The Demographic Foundations of Change in U.S. Households in the Twentieth Century

by

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Abstract

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The first objective of this research is to describe household change in the United States over the twentieth century. The next is to determine how much of that change is due to the changing demographic composition of the population, defining demographic composition as the structure of the population by age, sex, marital and parity status. The final objective is to determine how much of the demographic composition effect is due to each of the three vital rate components of fertility, mortality, and nuptiality. Achieving these objectives allows us to understand household change in the past, unite disparate threads of research on households, and refine tools for the projection of future household change.

I describe household change in the United States using decennial census samples from 1900 to 2000, combined with a new household classification system. The results confirm the long-term trend of household atomization, with the distribution of people across household types shifting away from complex structures involving extended kin and non-relatives, and toward living alone, with only a spouse, or children. In addition, longer average lifespans have brought with them a new household stage during which spouses live together after the children leave the parental home. Less noted in existing literature are the continuities in American households over the century. The proportion of people who share a household with relatives only has remained fairly stable, as has the presence of spouses (for adults) and parents (for children) in the average person's household. Finally, the new classification system's treatment of non-relatives reveals their rapidly increasing prevalence in households in the most recent decades, reversing a long-term trend. Thus, non-relatives

may be a new source of household complexity in the future.

Much of the description of household change suggests ways in which demographic composition affects households. To specify these effects, I use the same data as in the descriptive work, combined with decomposition techniques to attribute changes in the distribution of people across household types to two components: the demographic composition component, defined as the age, sex, marital and parity distributions in the population, versus the household propensity component, defined as the conditional probability of living in a certain household type given age, sex, marital and parity status. Microsimulation is then used to separate the demographic composition component into its vital rate components of fertility, mortality, and nuptiality. The results of this analysis show that, although the movement away from larger, more complex household types does not seem to have been demographically driven, demographic composition had a great deal to do with which of the smaller household types grew while the more complex types became less prevalent. Specifically, population aging favored people living alone or in households consisting of married couples only while fertility fluctuations increased the share of households consisting of nuclear families during the baby boom, and decreased that share during the subsequent baby bust. The most recent decades have seen an increase in more complex household structures, stemming from decreases in marriage, increases in divorce, and increases in cohabitation.

In addition to revealing patterns in the past, the microsimulation is also used to project future household change under various demographic scenarios. These projections imply that current patterns of delayed or foregone marriage and high divorce could end the century-long increase in married couple household prevalence. Also, continued high levels of extramarital childbearing could lead to a rise in household complexity, as unmarried parents and their children tend to live in more complex household types. Finally, projections suggest that future population change will continue to contribute positively to living alone and negatively to nuclear family households.

Professor Ronald D. Lee
Dissertation Committee Chair

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Chapter 1

Introduction

1.1 Research Question

The goal of this research project is to specify the role that demographic compositional change has played in shaping the household change observed in the United States over the twentieth century. The concept of household used here is one of shared living arrangements in a particular dwelling, as opposed to a system of exchange or mutual obligation. The compositional effects considered in this research are the population's age and sex structure, and marital and parity status distributions. Changes in demographic composition arise, ultimately, from the vital processes of fertility, mortality, and nuptiality (including marriage and divorce). Specifying the demographic foundation of household change, then, involves addressing two specific questions:

1. what is the magnitude of demographic compositional effects on household change in the United States over the twentieth century, and
2. how are demographic compositional effects ultimately determined by the vital processes that shaped the population?

1.2 Research Outline

The empirical research begins with a description of household change in the United States from 1900 to 2000, employing decennial census data for the century, gathered and coded for consistency in the Integrated Public Use Microdata Series database (Ruggles and

Sobek 2003). As part of this description, an original household classification system is used to examine the distribution of population across eight household types. The innovations of this classification system are its lack of reference to a household head and its clear treatment of non-relative relationships in the household. The changes in the household type distribution over the century constitute the variation to be explained in the subsequent empirical work.

To explain this variation, decomposition techniques are used to apportion changes in the household distribution into two components: the demographic composition component, defined as household change due to changes in the joint distribution of age, sex, marital and parity status in the population, versus the household propensity component, defined as household change due to changing conditional probabilities of living in a certain household type given a particular age, sex, marital and parity status.

In order to determine the effect of vital rates on household change, microsimulation is used to make demographic composition a function of its fertility, mortality, and nuptiality rates. Decomposition can then be used again to attribute the demographic composition component of household change to changes in fertility, mortality, and nuptiality.

Finally, the microsimulation is used to project future demographic composition. The projected populations are combined with existing household propensities to estimate a "baseline" of household change to be expected from changes in demographic composition in the future, holding household propensities fixed.

1.3 Motivation

Consider the factors involved in the decision of what kind of household to live in. While a basic question may be what kind of household arrangement suits you, there are many other questions that involve balancing preferences with circumstances. Who is available to you in terms of relatives or friends with whom you could reside? Can you afford to live the way you want, given your resources and what is available in the housing market, or do you have to compromise? Are you of an age where you require the assistance of others and thus cannot live alone, either because you are too young or too old? What kind of support might you get (financial or otherwise) from a coresident friend, partner or family member that would make you want to share a household with that person? Will you face social sanction if you choose to live in a particular arrangement? Do you feel pressure from family members or society to arrange your household in a certain way?

Then consider the potential outcome of your choice of living arrangement. You may be nearby to help care for young or elderly dependents in your family, and thus able to offer the kinds of support that requires your being present. On the other hand, you may be far away from those dependents and only able to offer monetary support, or perhaps the distance will undermine feelings of responsibility for giving any form of support. Your living arrangement decision may put pressure on the existing housing market, contributing to increases in housing prices and new construction, with subsequent environmental impacts from that construction. If you eschew traditional norms about how one should live and choose a non-traditional household arrangement, your choice could help to undermine those traditional norms by modeling alternative choices for others.

Of course, the impact of those outcomes does not seem very large when the choices involve just a few people. Multiply those outcomes over a whole region, nation, or planet, however, and you begin to see how household change has vast repercussions for individuals and society. A few examples highlight the scale of household impacts. Different household structures imply different household sizes. In the United States, the average person's household size fell by 39%, from 5.7 persons in 1900 to 3.5 by 2000.[1] What contributed to the decline and how different would our cities and towns look now if the average had not changed? Fewer people per household implies an increase in the number of necessary housing units. Depending upon how those units are constructed, they can have large impacts on the environment – they require more cleared land, more building materials, and more infrastructure to support new neighborhoods. Researchers concerned with biodiversity point to these environmental impacts and the trend toward fewer people per household to argue that environmental crises may await countries even if their populations stabilize (Liu, Daily, Ehrlich, and Luck 2003). Beyond the effects of the size of households, changing household structures have contributed to large shifts in economic organization. Ruggles (2001) argues that Social Security was created in part to meet the needs of the elderly living alone as households shifted away from extended families and toward more nucleated forms. That household change contributed to the creation of such a large and successful government

[1]This is a person-weighted average of household size, rather than a household-weighted average, for those persons living in households (as opposed to group quarters). The size of the average household, as opposed to the size of the average person's household, fell by 42% from 4.5 persons in 1900 to 2.6 persons in 2000. Author's calculation based on census data samples from the Integrated Public Use Microdata Series (IPUMS) (Ruggles and Sobek 2003).

program demonstrates its importance in contributing to larger social changes. Another situation highlighting the social changes that can occur when the household's role of taking care of dependents shifts was France's summer heat wave of 2003. The deaths of large numbers of elderly and disabled persons in France were blamed, in part, on the fact that so many of them live alone rather than with family (Rotella and Urbajtel 2003).

Despite the important role played by households, accounting for household change in the past and predicting household change in the future are not on very firm empirical footing. That is not to say that no one has ever inquired as to how and why households change. As will be discussed in Chapter 2, many factors involved in household change have been examined. On the non-demographic side, research has implicated income growth, industrialization, housing market change and changing social norms in the process. On the demographic side, shifts in population composition and kin structure have been a focus of inquiry, as have changes in households for sub-populations such as elderly widows, young unmarried adults, and female-headed single-parent families in more recent times. What remains to be done is to integrate these different strands of research and evaluate these various effects simultaneously, in order to determine their relative magnitudes and develop tools for projection under potential future scenarios.

Untangling every thread of causation in the story of household change is the work of many lifetimes. Narrowing the focus to workable pieces, this research takes on the task of isolating and estimating the demographic compositional element of household change. The effect of demographic composition is a good candidate for isolation and estimation because, compared to forces such as social norms, they are more readily observable and quantifiable. Also, compared to economic forecasting, tools of demographic projection are somewhat more straightforward, at least in the short-term. To the extent that the demographic compositional element of household change can be isolated, it can be combined with demographic projection to ground estimates of expected future household change.

Chapter 2

Context

2.1 Introduction

In order to provide context to the research described in subsequent chapters, this chapter reviews the literature surrounding households and household change. After discussing how to define a household, theoretical models of households from various disciplines are described. The discussion then moves to the practical aspects of observing, classifying and measuring households for research, followed by a review of analytical strategies employed in empirical research. The findings of empirical research on households are then reviewed, including research that looks at household change overall as well as the households of particular sub-groups in the population. Finally, continuations and departures of the current research compared to the existing literature are discussed.

2.2 Households as an Object of Inquiry

The difficulty in dealing with the concept of households is that everyone has some personal experience with households and thus some assumptions about what households are like. Furthermore, the concept of households exists at the intersection of many of the most basic structures of social organization and thus is difficult to pin down. The household concept is related to family, living arrangements and kin networks, but is not synonymous with any one of those concepts. While household definitions can vary for different classification or research purposes, definitions contain three elements: a spatial element defining the household in space, a social element describing who is in the household and how they relate to one another, and finally a time element, fixing a time frame in which the social entities must share the household space in order for them to be considered as members of the household. This research project uses the definition of households used by the Census Bureau of the United States. According to the documentation produced for the 2000 census, a household

> includes all of the people who occupy a housing unit. (People not living in households are classified as living in group quarters. A housing unit is a house, an apartment, a mobile home, a group of rooms, or a single room occupied (or if vacant, intended for occupancy) as separate living quarters. Separate living quarters are those in which the occupants live separately from any other people in the building and that have direct access from the outside of the building or through a common hall. The occupants may be a single family, one person living alone, two or more families living together, or any other group of related or unrelated people who share living quarters (U.S. Bureau of the Census 2002).

In this definition, the defined space is the housing unit, the defined social relationship is simply coresidence and the time element, although not clear from this definition, is to be found in Census Bureau protocols to involve where an individual sleeps most of the time.

The social element in the Census Bureau definition is very broad – the members of a household must have at least a living arrangement relationship. In their classifications of different household types, however, the social element of households is refined to distinguish households with families versus those without. Other household classification schemes recognize household types by degrees of relatedness by blood, marriage or adoption, while for other purposes relatedness can be a more behavioral concept, recognizing non-relatives who are integrated into the household system of mutual exchange and responsibility as a related person might be. Households with cohabiting unmarried partners are an example of this.

Moving on to the spatial element of what constitutes a housing unit, this may be clear in the case of a free-standing structure containing only one group of people with some social relationship, but it is less clear in a multi-unit building such as a hotel or an apartment building. There, some blurring of the distinction between the social and spatial relationships can occur, with one household being defined as separate from another if it contains a separate place where the members of each household eat together.

Given the many subtleties involved in operationalizing a household concept for research, various disciplines have taken different approaches based on what the research interest was. Short descriptions of the different disciplines' theories of what households are and how they change follow. They allow us to understand the implications of the assumptions made in household analysis for interpreting results and discussing their significance. The rest of this section discusses perspectives from anthropology, demography, economics and sociology.

Many anthropologists' interest in households has centered around detailing the family system: rules or norms which shape the creation of a household out of a set of existing kin. This involved defining the household as a unit of social organization meaningful in a particular context, rather than working with a definition that was applicable across different cultural contexts and times (Hammel 1984). This was appropriate given the anthropological goal of figuring out how cultures work to maintain the existence of the group. In this formulation, household change occurred when something made the prior family system unworkable. This might have come about through demographic change, altering the distribution of kin that was necessary for the previous family system to operate. It might have come about if economic change made certain types of households unfeasible. In any event, the household itself was often not the object of scrutiny beyond understanding its birth, development, and death. It was understood to be a locus of production, consumption, and childrearing, but the way in which different household arrangements affected those activities was more of a by-product of the family system than an aspect of the household itself (Wilk and Netting 1984).

This is somewhat similar to the way many demographers look at households – as the product of a family life cycle (Ryder 1975; Santi 1990). Emphasis is placed on understanding transitions through life stages and transitions through living arrangements (Richards, White, and Tsui 1987). As far as defining a household however, demographers, especially those working in the United States context, have very often let the census takers decide what a household was and have gone from there (Burch 1979).

Economic ideas of defining households are often based on what individuals achieve by maintaining the household agglomeration, versus the costs of the arrangement, monetary or otherwise. Households exist, in the economic view, because they achieve optima of production and consumption unattainable by the parties as individuals (Ermisch 1988). More recently, economic research has argued for a more realistic view of the household as full of competition, stemming from the constituent individuals who often have very different goals. In this more nuanced view, a household arrangement is the product of utility maximization of the individuals weighing the costs and benefits of remaining in the household, rather than of a cooperative whole. One of the costs of remaining in a household with others is thought to be the sacrifice of privacy and independence that occurs when sharing living arrangements with others. Taking privacy as a normal good, people purchase as much of it in their living arrangements as possible, within the constraints imposed by income and housing costs (Burch and Matthews 1987).

In this optimization-based view, the fact that households are largely family-based is the legacy of an agrarian past in which family ties were one of the main institutional structures in society. Much was to be gained by staying within this institution, balancing the loss of privacy it entailed. This enabled households to take on many functions that ultimately enabled production, such as education, certification, insurance, and risk-sharing. Household change was the product of the changing economy: economic development took production out of the household into larger agglomerations made feasible by economies of scale. When production moved outside of the household, the household lost many of its other functions, either because those functions could be provided for more economically by the market or because the household was no longer capable of performing the service necessary in the new economic situation (Becker 1981). In this way, the household moved from a locus of production and consumption to one of consumption almost exclusively. Economic change affected both the costs and benefits of particular household arrangements, while at the same time under cutting the centrality of the family in society and decreasing the costs of leaving a family-based household.

The sociological view of households has also focused on its role in production, seeing household members as a family-based labor force (Kertzer 1991). Others take a broader view in defining households as a residence or dwelling of a group of people, not necessarily related but "bound together" to achieve social goals (Schmid 1988). Many sociologists have focused on demographic change as causing changes in households, but have focused on the ultimate roots of those changes in the socially patterned behavior of individuals concerning marriage and reproduction. Influences on those behaviors are understood to come from social and economic forces (Lesthaeghe 1983, for example).

To summarize, all of the different understandings of households can be fit into a broad behavioral model of choice guided by preferences, in the face of constraints (Burch 1979). The differences occur in emphasis on preferences or constraints, and whether constraints are narrowly defined as material conditions, or opened up to include the effects of

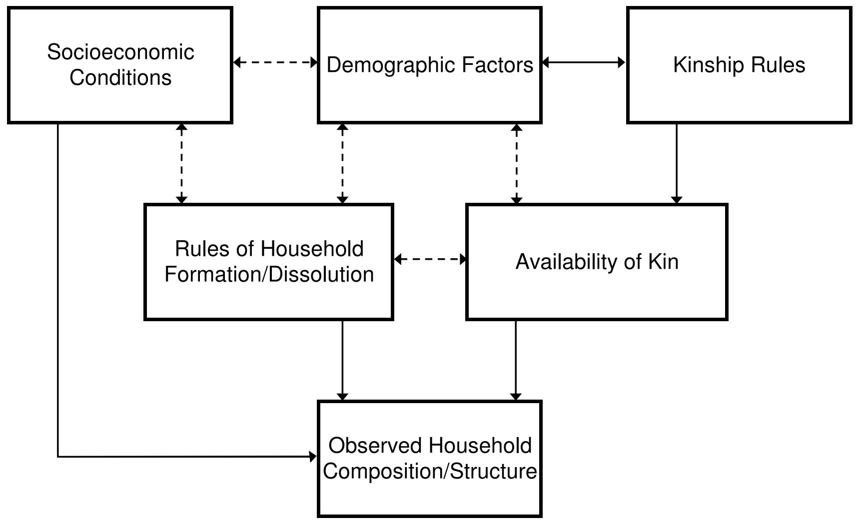


Figure 2.1: Theoretical Model of Determinants of Household Composition and Structure. From De Vos and Palloni (1989). Solid lines indicate direct causation, dotted lines indicate associations whose causal nature is less clear and may include feedbacks.

social control. De Vos and Palloni (1989) organize the various theoretical models of households using Figure 2.1. The object of study is the box at the bottom: the observed household composition, size, or structure, however defined for a particular research question. The solid arrows show direct effects on households by socioeconomic conditions, rules of household formation and dissolution, and the availability of kin. The socioeconomic conditions affecting households include both the wealth of potential household members and the costs of housing, as well as the household's role as a locus of production or consumption. Rules of household formation include social norms concerning which type of living arrangement is appropriate for each stage of the life course. The availability of kin determines the array of potential living arrangements. It is in turn directly determined by demographic factors and kinship rules, shown in two other boxes that have solid arrows leading to availability of kin. Demographic factors are levels of fertility, mortality, nuptiality and migration. Kinship rules determine who is appropriate for marriage relationships (incest taboos are an example of this kind of kinship rule) and who among one's blood relatives is more or less important as a potential coresident in a household (a matrilineal family system is an example of this kind of kinship rule). The dotted arrows in the diagram represent feedbacks among various pieces of the system.

To review the previous discussion, then, which parts of Figure 2.1 are central to each disciplinary perspective on households? Much anthropological study of households focused on detecting the "rules" portions of the framework: understanding the rules of household formation and dissolution and the kinship rules of a particular culture. Taking socioeconomic and demographic conditions as fixed, at least in the short term, the household system is fully determined. With a static understanding of the system in place, change could then be studied by determining how the rules responded to change in socioeconomic conditions and demographic factors.

An economic understanding of households involves an examination of how the other pieces of the framework respond to changing costs and benefits of forming or remaining in the household. Considering those responses fixed, it only requires an understanding of the economic inputs to determine both the equilibrium of the system and how it will respond to economic change. This is similar to a sociological view of households, except that emphasis would be placed on the socially patterned nature of response to economic change, rather than considering economic change to have only one possible outcome, given existing tastes and preferences.

The demographic study of households focuses on two main pathways in this scheme. One is the pathway through demographic factors to the availability of kin to observed household composition. Specifically, rates of fertility affect how many of each type of kin are ever born, rates of mortality affect the chances that the life spans of kin will overlap. The other pathway, although not given an arrow in De Vos and Palloni's version of the household model figure, goes from demographic factors directly to household composition. This is the demographer's specialty: compositional change. Rates of fertility, mortality, and nuptiality affect the distribution of characteristics in the population, such as age, sex and other characteristics, and the rules of household formation and dissolution vary with these characteristics. Thus overall household change can occur when changing demographic factors alter the distribution of characteristics in the population. It is this pathway that will be the focus of empirical investigation in the work in Chapter 5.

2.3 Classification and Measurement

2.3.1 The Nature of Classification

What are the characteristics under consideration in the "Observed Household Composition/Structure" box at the bottom of Figure 2.1? Most often studied are size, in terms of numbers of people in the household at a point in time, and composition, in terms of the characteristics of the individuals in the household and their relationships to one another. This is in contrast to studying a family system that may have created the different types of households observed. Characteristics are the usual focus because they can be measured in cross-sectional datasets – the prevalence of a characteristic is much easier to measure than a system. The study of systems requires more elaborate procedures, for example the computer experiments run by Wachter, Hammel, and Laslett (1978) in which the rules of systems were hypothesized and then experimented with using microsimulation to evaluate the system's plausibility when compared with observed cross-sectional data.

2.3.2 U.S. Census Household Classification

Given all of the theories that exist about what a household is, much of what we can know about them comes down to a practical question of what we can measure. The longest running historical information about households in the United States has been compiled by the Census Bureau in the decennial census and most of the results in subsequent chapters comes from these data. The Census Bureau definition of households on page 6 has changed somewhat over time, but has been closer to a strictly defined description of living arrangements, rather than a more expansive definition of households as an often kin-based arrangement of exchanges, mutual obligation or optimum seeking.

The concepts of living arrangements and mutual obligation are not entirely divorced from each other, though, as family and coresident relationships within a household boundary often involve much more mutual obligation among household members than relationships with those outside of the household. Shared living space create many opportunities for interaction, mutual assistance and also conflict (Kertzer 1986). It is hard to imagine that coresidence is meaningless in determining social relationships. Although there have only been a few, empirical studies examining the effect of coresidence have found that sharing a dwelling increases and intensifies exchanges between kin, compared to exchanges between non-coresident kin (White 1994).

The Census Bureau differentiates households from group quarters, but has not done so entirely consistently over time. The group quarters concept was used by the Census Bureau after 1930. It included both persons in institutions,[1] and those in dwellings with more than a certain number of persons unrelated to the householder or household head. (This number has changed over time.) Before 1980, the household head was not specifically defined, but was intended to be a male household member, if present, with some degree of authority or status in the household. If there was no such male in the household, a woman could be designated as household head. Beginning in 1980, the householder concept was used, defined as the homeowner or leaseholder of the home. If a husband and wife held the property jointly, either one could be the householder (Fields and Casper 2001). With the rise of urbanization, tenements and large multi-unit structures, the question of what was an individual dwelling unit became harder to settle. The first distinction made was whether the housing unit itself was free-standing, as would be the case for a house, or if not free-standing, then did not share access to the outside with any other unit, as would be the case for a duplex where both residences had their own, non-connected doors to the outside (Ruggles and Sobek 2003). For multi-unit buildings, more criteria were necessary. The Census Bureau has published detailed definitions of what constitutes a household for each census year and, while they have varied somewhat, for the period 1900-2000 they have focused on separate eating, cooking and housekeeping facilities and direct access to a common hall or other exit from the building. Since the the mail-back census became the majority of census returns in 1970, the effective definition of a household has become a geographic entity with a separate mailing address (Ruggles and Brower 2003).

Once it identifies a household, the Census Bureau's methodology classifies the household based on the relationships of the householder to the other household members. A family household is one in which the householder has at least one other person in the household related to him by blood, marriage or adoption. If no one is related to the householder, the household is classified as a non-family household, even if the persons not related to the householder are related to each other. Family households are further classified by whether or not the householder is married, whether or not the householder has any

[1] This includes persons in correctional institutions, asylums, homes for the aged or needy, convents and monasteries, workers' dormitories, hospitals, hotels, missions, camps, large lodging houses and, from 1950 on, student dormitories (U.S. Bureau of the Census 2002).

biological, adopted or step-children in the household and, if the householder is not married, by the sex of the householder. Thus, the position of the householder is very important in this classification scheme. For example, a household with a single parent, child and the parent's unmarried partner will be classified as a family household if the single parent is the householder, but as a non-family household if the partner is the householder.

2.3.3 Other Classifications

There have been several other ways in which researchers have classified households in order to study their nature and how they change. Three examples of classification systems are conjugal family units, minimal household units, and household headship-based classification.

Hammel and Laslett (1974) developed the concept of conjugal family units to study the relationship between kin availability and family systems in the formation of households. There are three types of conjugal family nuclei: a conjugal pair, a conjugal pair plus any of their offspring, or an unmarried parent with offspring. One could also be a solitary individual with no conjugal family. The whole household was classified based on the configuration of conjugal units in the household, or as "solitary" if no units were present. This classification was related to work on family systems and developed for use in a cultural context with extensive kin coresidence, so the kin links within the household play a large role in determining types. The position of non-relatives is somewhat obscured, however, as the addition of a non-relative into a household with a certain configuration of conjugal family units will not alter the classification of that household. As non-relatives were relatively scarce in the households this system was used to classify, such a system was appropriate.

In a similar fashion, Ermisch and Overton (1985) developed the system of minimal household units (MHU) to describe household composition. Defining four types of MHU's – single childless adults, single parents and dependent offspring, married couples with no dependent offspring, and married couples with dependent offspring – this scheme characterizes a household by whether it is made up of one MHU or is shared between two or more MHUs. An analysis of change would focus on how many MHUs were residing independently versus with other MHUs.

Another related method to analyze households is through household headship (Santi 1990). This method focuses on how many individuals of what type are the heads of households, but can also focus on the entire household if the analysis classifies households by the characteristics of the head and examines change in those distributions over time or across groups. Headship rates can also be used to study household change overall by combining them with information on the prevalence of family units. Comparing the ratio of heads to households and heads to families indicates the degree of nucleation versus doubling up of families within households (Burch, Halli, Madan, Thomas, and Wai 1987).

2.3.4 Modifications of Classification Systems for the Current Research

As mentioned, the household classification system used in subsequent chapters takes much of the Census Bureau's methodology, as it is based on census data. There are some modifications, however, for consistency and to capture major trends. While the number of unrelated persons necessary to qualify a dwelling as group quarters changed over time in the census, for purposes of this research, a consistent definition is imposed onto all of the census microdata samples to ensure comparability over time. The definition used here is that group quarters contain five or more persons unrelated to the householder/household head. Unfortunately, the five or more definition is a blunt instrument in ensuring comparability and studies have shown that this definition puts many family-based households into the group quarters category (Ruggles and Brower 2003). While this definition may be overly broad, it is the only one available for each decade of the century. The group of potentially misclassified arrangements is rather small in the context of the entire population, however, and is not as large as the institutional portion of the group quarters population in any decade.

Common to the classification systems described in the previous section is classification relative to some person or unit in the household. In the Census classification, the reference person is the householder. In the other systems, the classification is relative to some smaller unit. The classification system that will be used in this research, however, will as much as possible describe the household by all of the relationships in it, rather than by the relationships of household members to some fixed reference person.[2] This is especially important for non-relatives, as prior classifications treat non-relatives as a residual category, not affecting the classification of the related groups in the household. This treatment of non-relatives may be appropriate in certain contexts where they are either relatively rare

[2]The classification still relies on relationships to the household head to determine group quarters status.

or do not play a central social role in the household. Later results will show, however, that this is not the case in the twentieth century United States. In the classification used in this research, the presence of any persons not related to anyone else in the household changes the household classification. The full classification system will be detailed in Chapter 4, where it will be demonstrated that the presence or absence of non-relatives has been a major element of change in households in the United States, with the fall in border/lodger household members in the early part of the century (Ruggles 1988) and the rise in cohabitation in the later part (Manning 1995).

2.4 Analytical Strategies and Models

This section describes the main analytical models used to investigate demographic effects on household size, structure, and change over time: analytical, macrosimulation, and microsimulation models. In addition to these models, particular household types are most often studied using regression-type tools to examine the effects of individuals' characteristics on their attachment to a particular household type.

Analytic models involve the explication of closed-form mathematical relationships regarding population aggregates. An example is a stable population model that determines the distribution of age, sex, marital status and other characteristics, linked with household rules that assign persons to households based on these characteristics. Such models generate estimates of household size and the prevalence of certain household types in a population with a structure determined by demographic rates. They also show the effect demographic rate changes have on household change, taking household formation rules as fixed and depending on family relationships only. Coale (1965) used this type of model to estimate nuclear family sizes, depending on levels of fertility and mortality, as did Brass (1983) in a later formulation. Ryder (1975) used such a model to show that the empty-nest household of two married parents after grown children have moved out is a unique characteristic of low fertility, low mortality populations. Preston (1987) used the stable population model to work out duration estimates and proportions in various marital states important to household structure. Such models are helpful because of the clarity of their assumptions and because closed form solutions are possible. They are less useful in situations where the assumption of a stable or stationary population is not appropriate, or where the population change in question is too complex for closed-form solutions.

