaker inventiveness resulted in a capital stock that required highly skilled labor to operate and maintain it (Vadnais 1990). The results of this dissertation suggest that the Shaker labor force was becoming less skilled over time. Why did the Society not develop a more unskilled labor intensive production process?

It seems clear that the Shaker population decline began before the Civil War. The war may still have been a turning point in that it may have accelerated the population decline. As noted previously, the public image of the Shakers in their early period was similar to that of many who have assumed the role of prophet. They were cast out into the wilderness and attacked by mobs who did not appreciate being told that their way was not the way of God. By the end of the century the Shakers had become merely quaint. It should be possible to follow the course of this transformation through textual analysis of outsiders'

views of the Society, as in Morse (1980). It may be that part of the World's change of opinion was due to Shaker non-participation in the Civil War, which was fairly popular in the rural North where the Shakers had previously drawn many of their members.

Another road that should be taken is to examine the efficiency of Shaker productive processes. I am convinced, as Winifred Rothenberg has noted with farmers' production records (Rothenberg 1984), that the Shaker data alone will not yield information sufficient to fit production functions. Shaker records may be sufficient after some linking to U.S. Census data, however. Simple methods as in Cosgel (1992) may suffice. Or, as Atack and Bateman (1987) showed, Census manuscripts can be made to produce substantial agricultural production information. In particular, Atack (1987) used Census data to perform a production function study of antebellum manufacturing. A sample of most Shaker families should be feasible to construct, and a sample of nearby firms for comparison. The two could be analyzed using techniques common to the comparative economics literature that covers empirical studies of present day producer cooperatives (Bonin 1992). Study of the Shaker cooperative production structure would be a fascinating look at the Shaker difference--if it existed.

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APPENDIX

Table 2

Age at death in years, Shakers vs. other New Englanders

Harvard, Massachusetts and Enfield, New Hampshire Shaker Communities			Kingston, Massachusetts		
Years	N	Mean age	Years	N	Mean age
1784-1800	31	44.8	1780-1799	120	33.9
			Cohasset, Massachusetts		
			1780-1799	32	36.1
			Kingston, Massachusetts		
1801-1820	87	52.9	1800-1819	375	37.5
1821-1830	71	54.7	1821-1829	215	42.0

Sources: Shaker data from Edward Deming Andrews, The People Called Shakers, page 198; Massachusetts data from Edwin S. Dethlefsen, Colonial Gravestones and Demography. American Journal of Physical Anthropology 31 321-333 (1969). Following Dethlefsen's evaluation of data reliability, the pre-1800 data are from town cemetery headstones and post-1800 data are from town vital records.

Table 3

Life expectancy of those aged 20-29 at age 20

Group or place	Source	Years of study	Additional expected years
Moravians	Smaby	1784-1803	46.2
Moravians	Smaby	1804-1823	43.9
Moravians	Smaby	1824-1843	41.5
Portsmouth, N.H.	Estes	1809-1811	36(M) 37(W)
Greenfield, Mass.	Meindl and Swedlund	1803-1814	31.2
Boston	Vinovskis	1826-1835	35.8
Boston	Vinovskis	1839-1841	37.7
Boston	Vinovskis	1859-1861	36.6(M) 38.9(W)
Salem	Vinovskis	1818-1822	35.0(M) 41.1(W)
Salem	Vinovskis	1840-1842	42.0(M) 40.8(W)
Rural U.S.	Jaffe and Lourie	1826-1835	42.9
Rural Massachusetts	Jaffe and Lourie	1859-1861	45.1(M) 45.2(W)
New Lebanon Shakers	All members	1820-1860	56.8(M) 54.6(W)
New Lebanon Shakers	Life members only	1820-1860	56.4(M) 54.4(W)

All years are mean expected additional years of life at age 20 for those in the 20 to 29 year old group, except for Portsmouth, which is additional years at age 21. The Greenfield data is for the 1803-1814 birth cohort. If sex not given, both sexes are pooled.

Table 4

Life tables for Shakers and other rural Americans

	Rural New England 1826-1835	Rural Massachusetts 1859-1861		New Lebanon Shakers 1820-1860	
Age group	Both sexes	Males	Females	Males	Females
<5		47.6	48.4	76.4	73.1
5-9	54.6	55.5	54.8		
10-14	51.0	52.7	52.3	66.5	63.3
15-19	46.7	48.7	48.4		
20-29	42.9	45.1	45.2	56.8	54.6
30-39	36.2	38.1	39.2	47.4	45.5
40-49	29.6	31.3	33.5	37.5	37.5
50-59	22.5	23.4	25.9	28.3	29.2
60-69	15.3	16.3	18.4	19.3	21.1
70-79	8.4	10.2	10.9	11.3	13.0
>=80	1.0	5.3	5.9	5.8	7.9

The first three columns are from Vinovskis (1981), p. 35 and Jaffe and Lourie (1942). The last two were calculated using PROC LIFETEST on SAS 5.18.

Table 5

Crude and age-adjusted death rates per 1000 person years, all ages

Adjusted for Massachusetts undercount

	Massachusetts	Three Shaker Communities	
Years	CDR	CDR	AADR
1852-1858	19.6	22.6	17.1
1856-1863	19.9	22.8	17.4
1865-1873	19.7	20.0	14.8

Death rates, 15-29 year olds

Adjusted for Massachusetts undercount

	Massachusetts	Three Shaker Communities
Years	CDR	Death Rate
1852-1858	9.8	11.8
1856-1863	9.8	11.7
1865-1873	10.1	6.8

The three Shaker communities are North Union, Ohio; Tyringham, Massachusetts; and Enfield, Connecticut. The CDR is deaths per 1000 person-years. The SMR is an age adjusted ratio of Shaker deaths to Massachusetts deaths. The Massachusetts data are published in the annual Reports of the Secretary of the Commonwealth. They have been corrected for undercounting as described in Vinovskis (1981) and Meeker (1972).

Table 6

A selective list of epidemics cited in Shaker records

Date	Disease	Location	Comment
May 1813	Fever	Enfield, Conn.	
Winter 1813-1814	"Cold Plague" (influenza?)	South Union	"many young people destroyed"
Fall 1815	"severe sickness"	South Union	"hooping coughs, chills, lingering fevers"; at least 50 cases, 16 dead
1816	"Great Sickness"	Shirley	"famine year"
December 1820	influenza, "canker in the throat"	Harvard	20 young women affected
March 1826	measles	Enfield, N.H.	33 cases
March 1830	"brake bone fever" (dengue fever?)	Shirley	two-thirds of members in two of three families affected
December 1834	influenza	Harvard	"about everyone is sick"
March 1835	cholera	Harvard	at least 10 cases, 1 death at North Family
Spring 1836	mumps	Harvard	18 cases
February 1837	measles	New Lebanon	10 deaths
March 1837	measles, influenza, lung fever	Shirley	one-third of Church Family affected, several near death
March 1843	influenza	Harvard	
May 1843	scarlet fever	Harvard	

Table 6 (continued)

Date	Disease	Location	Comment
March 1850	influenza	North Union	"an uncommon time of sickness"; 2 deaths
November 1851	fever	Enfield, Conn.	
May 1853	measles	Enfield, Conn.	
Winter 1859-1860	putrid sore throat	Enfield, Conn.	one Shaker death, "many" nearby deaths

Sources: Shaker manuscripts. See text.

Table 7

Causes of death at three Shaker communities

Cause	Number	Percent of All Deaths
Accident	8	1.6%
Apoplexy or fits	14	2.8
Asthma	5	1.0
Bilious colic	2	0.4
Camp distemper	1	0.2
Cancer, unspecified	16	3.2
Cancer on neck	1	0.2
Cancer under lip	1	0.2
Internal cancer	1	0.2
Stone cancer	1	0.2
Chronic inflammation	1	0.2
Congestion	1	0.2
Congestion of brain	2	0.4
Consumption	124	24.5
Quick consumption	4	0.8
Consumption of the liver	1	0.2
Bronchial consumption	1	0.2
Dropsical consumption	2	0.4
Croup	1	0.2
Diabetes	2	0.4
Dropsy	19	3.7
Swelled legs	1	0.2
Dysentary or putrid dysentary	7	1.4
Dyspepsy	5	1.0
Erysipelas	3	0.6
Fever, unspecified	1	0.7
bilious fever	1	0.2
brain fever	1	0.2
epidemic fever	1	0.2
malignant fever	1	0.2
putrid fever	1	0.2
Gravel	1	0.2
Heart disease	10	2.0
Infection in knee (tetanus?)	1	0.2
Influenza epidemic	2	0.4
Insanity	3	0.6
Internal weakness	1	0.7
Kidney complaint	2	1.4
Jaundice	2	1.4
Kidney inflammation	3	2.2
Lightning	1	0.2
Lung fever or pleurisy	17	3.4
Bronchitis	2	0.4
Lung congestion	2	0.4

Table 7 (continued)

Cause	Number	Percent of all deaths
Old age	21	4.1
Palsy or numb palsy	7	1.4
Paralysis	8	1.6
Poison	1	0.2
Rumatic complaint	1	0.2
Rupture or hernia	2	0.4
Scrofula	3	0.6
Spinal disease	2	0.4
Strange	1	0.2
Stricture or inflammation of bowels	3	0.6
Sudden	5	1.0
Sudden cold	1	0.2
Suicide	1	0.2
Tumor	1	0.2
20 year cough	1	0.2
Typhoid, fever or pneumonia	3	0.6
Typhus fever	2	0.4
Ulcer	2	0.4
Complicated	4	0.8
No attribution or unknown	141	27.8
Total deaths recorded	507	

Note: Totals sum to greater than the number of deaths recorded in the manuscript due to multiple causes for some deaths.

