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FERTILITY DIFFERENTIALS AMONG THREE AMISH AFFILIATIONS
IN OHIO

DISSERTATION

Presented in Partial Fulfilment of the Requirements for the Degree of Doctor of Philosophy in the Graduate School of The Ohio State University

By

Samson Waga Wasao

* * * * *

The Ohio State University
1995

Dissertation Committee:

Joseph F. Donnermeyer
Donald W. Thomas
George M. Kreps

Approved by

Joseph F. Donnermeyer
Adviser

Department of Agricultural Economics and Rural Sociology
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©1995
Samson W. Wasao
To My Wife Patricia K. Wasao
and My Daughters
Xenia M. Wasao and Zelda S. Wasao
ACKNOWLEDGEMENTS

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VITA

January 4, 1956. . . . . . . Born-Kakamega District, Kenya

1980 . . . . . . . . . . . . BA(Hons), University of Nairobi, Kenya

1980-1982. . . . . . . . Assistant Planning Officer, Ministry of Livestock Development, Nairobi, Kenya

1985 . . . . . . . . . . . . M.S, The Ohio State University, Columbus, Ohio


1989-1993. . . . . . . . Graduate Teaching Assistant, Department of Black Studies, The Ohio State University, Columbus, Ohio

1993-1994. . . . . . . . Adjunct Instructor, Department of African American studies, University of Cincinnati

1994-Present . . . . . . . Graduate Administrative Assistant, University College, The Ohio State University, Columbus Ohio
FIELDS OF STUDY

Major Field: Agricultural Economics and Rural Sociology

Studies in: Rural Sociology . . . Dr. Joseph F. Donnermeyer

Demography . . . . Dr. Donald W. Thomas

International Development . . . Dr. Linda Lobao
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CHAPTER I

INTRODUCTION

PURPOSE

Differences of fertility within a population is a topic that has acquired increasing importance in recent years among social demographers and other interested scholars, especially in the study of the relationship between socio-cultural population change and development within societies. As was the experience with the industrialized societies, many traditional societies of today are undergoing the transition from being predominantly agricultural to being industrialized. A central characteristic of this transition is that it comes with certain costs and benefits to individuals as well as to society as a whole. An aspect of this transition which can be viewed as either a cost or a benefit is the liberalization of values, beliefs and attitudes from a traditional agrarian value system to a more secular value orientation. Some scholars like Laesthage (1983) believe that the spread of "secular individualism", which he defines as "the pursuit of
personal goals devoid of references to a cohesive and overarching religious or philosophical construct" plays a major role in shaping the behavioral changes that are observable in transitional societies (Laesthage, 1983:415-416). The Amish too, are undergoing these changes.

Demographers have special interest in very high fertility societies because among other things, such populations are rare and unique in modern times in the industrialized nations of Europe and North America and also because they provide a baseline population in the continuing search for empirical tests for the theoretical generalizations of fertility theories. The very high fertility among the Amish for example, contrasts sharply with the below replacement fertility rates of the wider North American industrial societies in which they live. This makes the study of Amish fertility interesting to demographers, planners and other professionals interested in the dynamics of population change.

The purpose of this study is to examine the levels and changes or trends of fertility among three Amish groups or church affiliations in the Wayne/Holmes settlement of Ohio, which constitutes the largest Amish settlement in the world. The three groups or church affiliations studied are the Andy
Weaver Amish, the Old Order Amish--and the New Order Amish. This dissertation seeks answers to three main questions. First, how does farm status affect fertility among the Amish? This question addresses one of the main historical issues which has been examined in many empirical studies of pre-industrial European fertility experience. Generally, fertility was observed to have declined along with the decline in the importance of farming. Although the exact causal mechanisms by which this happened are controversial in the literature, it has been empirically established that the movement from a farming and farm-based family production system to a industrial nonfarm production was accompanied by a demographic shift from high birth and death rates to low birth and death rates (Weeks, 1989). Since the Amish are shifting occupations from farm to nonfarm, this study seeks to examine how this shift is affecting their fertility.

Secondly, the study seeks an answer to the question: "How does being liberal or conservative affect fertility among the Amish?" This question is based on the idea mentioned before, that as societies undergo the transition, there is an accompanying shift in values from family and community orientation to individual and self orientation. This shift
in values occurs at different rates and to varying degrees among individuals and groups within a society. Some groups within the same society may therefore hold onto traditional conservative values while others may be more liberal and accommodating of change. The Amish as a whole are more conservative than contemporary North American society. However, even among the Amish, there are four major fellowship groups or church affiliations which can be categorized along a conservative-liberal continuum. These are the ultra-conservative Swartzentruber Amish, the conservative Andy Weaver Amish, the moderate Old Order Amish and the liberal New Order Amish. Although each of these groups shares with the others the basic Amish characteristics such as conservative dress, use of buggies for transportation and so on, they differ from each other in certain (doctrinal) values and practices which set them apart and which preclude fellowship between them.

The third question that the study seeks to address is: "How does social position in a traditional society affect fertility? Those who have key roles and responsibilities in society tend to have tremendous influence over the rest. In the innovation/diffusion theory, leaders are the custodians or
guardians of the core values and beliefs of a society. This role gives them power and control over the values and behavior of others. They can therefore determine to a great extent whether a new idea is accepted or rejected by simply being for or against it. Among the Amish, the elders (ministers, deacons and bishops) wield a disproportionate share of power and influence over the rest of the community. According to Kraybill (1989), the acceptance of major changes among the Amish is regulated by the senior bishops. If the bishops do not like a new practice, it may not be accepted and it "may need to await their death" (Kraybill, 1989:234). We will examine the relationship between leadership position and fertility performance among the Amish.

OBJECTIVES

With reference to the purposes of the study outlined above, the objectives of the study are also threefold:

(1) The first objective is to apply theories of fertility transition to Amish culture. These theories can be grouped into three broad analytical categories and will be discussed in more detail in chapter three. These categories are: Macroanalytical Theories, which explain how structural
(normative) changes in society that come with modernization affect the reproductive decisions and behavior of couples; Microanalytic theories which explain how changes in values, beliefs and aspirations at the individual level affect fertility outcomes; and Syncroanalytical theories which combine the two mentioned above by explaining fertility change as an outcome of forces of change at both the individual and structural levels. The study will examine to what extent changes in fertility are explained by the relevant theoretical propositions found in all of these broad categories, as more specifically outlined below.

The second objective of the study is to examine the occupational fertility differentials among the Amish based on their farm or nonfarm status. Many studies of fertility and occupational change do confirm that there tends to be high fertility among agricultural communities. For example, Knodel's study of Germany between 1871-1939 indicated that there was a persistent high differential in fertility among agricultural populations (Knodel, 1974). Similarly, Haines (1979) summarized studies conducted in various agricultural and non-agricultural communities in America and selected countries in Europe. He observed that there were higher
average fertility rates among agricultural populations as compared to non-agricultural ones. Similar patterns can be found among agricultural and non-agricultural communities in developing countries today (Hess, 1988, Gillian et.al, 1993).

The Amish readily accept changes that result in economic benefits to them, including work off the farm among non-Amish persons (Kraybill, 1989). How such changes are affecting their fertility will be examined in this study. We will test whether there are any significant differences between the Amish whose primary occupation is agriculture as compared to those with nonfarm based occupations.

The third objective of the study will be to examine how membership in each of the three church affiliations studied affects Amish fertility. Research has shown that when socioeconomic differences are controlled for, membership in pronatalist groups has a positive association with fertility (Goldscheider, 1992). This is so because membership in such groups most often means that one has to comply with the dominant norms of the group or else face sanctions from the group (Friedman et.al., 1994). As norms of the group change, especially allowing new ideas that loosen the grip of traditional norms on individuals, fertility also tends to
change with it (Sander, 1992). For the Amish, membership in one or the other church affiliation essentially means being in a different religious group because the different church affiliations have little or no fellowship with one another (Kraybill and Olshan, 1994).

Finally, the last objective is to examine how social leadership position is related to fertility among Amish elders on the basis of the theories briefly outlined above and which will be discussed further when formulating hypotheses in chapter four.

IMPORTANCE OF STUDY

This study is important in several aspects. First, it is unique in that it is the only study of its kind that examines fertility differentials of a unique population like the Amish. Almost all fertility studies on the Amish have only looked at the Old Order Amish Church affiliation and have therefore assumed that the other Amish groups are either similar to the Old Order group or are not important enough to warrant specific attention. This study does not make that assumption, but examines these three major groups separately and jointly to isolate their various contributions to overall Amish
fertility. This contributes to a better understanding of the patterns of fertility among the Amish.

Second, unlike many fertility studies of the Amish, which tend to be mainly descriptive, this study has an added strength because it uses both descriptive and inferential statistical analysis of the data in order to make inferences.

Third, the findings of the study will enrich the scholarly community by adding to the body of knowledge regarding minority populations. More specifically this study increases our understanding of fertility and socioeconomic change among traditional communities like the Amish in general and of Amish fertility in particular.

LIMITATIONS

There are two main limitations of the study. First, the data used are from about seven years ago, thus the fertility levels and trends observed are not current, but those of 1988 and earlier. A more recently updated directory would have provided data for a more contemporary assessment. However, this dissertation provides an important benchmark assessment. A new directory, similar in format to the 1988 directory is expected to be published in 1996. It is hoped that this study
can then be replicated. In addition, since fertility behavior and other changes happen over time, the findings of this study are still very useful in increasing our understanding of fertility change among the Amish and other high fertility groups.

Second, the explanatory variables used have limited ability in explaining causal relationships between children ever born or parity. This is because, except for the three demographic (individual level) explanatory variables, the rest are all structural (intervening) variables. Thus the relationships observed are indirect. Because of this reason, the focus of the study is on the general strength of the correlations between the explanatory variables and the response variable.

ORGANIZATION

The chapters that follow are organized as described below. In chapter two, the population of study is introduced by providing a brief description of who they are, their historical origins and a description of them as a contemporary subculture. Also in this chapter, Amish fertility is described
and related to some of the major changes they are undergoing today.

Chapter three reviews the demographic literature on the main theories of fertility and places the study within the wider context of the study of fertility as a process of social change. Chapter four discusses the methodology of the study, data type and sources as well as the sample size and selection method. Variables of interest and their measures are presented and discussed. Hypotheses to be tested as well as methods of analysis of the data are also discussed. This chapter lays the foundation for the next two chapters in which the descriptive and inferential statistical analyses are done.

In chapter five, the descriptive analysis is presented including all the relevant summary statistics, tables and charts. The relevant levels and trends of fertility among the Amish are presented. In chapter six, the results of multiple regression are presented in summarized tables that show the relationships among the variables of interest in the study. The significant relationships among the variables are discussed.

Chapter seven summarizes the major findings of the study and evaluates the hypotheses tested and discusses whether they
were confirmed or not. Also in this chapter, the implications of the findings of this study for further studies of Amish fertility are presented and the future direction of Amish fertility is briefly conjectured.

DEFINITION OF TERMS

The following terms will be frequently used throughout the study and their definitions are taken from Petersen, William and Renee Petersen (eds), (1986). Dictionary of Demography: Terms, Concepts and Institutions (New York, Greenwood Press).

Fertility: The birth performance of a population, usually viewed as the number of children per family or per unit of a population.

Fecundity: The physiological capacity to reproduce.

Parity: The number of children born alive to a woman to date. Also used as the characteristic of a mother with respect to the number of her live births.

Children Ever Born: Means exactly the same as parity above.

Natality: Is commonly used as a synonym to fertility and refers to births or birth performance of a population. A pronatalist population is one that favors births and which
therefore does severely limit or forbid deliberate birth limitation (birth control).

**Demographic/Fertility Transition:** The empirically observed shift in fertility and mortality from high rates of both to low rates of both with the onset of industrialization and modernization. It is an empirical generalization that though sweeping, is a very well documented trend in modern history. The more refined fertility transition is preferred and is used in this study.
CHAPTER II

THE AMISH SUBCULTURE

This chapter reviews the literature on the Amish by briefly describing their historical origin as well as discussing them as a contemporary subculture in North America.

THE AMISH

The Amish constitute one of the most unique population groups existing anywhere in the world today. They are unique because to a reasonable degree, they have been successful in maintaining their deeply religious lifestyle, which is characterized by simplicity, humility and faith (Kraybill, 1989). This lifestyle is closely patterned along the lifestyle of their European ancestors of the late Middle Ages, while at the same time they are living right in the middle of some of the most industrially advanced societies of the world, namely Canada and the United States (Loomis, 1963). Although they are more known for their "legendary" resistance to change,
they are in fact, a very innovative and dynamic society in their own way (Olshan, 1981). Change is acceptable as long as the change is defined within the boundaries of the normative structure of the Amish society and it's adoption does not upset the core (religious) values of the society. The Amish prefer continuity and gradual change to rapid and disruptive change (Stoltzfus, 1973).

EARLY ORIGINS

The Amish originated from the Anabaptist movement of the Protestant Reformation in the early 16th century. The Anabaptists or "rebaptizers" broke away from the Lutheran church because of disagreements on matters of doctrine and practice, one of which was the practice of infant baptism (Nolt, 1992). Their practice of baptizing again their adult members earned them the name "Anabaptists" (Kraybill, 1989). One of the breakaway groups was lead by Menno Simons which later became known as "Mennonites" after his name.

After some time, the Mennonites began to drift back toward looking like the mainstream society by compromising some of their beliefs and practices. A group from among the Mennonites led by Jacob Amman broke away in 1693. This group
emphasized separation from the mainstream society and was characterized by strict discipline, social avoidance and deep piety for its members (Nolt, 1992). They became known as the "Amish" after their leader. Because of widespread persecution, the Amish first moved to other parts of Europe, and ultimately found their way to the "New Land" of North America where they founded a settlement in Southeast Pennsylvania in 1738 (Hostetler, 1980; Nolt, 1992).

As their population grew, they spread to other parts of the North American continent, including the state of Ohio (Hostetler, 1980). Today, the Amish are conspicuous in their rural agrarian settlements characterized by their strict religious lifestyle separate from the mainstream American Society, and their selective refusal to use modern technological innovations.

THE CONTEMPORARY AMISH SUBCULTURE

The Amish have a distinctive way of life which continues to flourish within the broader American culture and as such, they are a subculture of the national American culture (Rodgers, 1960). According to Clarke (1974), an important aspect of a subculture is to what extent it encompasses all
aspects of an individual's life. In the Amish community, membership in an Amish family is very important and is a large part of an Amish person's social identity. Although the Amish have their own internally differentiated aspects of the wider culture of which they are a part for example, different denominations or "orders," they possess a unique distinctiveness in ways of thinking and behavior that is found only among them and which can only be acquired by being a member of the Amish subculture. The Amish value system and value judgements are equally unique and set them apart from the wider American society. Another way of looking at the Amish is to see them as a religious sect, although strictly speaking, in certain aspects, they do not fit into the definition of a sect. For example, the Amish do not demand that others (and even their own members to a certain extent) conform to their practices and they are not in direct conflict with the dominant culture as sects tend to be (Hostetler, 1980).

Like all subcultures, the Amish have to constantly deal with issues of boundary maintenance and systematic linkage relative to the larger American society. Loomis (1963:196) defines boundary maintenance as the "process by which a group
maintains it's solidarity, identity and interaction patterns." The Amish accomplish boundary maintenance as defined above by basing their whole lifestyle on a particular interpretation of Christian beliefs and norms from the Bible and by maintaining a (physical) geographical distance from non-Amish people whom they call the "English" after the language spoken by the citizens of the U.S. and Canada. They also do this by creating a social and economic distance from the rest of society by making sure that their economic structure is minimally dependent on the non-Amish world (Kreps et.al, 1994).

The Amish live in settlements which serve as the geographic basis for regulating contact with the rest of the world. These settlements are usually located away from a city and consist of church districts each of which has about 20-35 nuclear families (Kreps et.al, 1994). A church district is a congregation which serves as a governing unit. The settlements are concentrated in limited geographical areas that are predominantly agricultural. Total Amish population was estimated at 150,000 around 1989 (Kraybill, 1989).

The largest of the Amish settlements is the Holmes/Wayne county settlement in Northeast Ohio. This settlement consists of about 157 church districts in 1993 (Kraybill, 1989). The
settlement in Lancaster/Chester counties in Pennsylvania is next in size with 103 church districts, and the LaGrange/Elkhart counties settlement in Northern Indiana is third with 78 church districts. Other sizable Amish communities are the Geauga/Trumbull counties settlement located East of Cleveland Ohio, which has 54 church districts, and the Berne/Adams county settlement located north of Fort Wayne Indiana, with 22 church districts (Kreps et.al, 1993).

The primary occupation of the Amish is farming, the value of which is derived from the biblical injunction for man to work the land and take care of it. In situations where farming is not fully possible, the Amish engage in farm related and semi-rural occupations that are within or very close to their community. Such occupations are usually, but not always, owned by fellow Amish or by their Mennonite cousins who settled in the same areas of North America after their migration from Europe. This self-imposed limitation is functional to the Amish because it reinforces the community values of independence from the external non-Amish society, as well as the value of work solely as a means to support oneself and the family.
The family plays the most central role in the lives of the Amish because it is the most important social and economic unit. Procreation, nurturing and socialization are the major functions of the family. Parents have the God-given responsibility of bringing up the children in the Amish faith. The way the children are socialized ensures the maintenance of Amish faith and values. Socialization is comprehensive through both formal and informal schooling with the boys having their father as the role model of the father-farmer, while the girl's role model is the mother farm-wife (Kraybill, 1989). Formal schooling among the Amish is not allowed beyond the eighth grade. Interaction with the outside world is strictly forbidden to children as well as the adults and the ways in which knowledge and opinions are formed or modified among members are tightly controlled by keeping people away from and/or severely limiting access to modern means of communication like the automobile, telephone, television, radio and the non-Amish newspapers. Intimate interaction among family, friends and neighbors is encouraged as long as it is limited to fellow Amish.

The exclusion of non-members from the social life of the Amish as well as the avoidance of outsiders proves to be a
A system of social rewards and sanctions that encourage conformity to group norms are strictly enforced. The "Ordnung" is a set of rules and regulations which govern the lives of Amish people. These rules and regulations have evolved over a number of years and they are normally not written down. They are clarified and modified each year at special meetings before communion (Good, 1985). Those who violate them are subjected to the "Meidung" or social shunning (Schreiber, 1962). Such individuals are deprived full fellowship by being excommunicated partially or fully depending on the seriousness of the violation, for breaching Amish norms (Loomis, 1963, Kraybill, 1989). It is a powerful negative sanction which places a heavy moral stigma on the culprit. These and other social control mechanisms ensure that the social boundary is maintained and restricted to the Amish and therefore outside influences are blocked.

The Amish are not tradition bound as many people tend to think (Olshan, 1981). They accept or reject innovations or practices as depending on whether or not the innovations or practices are compatible with their core values and beliefs. They are quite good at adopting changes that are appropriate
to their scale of operations on the farm and which are not disruptive of their way of life. For instance, while they generally reject the use of tractors, they have adopted the use of other new agricultural implements such as mechanical hay loaders and manure spreaders (Olshan, 1981).

They exhibit a remarkable sensitivity to, and control over the process of change and are guided by a self-conscious awareness of who they are and where they want to go rather than by blind traditionalism (Olshan, 1981). This point is evident in the fact that in the majority of cases, the Amish opt to disagree and create new groups that are accepting and accommodating of change rather than entirely abandon their way of life.

AMISH AFFILIATIONS OR "ORDERS"

As was mentioned before, the legacy of schisms and divisions never left the Amish wherever they went. After they settled in the New World, they continued to disagree on how to live the Amish life. Tension and schisms occurred especially during those periods when the wider American society was undergoing rapid social and technological changes that were impacting them as well, and which had serious implications to
the retention of their core religious values (Schreiber, 1962). Table 1 below shows a profile of the four major Amish groups or affiliations in the Holmes/Wayne counties settlement area.

There are several Amish divisions or affiliations, often commonly referred to as "orders." An affiliation or church order is a group of church districts that have a common discipline and have fellowship together (see Table 1). From the point of view of the Old Order, or the largest Amish fellowship group, the other affiliations are classified according to their degree of "worldliness" (Hostetler, 1980). The other "orders" are essentially breakaway groups from the original (Old Order) because of disagreements regarding issues of interpretation of what the real Amish life is supposed to mean and to be. When resistance and negotiation to adopt certain changes failed, internal divisions followed as the more liberal and change oriented groups sought to adjust and to adopt some of these new changes.

In the Holmes/Wayne counties settlement area today, as shown in Table 1, there are four main Amish affiliations differing in their degree of conservativeness relative to the enforcement of shunning and living according to the "Ordnung".
### Table 1: A Profile of the Four Major Amish Affiliations

<table>
<thead>
<tr>
<th></th>
<th>SWARTZEN­TRUBER</th>
<th>ANDY WEAVER</th>
<th>OLD ORDER</th>
<th>NEW ORDER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent of Conservatism</td>
<td>extreme</td>
<td>high</td>
<td>moderate</td>
<td>low</td>
</tr>
<tr>
<td>Date of Origin</td>
<td>1913</td>
<td>1952</td>
<td>1809</td>
<td>1968</td>
</tr>
<tr>
<td>Church Districts</td>
<td>20</td>
<td>19</td>
<td>99</td>
<td>19</td>
</tr>
<tr>
<td>Estimated Population</td>
<td>2,900</td>
<td>2,750</td>
<td>14,400</td>
<td>2,750</td>
</tr>
<tr>
<td>Males in Farming (%)</td>
<td>80</td>
<td>46</td>
<td>36</td>
<td>35</td>
</tr>
<tr>
<td>Average number of children</td>
<td>--</td>
<td>5.9</td>
<td>5.1</td>
<td>4.9</td>
</tr>
</tbody>
</table>


The most conservative of these is the Swartzentruber Amish. They were separately identified in 1913 and are estimated to consist of about 20 church districts (Kreps et.al, 1994). They are estimated to be about 3,000 and mainly live in Wayne County, Ohio. Several other Swartzentruber groups are scattered in parts of northern and western Ohio. They do not use indoor plumbing, they refuse to use slow vehicle emblems on their buggies and they do not participate in the Ohio Amish Directory Project.
The next group in terms of degree of conservativeness is the Andy Weaver group (named after its leader, Bishop Andrew J. Weaver), which was formed in about 1955, having split from the Old Order fellowship. They disagreed with the Old Order on the practice of shunning, favoring strict shunning of deviant members rather than a softer and more accommodating attitude preferred by the Old Order. They also rejected changes in farm and household technology which were slowly creeping into Old Order homes (Nolt, 1992).