Macrosimulation models are created by the estimation of sets of differential equations. Family status life tables are an example of such a model. Family status life tables are an application of multistate life tables whereby transitions happen not just from life to death, as in the single decrement life table, but also among various family statuses. Such transitions are estimated by age by following a cohort of individuals over time. The simulation aspect comes from combining an estimated family status life table with populations of different age structures to generate counter-factual or projected distributions of family status or household type. Watkins, Menken, and Bongaarts (1987) used counter-factual scenarios to show that the potential of longer life spans to lengthen time spent in various family states had not been realized due to changes in marriage and fertility. Bongaarts (1987) examined many of the aspects of constructing family life tables, and showed how they could be applied to estimate the prevalence of various family types in a population, as well as numbers of transitions between various family states and duration of spells in certain family states. While the hazard models of Richards, White, and Tsui (1987) were used to investigate how individuals' characteristics affected the transitions among household types, they could also be combined with population characteristics to create a dynamic macrosimulation model. Household headship rates are also used as macrosimulation models. In this type of model, household headship rates are estimated by population characteristics. Combining these rates with counter-factual or projected populations generates estimates of counter-factual or projected population change (Akkerman 1980). The benefits of macrosimulation models are that they do not require stable population assumptions, but still generate numerical estimates of household change. As with analytical models, however, they become difficult to work with when the population in question is very complex.

Finally, microsimulation models are also sets of differential equations, but they incorporate randomness in their generation of individuals. As mentioned before, Wachter, Hammel, and Laslett (1978) used microsimulation plus household formation rules to evaluate whether hypothetical family systems could have produced observed household distributions. Ruggles (1987) used microsimulation with observed "residential propensities" – the proportion of persons with a given type of kin sharing a household with that type of kin – to examine the effect of population on the prevalence of extended family households. (The conclusions of these two studies will be discussed in the next section.) Computational costs of microsimulation kept these techniques rare at first. Currently, while the complexity of microsimulation still exerts a large cost on users and developers, the computing costs have decreased considerably. One benefit of microsimulation is its ability to simulate an entire kin network. Microsimulation can also be used to indicate the net effects of different demographic rate changes, something that would be difficult or impossible to calculate analytically (Casterline and El-Zeini 2002) when there are interactions between rates of vital events. Microsimulation also makes the examination of variability easier than with macrosimulation models, assuming that the variability was built into the microsimulation model in a realistic way.

The strategy used in the research presented in Chapter 5 most closely resembles Ruggles (1987) in its strategy of analyzing the effects of population characteristics versus residential propensities. It departs from that work in several ways, however. First of all, this research focuses exclusively on the twentieth century United States context, rather than the pre- versus post-industrial revolution United States focus in Ruggles' work. The different contexts are important because of the method's inability to take the full impact of changing kin availability into account. Therefore, its use is more appropriate to the twentieth century United States context where kin coresidence is less common than in prior eras. The results obtained in this research, then, are mainly driven by changes in population age, sex and marital status distributions instead of kin availability. (Kin availability is examined indirectly in later chapters.) Secondly, this research examines change across all household types rather than extended family types exclusively. Finally, the analysis here extends the examination of demographic compositional influences on household structure by decomposing the overall effect into the constituent parts of fertility, mortality, and nuptiality.

2.5 Patterns of Overall Household Change

Thus far, theoretical models and issues of classification, measurement and modeling have been discussed. We move now to the record of empirical findings documenting trends and explaining their causes. The consequences of household change constitute another branch of the household literature, but that will not be formally reviewed here.

This review of research on household change is largely limited to the United States in the twentieth century, as that is the scope of the empirical research of later chapters. Many researchers have noted trends in households and living arrangements over that time and have suggested explanations for those changes. Examination of overall household change usually focuses on changing household size, and changes in the degree of household nucleation – the degree to which kin links in households are only those between spouses, siblings, or parent-child, as opposed to including links between extended kin. Specific patterns in the transition of young people from the parental home, the rise in cohabitation, and the rate of household transitions have also been examined. Results describing overall household change are reviewed in this section, followed by a discussion of factors that could account for the changes observed.

The debate about the degree of household nucleation over time in the United States is connected to a long and still contested debate in demography, sociology and history. Most of this debate centered on whether the industrial revolution marked a change in household arrangements or not. The change view posited a large pre-industrial household of extended family ties, which then changed to a present of small nuclear family households. The no change view was that the pre-industrial extended family household was something of a sentimental myth and had never really existed. There have several back and forth cycles between these two versions of reality so that it is now difficult to say which view is the revisionist one. (See reviews of this debate in Burch 1979, Kertzer 1991, and Ruggles 1994b.) Most of this debate was centered on change before the twentieth century, however, when there was less population data to settle the debate on the empirical record one way or the other.

The twentieth century empirical record in the United States is much clearer. It indicates that the nuclear family household consisting of parents and dependent children has been the most common over the century, but is less so at the end than at the beginning of the century (Sweet and Bumpass 1987). The prominence of extended, multigenerational family households has never reached that of the nuclear family household, but multigenerational coresidence has decreased steadily over the century (Ruggles 2003), with older persons more frequently living alone (Kramarow 1995) or with a spouse (Uhlenberg 1996) instead of with offspring. Kobrin (1976) describes this trend away from the multigenerational household and toward increasing age segregation in households as the emergence of "uncompromising nuclearity." What remains hotly debated is the subjective nature of this change. Is it negative, the unfortunate decline of family togetherness, or positive, a newfound freedom from burdensome family ties? Another contested aspect of research on family coresidence is its significance. Coresidence of kin is a matter of household composition and its ultimate effect on relationship quality and the well-being of kin who coreside or do not coreside is unclear (White 1994; Wolf 1994).

Along with its increasing nuclearity, the size of the American household has fallen steadily over the twentieth century, although data reveal that the trend began long before 1900. Sweet and Bumpass (1987) document the steady decline in average household size back to 1790.

Several other trends in households are noted in the literature, such as the transition from the parental household, the rise in cohabitation, and the rate of household transitions. The nature of children's transition from the parental home to an independent household is an important part of overall household structure in a population and has received a great deal of attention in the literature. Maintaining the focus on the United States in the twentieth century, most offspring do leave the parental home to establish an independent residence, rather than remaining in the parental home until the parent dies. This "nest-leaving" is now concentrated at ages 18-21, however, where it used to be more spread out in the life course between age 10 and 30 (White 1994). Females generally leave earlier and do not return, as they more often leave to get married (Goldscheider and DaVanzo 1985). Smock (2000) reviews the findings on cohabitation, noting large increases since 1980 and the fact that most marriages now begin with cohabitation and most cohabitations end in marriage (55%). Many cohabiters have children in the household, and many nonmarital births are to people in cohabiting relationships. Sigle-Rushton and McLanahan (2002) find that half of new unmarried mothers are cohabiting in late 1990s, slightly higher than the number estimated in another study (Bumpass and Lu 2000).

Richards, White, and Tsui (1987) examine contemporary rates of transition among household types, examining transitions between alone, married couple, nuclear family, single parent, other family and other non-family household types. They find that transitions are most likely right after a previous transition, but that rate goes down with time. Transitions to living alone are U-shaped with age, transitions to nuclear families are the most stable. Transitions to nonfamily household types have risen over time.

2.6 Explanations of Overall Household Change

Following the model of households shown in Figure 2.1, the main explanations for the broad trends of decreasing household size and increasing nuclearity are socioeconomic change, cultural change (which would be included in the "Rules of Household Formation and Dissolution" in Figure 2.1) and demographic change. There are also some theories that posit particular combinations of forces to explain overall change.

2.6.1 Socioeconomic Conditions

Socioeconomic explanations of household change are varied. They involve the effects of income change either through overall economic growth or from transfer programs, of changes in housing markets that affect the ability to purchase separate dwellings, and of changes in the structure of the economy that shift the costs and benefits of large family agglomerations.

Income effects on living arrangements relate to the idea that privacy and independence are normal goods, meaning that more income will result in the purchase of more privacy and independence in living arrangements. People are therefore expected to use a part of any additional income to live alone or with just close kin rather than extended kin or non-relatives. Income growth brought about by overall economic growth can have this effect, as can income growth for subsets of the population through transfer programs (Michael, Fuchs, and Scott 1980). The effect of Social Security and the availability of pensions are often cited as allowing the elderly to purchase more privacy in their living arrangements. They purchase privacy by moving away from kin, shifting from extended family households to more atomized forms such as living alone or with just a spouse.

The ability to study the relationship between living arrangements and income is complicated by several factors. Incomes for some potential household members may be rising, while for others it is falling. Specifically, Goldscheider and Bures (2003) point out that while older people's incomes were rising and enabling them to live alone, wages for young people were stagnant, making them more dependent on support through coresidence in the parental home. Also, the direction of causality in the income-living arrangements association is unclear. While changes in income may cause living arrangement choices to change, a change in living arrangements may cause someone to devote more or less time to paid labor. The data necessary to separate these two pathways in empirical studies is extensive. As data on transfer program and pension receipt by elderly persons is available in many different forms, this phenomenon has been studied more extensively than the effect of overall income growth.

McGarry and Schoeni (2000) focus on the coresidence of elderly widows with their adult children and how it is affected by receipt of Social Security benefits. They find that

Social Security explained most of the variation of living with children versus living independently, with only small contributions from age, race, immigrant status, schooling and completed fertility. In a similar study, Engelhardt, Gruber, and Perry (2002) include all elderly and find an even larger effect of Social Security benefits on living independently for widows or divorced persons, but not for never married and married elderly. This suggests that income effects are not as simple as the model of more income leading to more independence in living arrangements. Examining data before the Social Security era, Costa (1997) found that income from Union Army pensions contributed to elderly men's likelihood of living alone or retaining household headship. This effect was weakened, however, in the face of severe health problems, which often led to reduced independence in living arrangements. (The issue of elderly health is discussed more in a subsequent section.) Her work on elderly women found that the receipt of old age assistance by elderly women explained about half of the increase in women living alone from 1940 to 1950 (Costa 1999). These studies vary, however, in the extent to which they do or do not contain elements of other non-income based explanations of change, such as the availability of kin for coresidence. They are also largely focused on the non-institutionalized population, so nursing home residence is rarely one of the potential living arrangements studied.

Although affecting a smaller segment of the population, welfare programs are also sometimes implicated in household change because they alter incomes. Welfare programs have been associated with the division of extended family households into more nuclear units because they offer income to young families that allows them to live separately from extended family (Ellwood and Bane 1985). Other research has looked at the extent to which the structure of some welfare programs seems to actively encourage household fragmentation and nucleation by creating incentives for household division, as when benefits are higher for those without family support in the household (Acs and Nelson 2004). In the opposite direction, others have found that welfare payments can keep families together in a household if young people know their parents may lose benefits if they move out (Hu 2001).

A variation of the income explanation of household change is that while incomes grew, the cost of separate housing fell, allowing still more people to purchase privacy and independence through a separate dwelling. In other words, even if incomes did not grow, existing incomes became more able to purchase privacy over time. Greater availability of cheaper rental housing and cheaper owned housing such as condominiums made purchasing privacy possible for more people (Haurin, Hendershott, and Kim 1993). Widening access to mortgage financing and tax incentive to purchase homes may have had the same effect. In the other direction, high housing costs are associated with more older parent-adult child coresidence (Giannelli and Monfardini 2003) and non-nuclear coresidence in general (Mutchler and Burr 2003). Chew (1990) showed moderate effects of rental costs and vacancy rates on household size and multigenerational coresidence, concluding that tight housing markets may exert a constraining effect on residential independence for young adults. The theoretical effect of high housing costs, then, is the same as the expected effect of lower incomes.

Another socioeconomic explanation of household change focuses on changes in the American economy: the move away from farming to industrialization and its concomitant shift from rural to urban areas as the locus of the majority of the population. Industrial wage labor attracted young people away from the farm, undercutting the forces that kept multigenerational families together in one physical location (Ruggles 2003). Other more recent structural changes that have been associated with household change are the rise in the availability of low-skill service jobs for the young, which allow them access to enough income to live independently from family (White 1994).

2.6.2 Cultural Factors

Cultural change is another factor implicated in household change. Some researchers suggest that norms encouraging family members to live together have broken down with the increasing individualism and secularism of the culture (Kobrin 1976; Lesthaeghe 1983). These have been replaced by norms encouraging young people to leave the parental household and establish an independent life (Goldscheider and Lawton 1998). Goldscheider and Goldscheider (1987) used interviews to examine young people's expectations about their future household transitions and found that most of them expect to establish an independent household before marriage and after leaving the parental home. Many older people also feel pressure not to be a burden to their children in their old age. The spread of this norm against burdening one's children could thus cause household change over time. This is in contrast to many developing nations, where there is still strong social support for the idea that children are obligated to take care of elderly parents (see Knodel, Chayovan, and Siriboon 1992 on Thailand, and Zimmer and Kwong 2003 on China). Of course, in those settings there is little other support for the elderly through transfer or welfare programs, and attitudes about care of the elderly may change if the institutional setting changes.

Another cultural change that affects households is related to the economic idea of privacy as a normal good. This implies a taste or preference for privacy that may be socially contingent and subject to change over time. In a review of normative effects on households, Elman and Uhlenberg (1995) describe the rise in the nineteenth century United States of the idea that the household should be a private, intimate setting with a few close kin, rather than a large collection of family, servants, border and lodgers. More recently, Kramarow (1995) found a significant portion of the increased likelihood of elderly widows living alone over the twentieth century that was not related to income changes, number of offspring, homeownership, rural/urban or farm residence or region and concluded that the remainder must relate to value changes. Kobrin (1976) also concludes that income cannot be the sole motivator of rising independent living for people of all ages, as the propensity to live independently rose much faster than incomes did over the twentieth century in the United States. Increasing preference for privacy could be just as important in motivating household change in an economic model as rising incomes.

2.6.3 Demographic Change

Referring back to the discussion on page 10 locating the demographic effect on households in the schematic in Figure 2.1, there are two ways in which demographic change is related to overall household change. One way is through the effect on available kin, the other is through compositional change.

Focusing on kin availability, Ruggles (1994b) demonstrated that even if extended families were preferred in early United States history, they were still relatively rare due to high mortality, large sibling sets, and the reluctance on the part of married siblings to coreside. Therefore, a coresident parent would only be able to "extend" the household of one child from the sibling set, limiting the potential for extended family households to exist. This finding mainly pertained to the U.S. experience in the nineteenth century. If demography was acting as a constraint on extended households, however, by the time that constraint was lifted there was no longer any desire for such living arrangements. Uhlenberg (1996) estimates the effects of mortality decline in increasing the potential for kinship ties across and with generations, but these increases have occurred over a time when those ties have become less and less prevalent within households. Specifically, while young people have more living grandparents, adults have more living parents, and elderly have more living spouses, children and siblings, fewer and fewer of these kin links exist in the household. There is also the issue of new types of kin. With the rise in divorce and remarriage, the increase in step-relationships may make up somewhat for points in the kin structure that may be declining (Wachter 1997), such as the decline in offspring due to falling fertility. As mentioned previously, there is a great deal more literature on the issue of kin availability as it relates to the structures of households from pre- to post-industrial societies, but as the focus of this work is decidedly post-industrial, that literature is not reviewed further. One part of the kin availability literature that focuses on current households is the availability of children as potential coresidents for the elderly. Macunovich, Easterlin, Schaeffer, and Crimmins (1995) found a large effect of offspring availability across cohorts with different levels of completed fertility. In related research, Wolf and Soldo (1988) used information on the characteristics of the surviving children of unmarried elderly women to show that, while more offspring made it more likely that an unmarried elderly woman would coreside with one of them, the children's attributes were more important than the total number of children. Specifically, unmarried sons were the most likely to coreside. Many other current studies include offspring as a potential effect on elderly living arrangements but find only small effects, but this may be due to the methods used to examine those effects.

The compositional effect on households is less about constraints and more about the prevalence of different types of people who tend to live in certain types of households. Kobrin (1976) focuses on the compositional aspect of demographic effects to explain falling household sizes. She finds that early twentieth century decreases in household size were largely attributable to falling fertility, which decreased the number of large nuclear families. This argument is compositional because it is not that children lacked for parents or parents lacked for children that decreased the nuclear families, it is rather that the size of the nuclear family declined. She attributes further declines in family size in the later twentieth century to falling mortality, which increased the number of small married couple households in the empty-nest phase.

Another compositional argument about coresidence relates to changing marital status of young adults. This argument turns around the traditional standpoint of elderly dependency taken by much of the research on elderly-adult child coresidence. Instead of adult children taking care of elderly parents, some research suggests that elderly parents provide support for adult children by sharing the household. The compositional aspect of this argument is in the shifting proportion of young in need of the support of parents. Messineo and Wojtkiewicz (2004) find that it is the marital status of offspring that determine if they remain in the parental household, with unmarried offspring coresiding much more than married offspring. Thus, young adults' changing marital status distribution over the century changed overall coresidence of young people with parents. Similarly, White (1994) focuses on home leaving and returning for unmarried children. She concludes that media reports of "Generation X" young adults returning to live with parents are overstated because the rates of unmarried young people returning to the parental home have actually decreased in recent decades. What has changed is the increasing proportion of unmarried young people, compared to married young people. DaVanzo and Goldscheider (1990) extend this marital status argument by including the effects of divorce: young adults leave home when they marry, but often return if the marriage does not last. Goldscheider and DaVanzo (1985) examine the effect of young adults' childbearing on returning to the parental home and find that young unmarried adults who are parents are more likely to live with their parents. Combined with a trend in increased extramarital childbearing, this can motivate household change. The increase in divorced young adults, and unmarried young adults with young children thus contributes to the prevalence of young people more likely to live with parents. Other research along these lines focuses on the characteristics of offspring. Aquilino (1990) showed that adult children who live with elderly parents tend to be unmarried and unemployed. The child may have foregone marriage and work because of the need of the elderly parents for care, or the elderly parents may be providing a safe haven for adult children who have not found success in the labor or marriage markets.

Another take on compositional effects on households is the effect of the changing life course on the prevalence of kin links and, therefore, of potential coresidence. Watkins, Menken, and Bongaarts (1987) showed the large changes over the century in life-years lived in various family statuses. Schoeni (1998) took a life-course perspective in examining parent-child coresidence and found that, although the percent of elderly persons living with an adult child fell over the twentieth century, the decline would have been much steeper if mortality had not declined. Glick and R. Parke (1965) examined the rise in the prevalence of post-childrearing married couple households and determined that much of it could be accounted for by the increase in survivorship and the number of years of married life after the last child left home.

2.6.4 Combination Theories

Some explanations of household change are harder to classify as socioeconomic, cultural, or demographic, either because they combine elements of these explanations in a combined theory, or because they combine these explanations in narratives of change over time. In one of the best known combination theories, Levy (1965) proposes a theory of household change that combines demographic and cultural change to explain the greater degree of nucleation in households. He suggests that early cultural norms supporting large extended families only developed in a high-mortality demographic regime that did not allow many such households to exist. Once mortality decreased and several generations of a family were all alive for long periods of time, more experience of the extended family households proved to those living there that they were not, in fact, a preferable way to live and the norm for extended families deteriorated. Thus, demographic change led to cultural change.

In an explanation of household change combining different elements over time, Santi (1990) looked at increasing household headship rates, indicating increasing household nucleation, from 1970-1985 by age, marital status, parental status, and income. His findings indicated that increasing preferences for independence were important from 1970 to 1980, but that from 1980 to 1985 headship increases were more the product of changing age structure. Kobrin (1976) examines the trend toward independent living over an earlier time period, from 1950 to 1974, and finds that the earlier portion of the fall in household size was due to changing composition effects of fertility and mortality, but the fall in later years was due to the large increases in all sorts of people choosing "primary individual" households: living alone or with non-relatives only. Even earlier in the century, while Costa (1997) found large income effects on purchasing privacy in living arrangements, she also found that the effect lessened after 1940. This could indicate that, while income was important in changing household behavior, those income effects translated into norms over time so that eventually the income effect was not as strong as the normative effect. An alternative interpretation of this change is that overall income growth and availability of cheaper housing progressed to the point that income was no longer a constraint on living independently.

Another combination narrative of change over time is offered by Ruggles (1988). He locates changes in marriage of young people as a major cause for the decrease in the prevalence of "secondary" individuals (borders, lodgers, servants) in the home. These people were often young and unmarried, but the proportion of the population made up of young unmarried people fell from 1900 through mid-century due to declines in age at marriage. By the time age at marriage rose again, however, young unmarried person's residential preferences had moved toward living independently as a primary individual instead of a secondary individual. While this narrative combines compositional change in marriage with cultural changes in preference for independence, the changes in marriage effect can also be combined with an economic change explanation, as in Xie, Raymo, Goyette, and Thornton (2003). This research relates higher earning potential with higher likelihood of marriage for men (no effect is found for women), but no effect on cohabitation. Thus, lower incomes or greater income inequality may shift the composition by marital status in the population, thus affecting households.

While not specifically a combination theory, one other explanation of household change not clearly classifiable as a socioeconomic, cultural or demographic is that household change creates feedback loops. On the cultural side, a feedback loop can occur if the adoption of a new household strategy by a few people helps to increase the adoption of that strategy by others. For example, the demonstration of cohabitation as a household form by a few can make it more acceptable for others (Smock 2000). Alternately, feedback can occur over generations. Teachman (2004) finds that any time spent in alternative household arrangements in childhood, such as the cohabitation of parents or living in a step-family, increases the likelihood that children will form cohabiting unions, or end up divorcing themselves. Michael, Fuchs, and Scott (1980) discussed the effect of social and structural feedback loops on the elderly living alone. The more elderly live alone, the more social programs arise to support them, making it possible for even more elderly to live alone.

2.6.5 Other Factors

Health

While compositional arguments about household change tend to focus on mortality rates, morbidity rates and overall health of the elderly have changed a great deal over the century and this has affected their living arrangements. Older people now are in much better health than their counterparts earlier in the century, allowing them to work and live independently at greater rates (Crimmins, Reynolds, and Saito 1999). There has also been an increase in home-based services to allow elderly persons to live independently and maintain their health (Krivo and Mutchler 1989).

While these findings speak to the better health of the modern older population and how that better health may contribute to more independent living arrangements, there is still an end of life at which many elderly persons' poor health precludes them from living independently. Mutchler and Burr (1991) found that, while economic resources determined elderly persons' transitions among three household types (living alone, living as the head of a household with others, or living in a household with others as head), health status determined the transition from any of these household types to institutionalization. In a related work, Soldo and Agree (1988) found that the institutionalized elderly were institutionalized because of their health, not because of a lack of offspring to take care of them.

Race, Ethnicity and Nativity

Explanations of household change related to race, ethnicity and nativity can be compositional if different ancestry groups favor different types of households and the shares of population groups shifts over time. However, more of the household literature by racial and ethnic groups focuses on the differences between minority and minority groups and what might cause those differences. Angel and Tienda (1982) find both and economic and cultural explanation for the greater propensity for Hispanic families to live in extended family households. Extended family households helped Hispanic families alleviate poverty, and provided more flexibility in dividing up market and household work. At the same time, they also found that non-nuclear family members provided more help in Hispanic and black family households than they did in non-Hispanic white households, indicating different household strategies among these groups that may be culturally determined. Group differences have not been constant over time, however, as shown in work by Goldscheider and Bures (2003). They found that while blacks are currently more likely than whites to live in extended families, that has only occurred after a large change at mid-century. Other aspects of black versus white households crossed over at about 1940. Before that point, blacks married younger than whites, left home younger than whites, and black unmarried adults were less likely to live with their parents than white unmarried adults, but all of these differences switched directions after 1940. Examining continuities in black families, Ruggles (1994a) demonstrates that blacks have had more single parenthood and children in households without parents than whites since 1880, but that differences with whites are growing.

In contrast to the literature on group differences, some researchers have suggested that racial and ethnic differences in households may actually be accounted for by other factors. For example, Aquilino (1990) found no racial difference in coresidence between adult children and their parents if the marital status of children is taken into account. Similarly, Wolf and Soldo (1988) suggests that the reason elderly unmarried black women are more likely to coreside with a child is that they are more likely than their counterparts in other racial and ethnic groups to have an unmarried adult son. As unmarried adult males are the most likely to coreside with a parent, this "explains" the racial and ethnic differences.

2.7 Continuations and Departures for this Research

This research continues in the tradition of demographers who have brought their understanding of compositional change to the discussion of many social changes. That is, there are groups that behave differently in some way in a population, so change in the overall level of some behavior can occur when the group proportions shift. The research also continues in the tradition of household typologies by proposing a new classification scheme for identifying household arrangements that is appropriate for the twentieth century United States context.

There are three main departures of this project, compared to past research. One is its focus on the distribution of household types for society as a whole, rather than for a particular sub-population or a particular type of household. On one hand, this may dilute the project's usefulness in the policy realm where concerns about households usually focus on particular groups of people or types of households. On the other hand, it provides a view of the rarely examined whole-nation context in which those sub-groups and households exist. In the whole-nation context, we can see the relative magnitudes of different types of change, as well as the other household types, or types of people, that increase in prevalence when another type decreases.

A second difference of this research is its focus on the impact of vital rates as the ultimate determinant of the population characteristics that feed into the process of household change. The overall phenomenon of population change is separated into the constituent parts of fertility, mortality, and nuptiality, each of which affects households in a distinct way. This reveals the ways in which vital rates often counteract each other in producing populations with observed characteristics, making concrete what is often only speculation based on observation of net effects. Also, focusing on the vital rates is important because demographic projection is based on vital rates. Thus, this research makes it easier to use well-developed tools of demographic projection to make household projections.

Finally, the focus on attributing impacts of the various causal factors results in an estimation of the relative magnitude of those impacts. This is important in uniting different strands of research on the household and linking effects observed for sub-populations to effects observed in the total population.

Chapter 3

Theoretical Framework: The Two-Stage Model

3.1 Introduction

The first purpose of this research is to separate demographic compositional impacts on households from other impacts, defining demographic composition as the age, sex, marital and parity status distributions in the population. The second purpose is to specify how the demographic compositional impact is caused by changes in fertility, mortality, and nuptiality. Analytical tools that can separate all of these effects are therefore necessary. Analytical tools by themselves, however, are not enough to make results interpretable. This chapter presents the analytical tools, and the underlying assumptions involved in the interpretation of results. Adding assumptions turns the analytical tools into a theoretical framework.

The main analytical tool is a two-stage model. Stage one, encompassing the demographic compositional effects, determines the probability that a randomly selected individual will have certain demographic characteristics. The characteristics used in this research are age, sex, marital and parity status. Stage two is everything else that determines an individual's propensity to live in a certain type of household arrangement, given his demographic characteristics. Following Ruggles' (1987) use of the term "residential propensities" for a similar concept, stage two will be referred to as "household propensities." Mathematically, demographic composition is the joint distribution of persons by age, sex, marital and parity status. Household propensities are the conditional probability of living in a certain household type, given a particular age, sex, marital and parity status. Demographic composition is determined by the vital rates of the past. It is characterized as exogenous to a conscious process of household formation, or more simply, less under direct control of individuals. Household propensities reflect all other impacts on households, and are interpreted to be the product of the intentional choices of individuals, although those choices are made under constraints. Characterizing the two stages in this way is a simplification of the model that will be discussed in greater detail in later sections. Also discussed later is the main assumption of the analysis: that demographic composition and household propensities are independent and analytically separable.