Table 8

Death rates due to consumption, per 1000 person-years
and ratio of female to male consumption deaths

for Shaker communities of
Enfield, Connecticut; North Union, Ohio; Tyringham, Massachusetts

Decade	Percentage of deaths attributed to some cause	All members	15-29 year old members
1790s	45 percent	11.3	0.0
1800s	89 percent	3.4	0.0
1810s	54 percent	5.0	11.6
1820s	50 percent	2.3	2.8
1830s	67 percent	4.6	8.5
1840s	67 percent	5.5	9.5
1850s	78 percent	6.9	9.7
1860s	70 percent	5.5	5.1
1870s	83 percent	3.9	4.2
Female:male ratio among consumption deaths		1.81	2.54

Table 9

Death rates and age adjusted death rates
per 1000 person years, all ages
for consumption only

Adjusted for Massachusetts undercount

	Massachusetts	Three Shaker Communities	
Years	Death Rate	Death Rate	AADR
1852-1858	4.5	7.9	6.4
1856-1863	4.1	6.8	5.5
1865-1873	3.5	5.5	4.7

Death rates per 1000 person years,
for consumption only, 15-29 year olds

	Massachusetts	Three Shaker Communities
Years	Death Rate	Death Rate
1852-1858	5.2	8.9
1856-1863	4.7	10.2
1865-1873	4.5	6.8

The three Shaker communities are North Union, Ohio; Tyringham, Massachusetts; and Enfield, Connecticut. The CDR is deaths per 1000 person-years. The SMR is an age adjusted ratio of Shaker deaths to Massachusetts deaths. The Massachusetts data are published in the annual Reports of the Secretary of the Commonwealth. They have been corrected for undercounting as described in Vinovskis (1981) and Meeker (1972).

Table 10

Estimated adult heights of nineteenth century Americans

Population	Mean	N	Centile of modern standards
Men			
Shakers, 1840-1865	170.1	59	24.5
Union Army, 1861-1865	174.0	9271	46.0
Slaves, 1808-1861	170.6	8725	26.9
Women			
Shakers, 1840-1865	154.9	107	11.1
Slaves, 1808-1861	158.8	6552	28.4

Sources: Shakers: Shaker manuscripts. Union Army: Margo and Steckel (1983). Slaves: Steckel (1987).

Table 11

Estimated adult heights of Shakers and other sample characteristics by birth cohort

	Birth decade					
	1790s	1800s	1810s	1820s	1830s	1840s
Men						
N	3	12	16	11	12	5
Mean	172.0	170.1	169.2	169.7	172.0	168.1
SD	2.2	9.4	6.6	5.0	5.7	4.5
Centile	34.1	24.5	20.3	22.7	34.1	16.1
% Foreign born	0.0	0.0	6.3	18.2	25.0	20.0
% Urban born	0.0	0.0	25.0	54.5	16.7	60.0
Women						
N	14	18	23	13	21	18
Mean	155.5	158.5	155.8	157.3	153.4	149.5
SD	3.9	4.6	5.9	4.6	5.0	7.4
Centile	13.3	26.8	14.3	20.6	7.1	1.7
% Foreign born	0.0	5.5	8.7	7.7	4.8	22.2
% Urban born	14.3	11.1	8.7	15.4	9.5	61.1

Sources: Shaker manuscripts, centiles calculated using standards in Tanner, Whitehouse, and Takaishi (1966).

Table 12

Estimated heights of Shaker children by sex and age
Smoothed according to Preece-Baines Model 1

	Male			Female		
Age	N	Mean	centile of modern standards	N	Mean	centile of modern standards
8.5	11	120.6	7.9	7	120.8	11.7
9.5	20	127.0	11.7	16	124.1	6.2
10.5	14	132.6	14.7	12	129.7	6.8
11.5	21	137.4	14.7	13	137.5	12.5
12.5	20	141.7	12.3	18	144.7	14.0
13.5	19	145.6	8.2	12	149.2	9.3
14.5	24	149.7	4.3	19	151.2	5.6
15.5	20	155.4	2.6	9	152.1	5.1
16.5	17	162.6	5.4	12	152.4	5.2
17.5	10	167.2	13.8	14	152.5	5.4
18.5	13	168.7	18.4	16	152.6	5.4
19.5	12	169.0	19.5	12	152.6	5.4
20.5	10	169.1	20.1	8	152.6	5.4
21.5	9	169.1	20.1	8	152.6	5.4
22.5	7	169.1	20.1	9	152.6	5.4

Sources: Shaker manuscripts; centiles calculated according to Tanner, Whitehouse, and Takaishi (1966).

Table 13

Covariates of Shaker adult height estimates

Dependent variable: adult height (cm)

(t-statistics in parentheses)

Variable	Men		Women	
	Model 1	Model 2	Model 3	Model 4
Intercept	171.9 (72.7)	171.9 (73.6)	156.0 (86.4)	155.7 (88.9)
Foreign birth	-2.94 (-0.90)	-3.63 (-1.11)	1.99 (0.65)	1.96 (0.63)
New York or New England birth	-4.49 (-1.96)	-4.43 (-1.96)	-0.02 (-0.01)	-0.10 (-0.05)
Urban birth	-2.71 (-1.30)	-2.87 (-1.38)	-4.74 (-2.64)	-4.76 (-2.65)
Proportion of years before age 18 as Shaker	5.59 (1.74)		-1.72 (-0.68)	
Proportion of adolescent growth spurt as Shaker		3.58 (1.88)		-0.11 (-0.28)
Adjusted R^2	.035	.044	.033	.029
N	59	59	107	107

Urban birthplaces include Providence, Cambridge, Troy, Albany, Binghamton, Jersey City, Williamsburg NY, Bridgeport, Jamaica-Queens NY, Charleston SC, South Bend, Savannah, Boston, London, Philadelphia, New York, Brooklyn, Buffalo, Detroit, Baltimore.

The adolescent growth spurt is 10-14 years of age for girls and 12-17 for boys, based on Shaker and other 19th century U.S. data in Steckel (1987).

Table 14

Estimates of Ohio illiteracy rates

Percentage of North Union and Butler County signers who marked
(Sample size in parentheses)

Decade	North Union		Butler County		Ohio	
	M	F	M	F	Read	Write
1820s	0% (15)	17% (12)	24% (120)	44% (9)		
1830s	23 (30)	31 (13)	21 (190)	80 (15)		
1840s	22 (59)	28 (25)	22 (184)	44 (32)		
1850s	12 (156)	27 (63)	15 (231)	51 (53)		
1860s	11 (153)	7 (43)	16* (145)	50* (32)		
1870s	9 (104)	0 (2)			5	9
1880s	9 (46)	50 (4)			4	6

*1860-1865

Sources. North Union: Shaker manuscript covenants and entrance agreements covering entrants over 18 years of age. Butler County: Unpublished study by William Newell of all wills probated there, 1803-1865. Ohio: Percentages of those over 20 years of age reporting inability to read or write on U.S. Census forms from Charles Warren, Illiteracy in the United States in 1870 and 1880, Circular of Information of the Bureau of Education, Number 3-1884.

Table 15

Percentage of North Union Shakers who were illiterate

Percentage of adults resident in that year who marked
(Sample size in parentheses)

Year	Men (number)	Women (number)
1828	0% (15)	17% (12)
1842	4 (57)	12 (60)
1850	13 (58)	15 (62)
1860	11 (62)	17 (61)
1870	13 (38)	15 (40)
1880	24 (21)	20 (15)

Sources. All signatures/marks were retrieved from Shaker documents. Covenants were signed in 1828 and 1842. Names of residents in 1850 onward are from U.S. Census enumeration schedules.

Table 16

Signature literacy among parents of indentured Shaker children and other contemporary Ohioans

Percentage of parents signing apprenticeship indentures at two Ohio Shaker communities

North Union, 1834-1868, 61 children

Father	Mother
92.3%	69%

Watervliet, 1832-1862, 23 indentures

Father	Mother
45.5%	29%

Percent of Testators Signing Wills

Butler County, 1832-1862, number of wills in parentheses

Men	Women
82% (658)	50% (111)

Sources: See Table 14.

Table 17

Means and standard deviations of variables in Table 18 regressions

Variable	1850		1860		1870	
	Mean	SD	Mean	SD	Mean	SD
LIT	.86	.35	.86	.35	.86	.35
OCC1	.27	.44	.23	.42	.26	.44
OCC2	.22	.41	.24	.43	.23	.43
OCC3					.29	.46
ORI1	.13	.34	.10	.30	.12	.32
ORI2	.36	.48	.24	.43	.28	.45
ORI3	.17	.37	.28	.45	.27	.45
AGE	42	17	46	18	53	17
RESULT	.60	.49	.57	.50	.69	.46

Definitions:
LIT=1 if person signed but never marked a document.
OCC1=1 if male, craft-related occupation.
OCC2=1 if male, farm-related occupation.
OCC3=1 if female, craft-related occupation.
ORI1=1 if born in Ohio.
ORI2=1 if born in New England.
ORI3=1 if born outside the United States.
AGE=age at that year's census.
RESULT=1 if person died as Shaker, moved to another Shaker community, or was still resident at North Union at its dissolution in 1889.