The mainstream of the Amish culture is the Old Order group. This is the largest affiliation in the Wayne/Holmes county area and are estimated to be slightly over 14,000 (Kraybill, 1989). In comparison to the Andy Weaver group, they are more liberal. They allow the use of gas and kerosene refrigerators and central heating in the home. They also allow the use of power units in the back of their wagons in the field. They do not allow the use of tractors, automobiles, electricity or telephones in the homes. They use horses for plowing and horse-drawn buggies for transportation. Because they are the largest group among the Amish, they have been the focus of most studies available on the Amish.
The New Order Amish split from the Old Order in 1966 when some of them adopted the use of farm equipment of which the rest did not approve. Although collectively known as the "New Order," the group consists of several variants or sub-orders. The group began when two new church districts were created by one hundred families dissenting from the Old Order Amish of Lancaster County in Pennsylvania. These all agreed among other things, on the need to maintain high moral standards on courtship practices and the use of tobacco, and established Sunday schools and other church activities for their youth (Nolt, 1992). Soon after, groups in the Holmes Wayne area, sympathetic to the New Order group in Pennsylvania also split with the Old Order. They remain a loose yet well defined fellowship group balancing what they see as the strengths of the Old Order with new (spiritual) insight into the way to live the Amish life amidst their rapidly changing social and economic circumstances.

AMISH FERTILITY

The Amish as a group constitute a "pocket" of high fertility in the United States (Cross and McKusick, 1968). Their high birth rates are exceeded only by the other
Anabaptist religious group known as the Hutterites, who are a well known high fertility group in the field of population studies. The Hutterites live in communes or colonies, mainly in the states of South Dakota and Montana in the United States and in some Canadian provinces. According to Cross and McKusick (1968), the "religious influence is a dominant, pervasive spur to fertility." In a comparative study of the two groups, they found out that the average annual growth rate among the Amish between 1900 and 1960 was 3.5 percent while the Hutterites during the same period grew at the rate of about 4.5 percent per annum. The rest of the United States during that period grew at 1.5 percent per annum (Cross and McKusick, 1968). Those rates were only slightly lower in the decades of the seventies and eighties for both the Amish and the Hutterites (Foster, 1984).

From an estimated population of about 5,000, in 1900, the Amish grew to a population of about 150,000 by 1989 (Kraybill, 1989). The Holmes/Wayne county Amish settlement constitutes the largest Amish community in the World. The map in Appendix A (Figure 5) shows where this settlement is located in the state of Ohio. The settlement has grown rapidly in this century. Within the past three decades alone, this Amish
settlement has grown from 55 church districts to more than 160 in 1993 (Kreps et.al, 1993). Since there is neither immigration among them nor prosletyzing, this growth is a direct outcome of natural increase. Each congregation in a church district averages about 145 persons, therefore, the Holmes/Wayne county settlement has a population of slightly over 23,000 people (or about one sixth of the total Amish population).

The conjugal family as was mentioned before, is the locus of all dimensions of life for the Amish and is in essence, the major determinant of group survival. According to Kraybill, "the family the keystone of Amish society is large in size and influence" (Kraybill, 1989). This implies that the quantitative (size or number growth) and the qualitative (degree of conformity to Amish norms and values) development of the people hinge on the family where they mutually reinforce each other. The value for family, based on their religious belief, works to encourage the desire for continuity which is expressed through quantitative population increases, i.e. high birth rates. The family farm is very labor intensive, and thus children are highly valued for this labor including domestic work (Hostetler, 1980). Because they are
a high fertility sub-population, we expect that the family size among them would be large in comparison with the rest of the American society. The prevailing attitude towards fertility among them would be pronatalist.

According to Forster (1984), the mean completed family size among the Amish was about eight children in the early eighties. Contraception is forbidden (except for health reasons, as was explained in a telephone conversation with the doctor in charge of the birthing center near Mt. Eaton, Dr. Lehmann: 6/16/95) and infant mortality is low. The low infant mortality can be explained in terms of their use of modern health facilities that are adjacent to their settlements. Like other mainstream Americans, the Amish too do utilize modern medical facilities.

The age-sex structure of the Amish is typical for high fertility populations. At least half of the population consists of young people below the age of eighteen (Kraybill, 1989). In comparing the demographic structure of the Amish with that of the non-Amish in Lancaster county Pennsylvania, Kraybill noted that 53 percent of the Amish population in that county was of age eighteen and below, while only 5 percent was over 65 years old. In the neighboring non-Amish population,
the corresponding numbers were 28 and 12 percent respectively (Kraybill, 1989).

According to Hostetler (1980), the median age at first marriage for Amish women was just under 22 years and for men it was slightly more than twenty three years in the early eighties. Some scholars have suggested that the Amish control their reproduction by delayed marriage and by having longer birth intervals or wider spacing (Markle and Pasco, 1977). In a study of the Old Order Amish, Cross (1976) found that they married at considerably later age than their rural counterparts. In his findings, female Amish married at the age of 22.6 years, while the men married at the age of 23.6 years. In comparing the Amish and the Hutterites, Cross and McKusick found that the mean interval from marriage to first birth was 13 months for the Hutterites and was 20 months for the Amish, while the last birth interval was significantly longer than the previous intervals for the Amish compared to the Hutterites (Cross and McKusick, 1970).

Hostetler also noted in the Lancaster, Pennsylvania study that the rate of childlessness for the Amish was lower (4.4%) compared to that of the United States as a whole (7.5%) (Hostetler, 1980). The proportion of couples having ten or
more children among them was also indicative of the high growth trend of the population. In the Hostetler study, 22 percent of Amish couples had ten or more children. Also, the age difference between husband and wife for the Amish was 1.5 years while for the US as a whole it was 2.5 years, according to the same study.

An important question is whether the Amish limit or even attempt to limit their fertility. Although there is agreement that the Amish generally do not use any modern methods of contraception, scholars differ as to whether they actually do so in some non-obvious ways. Of course, among the Amish, as in all other societies, there is always a discrepancy between the ideal and actual normative structures and practice (Levy, 1966). Ideally then, we expect the Amish to forbid any form of contraception, but in reality they may practice some form of family limitation (Markle and Pasco, 1970).

Some ways through which those among the Amish who wish to limit their fertility but remain true to their Amish beliefs regarding birth control are: 1) by changing church affiliation, i.e. joining the more liberal ones; 2) by engaging in non-farm occupations; and 3) by using traditional or natural methods of birth control, e.g. delayed marriage,
birth spacing etc. The last resort is to leave the Amish way of life altogether, as some scholars have observed is happening, especially among the Amish youth (Ericksen et al, 1979).

In relating marital fertility to occupation among the Amish, Markle and Pasco (1977) found that both Amish farmers and part time Amish farmers generally had higher fertility compared to those who were engaged in other occupations. In their study, non-farmers had an average of 4.82 children while farmers had 6.30 children (Markle and Pasco, 1977). Since it is only with respect to economic activities that they somewhat freely mix with the non-Amish world, there is some apparent relationship between fertility rates of those who work away from the home and those who do not. In their study of the changing occupational structure of the Amish, Kreps et al (1994) found that there was a marked trend for the Amish to shift toward non-farm occupations in the Holmes/Wayne county settlement area of Ohio between 1965 and 1988. Table 2 below shows this trend for the three church affiliations that are the focus of this study.

As can be seen from the table, in 1965 only about 30 percent of the Amish in this population were engaged in
nonfarm occupations. By 1988 however, the proportion had more than doubled to about 62 percent of the population (Kreps et al., 1993). Also from the table, we can see that for each church affiliation, there is a clear decline of farm occupations and an accompanying increase in nonfarm occupations. In a different study however, it was found that among the ultra-conservative (Swartzentruber) affiliation of the Amish who are not included in this table, farming was still the predominant occupation, with an estimated 80 percent of the families in that fellowship engaged in farming (Kraybill and Olshan, 1994). The gradual decline of farming as the primary occupation for the Amish is evident from these studies, and it is part of the objective of this study to examine the correlation between this decline and fertility patterns.

The labor intensive agricultural system upon which the Amish base their life has an in-built pronatalist bias which, other than encouraging numerical increase of the population, also facilitates Amish kinship networks and fosters community interdependence and vitality (Ericksen et al., 1979). These in turn promote the high fertility ethos in the community.
Table 2: Trend of Farm and Nonfarm Occupations, 1965-1968

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td><strong>ANDY WEAVER</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm (%)</td>
<td>75.5</td>
<td>66.1</td>
<td>49.3</td>
<td>42.0</td>
</tr>
<tr>
<td>Retired Farm (%)</td>
<td>7.8</td>
<td>8.7</td>
<td>9.8</td>
<td>8.0</td>
</tr>
<tr>
<td>Farm Laborer (%)</td>
<td>0.0</td>
<td>0.3</td>
<td>0.3</td>
<td>0.0</td>
</tr>
<tr>
<td>Non-Farm (%)</td>
<td>16.5</td>
<td>24.8</td>
<td>40.6</td>
<td>50.0</td>
</tr>
<tr>
<td><strong>OLD ORDER</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm (%)</td>
<td>65.0</td>
<td>47.8</td>
<td>41.6</td>
<td>33.6</td>
</tr>
<tr>
<td>Retired Farm (%)</td>
<td>7.4</td>
<td>9.1</td>
<td>9.1</td>
<td>7.0</td>
</tr>
<tr>
<td>Farm Laborer (%)</td>
<td>0.3</td>
<td>0.4</td>
<td>0.5</td>
<td>0.4</td>
</tr>
<tr>
<td>Non-Farm (%)</td>
<td>27.0</td>
<td>42.7</td>
<td>48.8</td>
<td>59.1</td>
</tr>
<tr>
<td><strong>NEW ORDER</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farm (%)</td>
<td>---</td>
<td>46.9</td>
<td>39.2</td>
<td>35.6</td>
</tr>
<tr>
<td>Retired Farm (%)</td>
<td>---</td>
<td>8.2</td>
<td>7.7</td>
<td>6.3</td>
</tr>
<tr>
<td>Farm Laborer (%)</td>
<td>---</td>
<td>0.7</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Nonfarm (%)</td>
<td>---</td>
<td>44.2</td>
<td>53.1</td>
<td>58.2</td>
</tr>
</tbody>
</table>

| Total Farm        | 1,212 | 1,083 | 1,092 | 1,073 |
|                  | (70.7) | (55.4) | (46.8) | (37.8) |
| Total Nonfarm     | 502   | 872   | 1,241 | 1,763 |
|                  | (29.3) | (44.6) | (53.2) | (62.2) |
| Grand Total       | 1,714 | 1,955 | 2,333 | 2,836 |
|                  | (100) | (100) | (100) | (100) |
| Farm/Nonfarm Ratio| 2.41  | 1.24  | 0.88  | 0.61  |

However, high fertility presents a paradox or contradiction for the Amish. While the maintenance of the traditional family is ensured with high fertility and is functional for the labor intensive agriculture, high fertility has also created pressure on limited resources, especially land, as well as additional social and psychological pressures and tensions that are creating a major crisis for the community (Ericksen, et.al., 1980). Indeed, one may say that the future existence and survival of the Amish as a distinct subculture depends among other things, on how this demographic factor adjusts to the external pressures imposed on the community by the social and economic changes that are impacting them now and which tend to favor smaller family size.
CHAPTER III

REVIEW OF LITERATURE

In this chapter, the relevant demographic literature on fertility transition is briefly reviewed and the hypotheses to be tested are outlined.

THEORETICAL FRAMEWORK

The interest in the study of population change was sparked by the "father" of population studies, the Rev. Thomas J. Malthus in the 19th century in England. In his well known book, *Essay in the Principle of Population*, first written in 1798, he outlined what he thought to be the most urgent problem facing mankind--that of rapid growth of human population at a time of declining or stagnant food supplies. He observed that population would tend to grow in an exponential manner, while food output only grew in an arithmetic manner. Given the fixed supply of land and other resources, and as land became fully occupied, the real price
of food would rise, causing real incomes to fall and leading to malnutrition, starvation and disease.

According to Malthus, there were only two avenues out of this situation, the onset of "positive checks" on population growth (i.e. starvation, disease and death), or as he later wrote, if people practiced "preventive checks" (delayed marriage or complete abstention from marriage) (Wrigley, 1986). He observed and was alarmed that in the North American territories, population was doubling every quarter century (Malthus, 1798).

DEMOGRAPHIC TRANSITION THEORY

Since the time of Malthus, the study of population growth has interested many scholars, especially with regard to the factors that determine such growth over time in various societies. Social demographers and other interested scholars have observed through the study of European communities and societies that there tended to be a transition in birth and the death rates, and in both, from high to low rates as these societies progressed from being rural, peasant, and agricultural societies to modern, industrial societies (Matras, 1977, Weeks, 1989). Certain basic regularities in
population patterns have been observed in the study of Europe of the 19th century, which have led to the formulation of the "theory of demographic transition." The gist of this theory is summarized in Figure 1 below.

This theory generally states that as a society becomes modernized and industrialized, mortality is lowered while fertility initially remains high, but later fertility also begins to decline and both move to a new equilibrium characterized by low levels or rates of both births and deaths (Potts and Selman, 1979). Figure 1 summarizes the main propositions of the theory. The transition refers to that point or stage where both rates begin to fall (Point B) and continue to do so steadily (towards Point C) (Potts and Selman, 1979).

Further, the theory states that the transition process goes through several stages, beginning with an initial stage of high fertility and mortality and very low population growth, (stage 1) to the last stage of low fertility and mortality during which the population growth rate is close to the zero rate of natural increase (Jones and Grupp, 1987). In a nutshell, demographic transition theory states that both the mortality and fertility rates of a population will decline
Figure 1: The Demographic Transition Model

from high to low levels with the onset of socioeconomic development (Hess, 1988). All the now developed industrialized countries are said to have gone through these stages with almost no exception.

In Figure 1, stage one represents the pretransition period of high births and deaths in a population, as did occur in many agrarian peasant communities of Europe prior to industrialization, and as can be observed in many communities of the developing countries today. High birth rates are essential during this stage for the survival of society and so tend to be supported by social beliefs and customs which develop in response to the threat of high mortality (Potts and Selman, 1979).

In stage two, birth rates are relatively still high while death rates are steadily declining. Society in this stage has developed control over mortality, through advances in medical services and improved sanitation, but no control over fertility yet. It is emerging from being predominantly agrarian to a greater division of labor as industrialization and other improvements set in. Birth rates remain high and population growth is fairly high. Stage three represents the onset of the transition from high to low rates of births and
deaths. Birth rates begin to decline while death rates are stabilizing at low levels. In this stage, economic growth, characterized by rapid industrialization and urbanization, as well as an increased expansion of educational opportunities is quite rapid and pervasive. This process changes people's value orientations and aspirations from an emphasis on traditional family structure and kinship networks with its high value placed on large families, to a nuclear family orientation which places value on smaller families and fewer children. Stage four is said to be possible only with a very high degree of industrialization as is the case with the industrialized countries of Western Europe and also Japan today, which have historically low fertility and mortality rates after the transition.

FERTILITY TRANSITION

The Demographic Transition Theory as outlined above has been strongly criticized and dismissed by some scholars as simply representing a vague set of empirical correlations with no validity as theory (Weeks, 1989). Other scholars prefer to use the phrase "demographic transition" without "theory" as a way of summarizing the observed regularities of the change
from high to low rates of births and deaths. They see this observed phenomenon as general historical links in the demographic experience of the now developed countries and not necessarily relating to the developing countries (van de Walle, 1992). Also criticized is the all-encompassing nature of the changes described by the demographic transition theory which some critics see as a weakness, while for some it is a source of strength. It is considered a weakness because of its deductive logic and ensuing ethnocentricism, i.e. the main underlying assumption being that what happened among European societies will also invariantly happen in other societies elsewhere (Weeks, 1989, Haines 1979).

In the first place, as the criticism goes, even among European societies, both rates of mortality and fertility were not as high as they are, for example, among the now developing societies (Anderson, 1986). Moreover, declines in mortality in these societies were a result of internal socioeconomic development with quite different contextual factors from those of the non-European societies of today among whom the same historical pattern is assumed to apply (Caldwell and Caldwell, 1987). Some of the agrarian, peasant-dominated European communities in France experienced the transition prior to, and
independent of industrialization and urbanization (Johnson, 1991). In almost all the developing societies of today, the decline in mortality which has left fertility high, has resulted from the impact of interventions originating from external sources, particularly contact with the West (Hess, 1988).

Revisions of the demographic transition theory (from the 1970's) have placed emphasis on "fertility transition" in an attempt to reformulate and clarify the mechanisms of fertility decline. These new versions use inductive logic, rather than the deductive reasoning of the original theory which essentially stated that in "preindustrial traditional societies, fertility and mortality are high, in modern societies they are low, and in between there is a transition" (Demeny, 1968). This kind of reasoning was no longer relevant given the findings that the decline in fertility in Europe occurred in the context of widely differing social, economic and demographic conditions, and also in view of the inconsistent findings of research in developing countries (Van de Walle and Knodel, 1967). Fertility transition has therefore taken the place of the original rendition of the theory and is defined in the writings of Knodel and Caldwell.
as the change from "natural fertility to family limitation" (Knodel, 1977, 1979; Caldwell and Ruzicka, 1978).

In this revised perspective, the transition is viewed not as a stage in a demographic scheme over time, but as the reflection point (point B) on the crude birth rate curve shown in Figure 1. The point is now to find out the theoretical explanations behind the downward change on the curve and at what precise point this takes place in a given society. Fertility transition theoretical perspectives attempt to explain why couples decide to modify their fertility behavior in favor of fewer children and to outline the specific contextual factors which characterize the pretransitional populations. These theoretical perspectives can generally be grouped into three very broad categories (1) Microanalytic theories (2) Macroanalytic theories and (3) Syncroanalitic theories (Matras, 1977).

MICROANALYTIC THEORIES

These are theories that attempt to analyze the dynamics of fertility change from the point of view of individual households or couples. Sometimes they are referred to as "rational decision making models" of fertility because they
analyze fertility decisions in terms of the parent's decision making process based on perceived costs and benefits (or values and rewards in other writings) that child bearing and child raising generates to the concerned parents (Alter, 1992). Most of the basic reasoning in these perspectives uses the main microeconomic theoretical assumption that the family or household is faced with budget, time and other constraints with regard to child raising and therefore has to decide how to allocate its available resources between children and other non-child activities in order to maximize its satisfaction or utility (Hess, 1988). In these models, therefore, children are viewed as economic goods whose production is decided by rational considerations of costs and returns such that where the expected benefits are greater than the costs (both direct and indirect), parents will want an extra child, and where the costs are greater, they will stop having children (Becker 1976; Easterlin, 1975).

One of the earlier proponents of this theoretical perspective was Leibenstein (1957). He argued that "motivations with respect to family size are, to a considerable extent, rational; that on the whole, parents will want an extra child if the satisfaction to be derived from
that child are greater than the costs that are involved" (Leibenstein, 1957:159). Another writer in this perspective was Easterlin who incorporated both potential supply and demand for children in his formulation and expanded the analysis to include a broader socioeconomic theory of reproduction and fertility (Easterlin, 1978). He accepted the basic microeconomic theoretical assumptions relating to income, tastes, and prices but argued that by themselves they are not sufficient for a general theory of reproduction. He argued that a better understanding is achieved with the inclusion of the determinants of taste for children as well as those of fertility regulation. Taste for children is shaped by parent's education, income, social status, and religion (Easterlin, 1978).

He further argued that a couple's aspiration for material goods which directs their consumption behavior is shaped by the consumption behavior of their parents and parental generation. Those with high aspirations for material goods will tend to desire fewer children and once they reach their desired number of children, they will adopt fertility regulating practices (Easterlin, 1976, 1978). He discussed two regimes: one a "natural fertility regime" which he said
characterizes the pre-modern or traditional societies and where the major characteristic relevant to high fertility is high infant mortality. In such societies, significant economic value is associated with children, thus creating excess demand for births and resulting in high fertility. On the other hand, situations where there is greater availability of effective contraception and where modernization and economic development are advanced, parents find it easier to control their fertility. Such a situation constitutes a "deliberate management" regime of fertility (Easterlin, 1975).

He further argued that parents subjectively evaluate the costs and benefits of the family size that they intend to have if they do not employ birth control. Desired family size is their way of expressing relative costs of child rearing compared with other activities and parents subjective preferences within the constraint of family income. The desired family size is their "demand" for children. It has to be compared with the "supply' of children in the absence of birth control, which depends on the biological and social determinants of fertility (Easterlin, 1978).

The concept of child quality and the opportunity cost of time (especially of the mother) are crucial in these models.
Child quality refers to the expenditures per child that parents incur and may reflect parental aspirations and investments in a child. It is therefore hypothesized that as the incomes of parents increase, fertility will decline because parents will substitute child quality (i.e. have fewer children and spend more on raising them), for child quantity (Hess, 1987). Coale refers to this reproductive behavior as being made within "the calculus of conscious choice" and he believes it is a necessary condition for fertility to begin to decline (Coale, 1973). These theories further postulate that a child provides three main types of satisfaction to the parents: First, the child is a source of personal pleasure or prestige, or in economic jargon, a child is a "consumption good." Second, a child may be expected to work and contribute to the family income thereby being a "productive agent." Last, a child is a potential source of security especially in old age. Given these assumptions about children, parents are expected to consider both the direct and the indirect costs and opportunities that will be foregone because of the child's existence, in their decision to have or not to have an extra child (Anderson, 1986).
Gary S. Becker (1960) was the first one to apply the utility maximization concept of microeconomics to the analysis of the decision making process in human reproduction. He argued that children were a household commodity and that desire for children should be subject to economic laws of demand. He therefore argued that given rational decision making by households, demand for children and reproduction would increase if the price (cost) of children decreased, or as household income increased, or that taste for children would increase if the prices of other (competing) goods and services increased (Becker, 1960; 1965).

The Value of Children theories are social-psychological explanations of rational or purposive reproduction behavior by couples. The main idea in these theories is that children are expected to provide certain positive (satisfactions) and negative (costs) values to potential parents. These values combine to form a net worth or value of children to a couple which directly affect reproductive motivations and decisions. The higher the value of children at any given time, the more likely a couple is to have (another) child. Examples of these values are self enhancement, economic utility, opportunity

This theoretical perspective has the important implication that there will be differential fertility patterns for different socioeconomic groups because some groups will be able to afford more or fewer children depending on their income and social status. Also, changes in fertility over time may be explained by this framework since economic development, including social and occupational mobility, does alter the cost/utility pattern for families making it more expensive, for example, to have more children as a family's income rises. This is because families with higher incomes tend to spend more on their children while at the same time, mothers in such families tend to be well educated and career oriented, thus they tend to avoid foregoing attractive wage income opportunities for raising a number of children that would severely constrain their participation in the labor force. For example in a study of a sample of Norwegian women, Kravdal (1992) found that women with more than 12 years of schooling lost less cumulated labor market experience because of childbearing than those who were less well educated. Thus the net effect of all these is that in the
more modernized societies, the direct and indirect costs of raising children are higher because high proportions of the population (especially women) are educated and so fertility rates are lower in these countries.