3.2 Stage One: Demographic Composition

3.2.1 Stage One Characteristics

The characteristics included in the first stage to represent demographic composition are those determined by vital rates that also influence household arrangements. Three characteristics meet both criteria and data exist that make it possible to isolate their effects on household arrangements. These are the age and sex distribution of the population, as well as the size of individuals' kin networks. Each is shaped by vital rates, and it is the impact of the various vital processes on demographic composition that we wish to examine, compared to the impact of household propensities. Age, sex and living kin networks impact households in two ways. Shifts in the population age and sex structure over time move the population away from groups that favor some household types and toward groups that favor others. Changing kin availability affects the distribution of household types by imposing or relaxing constraints on the types of household arrangements that are possible for individuals. The following discussion will explore further how each of the three kinds of characteristics is important in determining household arrangements.

3.2.2 Age

Age is an important determinant of household arrangements because the life cycle is also, in some ways, a household cycle. A baby is born into the parental household, usually, and spends many years as a dependent in that household. Of course, that household may undergo many changes, but those changes will usually be driven by the choices made by parents, not the dependent children. The child will eventually grow to maturity and may leave the parental household to establish an independent household alone or with others. He may then have children, marry, divorce, and/or return to the parental home, possibly undergoing multiple household transitions. The timing of many of these transitions will be subject to normative pressures or social influence. For example, there is some degree of social pressure on young people to leave the parental home after they reach a certain age, or risk being seen as unable to progress to adulthood. Age-dependent household transitions may also be subject to legal control, such as laws that allow the emancipation of minors from their parents only after a certain age, or laws preventing marriage before a certain age. Thus, through social and institutional channels, household transitions are tied to certain stages of the life cycle. Further on in the life course, the child becomes elderly and his health may be such that he becomes dependent again and leans on coresident kin for support. In other words, dependency upon others for resources and care at the beginning of life and possibly at the end necessitate certain types of household arrangements. Of course, there is a great deal of diversity in individuals' household histories, but age is still a powerful piece of information in predicting the living arrangements of a randomly selected individual.

For this reason, changes in the age distribution of the population are important drivers of change in the distribution of household types. We expect an older population to have a different household type profile compared to a younger population. It is this compositional aspect that brings age into the first stage of the two-stage household model, rather than the second stage household propensities which reflect intentional choices and household preferences. We would not want to interpret household change as reflecting changes in societal attitudes and preferences concerning households if a large portion of that change was due to a shift in age composition.

3.2.3 Sex

It is well documented, and will be demonstrated in the empirical work in Chapter 4, that males and females have slightly different distributions across different types of households, and thus that sex is an important piece of information in predicting household type. Sex here would include both the biologically-based concept in which sex differences are determined by genes and the socially-based concept in which sex differences are determined by social roles. For example, women are more often the head of single-parent families than men. There may also be different propensities for elderly widows versus widowers to live alone instead of with kin, depending on what you control for in the individual's other characteristics. Some of these differences may be biologically-based, while others are more historical. In either case, there is some piece of household formation that is explained by the sex composition of the population, making sex a first stage characteristic in this model of households.

The other reason to include a trait in the first stage of the model is that its distribution in the population is determined by vital rates. The role of vital rates in determining the sex distribution of the population is somewhat less clear than in the case of the age distribution. Vital rates drive sex differences that affect household arrangements in two ways. First of all, differential mortality affects the sex composition of the population. Males tend to have higher mortality, especially at older ages, and especially now that the risks of childbirth for women have been so greatly reduced. Secondly, marriage rates also differ by age and sex, in terms of age at first marriage and remarriage patterns after widowhood or divorce.[1] Thus, men and women will have different likelihoods of having a spouse and therefore of having particular household arrangements, due to differences in vital rates.

Including sex in the analysis will only improve predictions of household distribution over time if there is some variation in the sex composition of the population by age and marital status over time. For the overall population, we know that there is some shift in sex composition as population aging shifts the age distribution to older ages where women predominate. Beyond the improvement of prediction, however, we will want to discuss results in terms of the impacts of different types of changes. If the effects of age and kin-availability are different for males and females, in other words if there is an interaction between sex and the other demographic characteristics of interest, we will want to estimate that interaction so as to discuss the results accurately.

3.2.4 Kin

Kin matter because households are very often kin-based. Part of this is certainly biological with dependent children needing care from parents. Beyond the parent-child bond, there is also the historical legacy, biological perhaps but also socially enforced, that

[1] Some of that is driven by the differential mortality discussed previously, as in elderly men having a better chance of remarriage due to the relatively larger number of elderly women at the oldest age groups.

one's kin have a greater obligation to help one out in times of need than strangers do. Thus, when looking for those with whom to share a household, kin are often the choice. In addition, as with laws that govern household types by age, there are laws that enforce support relationships among given types of kin, such as laws that sanction child abandonment and laws that enforce monetary payments to a spouse after a divorce for the care of a child. Of course, none of these laws insist that this support must be expressed by sharing a household, but that is often the case. Furthermore, these are examples of the acknowledgment by society of the obligation involved in certain types of kin relationships. Beyond laws, there are many more norms that govern support across kin lines, including ones that support or discourage certain types of households. These norms are historically contingent, meant to affect intentional choices and behaviors and thus could be considered part of the stage two impacts on households. They are connected with the stage one issue of whether an individual has certain types of kin relationships, and thus would be subject to those norms, or not. In addition, the living kin network is determined by the vital rates of the past – the past fertility of female relatives, the mortality of their offspring, the marriage and divorce patterns that an individual and his relatives experienced – they work together to determine the living kin network.

In discussing the inclusion of age in the analysis, it was mentioned that one would not want to mischaracterize age-driven household change as a change in household preferences. Similarly, we include kin in the analysis because we would not want to mischaracterize a change driven by changes in kin availability as reflecting changes in values. One example of this might be a decline in three generation households consisting of parents, children and a grandmother. We would not want to characterize such a decline as being an abandonment of grandmothers if it was driven in part by decreasing widowhood that extends the period of life in which grandmothers live in a household with their husbands and thus have no need of other coresident kin. Similarly, if elderly women were increasingly living alone because their low fertility resulted in few adult children as potential coresidents, then we would want to acknowledge that the constraint they face is one of kin availability, rather than their children's reluctance to coreside.

While extended kin networks are clearly important in constraining household arrangements, the data necessary to examine this effect is often unavailable. To isolate kin's effect on household arrangements, we need to know the extent of the kin network outside of the household of residence. Information on non-coresident kin is rare in modern survey data and is only sparsely available in the census data used for this research. In fact, it is this lack of data availability that has spawned much literature using microsimulation to test theories about the effects of availability of extended kin in the absence of data about them (Wachter, Hammel, and Laslett 1978; Ruggles 1987).

The only information on kin outside of the household in the census data concern spouses and, for women only, offspring. Thus, the living kin network that can be considered in this analysis will be severely truncated. Whatever pieces of the kin network are left out will have their impact counted as household propensity effects. As an example, if we do not include second cousins as part of the kin structure in the analysis, then the effect of second cousin availability on household formation is absorbed into the household propensity effect, even though the probability of having a living second cousin is determined by vital rates.

That said, the classification of household types includes only a very few types in which extended kin coreside. Also, after a certain point in United States history, their role is not central. Thus, many of the results pertain to a time in which the likelihood of having extended kin in the household is small, as kin coresidence is rare. In addition, part of the analysis will also show that, during the time period in question, it is unlikely that extended kin were particularly scarce.

3.2.5 The Role of Vital Rates

In the two stage model, vital rates determine demographic composition in stage one, demographic composition combines with household propensities in stage two, resulting in the observed household distribution. The ordering of the stages is important. In the model formulation, demographic composition is determined by the vital rates first and the households are then determined by composition and household propensities. How can this formulation be justified, however, when some vital events are clearly exogenous to an individual's intentional household formation process, while other vital events are the expression of intentional household choices? This section argues that, within the two-stage model, there is an aspect of all vital events that can be considered apart from an individual's process of choosing a particular living arrangement at any given point in time.

Fertility, mortality, marriage and divorce rates are summaries of millions of individual decisions, accidents, disasters and transitions. Some of those vital events occur outside of any intentional process of household formation. Death is the most obvious example, as rarely does a person choose death in order to alter his living arrangements. Another example is an unplanned pregnancy. By being unplanned, the pregnancy is not the expression of a preference about what type of household to live in, so it is another example of a vital event occurring outside of an explicit decision about making a household transition. These types of events can be considered as exogenous to household formation and it is clear which causes the other: the death of a family member or an unplanned pregnancy causes a household type transition. On the other hand, some events are very much a part of the process of household formation. Marriage is overwhelmingly associated with the planned coresidence of spouses, just as divorce most often involves a decision to end a certain type of household arrangement. Similarly, a married couple's planned pregnancy represents a choice to transition from a married couple no children household to a married couple with children household.

This complicates the question of how to characterize the piece of change that the analysis here hopes to isolate and evaluate. In this framework, the demographic characteristics represent ongoing constraints on the household choice. For changes that are exogenous to the process, the constraint aspect is clear. The death of a spouse, for example, precludes the ability to live in a married couple household, at least until the time of a remarriage. For demographic changes that are more closely related to explicit household choices, we can think of the demographic effects as representing the continuing constraints on living arrangements due to the vital events of the past. In other words, the decision expressing the preference for a certain kind of household arrangement resulting in a birth, marriage or divorce occurs instantaneously, but the effect of the event is an ongoing demographic constraint on household arrangements. For example, at the time of marriage, the vital event represents the explicit household choice of two individuals to create a married couple household (if they live together with no one else in the dwelling). From that moment on, however, the marriage exerts a strong constraint on living arrangements through the obligation to coreside with a spouse until death or divorce. Similarly, the decision to have a birth entails a long period of childrearing during which the preference that was expressed in the past is a continuing constraint on household arrangements for the parents.

One other aspect of fertility decisions can be characterized as exogenous to a deliberate process of the formation of certain types of households: the fertility decisions of parents produce children who are household members but who made no decision about what sort of household arrangement was preferred. For the newborn, the parents' fertility decision was entirely exogenous. Similarly, other age structure effects, such as population aging, are brought about outside of an individual's intentional household formation or dissolution process.

3.3 Stage Two: Household Propensities

The analysis here focuses on the effects of vital rates and demographic composition on household change, versus the effect of changing household propensities. While household propensities are not the main focus of the research here, this does not detract from the fact that they contain a great deal of information. What forces push individuals to live in this or that type of household, given that they are a certain age, sex and have a given set of kin? This is expressed as the conditional probability of living in a certain type of household, given a particular set of demographic characteristics. The conditional probabilities are determined by individual preferences for certain types of households, income constraints on the expression of those preferences, social norms constraining or shaping preferences, and housing market conditions which may also constrain the expression of preferences. While the conditional probabilities are not the focus of research here, their impact will be presented in contrast to that of demographic composition. Comparing the relative magnitudes of the two effects on households is one of the objectives of the research.

3.4 Strengths and Weaknesses of the Two-Stage Model

The main strength of this model is its empirical usefulness in that it isolates different effects and makes possible scenario-based projection of future change. The main weakness of the model is the central assumption of the separability of the two stages. The previous section argued for their theoretical separability. In the statistical realm, this is an assumption about the independence of the two stages. One can critique the model by arguing that household formation norms did not occur independently, but rather in the context of demographic reality, making the two stages dependent (Kertzer 1991). One can also argue, as De Vos and Palloni (1989) do, that stage two probabilities are linked to stage one characteristics because different population structures have different "supply curves" of possible household types.

These critiques are less valid in the short-term where one could consider the normative environment more stable. For this reason, the emprical work is done in 20-year time segments instead of over the entire century. More importantly, these critiques are not valid if the entire kin network is included in the first stage. Making the stage two probabilities conditional upon known age, sex and kin structures means that, by definition, there is no age, sex or kin information left in the second stage, so they must be independent. Of course, due to data limitations, the subsequent analyses do not include much of the necessary kin information. The severity of this problem is reduced by several aspects of the analysis though, first mentioned on page 36. First of all, of the eight household types whose changing shares represent the variation to be explained using the two-stage model, only two of them include any type of kin relationship beyond spouse, parent-child and siblings. Secondly, the work focuses on a time period where coresidence with kin outside of the nuclear unit was already the exception rather than the rule, so the results are based on changes by age, sex and marital status rather than the availability of extended kin.

While the effect of extra-nuclear kin availability will be outside of the analysis, its potential effect will be examined indirectly: the availability of extended kin over the century is estimated using microsimulation. While not remedying the problem, these estimates give some indication of the extent of it. This work is presented in Chapter 5 and suggests that the lack of data on availability of extended kin should not have a severe effect on results based on the two-stage model of households discussed here. Thus, the two-stage model here is focused on an examination of aggregate composition, rather than the availability of kin that might effect a household formation process.

Chapter 4

The Demography of Twentieth Century U.S. Household Change

4.1 Introduction

Information about household change and living arrangements swims around us constantly. We have experiences in our daily lives with our own households and the households of people we know, and we pick up on often sensationalized news reports about the end of one kind of household, the burgeoning of another, and how the change reflects on our "family values." These values are, more often than not in the popular press, found wanting, especially as compared with values of the past. The French press lamented the demise of extended family living arrangements after the heat wave of 2003 caused high death rates among the elderly living alone (Rotella and Urbajtel 2003). Marketers worried that marketing "Family Sized" products was no longer a viable strategy because the nuclear family was becoming an endangered household form (Conlin 2003). Concern with living arrangements is hardly a modern phenomenon, either. In 1828, James Fenimore Cooper observed "that no American who is at all comfortable in life will share his dwelling with another" (Cooper 1828). The questions that these media reports and personal observations do not answer, however, are some of the most important in deciding whether an aspect of household change is truly noteworthy. How many people are affected by this change? Does it represent a new phenomenon, or the reemergence or realignment of something common in the past? Is a particular change relatively large, or are there other changes that dwarf it, in terms of the number of people affected? Have there been other similar changes in the past that proved temporary, rather than part of a long-term trend? The purpose of this chapter is to explore the empirical facts of household change in such a way as to leave none of those questions unaddressed. By the end of the chapter, changes in household living arrangements shall be firmly situated in the factual context of the United States, both currently and over the course of the previous century.

In order to describe household change fully, several different aspects of households will be examined. The number of people sharing a household has changed dramatically over the twentieth century, and this change will be examined in its central tendency, its variability, and in the size of different relationship groups in the household. The age and sex distributions of household members have also shifted along with shifts in the characteristics of the population as a whole. Changes in household size and composition can also be studied by classifying various household types, an important aspect of the study of household change, as discussed in Chapter 2. Such a classification system allows for the examination of shares of each type of household in the population over time. Finally, looking at characteristics within each type of household allows for a more detailed description of household change.

Overall, the analysis presented here shows a consistent pattern of household atomization, in accord with Cooper's observation that we often desire to live apart from others. At the same time, data reveal the endurance of certain family relationships within the household. For example, the tendency to live alone has increased steadily over the century, but the analysis also finds that just as many of us were residing in family-only households at the end of the century as at its beginning, albeit with fewer family members. A similar contrast between change and continuity is observed in the prevalence of married couple (no children) households. While the prevalence of married couple households has decreased among the young, it has grown steadily among the elderly as the years after childbearing expanded with increased life expectancy. Finally, while the greatest change in households overall seems to be the absence of young children, the product of a century-long trend toward lower fertility, there is continuity in that the children who are born today do not lack for parents in the household when compared with their early-century peers. What do the facts, taken together, have to say on the "family values" debate, then? The trend toward more atomized living arrangements would certainly reflect a deterioration in family values if more is always better when it comes to family relationships within the household. However, given the enduring nature of some family household forms, one could instead take a more positive view of modern households and hypothesize that the quality of their enduring relationships makes up for the lack of quantity.

There is another way in which the analysis presented here comments on a debate on changing values, and that is that it makes it beside the point to some extent. Worries about changing values come from searching for the cause of household change in changing human behaviors and preferences. To recall the two stage model of household change discussed in Chapter 3, this is to locate household change in the stage two household propensity effects completely. Whether we imagine household change as the product of changing values, or as the product of increased wealth enabling people to act on those preferences, most of the hypotheses put forward to explain household change situate causality in the actions, preferences, and conscious choices of individuals. Much of the analysis here, however, suggests a different causal path altogether. Many of the results presented in subsequent sections suggest that a significant portion of household change is caused by compositional shifts in the population that are not necessarily the product of an intentional household formation process. Recalling again the two stage model discussed in Chapter 3, much of the empirical record of household change over the twentieth century suggests that stage one changes in the demographic composition of the population were very important in the process of household change.

4.2 Data and Methodology

The data used in this chapter come from decennial census samples, gathered together and coded for consistency in the Integrated Public Use Microdata Series, or IPUMS (Ruggles and Sobek 2003), for the decades 1900 to 2000, with the exception of 1930, for which detailed microdata are not available. This research follows the Census Bureau methodology in defining households based on shared dwellings cited in Chapter 2 on page 6. This restricts the concept of households that can be examined to one of living arrangements, rather than a broader concept based on mutual exchange or obligation. Over the twentieth century, the Census Bureau's methodology for distinguishing one dwelling from the next has changed somewhat, although it has always revolved around identifying dwellings with separate housekeeping, cooking or eating facilities, with the requirement of direct access to a common mode of exit added in 1950 (Ruggles and Brower 2003). The distinction is unimportant for households occupying separate buildings, but necessary for multi-unit dwellings such as apartment buildings, rooming hotels, and tenements. Since the mail-back form has become widely used in 1970, the de facto definition of separate dwellings has been the existence of separate mailing addresses. This research uses the Census Bureau's methodology for separating dwellings from one another as it existed at the time of each census, following the rationale that contemporary definitions were adequate for conditions at the time. Instances shall be noted in the analysis, however, where it is possible that observed time trends could be the product of data issues or definitional changes and, to the extent possible, robustness tests have been conducted to evaluate the possible effect on the results if the definitional change had not taken place.

The Census Bureau divides dwellings into households versus group quarters. Group quarters include large institutions which are clearly different from family-based households, but also include smaller dwellings with more than some number of non-related persons in a dwelling (U.S. Bureau of the Census 2002). While the Census Bureau has changed this number over time, a consistent definition is imposed here. Specifically, five or more persons not related to the householder or household head qualifies a dwelling as group quarters, thus making a household a dwelling with fewer than five persons not related to the householder or household head. Early census methodology used the concept of household head, defined as strictly male. Since 1980, the reference person has been called the householder and could be male or female. With the mail-back forms, the householder is whomever the person filling out the form designates as the householder, although the householder is meant to be the owner or lease-holder for that dwelling. For the household type classification used here, the position of the household head or householder is only important for determining group quarters status. As mentioned in Chapter 2, the "fewer than five persons" criterion is a somewhat low threshold for the number of non-relatives qualifying a dwelling as group quarters, but it is the only definition that is consistently available over the entire period. The imposition of this consistency is warranted, as the number of non-relatives qualifying a dwelling as group quarters in Census Bureau tabulations has changed much more drastically from decade to decade than the slight adjustments to the separate household definitions.[1]

The only adjustment made to the census samples available in the IPUMS is the deletion of a small proportion of observations for which information on household relation-

[1] For 1930 and 1940, the group quarters criterion was 11 or more non-relatives, from 1950 to 1970 it was five, for 1980 it was 10.

ships was not consistent throughout the household. Examples of such inconsistencies are households in which two persons are identified as each other's spouses but both persons are coded as being unmarried, or a step-parent/step-child relationship indicated by one variable not reflected in other parent/child linking variables. These deletions are never more than 1% of the sample in any decade, and sensitivity analyses show that they do not affect results in any material way. They do, however, decrease the total estimated population calculated when using sample weights. As so much of the analysis focuses on household composition, and there are no criteria for judging the relative accuracy of conflicting indicators, the decision was made to drop problem observations. Re-analysis of the data imposing consistency on the information in various ways revealed no material differences in results.

The methods used in this analysis are not complex, relying mostly on simple calculations and graphical techniques. A word about the unit of analysis is warranted, however, for it is not obvious what that unit should be in an analysis of household change. It is often the case that the household itself is the unit of interest. Theoretically, however, this is not appropriate if the object of description is lived experience. The household does not experience itself, nor can it be the agent of its own change over time. Only individuals can do these things. Thus, the unit of analysis used in this work is the individual, residing in a household or group quarters as described above. (Group quarters are, by definition, not households, although persons in group quarters will be included in the analysis where appropriate.) Methodologically, this means that we want to examine statistics calculated for people rather than households. For example, in calculations of average household size, as will be shown in subsequent sections, the calculation of interest is person-weighted rather than household weighted. In other words, we want to know the size of the average *person's* household, rather than the size of the average *household*. The size of the average person's household is larger than the size of the average household, because a person-weighted average has more large households in it than a household-weighted average. It is, however, the average person's experience we want to describe, with a few exceptions showing household-level statistics for comparison. An exaggerated example makes the distinction clear: a town has two households, one occupied by a single individual and the other housing a large family of 25 people. The average size of the two households is $[1 + 25] \div 2 = 13$ persons while the average household size for the 26 people is $[(1 \times 1) + (25 \times 25)] \div 26 = 24$ persons. Household-weighted and person-weighted statistics will only be the same when all household sizes are the same.

Year	Population	Population in HHs	Number of HHs	Size of HH: Avg. Person	Size of HH: Avg. HH	Percentage in HHs with <5 People: by Person	Percentage in HHs with <5 People: by HH
	(millions)	(millions)	(millions)			(%)	(%)
1900	75.2	72.0	15.8	5.7	4.5	34.7	55.4
1910	92.2	87.6	20.0	5.5	4.4	38.1	58.9
1920	106.0	101.6	24.2	5.3	4.2	41.8	62.4
1930	--	--	--	--	--	--	--
1940	131.5	127.4	34.9	4.7	3.7	53.9	73.1
1950	150.6	144.9	43.4	4.3	3.3	62.2	79.2
1960	178.8	173.9	52.7	4.3	3.3	59.1	77.5
1970	202.3	196.5	63.3	4.2	3.1	61.3	79.9
1980	226.3	220.3	80.3	3.6	2.7	72.5	86.7
1990	247.8	240.7	91.7	3.5	2.6	76.6	89.1
2000	281.3	272.9	105.4	3.5	2.6	76.3	89.2

Table 4.1: Estimated U.S. Population and Household Counts from the IPUMS. Reflects the deletion of observations for which household composition information was inconsistent. Deletions amounted to less than 1% of the population in each decade. All columns except "Population" exclude persons in group quarters. Average household size and percentage in households with less than five persons are shown in two ways: person-weighted and household-weighted.

4.3 Overall Household Change

4.3.1 Household Size

Table 4.1 presents estimates of the size of the population at each census year, how many of those people were considered to be living in households (as opposed to group quarters) and how many households were enumerated in that census year. It is clear that the number of households has been growing much faster than the number of people occupying them. Households increased from 15.8 million in 1900 to 105.4 million in 2000, a more than six-fold increase. The household population, however, went from 72.0 million to 272.9 million, close to a four-fold increase. These differing growth rates produce the falling

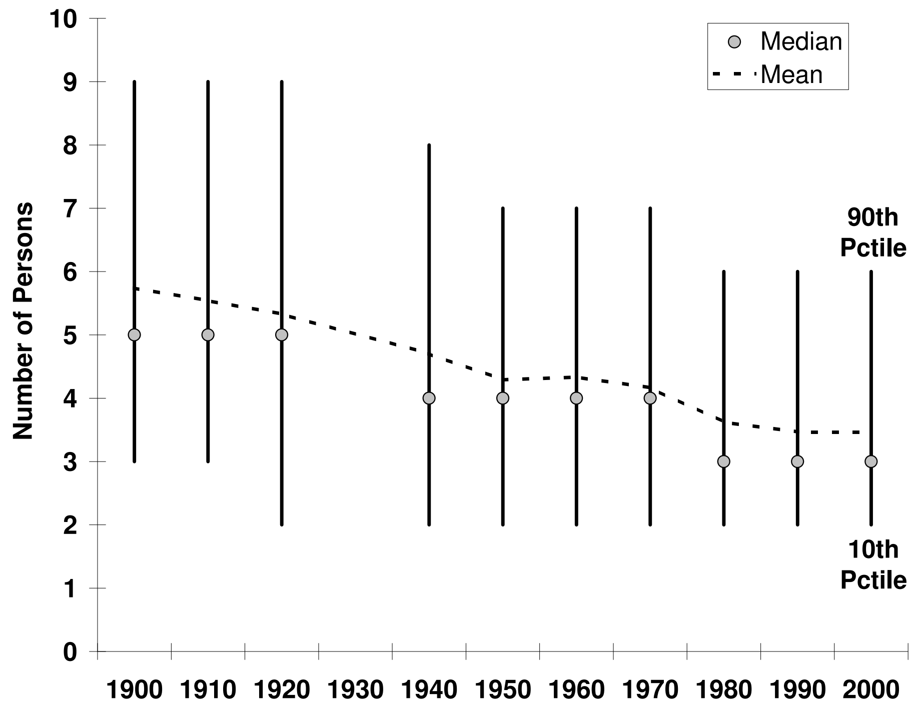


Figure 4.1: Household Size (excludes Group Quarters), 1900-2000. Note that distribution is the size of each person's household, not the distribution of households themselves.

household sizes seen in the right-hand columns of the table. While the average person lived in a household with about five other persons in 1900, he only shared his home with one or two by the end of the century. The table also shows the difference between average size calculated for a person versus a household. The household-weighted average size is always smaller than the person-weighted average household size, although the difference has been dropping over the century as the tail of the household size distribution shrinks and the distribution concentrates around just a few numbers.