Table 18

Logit regressions of probability of an adult resident at North Union being a lifetime Shaker, 1850, 1860, 1870

	1850*			1860*			1870**		
Variable	Beta	∂P/∂X	p	Beta	∂P/∂X	p	Beta	∂P/∂X	p
CONSTANT	-1.21	-.277	.21	-1.43	-.342	.10	-2.31	-.586	.19
LIT	-1.32	-.302	.11	-2.10	-.502	.001	-3.48	-.883	.03
OCC1	-0.18	-.041	.75	0.44	.105	.46	-0.34	-.086	.74
OCC2	-1.41	-.322	.02	0.52	.124	.39	0.22	.056	.84
OCC3							0.51	.129	.62
ORI1	0.53	.121	.42	1.17	.280	.12	2.01	.510	.08
ORI2	0.12	.029	.84	-0.29	-.069	.65	-1.08	-.274	.34
ORI3	-0.97	-.222	.19	-1.05	-.251	.11	-0.98	-.249	.31
AGE	0.08	.018	<.001	0.08	.019	<.001	0.13	.033	.001
χ^2 likelihood ratio	36.99 (7 d.f.)			42.10 (7 d.f.)			39.01 (8 d.f.)		
N	120			123			78		

*The omitted case is an illiterate woman, born in the U.S. but not in Ohio or New England.

**The omitted case is an illiterate woman whose job involves farmwork and was born in the U.S. but not in Ohio or New England.

∂P/∂X is evaluated at the mean values of all independent variables.

Table 19

Origins of New Lebanon Church Family entrants by decade

Whole numbers in parenthesis

Decade	Total	Birthplace				
		Rural	Urban 1	Urban 2	Foreign	Unknown*
pre 1800	260	91% (236)	2% (4)	1% (2)	1% (3)	5% (14)
1800s	16	88% (14)				12% (2)
1810s	47	68% (32)	2% (1)	11% (5)	13% (6)	15% (7)
1820s	67	75% (50)		6% (4)	9% (6)	10% (7)
1830s	102	54% (55)	2% (2)	19% (19)	15% (15)	4% (4)
1840s	86	63% (54)	8% (7)	12% (10)	17% (15)	1% (1)
1850s	150	38% (57)	15% (22)	27% (41)	23% (34)	6% (9)
1860s	149	39% (58)	16% (24)	34% (50)	7% (10)	5% (7)
1870s	88	17% (15)	7% (6)	57% (50)	3% (3)	16% (14)
1880-82	14	7% (1)		78% (11)	7% (1)	7% (1)

*includes "at sea" (2) and "on Lake Erie" (1).

Urban 1=Providence, Cambridge, Troy, Albany, Binghamton, Jersey City, Williamsburg NY, Bridgeport, Jamaica-Queens NY, Charleston SC, Halifax NS, Aberdeen Scotland, New Haven, Schenectady, Norfolk, Trenton, South Bend, Savannah.

Urban 2=Boston, London, Philadelphia, New York, Brooklyn, Buffalo, Detroit, Baltimore, Glasgow, Manchester, Montreal.

Table 20

Means and standard deviations for proportional hazard model variables for all entrants 1787-1883, by sex and membership outcome

	Life Members		Apostates	
	Men	Women	Men	Women
Duration (years)	40.38 (22.23)	41.71 (23.39)	9.98 (7.32)	10.83 (7.30)
Years of youth as Shaker	3.84 (5.39)	3.68 (4.63)	8.08 (4.88)	6.54 (4.40)
Urban birth	0.06	0.08	0.35***	0.36***
Local birth	0.13	0.15	0.06**	0.09**
Other NE birth	0.74	0.72	0.55***	0.63**
European birth	0.03	0.03	0.11***	0.07
N	171	230	215	117

*=difference between life members and apostates of same sex is significant at .10 level.
**=difference is significant at .05 level.
***=difference is significant at .01 level.

Notes: Standard deviations are in parentheses. Except for the variables measured in years, these are dummy variables; their means represent the given proportion of adult New Lebanon Church Family members. Asterisks give significance levels of differences between life members and apostates. Local birth refers to Columbia County, New York, and adjacent counties. Sources are Shaker manuscripts Andrews item 980, NYSL Shaker Collection item 13500, and WRHS V:B-70 and V:B-71.

Table 21

Means and standard deviations for proportional hazard model variables for all entrants 1787-1883

Variable	Men		Women	
	Mean	SD	Mean	SD
Duration (years)	23.51	21.85	31.30	24.40
Urban birth	0.22	0.42	0.17	0.38
Local birth	0.19	0.39	0.26	0.44
Other NE birth	0.54	0.50	0.56	0.50
European birth	0.07	0.26	0.05	0.22
Years of youth as Shaker	6.18	5.54	4.64	4.74
Year of entrance pre 1790	0.31	0.46	0.31	0.46
1790-1799	0.04	0.19	0.05	0.21
1800-1809	0.05	0.22	0.03	0.18
1810-1819	0.06	0.23	0.10	0.29
1820-1829	0.09	0.29	0.08	0.28
1830-1839	0.10	0.30	0.09	0.29
1840-1849	0.10	0.30	0.09	0.29
1850-1859	0.12	0.32	0.10	0.30
1860-1869	0.06	0.25	0.08	0.27
1870-1883	0.08	0.27	0.07	0.25

Notes: Except for the variables measured in years, these are dummy variables; their means represent the given proportion of adult New Lebanon Church Family members. Sources are Shaker manuscripts Andrews item 980, NYSL Shaker Collection item 13500, and WRHS V:B-70 and V:B-71. Local birth refers to Columbia County, New York, and adjacent counties.

Table 22

Proportional hazard model parameter estimates
for all entrants 1787-1883

Variable	Men			Women		
	Coefficient	Standard Error	p	Coefficient	Standard Error	p
Intercept	-3.37	0.30	<.001	-4.09	0.39	<.001
Urban birth	0.56	0.19	.004	0.40	0.26	.12
Local birth	-0.49	0.26	.07	-0.34	0.35	.33
Other NE birth	-0.50	0.20	.01	-0.57	0.28	.04
European birth	0.02	0.29	.94	-0.35	0.46	.45
Years of youth as Shaker	0.002	0.02	.88	0.007	0.02	.76
Year of entrance pre 1790	-1.05	0.33	.002	-1.90	0.54	<.001
1790-1799	-1.21	0.61	.05	-0.40	0.66	.55
1800-1809	-1.21	0.61	.05	-25.84	$<10^6$	.99
1810-1819	-1.05	0.45	.02	-1.97	0.73	.007
1820-1829	-0.03	0.32	.93	-2.44	0.87	.005
1840-1849	0.45	0.31	.14	0.27	0.41	.52
1850-1859	0.33	0.28	.24	0.84	0.41	.04
1860-1869	1.35	0.31	<.001	1.76	0.40	<.001
1870-1883	1.33	0.30	<.001	1.88	0.42	<.001
α	1.10	0.06	.11	1.11	0.09	.19

Table 21 (continued)

	Men	Women
Number uncensored	215	117
Number right-censored	171	230
Log-likelihood	-487	-291

Notes: Sources are Shaker manuscripts Andrews item 980, NYSL Shaker Collection item 13500, and WRHS V:B-70 and V:B-71. Right-censored observations represent residents who died as Shakers. P-values for α estimates refer to test of difference from 1. Local birth refers to Columbia County, New York, and adjacent counties. Coefficients give the effect of a one unit change in the variable on the log of the hazard function (conditional probability of leaving).

Table 23

Means and standard deviations of variables
in proportional hazard model
for New Lebanon Church Family residents by decade and sex

Variable	1820s		1830s		1840s	
	Men	Women	Men	Women	Men	Women
Membership duration (years)	42.2 (21.5)	50.3 (19.8)	40.4 (22.8)	49.2 (21.4)	37.6 (24.6)	48.3 (23.7)
for life members	50.2 (16.6)	51.3 (19.1)	54.2 (15.2)	53.6 (18.1)	54.9 (18.2)	57.3 (17.3)
for apostates	13.5 (8.6)	17.1 (11.5)	15.2 (8.0)	12.8 (7.6)	15.1 (8.7)	13.8 (8.4)
Urban birth	0.07	0.04	0.15	0.07	0.15	0.09
Local birth	0.23	0.31	0.24	0.27	0.22	0.25
Other NE birth	0.63	0.58	0.57	0.59	0.56	0.58
European birth	0.03	0.04	0.04	0.03	0.08	0.04
Years of youth as Shaker	5.2 (5.7)	4.1 (4.5)	6.9 (5.9)	4.9 (4.9)	8.1 (6.0)	5.8 (5.0)
N	133	136	144	148	143	151

Notes: Sources are Shaker manuscripts Andrews item 980, NYSL Shaker Collection item 13500, and WRHS V:B-70 and V:B-71. Observations were of Shakers resident in the New Lebanon Church Family for any part of the decade.