Certain shortcomings of this theoretical perspective have been pointed out by critics of the theories, the main ones of which are summarized here. The major issue of contention with the perspective is that the assumption of rationality is said to be untenable with regard to fertility (Schutjer and Stokes, 1984). Reproductive behavior appears anything but rational and more often, process rationality is confused with outcome rationality. For example, outcome rationality could be seen in the decision to delay marriage which is voluntary and consciously adopted to limit final family size, a la Malthus. However, more often the decision to delay marriage is a process that is consciously made for economic and other reasons, with little concern for the ultimate effects on family size and child bearing (Schutjer and Stokes, 1984).

The assumption that couples can control their fertility in the same manner that they can purchase a consumer durable is also criticized because it reduces a complex sociobiological decision process to a simple market decision.
This is particularly true when one considers the situation of the developing nations where reproductive behavior appears to be anything but rational, especially to Western observers or by Western cultural values (Donaldson, 1991). This is probably because such decisions are consistent with the sociocultural and economic constraints that limit the choices available (Schutjer and Stokes, 1984). Related to the above criticism is the fact that these theories do not incorporate the impact of institutional or cultural factors on reproductive behavior (Knodel and van de Walle, 1979).

The theories also assume that the husband and wife preference orderings are the same. It is, however, known that although some couples may agree on their preferences regarding fertility, this decision aspect of their lives should be treated separately for a more representative outcome because there are many cases where couples do not agree on this matter (Bean, 1975). There are also other competing variables in preference factors which may moderate the influence of reproduction preferences, e.g. norms of family formation or family size, may exert important influences on reproductive decisions. For example, Catholics tend to have more children than non-Catholics, regardless of income (Mosher and Johnson,
1986). Moreover, reproductive preferences may influence reproductive decisions only for certain kinds of people and only in certain conditions. This may be because of the different degrees of uncertainty that different people face and which should be included in the models (Namboodiri, 1991). Leibenstein (1981) has pointed out that in matters of reproduction, habit and routine are easier to follow because they solve the problem for which decision has to be made, thus they provide an alternative basis for decision making. One would therefore expect some parents to go by the norm of their immediate reference group irrespective of whether it is rational or not to do so.

Another line of theoretical reasoning is the Subjective Expected Utility Theory which incorporates the dimension of uncertainty in the reproduction decision making. In this theory, individuals are assumed to assess the anticipated consequences in terms of both value or utility (U) and subjective expectation of occurrence (SE). Any given consequence or outcome is weighted as the product of the two and the decision value of any given alternative is simply the net sum of the products of its consequences. It is assumed that the decision maker will choose that alternative with the
greatest maximum sum (i.e. SEU) (Beach, Campbell and Townes, 1979).

A final theory under this perspective to be reviewed here is the Theory of Reasoned Action which explains both reproductive and contraceptive decision making (Davidson and Jaccard, 1975). According to this theory, a person's behavioral and normative beliefs about some behavior jointly determine the person's intention to perform the behavior. This behavior intention, in turn, serves as the sole and direct determinant of the behavior itself. Thus the more powerful the behavioral and normative beliefs, the greater the intent to, and the more likely the behavior is to be performed. It is not a theory of strict rationality because it assumes that normative beliefs do moderate the individual's tendency to maximize satisfaction. The product of beliefs and evaluations constitutes the behavioral belief variable while the normative belief variable is the person's perception of how significant others evaluate the behavior and his motivation to comply with the rest. For the individual to act rationally, his own normative beliefs and behavior must be congruent. Otherwise, his reasoning and evaluation of the
situation will lead him to act differently (Davidson and Jaccard, 1975).

MACROANALYTIC THEORIES

The discussion of fertility during the earlier periods of theoretical formulations emphasized economic theory, as summarized above. The more recent discussions however, have gone beyond economic thinking and have incorporated and emphasized both the cultural context and the institutional environment in which fertility decisions are made by couples. These recent approaches agree that the costs of raising children are important considerations, but add that such economic considerations are severely constrained by cultural and other social structures (Stern, 1987). These theories are sometimes variously referred to as "structural or cultural theories." Although they too do talk about economic considerations, they particularly emphasize the normative context in which the considerations or decisions are made (Alter, 1992). Caldwell (1976:324) summarizes well the main thrust of these perspectives "... remove cultural support for fertility then fertility transition will begin."
The classic formulation of this approach may be traced back to T. R. Malthus who first analyzed the interrelationship between population growth and socioeconomic change in his "Essays" (Malthus, 1798). Another earlier theoretical explanation was that by Goode (1963) and others who argued that the changing family structure leads to a decline in fertility because in societies where the extended family system is predominant and where urbanization and industrialization are lacking, fertility tends to be high. This is because societal norms support large families since the patterns of production and consumption are family based. Moreover, in such societies, economic and social roles tend to be rigidly defined by age and sex as well as religious beliefs. Also, hierarchical patterns of family authority in which the young defer to the old and female to the male are common in such societies. Women tend to be relegated to a subordinate status with no much say in anything including reproduction. In such situations, the family patriarchs are the major decision makers and they prefer large families for both economic and status reasons (Jones and Grupp, 1987). Some of the rewards of large families are assistance in domestic tasks and security in old age. The maternal role is
also associated with social as well as psychic rewards for example mothers with more children (especially boys) are given higher status (Caldwell and Caldwell, 1986). Because women in such societies usually lack alternative roles or opportunities outside the home, they tend to accept their ascribed role as given. Underlying these familial and social relationships are a network of beliefs, traditions, values and norms that operate to reinforce the patriarchal behavior pattern and hence high fertility (Jones and Grupp, 1987).

Fertility studies from the 1970s to current times have heavily focused on the social and cultural issues outlined above and reformulations of the demographic transition theory have been based on patterns and relationships identified relative to fertility. A noted scholar in this regard is the Australian demographer John Caldwell. Caldwell's theory of fertility decline (sometimes known as "Wealth Flow Theory"), was based on an extensive study of contemporary Africa, Asia and historical Europe. He rejected the common assumption by many scholars that pretransition (traditional, premodern) societies were less rational in their fertility behavior. He argued that the logic of the family economy before transition encouraged high fertility because the net flow of wealth then
was from the children towards the parents but after the transition, this flow is from parents to children and therefore makes low fertility rational (Caldwell, 1976: 1979).

Caldwell argued that there are no purely economic reasons why fertility declines but more importantly the social and psychological reasons are crucial. He is, however, more concerned in his analysis, about those ideological supports of the family system and the cultural and institutional forces that undermine the traditional family system (Caldwell, 1979). The value of children, according to Caldwell, was directly related to the familial mode of production which "enjoined children to work hard, demand little and respect the authority of the old." Family production worked within a framework of "family morality" which survived for a long time even with onslaught of the capitalist labor market. It was through mass education and the new community morality which supported non-family production, which accompanied it, that began to undermine the familial mode and supplanted it (Caldwell, 1982). Education thus decisively changed the economic value of children and their cultural position in the household, mainly by reducing the child's potential for work, both at home and outside, by increasing the (direct and indirect) cost
of children, by creating a child's dependency to family and society as the child becomes a future producer and an investment now, and finally and more importantly, by speeding up cultural change through creating new cultures and new values (Caldwell, 1982).

An important research project that has contributed greatly to the understanding of historical fertility patterns in Europe is the European Fertility Project which was undertaken by the Princeton University's Office of Population Research. The project undertook the task of trying to reconstruct the course of fertility decline in 19th century Europe (Knodel and van de Walle, 1979). Among their many findings were that the practice of family limitation was largely absent from the pretransitional populations, and that the decline in fertility was irreversible, and that cultural setting influenced the onset and spread of the fertility decline independently of socioeconomic conditions in Europe. They also found long standing patterns of fertility variations based on regions and linguistic categories as well as status of women and political attitudes (Knodel and van de Walle, 1979). Thus, according to these researchers, "fertility patterns in 19th century Europe closely followed the language
and dialect boundaries established centuries earlier" (Alter, 1992: 21).

Lesthaeghe (1978, 1986) emphasizes the role of culture in qualifying the economic theory of fertility. For him, the imperatives of the social system to maintain a demographic "homeostatic" in fertility combine with the cost-benefit rationality of individual couples to govern fertility decline. He further states that when economic development is controlled, the chief variation in fertility is the result of the effectiveness of the old moral order in marshalling its social control. He claimed that the church and the "lagging ethical approval" of other cultural institutions enforced societal interest in higher fertility on individual couples. With the appearance of new subcultures like new political movements, dissenting religious orders etc., the control of the old order declined and fertility with it (Lesthaege and Wilson, 1986). Only a revolution in thought, then, could reduce marital fertility by undermining the hold of social control on couples according to this view.

The implications of the cultural and structural factors for fertility patterns are important because studies in a variety of cultures have demonstrated that the statistical
relationships between socioeconomic development and the timing of the fertility transition vary widely and are not as strong as the earlier demographic theory postulated. A strong correlation between natality and erosion of traditional family patterns has been consistently established, not necessarily between measures of modernization and natality (Knodel 1977). Thus the process of modernization by itself is not the key to understanding the transition but the erosion of family values which is emphasized as "secularization" by other writers (Suganya and Roumasset, 1991). Thus those measures that come closely to capturing the breakdown of patriarchal sex roles and authority patterns will give the best predictors of natality. Another factor is the effect of public policy or government policy which can involve programs aimed at speeding up or limiting or inhibiting changes associated with modernization (Johnson, 1991).

The major critique of this perspective has been the lack of consistent empirical findings to support the structural theory of fertility. For example, as was mentioned before, the major finding of the European Fertility Project was that the regional differences in European levels of fertility during the 19th and 20th centuries were only partially
explained by the expected determinants of urbanization and socioeconomic levels (Hirschman and Guest, 1990).

These studies did not include indicators of culture in their measurement and analysis despite the finding that fertility decline was related to specific cultural contexts. The writings of Caldwell have been criticized for ignoring the impacts of social class and ethnicity, which he treats tangentially in his theory (Stern, 1987). Class and ethnicity did and does affect both the beliefs of individuals and their economic opportunities as well as other opportunities available to them (Johnson and Ryoko, 1980).

Caldwell (1982) also believes that the disintegration of the traditional family ideology leads to fertility decline. It is not clear, however, in his theory why the decline tends to lag behind the disintegration of the traditional family ideology. Although the Princeton European Fertility Project has significantly contributed to our knowledge of the historical fertility patterns of Europe, it did not document in detail the underlying behavioral changes involved in the transition from high to low fertility. This requires different types of data, i.e. data at the individual and
family level rather than the highly aggregated regional data used by the project (Livi Bacci, 1977).

Caldwell for example, has used individual and family level data in his extensive studies of Africa (Caldwell, 1982; Caldwell and Caldwell, 1987). Knodel (1979) also abstracted and analyzed genealogies from fourteen German villages and came up with many useful insights into the fertility behavior of the population studied, similar to insights produced by the Caldwell studies of Africa referred to. The concept of social control as used by Lesthaege (1986) is not well defined i.e. it is not clear whether social control as the direct regulation of behavior through law and coercion is what is meant or socialization which is the indirect regulation of values through training and education (Stern, 1987).

Much of the empirical evidence against the socioeconomic determinants of fertility and the structural approach have come from studies of developing countries which have been based on individual level theoretical perspectives. Thus given the results of the structural (European studies) and the insights from the individual (Developing Country) approaches, a better approach to studying the socioeconomic factors relative to fertility seems to be that which uses both
structural and individual level theoretical relationships in specifying relevant hypotheses. This approach is reviewed in the following section.

**SYNCHRONALYTIC THEORIES**

Theories in this category are simply attempts to reconcile the first two approaches discussed above. This approach holds that fertility behavior is explained simultaneously by both individual factors and structural and cultural factors. Freedman (1968) argued that when a large number of people exhibit a common pattern of behavior, or decision making in response to changing circumstances, such behavioral patterns become institutionalized and normatively prescribed in the society and become the norm for most people.

Easterlin (1978) views the formation of tastes in the cost-utility model of fertility behavior as a sociological as well as an economic variable because tastes are shaped by religion, color, education etc. He says that cumulative experience in the formation of tastes plays an important role but is determined by many variables. Thus factors determining preferences are not purely economic and so should be treated in the widest possible scope.
One's location in the social and economic structure also makes for the differences in the advantages to be reaped from the control of fertility in any given economic circumstance. Those individuals who stand to gain the most from adopting practices which diminish fertility will practice birth control, while those who are located such that they derive little or no reward from fertility control will not limit family size. The various studies on minority status and fertility tend to bear this out (Goldscheider and Uhlenberg, 1969; Johnson, 1979).

Other scholars especially in the 60's and 70's believed that population growth resulting from high fertility would take care of itself with development i.e. that the best "contraceptive" was social and economic development (Ping, 1991). They argued that given the historical fact that all developed countries have low fertility rates regardless of how they got there, there is definitely a strong negative correlation between fertility and economic development. For scholars in this camp, the relevant question was not about what took place first i.e., fertility decline or economic development, but when fertility decline would set in. They argued that it was a matter of time for birth rates to start
to fall regardless of what individuals did given economic development. The question whether modern society makes a modern man or the other way round still lingers on however, regardless of one's position on the issue (Alter, 1992).

Another group of scholars advocate interventionist policies of deliberate provision of family planning services as a key to rapid fertility reduction especially for developing societies. They believe that as long as appropriate incentives are built into the structural and institutional frameworks of these countries, couples will be motivated to have fewer children. For example, Johnson (1991) argues that the political economy approach to fertility i.e. state sponsored programs to limit reproduction, are essential because they can combine both the micro (individual) level and the macro (structural) level approaches in a way to maximize the impact of both approaches. Such dual approaches can combine both culturally relevant factors and economic factors simultaneously to achieve fertility reduction goals.

THEORIES OF ADAPTATION AND DIFFUSION

Yet another set of theoretical propositions that attempt to explain fertility behavior can be described as those that
explain decision making for family formation as being attempts by couples to adapt their behavior to changed circumstances or to be innovative in such circumstances. The adaptation model states that a couple will practice fertility control as a way to adapt to changes in economic and social circumstances, such as movements in price or income or a decline in infant mortality (Watkins, 1991). Upward price movements imply lower real incomes to couples and this increases the real costs of raising children. In such circumstances then, couples will opt for not having children (Watkins, 1986).

Fertility is predicted to fall when societies undergo structural transformations which erode the motivation for large families. Couples are assumed to take a rational decision approach to family formation. In societies which are at the stage prior to the onset of the fertility transition, high fertility is rational because it is a response to the prevailing circumstances e.g. of high infant mortality, in which case couples are motivated to maximize the number of children they can possibly have since some of them die due to high infant mortality. When fertility transition sets in, usually health conditions are improving as well as other
social and economic conditions, infant mortality declines and more children survive childhood deaths. High fertility becomes an irrational behavioral response, thus couples are motivated to restrict sizes of their families.

The diffusion innovation model claims that the diffusion of information and ideas along similar cultural contours, particularly religious and ethnic ones, spreads the knowledge of birth control and legitimizes its use in marital unions (Watkins, 1991). This model looks beyond the economic forces of costs and benefits to other social forces that can affect reproductive outcomes in marital unions. Fertility declines in Western Europe are said to have followed similar linguistic and religious lines and facilitated the spread of ideas and information that lead to the practice of family limitation in marital unions (Watkins, 1991; Alter, 1992).

AMISH FERTILITY TRANSITION

We now relate the theories discussed above to Amish fertility. At the individual (macro) household level, the rational decision model is relevant to the Amish because the Amish do rationally analyze the perceived costs and benefits to themselves of having more children. According to Kraybill
(1989), and Olshan (1981), the Amish welcome new innovations that have economic benefits to them and whose adoption has minimum cost associated with it. Given the fact that land is now very scarce (Ericksen et al., 1980), and the fact that farming is declining in importance, a declining trend in Amish fertility would be an indication of rational decision making on their part, in the changed circumstances. The traditional "natural fertility" regime of the Amish is evidently giving way to family limitation (Markle and Pasco, 1977).

One can also argue with reference to the Subjective Expected Utility theory that given the changing circumstances of the Amish, Amish couples now weigh the expected outcome of having more children with the satisfaction they expect to get from having them. The decline in the average number of children per Amish couple cited in the literature may point towards the fact that these considerations are now being made by Amish couples.

At the structural or macro level, there is no doubt that socioeconomic changes in the recent past, particularly in Amish occupational structure, is having a major impact on their valuation of children (Ericksen et al., 1977; Kreps et al., 1994). Also there are new cultural and ideological
pressures that are undermining the cohesion of the traditional social units among them as is evident in the increase in divisions (sub-orders). The expansion of the capitalist labor market within Amish settlements is a major onslaught on Amish life by providing jobs off the farm and forcing Amish men working in this new sector to spend many hours away from their families. Kraybill (1991) terms this the "lunch-pail threat" as the number of Amish factory workers increase with the creation of more factory jobs in Amish vicinity (Foster, 1984).

As the theories reviewed above explain, individual couples make their fertility decisions within the sociocultural climate in which they live and so the outcome of such decisions are a reflection of a combination of different factors as discussed. The Amish too, are adapting to the new changes in their society impacting them, and as such the effects of these adjustments on their fertility levels can be understood by use of both the macro and micro-analytic explanations.

Given the above discussion, where do we place the Amish in the transition model? We can place the Amish in stage two (Figure 1), which is the transition stage. They probably are
on the second half of this stage, nearer to point B where the crude birth rate is declining but the crude death rate has declined to a stable low rate. Amish society may be gradually moving toward point C, which the rest of American society already passed over half a century ago. However, it is unlikely for the Amish to get to this point unless they are completely assimilated into the mainstream of North American society (i.e., unless they cease to be Amish). This possibility is not likely in the near future. The theories reviewed above are used as background for formulating the hypothesis in the section that follows.

HYPOTHESES

The general hypothesis of the study is that there are fertility differences between the Amish and that these differences are a reflection of the changing values and attitudes of the Amish people relative to fertility behavior.

Specifically, the following hypotheses are examined with respect to fertility:

1. Church Affiliation

Macroanalytic theories state that as social change takes place, sociocultural changes in society affect the traditional
norms and values of the society which in turn affect individuals and groups within the society differently. As individuals attempt to cope with change, groups tend to form with differing beliefs and practices in the process of ensuring social control and boundary maintenance. For the Amish, deviancy toward the norms of the larger society is counteracted through many controls built into the Amish social system (Loomis, 1963). Institutionalization of relationships to make behavior predictable and patterned takes the form of church affiliations.

Each of the Amish affiliations is essentially a different religious group with more or less conservatism relative to the others. The unique beliefs and values of each affiliation indirectly affect their fertility performance (Nam, 1994). The more liberal and progressive groups are more open to external influence and are therefore more likely to change their (fertility) behavior (Sander, 1992). It is hypothesized that members of the more liberal (or less conservative) New Order Amish have lower fertility as compared to the other members of affiliations (Heaton, 1986).
2. Farm and Nonfarm Status

At the micro level, individual Amish men who are mainly farmers spend most of their time doing the traditional farm based chores, they have little exposure time to the outside world. On the other hand, those Amish men who work in factories and other nonfarm related jobs spend most of their job time away from home and are exposed to influences external to the Amish social system.

Empirical studies have shown that as family production organization is eroded by the increase in nonfarm (labor market) occupations, fertility tends to decline among couples whose primary occupation is off the farm or away from home (Haines, 1979). Two main explanations are provided. First, it is argued that as children contribute less to the family farm labor requirement, the decision maker's motivation to have a large number of children is reduced (Axinn, 1992). The value of children as labor input on the family farm is reduced and couples accordingly reduce the size of family or the number of children they desire. Secondly, nonfarm or nonfamily work removes individuals from their families and therefore provides opportunity for exposure to new ideas and new values which may legitimize the practice of fertility
limitation or may create new goals and new values that are not compatible with large families (Watkins, 1991). Since the Amish are increasingly involved in the nonfarm wage market, it is hypothesized that those households with male heads in nonfarm occupations will have lower fertility as compared with those households in which the men are primarily farmers.

3. Church (membership) status

Social status is a structural element which also implies position held by an individual within a social structure. Associated with every position are a set of roles that give it functional value, i.e. what is expected from the holder of the position (Loomis, 1963). Leadership is therefore both a macro (structural) as well as a macro (individual) variable.

Among the Amish, those who play key (male) leadership roles are the bishop, the minister (or preacher) and the deacon (or elder) (Kraybill, 1989). They are the major opinion leaders of the community and together they constitute an informal "executive committee" that guides their congregations and church districts in most spiritual and other matters (Kraybill, 1989). They are the custodians and role models of Amish religious beliefs as well as other aspects of the culture. They have authority and influence over community
affairs related to the church than do ordinary members (Loomis, 1963). It is therefore hypothesized that in all the three affiliations, Amish leaders will have relatively higher fertility compared to ordinary members.

CONTROL FACTORS

In order to be able to isolate the effects of the explanatory variables of interest defined above, we need to identify and control for those factors which may also account for differences in the major variable of interest (fertility). Both age and duration of marriage are major demographic variables which influence fertility in important ways. For example, Mineau and Trussell (1982) in a study of Mormon birth cohorts between 1840 and 1879 found that the age of the mother was most important in depressing marital fertility, while father's age had a moderate negative effect on fertility.

(a) Age at First Marriage of male head of household

The age at which individuals enter marriage for the first time is a very important demographic variable relative to their fertility performance (Weller and Bouvier, 1981). Generally, the earlier one gets into marriage the longer the reproductive period and therefore the greater the risk of
having many children. This is even more so in a situation where there is no deliberate family limitation or birth control as is the case with Amish as far as it is known. When birth control is practised, it is for health reasons only. Also reproductive performance is higher for both men and women in the younger years just after adolescence. It is therefore hypothesized that Amish men who marry earlier will have more children on the average as compared to those who marry later.

(b) Age at First Marriage for Female

A similar explanation as given above can be used for women with regard to the importance of age at first marriage. However, for women since fecundity impairments tend to increase with age in adult life, earlier marriage exposes the woman to the risk of conception at a time when her fecundity is relatively high (Shryock, 1980). Generally, women's fecundity declines rapidly after age forty and goes to zero at menopause just before or around age fifty. It is hypothesized that among the Amish, those women who marry early will have more children on the average as compared to those who marry later (Weller and Bouvier, 1981). Age at first marriage will have a positive association with the (average) number of children ever born.
(c) Marriage Duration

The length of time a couple are married is relevant in fertility analysis because it defines the duration of exposure to the risk of having a child or the probability that a given (desired) number of children will be born to a couple other things being constant. It is therefore hypothesized that the longer the duration of marital union the more children on the average a couple will have. Marriage duration is therefore positively related to average number of children ever born.

DEPENDENT VARIABLE

The dependent variable is children ever born to a woman by the date of the directory survey (taken to be June 30, 1988). For the sake of brevity, we will use the term "parity" in all the analyses in the following chapters. Parity is therefore the number of children born alive to a woman by the time of the directory survey. Still births and miscarriages are not counted in the definition of parity, as such they are not used in this study. In operational terms, parity is the number of children (NUMKIDS in SAS files) that a couple in the sample had born alive to them by the date of the survey. The
relevant details of the derivation of this variable is given in the next chapter.