The trend of falling household size is shown graphically in Figure 4.1. The mean falls almost monotonically over the century, while the whole distribution narrows, shown by the shrinking range between the 90th and 10th percentile of people's household sizes. That range starts the century measuring six persons (nine to three), but ends at four. With a discrete distribution, it is possible to show more detail over time, rather than relying on summary statistics. This is shown in Figure 4.2, where each line represents the percentage of the population living in a household of the indicated size. Here we see clearly the shrinking

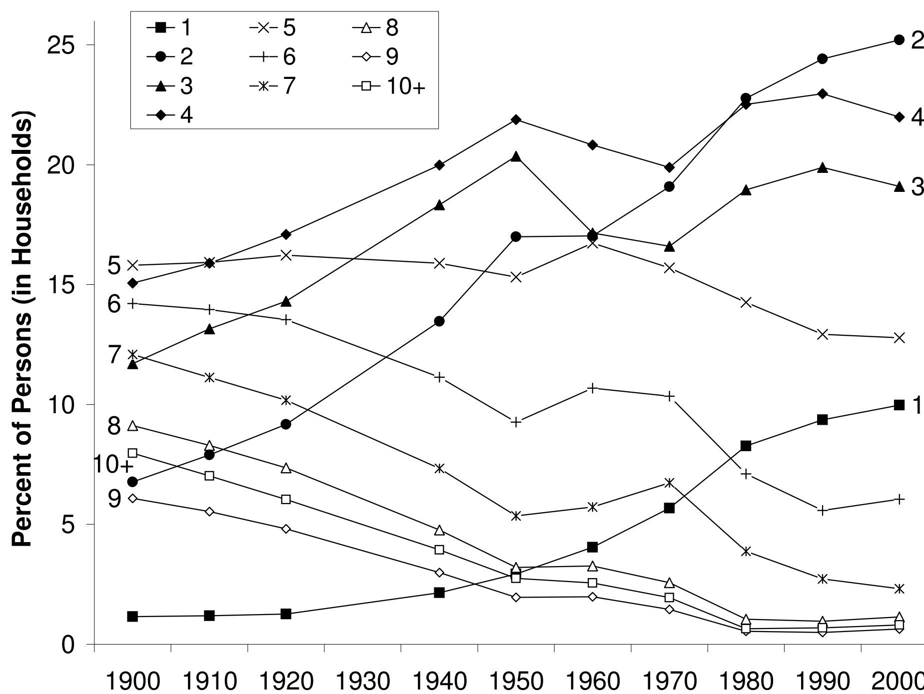


Figure 4.2: Percent of Population by Household Size (excludes Group Quarters)

tail of the household size distribution as the share of the population accounted for by the largest households (10+, 9, and 8 persons) decreases steadily, while the share of population living in the smallest household types (1 and 2 persons) increases steadily over the century. In the middle ranges, the smaller sizes (3 and 4) start out increasing while the larger sizes (5, 6, and 7) fall. The baby boom years, shown here in the changes from 1950 to 1970, reverse these trends temporarily with larger households gaining on the smaller ones during this period. This is consistent with what we know of the baby boom – that much of later boom came from higher order births (Morgan 1996), resulting in families of two parents plus three to five children. The earlier part of the century's trend then resumes, for the most part, for the rest of the century. It is striking that the modal category in 1900 was a five person household, while the modal category in 2000 was a two person household.

As mentioned in Chapter 2, some of this decrease in household size is ascribed to the urbanization and industrialization of America, which left no need for the large extended family of workers needed on the preindustrial farm (Ruggles 2001). Farms in the early twentieth century required many hands to work them and there was plenty of land for a house that could hold them all. Indeed, in 1900 the average farm inhabitant's household size was 6.3 persons compared to 5.4 for a non-farm dweller (author's tabulation from the IPUMS). Two things occurred with economic development and urbanization: more people lived in the smaller households typical of the city while, at the same time, mechanization cut the number of hands needed to work a farm and allowed larger farms where farm families could spread out into separate dwellings. By 2000, the average size of farm and non-farm households is virtually identical, while only 1% of people are classified as living on a farm, compared to 40% in 1900 (author's calculations from IPUMS data).[2] Of course, for some analytical purposes, the increasing separateness of dwellings may be immaterial if families in separate dwellings still operate under the same system of mutual obligations. It is doubtful, however, that all aspects of such a system could survive greater spatial separation with no alteration.

[2] This classification of persons living on a farm should not be confused with calculations of the numbers of people employed in farming, which is closer to 2% of adult workers by 2000 (Author's tabulations using IPUMS data).

4.3.2 Age and Sex Distribution

The aging of the United States population is by now well documented, as is the slightly increased proportion female, due largely to the greater number of women than men surviving to the oldest ages. These trends pass through to households, but their effects on the composition of households by age and sex are made more complex by household change over the century.

Overall person-weighted household statistics are very similar between the sexes and this similarity has altered only slightly over the century. Males and females have similar average household sizes, and females have become only slightly more likely than males to live in a single sex household. This includes those living alone, so the greater prevalence of females in single-sex households is largely accounted for by greater numbers of elderly women living alone, compared to elderly men. The one aspect in which households seem to differ by sex is that the variability in the sizes of men's households is greater than that in women's households, but the difference has narrowed slightly over the century. We will see more differences in household composition by sex in subsequent sections that focus on certain types of households.

Age composition in households has changed more radically than sex composition. The first graph in Figure 4.3 shows the increasing average age of the population, from 25 years in 1900 to more than 35 years in 2000.[3] Although not shown graphically, the variation in age in the population has increased as well. Household age composition has followed a somewhat different path, however. The figure also shows the person-weighted average age of the oldest and youngest person in the household. In a person-weighted average oldest age, each individual is assigned the age of the oldest person in his household, those oldest ages are summed and divided by the number of people in the population. In a household-weighted average oldest age, the oldest age for each household is summed and divided by the number of households. Therefore, in the person-weighted average oldest age, an old person in a large household has a greater effect on the average than an old person in a small household.

The average oldest age has not increased over the century, but the average youngest age has. The flat trend for oldest person in the household reflects in part the trend toward older people living alone rather than with kin. For many in the early part of the century,

[3] Some inaccuracy in this calculation is introduced through the use of a top code of 90+ on the possible age values.

the oldest person in the household was a grandparent who was, because of shorter life spans, shorter generations and more generational overlap, not that old. For many today the oldest person in the household is a middle-aged spouse or parent who is as old as the grandparents of the early century. The effect of this change on the overall average is enhanced by the use of a person-weighted average rather than a household-weighted average. While the average age in the population is increasing, the household size of older people is declining, reducing the weight of their households in the overall person-weighted average of oldest age. Again, although not shown, variability in both of these age distributions has increased during the century as well.

The rising youngest age has decreased the age span (age difference between youngest and oldest person in the household) in the average person's household, shown in the panel on the right of Figure 4.3. With all of the increased variability in ages mentioned previously, however, this age span has increased in variability as well. The range between the 80th and 20th percentiles of age span has increased from twenty years in 1900 to 35 years in 2000. The decrease in the 20th percentile age span is driven by the greater number of person's living alone, for whom the household age span is zero. Overall, households seem to have more age segregation in them by 2000 than they had in 1900.

4.3.3 Relationships

Using the IPUMS, it is possible to look inside households to see what sort of family and non-family relationships each individual has within his household. Specifically, the number of spouses, parents, children, siblings, other relatives and non-relatives each person has in his household can be counted. The definition of children, parents and siblings used here includes biological, step- and adopted relationships between persons of any age. In-laws are included as other relatives. Children can be of any age. This is in contrast to the Census Bureau practice of including as "own children" only those younger than 18 years.

Averaging these counts gives the number of each type of relationship in the "average person's" household.[4] This reveals the extent to which the small modern household

[4]The calculation includes a minor inaccuracy due to the use of top coded variables for the number of some family relationships. The number of children and number of siblings in the household are accounted for up to a maximum of 9+ persons. The proportion of persons given the top code is at its largest in 1900, at 1.2%. From 1950 on, the proportion is less than half a percent. Sensitivity analyses reveal that only an unrealistically large number of sibling sets larger than 9 affects the results materially.

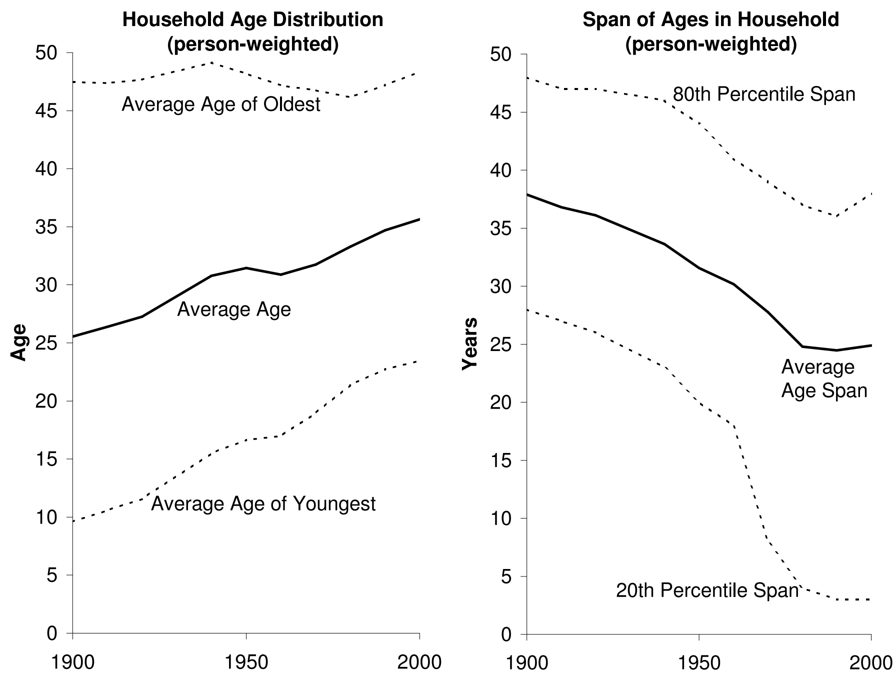


Figure 4.3: Age Distributions in Households. Excludes group quarters population. All results are person-weighted. The average age is the average age of all individuals in the population who are in a household. The average oldest, youngest, and age span in the household are weighted by the number of persons in the household. Similarly, the percentiles of the age span are from the distribution of all individuals, not households. For persons living alone the span is zero. Results reflect data in which the maximum possible age designation is 90+ years.

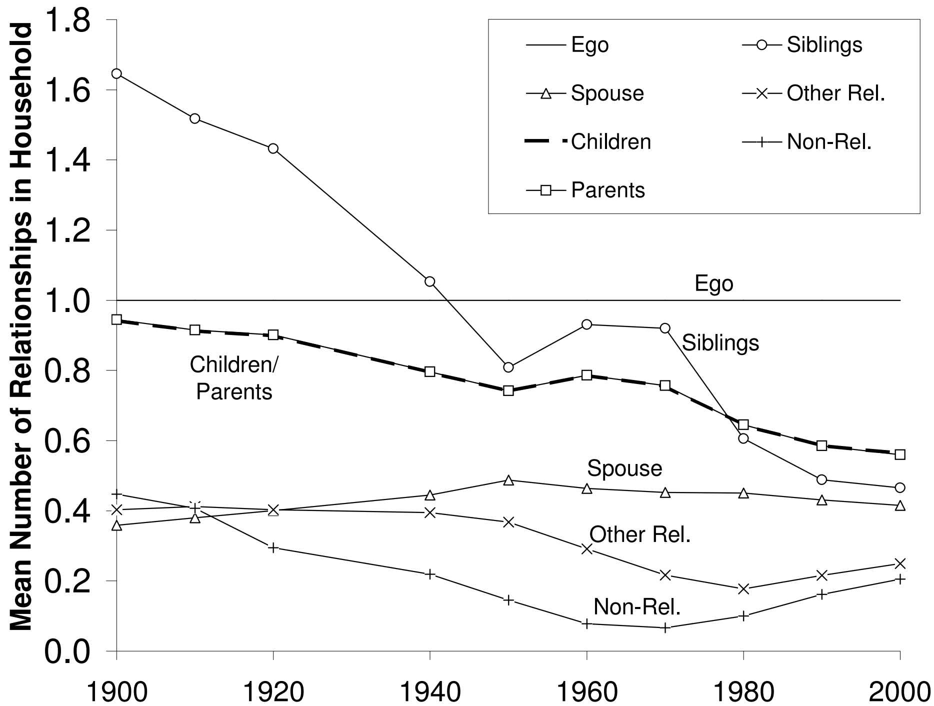


Figure 4.4: Average Number of Relationships in a Person's Household. Excludes group quarters population. Children, siblings and parents include biological, step- and adopted relationships between persons of any age but not in-law relationships. In-law relationships are included in other relatives. Relationships are relative to each ego, not to any fixed point in the household, such as a household head or householder. Averages are person-weighted.

	1900	2000	1900 to 2000 Change
Ego	1.00	1.00	0.00
Spouse	0.36	0.42	0.06
Children	0.94	0.56	-0.38
Parents	0.94	0.56	-0.38
Siblings	1.65	0.47	-1.18
Other Relatives	0.40	0.25	-0.15
Non-Relatives	0.45	0.21	-0.24
Avg. Person's HH Size:	5.74	3.46	-2.28

Table 4.2: Average Number of Relationships, Change from 1900 to 2000. Relationships are relative to each reference person or "Ego." Siblings, parents and children include relationships that are biological, adoption-based, or step-relationships but not in-laws. In-laws would be counted in "Other Relatives." Averages are person-weighted.

may be the product of the demise of certain kinds of relationships in the household. Figure 4.4 shows the results of the average calculation. The solid horizontal is for the reference individual, labeled "Ego" on the graph. The line goes through one because the reference individual is always represented in his own household. The other lines represent the average number of each type of relationship found in ego's household, not relationships relative to a fixed person in the household, such as a household head.

At the beginning of the century, ego shared his household with multiple siblings, a parent and a child.[5] There might also have been a non-relative, a spouse, or another relative (other than spouse, parents, children or siblings). By the end of the century, however, the average person is still as likely to have a spouse in the household, but the likelihood of having parents, children, or siblings has dropped considerably. Other relatives and non-relatives are also more scarce in the modern household but the trend has reversed somewhat in the

[5]The lines for parent and children are the same when this statistic is calculated over the entire population. This is because, given P parents and C children in each household, the children contribute P parents C times to the average, while the parents contribution C children P times. For example, in a family with two parents and three children, the data for number of children for the five individuals, listing parents first, would be 3,3,0,0,0. The data for number of parents for the five individuals would be 0,0,2,2,2. The average number of children across the five people is $6 \div 5$, the same as the average number of parents.

most recent decades. Although not shown, the variability in the number of siblings and children in the household has dropped considerably as well, consistent with the smaller and smaller sibling sets born over the twentieth century. The average number of all relationship types is affected by the number of people who live with no one else in their household or no other family members. The proportion living alone has increased from 1% in 1900 to 10% in 2000. The proportion of people living without any relatives, defined to be those related by blood, marriage, or adoption has increased from 9% in 1900 to 19% in 2000. This includes persons living alone.

Following the logic of person-weighted averages, the person-weighted average number of each type of relationship in a person's household sums to the average person-weighted household size, as demonstrated in Table 4.2. The table shows the values plotted in Figure 4.4 for 1900 and 2000, with the change from 1900 to 2000 shown in the far right column. Returning to the question of which relationships account for the decreasing average household size, we see that the decrease in siblings of 1.18 accounts for slightly over half of the total decrease of 2.29 fewer people in the average. The decrease in number of siblings affects overall household composition in two ways. It affects children's household composition directly, but it also affects the overall average composition by shifting the distribution of the population to older ages. Much of what we see in Figure 4.4 has to do with this population aging. At the beginning of the century, a large share of the population was made up of children, who tend to live with siblings, while at the end of the century the population is older, generally past the years of living with a sibling and into the years of living with a spouse.

Returning to the question of whether household change is the product of conscious choice and behaviors or not, the effect of decreasing sibling sets shows that the answer to that question is yes and no. Decisions about fertility may be the direct product of changes in values and ideas about what an ideal family size is on the part of parents, or whether or not it is acceptable to choose the number of children one has at all. On the other hand, the children themselves had no hand in choosing the fertility of their parents, which appears to have a very large effect on the composition of their households. Furthermore, if the byproduct of those value changes is population aging, does that aging also represent a value change? People may have made a choice to have fewer children, but they were most likely not cognizant of causing the age distribution of the population to shift to older ages through that choice. Rather, population aging is more properly characterized as a compositional shift that changes overall household composition by changing the types of people in the population.

Setting aside population aging for a moment, however, Figure 4.5 presents the same kind of calculation as Figure 4.4, done within each of four age groups. For children age 0-17, we see that the decrease in average number of siblings was quite sharp and consistent, with the exception of the baby boom after mid-century. Surprisingly, the average number of parents in a child's household has not fallen very much over the century. This is in contrast to strong research and popular interest in recent decades on the impacts on children of being raised in single parent families. There is a slight downward trend in average number of parents since 1960, but the level is still near the long-run historical average. Other relatives and non-relatives were never a large component of children's households, but fell to lows in 1970 and 1980 and have picked up somewhat since then. Data to be shown later suggest that some of those non-relatives may, in fact, be the child's parent, or someone functioning as a step-parent but who is not married to the person identified as the child's parent. This may compensate for some of the recent decade's decreases in average number of parents in the household. Whether the lack of marriage between the child's parents, or between a parent and a potential step-parent signifies very different impacts on the child is a more complex research question.

For young adults aged 18-29, we see first of all that they live with fewer people on average than those age 0-17 do and that their household size diminished over time. The decrease seems to be accounted for by the decrease in siblings and parents in the households of 18-29 year olds over the century, as more young people leave the parental household at younger ages than earlier in the century (Goldscheider and DaVanzo 1985). Young adults also have fewer children in their households from 1900 to 2000, with the exception of the large baby boom discontinuity where spouse and number of children increase. There is also a steady rise in non-relatives since 1960, as more young people live with an unmarried partner or roommate, rather than family. Moving up the age scale, adults age 30-64 have far fewer children in their households over the century but also have a steadily declining number of all other types of relationships, with the exception of spouses. A similar picture is seen for the elderly, for whom the prevalence of all relationships falls over time, with the exception of the spouse. There is a small but steady increase in this measure, due to the increase in the period after the childbearing years that mortality decline has afforded so many people in the modern era. It is also the product of the compression of fertility into fewer of a

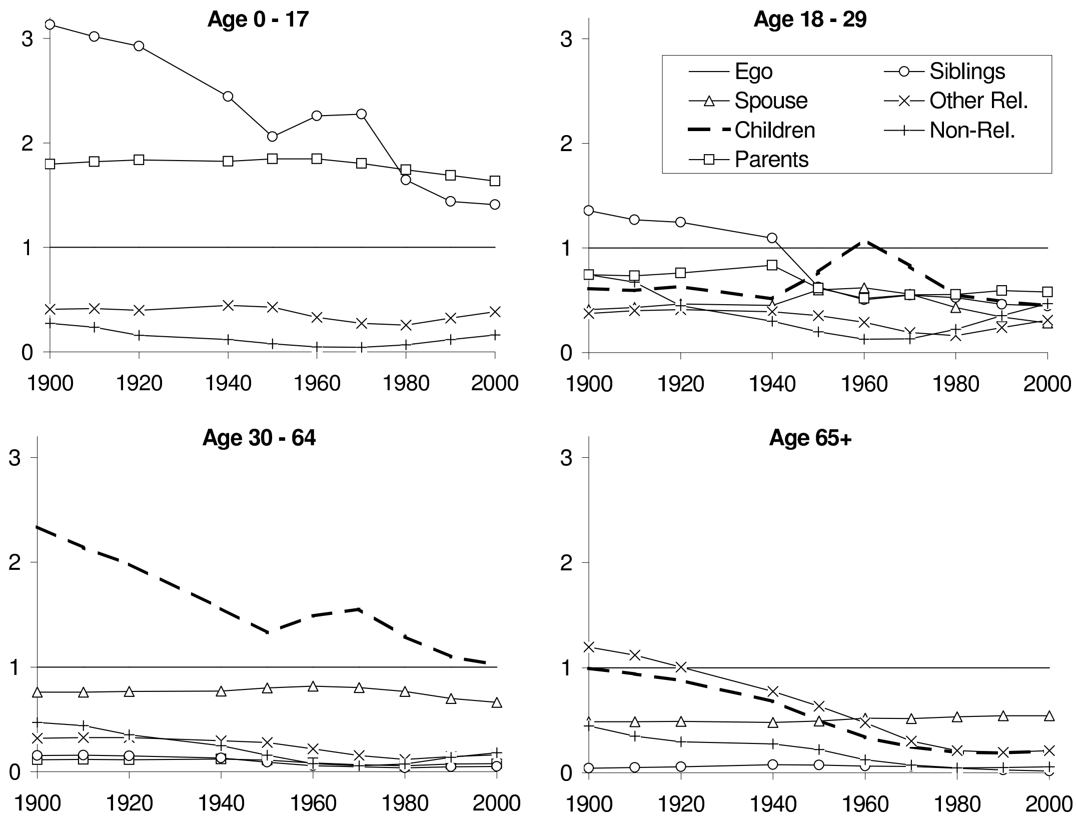


Figure 4.5: Relationships in the Household by Age Group. All graph scales are the same. Relationships are relative to the reference person in that particular age group. Siblings, parents and children include relationships that are biological, adoption-based, or step-relationships but not in-laws. In-law relationships would be considered "Other Relatives." Children can be of any age. Average number of spouses and children are not shown on the Age 0-17 graph as very few 0-17 year olds were married or had children. Similarly, parents were omitted from the Age 65+ graphs as very few people in this age category had parents living in their households.

woman's childbearing years, resulting in an earlier entry into the "empty nest" stage for modern couples compared to their early century counterparts. However, the prevalence of spouses in the households of elderly women declines somewhat in recent decades (data not shown) due to women's longer life expectancies compared to men and their tendency to marry men somewhat older than themselves who are therefore more likely to die first. Those in the oldest age category, age 65+, were far less likely to share a household with an adult child as the century progressed. In 1900, there was an average of one child in the households of people age 65+, dropping steadily throughout the century. This average reflects the fact that a large proportion of elderly people at any year do not coreside with an adult child, while some elderly coreside with more than one. In 1900, 58% of all persons age 65+ lived with at least one child. This number fell steadily to just 16% in 2000.

The sharp decline in other relatives in the households of elderly persons is mostly due to fewer grandchildren, as elderly people reside less frequently with their grown children's families, and those who do coreside with children and grandchildren have a smaller number of grandchildren overall, due to the lower fertility of their children. This decrease in grandchildren is another instance in which we can return to the conscious action versus compositional change question at the root of causal explanations of household change. While the adult child may have chosen to have fewer children very consciously, this change may be experienced by the grandparent as something wholly out of his or her influence. Under direct control or not, the elderly of 1900 clearly lived in very different households compared to their counterparts in 2000.

4.3.4 Household Type

Beyond looking at household characteristics, the overall distribution across various household types can be examined. Aspects of the classification used in this research were mentioned briefly in Chapter 2: it is based on the Census Bureau's definition of households, but departs from previous household classification schemes in not depending on a particular reference person in the household for classification purposes and in its treatment of households with non-relatives. The full classification is shown in Figure 4.6. The top-layer distinction between households and group quarters has been discussed previously. That this distinction is based on some number of non-related persons living together demonstrates the intersection between the concepts of household and family relatedness. Using the concept of

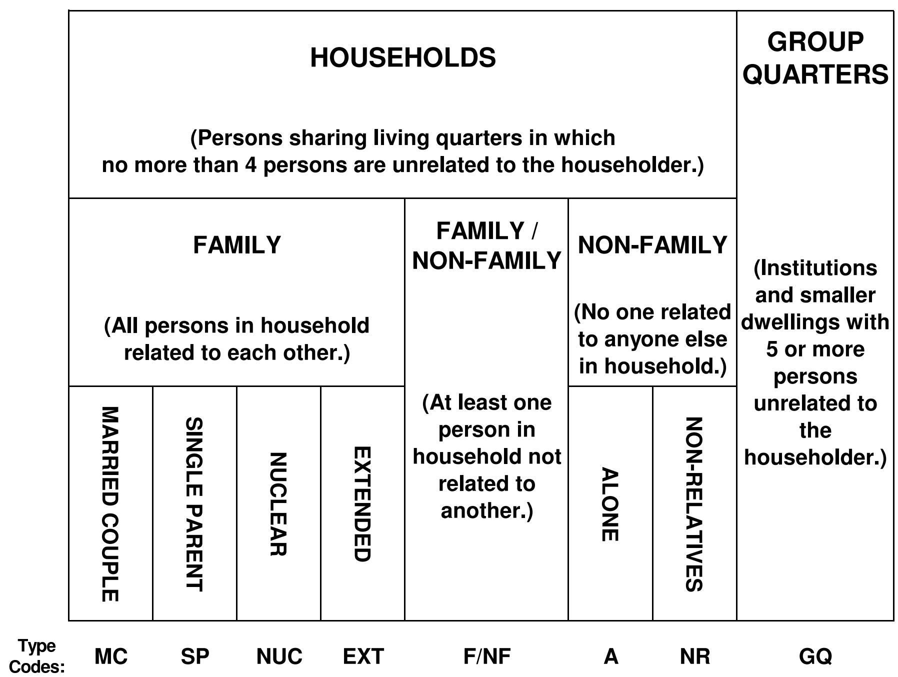


Figure 4.6: Schematic for Classification of Households. Relatedness defined by blood, marriage or adoption. Relationships are independent of age. Single parent households, for example, can have a young parent and children or an elderly parent and adult children.

relatedness, then, we can divide households into three groups: family households in which all persons are related to one another by blood, marriage or adoption, non-family households in which no one is related to anyone else, and family/non-family combination households in which there is some combination of relatives and non-relatives living together. This family/non-family combination category is another important difference between the classification scheme used here and many other schemes in the literature: the presence of anyone not related to anyone else in the household changes the household classification. Under Census Bureau methodology, non-relatives do not effect classification as long as the household head or householder is part of a family unit, i.e. has some relatives in the household (U.S. Bureau of the Census 2002). As the methodology used here does not make reference to any head or householder beyond the household versus group quarters distinction, that would not be appropriate. Family-only households in the system used here are ones in which each member of the household is related to each other member. Any combination of related and non-related individuals is classified as family/non-family combination.

For the family-only households, we can further classify them using a description of the family structure. In this work, four such family households are distinguished: married couple, single parent, nuclear and extended. Married couple households contain only a husband and a wife. Single parent households contain only one parent and his or her children, while nuclear family households contain only two married parents and their children. For both single parent and nuclear families, children include biological, adopted and stepchildren of any age, but not children-in-law. Thus, extended family becomes something of a residual category for households that contain persons all related to one another but that do not fit the simpler descriptions of married couple, single parent or nuclear family. As mentioned previously, this classification system is not based on relationships to a household head, but rather on relationships among all persons. Thus, a single parent family household could be a household containing a single male householder and his young children, or could be one in which a single female householder lives with her elderly widowed mother. Both consist of an unmarried parent and an unmarried offspring.

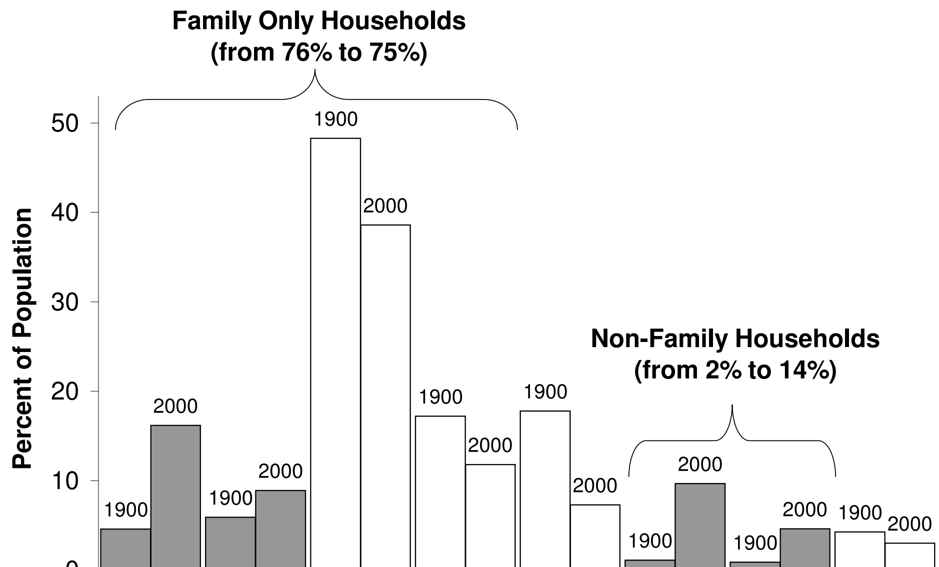
Many would argue that same- and opposite-gender cohabiting couples, with or without children, should be included as family types in any household classification scheme. This is impossible over the time period under study here, however. It is only in the latest periods in which it was possible to identify a member of the household as an "unmarried partner" of the householder. Even when the designation was available, neither the definition of an unmarried partner nor the tendency to self-identify as such is well understood (Casper and Cohen 2000). Because of this lack of consistent data over the century, any household type based on a cohabiting couple relationship is left out of the analysis. A household consisting of a cohabiting couple only will be classified as a non-relative household. A cohabiting couple household in which one or both members of the couple have children would appear as a family/non-family combination household. While cohabitation-based households do not appear as a separate category in the classification scheme, their presence will be seen and discussed in the sections reviewing the characteristics of non-relative and family/non-family combination households.