Table 24

Means and standard deviations of variables
in proportional hazard model
for New Lebanon Church Family residents by decade and sex

Variable	1850s		1860s		1870s	
	Men	Women	Men	Women	Men	Women
Membership duration (years)	34.1 (25.6)	45.8 (24.8)	30.5 (25.5)	41.2 (26.8)	29.6 (26.6)	41.9 (27.8)
for life members	54.2 (21.0)	57.0 (18.6)	55.7 (19.3)	58.7 (18.0)	54.7 (20.3)	59.9 (18.3)
for apostates	14.0 (8.1)	14.8 (7.0)	12.4 (8.3)	13.1 (7.1)	10.1 (8.3)	12.0 (7.4)
Urban birth	0.27	0.20	0.34	0.24	0.36	0.26
Local birth	0.20	0.22	0.17	0.20	0.14	0.18
Other NE birth	0.53	0.54	0.54	0.54	0.53	0.57
European birth	0.15	0.09	0.13	0.08	0.07	0.06
Years of youth as Shaker	9.2 (5.5)	6.5 (4.9)	9.3 (5.1)	6.7 (4.6)	7.7 (5.4)	6.5 (4.4)
N	137	152	119	147	95	125

Notes: Sources are Shaker manuscripts Andrews item 980, NYSL Shaker Collection item 13500, and WRHS V:B-70 and V:B-71. Observations were of Shakers resident in the New Lebanon Church Family for any part of the decade.

Table 25

Proportional hazard model estimates for New Lebanon Church Family residents by decade and sex

Decade=1820s

Variable	Men			Women		
	Coefficient	Standard Error	p	Coefficient	Standard Error	p
Intercept	-5.46	0.80	<.001	-7.88	2.70	.004
Urban birth	1.51	0.71	.03	-34.79	$>10^6$	.99
Local birth	-2.32	1.02	.02	-2.44	2.49	.33
Other NE birth	-1.06	0.67	.11	-2.07	2.17	.34
European birth	0.34	0.99	.73	-36.67	$>10^6$	.99
Years of youth as Shaker	0.10	0.05	.04	0.11	0.17	.51
α	1.34	0.23	.14	1.54	0.74	.46
Number uncensored	29			4		
Number right-censored	104			132		
Log-likelihood	-99			-22		

Notes: Coefficients give the effect of a one unit change in the variable on the log of the hazard function (conditional probability of leaving). Sources are Shaker manuscripts Andrews item 980, NYSL Shaker Collection item 13500, and WRHS V:B-70 and V:B-71. Observations were of Shakers resident in the New Lebanon Church Family for any part of the decade. Right-censored observations represent residents who died as Shakers. P-values for α estimates refer to test of difference from 1. Local birth refers to Columbia County, New York, and adjacent counties.

Table 26

Proportional hazard model estimates for New Lebanon Church Family residents by decade and sex

Decade=1830s

Variable	Men			Women		
	Coefficient	Standard Error	p	Coefficient	Standard Error	p
Intercept	-4.77	0.44	<.001	-8.49	1.72	<.001
Urban birth	0.72	0.36	.04	1.19	1.27	.37
Local birth	-2.01	0.61	.01	-0.95	1.49	.52
Other NE birth	-0.99	0.37	.007	0.05	1.25	.97
European birth	0.09	0.61	.88	-36.08	$>10^6$	.99
Years of youth as Shaker	0.09	0.03	.001	0.19	0.10	.04
α	1.07	0.13	.54	1.60	0.38	.13
Number uncensored	51			16		
Number right-censored	93			132		
Log-likelihood	-137			-70		

Notes: Coefficients give the effect of a one unit change in the variable on the log of the hazard function (conditional probability of leaving). Sources are Shaker manuscripts Andrews item 980, NYSL Shaker Collection item 13500, and WRHS V:B-70 and V:B-71. Observations were of Shakers resident in the New Lebanon Church Family for any part of the decade. Right-censored observations represent residents who died as Shakers. P-values for α estimates refer to test of difference from 1. Local birth refers to Columbia County, New York, and adjacent counties.

Table 27

Proportional hazard model estimates for New Lebanon Church Family residents by decade and sex

Decade=1840s

Variable	Men			Women		
	Coefficient	Standard Error	p	Coefficient	Standard Error	p
Intercept	-4.63	0.43	<.001	-7.51	1.17	<.001
Urban birth	0.68	0.33	.05	0.57	0.96	.55
Local birth	-1.84	0.58	.002	-0.74	1.03	.47
Other NE birth	-0.67	0.36	.06	-0.06	0.99	.95
European birth	0.25	0.37	.66	0.88	1.57	.58
Years of youth as Shaker	0.08	0.02	.002	0.13	0.06	.04
α	1.12	0.12	.34	1.56	0.26	.03
Number uncensored	63			31		
Number right-censored	80			120		
Log-likelihood	-163			-118		

Notes: Coefficients give the effect of a one unit change in the variable on the log of the hazard function (conditional probability of leaving). Sources are Shaker manuscripts Andrews item 980, NYSL Shaker Collection item 13500, and WRHS V:B-70 and V:B-71. Observations were of Shakers resident in the New Lebanon Church Family for any part of the decade. Right-censored observations represent residents who died as Shakers. P-values for α estimates refer to test of difference from 1. Local birth refers to Columbia County, New York, and adjacent counties.

Table 28

Proportional hazard model estimates for New Lebanon Church Family residents by decade and sex

Decade=1850s

Variable	Men			Women		
	Coefficient	Standard Error	p	Coefficient	Standard Error	p
Intercept	-5.72	0.48	<.001	-6.46	0.75	<.001
Urban birth	1.49	0.28	<.001	2.18	0.52	<.001
Local birth	-0.30	0.51	.55	-0.18	0.66	.79
Other NE birth	0.12	0.39	.76	-0.98	0.61	.11
European birth	1.83	0.45	<.001	-0.21	0.75	.77
Years of youth as Shaker	0.08	0.03	.003	0.13	0.05	.009
α	1.01	0.10	.94	1.22	0.17	.20
Number uncensored	69			40		
Number right-censored	68			112		
Log-likelihood	-157			-122		

Notes: Coefficients give the effect of a one unit change in the variable on the log of the hazard function (conditional probability of leaving). Sources are Shaker manuscripts Andrews item 980, NYSL Shaker Collection item 13500, and WRHS V:B-70 and V:B-71. Observations were of Shakers resident in the New Lebanon Church Family for any part of the decade. Right-censored observations represent residents who died as Shakers. P-values for α estimates refer to test of difference from 1. Local birth refers to Columbia County, New York, and adjacent counties.

Table 29

Proportional hazard model estimates for New Lebanon Church Family residents by decade and sex

Decade=1860s

Variable	Men			Women		
	Coefficient	Standard Error	p	Coefficient	Standard Error	p
Intercept	-4.95	0.45	<.001	-5.29	0.54	<.001
Urban birth	1.60	0.31	<.001	2.44	0.44	<.001
Local birth	-0.39	0.54	.47	0.03	0.54	.95
Other NE birth	-0.30	0.38	.43	-1.06	0.50	.03
European birth	1.09	0.48	.02	-1.15	0.70	.10
Years of youth as Shaker	0.05	0.03	.09	0.04	0.04	.32
α	1.14	0.11	.20	1.28	0.15	.06
Number uncensored	70			56		
Number right-censored	49			91		
Log-likelihood	-163			-161		

Notes: Coefficients give the effect of a one unit change in the variable on the log of the hazard function (conditional probability of leaving). Sources are Shaker manuscripts Andrews item 980, NYSL Shaker Collection item 13500, and WRHS V:B-70 and V:B-71. Observations were of Shakers resident in the New Lebanon Church Family for any part of the decade. Right-censored observations represent residents who died as Shakers. P-values for α estimates refer to test of difference from 1. Local birth refers to Columbia County, New York, and adjacent counties.

Table 30

Proportional hazard model estimates for New Lebanon Church Family residents by decade and sex

Decade=1870s

Variable	Men			Women		
	Coefficient	Standard Error	p	Coefficient	Standard Error	p
Intercept	-4.44	0.54	<.001	-4.79	0.53	<.001
Urban birth	1.78	0.45	<.001	2.53	0.49	<.001
Local birth	-1.04	0.86	.22	-0.39	0.63	.53
Other NE birth	-0.44	0.45	.33	-1.40	0.32	.007
European birth	0.80	0.78	.31	-1.98	0.91	.03
Years of youth as Shaker	0.004	0.04	.91	-0.004	0.04	.93
α	1.41	0.16	.01	1.34	0.17	.05
Number uncensored	54			47		
Number right-censored	41			78		
Log-likelihood	-139			-140		

Notes: Coefficients give the effect of a one unit change in the variable on the log of the hazard function (conditional probability of leaving). Sources are Shaker manuscripts Andrews item 980, NYSL Shaker Collection item 13500, and WRHS V:B-70 and V:B-71. Observations were of Shakers resident in the New Lebanon Church Family for any part of the decade. Right-censored observations represent residents who died as Shakers. P-values for α estimates refer to test of difference from 1. Local birth refers to Columbia County, New York, and adjacent counties.