INDEPENDENT VARIABLES

There are two groups of variables used in the analysis of the sample data; the explanatory variables discussed before, which we refer to as social variables, and the demographic variables which we refer to as control variables. These variables are discussed in more detail in the next chapter and are therefore just listed here.

The social variables are Church Affiliation, Farm or nonfarm status and Church Membership Status of the male head of household. The demographic or control variables are: Age at first marriage of the male head of household; Age at first marriage of the female and Marriage Duration. Another demographic variable, Infant Mortality is also analyzed, but separately because of the nature of its definition and the data requirements for its creation, both of which are discussed in the next chapter also.
CHAPTER IV

METHODOLOGY

This chapter discusses the methodology of the study which includes type and source of data, sample size and how it was collected, the variables of interest and how they were measured and analyzed.

DATA

Data for this study were obtained from the 1988 Ohio Amish Directory for the Holmes/Wayne county area. The directory is published every five years mainly for the use of the Amish community and contains a wealth of data useful for demographic and sociological analyses. It lists in alphabetical order the male head of each Amish household, followed by his home address, birth date in month, day and year, and his marriage date also listed in month day and year. These are followed by the name of the spouse and her birth date. In cases where the male head of household had a prior marriage, the name of his earlier spouse is also given and the
children, if any, from that marriage are listed i.e. children are listed by their biological parents.

The directory does not provide information about adopted children or illegitimate children. All children are therefore treated as legitimate biological offsprings of their parents and only the children of first marriages are used in this study. Among the Amish, very few births occur outside of marriage and divorce is almost unknown. For each entry, of the male head of household, the occupation is also specified. The household entries are conveniently arranged by church districts which themselves are listed by their church affiliation. (see Appendix B, Figure 6: Directory Sample Page). Each church district has a reporter (usually a woman) who updates the information for the directory regarding each family through a survey form or report (see Appendix M, Figure 12: Director report form).

In a few cases, the data suffers from typical problems of survey data relating to accuracy of reporting as well as problems with incompleteness. For example, in a few cases, the birth dates of a child preceded that of the parent and in some cases the occupations of the heads of household were not
recorded. Apart from such minor cases, the directory information is sufficient for the kind of analysis done here.

THE SAMPLE

A simple random sample of 888 households was drawn from the directory covering the three church affiliations of interest out of a total of 3627 households in the directory. Since the first group which is the most conservative, the Swartzentruber Amish, do not participate in the directory project, they are therefore not included in this analysis. The sample consisted of nineteen church districts for the largest affiliation—the Old Order Amish, and four church districts each for the Andy Weaver and New Order affiliations. Each fifth church district was selected for inclusion in the sample. Coding was done and the coded data were entered into a Statistical Analysis Service (SAS) file for analysis (see Appendix L: For coding format). In coding the data, each household was entered as an observation with all the information pertaining to spouses and children coded as shown in the codebook in the Appendix L. The analyses focus on differentials in fertility between the three Amish church
affiliations and where relevant, between subgroups of the
three groups.

VARIABLES AND MEASURES

Fertility was analyzed at the macro level in order to
compare fertility levels of the different Amish groups and
also in order to compare the fertility levels over time (up to
the date of the directory survey). It was also analyzed at
the micro level in order to determine the parity distribution
for the sample women by the time of the directory survey.

The main dependent variable of interest is parity, which
is defined as children ever born to a woman by a particular
date (Shryock and Siegel, 1980) which for this research is the
date of the directory survey (taken to be June 30, 1988). Thus
the number of children ever born to an Amish woman by midnight
of this date is equal to the woman's parity (the response is
operationalized as NUMKIDS for the SAS files). It is assumed
for the purposes of analysis in this study that no females
marry before age fifteen and that child bearing stops at age
forty nine. The variable Numkids was defined and created
according to the demographic convention and definition of
using only live births in the derivation and computation of fertility measures (Shryock and Siegel, 1980).

In the codebook, children were assigned the following codes under the variable "mortality" depending on the nature of their birth and whether or not they died within the first five years of their birth: All live births for which there were no indications of death in the first five years of life were coded as 0, stillbirths were coded as 1, those who died during the first year of life were assigned the code 2, and those who died between the second and fifth year of life were assigned the code 3 (see codebook in appendix L for further details). In the creation of the numkids variable, therefore, only those coded 0, 1 or 3 were used. SAS birthdates in month, day and year were computed for each household entry (the parents) and for each child by creating three different age variables: One for the father; another for the mother; and one for the children. The age variable for the children was further numbered by the order of the child's birth so that all the relevant births were included. The means for the variable referring to date of birth were computed and were renamed "numkids" and placed in an output file. Thus for each household (caseid in SAS), the frequency of appearance of the
date of birth variable was identical to the new (output) variable "numkids".

The independent variables were divided into two groups, **Social Variables** and **Demographic (control) Variables**. The social variables are: Church or religious affiliation (CHURAFF), which has three levels or classes (coded 1, 2, and 3). Class one (code=1) represents the Andy Weaver church affiliation; level two (code=2) represents the Old Order church affiliation and level three (code=3) represents the New Order church affiliation. Farm/Nonfarm Status of male head of household was the next variable (FARMSTU). This variable had two classes (coded 1 and 2). The first class represented Amish males whose (primary) occupations were listed in the directory as "farmer" as well as those who were listed as "retired farmer." The second class represented Amish male heads of households whose primary occupations were defined for the purposes of this research as being nonfarm occupations e.g. those individuals listed as "factory" worker or "lumber mill" worker or "laborer", etc (see sample page from directory in Appendix B, Figure 6).

The third explanatory variable was Church membership status of the male head of household (CHURSTUS). This variable
had four classes coded one through four. The first class (code=1) represented ordinary members, the second class (code=2) represented ministers, the third class (code=3) represented deacons and the fourth class (code=4) represented the bishops. The codes were based on the directory entries, which specify immediately next to the names of the appropriate individuals the leadership functions that they perform. These classes were used as they are (four) for the descriptive analysis but were further collapsed into two categories to represent ordinary members (CHURST1) and leaders (CHURST2), for the regression analyses. The creation of these variables simply involved the assigning of a variable name to each entry in a specific column of the original (coded) data file. For example, for each observation, all entries (codes 1 or 2 or 3) in column ten of every first record was assigned the name "churaff" because each of those was a number representing the respective church affiliation to which the relevant observation belonged. Similarly, all entries in columns 41-42 represented the farm or nonfarm status of the relevant entry and were therefore assigned the variable name "farmstus", and so on.
The **Demographic Variables** are: Age at First Marriage of the male head of household (HAATMAR), age at first Marriage of the female (FAATMAR), and Marriage Duration (MARRDUR). Marriage duration refers to the first marriage only of each couple and was obtained by subtracting the age at marriage (month, day, year) from the date of the directory survey. Age at first marriage was computed by subtracting the individual's birth date (in month, day, year) from the date of marriage (also in month, day, year). In order to avoid working with fractional years, age was rounded off to the nearest whole year. Infant mortality is computed and used only in the descriptive analysis because the levels of the variable were not sufficient for regression analysis. The definition of infant mortality as well as the method of computation are described in the relevant section in the next chapter. Figure 2 in the next page summarizes the expected direction of the relationships between the explanatory variables discussed above and parity.

**ANALYSIS**

Two methods of analyses were undertaken. The first method was descriptive, giving the levels and trends of fertility
Figure 2: Conceptual Model of Variable Relationships
between Amish groups and subgroups for the survey date (1988) and over time by birth cohorts of Amish women. In this section also age specific fertility rates were provided to allow the examination of the variation in fertility by age of the women and by period. The nature of the relationships between the variables was examined and the significance of the hypothesized relationships tested by fitting several different types of Multiple Regression Models from which inferential statistical analysis was done. Two types of linear estimation procedures were used: Ordinary Least Squares (OLS), from which the Analysis of Variance results (ANOVA) were used for inference; and Maximum Likelihood Estimates (MLE), from which the Odds Ratios were computed and used for inference. The ANOVA results were generated by use of the General Linear Model (GLM) procedure of SAS which uses ordinary least squares to estimate the parameters, and the MLE results were generated by use of the Logistic Regression Procedure. The first procedure (GLM) was used because the variables of interest in this study are categorical (i.e. have several levels or classes) and the data are unbalanced i.e. there are missing information for some observations. The GLM approach does not require balanced data and regardless of the number of missing
cells, GLM uses the concept of estimability to provide appropriate tests of hypotheses and also allows the specification of any degree of interactions between variables (Rawlings, 1988; SAS Institute Inc., 1990). It does this for all variables regardless of whether the variables are qualitative or quantitative. It was therefore appropriate for the estimation of least squares estimates with such data as were available for this research. The expected relationship can be summarized in the following general multiple linear regression model:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_7 X_7 + \epsilon_i \quad [1]$$

Where $Y =$ Parity or the number of Children Ever Born (NUMKIDS).

$\beta_1 - \beta_7 =$ Parameter estimates of the respective independent variables

$X_1 =$ Church Affiliation of household (CHURAFF).

$X_2 =$ Farm or Nonfarm status of male head of household (FARMSTUS)

$X_3 =$ Primary Occupation of male head of household (PRIMOCC)

$X_4 =$ Church Status of male head of household (CHURSTUS)

$X_5 =$ Infant Mortality (INFموت)

$X_6 =$ Age at First Marriage of Male (HAATMAR)

$X_7 =$ Age at First Marriage of Female (FAATMAR)
\( X_i \) = Marriage Duration (MARRDUR)

\( U_i \) = Error term representing unexplained variation of the dependent variable i.e. all (important) explanatory variables left out in the analysis.

Although the OLS method of computing parameter estimates is useful, the estimates which it provides are however not efficient because it uses the variables as if they were quantitative. Also with imbalance in the data, the specific relationship between the response variable and the explanatory variables may or may not be linear. This situation may create problems in the computation of ordinary least squares with linear models and may provide faulty estimates of the specified functions or may provide sums of squares for tests of significance for any testable hypothesis that are misleading (Haines, 1979).

A more flexible or robust functional form of the multivariate analysis that uses categorical variables is required to provide more efficient estimates. We therefore made use of the Logistic Regression method in order to achieve this (Press and Wilson, 1978).

The Logistic Regression method is appropriate in cases where the response variable is binary and where the
explanatory variables are either qualitative or quantitative or a mixture of both. The use of Logistic Regression offers certain advantages for the analysis of categorical variables. One of these advantages is that it does not have restrictive assumptions about the linearity of the underlying function (Demaris, 1991). The results of the logistic model also provides for a variety of tests that are not possible in other methods including the use of odds ratios in examining the differential effect of a variable or a set of variable on others (Knoke and Burke, 1980). In brief, the logistic approach provides a single Multivariate model which has sufficient flexibility to handle a diverse set of variables and data (Press and Wilson, 1989; Collett, 1991). The Maximum Likelihood Estimates of the parameters generated by this method are therefore quite suitable for inferential analyses. As was mentioned before, the Logistic Regression Model is more appropriate in cases where the response variable is binary (dichotomous), or in cases where it is polytomous (has more than two levels). Since the dependent variable of interest in this study has a range of 0-15 children, it was divided into five mutually exclusive and exhaustive categories (of parity) in order to make it a polytomous
variable. This allowed the creation of as many models as the created categories on the basis of the parity cut off levels. The categories were: Parity 0-2, Parity 0-5, Parity >5, Parity >8, and Parity >10. The basis for the cut off points were more or less arbitrary, although the use of the mode (4 children) and the median or mean (5 children) made sense when comparing fertility levels of the various population sub-groups with reference to the sample mean. The fewest number of children (parity 0-2) was useful when comparing Amish fertility with that of the U.S. national average, which is less than two children. The higher categories (parity>8 and parity>10) are useful in assessing which of the explanatory variables shows clear association with large number of children, i.e what explains high fertility according to the model.

With Logistic Regression, we could therefore analyze the dependent variable as a dichotomous variable by fitting models for each parity category as specified by the cutoff points listed above.

When we have a dichotomous dependent variable, we can represent it by an indicator or dummy variable taking on values of 0 and 1. Despite the use of dummy variables, the
logic of regression equation remains the same, because we are predicting conditional means on the dependent variable i.e. we are looking at the average values of Y given specific values of the independent variable (Hardy, 1993). In the logistic formulation, the mean response is obtained as follows;

\[ Y_i = B_0 + B_{1i}X_i + E_i \quad Y_i = 0,1 \]  \[ 2 \]

Where the responses \( Y_i \) is binary 0,1 observations. The expected response \( E(Y_i) \) then becomes;

\[ E(Y_i) = B_0 + B_{1i}X_ii \]  \[ 3 \]

Thus the mean response \( E(Y_i) \) as given by the response function is the probability that \( Y_i = 1 \) when the level of the independent variable is \( X_i \). The response function is curvilinear and usually has the shape of a stretched out S with asymptotes at 0 and 1, when the dependent variable is restricted to take on the values 0 and 1 (Neter et.al 1983). This function has to be linearized in order to predict the mean response based on conditional probabilities. If we represent \( E[Y] \) with \( \hat{p} \) and noting that the mean response is a probability when the response is a 0 or 1 dummy variable, we can transform the response function (linearize) by making it a logarithmic function:

\[ \hat{p} = \log(e^{\hat{p}}/1-\hat{p}) \]  \[ 4 \]
where \( p^\hat{} = B_0 + B_1x_1 \) \[5\]

The transformed function \([4]\) is called the \textit{logistic} or \textit{logit} transformation of the probability \( p^\hat{} \) (Neter, et.al, 1983).

**ODDS AND ODDS RATIOS**

One of the attractive aspects of the logistic formulation as mentioned before is that it produces the statistic known as "Odds Ratios". The meaning and utility of this statistic is discussed below. The "logit" or logistic value is always the natural logarithm of the odds of the occurrence of an event. The odds of an event happening is the ratio of the probability of success to the probability of failure of the event (SAS Institute, 1990). Using the notation we developed earlier, suppose \( p \) is the probability of success, the odds of a success is

\[
p/(1-p) \quad [6]
\]

If we have a total of \( y \) successes in \( n \) observations, then the odds of \( y \) successes can be estimated by

\[
p^\hat{}(1-P^\hat{}) = y(n-y) \quad [7]
\]

When we are comparing two sets of binary data (as is usually the case when we have a binary dependent variable), we use a relative measure of the odds of a success in one set relative
to that in the other. This relative measure is known as the **odds ratio** (Collett, 1991). The table below illustrates how the odds ratios are computed.

**Table 3: Computation of Odds Ratio--An Example**

<table>
<thead>
<tr>
<th>Number of successes</th>
<th>Number of failures</th>
</tr>
</thead>
<tbody>
<tr>
<td>data set 1</td>
<td>a</td>
</tr>
<tr>
<td>data set 2</td>
<td>c</td>
</tr>
</tbody>
</table>

Source: Collett, 1991 p.36

Let the probability of success in the first data set be represented by $P^1$ and the probability of success in the second data be represented by $P^2$, then the odds ratio for this particular example is:

$$\text{Odds Ratio} = \frac{P^1 / (1-P^1)}{P^2 / (1-P^2)} = \frac{ad}{bc} \quad [8]$$

The odds ratio is therefore the ratio of the products of the two pairs of diagonal elements in our example above. It is sometimes called the "cross product ratio" because of this reason (Collett, 1991). The odds ratio indicates the relative probability of falling into one of two categories of some variable of interest. It is a parameter that gives us a summary of the impact of a given predictor on the dependent
variable adjusted for other effects in the model (Demaris, 1992). For example, in our Amish data, suppose that the probability of being an Old Order Amish $p=0.6$ and the probability of not being an Old Order Amish $1-p=0.4$, then the odds of a couple being an Old Order Amish is $0.6/0.4=1.5$. This means that a couple in the data is one and a half times more likely to belong to the Old Order Amish (than to belong to some other group used as the reference group, e.g., Andy Weaver). Thus in categorical data analysis, the effect of one variable upon another is best described in terms of odds ratios. This statistic will be used in interpreting the results of the logistic model in the next chapter.

**HYPOTHESIS TESTING**

The test statistic that will be used in hypothesis testing is the odds ratio, $\exp(B^\wedge)$. It is obtained by exponentiating the corresponding parameter estimate i.e. odds ratio=$\exp(B^\wedge)$ and the $100(1-\alpha)$ upper and lower confidence limits are given by

$$\exp[B^\wedge \pm z\alpha/2\ s(B^\wedge)]$$  \hspace{1cm} [9]$$

where $B^\wedge$ is the maximum likelihood estimate of $B$, $s(B^\wedge)$ is the standard error of $B^\wedge$ and $z\alpha/2$ is the $100(1-\alpha/2)$ percentile.
point of the standard normal distribution (SAS Institute, Inc., 1985). We obtained and reported confidence intervals for the various odds ratios at both the 95 percent and 99 percent confidence intervals. A 95 percent confidence interval indicates that in a random test of the statistic, 95 out of 100 times we will be confident that the confidence interval computed will contain the odds ratio of interest to us. An identical explanation is relevant for a 99 percent confidence interval.

An odds ratio of one corresponds to the null hypothesis that the parameter in consideration is equal to zero i.e., the variables are not associated (similar to $H_0: B_0=0$), and an odds ratio greater than one indicates a positive association. An odds ratio less than one indicates a negative association. For any explanatory variable to be significant, it must have an odds ratio that is significantly different from one. If the odds ratio falls outside the computed confidence interval, we reject the null hypothesis and accept the alternative hypothesis at the specific level of significance.
CHAPTER V
DESCRIPTIVE ANALYSIS

The purpose of this chapter is two-fold: First, to describe the levels and trends of Amish fertility; and second, to show the differentials in Amish fertility by church affiliation, farm or nonfarm status, and church membership status of Amish males.

LEVELS AND TRENDS

In the sample of 888 households, 92.5 percent of the women were married, 5.3 percent were widows as compared to men of whom only 0.4 percent of the sample were widowers. This implies that among the Amish as is true in most societies, men tend to remarry more frequently than women after the loss of a spouse. About 13.6 percent of the sample consisted of households which had no children. This proportion included single women who were listed as heads of their households as well as married couples who had no children for whatever reasons.
FERTILITY

The basic measure of fertility which was used as the dependent variable in this study is parity. As defined before in both chapters one and two, parity is simply the number of children born to a woman by the date of the directory survey (June 30, 1988).

Although information was available for couples who were in their second or third marriages, only children from first marriages were counted and used in this study. Parity ranges from zero to fifteen in the sample (Table 4). Thus we have zero parity couples (childless couples), one parity couples (couples with one child) etc. In the SAS computations, the variable name used for parity is Numkids (number of children). Table 4 shows the range of values for the dependent variable. Zero parity couples represented 13.6 percent of total households in this study. As was mentioned before, most of these were single person heads of households and a few couples who had recently been married and therefore had no children yet. Since only married couples are of interest in this study, the effective sample is smaller by this proportion.

We can see from the table that there were four households with fifteen children each. The mode was four children and the
Table 4: Frequency Distribution of Parity

<table>
<thead>
<tr>
<th>Parity</th>
<th>Number (X)</th>
<th>Percent (N)</th>
<th>Total (X*N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>121</td>
<td>13.6</td>
<td>--</td>
</tr>
<tr>
<td>1</td>
<td>67</td>
<td>8.7</td>
<td>67</td>
</tr>
<tr>
<td>2</td>
<td>93</td>
<td>12.1</td>
<td>186</td>
</tr>
<tr>
<td>3</td>
<td>94</td>
<td>12.2</td>
<td>282</td>
</tr>
<tr>
<td>4</td>
<td>104</td>
<td>14.0</td>
<td>416</td>
</tr>
<tr>
<td>5</td>
<td>85</td>
<td>11.0</td>
<td>425</td>
</tr>
<tr>
<td>6</td>
<td>83</td>
<td>10.8</td>
<td>498</td>
</tr>
<tr>
<td>7</td>
<td>65</td>
<td>8.4</td>
<td>455</td>
</tr>
<tr>
<td>8</td>
<td>58</td>
<td>7.5</td>
<td>464</td>
</tr>
<tr>
<td>9</td>
<td>33</td>
<td>4.3</td>
<td>297</td>
</tr>
<tr>
<td>10</td>
<td>29</td>
<td>3.8</td>
<td>290</td>
</tr>
<tr>
<td>11</td>
<td>30</td>
<td>3.9</td>
<td>330</td>
</tr>
<tr>
<td>12</td>
<td>15</td>
<td>1.9</td>
<td>180</td>
</tr>
<tr>
<td>13</td>
<td>6</td>
<td>0.8</td>
<td>78</td>
</tr>
<tr>
<td>14</td>
<td>1</td>
<td>0.1</td>
<td>14</td>
</tr>
<tr>
<td>15</td>
<td>4</td>
<td>0.5</td>
<td>60</td>
</tr>
</tbody>
</table>

16  888  100  4042

Source: Computed from sample data.

The median was 7.5 children and the sample mean was 5.3 children per couple (see also Figure 3 next page). Of the total number of children born to women in the sample, 97.98 percent were live births of which 2.5 percent died between their first birthday and 0.28 percent died before their first and fifth birthday. Stillbirths were 0.63 percent of the children in the sample.
Figure 3: Frequency Distribution of Parity
Table 5: Distribution of Households by Farm and Nonfarm Status

<table>
<thead>
<tr>
<th></th>
<th>ANDY WEAVER</th>
<th>OLD ORDER</th>
<th>NEW ORDER</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm/Farm Labor</td>
<td>31 (28.1)</td>
<td>204 (31.2)</td>
<td>36 (28.8)</td>
<td>271 (31.0)</td>
</tr>
<tr>
<td>Retired Farm</td>
<td>11 (10.2)</td>
<td>49 (7.5)</td>
<td>6 (4.0)</td>
<td>66 (7.0)</td>
</tr>
<tr>
<td>Nonfarm</td>
<td>66 (61.1)</td>
<td>400 (61.2)</td>
<td>84 (67.2)</td>
<td>551 (62.0)</td>
</tr>
<tr>
<td>Total</td>
<td>108 (100)</td>
<td>653 (100)</td>
<td>125 (100)</td>
<td>888 (100)</td>
</tr>
</tbody>
</table>

* Numbers in parenthesis are column percentages.
* The column totals may not add up to one hundred because of rounding off errors.

One of the major changes that is taking place among the Amish today is the trend of movement from farm based occupations to nonfarm occupations. Table 5 above shows the distribution of Amish households by farm and nonfarm status in the sample. As can be seen in the table, the nonfarm Amish were about 62 percent of the total sample. This proportion compares well with Table 1 from Kreps et.al (1994) study.
which enumerated households from the 1988 directory, and indicates that the sampling frame used for this study developed a representative sample. The Kreps et.al (1994) study found that Amishmen employed in nonfarm occupations had substantially increased from about 29 percent in 1965 to slightly over 62 percent in 1988. Also by church affiliation, the percentages generally tell the same story, that is, the nonfarm proportions are about one and half times as many as those in the farm and retired farm combined (Table 5). These data point to the fact that at least by 1988 the Amish had already moved away from farming as the primary occupation to various nonfarm occupations. The implication of this trend to Amish fertility can be seen in Table 6, which shows the distribution of parity by farm and nonfarm status. Parity levels are grouped into four categories for ease and brevity in presentation. This way space is used more efficiently and information is presented succinctly without losing any important facts regarding Amish fertility.