For the non-relative households, two main groups are distinguished: persons living alone and persons living with one to four non-relatives (who must in turn be all unrelated to each other). The final classification system results in eight groups altogether, as shown by the type codes below the boxes in Figure 4.6: the four family-only household types of married couple (MC), single parent (SP), nuclear (NUC) and extended (EXT), followed by the family/non-family (F/NF) combination households, the two non-family household types of alone (A) and non-relatives (NR) and, finally, group quarters (GQ).

Figure 4.7 shows the long-term trend of change by type from 1900 to 2000. The household types that increased over the period are shown in gray, those that decreased are shown in white. Within the family-only households, the two more atomized types, married couple and single parent, increased while the more complex types, nuclear and extended family, decreased. Adding the four family types together, however, shows that the proportion of people living in family-only households barely changed (from 76% in 1900 to 75% in 2000). Family/non-family combination households decreased a great deal (down by 11%), while non-family households increased by about that amount (up by 12%). Group quarters' share of the population stayed at about the same level as in 1900.[6]

Figure 4.8 shows the full pattern of change over the century. Of the types that increased over the century, they seem to have done so fairly monotonically. The proportion of people living in married couple and alone households increased steadily over the century, while single parent and non-relative households were relatively stable to 1960 followed by

[6]Statistics computed at the household level are, of course, somewhat different because smaller households receive the same weight as larger households in such a calculation. For example, the proportion of households consisting of a person living alone goes from 5% in 1900 to 26% in 2000, while we note at the same time that the proportion of persons living alone (excluding group quarters residents) goes from 1% in 1900 to 10% in 2000.



	Married Couple	Single Parent	Nuclear	Extended	Family/ Non-Family	Alone	Non-Related	Group Quarters
1900	5%	6%	48%	17%	18%	1%	1%	4%
2000	16%	9%	39%	12%	7%	10%	5%	3%

Figure 4.7: Proportion of Persons in each Household Type and Group Quarters, 1900 and 2000. Types increasing in share are shown in gray; types decreasing in share are shown in white.

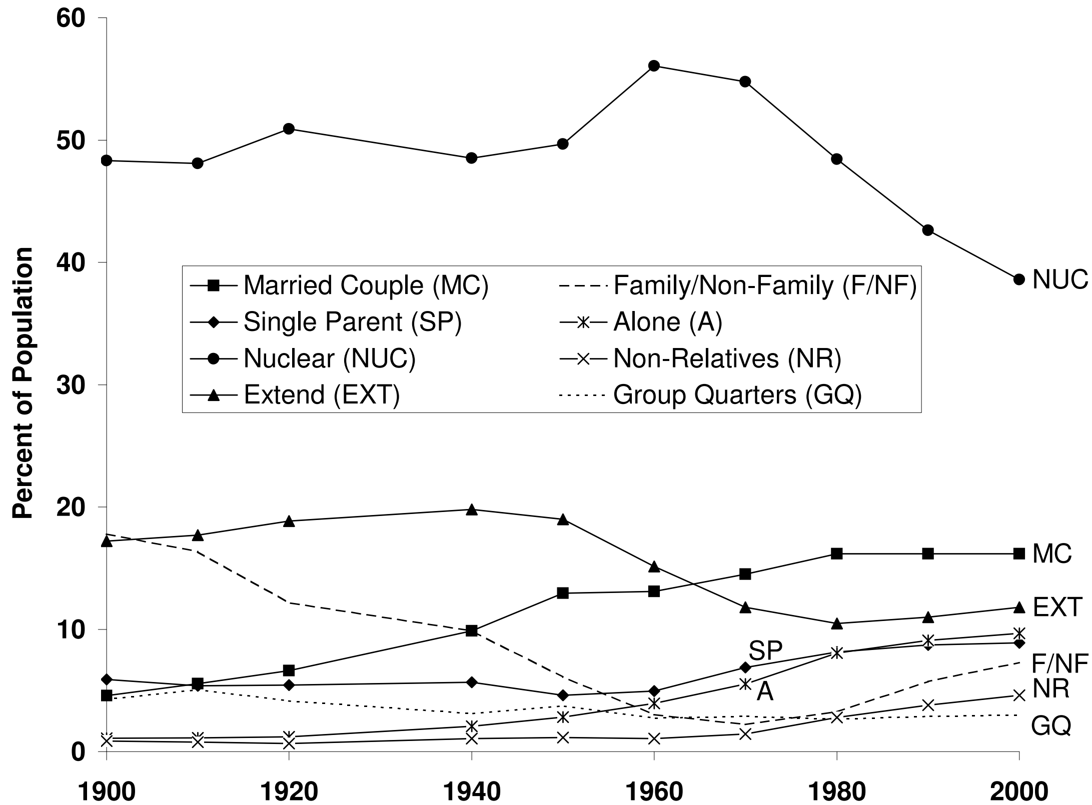


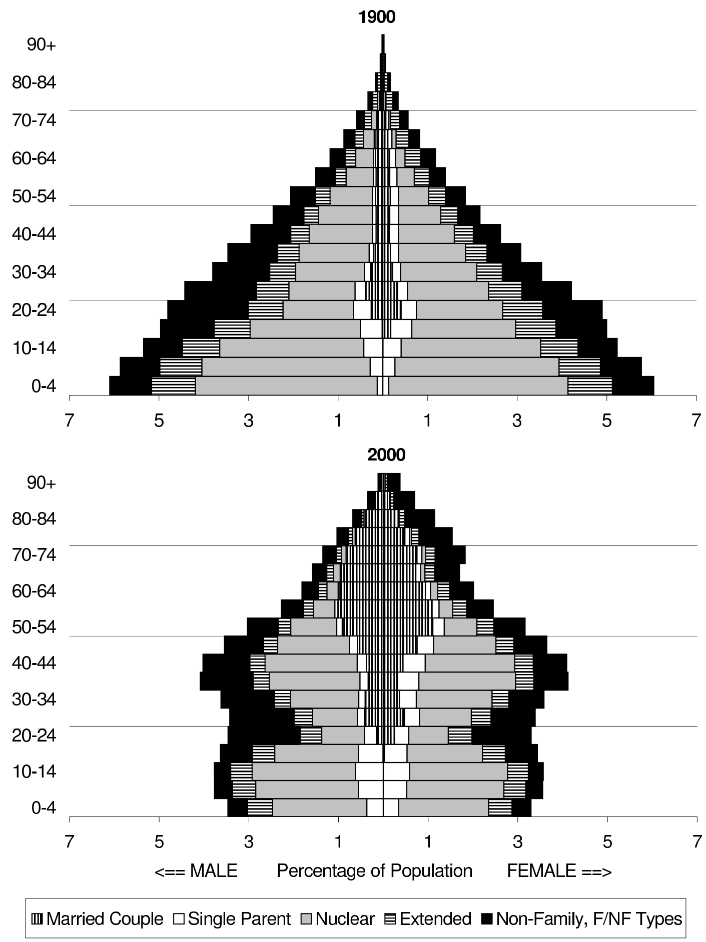
Figure 4.8: Proportion of Persons in each Household Type and Group Quarters, 1900-2000. Family-only types are shown with solid black point markers.

steady increases to 2000. Among the types decreasing over the century, however, there are more discontinuities in the 100 year history. Extended family households increased somewhat to 1940, decreased through 1980 and have increased a bit in the recent decades. For nuclear family households, we see the major variation from 1950 to 1980 caused by the baby boom, but it seems to have been temporary. Family/non-family combination households fell steadily until 1970 and have picked up somewhat since then. Group quarter's share, never very large, decreased slightly.

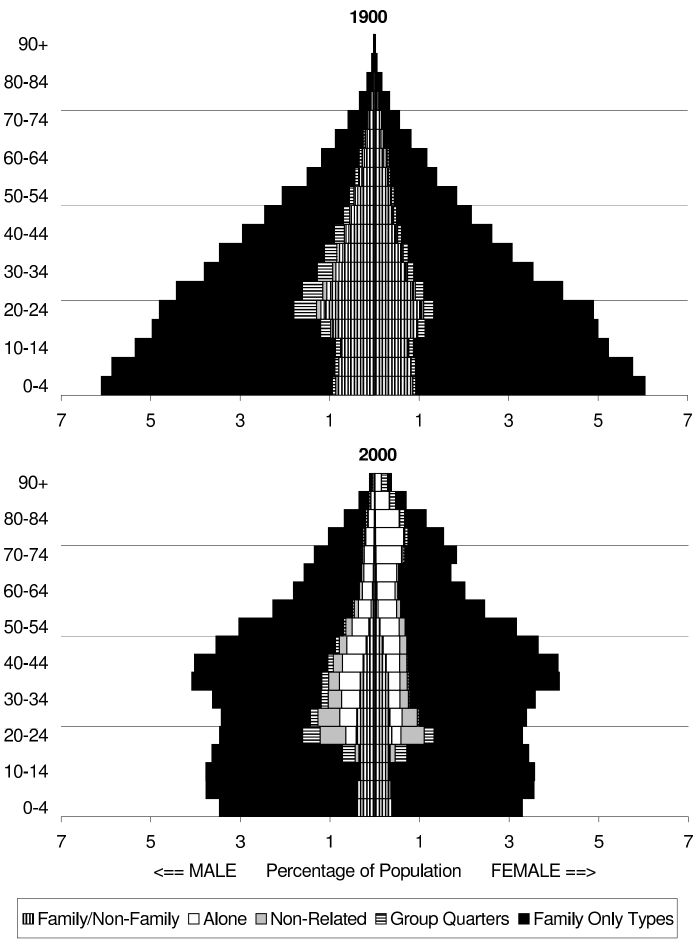
Behind these shifts in household types at the population level are shifts in the types of households occupied by people of different age and sex groups, as well as shifts in the representation of those age and sex groups in the population. Age and sex distributions can be shown graphically using population pyramids. Dividing each bar in the population pyramid into its shares by household type allows the combination of all of this information into one picture, as in Figure 4.9. The pyramids on the top represent the population in 1900, those on the bottom are for 2000. To enhance readability, the pyramids on the left only show information for the family-only household types in detail, with all other types shown in black and moved to the outer edge of the pyramid. Those on the right show the non-family and combination types in detail, with the family-only types all in black and moved to the outside edges of the pyramid. Recalling the fact that the split between family only versus other types of households was approximately the same size in 1900 as in 2000, the area of the black portion of the pyramids is then about the same when comparing a 1900 graph with the 2000 version below it.

These pyramids are very informative about the specific kinds of changes in households from 1900 to 2000. Looking first at the detail in the family-only types, while only a very few adults lived in married couple households in 1900, by 2000 it seems that this living arrangement was the most common among the elderly, especially elderly men. Also, much of the large area of elderly married couples in 2000 is in a portion of the population pyramid that was much smaller in 1900. It seems that, as many older people reached this new stage of life that was not available to their early century counterparts, they chose to spend it with a spouse. Looking slightly further down the pyramids, we see another new stage, not in terms of years of life in this instance, but in terms of the household life cycle. In 1900 the transition from the parental household was often to another family household, often one's own nuclear household. By 2000, however, we see far more adults living some of those adult years in non-family households. Finally, at the bottom of the pyramids, we see that the large child cohorts born in the 20 years prior to the 1900 census dominate the population pyramid and reside largely in nuclear family households. By 2000, the child cohorts are no longer larger than each preceding one, and they are much more likely to live in single parent families than children in 1900. Turning to the non-family and combination household types, some large changes are obvious. Living alone or with non-relatives only was exceedingly rare in 1900, while significant numbers of adults and elderly people are residing in such households by 2000. The large share of family/non-family combination households observed in 1900 are restricted to only a small share of children and adults by 2000.

Figure 4.9: Population Pyramids with Household Type Overlay, 1900 and 2000. Bars are for five-year age groups. The width of each household type section represents percentage of population in that age group, sex and household type. In the left-hand panels, family-only types are displayed in detail while other types are all shown in black. This switches in the right-hand panel, with family-only types all shown in black, moved to the outside of the pyramid, and other types shown in detail.

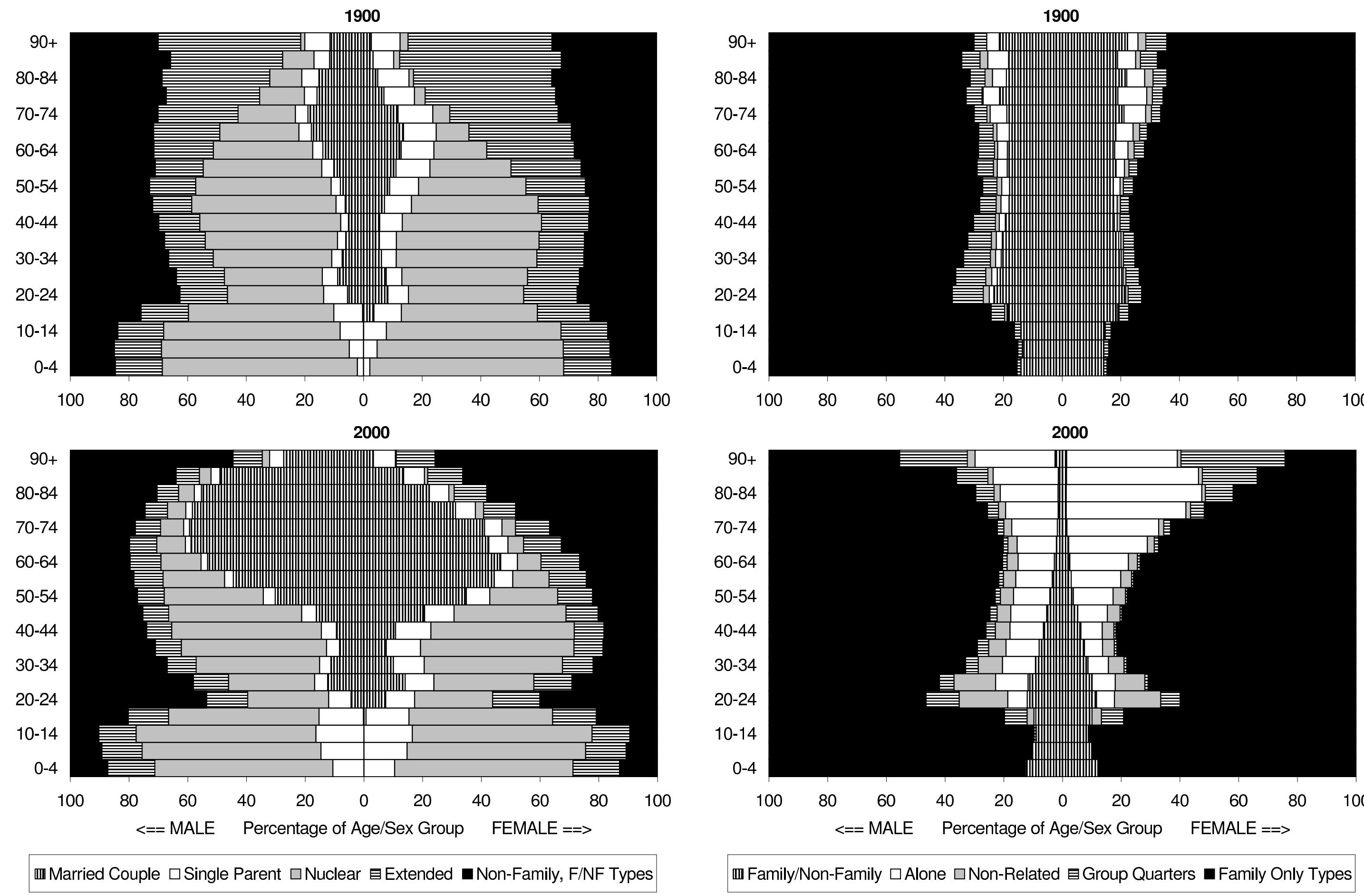


(a) Family-Only Detail



(b) Non-Family, F/NF Detail

Figure 4.10: Household Types by Age and Sex, 1900 and 2000. Bars are for five-year age groups. The width of each household type section represents the percentage of that age group and sex living in the household type. In the left-hand panels, family-only types are displayed in detail while other types are all shown in black. This switches in the right-hand panel, with family-only types all shown in black, moved to the outside of the pyramid, and other types shown in detail.



(a) Family-Only Detail

(b) Non-Family, F/NF Detail

The pyramids demonstrate the two themes discussed in earlier analyses. First of all, the theme of continuity versus change is demonstrated by the unchanging shares of population in family-only versus other types of households coupled with the large changes in proportions by type and by age and sex for each type within the larger categories of family-only and other types of households. The second theme of identifying household change that is the product of compositional changes, rather than changing actions of individuals, is shown largely by the changing age distribution demonstrated by the population pyramids, shifting the population toward ages where different household types are more prevalent.

To set aside some compositional changes in the population, the proportions in each household type can be calculated *within* each age and sex group. Thus each bar in the population pyramid comes to equal 100%. Such an analysis is shown in Figure 4.10. As in the previous figure, family-only types in the left-hand two graphs are shown in detail and the other types are all black and moved to the outside edges of the graph, while in the right-hand two graphs the non-family and combination types are shown in detail and the family-only types are all black and moved to the outside edges of the graph. These pictures highlight the changes in individual's household circumstances from 1900 to 2000, setting aside the information on how types of individuals in the population have changed. We see somewhat more continuity for younger people between 1900 and 2000 when age and sex distribution is eliminated from the graphic. Specifically, the pinched in region of the graph for family-only types in 1900 shows that young people were less likely to live with family, compared to children and older adults, even in 1900. This was obscured in full population pyramids by the size of the large youth cohorts. We also see that the elderly in 1900 were somewhat more likely to live as married couples than mid-life adults in 1900. They were much more likely to live with extended family members, of course, but some of the basic shapes observed in 2000 are visible to some extent in 1900. This was obscured in the age pyramid graphs because the proportion of population at older ages in 1900 was too small to observe any detail. For the non-family and combination types, we see the large increase from 1900 to 2000 in the probability that an elderly person will live alone. We see as well the large increase in the probability that an elderly person, women especially, will live in group quarters, most often nursing homes. Finally, there is also indication of the increasing number of young adults living with non-relatives. As we shall see in subsequent sections, many of these living arrangements are probably cohabiting couples and the children they had together or in previous marriages or relationships.

Thus far, all household change has been examined for the household population as a whole. It has been demonstrated that many of the average characteristics in households have changed: size has decreased, as has average age span although with greater variability, and we tend to live with fewer relatives with the exception of our spouses. The distribution of people across household types has changed as well – with the balance moving toward more atomized types, although not away from family-based households. The next descriptive step, then, is to join the exploration of average statistics with that of type distribution and look within each household type. This will give some indication of how much change in the average characteristics comes from the shifting type distribution versus changes of characteristics within household types. As is often the case with these types of contrasts, the answer turns out to be a little bit of both, as will be demonstrated in the next section. It looks briefly into each household type, suggesting for some types the ways in which population has changed them, and for others how large-scale social change outside of any shift in the population characteristics of age, sex, marital status and parity have reshaped them.

4.4 Change Within Each Household Type

4.4.1 Family-Only Types

Of the four family-only types of households, married couple households had by far the largest increase in share from 1900 to 2000. As previous analyses have indicated, this increase was driven by an increase in the prevalence of older people past their childrearing years in the population, along with an increase in the propensity of those older people to live with only a spouse as opposed to additional family members. The increase in numbers and share, along with the increase in the age of people in married couple households, is shown in the top two graphs in Figure 4.11. Interestingly, while the age of the couple has increased steadily, the age difference between them has gradually declined, as shown by the left-hand graph on the bottom. Finally, in contrast to the commonplace that women always marry slightly older men, it seems that the proportion of married couples where the woman is older than the man has been substantial since the beginning of the century and has grown in recent decades.

Single parent families are the other family type that increased over the century, as

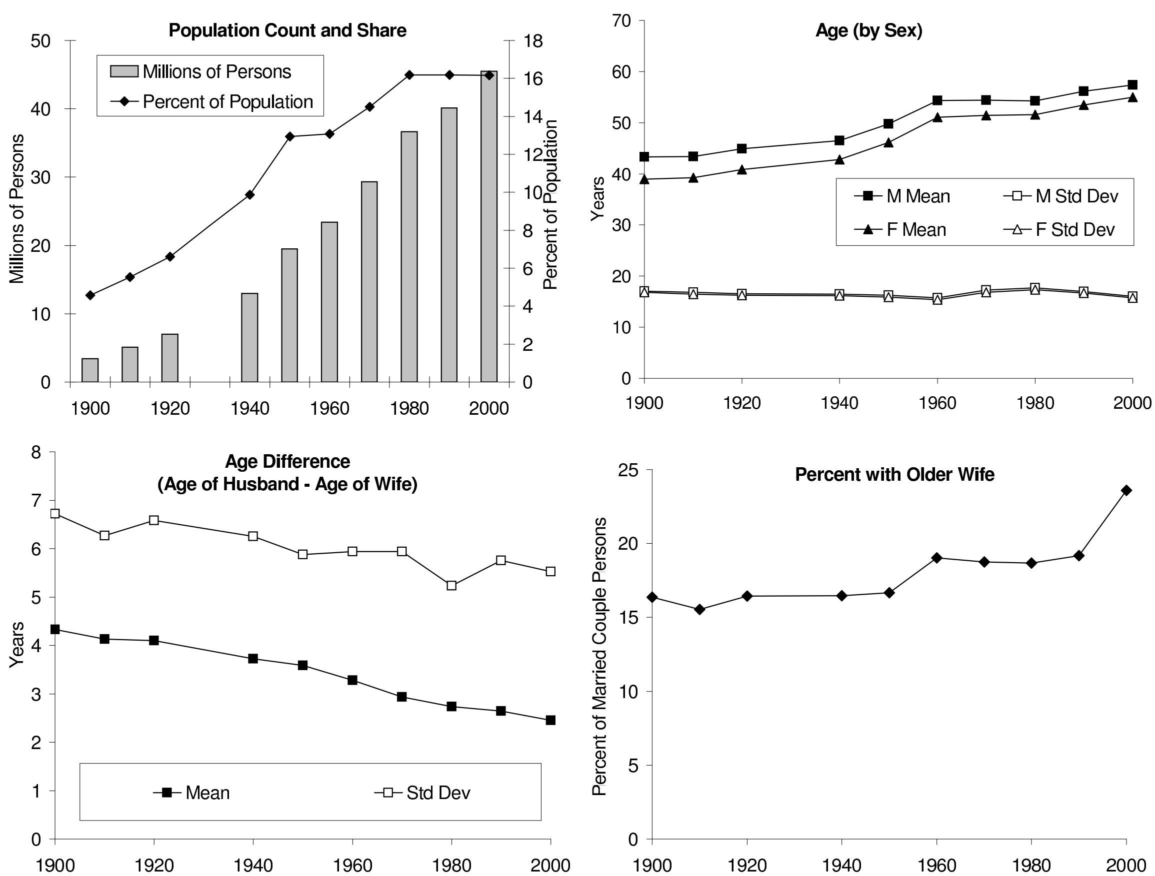


Figure 4.11: Descriptive Charts of Married Couple Households. Data represent statistics for only those men and women living in married couple only households (no children present).

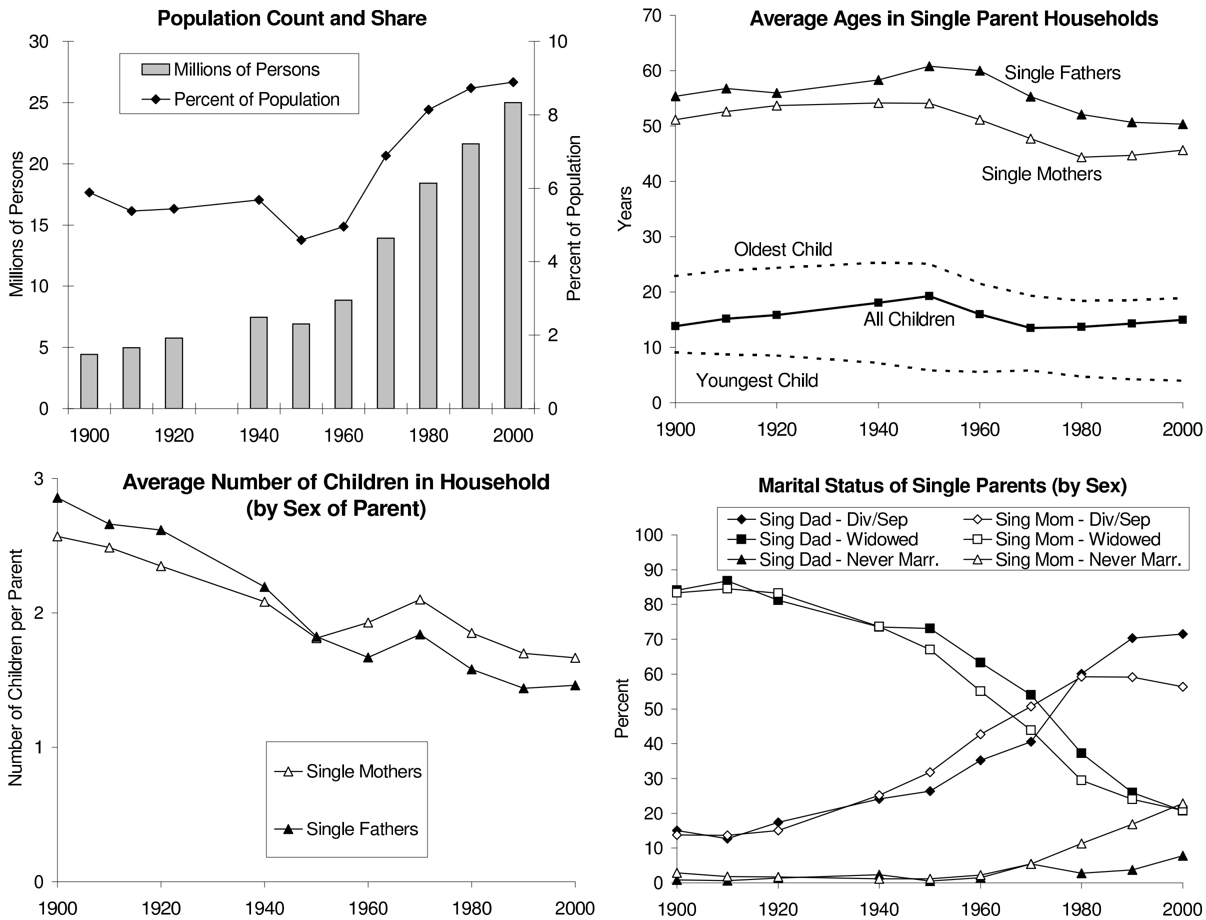


Figure 4.12: Descriptive Charts of Single Parent Family Households. Data represent statistics for only those living in single parent households (one unmarried parent and his or her unmarried biological, adopted or step-children of any age).

shown in the first graph in Figure 4.12. The parent in the single parent family has always been more likely to be a woman, ranging from a low of 72% of single parents in 1920 to a high of 89% in 1980. Following the other graphs in the figure, we see that single mothers have always been slightly younger than single fathers and that all single parents have become somewhat younger since mid-century. Single mothers began the century with fewer children in their single parent families than single fathers on average, but this relationship crossed over in 1950. This trend, combined with the much higher prevalence of single mothers than fathers, means that as the century progressed the children of single parent families became even more likely to live with a mother than a father. In 1900, 75% of the children in single parents families lived with a mother, compared with 86% by 2000, down slightly from the high of 90% in 1980.