Table 31

Means and standard deviations of variables
in proportional hazard model
for New Lebanon Church Family residents by year and sex

Variable	1840		1845		1850	
	Men	Women	Men	Women	Men	Women
Membership duration (years)	44.6 (23.1)	52.4 (21.4)	43.3 (24.1)	52.3 (21.8)	43.3 (24.4)	53.4 (21.4)
for life members	57.8 (14.9)	57.6 (16.7)	58.3 (16.1)	59.5 (15.4)	57.1 (18.6)	59.4 (16.6)
for apostates	17.1 (7.9)	13.1 (7.8)	17.5 (8.6)	15.1 (7.6)	18.1 (8.8)	17.8 (7.0)
Urban birth	0.14	0.07	0.14	0.07	0.15	0.10
Occupation						
skilled	0.48	0.36	0.47	0.33	0.42	0.31
farm-related	0.44	0.53	0.47	0.57	0.54	0.58
supervisory	0.08	0.11	0.06	0.10	0.04	0.11
Local birth	0.26	0.24	0.23	0.27	0.24	0.26
Other NE birth	0.55	0.60	0.59	0.58	0.55	0.56
European birth	0.04	0.03	0.04	0.03	0.10	0.04
Years of youth as Shaker	7.7 (6.0)	5.4 (5.0)	8.5 (6.1)	6.1 (5.1)	9.1 (6.1)	6.3 (5.1)
N	105	120	103	130	91	118

Notes: Sources are Shaker manuscripts Andrews item 980, NYSL Shaker Collection item 13500, and WRHS V:B-70 and V:B-71. Observations were of Shakers resident in the New Lebanon Church Family for any part of the decade.

Table 32

Means and standard deviations of variables
in proportional hazard model
for New Lebanon Church Family residents by year and sex

Variable	1855		1860		1865	
	Men	Women	Men	Women	Men	Women
Membership duration (years)	41.5 (24.7)	53.8 (21.4)	36.8 (25.1)	48.0 (24.3)	37.4 (25.9)	47.3 (25.0)
for life members	56.9 (18.5)	60.7 (15.8)	57.5 (17.7)	58.8 (17.5)	56.7 (19.1)	59.5 (17.8)
for apostates	17.4 (8.8)	19.8 (5.7)	15.4 (8.2)	16.2 (6.7)	14.3 (8.6)	15.8 (6.2)
Urban birth	0.17	0.14	0.30	0.21	0.28	0.22
Occupation						
skilled	0.40	0.30	0.36	0.27	0.32	0.24
farm-related	0.56	0.60	0.61	0.65	0.66	0.68
supervisory	0.04	0.10	0.03	0.08	0.02	0.08
Local birth	0.22	0.23	0.18	0.18	0.17	0.20
Other NE birth	0.51	0.52	0.54	0.55	0.56	0.54
European birth	0.13	0.10	0.15	0.09	0.12	0.08
Years of youth as Shaker	9.0 (5.7)	6.9 (5.0)	9.5 (5.5)	6.9 (4.8)	9.5 (5.6)	6.9 (4.7)
N	89	108	94	119	82	118

Notes: Sources are Shaker manuscripts Andrews item 980, NYSL Shaker Collection item 13500, and WRHS V:B-70 and V:B-71. Observations were of Shakers resident in the New Lebanon Church Family for any part of the decade.

Table 33

Proportional hazard model estimates for New Lebanon Church Family residents by year and sex

Year=1840

Variable	Men			Women		
	Coefficient	Standard Error	p	Coefficient	Standard Error	p
Intercept	-4.14	0.49	<.001	-8.25	1.75	<.001
Urban birth	0.39	0.39	.32	0.55	1.68	.74
Skilled	-0.95	0.39	.01	-1.69	1.13	.13
Supervisor	-22.38	$>10^6$	.99	-38.28	$>10^6$	.99
Local birth	-2.37	0.69	.001	0.08	1.47	.96
Other NE birth	-1.23	0.41	.003	0.17	1.24	.89
European birth	-0.59	0.79	.45	-37.81	$>10^6$	.99
Years of youth as Shaker	0.10	0.03	.003	0.22	0.10	.03
α	0.94	0.14	.67	1.58	0.40	.15
Number uncensored	34			14		
Number right-censored	71			106		
Log-likelihood	-86			-57		

Notes: Coefficients give the effect of a one unit change in the variable on the log of the hazard function (conditional probability of leaving). Sources are Shaker manuscripts Andrews item 980, NYSL Shaker Collection item 13500, and WRHS V:B-70 and V:B-71. Right-censored observations represent residents who died as Shakers. P-values for α estimates refer to test of difference from 1. Local birth refers to Columbia County, New York, and adjacent counties.

Table 34

Proportional hazard model estimates for New Lebanon Church Family residents by year and sex

Year=1845

Variable	Men			Women		
	Coefficient	Standard Error	p	Coefficient	Standard Error	p
Intercept	-3.76	0.53	<.001	-7.40	1.26	<.001
Urban birth	0.54	0.37	.14	-0.40	1.38	.77
Skilled	-0.90	0.37	.01	-1.94	0.89	.03
Supervisor	-22.36	$>10^6$	.99	-30.59	$>10^6$	.99
Local birth	-2.52	0.70	<.001	1.29	1.04	.21
Other NE birth	-1.40	0.42	<.001	0.07	1.02	.94
European birth	-0.73	0.80	.36	-29.26	$>10^6$	.99
Years of youth as Shaker	0.08	0.03	.01	0.17	0.07	.01
α	0.95	0.13	.74	1.29	0.26	.25
Number uncensored	38			21		
Number right-censored	65			109		
Log-likelihood	-93			-73		

Notes: Coefficients give the effect of a one unit change in the variable on the log of the hazard function (conditional probability of leaving). Sources are Shaker manuscripts Andrews item 980, NYSL Shaker Collection item 13500, and WRHS V:B-70 and V:B-71. Right-censored observations represent residents who died as Shakers. P-values for α estimates refer to test of difference from 1. Local birth refers to Columbia County, New York, and adjacent counties.

Table 35

Proportional hazard model estimates for New Lebanon Church Family residents by year and sex

Year=1850

Variable	Men			Women		
	Coefficient	Standard Error	p	Coefficient	Standard Error	p
Intercept	-4.64	0.69	<.001	-8.08	1.52	<.001
Urban birth	0.10	0.39	.01	0.59	0.85	.49
Skilled	-0.85	0.39	.03	-2.87	1.26	.02
Supervisor	-21.34	$>10^6$	.99	-26.68	$>10^6$	.99
Local birth	-1.52	0.63	.01	2.03	1.24	.10
Other NE birth	-0.98	0.46	.04	0.48	1.20	.69
European birth	0.34	0.64	.60	2.35	1.67	.16
Years of youth as Shaker	0.09	0.04	.01	0.19	0.07	.01
α	0.91	0.14	.52	1.09	0.24	.69
Number uncensored	33			17		
Number right-censored	58			101		
Log-likelihood	-79			-52		

Notes: Coefficients give the effect of a one unit change in the variable on the log of the hazard function (conditional probability of leaving). Sources are Shaker manuscripts Andrews item 980, NYSL Shaker Collection item 13500, and WRHS V:B-70 and V:B-71. Right-censored observations represent residents who died as Shakers. P-values for α estimates refer to test of difference from 1. Local birth refers to Columbia County, New York, and adjacent counties.

Table 36

Proportional hazard model estimates for New Lebanon Church Family residents by year and sex

Year=1855

Variable	Men			Women		
	Coefficient	Standard Error	p	Coefficient	Standard Error	p
Intercept	-4.43	0.68	<.001	-7.24	1.14	<.001
Urban birth	0.69	0.43	.11	1.84	0.54	.001
Skilled	-1.10	0.44	.01	-2.04	0.96	.03
Supervisor	-22.48	$>10^6$	.99	-20.69	$>10^6$	.99
Local birth	-1.74	0.77	.02	1.11	0.75	.13
Other NE birth	-0.72	0.54	.19	-0.94	0.75	.21
European birth	0.47	0.64	.46	0.48	0.79	.54
Years of youth as Shaker	0.08	0.03	.03	0.18	0.07	.001
α	0.97	0.14	.64	0.87	0.17	.42
Number uncensored	35			18		
Number right-censored	54			90		
Log-likelihood	-85			-44		

Notes: Coefficients give the effect of a one unit change in the variable on the log of the hazard function (conditional probability of leaving). Sources are Shaker manuscripts Andrews item 980, NYSL Shaker Collection item 13500, and WRHS V:B-70 and V:B-71. Right-censored observations represent residents who died as Shakers. P-values for α estimates refer to test of difference from 1. Local birth refers to Columbia County, New York, and adjacent counties.

Table 37

Proportional hazard model estimates for New Lebanon Church Family residents by year and sex

Year=1860

Variable	Men			Women		
	Coefficient	Standard Error	p	Coefficient	Standard Error	p
Intercept	-4.75	0.58	<.001	-5.58	0.65	<.001
Urban birth	1.44	0.31	<.001	2.18	0.51	<.001
Skilled	-0.87	0.35	.01	-1.65	0.68	.02
Supervisor	-21.81	$>10^6$	.99	-24.18	$>10^6$	.99
Local birth	-0.40	0.36	.48	0.29	0.62	.64
Other NE birth	-0.54	0.46	.25	-1.16	0.56	.04
European birth	0.89	0.53	.10	-0.80	0.70	.26
Years of youth as Shaker	0.06	0.03	.05	0.08	0.05	.08
α	0.91	0.11	.43	1.05	0.16	.77
Number uncensored	47			30		
Number right-censored	47			89		
Log-likelihood	-101			-82		

Notes: Coefficients give the effect of a one unit change in the variable on the log of the hazard function (conditional probability of leaving). Sources are Shaker manuscripts Andrews item 980, NYSL Shaker Collection item 13500, and WRHS V:B-70 and V:B-71. Right-censored observations represent residents who died as Shakers. P-values for α estimates refer to test of difference from 1. Local birth refers to Columbia County, New York, and adjacent counties.