**FERTILITY BY FARM AND NONFARM STATUS**

In table 6, Amish fertility by farm and nonfarm status is shown on the basis of parity levels. The mean parity for farm
Table 6: Parity Distribution by Farm/Nonfarm Status

<table>
<thead>
<tr>
<th></th>
<th>1-4</th>
<th>5-8</th>
<th>9-12</th>
<th>&gt;13</th>
<th>Total</th>
<th>N</th>
<th>Mean</th>
<th>Std. Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>FARM</td>
<td>297</td>
<td>857</td>
<td>651</td>
<td>98</td>
<td>1903</td>
<td>315</td>
<td>6.2</td>
<td>3.2</td>
</tr>
<tr>
<td></td>
<td>(15.6)</td>
<td>(45.0)</td>
<td>(34.2)</td>
<td>(45.1)</td>
<td>(100)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>NONFARM</td>
<td>672</td>
<td>1002</td>
<td>423</td>
<td>54</td>
<td>2151</td>
<td>461</td>
<td>4.7</td>
<td>2.8</td>
</tr>
<tr>
<td></td>
<td>(31.2)</td>
<td>(46.6)</td>
<td>(19.7)</td>
<td>(2.5)</td>
<td>(100)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>969</td>
<td>1859</td>
<td>1074</td>
<td>152</td>
<td>4054</td>
<td>776</td>
<td>5.3</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>(23.9)</td>
<td>(45.9)</td>
<td>(26.5)</td>
<td>(3.7)</td>
<td>(100)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Numbers in parenthesis are row percentages for example, in column one, 15.6 = (297/1903) * 100

Amish is 6.2 and the mean parity for the nonfarm Amish is 4.7. The overall parity in the sample is 5.3. Also from the table, we can see that the farm Amish have a proportionately larger concentration in the high parity levels, which means that they tend to have more children (parity > 5), while the parity level for the nonfarm Amish are concentrated at a relatively lower parity (parity < 8). (See appendix D, Figure 8 for the corresponding chart). Data in this table show that Amish couples whose jobs were categorized as farm based had on the average lower fertility as compared to couples whose jobs were categorized as nonfarm. Table 27 in appendix I shows the age distribution of women by farm and nonfarm status. In this
table we can see that for every age group, between fifteen and forty years, the nonfarm Amish had higher proportions as compared to the farm Amish. Beyond age forty, however, the farm Amish had bigger proportions of women in this age. For example, 40 percent of farm Amish women were 50 years of age or older, while the corresponding number for the nonfarm Amish was 31 percent.

In Table 7, the average number of children by farm and nonfarm status is shown for Amish women by ten year birth cohorts of the women. The ten year birth cohort is used instead of the conventional five year cohort in order to avoid working with very small numbers. The 1960-1969 cohort is not included in this table (and Table 9) because the data for them were not complete since women in this cohort had not gone through the full duration of their reproductive years by the date of the directory survey. The table shows that for all cohorts, the nonfarm Amish women had smaller mean parity as compared to the farm Amish women. The net change in parity for the whole period over which the cohorts were defined was not much different between the two categories. The farm women had an average decline of 1.6 children while the nonfarm women had
Table 7: Average Number of Children By Farm Status And Female Birth Cohorts

<table>
<thead>
<tr>
<th>BIRTH COHORT</th>
<th>FEMALE MEAN</th>
<th>FEMALE CHANGE</th>
<th>FARM MEAN</th>
<th>FARM CHANGE</th>
<th>NONFARM MEAN</th>
<th>NONFARM CHANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>BEFORE 1920</td>
<td>8.1</td>
<td>-</td>
<td>7.2</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1920-1929</td>
<td>8.9</td>
<td>(0.8)</td>
<td>7.9</td>
<td>(0.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1930-1939</td>
<td>8.5</td>
<td>(-0.4)</td>
<td>7.9</td>
<td>(0.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1940-1949</td>
<td>8.8</td>
<td>(0.3)</td>
<td>6.7</td>
<td>(-1.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1950-1959</td>
<td>6.5</td>
<td>(-2.3)</td>
<td>5.2</td>
<td>(-1.5)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NET CHANGE: - (-1.6) - (-2.0)

Source: Computed from Sample Data

an average decline of 2.0 children for all the birth cohorts specified.

FERTILITY BY CHURCH AFFILIATION

Table 8 below shows parity distribution by church affiliation for the sample.

In Table 8, we can see that the highest mean parity is recorded for the very conservative Amish group of Andy Weaver (6.3), followed by the moderate Old Order Amish group with a mean value of 5.2. The more liberal New Order affiliation has
Table 8: Parity Distribution by Church Affiliation

<table>
<thead>
<tr>
<th>PARITY</th>
<th>1-4</th>
<th>5-8</th>
<th>9-12</th>
<th>&gt;13</th>
<th>TOTAL</th>
<th>N</th>
<th>MEAN</th>
<th>S.D.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANDY WEAVER</td>
<td>90</td>
<td>236</td>
<td>217</td>
<td>56</td>
<td>599</td>
<td>95</td>
<td>6.3</td>
<td>3.4</td>
</tr>
<tr>
<td></td>
<td>(15.0)</td>
<td>(39.4)</td>
<td>(36.2)</td>
<td>(9.3)</td>
<td>(100)</td>
<td>(12.2)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>OLD ORDER</td>
<td>750</td>
<td>1312</td>
<td>793</td>
<td>96</td>
<td>2951</td>
<td>570</td>
<td>5.2</td>
<td>3.0</td>
</tr>
<tr>
<td></td>
<td>(25.4)</td>
<td>(44.5)</td>
<td>(26.9)</td>
<td>(3.3)</td>
<td>(100)</td>
<td>(73.5)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>NEW ORDER</td>
<td>129</td>
<td>311</td>
<td>97</td>
<td>0</td>
<td>537</td>
<td>111</td>
<td>4.8</td>
<td>2.6</td>
</tr>
<tr>
<td></td>
<td>(24.0)</td>
<td>(57.9)</td>
<td>(18.1)</td>
<td>(0.0)</td>
<td>(100)</td>
<td>(14.3)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>TOTAL</td>
<td>969</td>
<td>1859</td>
<td>1107</td>
<td>152</td>
<td>4087</td>
<td>776</td>
<td>5.3</td>
<td>3.0</td>
</tr>
</tbody>
</table>

* Numbers in parenthesis are row percentages except for column six in which they are column percentages. Percentage totals may not add up to one hundred because of rounding off errors.

The lowest mean parity (4.8). The Old Order Amish have a larger concentration on the higher parity levels (parity >5) followed by the Andy Weaver group. The parity of the New Order Amish is concentrated on relatively lower levels. (See Figure 9, appendix E for the corresponding chart).

The next table (Table 9) shows the average number of children by church affiliation based on ten year female birth cohorts. We can see that there was a net decline in the average number of children for each church affiliation over the years by which the cohorts are defined. The Old Order
affiliation had the largest mean decline (2.0), followed by Andy Weaver affiliation (1.5) and the New Order affiliation (1.1). For each church affiliation, the largest single decline was experienced by women born during the decades of the forties and fifties. The New Order Amish had relatively smaller averages as compared to the other two affiliations.

Table 9: Average Number of Children by Church Affiliation and Mother's Birth Cohort

<table>
<thead>
<tr>
<th>MOTHER'S BIRTH COHORT</th>
<th>ANDY WEAVER</th>
<th>OLD ORDER</th>
<th>NEW ORDER</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MEAN</td>
<td>MEAN CHANGE</td>
<td>MEAN CHANGE</td>
</tr>
<tr>
<td>Before 1920</td>
<td>8.1</td>
<td>--</td>
<td>7.8</td>
</tr>
<tr>
<td>1920-1929</td>
<td>8.3</td>
<td>(0.2)</td>
<td>8.6</td>
</tr>
<tr>
<td>1930-1939</td>
<td>9.9</td>
<td>(1.6)</td>
<td>8.1</td>
</tr>
<tr>
<td>1940-1949</td>
<td>9.6</td>
<td>(-0.3)</td>
<td>7.6</td>
</tr>
<tr>
<td>1950-1959</td>
<td>6.6</td>
<td>(-3.0)</td>
<td>5.8</td>
</tr>
<tr>
<td>NET CHANGE</td>
<td>(-1.5)</td>
<td>(-2.0)</td>
<td>(-1.1)</td>
</tr>
</tbody>
</table>

Source: Computed from sample data.
FERTILITY BY CHURCH MEMBERSHIP STATUS

Next, we examine the distribution of parity by church membership status to see whether or not there were differences in the average number of children born to ordinary members as compared to the number of children born to those in leadership positions (ministers, deacons and bishops).

The comparison is not done by church affiliation but for the whole sample, because comparisons by church affiliation would yield very small numbers to work with for some church affiliations which have few observations for some of the categories of elders. Such small numbers would not yield meaningful comparisons. Table 10 below shows the levels of parity by church (affiliation) membership status for the sample.

From table 10, we can see that the differentials in mean parity levels by membership status indicate that ordinary members have lower fertility as compared with the fertility levels of the various categories of leaders. The deacons and the bishops have about the same mean parity (6.6 and 6.3) respectively, while the ministers have the highest level (7.2). Except for the ordinary members, each of the leadership
Table 10: Distribution of Parity by Membership Status in Church

<table>
<thead>
<tr>
<th>PARITY</th>
<th>1-4</th>
<th>5-8</th>
<th>9-12</th>
<th>&gt;13</th>
<th>TOTAL</th>
<th>N</th>
<th>MEAN</th>
<th>S.D</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEMBER</td>
<td>891</td>
<td>1523</td>
<td>843</td>
<td>110</td>
<td>3367</td>
<td>671</td>
<td>5.1</td>
<td>2.9</td>
</tr>
<tr>
<td>ONLY (26.5)</td>
<td>(45.2)</td>
<td>(25)</td>
<td>(3.3)</td>
<td></td>
<td>(100)</td>
<td>(86.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MINISTER</td>
<td>47</td>
<td>146</td>
<td>161</td>
<td>28</td>
<td>382</td>
<td>53</td>
<td>7.2</td>
<td>2.9</td>
</tr>
<tr>
<td>(4.8)</td>
<td>(7.9)</td>
<td>(14.8)</td>
<td>(18.4)</td>
<td></td>
<td>(100)</td>
<td>(6.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEACON</td>
<td>18</td>
<td>85</td>
<td>53</td>
<td>14</td>
<td>170</td>
<td>26</td>
<td>6.6</td>
<td>3.1</td>
</tr>
<tr>
<td>(10.6)</td>
<td>(50)</td>
<td>(31.2)</td>
<td>(8.2)</td>
<td></td>
<td>(100)</td>
<td>(3.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BISHOP</td>
<td>13</td>
<td>100</td>
<td>50</td>
<td>0</td>
<td>163</td>
<td>26</td>
<td>6.3</td>
<td>2.3</td>
</tr>
<tr>
<td>(7.9)</td>
<td>(61.3)</td>
<td>(30.7)</td>
<td>(0.0)</td>
<td></td>
<td>(100)</td>
<td>(3.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>969</td>
<td>1854</td>
<td>1107</td>
<td>152</td>
<td>4082</td>
<td>776</td>
<td>5.3</td>
<td>3.0</td>
</tr>
<tr>
<td>(23.7)</td>
<td>(45.4)</td>
<td>(27.1)</td>
<td>(3.7)</td>
<td></td>
<td>(100)</td>
<td>(100)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Numbers in parenthesis are row percentages except for column six for which they are column percentages.

categories has a higher than average number of children (the sample average being 5.3 children).

In order to control for age, Table 11 below shows the average number of children by mother's birth cohorts for the categories discussed above. Generally, the mean parity for the leaders remained above the average for most of the cohorts, implying that they tended to have more children in comparison with ordinary members of their affiliations.
Table 11 further confirms the fact that fertility has been declining within all the ranks of the Amish even among the leadership. The biggest overage decline was experienced by the deacons (2.7) followed by ordinary members (2.0), while ministers as well as bishops experienced relatively lower declines (1.5 and 0.1 respectively).

**AGE-SPECIFIC MARITAL FERTILITY RATES**

In order to examine the direct effect of age on fertility, we need to use a more precise measure of fertility which incorporates the age structure of the population in its calculation. The Age Specific Marital Fertility Rate (ASMFR), is such a measure. Age specific Marital Fertility is defined as the number of live births occurring to married women of a particular age or age group, divided by the total number of women in the particular age group, usually for a specific year (Shryock, 1983, Newell, 1987). The ratio is usually multiplied by one thousand or one hundred, and therefore expressed as a rate per thousand or per hundred women. Thus,

\[ \text{ASMFR}_i = \left( \frac{B_i}{P_i} \right) \times 1000 \]  

[10]

Where \( \text{ASMFR}_i \) = Age specific Marital Fertility Rate for group \( i \)

\( B_i \) = Live births to women in group \( i \)
### Table 11: Average Parity by Church Status and Mother's Birth Cohort

<table>
<thead>
<tr>
<th>Male Status</th>
<th>Member Only (n=671)</th>
<th>Minister (n=53)</th>
<th>Deacon (n=26)</th>
<th>Bishop (n=26)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mother's Birth Cohort</strong></td>
<td><strong>Mean</strong></td>
<td><strong>Mean</strong></td>
<td><strong>Mean</strong></td>
<td><strong>Mean</strong></td>
</tr>
<tr>
<td>Before 1920</td>
<td>7.5</td>
<td>8.2</td>
<td>10.7</td>
<td>6.7</td>
</tr>
<tr>
<td>1920-1929</td>
<td>8.7 (1.2)</td>
<td>7.3 (-0.9)</td>
<td>5.0 (-5.7)</td>
<td>7.6 (0.9)</td>
</tr>
<tr>
<td>1930-1939</td>
<td>8.1 (-0.6)</td>
<td>9.2 (1.9)</td>
<td>9.1 (4.1)</td>
<td>4.5 (-3.1)</td>
</tr>
<tr>
<td>1940-1949</td>
<td>7.6 (-0.5)</td>
<td>9.1 (-0.1)</td>
<td>6.9 (-2.2)</td>
<td>8.9 (4.4)</td>
</tr>
<tr>
<td>1950-1959</td>
<td>5.5 (-2.1)</td>
<td>6.7 (-2.4)</td>
<td>8.0 (1.1)</td>
<td>6.8 (-2.1)</td>
</tr>
<tr>
<td><strong>Net Change</strong></td>
<td>(-2.0)</td>
<td>(-1.5)</td>
<td>(-2.7)</td>
<td>(-0.1)</td>
</tr>
</tbody>
</table>

* Source: Computed from sample data
* No data for the 1960-1969 birth cohort because those born during this period would be too young to hold leadership positions in the Amish community.
* Numbers in parenthesis are change in the average between the preceding period and the period for which the average appears.

\[ p_{ix} = \text{Population or number of women in group } i \]

Rates such as ASMFR allow comparison of fertility performance between groups with different age structures and are therefore important in analyzing populations that are just entering the transition to a lower fertility. Generally, it
has been shown that family limitation often begins among women in the later stages of their reproductive period (Jones and Grupp, 1987). In many societies child bearing mainly takes place within marriage, as such, ASMFR gives a clearer indication of changes in actual child bearing (Pressat, 1985). Table 12 below shows the age specific marital fertility per hundred women by farm and nonfarm status of their husbands. The farm or nonfarm status is defined in terms of primary occupation of the husband. We can see from Table 12 that the age cohort of peak reproduction was 25-29 for both farm and nonfarm categories, followed by the 20-24 age cohort for both categories. The table also shows that for all age groups, the fertility rates for the Amish women whose husbands were engaged in farming as their primary occupation were higher.

Table 12: Age Specific Marital Fertility Rate by Farm Status (per hundred women), 1988.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm/Farm Labor</td>
<td>68</td>
<td>1002</td>
<td>1197</td>
<td>1053</td>
<td>838</td>
<td>488</td>
<td>44</td>
</tr>
<tr>
<td>Nonfarm</td>
<td>43</td>
<td>351</td>
<td>371</td>
<td>288</td>
<td>158</td>
<td>56</td>
<td>3</td>
</tr>
</tbody>
</table>
than the rates for women whose husband's occupations were nonfarm.

Table 13 below shows that marital fertility was at its peak for the age group 25-29 for all church affiliations and was lowest in general for the New Order Church Affiliation. If we sum up each row percentages and calculate the mean for all the age cohorts in the row, using the total number of cohorts as our total observations, we find that the Andy Weaver affiliation contributed on average, about 42 percent of all births across all the age cohorts in 1988. Thus for Andy Weaver's contribution (row 1):

\[
\frac{(39+40+38+39+41+50+45)}{7}=41.7
\]

Similarly, the Old Order affiliation was the next big contributor with 30 percent and the New Order Amish had the lowest proportionate contribution (28 percent).

In order to examine the fertility performance of over time of these cohorts, fertility rates by birth cohorts and by specific periods are shown on Table 14 below. By reading the table along successive columns, we can compare the variation in fertility by age per period, and likewise by looking at successive rows, we can compare how fertility varied by period, for each age group. We can see by looking at the
columns in the table that for each period, fertility rate increased from the youngest age group, peaked at age 25-29 and tapered off thereafter. The 1960-69 cohort had not completed their reproductive years by the publication date of the directory so the data is not complete for this cohort. The table also shows that except for the youngest age cohort, the decade of 1930-1939 was the most fertile for all others.

Table 13: Age Specific Marital Fertility by Church Affiliation
(Per thousand Women, 1988)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CHURCH AFFIL.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ANDY WEAVER</td>
<td>462</td>
<td>5161</td>
<td>5609</td>
<td>4783</td>
<td>3495</td>
<td>1804</td>
<td>108</td>
</tr>
<tr>
<td>(39)</td>
<td>(40)</td>
<td>(38)</td>
<td>(39)</td>
<td>(41)</td>
<td>(50)</td>
<td>(45)</td>
<td></td>
</tr>
<tr>
<td>OLD ORDER</td>
<td>439</td>
<td>4272</td>
<td>4660</td>
<td>3681</td>
<td>2411</td>
<td>979</td>
<td>587</td>
</tr>
<tr>
<td>(37)</td>
<td>(33)</td>
<td>(31)</td>
<td>(29)</td>
<td>(28)</td>
<td>(27)</td>
<td>(25)</td>
<td></td>
</tr>
<tr>
<td>NEW ORDER</td>
<td>270</td>
<td>3359</td>
<td>4536</td>
<td>3845</td>
<td>2657</td>
<td>802</td>
<td>72</td>
</tr>
<tr>
<td>(23)</td>
<td>(26)</td>
<td>(31)</td>
<td>(31)</td>
<td>(31)</td>
<td>(23)</td>
<td>(30)</td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>1171</td>
<td>12792</td>
<td>14805</td>
<td>12309</td>
<td>8563</td>
<td>3585</td>
<td>239</td>
</tr>
<tr>
<td>(100)</td>
<td>(100)</td>
<td>(100)</td>
<td>(100)</td>
<td>(100)</td>
<td>(100)</td>
<td>(100)</td>
<td></td>
</tr>
</tbody>
</table>

Source: Computed from sample data
Numbers in parenthesis are column percentages.

Whenever there is a decrease in fertility among older women relative to the peak marital fertility, this points to
a decline of marital fertility and may indicate that fertility control within marriage is occurring (Haines, 1979). Further to this, sharp declines in fertility among women over age 30 may signal the beginning of a long term fertility decline (Jones and Grupp, 1987). Table 15 shows marital fertility at all ages (in Table 14) as a percent of the peak rate at age 25-29, i.e. standardized using age 25-29 as the base. We can see that for all the older ages, (ages above 30), fertility did decline for every cohort. Figure 4 on the next page

<table>
<thead>
<tr>
<th>Table 14: Age Specific Fertility Rates by Mother's Birth Cohorts</th>
</tr>
</thead>
<tbody>
<tr>
<td>---------</td>
</tr>
<tr>
<td>PERIOD</td>
</tr>
<tr>
<td>1900-1920</td>
</tr>
<tr>
<td>1920-1929</td>
</tr>
<tr>
<td>1930-1939</td>
</tr>
<tr>
<td>1940-1949</td>
</tr>
<tr>
<td>1950-1959</td>
</tr>
<tr>
<td>1960-1969</td>
</tr>
</tbody>
</table>

Source: Computed from sample data.
Figure 4: Age-Specific Birth Rates by Mother's Birth Cohort
provides a clearer picture of the behavior of age specific marital fertility from Table 14. It shows the ASMFR schedules for each age group by birth cohorts. We see that the highest schedule is that one for the cohort of 1930-1939 followed by the 1940-49 birth cohort. Here again, these schedules show that the highest parity group is the 25-29 age group as shown by the point of inflection (highest point on each of the schedules), except for the youngest age group, for which data was not complete. The findings shown in Table 15 agree with the studies by Markle and Pasco (1977) and Ericksen et.al (1979), which found that there was evidence of family limitation among the Old Order Amish. The findings also agree with information regarding family planning obtained by the author of this study from key informants in the study area. The author was told that Amish women do consult health workers regarding use of (modern) birth control methods and they do express to health workers the desire for fewer children.