For both single mothers and fathers, early twentieth century single parent families were overwhelmingly the product of widowhood. By the end of the century, however, single parent families come from the divorce of parents. For single mothers, there is also a steady rise since 1960 in the proportion of single parent families in which the mother has never been married. This does not include single parent families that share a dwelling with a parent's cohabiting partner, as such households would be classified as family/non-family combination households. The increase is much flatter for single fathers. This shift from single parenthood resulting from widowhood to resulting from divorce comes from many different changes. In the early century, single parent families were often elderly widows living with an unmarried adult child. This type of household is less common by 2000 because widowhood is now confined to older ages, and the older widows who are in the population are far more likely to be living independently or in a group quarters setting than they were in 1900. Many young women experienced widowhood in the early century, but they were far more likely to form extended family households with other kin than to live as an independent head of household (data not shown). The greater incomes earned by women in recent decades make it possible for them to maintain independent households, and post-divorce financial support through a divorce settlement is more available to a woman than was support after a husband's death in 1900. Finally, the fact that divorce is an event easier to foresee than the death of a spouse may mean that a woman is better able to plan for the future after divorce in order to maintain an independent household.

Moving on to examine the characteristics of nuclear families in Figure 4.13, we see similar ages and age differences between husbands and wives as were observed for married

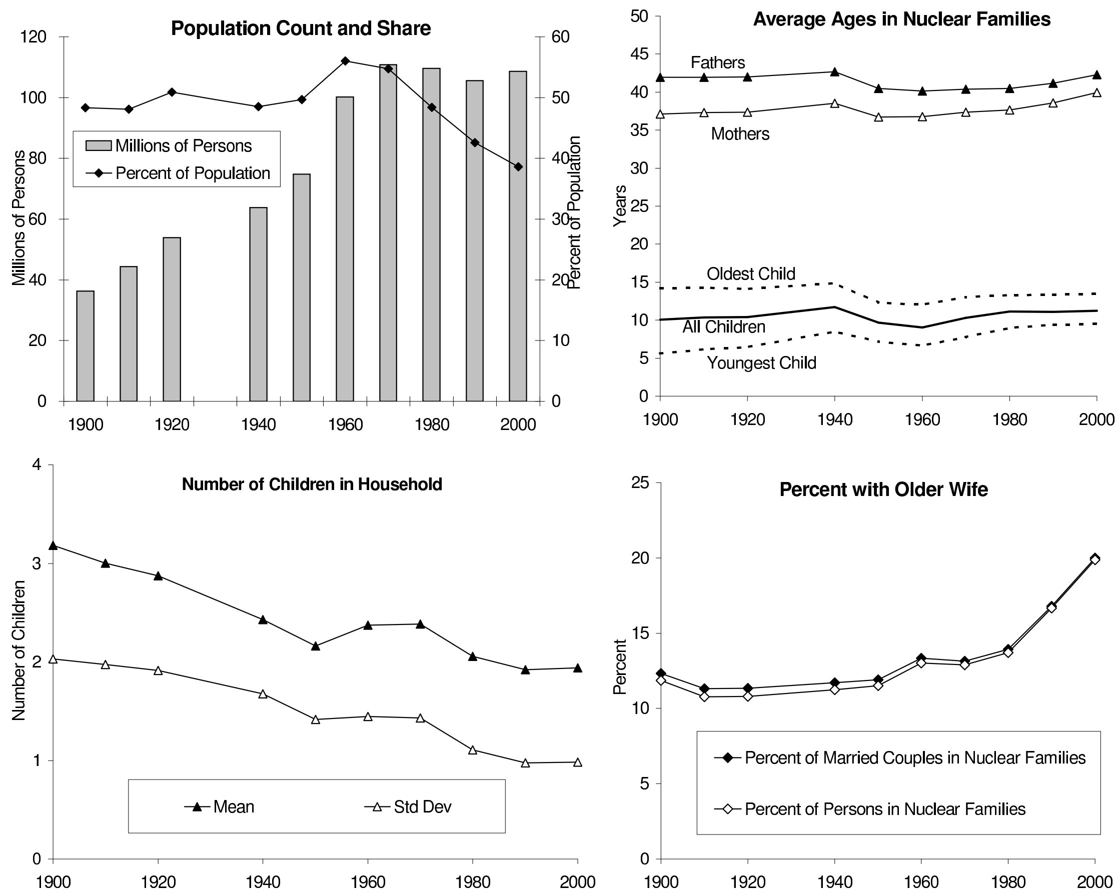


Figure 4.13: Descriptive Charts of Nuclear Family Households. Data represent statistics for only those living in nuclear family households (two married parents and their unmarried biological, adopted or step-children of any age). The percent with an older wife is shown two ways: the percent of couples in nuclear family households in which the wife is older, and the percent of people (including children) in nuclear family households in which the wife is older. The slight difference in the early part of the century is due to the slightly lower number of children in nuclear family households in which the wife is older.

couple families. (Although not shown on the graph, the variability in the ages of married couples is greater than that of the couple in a nuclear family household.) Fewer nuclear family married couples have an older wife than was observed for married couple households, though. This is due to the different age distributions of spouses in the married couple household types. Nuclear family households are concentrated in the middle of the life course for both husbands and wives, while married couple no children households have an age distribution with two local maxima – at the youngest ages before childbearing and at the oldest ages after childbearing – for both husbands and wives. Men who marry very young are slightly more likely to have an older wife than men marrying later, and women still married when they are older are more likely to have a younger husband. Therefore, the two local maxima in the age distributions of married couple no children households catch married men and women in ages when it is somewhat more likely that the wife is older.

Turning to the children in nuclear family households, both the average and variability of number of children decreased over the century, while the age range of children in the household shrinks as well. These changes are due to the decrease in fertility and its compression into a much shorter span of years in a couple's life. This contributes to the rise of married couple families (without children in the household), as the childrearing stage compresses into far fewer years of life for a couple.

Finally in the family household types, Figure 4.14 shows a small amount of detail on extended families. The size of extended families has declined steadily throughout the century, while there is no strong trend in the sex (not shown) or age distribution of the occupants of extended families over the period. There seem to be some shifts in the types of extended families observed, defining those types by the number of generations represented in the household. Unfortunately, the degree of identification of various family relationships has not been consistent over time and the decades of 1960, 1970 and 1990 had large numbers of relatives in these households coded with no more information than "other relative." This can be seen in the distribution of families by generations as the large spikes in the dotted line representing the proportion of people living in extended families where one or more of the members has an unidentified relationship to the other members. Ignoring those problem decades, the data do seem to indicate that, while the three generation grandparent-adult child-grandchild extended family household type has remained roughly constant at about half of all of the people living in extended families, the two generation type has decreased somewhat since the beginning of the century. One generation types, most often two sib-

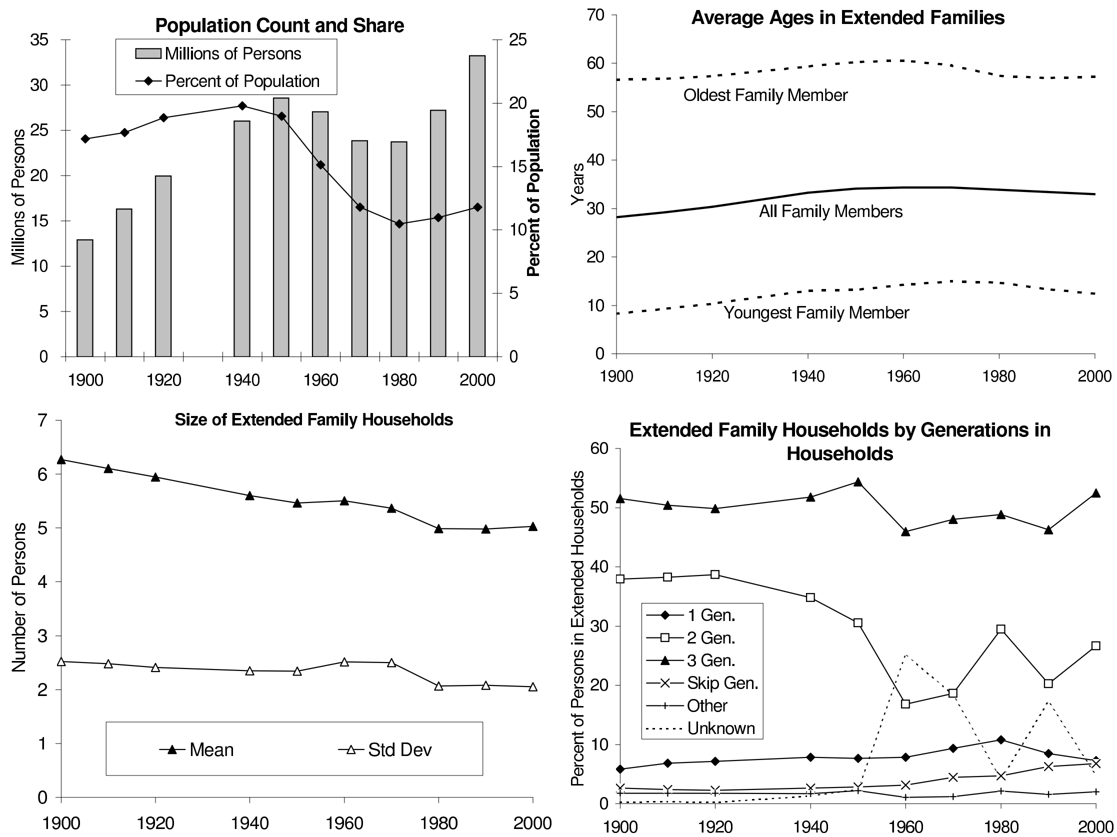


Figure 4.14: Descriptive Charts of Extended Family Households. Data represent statistics for only those living in extended family households (all persons related to one another, but unclassifiable as married couple, single parent or nuclear family). Large shares of unknown generational composition in 1960, 1970 and 1990 are due to lack of detail in the family relationship information gathered during these years.

lings sharing a household, increased until 1980 and skip generation households (most often grandparent-grandchildren households) have increased slowly yet steadily since 1950. The decrease in the two-generation share of extended family households is related to mortality decline and social and economic change. Many of the early century two generation households included the young widows with children discussed in the previous paragraph who, rather than forming an independent single parent household, were more likely to form an extended household with a sibling's nuclear family or a sibling and sibling-in-law. Mortality decline has meant fewer young widows with young children in the population. For those women who have experienced the death of a spouse in the later half of the century, their increasing economic ability to head households, along with the increasing social acceptance of female-headed households, has brought about a decrease in the share of two generation households in the extended family mix.

4.4.2 Family/Non-Family Combination

Family/Non-Family combination households are more complex, and thus somewhat harder to characterize than other household types. To begin, we observe that the majority of these households have only one family unit (a group of people all related to one another by blood, adoption or marriage) plus one or more non-relatives. This characterized the households of 93% of people in this household type in 1900 and 97% by 2000. Only a very few of these household types, then, had more than one family unit in them. To describe the family units in these households, we can use the types used to describe family-only households. At the beginning of the century, most of these family units were nuclear families, while after 1960 we see the sharp rise in the share of single parent families. To describe the non-relative part of these households, we can look at the number of non-relatives present. Based on the definition of households as having no more than four persons unrelated to the household head, there can be from one to four non-relatives in the family/non-family combination household. While most of these households have always had only one non-relative, that proportion has gone up over the century. The rise in the prevalence of single parent family units, together with the rise in single non-relatives suggests that, in the most recent decades, many of these households may be very similar to nuclear families with the exception that the older members, perhaps both the biological parents of the children in the household, or perhaps a biological parent and potential step-parent, are

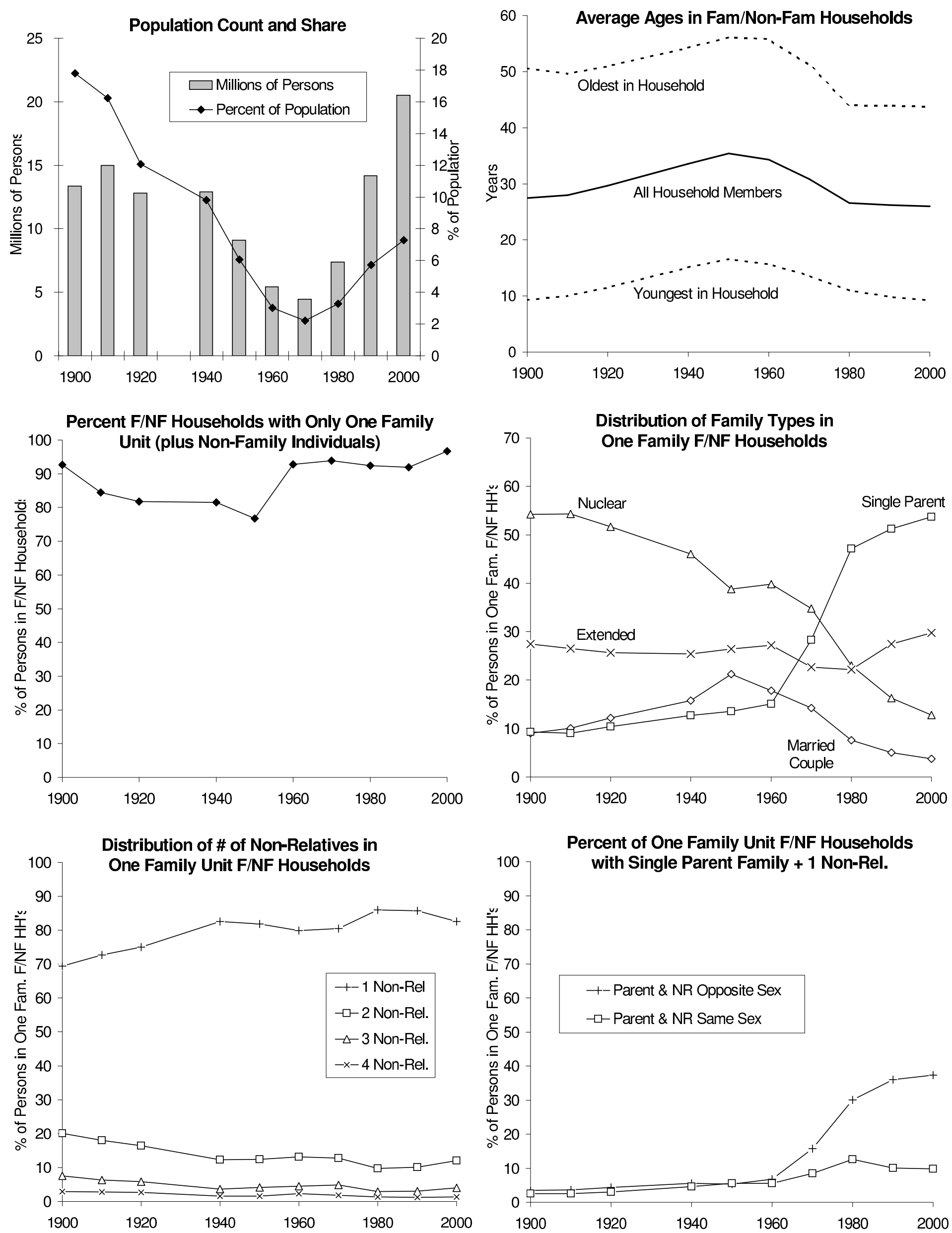


Figure 4.15: Descriptive Charts of Family/Non-Family Households. Data represent statistics for only those living in family/non-family combination households (one or more groups of relatives plus one to four persons not related to anyone else in the household). The middle right and bottom row graphs are for only those living in a family/non-family combination household that contains only one family unit, plus one or more non-relatives. Recall that non-relatives are persons with no relatives in the household at all, not just persons not related to the household head or householder.

not married. In fact, focusing on the group of family/non-family households with only one family unit, we see a sharp rise in the proportion of people in households with one single parent and his or her children, plus one non-related adult who is of the opposite sex of the parent. These types of households accounted for a great deal of the category's overall growth in numbers in recent decades. Since this category's low point of 4.5 million persons in 1970, it has grown by 16.0 million people to 20.5 million in 2000. Most of this growth (52%, or 8.3 million people) can be accounted for by the number of households consisting of a single parent family plus one non-relative, and most of those households have a parent and non-relative of the opposite sex (6.7 million people). While the single parent plus one household configuration does not guarantee that the household consists of a cohabiting couple, it is likely that many of them do and the rise in the whole category does suggest that such arrangements are becoming more prevalent in recent decades. It also suggests a distinct break from the past starting around 1960 to 1970.

With the changing definitions of separate dwellings in the census, there is some concern that the changes in the prevalence of non-relatives over this period are artifacts of the definitional changes (Beresford and Rivlin 1966). However, Ruggles (1988) demonstrates that various reclassification schemes to impose more consistency to not make large differences in classifications of households with non-relatives.

4.4.3 Non-Family Types

Statistics describing people living alone show some strong trends over the century. This type of household becomes dominated by older women as the century progresses: the proportion female rises steadily over the period, while the average age of women living alone rises as well. Younger men have made up an increasing proportion of people living alone since 1970, however, as indicated in the dropping average age of males living alone after this period. The marital status graphs show interesting sex differences as well. At the beginning of the century, when living alone was rare, it seems that it was the provenance of older female widows and somewhat younger never married men. This is still largely true by 2000, but far more of these households are the product of divorce by this time than was observed in 1900. The sex differences are largely driven by the earlier age at death for males, and exacerbated by the few years by which the average husband is older than his wife. Thus, the fact that so few men live alone due to widowhood is driven by their higher

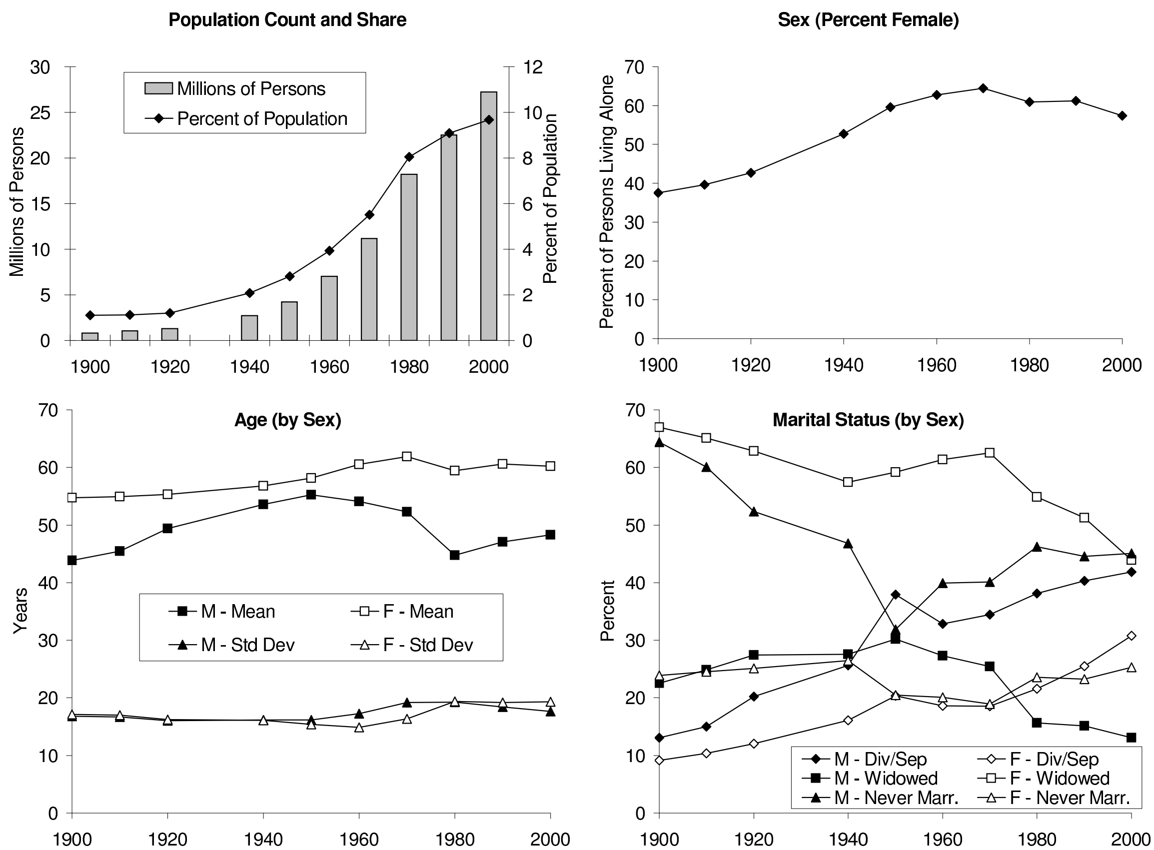


Figure 4.16: Descriptive Charts of Alone Households. Data represent statistics for only those living alone (no others sharing dwelling).

probability of preceding their wives in death.

As with the family/non-family combination households, the rise in non-relative households in the recent decades seems to be driven by the increasing prevalence of cohabitation. The average age of people living in such households has dropped, as living together has become a common stage before marriage, or instead of it, for young adults. The span of ages in non-relative households has gone down as well. During the early century when this type of household was relatively rare, if was often two individuals of the same sex living together. Whether these were homosexual unions or not is not indicated in the data. The proportion of persons in non-relative households since 1970, however, has been fueled by the sharp rise in two people of the opposite sex living together. The number of persons in each sub-type of non-relative household is shown in the final graph in Figure 4.17. Of the overall 10.0 million person increase in the number of people living in non-relative households from 1970 to 2000, 5.6 million is accounted for by the growth in households of two non-relatives of the opposite sex. Another 2.4 million is the increase in households with two non-relatives of the same sex. Many of these households are probably cohabiting couples, both heterosexual and homosexual. Only 2 million in increase since 1970 is accounted for by households with more than two people. Comparing growth factors, the entire household population of the United States grew by a factor of 1.4 from 1970 to 2000. The number of people living in two person opposite-sex non-relative households grew by a factor of 9.6, in two person same-sex non-relative households by 2.8, and in more than two person non-relative households by 3.2. As was observed in family/non-family combination households, this represents a distinct break from the past starting around 1960 to 1970. As with homosexual unions, the extent to which the two person opposite-sex households were romantically involved cohabiters is not clear from available data, but it is likely that many of them were.

An in-depth description of the group quarters population is not possible over the period, as the degree of detail about the type of group quarters available in the census has changed drastically from decade to decade. Furthermore, the analysis is unable to look inside group quarters dwellings to characterize their composition, due to the sampling method used to create the public-use microdata census samples that make up the IPUMS. For most of the decades under observation, only individuals were sampled from group quarters, rather than sampling the quarters themselves and enumerating every individual in a group quarters unit. Given these difficulties, however, the changes in the overall characteristics

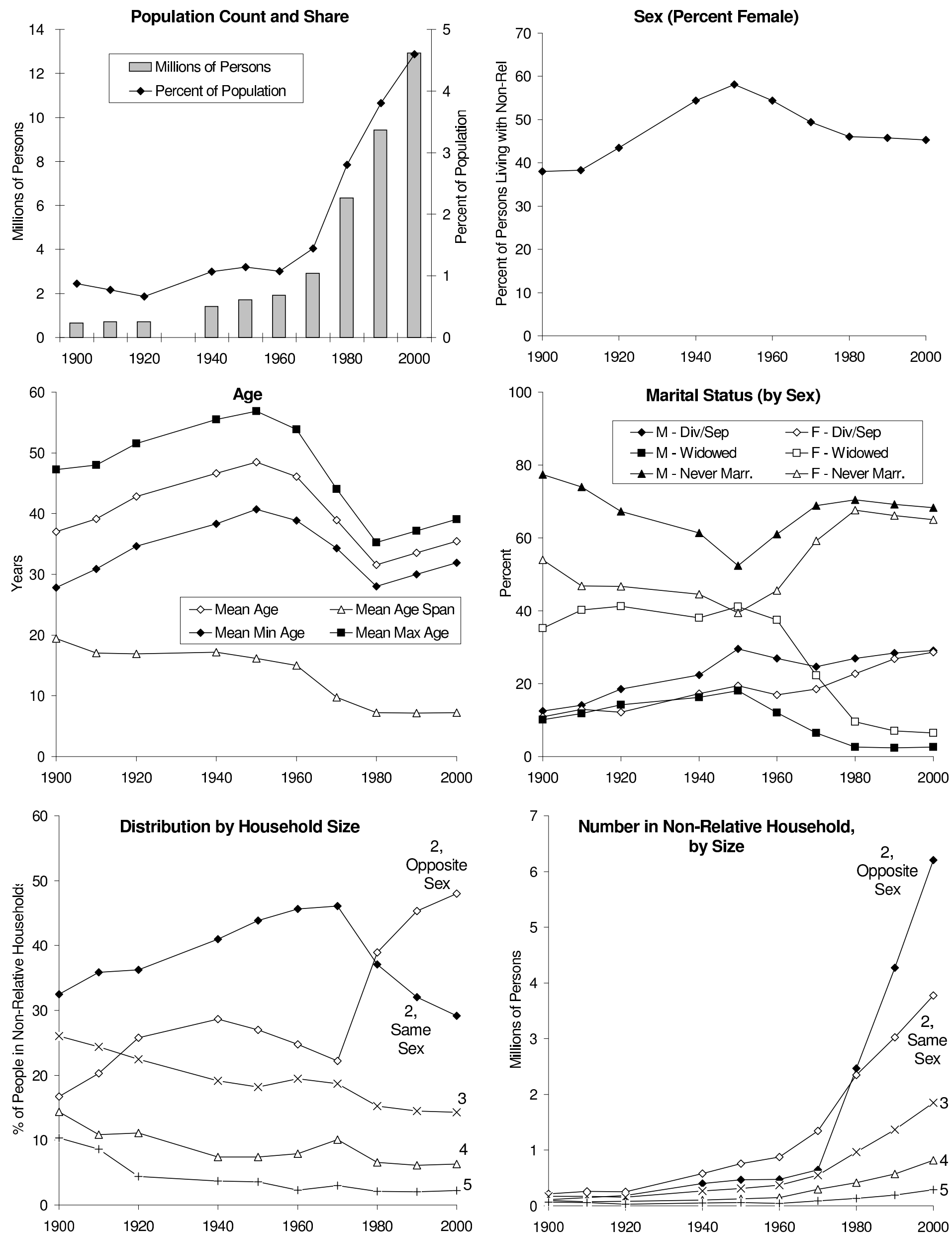


Figure 4.17: Descriptive Charts of Non-Relative Households. Data represent statistics for only those in non-relative households (no one in household related to anyone else). These households can have no more than five people, as more than four persons not related to the designated household head would qualify a dwelling as group quarters.