Table 38

Proportional hazard model estimates for New Lebanon Church Family residents by year and sex

Year=1865

Variable	Men			Women		
	Coefficient	Standard Error	p	Coefficient	Standard Error	p
Intercept	-4.48	0.70	<.001	-5.54	0.62	<.001
Urban birth	1.54	0.43	<.001	2.98	0.64	<.001
Skilled	-1.34	0.49	.006	-1.84	0.65	.005
Supervisor	-24.91	$>10^6$	.99	-23.68	$>10^6$	.99
Local birth	-0.86	0.70	.22	1.27	0.59	.03
Other NE birth	-0.88	0.53	.09	-1.50	0.56	.007
European birth	0.53	0.68	.44	-1.75	0.79	.03
Years of youth as Shaker	0.06	0.04	.13	0.05	0.04	.18
α	1.06	0.14	.69	0.99	0.14	.94
Number uncensored	38			33		
Number right-censored	44			85		
Log-likelihood	-91			-80		

Notes: Coefficients give the effect of a one unit change in the variable on the log of the hazard function (conditional probability of leaving). Sources are Shaker manuscripts Andrews item 980, NYSL Shaker Collection item 13500, and WRHS V:B-70 and V:B-71. Right-censored observations represent residents who died as Shakers. P-values for α estimates refer to test of difference from 1. Local birth refers to Columbia County, New York, and adjacent counties.

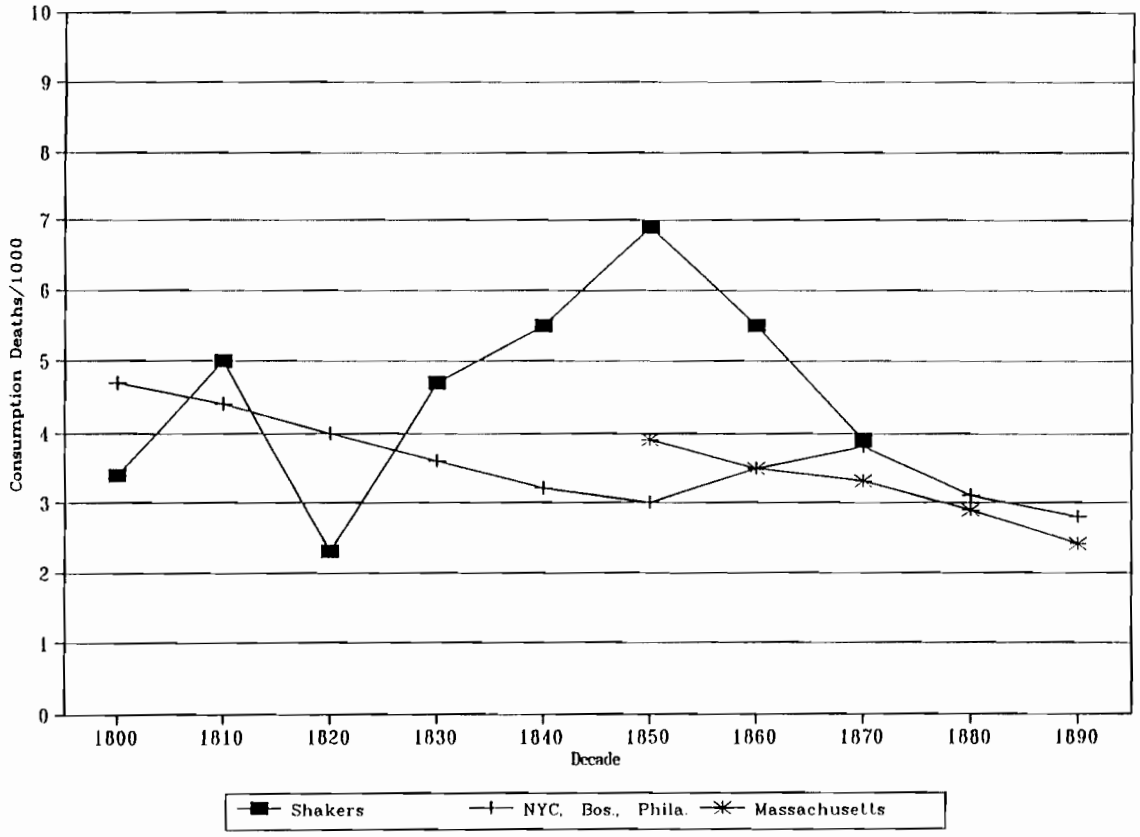

FIGURE 1
Consumption death rates in three Shaker communities
and elsewhere in the United States