CONTROL (DEMOGRAPHIC) VARIABLES

Table 16 shows the average ages at first marriage for both males and females of Amish households (HAATMAR and FAATMAR). Only the first marriage of either spouse was used in
the computations of age and other related variables. As can be seen in Table 16, the mean age at first marriage for the men was 22.5 years while for the women it was lower by about one year (21.4). This compares well with Ericksen et.al (1979) who found that the median age at first marriage for Amish men was about 23 years, and for Amish women the median was just under 22 years and the difference in mean age at first marriage between men and women was about one year. The other

Table 15: Relation of Age Specific Marital Fertility Rates to the Peak Rate at 25-29

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Period</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1900-1920</td>
<td>1.17</td>
<td>77.4</td>
<td>100</td>
<td>96</td>
<td>86</td>
<td>51</td>
<td>2.4</td>
</tr>
<tr>
<td>1921-1930</td>
<td>6.3</td>
<td>68.6</td>
<td>100</td>
<td>95</td>
<td>78.4</td>
<td>39.3</td>
<td>1.9</td>
</tr>
<tr>
<td>1931-1939</td>
<td>6.1</td>
<td>68.6</td>
<td>100</td>
<td>92</td>
<td>75.7</td>
<td>39.6</td>
<td>--</td>
</tr>
<tr>
<td>1940-1949</td>
<td>6.7</td>
<td>93.6</td>
<td>100</td>
<td>90</td>
<td>61.5</td>
<td>18.6</td>
<td>3.5</td>
</tr>
<tr>
<td>1950-1959</td>
<td>11.4</td>
<td>91.2</td>
<td>100</td>
<td>67.9</td>
<td>10.9</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>1960-1969</td>
<td>51.3</td>
<td>223</td>
<td>100</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
</tbody>
</table>

Note: Figures in this table are obtained by dividing each entry in Table 13 by its associated base entry in the column for age group 25-29 and multiplying the result by one hundred. For example, the first entry, 1.17 = (59/5029)*100
Table 16: Average Age at First Marriage and Marriage Duration

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>Std.Dev</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Male Age at First Marriage (HAATMAR)</td>
<td>888</td>
<td>22.5</td>
<td>2.6</td>
<td>17.0</td>
<td>9.0</td>
</tr>
<tr>
<td>2. Female age at First Marriage (FAATMAR)</td>
<td>888</td>
<td>21.4</td>
<td>2.7</td>
<td>15.0</td>
<td>40.0</td>
</tr>
<tr>
<td>3. Difference in Age (1-2)</td>
<td>888</td>
<td>0.003</td>
<td>0.008</td>
<td>-0.004</td>
<td>0.03</td>
</tr>
<tr>
<td>4. Marriage Duration</td>
<td>888</td>
<td>27.0</td>
<td>15.8</td>
<td>1.0</td>
<td>67.0</td>
</tr>
</tbody>
</table>

Source: Computed from sample data

important control variable in this study is duration of marriage (MARRDUR) which was defined in the previous chapter. We can see that the mean duration of marriage was 27 years, with a minimum of one year and a maximum of 67 years.

**FERTILITY AND INFANT MORTALITY**

Fertility decline usually follows a decline in infant mortality according to the fertility transition theories. We have shown that fertility has been declining over the years among the Amish for all groups. Therefore, it is necessary to
examine the behavior of infant mortality for the same periods for which fertility has been analyzed.

We computed a rate that is not a "conventional" infant mortality rate (which is usually defined for a specific population as the number of children dying before their first birthday in that population divided by total live births in a year). The index used here was computed by dividing the total number of infants dying before their first birthday within a ten-year period (child's birth cohort) divided by the total number of live births within that period and multiplied by one thousand. It is therefore similar to the conventional infant mortality rate except that it is not based on a year's count of the relevant event and so it is a crude but useful measure. Table 17 below shows infant mortality index as described above by ten year birth cohorts of the children.

We can see in Table 17 that infant mortality did consistently decline over the decades to the low level of 8.07 per thousand live born children in the early part of the 1980s (note that the survey date was June 1988).

It is also helpful to note at this point that the infant mortality rate for the U.S.A. as a whole in 1988/1990 was 10 per thousand live births (United Nations, 1990), for Ohio it
was 9.9 per thousand live births, and for Wayne and Holmes Counties it was 7.6 and 7.0 per thousand live births respectively (Thomas, 1991).

A trend of declining infant mortality and fertility, though not a proof of entry into the fertility transition stage of low fertility, has historically, in many countries been empirically shown to be an indicator of the onset of the transition. These data further support the fact that the Amish in the Wayne/Holmes County settlement area were already experiencing fertility transition. Infant mortality is a major and important component of the crude death rate of any population because it is very sensitive to the living conditions at any time, place and population. The fact that it declined shows that there was improvement in the living conditions of the population in question. Thus we can say that the decline in fertility coupled with the decline in infant mortality points to the fact that the Amish of this study area were beginning around that decade to enter stage 3 of the transition model (Figure 1).
Table 17: Infant Mortality Index by Child's Birth Cohort, 1920-1988

<table>
<thead>
<tr>
<th>Birth Cohort</th>
<th>Infant Mortality Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1920-1929</td>
<td>58.80</td>
</tr>
<tr>
<td>1930-1939</td>
<td>56.70</td>
</tr>
<tr>
<td>1940-1949</td>
<td>25.07</td>
</tr>
<tr>
<td>1950-1959</td>
<td>34.54</td>
</tr>
<tr>
<td>1960-1969</td>
<td>32.17</td>
</tr>
<tr>
<td>1970-1979</td>
<td>21.54</td>
</tr>
<tr>
<td>1980-1989</td>
<td>8.07</td>
</tr>
</tbody>
</table>

Source: Computed from sample data.
CHAPTER VI
REGRESSION ANALYSIS AND HYPOTHESIS TESTING

In this chapter, the results of the regression analyses are presented and discussed, starting with exploratory analysis followed by analysis of variance results and logistic regression results.

EXPLORATORY ANALYSIS

In order to explore the type of relationship existing between the explanatory variables and the response variable, a stepwise regression analysis was done. The stepwise procedure is a model building procedure which gives insight into which of the many possible explanatory variables should be included in the regression model. The variables selected through this process are those that contribute the most to the predictive power of the model (SAS Institute Inc., 1987). Table 18 shows the results from the stepwise regression run.

The exploratory results as shown in Table 18 indicate that the variables listed are the best predictors of (average)
Table 18: Stepwise Regression Results for All Variables

<table>
<thead>
<tr>
<th>Entered</th>
<th>Parameter Estimate</th>
<th>Partial R²</th>
<th>Model R²</th>
<th>C(p)</th>
<th>F</th>
<th>P&gt;F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marriage duration</td>
<td>0.083</td>
<td>0.1639</td>
<td>0.1639</td>
<td>606.46</td>
<td>791.75</td>
<td>0.0001</td>
</tr>
<tr>
<td>Farm status</td>
<td>-1.141</td>
<td>0.0458</td>
<td>0.2097</td>
<td>353.83</td>
<td>234.29</td>
<td>0.0001</td>
</tr>
<tr>
<td>Church affiliation</td>
<td>-0.982</td>
<td>0.0283</td>
<td>0.2380</td>
<td>198.56</td>
<td>150.03</td>
<td>0.0001</td>
</tr>
<tr>
<td>Age at Marriage (F)</td>
<td>-0.143</td>
<td>0.0260</td>
<td>0.2640</td>
<td>56.39</td>
<td>142.37</td>
<td>0.0001</td>
</tr>
<tr>
<td>Age At Marriage (M)</td>
<td>-0.102</td>
<td>0.0048</td>
<td>0.2688</td>
<td>31.77</td>
<td>26.45</td>
<td>0.0001</td>
</tr>
<tr>
<td>Church Status</td>
<td>0.313</td>
<td>0.0047</td>
<td>0.2735</td>
<td>7.51</td>
<td>26.25</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

a. C(p) is a criterion for selecting a model. It is a measure of total squared error defined as $C_p=(SSEp/S^2)-(N-2p)$; where $S^2=MSE$ for the full model, $SSEp=SSE$ for a model with $p$ parameters plus intercept.

children ever born or parity, in the order they are given. Since the main focus of this section is to explore and select the most appropriate variables, the discussion of specific meanings of variable associations will be left for later sections when the more relevant analyses are made. Looking at
the parameter estimates, the demographic variable marriage duration is the single most important predictor variable. It explains the largest portion of the variation in the dependent variable ($R^2=16.4$ percent). The other demographic variables included as good predictors of parity are age at first marriage of the female, as well as age at first marriage of the male head of household. Both of these have a negative association with parity. The parameters for all the three demographic variables above were significantly different from zero as shown by their respective probabilities ($Pr>F$), which are very small for each case implying that there is a significant linear relationship between the response variable and the specific explanatory variables.

The social variables accepted by the model are church affiliation, farm status and church status. It is important to note in the following discussion of these variables that each is categorical i.e., has more than one level or class. The importance of this fact can be seen in Appendix H Table 26, in which the Pearson correlation coefficients for each level of the variable are shown. Similarly, church affiliation has a negative association with parity. Again, this association is net of the total effect of all the three levels of the
variable. The meaning of the negative sign for the (composite) variable has to do with the differential weights of the specific levels of the variable. For example, both the Old Order Amish (Church2) and the New Order Amish (Church3) has a negative association with the response variable (Appendix H, Table 26). Given the relative weights of the New Order (N=127) as well as the Old Order (N=653) church affiliations, which have relatively lower average number of children (Table 8), the negative sign for the composite church affiliation variable is therefore bigger overall.

Similar explanations can be given for both the farm status and church status variables. The parameter estimates for farm status show a negative association with parity while that of church status show a positive association with parity.

Although the stepwise procedure is very useful in enabling us to identify the variables to be used in regression analysis, it suffers from a couple of limitations. One of these limitations is that the procedure presumes there is a single "best" subset of explanatory variables which it seeks to identify. There may not be a unique or best subset. Secondly, the procedure may sometimes arrive at an unreasonable 'best' subset when the explanatory variables are
very highly correlated (Neter et al., 1983). Appendix H, Table 26 shows the correlation matrix for all the variables, including the dependent variable. The data in this table show that the variables FARMSTU1 and FARMSTU2 had the highest degree of association with parity (NUMKIDS), with coefficients of 0.243 and -0.243 respectively. The variables CHURCH2 and CHURCH3 had the lowest degree of association with the dependent variable. All the independent variables except for CHURCH1, CHURCH2 and CHURCH3 had low pairwise intercorrelations. This implies that multicollinearity was not a problem to worry about for the selected variables. The intercorrelations between CHURCH1, CHURCH2 and CHURCH3, though high in comparison with those between the other independent variables, was not close to one and as such multicollinearity is not a problem here either.

**GENERAL LINEAR MODEL WITH MAIN EFFECTS**

In this section, the variables selected through the procedure described above are used to examine the effect of each explanatory variable on the response variable, independent of all others included in the model. When the effect of one explanatory variable does not depend on the
level of any other variable, the variables are said to have additive effects, i.e. they do not interact. The parameters obtained from such variables are called partial regression coefficients because they reflect the partial effect of one explanatory variable when all the others included in the model are held constant. As was explained in the methodology chapter, the General Linear Model Procedure of SAS was used to do the multiple regression analysis.

Table 19 shows the analysis of variance results for the additive model. We can see that church1 (Andy Weaver), had a positive effect on parity ($B=1.836$), and a significant association with it as shown by the relevant probability value ($P>|T|=0.0001$). The regression coefficients, or parameter estimates, have the usual interpretations, i.e. the value of the perimeter estimate indicates that a one unit increase in membership of this church affiliation leads to an increase of about two children in mean parity, holding all other variables constant. The probability value tests the hypothesis that the specific parameter estimate is equal to zero, i.e. that there is no association between this independent variable (being an Andy Weaver Amish) and parity. A very small probability, such
Table 19: Analysis of Variance Results for Main Effects

Dependent Variable: Numkids

<table>
<thead>
<tr>
<th>Source</th>
<th>Df</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F-Value</th>
<th>Pr&gt;F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>8</td>
<td>2112.38</td>
<td>264.05</td>
<td>39.84</td>
<td>0.0001</td>
</tr>
<tr>
<td>Error</td>
<td>758</td>
<td>5023.20</td>
<td>6.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected</td>
<td></td>
<td>7135.59</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

R-Squared: 0.296  C.V. 48.86  Root MSE 2.57  Dep.Mean 5.27

| Independent Variable* | Parameter Estimate | T for Ho Param=0 | P>|T| | Std. Error |
|-----------------------|-------------------|-----------------|-----|-----------|
| 1. Church1            | 1.836             | 4.63            | 0.0001 | 0.396     |
| 2. Church2            | 0.730             | 2.54            | 0.0112 | 0.287     |
| 3. Church3            | -1.830            | -4.62           | 0.0001 | 0.396     |
| 4. Farmstul1          | 1.012             | 4.61            | 0.0001 | 0.211     |
| 5. Farmstu2           | -0.974            | -4.61           | 0.0001 | 0.211     |
| 6. Churst1            | -0.958            | -3.35           | 0.0008 | 0.211     |
| 7. Churst2            | 0.958             | 3.35            | 0.0008 | 0.285     |
| 8. Faatmar             | -0.186            | -5.29           | 0.0001 | 0.034     |
| 9. Marrdur             | 0.970             | 28.24           | 0.0001 | 0.017     |

*The independent variables are specified as follows:
1. Church1= (Andy Weaver), Church2= (Old Order) and Church3=New Order affiliation.
2. Farmstul1= primary farm occupation and Farmstu2= primary nonfarm occupation.
3. Churstus=church status: 1=member only, 2=minister, 3=deacon and 4=bishop.
4. Haatmar=Age at first marriage of male household head.
5. Faatmar=Age at first marriage of female.
6. Maardur=Marriage duration

** All probabilities significant at the 0.05 level**
as the one reported here, indicates that the chances of actually finding that there is no association between the two variables is very small, so we accept the hypothesis that being an Andy Weaver Amish had a positive effect on having more children.

Similarly, the second Church affiliation (Old Order) has a positive and significant effect on parity as shown by the value of the parameter estimate and the small probability value for the test statistic. The parameter estimate is positive but small as compared to that of the first church affiliation. Thus for the Old Order Amish, we accept the hypothesis that being an Old Order Amish couple had a positive effect on the average number of children. We can see that this effect is smaller compared to the effect of the first church affiliation. The magnitude of the effect of the second church affiliation (B=0.730) on the response is less than half as much as that of the first church affiliation (B=1.836).

The third Church affiliation (Church3) has a negative and significant effect on parity. The absolute value of the parameter estimate is the same as the one for the first church affiliation but in the opposite direction. Thus a one unit increase in this variable leads to a decline in the mean
parity by about two children. We therefore accept the hypothesis that the New Order Amish tend to have fewer children as compared to the other church affiliations.

The first level of farm status Farmstul, (farm based occupation) had a positive and significant effect on parity, while the second level of farm status Farmstu2, (nonfarm based occupations) had a negative and significant effect on the response variable. The respective parameter estimates indicate that a one unit increase in each variable has the effect of changing the mean parity value in the respective direction by about one child. We therefore accept the hypothesis that Amish households in which the men have nonfarm jobs (Farmstu2) tended to have fewer children on the average as compared to households in which the men were primarily farmers (Farmstul).

The first church membership status (Churst1) variable had a negative and significant effect on parity. This indicates that ordinary members (across all church affiliations) of Amish fellowships had fewer children as compared to their leaders (Churst2). In fact, a one unit increase in this variable leads to a decrease in the mean parity by about one child while a one unit increase in the second variable (Churst2) leads to an increase of about one in mean parity.
We can therefore accept the hypothesis that Amish leaders did have more children as compared to average Amish fellowship members. This result makes sense generally because Amish leaders tend to be older men who by virtue of their age and length of exposure to marriage as well as their social status in society, would have more children relative to others. The additive model explains about 30 percent of the overall variation in parity (R²=0.296). This is a fairly good degree of explanation given the fact that the explanatory variables used in the model are macro level (structural) variables, which essentially affect fertility only indirectly.

Age at first marriage of the female spouse (Faatmar) has a negative and significant effect on parity. Age at first marriage of the male head of household (Haatmar) was dropped from this analysis because it's absolute value was not much different from that of the age at first marriage of the female spouse, and it's overall contribution to the variation in the model was negligible. The negative relationship implies that the older a woman was (beyond puberty) when she got married, the fewer the number of children she had, all other relevant variables being held constant.
Since most Amish women married relatively younger ages (at age 20), and practiced little or no birth control, those who married after this age lost, on the average, the potential number of children for every year that passed beyond this age until menopause. The duration of marriage (Marrdur) had a positive and significant effect on parity. This result would be expected since the longer a woman stays in marriage, the longer is her exposure to the risk of having a (another) child or more children.

GENERAL LINEAR MODEL WITH INTERACTION

In Table 20, analysis of variance results are given for the interaction model. Only the two-way interactions are used in the analysis because higher order interactions would not make intuitive sense and as such the coefficients obtained from them would not provide a meaningful interpretation. Looking at the parameter estimates, we can say in relative terms for example, that an additional Amish couple that was both Andy Weaver (Church1) and primarily a farmer (Farmstul1) increased parity average by more than twice as much as a couple who is a farmer in the Old Order church affiliation (Church2).
Table 20: Analysis of Variance Results with Interaction

<table>
<thead>
<tr>
<th>Source</th>
<th>Df</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
<th>F Value</th>
<th>Pr&gt;F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
<td>8</td>
<td>812.74</td>
<td>101.59</td>
<td>12.18</td>
<td>0.0001</td>
</tr>
<tr>
<td>Error</td>
<td>758</td>
<td>6322.84</td>
<td>8.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected</td>
<td>766</td>
<td>7135.59</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>7938.59</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

R-Square: 0.114  C.V: 54.79  Root MSE: 2.89  Numkids Mean: 5.27

| Independent Variable | Parameter Estimate | T For Ho | Pr>|T| | Std. Error |
|----------------------|-------------------|----------|------|--------------|
| 1. Church1*farmstu1  | 6.66              | 2.22     | 0.027| 3.00         |
| 2. Church1*farmstu2  | 4.01              | 1.32     | 0.186| 3.03         |
| 3. Church2*farmstu1  | 3.76              | 1.30     | 0.194| 2.89         |
| 4. Church2*farmstu2  | 2.41              | 2.42     | 0.404| 2.89         |
| 5. Church3*farmstu1  | 3.18              | 1.09     | 0.276| 2.92         |
| 6. Church3*farmstu2  | 2.61              | 0.90     | 0.369| 2.90         |
| 7. Church1*churstus1 | -0.95             | -1.08    | 0.283| 0.88         |
| 8. Church2*churstus2 | 1.75              | 4.79     | 0.0001| 0.36        |

**All probabilities significant at the 0.05 level**

Similarly, a New Order couple who were nonfarmers (Farmstu2) increased average parity by only one third compared to Andy Weaver farmers. The first combination had the largest positive effect on parity. All the other interaction relationships can be interpreted in a similar fashion. This model with interactions explains only about 11.4 percent of the variation in parity, thus indicating that the model with
Table 21: Maximum Likelihood Estimates for Model 1  
(Parity 0-2)

<table>
<thead>
<tr>
<th>Independent Variable*</th>
<th>Param Estim</th>
<th>Stand Error</th>
<th>$X^2$</th>
<th>Pr&gt;$X^2$</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. FAATMAR</td>
<td>0.078</td>
<td>0.015</td>
<td>28.93</td>
<td>0.0001</td>
<td>1.081**</td>
</tr>
<tr>
<td>2. MARRDUR</td>
<td>-0.022</td>
<td>0.003</td>
<td>50.11</td>
<td>0.0001</td>
<td>0.979**</td>
</tr>
<tr>
<td>3. CHURCH1</td>
<td>-0.978</td>
<td>0.220</td>
<td>19.79</td>
<td>0.0001</td>
<td>0.376**</td>
</tr>
<tr>
<td>4. CHURCH2</td>
<td>-0.291</td>
<td>0.134</td>
<td>4.75</td>
<td>0.0293</td>
<td>0.748*</td>
</tr>
<tr>
<td>5. CHURCH3</td>
<td>0.978</td>
<td>0.220</td>
<td>19.79</td>
<td>0.0001</td>
<td>2.658**</td>
</tr>
<tr>
<td>6. CHURST1</td>
<td>1.742</td>
<td>0.270</td>
<td>41.63</td>
<td>0.0001</td>
<td>5.711**</td>
</tr>
<tr>
<td>7. CHURST2</td>
<td>-1.742</td>
<td>0.270</td>
<td>41.63</td>
<td>0.0001</td>
<td>0.175**</td>
</tr>
<tr>
<td>8. FARMSTU1</td>
<td>-0.476</td>
<td>0.109</td>
<td>19.26</td>
<td>0.0001</td>
<td>0.621**</td>
</tr>
<tr>
<td>9. FARMSTU2</td>
<td>0.476</td>
<td>0.109</td>
<td>19.26</td>
<td>0.0001</td>
<td>1.610**</td>
</tr>
</tbody>
</table>

*All variables are defined same as in Table 17 Footnotes.
* Significant at the 0.05 level.
** Significant at both 0.05 and 0.01 levels.

interactions has less explanatory ability in explaining the variation in parity as compared to the additive model.

LOGISTIC REGRESSION RESULTS

In this section the maximum likelihood estimates of the logistic regression runs are presented including the relevant tests for hypotheses. Four models based on the various cut-off points of the dependent variable as defined and created in chapter 4 were used. Table 21 gives the results of the first model run in which the values of the dependent variable are defined for parity levels 0-2 only.
In the following discussion, OR represents an abbreviation for Odds Ratio. From Table 21, we see that for parity 0-2, couples in church1 (Andy Weaver) and Church2 (Old Order) were less likely to be of this particular parity (OR=0.376 and 0.748, respectively) as compared to church3 (New Order). Couples in Church3 were 2.658 times more likely to be of this parity than couples in the other two affiliations, who were less likely to have this parity (OR=0.376 for church1 and 0.748 for church2). The odds ratio for each of the affiliations was significant in its specific direction of influence, i.e. members of Church1 and Church2 were significantly less likely (negative association) to be of this parity as compared to members of Church3 who were significantly more likely (positive association) to be of this parity level. The significance is shown by the fact that each of the odds ratios (except for Church2 which is significant at 95 percent level only) is significant at both the 95 and 99 percent confidence intervals. The negative direction of the association can be seen in the value of the parameter estimate for the respective variable.

Next, we look at the church status variable (Churst1 and Churst2), which divided the sample into two categories, the
first one representing ordinary members (Churst1) and the other one representing leaders (ministers, deacons and bishops combined). Ordinary members were 5.711 times more likely to be of parity 0-2 as compared to the leaders (Churst2) who were less likely to be of this parity (OR=0.175). The status of ordinary members had a strong positive association with parity 0-2 while the leadership status had a strong negative association with it.

With regard to farm status, Table 21 shows that Amish households in which the males had farm based occupations were less likely to be of parity 0-2 (OR=0.621), while those households for which the male head had a nonfarm occupation, were more likely to be of this parity level (OR=1.610). Each of the odds ratios is significant with respect to the specific direction of association i.e. farm status has a significant negative association with this level of parity while nonfarm status has a significant positive association with it. The odds ratio for both age at first marriage of the female and marriage duration are close to one implying that each of these variables were almost independent (had no influence) of the parity level under discussion. Although each one falls within
Table 22: Maximum Likelihood Estimates for Model 2
(Parity 0-5)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Param Estm</th>
<th>Stand. Error</th>
<th>$X^2$</th>
<th>Pr&gt;$X^2$</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. FAATMAR</td>
<td>0.066</td>
<td>0.012</td>
<td>30.060</td>
<td>0.0001</td>
<td>1.069**</td>
</tr>
<tr>
<td>2. MARRDUR</td>
<td>-0.030</td>
<td>0.002</td>
<td>194.350</td>
<td>0.0001</td>
<td>0.970**</td>
</tr>
<tr>
<td>3. CHURCH1</td>
<td>-0.660</td>
<td>0.134</td>
<td>22.902</td>
<td>0.0001</td>
<td>0.517**</td>
</tr>
<tr>
<td>4. CHURCH2</td>
<td>-0.204</td>
<td>0.099</td>
<td>4.146</td>
<td>0.0001</td>
<td>0.816*</td>
</tr>
<tr>
<td>5. CHURCH3</td>
<td>0.204</td>
<td>0.099</td>
<td>4.145</td>
<td>0.0417</td>
<td>1.226**</td>
</tr>
<tr>
<td>6. CHURST1</td>
<td>0.556</td>
<td>0.103</td>
<td>29.315</td>
<td>0.0001</td>
<td>1.744**</td>
</tr>
<tr>
<td>7. CHURST2</td>
<td>-0.556</td>
<td>0.103</td>
<td>29.315</td>
<td>0.0001</td>
<td>0.573**</td>
</tr>
<tr>
<td>8. FARMSTU1</td>
<td>-0.648</td>
<td>0.072</td>
<td>80.662</td>
<td>0.0001</td>
<td>0.523**</td>
</tr>
<tr>
<td>9. FARMSTU2</td>
<td>0.648</td>
<td>0.072</td>
<td>80.662</td>
<td>0.0001</td>
<td>1.912**</td>
</tr>
</tbody>
</table>

*All variables are defined as in Table 17 footnotes.
* Significant at the 0.05 percent level.
** Significant at both the 0.01 and 0.05 levels.

the 95 percent confidence limit, each is quite close to the lower limits of its respective interval.