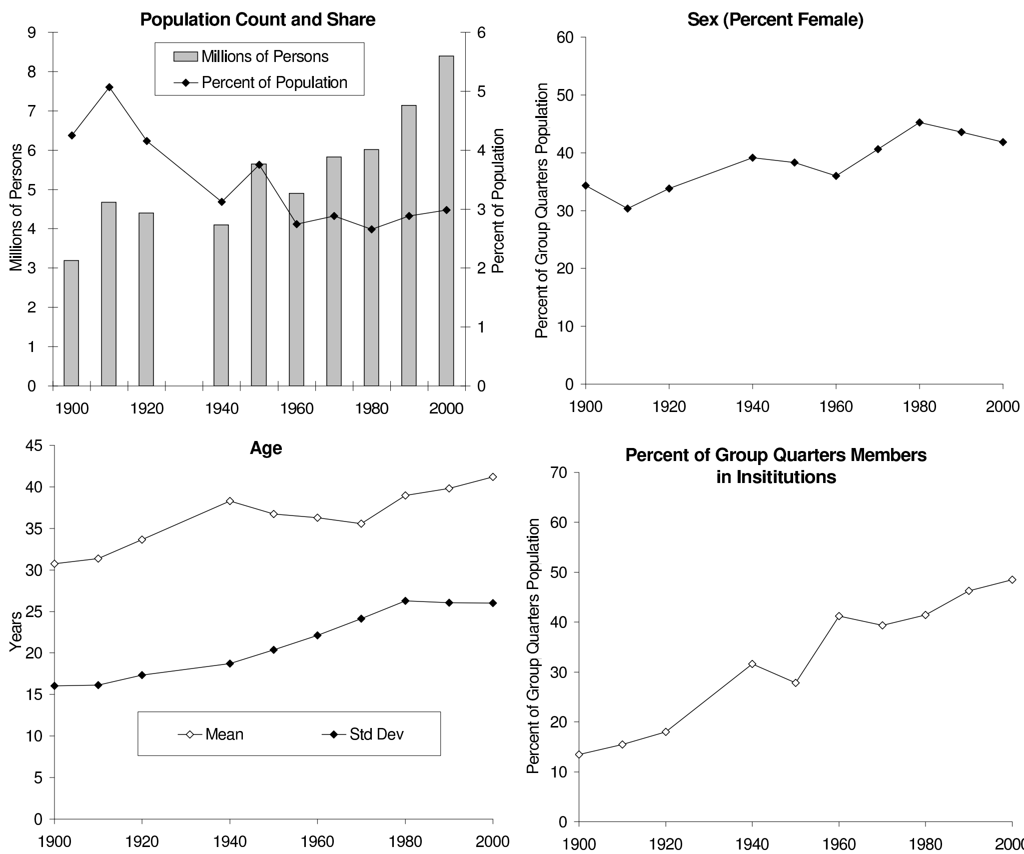


Figure 4.18: Descriptive Charts of Group Quarters. Data represent statistics for those in group quarters only (more than five persons not related to household head).

of persons living in group quarters are suggestive of the important role population aging plays in determining the composition of this population. Figure 4.18 shows that persons in group quarters have become, over the century, increasingly female, increasingly older, and increasingly institutionalized, all of which point to larger proportions of the group quarters population coming from elderly women in nursing homes or other institutional care facilities.

4.5 Conclusions

4.5.1 Major Trends

This analysis has described many trends in household composition over the century. Taken together, they generalize into three overarching trends:

1. People became less likely to live in any kin arrangement other than two spouses or parent-child.

2. Cohabitation and divorce replaced unexpected mortality and the coresidence of extended kin as the new forces behind household complexity.

3. Along with a new life stage, increased life expectancy has brought many people a new household stage: the empty-nest.

The most obvious example of the first trend is the decrease in those living in extended family households over the century, but is also observed in many other types of kin-based living arrangements. Young people leave the parental home earlier than at the beginning of the century, and the likelihood of an elderly person living with his or her grown children has decreased a great deal, whether those grown children had families of their own or not.

The second trend is related to the first one, in that much of the household complexity of the early century was the product of coresidence of kin due to the unexpected mortality of a spouse or parent. Many extended families of the early century were a widowed parent with young children and the parent's sibling (possibly with a sibling in law and their children as well), or a grandparent or grandparents. While the data do not reveal this directly because we do not have data on the process of household formation, those households were most likely the product of a suddenly widowed mother's need for support, causing her to turn to kin for support through coresidence. As the century progressed, however, the unexpected death of a spouse became more uncommon especially at ages when an adult was likely to have young children, decreasing the number of coresident extended families formed after the death of a parent. Thus, premature death became less of a factor in causing complex kin-based extended households. Economic change was probably at work as well, as income growth increased the ability of a widowed parent to afford to maintain a separate dwelling. Economic change was probably also at work in decreasing the share of family/non-family combination households. Early in the century, these households were the product of servant or border/lodger relationships, types of living arrangements that were available to people with relatively modest incomes. Such arrangements are very rare nowadays, thanks to income growth bringing independent living arrangements within reach of more people, and changes in housing markets such as widening availability of mortgage lending, among other factors.

While early mortality and economic need play less of a role in causing household complexity, there are still many people living with others in arrangements with links other than between spouses or parents and children. Cohabitation and divorce are increasingly the forces behind more complex family arrangements. Of course, you could say that a household of two cohabiting persons is just like a married couple household, rather than the non-relative household that it is classified as in the scheme used here. Similarly, a household with a divorced single parent plus offspring family unit coresiding with the unmarried partner of the parent is similar to a nuclear family unit,[7] rather than the family/non-family combination household it is classified as here. Given the legacy of household classification based on marital status, however, these households present a source of greater complexity.

While tracking cohabitation-based households versus marriage-based households may be an argument about whether there is real change or not, the third trend noted above – the emergence of the "second honeymoon" stage for married couples after the end of the childrearing years – represents a definite break from the past. Such households were very rare at the beginning of the century, for several reasons. First of all, overall life expectancy was shorter, making it less likely that the average person would reach the post-childrearing years and less likely that his or her spouse would make it there as well. Second of all, the childrearing years extended much farther into a couple's later life than they do now,

[7]Some of the unmarried partners may be the parent of one or more of the single parent's children.

extending the number of years in which older couples would have young children in the household. Finally, kin-coresidence for older persons was much higher at the beginning of the century, even for those with a living spouse, often times because one or more adult children never left the parental household. By 2000, however, it was much more likely that spouses in the average couple would both live to at least age 65, that their children would have become old enough to move out, and that they neither needed their grown children for coresident support nor were needed by them for support. All of these trends worked together to create more older couples living more years together now than at any earlier time in the century. This trend may be slowed or even reversed in the future, due to increasing rates of divorce, a possibility that will be examined in later projections of potential future household change. Also, while lengthening life expectancies have granted many couples this new household stage, life still must end and one spouse, most often the wife, is left with another new household stage: living alone after the death of a spouse.

4.5.2 Continuity and Change

Recalling the theme of continuity and change, some of the propositions above relate to that theme. The drastic change in the prevalence of living with kin, especially extended kin, is balanced by the constant prevalence of a spouse in the average person's household, as well as parents in the average child's household, resulting in the fairly constant proportion of people living in family-only households. The emergence of cohabitation as a major feature in households is certainly new, but to the extent that cohabiting relationships are similar to marital relationships, many of the cohabitation-based households of today may "look and feel" just like the marriage-based households of previous times. Finally, we saw that some features of the household life cycle have not changed as drastically as we might have thought because their changes were exaggerated by compositional changes in the population, such as population aging. The best example of this was the existence for young people of a stage of living independently between the stage of living in the parental home and forming a new family home by having children (see page 67 for discussion). Examining the prevalence of this stage without eliminating the effect of age structure made it appear as though this stage was non-existent for youth of 1900 and almost universal for the youth of 2000. Looking within each age group, however, revealed that youth did tend to leave the parental home for other household types in 1900, albeit less than their peers in 2000.

4.5.3 Compositional versus Intentional Change

Another theme that was prevalent in the discussion of results in this chapter was that of the nature of changes in households: whether they were compositional changes that came out of population change not directly related to the household formation process, or whether they were the product of deliberate decisions about household arrangements that were expressed through demographic events such as a marriage or a planned birth. In other words, did the composition of the population change and cause household change, or did many decisions about preferred types of households cause household change? The best example of compositional change is that thought to have its antecedent in increased life expectancy, such as the increase in households made up of older married couples, or older unmarried women. Couples did not decide to live longer so that they could have this particular type of household. Rather, they are the lucky recipients of the various kinds of economic, social, and medical progress that together lengthened the life spans. Of course, there are deliberate household decisions involving this type of household as well, namely the fact that older couples became less likely to live with any other kin. This is certainly related to a deliberate expression of a preference about household arrangements. Regardless of whether this change reflects changing values about the desirability of living with extended family or changing economics that allowed the expression of preferences long held but unattainable, it certainly represents the sum of deliberate decisions about which kind of household to live in. Recalling the two-stage model described in Chapter 3, then, the increased life expectancy that brought so many more people to the stage of being able to live as a married couple after the childrearing years would be a stage one demographic composition effect. The behavioral changes that found more modern couples in their own households compared to their counterparts in the past who were more likely to live with kin is a stage two household propensity change.

Other types of household changes are not so clearly delineated between demographic composition and household propensities. Take fertility change. We have seen how fertility change affects the household arrangements of potential parents - fewer children compresses their childrearing years and the time they will live in nuclear family households. These changes seem to reflect deliberate decisions about entering and ending a stage of life involving a nuclear family (or extended family household if other relatives are present), reflecting a stage two effects: behaviors directly determining the household arrangement.

We have also seen, however, the ways in which the decisions of parents are experienced as compositional – stage one – changes by others in the population. Children have fewer siblings in their households, and grandparents have fewer grandchildren. Also, we have seen that there can be a delay between the fertility decisions and their effect on household composition, as in the return to a married couple no children household after the last child leaves the home. Was the decision not to have another child a decision about household preferences 18 years in the future, as well as household arrangements at the time of the decision? At another level of remove from the parents' decisions, we see as well that the relatively smaller birth cohorts of lower fertility parents increase the proportions at older ages, thus increasing the proportions of people living in household types favored by older people. This is clearly a stage one demographic composition effect.

While the discussion in this chapter has mentioned various ways in which demographic composition or household propensity effects have altered households over the century, there has been no effort to separate the two stages in anything more than the direction of their effects. The next chapter attempts to examine the two effects in their particulars, to add an estimated magnitude to the discussion in this chapter, which only guessed about the direction of effects. Furthermore, the demographic effects that have been discussed – of fertility, mortality, and nuptiality – will be separated out in the results of the next section, to add the complete picture of demographic effects on households to the understanding of the net effects.

Chapter 5

Demographic Rates and Twentieth Century U.S. Household Change

5.1 Introduction

Thus far, we have seen that the distribution of Americans across different types of households has changed a great deal, with a shrinking share of the population living in extended family and nuclear family households, and a rising share living alone, as married couples, or with children exclusively. It has also been detailed that these changes have often been interpreted in the research literature as the product of shifts in the types of households people prefer, reading household change as indicative of changes in individual's preferences and society's fundamental ideas about families and households. Alternately, they have been attributed to economic growth and the increasing ability of persons to purchase more privacy in living arrangements.

While these explanations are certainly true in part, there is the additional demographic constraint on the choice each person makes among all of the possible household types at any given time. The social and economic constraints mentioned above are often discussed, but in such a life cycle- and family-based institution as the household, we would expect that demographic change, defined as the changing distributions of age, sex, and kin in the population, should play a large role as well, for reasons discussed in Chapter 3. Most studies attempt to take demographic constraints into account either by confining the study to a very specific demographic group (elderly widows or widowers, most frequently) or by entering demographic variables into the analysis to asses the affect on the average individual of some demographic characteristic, such as age or the availability of certain types of kin. Such studies of household change, however, do not capture the effects of compositional change in the population. For example, while micro-level studies indicated that older women lived alone more often due to rising incomes (McGarry and Schoeni 2000), the ultimate impact of income increase on the population percentage living alone over any particular period was determined by how many older women were in the population as incomes rose. Similarly, some researchers have found that that numbers of offspring affect the probability that elderly widowed women reside with their offspring (Macunovich, Easterlin, Schaeffer, and Crimmins 1995), but this would only affect household change over time if the distribution of offspring is changing. Individual-level research on living arrangements can indicate the direction of change expected from change in the population. It must be combined with information on population composition to indicate the magnitude of expected change.

How much of the change in households, then, is due to changes that have been detailed as representing changing demographic composition, including population age and sex distribution and changing living kin networks? As mentioned previously, much of the research concerning this question has only considered pieces of the story, either because it focused on the living arrangements of a sub-group, or because it employed individual-based methods such as regression that are unequipped to include the influence of compositional change in population in a way that specifies the magnitude of the effect. Another reason that compositional population change may be discounted as influential, even at the level of change in the total population, is that various demographic influences may cancel each other out. For example, the existence of a living spouse is an important part of determining living arrangements, but the probability of having a living spouse may be fairly constant if decreasing widowhood is counteracted by increasing divorce.

The research in this chapter isolates the overall demographic influence on household change in such a way as to avoid both of these issues. Attributing household change over the twentieth century to demographic composition by assessing the entire United States population in a decomposition framework avoids the issue of sub-group or individual focus. Breaking down effects of demographic composition on household change into the separate effects of fertility, mortality, and nuptiality allows us to examine potentially counteracting influences.

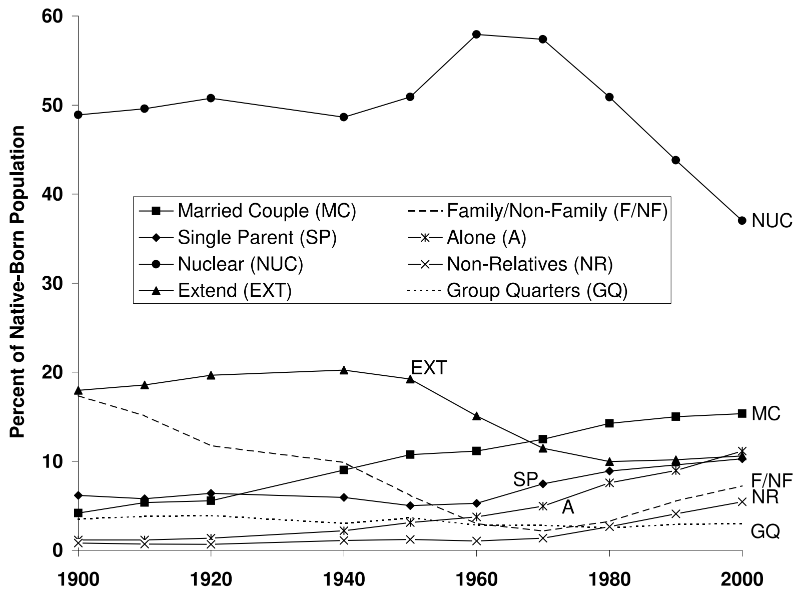


Figure 5.1: Proportion of Native-Born Persons in each Household Type, 1900-2000. Author's classification and tabulations based on data in IPUMS census samples.

The rest of the chapter proceeds as follows. The first section describes the variation to be explained and the vital rates that are at the heart of that explanation. The next section describes that data and methodology, which involves both decomposition techniques and microsimulation. As the microsimulation is a crucial part of the analysis, some time is spent examining the microsimulation's ability to reflect the reality of population change in the United States over the twentieth century. After the methodology is described and its validity supported, the results are presented in which overall household change is attributed to five components: fertility, mortality, nuptiality, population momentum and household propensities. Finally, the implications of the analysis on the future of household change are discussed.

5.2 What is to be Explained?

This chapter uses the same household type classification and the same IPUMS data described in Chapter 4 and outlined in Figure 4.6. As mentioned in Chapter 4, a small proportion of the households in the IPUMS samples presented classification difficulties

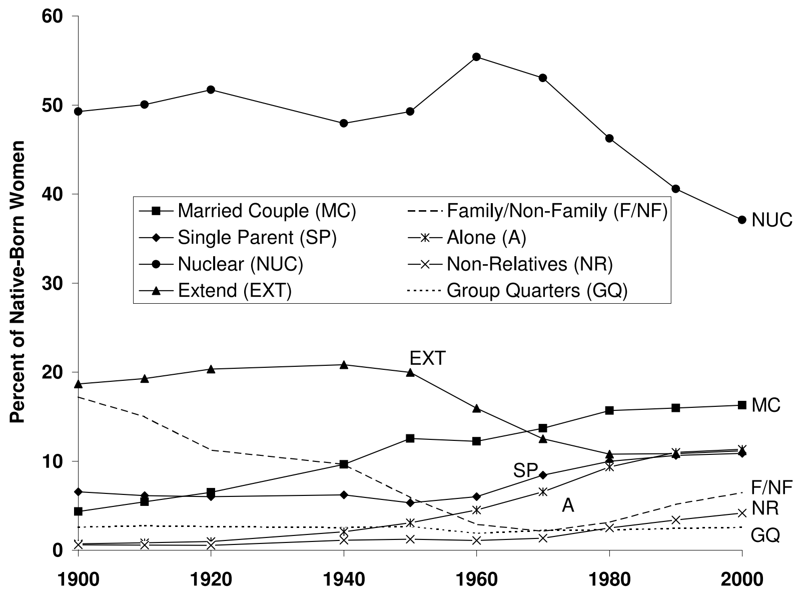


Figure 5.2: Proportion of Native-Born Women in each Household Type, 1900-2000. Author's classification and tabulations based on data in IPUMS census samples.

because the information used in defining household types is in conflict. For example, a woman's marital status is listed as not married, but she is identified as the spouse of someone in the household. Overall levels by household types, as well as the results in the rest of this chapter, are robust to deletion of these problem households, however, as well as to various schemes of apportioning these problem households to one type or another.

Figure 5.1 shows how the distribution of persons across different household types and group quarters has changed over the century for the native-born population, while Figure 5.2 shows a similar graph for native-born women. These two population subgroups will be the subjects of different analyses, for methodological reasons that will be explained in subsequent sections. The distributions for the entire population versus native-born population are largely similar, with the exception that the native-born population tends to have a somewhat higher proportion in nuclear family households, and slightly less living with extended family, compared to the total population.

These two figures show the variation to be "explained" by the analysis in this chapter. To review the main features of the century of household change, the percentage of persons living in the family-only types (married couple, single parent, nuclear family, and extended) has remained fairly constant over the century for the native-born population, starting in 1900 at 77% and ending in 2000 with 73% for all native-borns, and going from 79% to 75% for native-born women. Within this family-only class, however, population has shifted away from the more complex types of extended and nuclear, toward the more atomized types of married couple and single parent. The proportion living in family/non-family combination households fell steadily until 1970 and has since risen. The proportion living alone has risen steadily and non-relative households have risen since 1960.

We can imagine many demographic compositional reasons for some of the changes seen in Figures 5.1 and 5.2, defining "demographic compositional reasons" as those based in the rates of birth, death, marriage and divorce that determined the population distribution by age, sex, marital and parity status. The basic shapes of vital rate change over the century can be seen in Figure 5.3. This figure presents an index for each rate over time. Of course, these summary measures leave out the age-specific and marital status-specific changes in vital rates that are so important in determining population structures, but they do indicate the basic trends. Some of the rate trends look clearly related to the trends in the household type distribution. The increase and decrease in the share of nuclear families mirrors the fertility boom and bust, while the recent decrease in nuclear families and rise in single parent families occurs simultaneously with increasing divorce rates and decreasing marriage rates. The steady increase in married couple families may be influenced by the similar steady increase in average life span that spouses enjoy after the childbearing and childrearing years are over. These explanations posit vital events as affecting household change by determining the numbers of people in the society who are, because of their demographic characteristics, more or less likely to live in a given household type.

Much historical research on the demographic influences on the household focused on whether nuclear or extended families were more prevalent in preindustrial and early industrial populations, due to changing kin availability caused by changing demographic rates. Simulation was used to determine whether observed rates of mortality and fertility resulted in kin networks with enough living kin to allow for the existence of large, extended families. While the results of one such study did not seem to preclude the existence of extended household structures in preindustrial England (Wachter, Hammel, and Laslett 1978), another study found constraints on the existence of extended family coresidence due to high mortality (Ruggles 1987). In contrast with that literature, the study here focuses more on the demographic composition of the population, defined as encompassing the age,

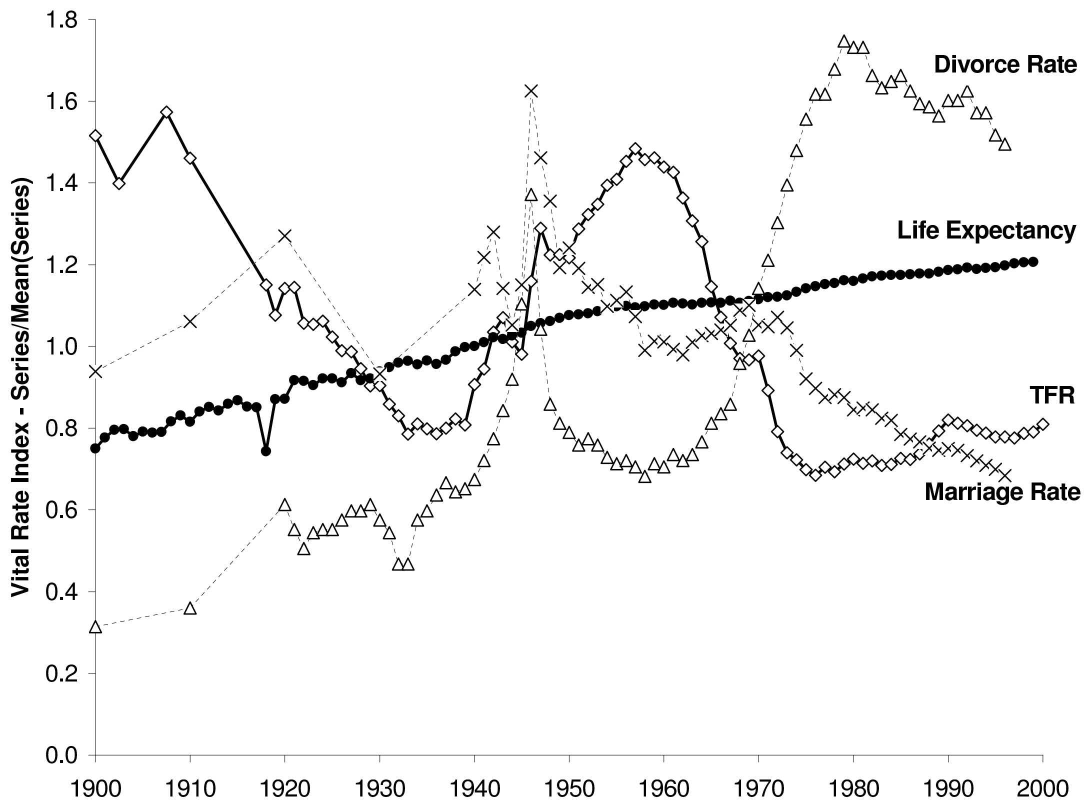


Figure 5.3: Trends in Vital Rates, 1900-2000. Each index is created by dividing each series by its mean value for the century. Life expectancy is period life expectancy for each year. The total fertility rate is calculated using five-year age groups for women age 10 to 49. The marriage rate is marriages per 1,000 unmarried women age 15+ and the divorce rate is divorces per 1,000 married women age 15+. Data are from vital statistics sources and historical estimates. See Appendix A for full source details.

sex, marital and parity status distribution, rather than the role of the availability of kin for potential extended kin-based households. The issue of kin availability will be examined indirectly in subsequent analyses, however.

Researchers acknowledge that household change involves both compositional and non-compositional factors. What has not been systematically attempted before is the separation of these two families of factors for the whole population, and the further separation of the demographic factor into its constituent parts of fertility, mortality, and nuptiality changes.

5.3 Methodology

5.3.1 Introduction

Recalling the theoretical discussion in Chapter 3, the model of households here has two stages: demographic composition is stage one, household propensities are stage two. Demographic composition is operationalized for this research as the joint distribution of age, sex, marital and parity status in the population. Household propensities are then operationalized as the probability of living in a certain household type, given a particular age, sex, marital and parity status. The eight household types[1] used are the same as those in Chapter 4.

The analysis presented here has two decompositions. The first decomposition determines how much change in the distribution of people across household types from one period to another is due to the two stages of the theoretical model described in Chapter 3: changes in demographic composition versus changes in household propensities. The second decomposition determines how much of the demographic composition effect on the household distribution is due to four vital rate components: fertility, mortality, nuptiality (including marriage and divorce), and population momentum.

The rest of the methodology discussion below specifies how demographic composition and household propensities are calculated, how the decomposition works, and what role microsimulation plays.

[1] This includes group quarters even thought it is not technically a type of household.

5.3.2 Decomposition into Demographic Composition versus Household Propensities

While demographic composition is defined here as including information on the age, sex, marital and parity distributions of the population, data on all of those characteristics are not available for every census. Thus, the analytic strategy attempts to make the most of the available data by defining demographic composition differently for the different time periods when the necessary data are available. The analysis will be presented in two ways: one for both sexes together and one for women only. The demographic composition in the two-sex analysis is defined as the joint distribution of age, sex and marital status in the population. For the women-only analysis the demographic composition includes age, marital status and parity (number of children ever born). Parity information is only available for women and not in every census, so census years with omitted parity information are omitted from the decompositions, which are only able to decompose change between periods where all necessary data are available. Both the two-sex and the women-only analysis will be restricted to the native-born population, necessitated by aspects of the simulation discussed in the next section.

The demographic composition is represented mathematically as a vector of proportions in each age/sex/marital status for the two-sex analysis or age/marital/parity status group for the women-only analysis. Age is classified in 18 five-year age groups up to age 90+. Sex is classified in two groups: male of female. Marital status is classified in four groups: never married, married, widowed, and divorced or separated. Parity status is classified in six groups: none, 1-4, and 5+ children ever born. For the two-sex analysis, then, the vector of cell proportions has 18 age $\times$ 2 sex $\times$ 4 marital status $=$ 144 cells. The women-only analysis has 18 age $\times$ 4 marital status $\times$ 6 parity status $=$ 432 cells. Of course, not all of these cells will have population in them. Call this demographic composition vector D_t at time t.

The household propensities are contained in a vector of probabilities of living in a particular household type, conditional upon membership in a particular demographic characteristics cell defined by age, sex and marital status for the two-sex analysis or age, marital status and parity for the women-only analysis. Call this conditional probability vector P_t.

The probability that a randomly chosen individual lives in a particular household type at time t, call this h_t, is the cross-product of the D and P vectors: $h_t = f(D_t, P_t) = D_t \times P_t$. So h is the weighted average of the conditional probabilities of living in a particular household type, with the weights provided by the demographic composition (the proportions of people with each combination of demographic characteristics in the population). There is an h value for each decade for each household type and it is the change in h over time that the decomposition seeks to explain.