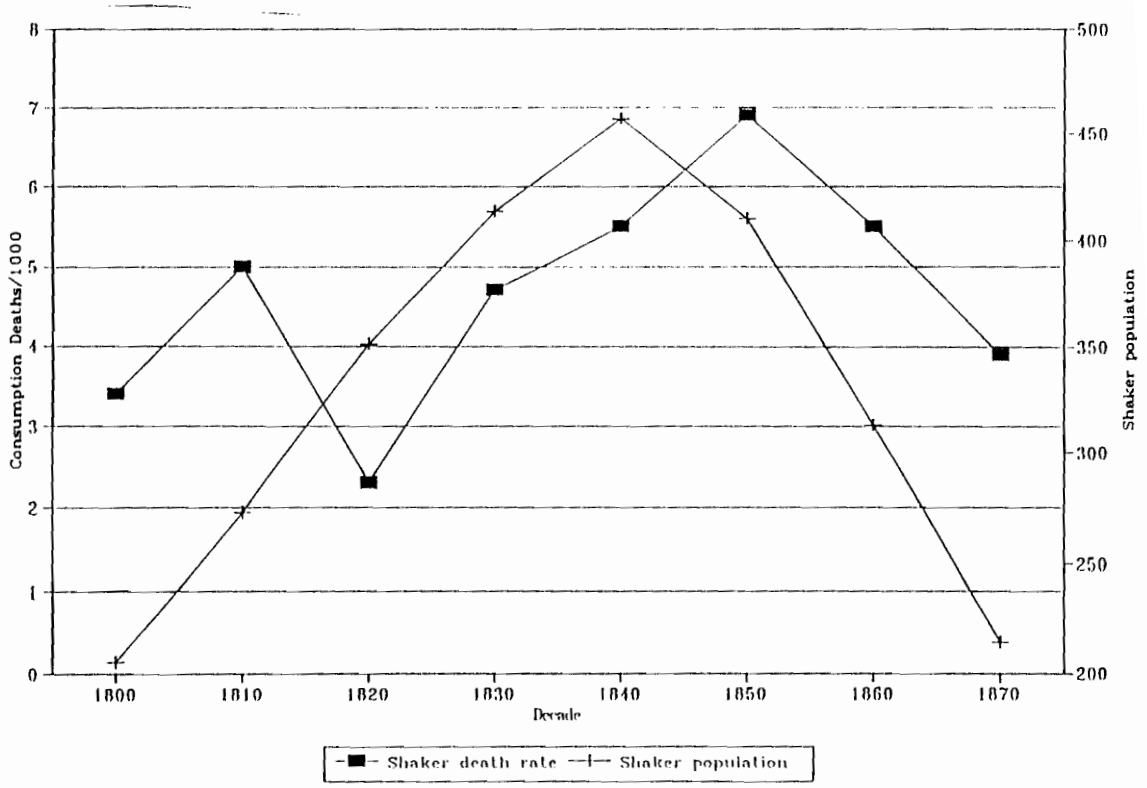

FIGURE 2
Consumption death rates and population
in three Shaker communities

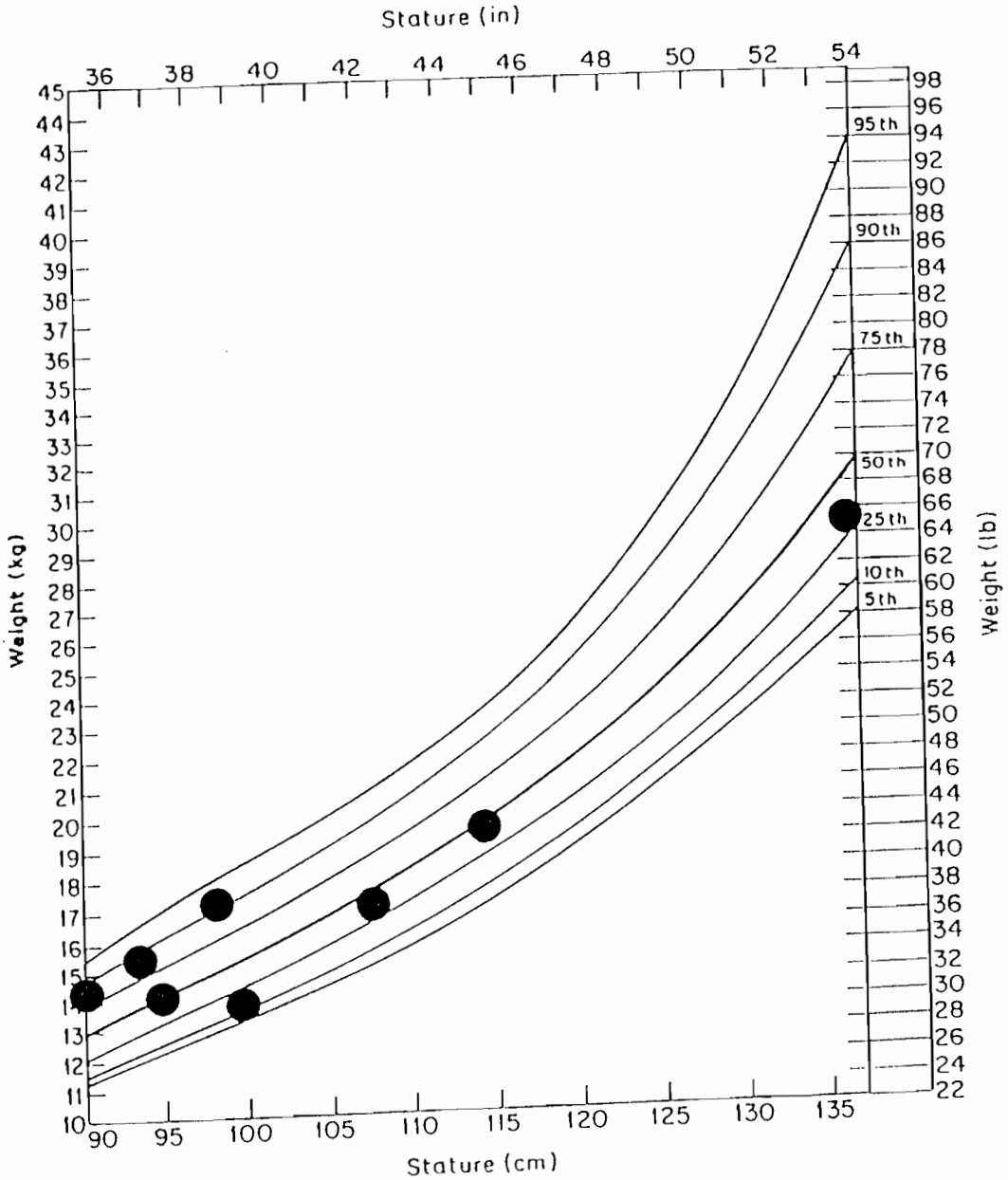

FIGURE 3

Weight for height measures for 8 prepubescent Shaker girls, 1837-1863. Centiles of standards given in Tanner (1978).

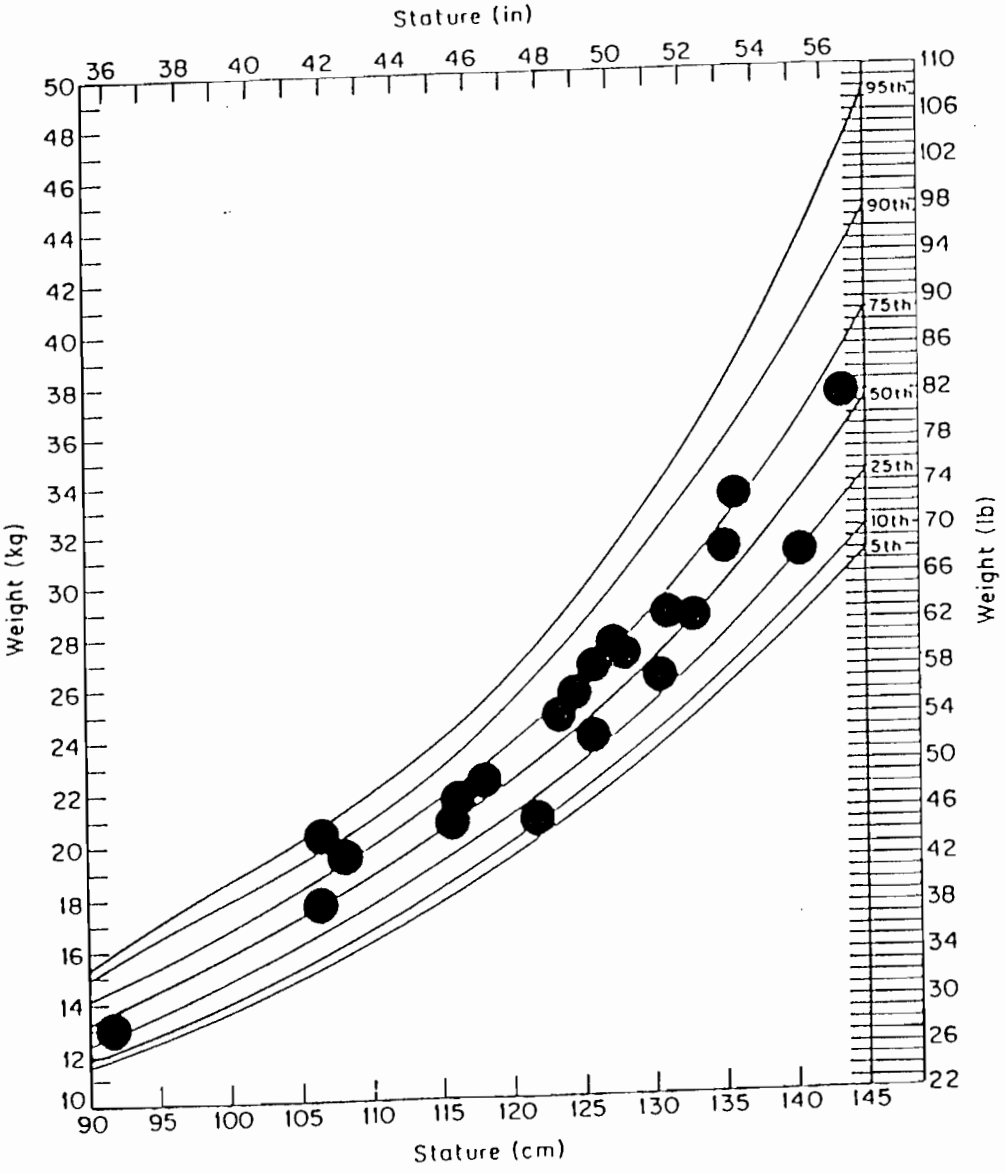

FIGURE 4

Weight for height measures for 21 prepubescent Shaker boys, 1837-1863. Centiles of standards given in Tanner (1978).

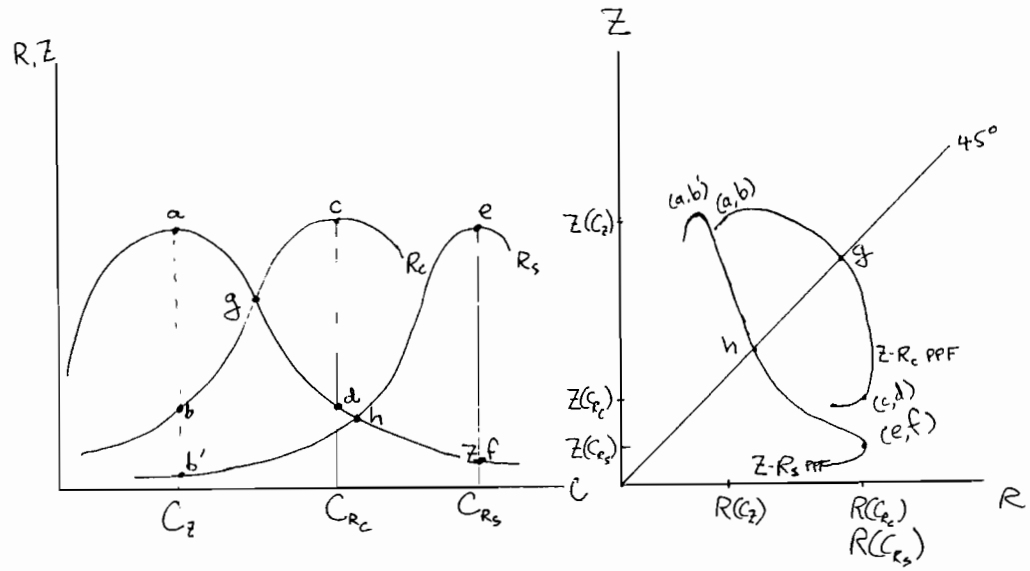

FIGURE 5
If religious and secular norms differ greatly, a concave Z-R production possibilities frontier results.

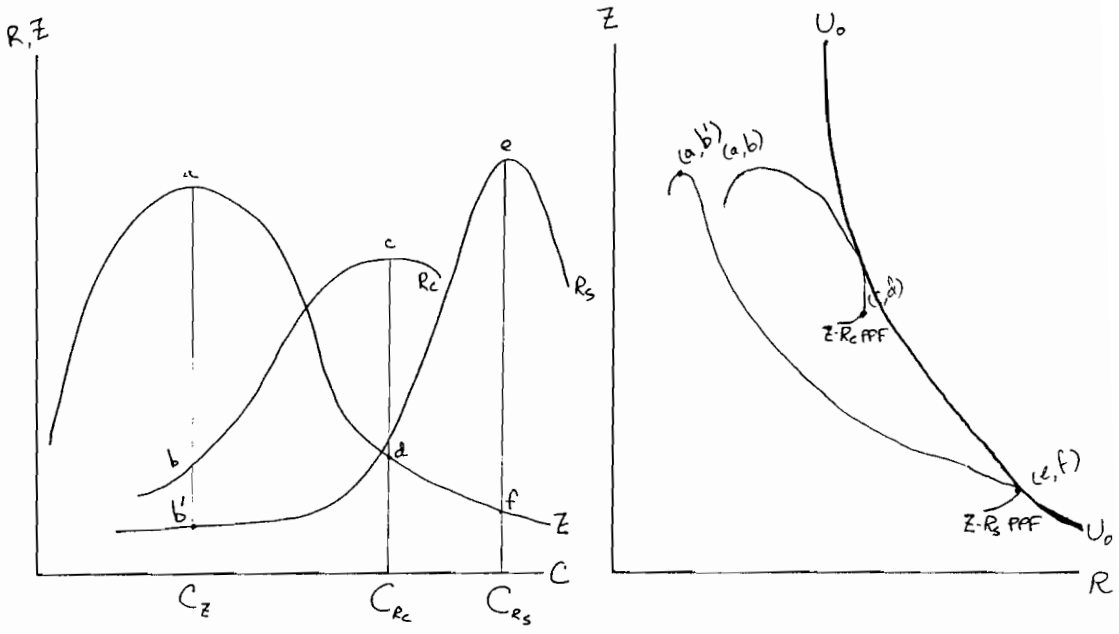

FIGURE 6

Shaker R profile will be higher than that of a common church to compensate Believers for greater forgone secular support.