Table 22 shows the results from model 2 for parity 0-5 as the dependent variable. Here also, members of Church1 and Church2 (OR=0.517 and 0.816) were less likely to be of parity 0-5 as compared to members of Church3 (OR=1.226). In the descriptive analysis (Table 6), it was observed that the sample average was 5.3 children. The results here therefore indicate that Andy Weaver Amish couples (Church1) and Old Order Amish couples (Church2) were not likely to have the
sample average number of children (5 or fewer children), while Church3 (New Order) couples were more likely to be within the sample average of at least five children.

The church status variable (Churst1) indicates that couples who were ordinary members (regardless of church affiliation) were more likely (1.7 times) to be of parity 0-5 (OR=1.744), while those who were in leadership positions (Churst2) were less likely to have at least the sample average number of children (OR=0.816). Both of these associations are significant at both the 95 and 99 percent levels.

Households in which the male head was engaged in a farm based occupation (Farmstul) were less likely to be of parity 0-5 (OR=0.523), while households which had male heads engaged in nonfarm occupations (Farmstu2) were almost twice as likely to be of this parity (OR=1.912). Both age at first marriage of the female as well as marriage duration showed independent association with parity level 0-5 (OR=1.069 and 0.970) because though these values are significant, they are close to one.

Table 23 shows the maximum likelihood estimates for model 3 for parity equal to or greater than six (this covers 6-15 children). For parity levels six and above, members of both Church1 (Andy Weaver) and Church2 (Old Order) were more likely
Table 23: Maximum Likelihood Estimates for Model 3
(Parity^6)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Param Estm</th>
<th>Stand Error</th>
<th>X^2</th>
<th>Pr&gt;X^2</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. FAATMAR</td>
<td>-0.0947</td>
<td>0.013</td>
<td>54.619</td>
<td>0.0001</td>
<td>0.910**</td>
</tr>
<tr>
<td>2. MARRDUR</td>
<td>0.0330</td>
<td>0.002</td>
<td>224.811</td>
<td>0.0001</td>
<td>1.034**</td>
</tr>
<tr>
<td>3. CHURCH1</td>
<td>0.4999</td>
<td>0.138</td>
<td>13.119</td>
<td>0.0003</td>
<td>1.649**</td>
</tr>
<tr>
<td>4. CHURCH2</td>
<td>0.1343</td>
<td>0.101</td>
<td>1.755</td>
<td>0.1853</td>
<td>1.144</td>
</tr>
<tr>
<td>5. CHURCH3</td>
<td>-0.1343</td>
<td>0.101</td>
<td>1.775</td>
<td>0.0001</td>
<td>0.874**</td>
</tr>
<tr>
<td>6. CHURST1</td>
<td>-0.6707</td>
<td>0.103</td>
<td>42.835</td>
<td>0.0001</td>
<td>0.511**</td>
</tr>
<tr>
<td>7. CHURST2</td>
<td>0.6707</td>
<td>0.103</td>
<td>42.835</td>
<td>0.0001</td>
<td>1.956**</td>
</tr>
<tr>
<td>8. FARMSTU1</td>
<td>0.7219</td>
<td>0.073</td>
<td>99.075</td>
<td>0.0001</td>
<td>2.058**</td>
</tr>
<tr>
<td>9. FARMSTU2</td>
<td>-0.7219</td>
<td>0.073</td>
<td>99.075</td>
<td>0.0001</td>
<td>0.486**</td>
</tr>
</tbody>
</table>

*All variables are as defined in Table 17 footnotes.
* Significant at 0.05 level.
** Significant at both the 0.01 and 0.05 levels.

(OR=1.649 and 1.144 respectively) to be of this parity as compared to members of Church3 (New Order), who were less likely to be of this parity (OR=0.874). The odds ratios for each of these variables were significant at both the 95 and 99 percent levels of confidence as shown in Table 23. Amish couples who were ordinary members of their church affiliations (Churst1) were less likely (OR=0.511) to have, on the average, more than six children while for couples in leadership positions (Churst2), the odds of having six or more children on the average was almost twice as much (OR=1.956).
Similarly, households which had male heads whose occupations were farm based (Farmstul) were two times more likely to have more than six children (OR=2.058), as compared to those whose male heads had nonfarm based occupations (Farmstu2) (OR=0.486). The control variables of age at first marriage of the female as well as marriage duration both had significant independent associations with the fact of having six or more children (OR=1.081 and 0.979).

Table 24 below shows the maximum likelihood results from model 4, for parity greater than 10.

Table 24: Maximum Likelihood Estimates for Model 4 (Parity>10)

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>Param Estm</th>
<th>Stand Error</th>
<th>$X^2$ Pr&gt;</th>
<th>$X^2$</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. FAATMAR</td>
<td>0.2277</td>
<td>0.025</td>
<td>82.469</td>
<td>0.0001</td>
<td>0.796**</td>
</tr>
<tr>
<td>2. MARRDUR</td>
<td>0.0418</td>
<td>0.003</td>
<td>170.81</td>
<td>0.0001</td>
<td>1.043**</td>
</tr>
<tr>
<td>3. CHURCH1</td>
<td>2.2011</td>
<td>0.252</td>
<td>76.626</td>
<td>0.0001</td>
<td>9.035**</td>
</tr>
<tr>
<td>4. CHURCH2</td>
<td>1.4735</td>
<td>0.228</td>
<td>41.913</td>
<td>0.0001</td>
<td>4.364**</td>
</tr>
<tr>
<td>5. CHURCH3</td>
<td>-0.4735</td>
<td>0.228</td>
<td>41.913</td>
<td>0.0001</td>
<td>0.229**</td>
</tr>
<tr>
<td>6. CHURST1</td>
<td>-0.5793</td>
<td>0.129</td>
<td>20.149</td>
<td>0.0001</td>
<td>0.560**</td>
</tr>
<tr>
<td>7. CHURST2</td>
<td>0.5793</td>
<td>0.129</td>
<td>20.149</td>
<td>0.0001</td>
<td>1.785**</td>
</tr>
<tr>
<td>8. FARMSTU1</td>
<td>0.9062</td>
<td>0.106</td>
<td>73.617</td>
<td>0.0001</td>
<td>2.475**</td>
</tr>
<tr>
<td>9. FARMSTU2</td>
<td>-0.9062</td>
<td>0.106</td>
<td>73.617</td>
<td>0.0001</td>
<td>0.404**</td>
</tr>
</tbody>
</table>

*All variables are defined as in Table 17 Footnotes.  
** Significant at both the 0.01 and 0.05 levels.
In Table 24, we see more clearly the differences in the concentration of parity in the three affiliations. Couples who were members of church1 (Andy Weaver) were nine times more likely (OR=9.035) to have ten or more children as compared to couples of Church3 (New Order), while Church2 (Old Order) couples were over four times more likely to have ten or more children as compared to Church3. Thus the New Order Amish were more unlikely to have large family sizes (10 children or more) as compared to the other two church Affiliations (OR=0.229). Ordinary members across the affiliations were less likely to have ten or more children (OR=0.560), while the leaders across affiliations were about 1.8 times more likely to have ten or more children (OR=1.785). By farm status, households with male heads engaged in farm occupations were almost two and a half times more likely to have ten or more children (OR=2.475) as compared to households where the male head was engaged in nonfarm occupations (OR=0.404).

Table 25 gives a summary of the coefficients from the previous four tables discussed above relative to the sample average number of children (5 children). This table essentially summarizes the picture given by the odds ratios in those tables except that the mean value is used as the
Table 25: Summary of Coefficient Signs
Relative to Mean Parity

<table>
<thead>
<tr>
<th>Parity</th>
<th>0-2</th>
<th>0-5</th>
<th>≥6</th>
<th>≥10</th>
<th>Less than Mean</th>
<th>More than Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feratmar</td>
<td>0.078</td>
<td>0.066</td>
<td>-0.095</td>
<td>-0.228</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Marrdur</td>
<td>-0.022</td>
<td>-0.030</td>
<td>0.033</td>
<td>0.042</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Church1</td>
<td>-0.978</td>
<td>-0.660</td>
<td>0.499</td>
<td>2.201</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Church2</td>
<td>-0.291</td>
<td>-0.204</td>
<td>-0.366</td>
<td>1.474</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Church3</td>
<td>0.291</td>
<td>0.204</td>
<td>-0.499</td>
<td>-1.474</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Churst1</td>
<td>1.742</td>
<td>0.556</td>
<td>-0.671</td>
<td>-0.579</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Churst2</td>
<td>-1.742</td>
<td>-0.556</td>
<td>0.671</td>
<td>0.579</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Farmstu1</td>
<td>-0.476</td>
<td>-0.648</td>
<td>0.722</td>
<td>0.906</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Farmstu2</td>
<td>0.476</td>
<td>0.648</td>
<td>-0.722</td>
<td>-0.906</td>
<td>+</td>
<td>-</td>
</tr>
</tbody>
</table>

1 The sample mean number of children is 5.27. For this table, this mean value is rounded off to the nearest whole number i.e. 5. which is used as the mean cut-off point.

reference for each of the explanatory variables. Both Andy Weaver and Old Order church affiliations had a negative association with at most the mean parity, but had positive association with at least the mean parity. This implies that the fertility levels of the two church affiliations tended to be above the average (higher fertility) as compared to the New Order affiliation whose fertility level tend to be below the average (low fertility).

We can give similar explanations for fertility levels of ordinary members (Churst1) as compared to that of the leaders.
(Churst2). The former had below average fertility while the latter had above average fertility as indicated by the positive sign relating their fertility levels to the sample average. Finally, households in which the men were primarily farmers had above average number of children while those households in which the men were engaged in nonfarm occupations had below average number of children.
CHAPTER VII

SUMMARY AND CONCLUSIONS

In this chapter, the major findings of the study are summarized, relevant conclusions made and suggestions of issues for further research are made.

SUMMARY OF MAJOR FINDINGS

This research has shown that there exists significant fertility differentials between the three church affiliations of the Amish of Holmes/Wayne county settlement area of Ohio, at the time of the directory survey. The levels and trends of these differentials showed a pattern of significant variation across the three affiliations and over time. The differentials showed significant associations with two macro-level (structural) factors: the couple's church affiliation and the farm or nonfarm status of the male head of household.

This research has shown that fertility was highest among the more conservative Andy Weaver Amish and was lowest among the more liberal New Order Amish. The moderate Old Order Amish had an average that fell in-between the other two groups.
The age-specific fertility rates by various cohorts of Amish women also showed significant variations between the three groups as well as over time (Tables 12, 13 and 14). These differentials were even more conspicuous when fertility was analyzed on the basis of farm or nonfarm status of male household heads (Table 6). Fertility was shown to be higher for households in which the men were primarily farmers and was lower for households in which the men were engaged in nonfarm occupations.

The third factor which showed an important correlation with fertility for the Amish was the church membership status of the men. This research has shown that across all the three church affiliations studied, elders or leaders had more children on the average as compared to ordinary members of their fellowships (Table 10). This confirmed the relevant hypothesis that leaders among the Amish had higher fertility.

Two major trends among the Amish in the area of study were identified in this research. The first one, which supports the findings of the study by Kreps et al. (1994), is that the occupational structure among the Amish is rapidly changing from being primarily farming to nonfarm occupations. Data in this research have indicated that the proportion of
Amish men engaged in nonfarming occupations was about 61 percent in 1988 (Table 5). Controlling for church affiliation, the involvement of men in nonfarm jobs has been shown in this study to have a dampening effect on their fertility rates i.e. all households for which the men were nonfarmers had consistently lower fertility rates (Table 6).

With regard to trends in fertility of the Amish in Wayne/Holmes county settlement area, this research has shown that by the time of the directory survey, fertility was declining for all the groups regardless of church affiliation, farm or nonfarm status. This trend of decline has the important implication that some form of deliberate family limitation or birth control was being practiced by the Amish in the study area for this decline to have occurred. The rate of fertility decline also followed along farm/nonfarm and church affiliation lines. The more liberal New Order group registered a larger decline as compared to the nonfarm Amish (Tables 7, 9 and 11).

Thus of the variables analyzed, farm and nonfarm status as well as church affiliation were the two most important factors in explaining fertility differentials in the population of study after controlling for marriage duration
and age at first marriage for both the husband and wife. Farm status had a positive and significant association with number of children and households with male heads in farming were more likely to have more than average number of children as compared to those who were not in farming. Nonfarm status had a negative and significant association with number of children and households which had male heads engaged in nonfarm jobs were less likely to have more than the average number of children (Tables 22 and 25).

Similarly, members of the conservative Andy Weaver Amish were more likely to have more than the average number of children as compared to households of the liberal New Order Amish. The Old Order Amish households were less likely to have more than average number of children when compared to the Andy Weaver group. The Old Order tended to be in between the other two in terms of average number of children. (Tables 22 and 25). All three hypotheses that the study set out to test regarding Amish fertility, viz church affiliation, farm or nonfarm status as well as church membership status of the male heads of Amish households were confirmed. These findings therefore support the main theoretical propositions based on historical and empirical observations of the various
fertility transition theories, which postulate that as a society undergoes socio-economic changes, fertility tends to decline. The decline occurs differently within the same society, beginning with groups which tend to be more liberal or that adapt faster to new circumstances.

The demographic variables which were used as control variables in the study were all significant in explaining parity. Age at first marriage of both male and female, as well as marriage duration were important predictors of fertility variation. Although infant mortality was not analyzed in as much detail as the other variables because of lack of sufficient data to compute the infant mortality variable, the limited analysis did show that there was a declining trend of infant mortality among the Amish up to the period of the directory survey (Table 17). Empirical studies of fertility change over time in different societies have shown that a declining infant mortality rate in a traditional society such as the Amish, usually precedes or happens concurrently with declining fertility.

The analysis of age specific marital fertility indicated that the age group of peak fertility among the Amish was 25-29 followed by the younger 20-24 age group. At all age levels,
the nonfarm women had substantially lower rates as compared to the farm Amish. All the periods for which data were analyzed indicated that fertility among older women (ages above thirty) declined during each of the periods, a fact which further supported the idea that the Amish were in some way practicing deliberate family limitation (Table 15).

**SUGGESTIONS FOR FUTURE RESEARCH**

The research regarding fertility differentials among the Amish in the Wayne/Holmes county settlement area of Ohio did not include the ultra-conservative Swartzentruber Amish who also live in the same settlement area. Like the Hutterites who are often used as the benchmark in fertility studies, the Swartzentruber Amish offer a very appropriate benchmark for the study of Amish fertility. Future research of Amish fertility should be directed at collecting data on this important group and using the group as a benchmark for comparisons of fertility differences between the various Amish groups.

This research used only a small portion of the data available in the 1988 Ohio Amish directory. The various Amish directories for Ohio and for other Amish settlements contain
a wealth of information that is rarely utilized by social scientists. In fact, in addition to the already available directories, there is a forthcoming issue of the Ohio Amish Directory for 1996 which will contain updated and expanded information on the Amish of Wayne/Holmes county.

In further studies of Amish fertility, an analysis and comparison of information found in these directories for various Amish settlements of different sizes as well as for the different periods of time could yield very interesting results for fertility scholars and others interested in the study of the Amish. Size of settlement as a variable may show interesting patterns due to, among other things, the effect of density of social interaction and the isolation of the particular settlement from other (non-Amish) populations.

A future study of Amish fertility could also address itself to the historical analysis of change and differentiation in Amish farming and how this has impacted fertility. A major component of this differentiation, as was noted in this study, is that by 1988 there was an increased shift by the Amish from farm to nonfarm occupations. This shift continues to occur and as such is an issue for further research. For example, relative to the growing complexity of
the Amish occupational structure would be the analysis of fertility by type of off-farm employment among the Amish today. One could examine fertility differentials for factory workers as compared to construction workers, or between service industry workers and lumber mill workers etc.

Moreover, such a study could also examine the relationships between Amish fertility and (cash) incomes generated from working in nonfarm occupations. The growth in both personal income (wages and salaries) and national income (value of goods and services produced in a county per period of time) has been shown to have a strong negative association with fertility. The study of the income variable for the various categories and employment types among the Amish would therefore yield interesting differentials between the various Amish groups. Such a study could make use of data from the existing Amish directories including the forthcoming 1996 Ohio Amish directory.

Also, with the availability of directories for multiple time periods (1965, 1981, 1988 and 1996), a study of fertility variation over time and by specific periods would show interesting patterns arising from period effects and time effects. These could be done on the basis of affiliation as
well as by farm or nonfarm status of Amish men. A study with this focus could be very useful in an attempt to identify the period during which fertility transition among the Amish could be said to have began.

Another issue that was mentioned in this research as having relevance to fertility change for the Amish but was not part of the study objectives is the question regarding the availability and cost of land for the Amish. Further studies are needed that would examine the relationship between fertility levels and land or farm size. Such a study would also possibly reveal interesting geographical or locational differentials in fertility.

A substantial amount of the variation in fertility is more directly explained by what in demographic parlance are known as "proximate determinants." These are factors such as birth spacing, breastfeeding practices, etc., as well as the use of (mechanical) birth control methods that directly impact the birth performance of couples. There is need for an intensive qualitative study of Amish practices and strategies with respect to family planning practices and particularly birth control. This could be done by interviewing a selected sample of healthcare workers and Amish women in several Amish
settlements on issues relating to these proximate determinants of fertility. Information obtained from such interviews could be supplemented with other relevant data which can be derived from the forthcoming 1996 directory, such as age at marriage, interval between marriage and first child, etc. The incorporation of these variables in the study of Amish fertility would yield a more powerful model for the study and prediction of Amish fertility.

One further issue which is also a subject for further research is the relevance of macro-analytical and micro-analytical theoretical frameworks in the study of tradition bound subcultures within the modern industrialized societies, like the Amish. While these theoretical conceptualizations capture quite well the dynamics of change in societies within the developing countries, which in most cases tend to be more open to Western influence, their relevance is questionable to the analysis of subcultures like the Amish that have a fair amount of success in their history of insulating themselves from the forces of modernity. For example, how much does externally induced (macro-structural) change affect the reproduction behavior of the Amish given that they spend only a limited amount of time interacting with the non-Amish world?
Given the above, a further question is, how much of the observed differences in fertility among the Amish can we really attribute to factors in the macro-environment in which they live? At the micro (individual) level, how much of the fertility outcomes or choices made by Amish couples within the constraining socio-cultural values of their society really reflect individual (rational) choices made by couples regardless of their socio-cultural conditioning, i.e. how much can we explain the reproductive outcomes in terms of the rational choices due to changed (economic) circumstances? These are issues that deserve to be addressed in future studies of the Amish that would use fertility transition theoretical frameworks.

A final topic of interest is the implications of all the above issues to the future survival of the Amish as a subculture in North America. Given the Amish background of schisms and splits arising from disagreements based on differences among them in the interpretation of what constitutes being Amish, one can hypothesize that the issue of whether to allow the widespread practice of birth control may be a basis for a further division in the future or
increased defection from the Amish faith. This too is an area that requires further research.