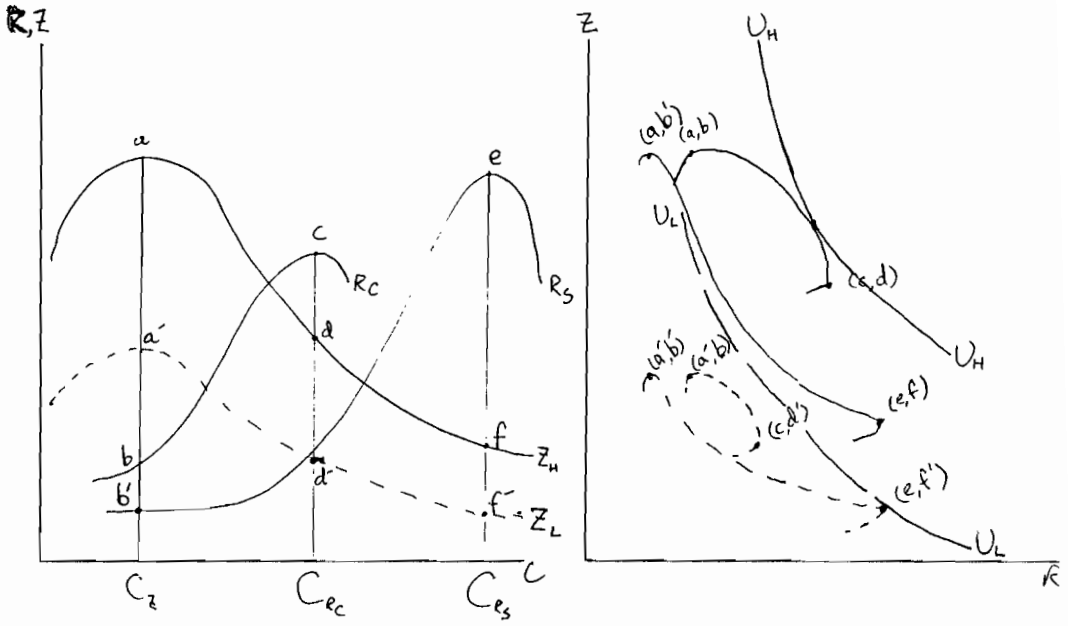

FIGURE 7
Differing levels of human capital induce different Z profiles, causing low human capital people to choose Shaker membership and higher level human capital people to stay in the World or apostatize.

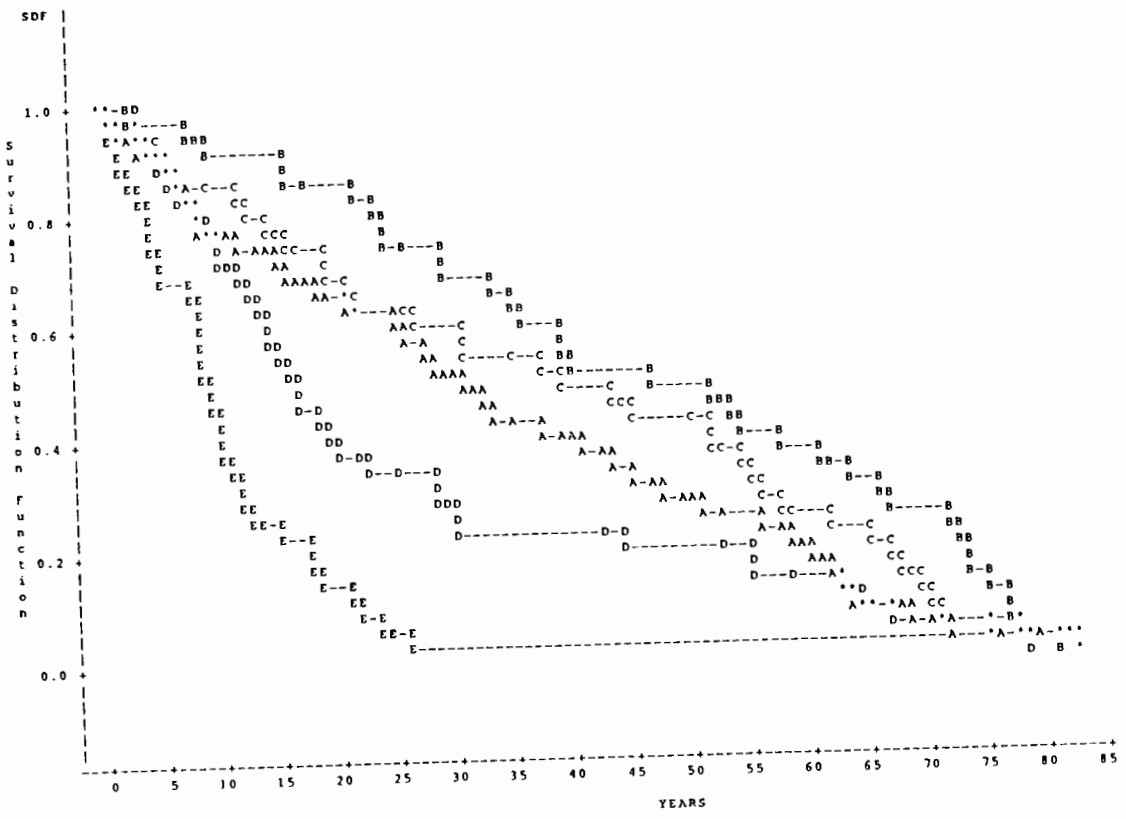

FIGURE 8

Survival function estimates for Shaker women.
A=cohort entering 1780-1799. B=cohort entering 1800-1819.
C=cohort entering 1820-1839. D=cohort entering 1840-1859.
E=cohort entering 1860-1883.

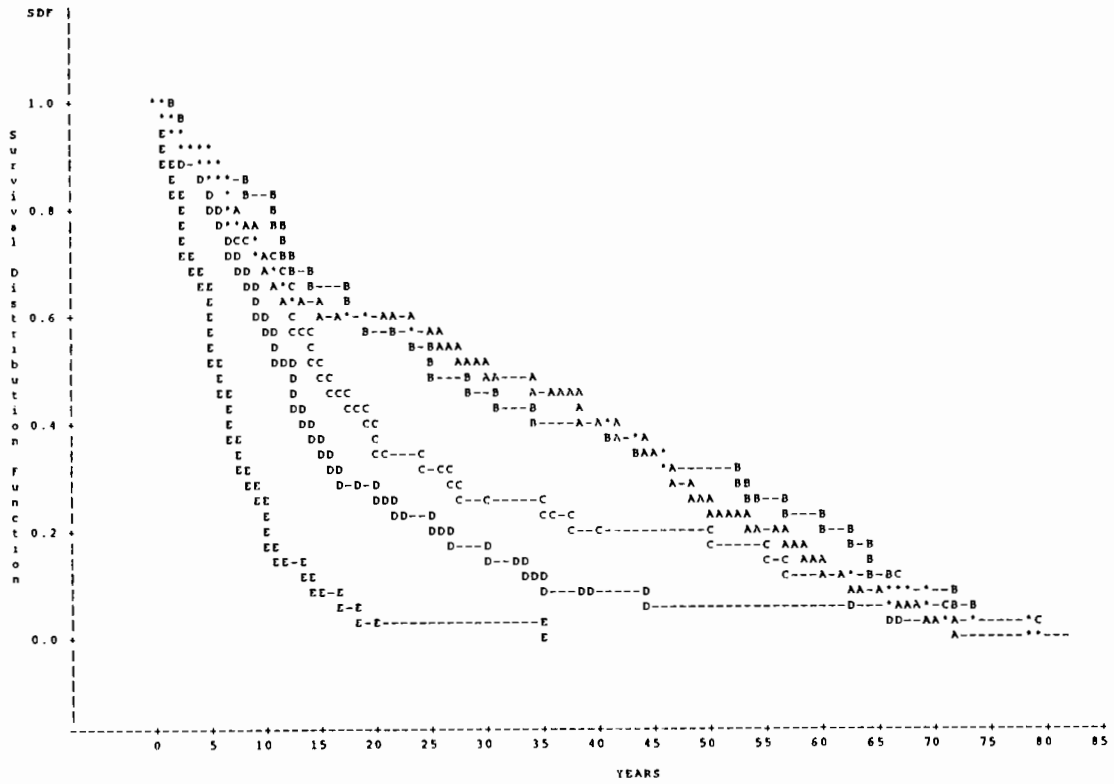

FIGURE 9

Survival function estimates for Shaker men.
A=cohort entering 1780-1799. B=cohort entering 1800-1819.
C=cohort entering 1820-1839. D=cohort entering 1840-1859.
E=cohort entering 1860-1883.