CONCLUSIONS

This study has used fertility transition theories as a basis for the formulation of the hypotheses and analysis of fertility differentials among the Amish of Holmes/Wayne county settlement area in Ohio. The research has contributed to the knowledge and understanding of Amish fertility through the following findings:

First, there is a trend of occupational movement from farming to nonfarming among the Amish, and along with this, there exists significant differentials in Amish fertility based on farm or nonfarm status of the husband. Second, there exists significant differentials in fertility based on church affiliation of Amish couples. Third, there exists significant differentials in Amish fertility between the leaders as compared to ordinary members across all affiliations. Fourth, there is a trend of declining fertility among all the ranks of the Amish.
APPENDIX A

LOCATION OF AMISH SETTLEMENTS IN OHIO
Figure 5: LOCATION OF AMISH SETTLEMENTS IN OHIO
APPENDIX B

SAMPLE PAGE FROM DIRECTORY
MILLER, SIMON J.
7491 Honeycomb Rd. Frederickburg  
Son of Charles s. and Katie S. (Yoder) Miller  
b. Nov. 30, 1907 m. Apr. 4, 1930 to  
KATE J. RAUER b. July 25, 1919 dau. of  
John C. and Fanny J. (Mast)  
Children:  
Weaver b. Nov. 28, 1956 A  
David b. Apr. 18, 1960  
Ira b. Oct. 18, 1960  
Mary Ann b. June 3, 1970  
John b. Nov. 4, 1970  
Rudy b. Dec. 28, 1970  
Barbara b. Oct. 11, 1970  
Rhoda b. Oct. 8, 1970  

MILLER, STEVEN E.
5093 Frederickburg Rd. Frederickburg  
Son of Eli J. and Mattie W. (Yoder) Miller  
b. Jan. 12, 1903 m. Sept. 5, 1925 to  
HILIE J. HUCHESTILLER b. Sept. 4, 1904 dau. of  
John E. and Sara A. (Mast) Hochster  
Children:  
Elsie b. Dec. 12, 1936 A  

TROYER, ADEN J.
7701 Carr Rd. Frederickburg  
Son of Jacob R. and Fannie (Miller) Troyer  
b. Aug. 12, 1952 m. Oct. 11, 1973 to  
CLAIR WEISS b. Nov. 10, 1950 dau. of  
Eli F. Weiss and Edna Miller  
Children:  
Daniel b. July 13, 1974 A  
Jared b. Feb. 6, 1976  
Erika b. Feb. 21, 1976  
Fannie b. July 5, 1978  
Ira b. Apr. 1, 1980  
Ethel b. Aug. 12, 1981  
Alvy b. Nov. 8, 1982  
Barbara b. Apr. 27, 1984  
Linda b. May 18, 1986  
Rhoda b. Jan. 7, 1988  

TROYER, DAN B. [Min.]  
6560 Salt Creek Rd. Frederickburg  
Son of Ben J. and Mattie M. (Elli) Troyer  
b. Apr. 10, 1922 m. Dec. 23, 1943 to  
AMANDA E. CHUPP b. Oct. 20, 1921 dau. of  
Ella J. and Lois J. (Miller)  
Children:  
Stullman Son b. Sept. 20, 1946  
Ada b. July 24, 1951  
M. Ada Schlabach Jr. 704 G Rd. N 2  
Frederickburg  
Rachel b. Feb. 23, 1954  
M. Ada Schlabach Jr. 704 G Salt Creek Rd. N 2  
Frederickburg  

TROYER, ELIN
6170 Harrison Rd. Frederickburg  
Son of Andy C. and Amanda (Yoder) Troyer  
b. July 31, 1912 m. Dec. 27, 1930 to  
AMANDA HERSBERGER b. Sept. 10, 1916 dau. of  
Eli E. and Fannie (Yoder) Herber  
Children:  
Stillman Son b. Dec. 13, 1930  
Jesse b. Apr. 7, 1941  
Larry b. Apr. 13, 1943  
Melvin b. Dec. 28, 1946  
M. Ada Schlabach Jr. 704 G Rd. N 2  
Frederickburg  
Noah b. Aug. 2, 1949  
M. Ada Schlabach Jr. 704 G Rd. N 2  
Frederickburg  
Rudy b. Apr. 13, 1943  
Melvin b. Dec. 28, 1946  
M. Ada Schlabach Jr. 704 G Rd. N 2  
Frederickburg  
M. Ada Schlabach Jr. 704 G Rd. N 2  
Frederickburg  

TROYER, JACOB N. (Dbl.)  
7699 Carr Rd. Rt. 3 Frederickburg  
Son of Rudy E. and Amanda (Yoder) Troyer  
b. Mar. 2, 1920 m. Nov. 28, 1940 to  
FANNIE MILLER b. Jan. 30, 1921 dau. of  
Eli J. and Barbara D. (Troyer)  
Children:  
Eli b. Feb. 17, 1942  
M. Ada Schlabach Jr. 704 G Rd. N 2  
Frederickburg  
Noah b. Aug. 10, 1944  
M. Ada Schlabach Jr. 704 G Rd. N 2  
Frederickburg  
Barbara b. Sept. 7, 1946  
M. Ada Schlabach Jr. 704 G Rd. N 2  
Frederickburg  

WENGER, LEVIA  
6170 Harrison Rd. Frederickburg  
Son of Ammon C. and Eliza (Yoder) Wenger  
b. Jan. 27, 1904 m. Nov. 12, 1964 to  
LIZZIE E. TROYER b. Apr. 13, 1903 dau. of  
Eli E. and Fannie (Troyer)  
Children:
APPENDIX C

DISTRIBUTION OF HOUSEHOLDS BY FARM STATUS
Figure 7: Distribution of Households by Farm Status
APPENDIX D

PARITY DISTRIBUTION BY FARM STATUS
Figure 8: Parity Distribution by Farm Status
APPENDIX E

DISTRIBUTION OF PARITY BY CHURCH AFFILIATION
Figure 9: Distribution of Parity by Church Affiliation
APPENDIX F

PARITY DISTRIBUTION BY STATUS IN CHURCH
Figure 10: Parity Distribution by Status in Church
APPENDIX G

SUMMARY OF AMISH FERTILITY BY FARM STATUS AND AFFILIATION
Figure 11: Summary of Amish Fertility by Farm Status and Affiliation
APPENDIX H

CORRELATION ANALYSIS RESULTS
### Table 26: Correlation Analysis Results

The SAS System

**Correlation Analysis**

**Pearson Correlation Coefficients / Prob > |R| under Ho: Rho=0 / # of Observations**

<table>
<thead>
<tr>
<th>NUMKIDS</th>
<th>CHURCH1</th>
<th>CHURCH2</th>
<th>CHURCH3</th>
<th>CHURST1</th>
<th>CHURST2</th>
<th>FARMSTU1</th>
<th>FARMSTU2</th>
<th>FARMMAR</th>
<th>HAATMAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00000</td>
<td>0.12935</td>
<td>-0.62710</td>
<td>-0.15612</td>
<td>-0.02012</td>
<td>0.0003</td>
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<td>0.20303</td>
<td>-0.0003</td>
</tr>
<tr>
<td>0.12935</td>
<td>1.00000</td>
<td>-0.62710</td>
<td>-0.15612</td>
<td>-0.02012</td>
<td>0.0003</td>
<td>-0.05844</td>
<td>-0.20303</td>
<td>0.20303</td>
<td>-0.0003</td>
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<td>-0.62710</td>
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<td>-0.15612</td>
<td>-0.15612</td>
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<tr>
<td>-0.02012</td>
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<td>-0.10479</td>
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</tr>
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<td>-0.02499</td>
<td>0.02499</td>
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<td>-0.0003</td>
<td>0.0003</td>
<td>0.0003</td>
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<tr>
<td>-0.20303</td>
<td>-0.20303</td>
<td>0.02499</td>
<td>-0.02499</td>
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<td>-0.02499</td>
<td>0.02499</td>
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<td>-0.0003</td>
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<td>0.20303</td>
<td>0.02499</td>
<td>0.02499</td>
<td>-0.02499</td>
<td>0.02499</td>
<td>-0.02499</td>
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<tr>
<td>FARMSTU1</td>
<td>0.24311</td>
<td>-0.00253</td>
<td>-0.00253</td>
<td>1.00000</td>
<td>-0.00253</td>
<td>0.0001</td>
<td>0.0001</td>
<td>0.0003</td>
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</tr>
<tr>
<td>FARMSTU2</td>
<td>-0.24311</td>
<td>-0.00253</td>
<td>0.0001</td>
<td>0.0001</td>
<td>0.0001</td>
<td>0.0001</td>
<td>0.0001</td>
<td>0.0001</td>
<td>0.0001</td>
</tr>
<tr>
<td>FAATMAR</td>
<td>-0.10479</td>
<td>0.00036</td>
<td>0.00036</td>
<td>0.00036</td>
<td>0.00036</td>
<td>0.00036</td>
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<td>0.00036</td>
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<tr>
<td>HAATMAR</td>
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<td>-0.03789</td>
<td>0.05142</td>
<td>0.10206</td>
<td>0.24779</td>
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173
APPENDIX I

AGE DISTRIBUTION OF WOMEN BY FARM STATUS
Table 27: Age Distribution of Women by Farm Status

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
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<th></th>
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<tr>
<td>FARM</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
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<td>24</td>
<td>36</td>
<td>42</td>
<td>31</td>
<td>32</td>
<td>31</td>
<td>130</td>
<td>326</td>
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<tr>
<td></td>
<td>(0.0)</td>
<td>(7.4)</td>
<td>(11.0)</td>
<td>(12.9)</td>
<td>(9.5)</td>
<td>(9.8)</td>
<td>(9.5)</td>
<td>(39.9)</td>
<td>(100)</td>
</tr>
<tr>
<td>NONFARM</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>63</td>
<td>82</td>
<td>79</td>
<td>51</td>
<td>36</td>
<td>28</td>
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<td></td>
<td>(0.4)</td>
<td>(12.8)</td>
<td>(16.6)</td>
<td>(15.9)</td>
<td>(10.3)</td>
<td>(7.3)</td>
<td>(5.7)</td>
<td>(30.9)</td>
<td>(100)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2</td>
<td>87</td>
<td>118</td>
<td>121</td>
<td>82</td>
<td>88</td>
<td>59</td>
<td>283</td>
<td>820</td>
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<tr>
<td></td>
<td>(0.2)</td>
<td>(10.6)</td>
<td>(14.4)</td>
<td>(14.8)</td>
<td>(0.1)</td>
<td>(10.7)</td>
<td>(7.2)</td>
<td>(34.5)</td>
<td>(100)</td>
</tr>
</tbody>
</table>

*Numbers in parenthesis are percentages of row total.
APPENDIX J

AGE DISTRIBUTION OF WOMEN BY CHURCH AFFILIATION
<table>
<thead>
<tr>
<th></th>
<th></th>
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<tbody>
<tr>
<td>ANDY</td>
<td>0</td>
<td>15</td>
<td>15</td>
<td>11</td>
<td>12</td>
<td>10</td>
<td>6</td>
<td>36</td>
<td>105</td>
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<tr>
<td>WEAVER</td>
<td>(0.0)</td>
<td>(14.3)</td>
<td>(10.5)</td>
<td>(10.5)</td>
<td>(11.4)</td>
<td>(9.5)</td>
<td>(5.7)</td>
<td>(34.3)</td>
<td>(100)</td>
</tr>
<tr>
<td>OLD</td>
<td>1</td>
<td>64</td>
<td>88</td>
<td>98</td>
<td>61</td>
<td>51</td>
<td>41</td>
<td>194</td>
<td>598</td>
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<td>(0.2)</td>
<td>(10.7)</td>
<td>(14.7)</td>
<td>(16.4)</td>
<td>(10.2)</td>
<td>(8.5)</td>
<td>(6.9)</td>
<td>(32.4)</td>
<td>(100)</td>
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<tr>
<td>NEW</td>
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<td>15</td>
<td>12</td>
<td>9</td>
<td>7</td>
<td>12</td>
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<td>87</td>
<td>118</td>
<td>121</td>
<td>82</td>
<td>68</td>
<td>59</td>
<td>283</td>
<td>820</td>
</tr>
</tbody>
</table>

* Numbers in parentheses are percentages of row total.
APPENDIX K

AGE DISTRIBUTION OF MALE HEADS OF HOUSEHOLD BY CHURCH MEMBERSHIP STATUS
Table 29: Age Distribution Of Male Heads of Household By Church Membership Status

<table>
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<th></th>
<th></th>
<th></th>
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<td>MEMBER</td>
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<td>86</td>
<td>114</td>
<td>112</td>
<td>69</td>
<td>58</td>
<td>43</td>
<td>233</td>
<td>717</td>
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<tr>
<td>ONLY</td>
<td>(0.3)</td>
<td>(11.9)</td>
<td>(15.9)</td>
<td>(15.6)</td>
<td>(9.6)</td>
<td>(8.1)</td>
<td>(5.9)</td>
<td>(32.5)</td>
<td>(100)</td>
</tr>
<tr>
<td>MINI</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>6</td>
<td>7</td>
<td>5</td>
<td>7</td>
<td>26</td>
<td>54</td>
</tr>
<tr>
<td>STER</td>
<td>(0.0)</td>
<td>(0.0)</td>
<td>(5.6)</td>
<td>(11.1)</td>
<td>(22.2)</td>
<td>(9.3)</td>
<td>(12.9)</td>
<td>(48.1)</td>
<td>(100)</td>
</tr>
<tr>
<td>DEACON</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>6</td>
<td>11</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>(0.0)</td>
<td>(3.7)</td>
<td>(0.0)</td>
<td>(7.4)</td>
<td>(14.8)</td>
<td>(11.1)</td>
<td>(22.2)</td>
<td>(40.7)</td>
<td>(100)</td>
</tr>
<tr>
<td>BISHOP</td>
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<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>13</td>
<td>22</td>
</tr>
<tr>
<td></td>
<td>(0.0)</td>
<td>(0.0)</td>
<td>(4.5)</td>
<td>(4.5)</td>
<td>(9.0)</td>
<td>(9.0)</td>
<td>(13.6)</td>
<td>(59.0)</td>
<td>(100)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2</td>
<td>87</td>
<td>115</td>
<td>121</td>
<td>82</td>
<td>68</td>
<td>59</td>
<td>283</td>
<td>820</td>
</tr>
<tr>
<td></td>
<td>(0.2)</td>
<td>(10.6)</td>
<td>(14.0)</td>
<td>(14.8)</td>
<td>(10)</td>
<td>(8.3)</td>
<td>(7.2)</td>
<td>(34.5)</td>
<td>(100)</td>
</tr>
</tbody>
</table>
APPENDIX L

CODEBOOK
AMISH DIRECTORY: DEMOGRAPHY ANALYSIS
### CODEBOOK
**AMISH DIRECTORY: DEMOGRAPHY ANALYSIS**

<table>
<thead>
<tr>
<th>CARD NUMBER/ COLUMN</th>
<th>DESCRIPTION OF VARIABLE</th>
<th>VARLABEL</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-6</td>
<td>Identification number</td>
<td>housenum</td>
</tr>
<tr>
<td></td>
<td>00001-99999</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(numbers are continuous from one district to the next)</td>
<td></td>
</tr>
<tr>
<td>7-8</td>
<td>Settlement (directory title)</td>
<td>settdir</td>
</tr>
<tr>
<td></td>
<td>1 = Holmes and Vicinity</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Affiliation</td>
<td>churaff</td>
</tr>
<tr>
<td></td>
<td>1 = Andy Weaver</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 = Old Order</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3 = New Order</td>
<td></td>
</tr>
<tr>
<td>12-15</td>
<td>Church District Number/Letter</td>
<td>churdist</td>
</tr>
<tr>
<td></td>
<td>Fourth digit: 0 = no letter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 = A</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 = B</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Example:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Brush Run West (1) = 0010</td>
<td></td>
</tr>
<tr>
<td></td>
<td>New Bedford North (12) = 0120</td>
<td></td>
</tr>
<tr>
<td></td>
<td>New Bedford Middle (12A) = 0121</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Flat Ridge (21B) = 0212</td>
<td></td>
</tr>
<tr>
<td>17-24</td>
<td>Birthdate of First Person listed</td>
<td>birthl</td>
</tr>
<tr>
<td></td>
<td>Note: all birthdays before 1900 will be listed as 01011900</td>
<td></td>
</tr>
</tbody>
</table>
26-33  Marriage Date (Most Recent Marriage)  Marrdate
(26-27:month/28-29: day/30-33:year)

35  Marital Status of First Person Listed  Marstul1
1=Married
2=Never Married
3=Widow
4=Widower
9=No information/not applicable

37  Number of Previous Spouses prevspl
0=none
e.tc.

39  Gender of First Person genderl
0=no information
1=male
2=Female

41-42  Farm/Nonfarm Status of First Person Listed  farmstl1
1=Farm/Farm Laborer
2=Retired Farm
3=Nonfarm
9=Not indicated/not applicable

44-47  Occupational Code: 1st occupation of first person  primocc

0001-0024  Most frequently mentioned occupations
0001=Active Farmer (all types)
0002=Retired Farm
0003=Farm Laborer/Herdsman
0004=Feed mill worker/agricultural supply store/seed dealer/farm chemical dealer
0005=Carpenter/furniture/hickory chair maker/woodworker/cabinet maker (inc. furniture making companies such as Artwood
Products, Berlin Wood, Schrocks Woodcrafts, Hiland Wood Products, Holmes Furniture, EYE Woodcrafts

0006=Carpenter/construction (companies such as Stark Truss)
0007=Carpenter/no company listed, unspecified.

0008=Laborer/factory worker/day laborer (or listing a company, such as Akro, Wayne-Dalton Doors, Skyline Corp., Semac Industries, Semco Ceramics, trailer factory, Sugar Creek Clay and limestone, Sugar Creek Door and Window

0009=Sawmill worker (inc. sawyer/logger/lumber grader timber cutter/lumberman)

0010=Pallet Assembly (inc. Pallet-All, Litco Pallet and companies which make pallets)

0011=Lumber Yard/Hardware (inc. Keim Lumber, Holmes Lumber, Yoder Lumber, Gross Lumber, Lehman Hardware, Northwood Lumber, Stoney Point Lumber, Sugar Creek Lumber and similar businesses)

0012=Brickyard worker (inc. Beldon Brick)
0013=Mason (bricklayer/stonemason)
0014=Buggy Shop/buggy maker/buggy repair/carriage shop/wheelwright
0015=Mechanic/engine repair/mechanist

44-47

0016=Shop work/shop repair/repairman/machine shop
0017=Harness shop/harness maker/harness repair/collar shop
0018=Cheese plant worker/cheesegrader (inc. listing of cheese company like Steiner Cheese, Guiggesberg Cheese, Heine'ys Cheese)
0019=Painter
0020=Blacksmith/horseshoeng
0021=Heavy equipment operator (inc.
dragline operator/bulldozer operator/caterpillar operator/loader operator
0022=Coal miner (inc. Peabody or Peabody Galion Coal Company, Peabody Pullman, Wayne Mines)
0023=Leathershop worker/leather manufacturing
0024=Plumber/Pipeliner/pipefitter
0025=Maintenance worker

0026-0199: Other Occupations (predominantly men)

0026=Auctioneer
0027=Baker
0028=Blanketmaker/rug weaver/carpet weaver or maker/quilter
0029=Bookkeeper/Bookkeeping
0030=Bookstore owner/worker
0031=Bulk Foodstore mgr/worker
0032=Butcher/Meat cutter
0033=Clockmaker and repair/watchmaker and repair
0034=Contractor/Builder
0035=Drywaller
0036=Excavator
0037=Floor Sander
0038=Foundry Worker
0039=Fur and Hide Dealer/Trader
0040=Gunsmith/Gunsales
0041=Oilfield/Gasfield worker
0042=Roofer

44-47

0043=Salesperson
0044=Sheetmetal worker
0045=Storeowner
0046=Tarp shop/tarpmaker/tarp repair
0047=Tax accountant/tax preparer
0048=Toolmaker
0049=Deglazer of tile block

(list others)

0199=Self employed (unspecified)
0200-0250: Other occupations (predominantly women)

0200=Domestic/Maid/housework/cleaning
0201=Dry Goods Store
0202=Health Aid Worker
0203=Nurse
0204=Office Worker/Clerical/Secretary
0205=Quilter/Knitting/sewing
0206=Restaurant worker/dishwasher
0207=Teacher/teacher's aid
0208=Therapist/masseuse/reflexologist
0209=Waitress/waiter

9997=Retired (nonfarm, for example, retired carpenter, retired laborer, retired bricklayer etc.)
9998=Retired (unspecified)
9999=No occupational listing

49-52 Occupational Code: 2nd Occupation of first person Secocc1 (same as above)

54 Status in Church (Male only) Churstus
1=Member
2=Minister
3=Deacon
4=Bishop
5=Retired Minister
6=Retired Deacon
7=Retired Bishop
9=female

56-63 Birthdate of 2nd Person listed bdate2

65 Marital Status of 2nd Person listed Marstu2

67 Number of Previous Spouses
0=None (one or no spouses)
1=1 (two spouse)
2=2 (three)
2=2 (three spouse)
3=3 (four spouses)
etc.

69
Gender of 2nd person listed  Gender2
0=no information
1=male
2=female

2-6
Identification number  Housenum
00001-99999
(numbers are continuous from one church district to the next)

7
Gender of 1st Offspring  Sexoff1
0=No Information
1=Male
2=Female
9=Not Applicable (no children)

9-16
Birthday of 1st Offspring  biroff1
(1st 2 digits=month, next 2 digits=day, last 4 digits=year)
999999999=not applicable (no children)

18
Baptism Code  baptsl
0=No information
1=A:children are still living at home with parents
2=B:married and Amish and living in the community
3=C:married and Amish and living in another community
4=D:no longer Amish
5=E:Single, but not living at home
9=Not Applicable (no children)

20
Infant Mortality Code  mortl
0=alive
1=listed as stillborn
2=died before first birthday
3=died before fifth birthday
9=Not applicable (no children)

Repeat codes for Offspring #2
Gender sexoff2
0=No Information
1=Male
2=Female
9=Not Applicable

Birthdate
(1st 2 digits=month, next 2 digits=day,
last 4 digits=year)
999999999=Not applicable

Baptism Code
0=No information
1=A: children are still living at home with
   parents
2=B: married and Amish and living in the
   community
3=C: married and Amish and living in
   another community
4=D: no longer Amish
5=E: Single, but not living at home
9=Not Applicable (1 child)

Mortality Code
0=alive
1=listed as stillborn
2=died before first birthday
3=died before fifth birthday
9=Not applicable (1 child)

Repeat Codes for Offspring #3
Repeat Codes for Offspring #4
Identification number
00001-99999 Housednum
(numbers are continuous from one
church district to the next)
Repeat Codes for Offspring #5
Repeat Codes for Offspring #6

37-50
Repeat Codes for Offspring #7

52-65
Repeat Codes for Offspring #8
2-6
Identification Number
00001-999999

(numbers are continuous from one church district to the next)

7-20
Repeat Codes for Offspring #9

22-35
Repeat Codes for Offspring #10

37-50
Repeat Codes for Offspring #11

52-65
Repeat Codes for Offspring #12

2-6
Identification Number
00001-999999

(numbers are continuous from one church district to the next)

7-20
Repeat Codes for Offspring #13

22-35
Repeat Codes for Offspring #14

37-50
Repeat Codes for Offspring #15

52-65
Repeat Codes for Offspring #16

2-6
Identification number
00001-999999

(numbers are continuous from one church district to the next)

7-20
Repeat Codes for Offspring #17

22-35
Repeat Codes for Offspring #18
37-50  Repeat Codes for Offspring #19
52-65  Repeat Codes for Offspring #20
APPENDIX M

DIRECTORY SURVEY REPORT FORM
### FAMILY GENEALOGY FORM

<table>
<thead>
<tr>
<th>Field</th>
<th>Information</th>
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</tr>
<tr>
<td>District</td>
<td></td>
</tr>
<tr>
<td><strong>FATHER</strong></td>
<td></td>
</tr>
<tr>
<td>Full Birth Date</td>
<td></td>
</tr>
<tr>
<td>Address</td>
<td></td>
</tr>
<tr>
<td>Full Death Date (if deceased)</td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
</tr>
<tr>
<td>Birthplace: State</td>
<td></td>
</tr>
<tr>
<td>County</td>
<td></td>
</tr>
<tr>
<td>Township</td>
<td></td>
</tr>
<tr>
<td>District</td>
<td></td>
</tr>
<tr>
<td>Parents of Father: Father</td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td></td>
</tr>
<tr>
<td>Most Recent Address of Parents:</td>
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</tr>
<tr>
<td><strong>MOTHER</strong></td>
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</tr>
<tr>
<td>Full Birth Date</td>
<td></td>
</tr>
<tr>
<td>Address</td>
<td></td>
</tr>
<tr>
<td>Full Death Date (if deceased)</td>
<td></td>
</tr>
<tr>
<td>Occupation</td>
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</tr>
<tr>
<td>Birthplace: State</td>
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<tr>
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<td>District</td>
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<td>Parents of Mother: Father</td>
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<tr>
<td>Mother</td>
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</tr>
<tr>
<td>Most Recent Address of Parents:</td>
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</tr>
<tr>
<td><strong>Full Date of Marriage:</strong></td>
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</tr>
<tr>
<td>Place of Marriage: State</td>
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</tr>
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<td>County</td>
<td></td>
</tr>
<tr>
<td>Township</td>
<td></td>
</tr>
<tr>
<td>District</td>
<td></td>
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<tr>
<td><strong>Use Below Only If Remarried:</strong></td>
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</tr>
<tr>
<td>Name of Previous Marriage Partner:</td>
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</tr>
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<td>Full Birth Date</td>
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