The separation of change into that due to changes in D_t versus P_t is an application of a general methodology for decomposing change into additive parts, formulated by Das Gupta (1991) that stretches back to Kitagawa (1955) in its basic technique. As h changes from time 1 to time 2, allowing demographic composition D to vary while holding conditional probabilities P constant generates an estimate of the portion of change in h that is caused by changes in demographic characteristics. As the conditional probabilities can be held constant at their levels at time 1 or time 2, this generates two estimates of the D effect, which can be averaged together to estimate the total D effect over the period. The process is similar for estimating the effect of changing conditional probabilities P.

Specifically from time 1 to time 2:

$$\begin{aligned} h_1 - h_2 &= f(D_1, P_1) - f(D_2, P_2) \\ &= \text{D-effect} + \text{P-effect} \end{aligned}$$

$$\begin{aligned} \text{D-effect} &= \frac{[f(D_1, P_1) - f(D_2, P_1)] + [f(D_1, P_2) - f(D_2, P_2)]}{2} \\ \text{P-effect} &= \frac{[f(D_1, P_1) - f(D_1, P_2)] + [f(D_2, P_1) - f(D_2, P_2)]}{2} \end{aligned}$$

The first term in each of the effect equations above seems clear enough in interpretation: what would have happened to h if only one part of the cross product had changed? The second term is somewhat less clear but it is related to the interaction effect between P and D. Some of the change from h_1 to h_2 is an interaction between P and D because they both changed over the period. The decomposition above attributes the interaction term to the two factors by calculating the change in each factor, scaled by the other factor's value at time 2.

The decomposition is performed in four time segments: 1900 to 1940, 1940 to 1960, 1960 to 1980 and 1980 to the final decade. For the two-sex analysis, the final decade is 2000. For the woman-only analysis, the final decade is 1990. The shortened analysis is necessitated by the lack of a parity question in the 2000 census. There was no parity question in 1920 either, necessitating the initial 40 year segment.

5.3.3 Decomposition into Vital Rate Components

The decomposition above gives the basic "demographic composition versus household propensities" results. To expand the demographic composition results and express change in terms of the effects of changing vital rates of fertility, mortality, and nuptiality,[2] we use microsimulation. Microsimulation makes the demographic composition vector D a function of rates of fertility F, mortality M, and nuptiality N, i.e. $D = g(F, M, N)$. Rates are for each decade from 1900-1909 to 1990-1999, constructed as averages of single-year rates for the decade. The decomposition examines the effect of letting vital rates change as they were observed to change during the time segment, versus holding them fixed at the level of the decade before the beginning of the segment. There is one other element – population momentum. Population momentum is the change in population that would occur even if the vital rates had not changed from one time period to the next, due to the pre-existing demographic composition of the population. The longer the time segment, the lower the momenum effect as the starting population's effect on composition decreases with time. We do not want time segments too long, however, for reasons discussed in Chapter 3 (see page 39).

Using microsimulation, different counter-factual Ds can be generated, depending on which vital rates are held fixed at the previous decade's levels, call this F_{fix}, M_{fix} or N_{fix}, and which are allowed to change throughout the decades of the time segment as they were observed to have changed, call this to F_{chg}, M_{chg} or N_{chg}. For example, in a decomposition for the time period 1940-1960, the population is simulated from 1900 to 1940 using observed vital rates. For the period from 1940 to 1960, various rates are either held constant at their 1930-1939 levels for the next 20 years of simulation, or they are allowed to change to their 1940-1949 levels for 10 years of simulation and to their 1950-1959 levels for the next 10 years of simulation. The simulation begins at 1900 for each replication, so the time segment's starting population is different for each replication, except for the 1900-1940 time segment, which starts with the same 1900 population for each replication.

[2]Nuptiality includes marriage and divorce rates.

The decomposition technique to attribute the D-effect into components attributable to changes in F, M, and N, is similar to the D versus P decomposition. As this is a decomposition of the D-effect only, the changes in the conditional probability vector P over the period are not important, but some P vector is still necessary to convert the effect of changes in each element of the D vector into a single scalar value in units of h (proportion of persons in a particular household type). The average P for the period is used for this purpose, designated as P_{avg}, a vector of element by element averages of P_1 and P_2. Alternately, the vectors P_1 or P_2 could be used, changing the results somewhat. Although not reported here, the full simulation and decomposition results using the other P vectors have been computed and the results are largely robust to such changes.

The idea behind the vital rates decomposition is the same as in D versus P decomposition: the effect of change in one of the elements is the change observed when all other elements are held constant. When the function has more than two factors, there are multiple ways that the other factors can be held constant, such as all fixed, all changing, one fixed and the others changing, etc. Whereas we were concerned with changes in $D \times P$ in the two factor D versus P decomposition, we are now concerned with changes in $g(F, M, N) \times P_{avg}$ in the three factor case. The effects are calculated as follows:

$$
\begin{aligned}
\text{F-effect} &= \frac{[g(F_{fix}, M_{fix}, N_{fix}) - g(F_{chg}, M_{fix}, N_{fix})] \times P_{avg}}{3} \\
&+ \frac{[g(F_{fix}, M_{chg}, N_{chg}) - g(F_{chg}, M_{chg}, N_{chg})] \times P_{avg}}{3} \\
&+ \frac{[g(F_{fix}, M_{fix}, N_{chg}) - g(F_{chg}, M_{fix}, N_{chg})] \times P_{avg}}{6} \\
&+ \frac{[g(F_{fix}, M_{chg}, N_{fix}) - g(F_{chg}, M_{chg}, N_{fix})] \times P_{avg}}{6}
\end{aligned}
$$

$$
\begin{aligned}
\text{M-effect} &= \frac{[g(F_{fix}, M_{fix}, N_{fix}) - g(F_{fix}, M_{chg}, N_{fix})] \times P_{avg}}{3} \\
&+ \frac{[g(F_{chg}, M_{fix}, N_{chg}) - g(F_{chg}, M_{chg}, N_{chg})] \times P_{avg}}{3} \\
&+ \frac{[g(F_{fix}, M_{fix}, N_{chg}) - g(F_{fix}, M_{chg}, N_{chg})] \times P_{avg}}{6} \\
&+ \frac{[g(F_{chg}, M_{fix}, N_{fix}) - g(F_{chg}, M_{chg}, N_{fix})] \times P_{avg}}{6}
\end{aligned}
$$

$$
\begin{aligned}
\text{N-effect} &= \frac{[g(F_{fix}, M_{fix}, N_{fix}) - g(F_{fix}, M_{fix}, N_{chg})] \times P_{avg}}{3} \\
&+ \frac{[g(F_{chg}, M_{chg}, N_{fix}) - g(F_{chg}, M_{chg}, N_{chg})] \times P_{avg}}{3} \\
&+ \frac{[g(F_{fix}, M_{chg}, N_{fix}) - g(F_{fix}, M_{chg}, N_{chg})] \times P_{avg}}{6} \\
&+ \frac{[g(F_{chg}, M_{fix}, N_{fix}) - g(F_{chg}, M_{fix}, N_{chg})] \times P_{avg}}{6}
\end{aligned}
$$

Each effect has four versions of the "hold others constant and vary one" contrast. In the D versus P decomposition of demographic composition versus household propensities, the decomposition was done taking the simple average of contrasts which attributed interaction effects between D and P proportionally to the changes in D and P. The same treatment of interactions among F, M, and N requires the differential weighting of contrasts as shown in the equations above. Finally, the effect of momentum is calculated by subtracting the F-, M-, and N- effects from the total D-effect calculated in the D versus P decomposition. The effect of momentum occurs because of the short time periods over which the decomposition takes place. The longer the time period, the lower the momentum effect because the effect of the demographic composition at time 1 on that at time 2 would decrease. The short time periods are warranted, however, because of the sharp changes and reversals in some of the vital rates, fertility especially, that are of interest.

5.3.4 The Simulation Program

The simulation program used is SOCSIM (Hammel, Hutchinson, Wachter, Lundy, and Deuel 1976), developed at the University of California at Berkeley. The program itself is highly customizable to model different demographic regimes and to take as inputs vital rates for very detailed sub-groups of the population. In the simulations used here, only some features of the program are used. Furthermore, the "SOC" part of SOCSIM is not used in this analysis, as the simulation program itself has no default social rules or family system with which to sort people into particular households, although the program was built to have such things programmed into it. All household information in the decomposition analysis comes from the P vector discussed in the previous section. The simulation provides only the population. Microsimulation here is preferable to a macrosimulation model because of the degree of interactions among age, previous marital status and marriage, and childbearing and marital status.

There are three inputs to the simulations constructed for this analysis: sets of vital rates for each decade, a starting population for 1900, and a population of immigrants for each decade who are "migrated" into the simulation. These inputs are discussed first, followed by a discussion of the mechanisms used by the simulation to turn the inputs into populations.

Each decade has one rate set that holds sway for the entire decade. Rates used here are all based on data from the vital statistics system, although there is some degree of variability in the extent to which the rates used are those published in Vital Statistics publications, or estimates based on Vital Statistics information. Some estimates were made by researchers for times in which published vital statistics data were either suspect or not available. Other estimates are the result of assumptions about rates in periods during which they were not available. Some early century rates based on smaller areas of the country were adjusted slightly on an ad hoc basis to increase the agreement in population composition between the IPUMS and the "baseline" simulation in which rates change from 1900 to 2000 as they were observed to have changed in reality. Appendix A contains full details on the sources, construction and, in some cases, assumptions and adjustments concerning each decade's rates.

To review the major features of the rate sets, each is constructed by averaging single-year rates during the period. For some decades, rates for each year are not available and the decade rate set is an average of only some years in the decade, or is an estimate of the rates for the decade. Birth, death, and marriage rates are age- and sex-specific. In addition, marriage rates are also specific to previous marital status (never married, divorced or widowed) and birth rates are specific to unmarried or married women. Divorce rates are intended as duration specific in the simulation program, however not enough detailed data on duration-specific divorce is available to provide accurate rates for the century. Overall divorce rates, though not by duration, are available for the century. These are adjusted to apply after the first year through year 30. Thus the simulation assumes no divorce within the first year of marriage or after the thirtieth year. The simulations also assume no births to unmarried women and no divorce until the 1940-1949 decade. As with the divorce by duration of marriage assumption, these additional assumptions are necessitated by the lack of sufficiently detailed rates for these periods, but do not seem unreasonable given the low prevalence of divorce and extramarital births at that time. Where rates were estimated or assumed, alternative analyses assuming some other reasonable guesses of the actual rates were conducted and the decomposition results were not materially different from those shown here.

A starting population is the next input element to the simulation. The starting population for 1900 must have the correct age and sex structure. It must also enter the simulation with the same marital status as the actual starting population, or the fertility of the early decades will be hampered by the need for individuals to get married before they can have children. A properly aged and married population is created by starting with a small unmarried population and simulating it for 100 years. The rates that were used for this pre-simulation were roughly similar to the 1900 rates, adjusted in an ad hoc fashion until a starting population was achieved with the proper demographic characteristics. The size of the pre-simulation population for each run of the simulation is about 1,200 persons, simulated through 100 years resulting in a 1900 starting population of about 5,000 living persons. The total starting population can be made arbitrarily large, however, by running the simulation multiple times. After a starting population was achieved that had distributions across sex, age, marital and parity status similar to the IPUMS population of 1900, some individuals were then designated as being foreign-born so that the proportion foreign-born by age and sex for the 1900 population matched that observed in the IPUMS.[3] This brings the discussion to the need to include immigration in the simulation.

Beyond accurate rates and starting population, the simulation needs to take immigration into account. The SOCSIM program does have the ability to incorporate immigration of individuals and families, but incorporating immigration this way requires immigration rates by years of time and age, as well as the sex, and family status of the immigrants. While such information may be available for recent decades, it is much more sparse for the earlier twentieth century. As that would introduce much more uncertainty and sources of variation into the simulation, the analyses are confined to native-born persons only. The simulation still requires some immigrants to enter the population, however, as they are often adults in their childbearing years and their native-born children must be introduced into native-born simulated population in order to grow the population appropriately and have it produce a realistic age structure. Immigration in the simulation is thus implemented in a

[3]The cells for designation of foreign-born status are not expanded to include marital and parity status due to the small cell sizes obtained for some cells in the IPUMS distributions when increasing to this level of specificity in 1900.

less data intensive manner that allows the population to grow appropriately, but will only generate accurate age, sex, marital and parity status distributions for native-borns.

The procedure estimates immigrants needed at the end of each decade, using the baseline simulation in which rates change from 1900 to 2000 as they were observed to have changed. At the end of each decade, the proportion foreign-born in each age and sex group in the baseline simulation is compared with the same proportion in the IPUMS. If more immigrants are needed in a particular age-sex group, they are created and added to the simulated population. They are created as single and childless, to avoid making the additional assumptions necessary to immigrate whole families into the population. This stylized immigration system, while obviously not realistic, allows the new immigrants to find spouses and have children who are then classified as native-born. This procedure is followed at the end of each decade, generating a list of immigrants to be added at the end of each decade. The baseline simulation was run 100 times to generate an average number of immigrants needed in each age/sex group at the end of each decade. That list of immigrants is used for all counter-factual simulated populations in this chapter.[4]

This system, while it includes the population growth due to immigration, does not accurately account for the marital status and parity of immigrants at the time of entry into the United States population. As the distributions of these characteristics are an essential part of the decomposition technique, the decomposition analyses can only be done accurately for the native-born population, which includes the children of immigrants born after entry into the United States population, but not the immigrants themselves.

How does the simulation program actually work? Each "person" is simply an observation in a rectangular data file, called a population array, with records of date of birth and other information on demographic characteristics and family relationships. Each person is subject to vital rates, expressed as monthly probabilities of an event for a person with given characteristics, and the simulation takes place one month at a time. For example, there is some probability that a divorced woman age 30-34 will get married in a month. There are other events that could happen to this same woman, such as a birth or death. The selection of the event and the waiting time until that event are determined stochastically using a competing risks model (Wachter, Blackwell, and Hammel 1997). Waiting times are drawn for each event for which an individual is eligible based on the event probability and a

[4]The immigrants created to add to the 2000 population are used in the projections of future population and household change in Chapter 6.

random perturbation, drawn anew after each event. In the case of waiting times until births, there is an additional element of randomness provided by a fertility multiplier, which was added to the program to create sufficiently varying parity distributions.[5] The simulation also allows specification of a minimum time interval between births. All simulation here specify this minimum birth interval to be 12 months. The shortest waiting time to the next possible event determines which event occurs next. If the winning event is a birth, then when the waiting time to birth is over, a new line with the date of birth and other information for the offspring is added to the population array. If the event is a death, the date of death is recorded. Marriages are tracked in a separate marriage array file. If the event is a marriage or divorce, the marriage file is updated.

The program implements events month by month. At the beginning of the simulation, events and waiting times are determined for everyone in the population. In the first month of the simulation, events scheduled for that month occur, the population and marriage arrays are updated, and new events and waiting times are drawn for those who just experienced an event. The simulation proceeds this way for each month of the simulation. New waiting times and events are also drawn for the whole population when the rate sets change, as occurs at the end of each decade in the simulation implemented for this research.

The event of marriage is more complicated than events of births and deaths, as someone who has drawn marriage as the next event must find another person who has drawn marriage as the next event. Such persons are entered into a marriage queue at the end of the waiting time to marriage and each person searches through the list of opposite-sex persons in the marriage queue. SOCSIM can be programmed to place limitations on who is considered a suitable marriage partner, such as age limitations or membership in a certain group. None of those custom features is used here, however, so the waiting time to marriage after entering the queue is not long.

At the end of a simulation, the products are a population file and a marriage file containing a list of everyone who ever lived in the population and a list of every marriage that ever occurred. These files contain enough information to determine the main demographic features of the population, and to determine the entire kin network of any individual at any time. Few actual sources can approach a broad kin accounting outside of the household, especially over time. Beyond very close family members, we are largely left to guess about

[5]The fertility multipliers can be made hereditary in the simulation program, although that feature was not used in this research.

the effects of the availability of extended kin over time. Using the IPUMS information we can estimate the effects of age and sex distribution, marital status and parity. Using the simulation, we can also estimate how many kin were available and, by this means, judge whether large changes in the availability of kin over time have occurred which might be associated with household change.

Decisions about how many replications of each simulation to run were based on inspection of the stability of the estimated values for the main facets of population change and decomposition results. Running 25 replications, corresponding to an effective starting population of $5,000 \times 25 = 125,000$, creates a reasonable amount of stability in decomposition analysis results and in the main features of the simulated population compared to the observed. For even greater stability, 50 replications of the necessary 200 year simulations (100 years of pre-simulation to achieve the 1900 population and then the main simulation of the population from 1900 to 2000) were used in the results presented here.[6]

5.4 Vetting the Simulation

Theoretically, accurate and detailed vital rates should lead to an accurate simulation. In reality, vital rates with enough detail are rarely available and when they are they often contain errors. Furthermore, many of the assumptions and procedures of the simulation described in the previous section are simplifications that preclude a totally accurate baseline simulation. There may be additional error introduced by inaccuracies in the IPUMS census samples' in representing the entire population. The question is one of extent. Does the simulation mirror the observed reality closely enough to capture the main facets of population change over the course of the century?

Some aspects of SOCSIM's validity have been examined in previous studies. Wachter, Blackwell, and Hammel (1997) focussed on an external validation of simulated numbers of living kin, compared to those observed in a nationally representative survey.[7] The results, comparing mean number of living relatives, found reasonably accurate estimates of siblings.

[6]To confirm the stability of results based on 50 replications, part of the analysis was re-run using 100 replications. The 100 replication results were virtually identical to the 50 replication results. As 100 replications is very time consuming, however, the whole simulation and decomposition were not repeated using 100 replications.

[7]The National Survey of Families and Households is one of the few nationally representative surveys to ask respondents about numbers of living kin outside of the respondent's household. The survey used in the comparison with simulated kin was conducted in 1987-88.

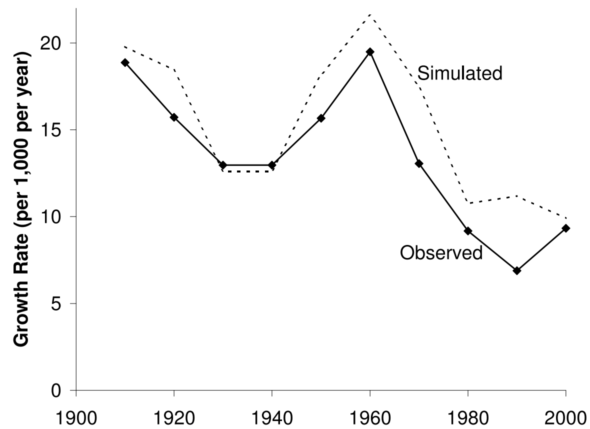


Figure 5.4: Observed versus Simulated - Growth Rate of Native-Born Population, 1900-2000. Observed growth rates are for the IPUMS native-born population. Note that the IPUMS has no 1930 sample available, so the growth rates shown for 1930 and 1940 are the average annual growth rates in effect from 1920 to 1940.

Expected grandchildren were overestimated, due to a few large families pulling up the mean. This study provides support for the use of microsimulation for estimating close kin.

The rest of this section addresses the question of using the microsimulation for the main population characteristics important in the decomposition – age, sex, marital and parity status distributions. Comparisons between the baseline simulation, in which the vital rates track their estimated empirical values, and the observed IPUMS populations are examined. If the past century's population can be realistically recreated, in terms of the characteristics important in the analysis, then the validity of using the counter-factual simulations is supported. In addition to supporting the use of SOCSIM in the decomposition analysis, this section adds to the literature on the validation of microsimulation models as a whole. (For a review, see Cohen 1991.) As the decomposition analysis is limited to the native-born population, many of the "observed versus simulated" comparisons will be for native-born persons only.

The first question addressed is whether the population grows as it should. Figure 5.4 compares the average annual growth rate for each decade based on the IPUMS native-born population and the simulated native-born population. The simulated native-born population grows at a slightly higher rate than the observed native-born population for most of the century. This is to be expected, as the vital rates used in the simulation are for the entire population. Immigrant fertility is typically higher than native-born fertility, so the use of overall fertility rates assigns slightly higher fertility to native-borns than is accurate and grows the native-born population somewhat faster than necessary for most of the century. The generally higher growth rate for the simulated native-born population is reflected in the growth factor over the whole century: the IPUMS native-born population (using appropriate weights so the sample represents the entire nation) grows from 65 million in 1900 to 248 million in 2000, increasing by a factor of 3.8. The simulated populations increase by a factor of 4.6 on average, which would have made the observed population approximately 300 million by century's end.[8] The pattern of simulated growth rates over time, however, closely mirrors the shape of population growth observed in the IPUMS data. The simulation therefore captures the shape of change in the observed population quite closely.

Given the variation between observed and simulated reality seen in Figure 5.4, there is a need to verify that the rates put into the simulation are the rates that come out. This comparison is done for the entire population instead of the native-born, as the input vital rates were representative of the whole population. General agreement between observed and simulated rates is shown in Figure 5.5. The total fertility rate achieved by the simulated population mirrors the observed rate very closely. A consistent time series of total fertility rates is only available back to 1918, but researcher estimates place fertility between 1900 and 1920 at 3.5 to 4 children per woman (Haines 1989). This is somewhat higher than the total fertility rate in the simulation. Rates used in the simulations were estimated for married women based on overall fertility rates and an assumption of no extramarital childbearing (see Appendix A for details). That estimation procedure may have introduced a bias downward for overall fertility. As we will see in subsequent comparisons, however, the effect of this discrepancy on the size of simulated birth cohorts for the first two decades, compared to observed cohorts, is not severe. Simulated mortality rates in the next panel of Figure 5.5 also closely mirror the input rates for the two example age-sex groups shown. (All other age-sex groups exhibit roughly similar degrees of dispersion of simulated rates around the observed values.) Marriage and divorce, shown in the bottom two graphs, are somewhat more problematic. Simulated overall marriage rates, based on rates by age and marital status used in the simulation, in the first half of the century are generally lower than

[8] The average and median growth factors are both 4.6, so there is no long tail in the distribution of simulated growth factors pulling up the average.

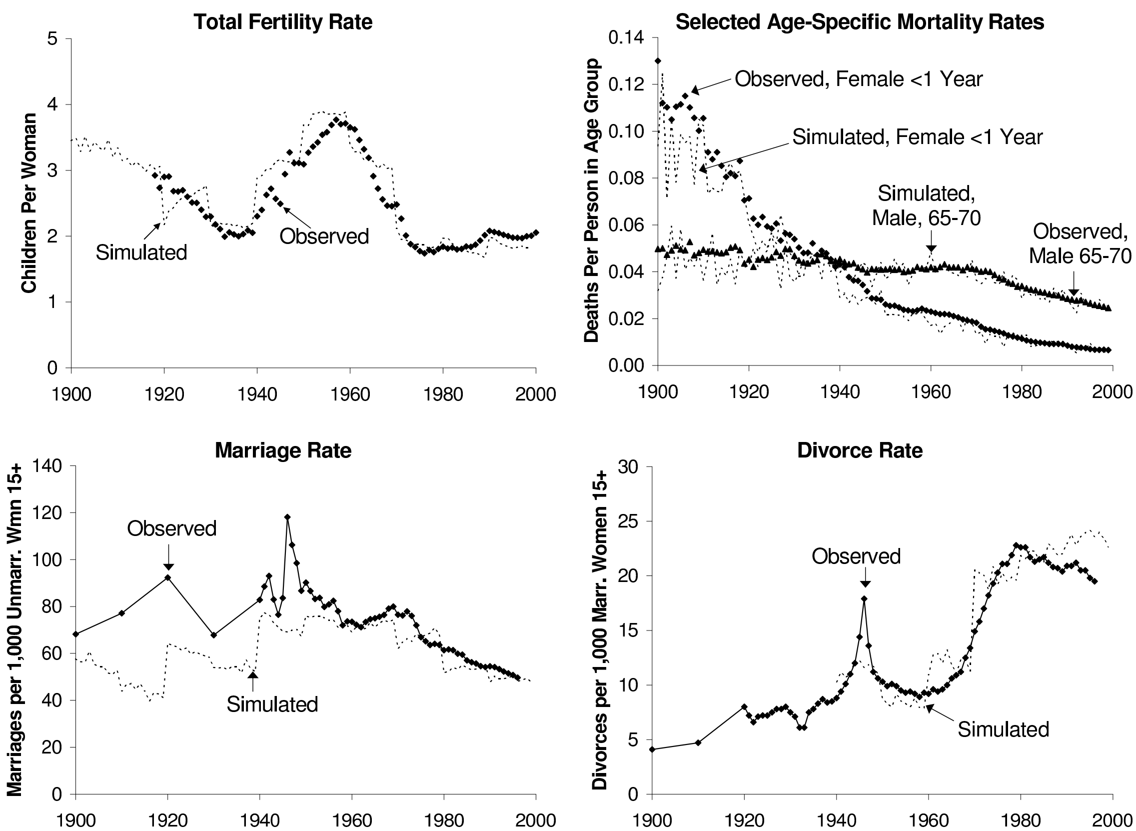


Figure 5.5: Observed versus Simulated - Vital Rates, 1900-2000. Data represent rates applying to the whole population. Simulation rates are constant over each decade. See Appendix A for details on sources of observed rates, and sources and estimation of rates used in the simulation.

overall marriage rates reported in vital statistics publications. We will see in subsequent analyses that this is due in large part to estimated rates of remarriage after widowhood being too low. Possibly because of overly wide age categories used for the rates.

The trend over the century, however, is fairly consistent, ignoring the late 1940's marriage and divorce spikes. There is a very gradual rise in marriage through the 1940s, followed by a steady decline. Finally, we can see that, although the simulation assumes no divorce before 1940, there was some, if very little. Also, the simulated divorce rate in the final years of the century is somewhat higher than observed. This is probably because the divorce rates used in the simulation were not specific to marriage duration.

While any deviation from observed rates is a concern, the first goal of the simulation is to mimic the overall shape of change. The effect of all of these deviations will be to distort the distributions of persons by age, sex, marital and parity status from observed reality. It is the degree of those distortions that are most important for the decomposition analyses. As the overall fertility and mortality rates in the simulation look accurate, we would expect that simulated age distributions should match observed IPUMS age distributions as well. That seems to be the case observing Figure 5.6, showing simulated and observed percentages in five-year age groups over the century for the native-born population. The simulation catches the effects of the baby boom and bust on the age structure throughout the century, as well as the steady increases in population share of the oldest age groups. This figure also shows that the simulated baby boom comes a bit later and lasts a bit longer than the actual boom. This is due to the use of decadal average rates instead of single-year rates.

Moving on to the distribution of persons across marital states, Figure 5.7 shows that the inaccuracies in the simulated marriage rates mentioned previously are mostly confined to problems in older age groups. Some of the discrepancy between simulated and observed values in the early century may also be due to the fact that marriage rates were calculated based on information from only a very few states while the observed native-born population represents the whole nation. The federal-state partnership that provides the most accurate nationally-representative data for recent decades was not begun until the 1950s (Grove and Hetzel 1968). Another potential cause of the problem is the lack of age-specificity in marriage rates at older ages or for particular marital statuses. For example, while marriage rates for the never married are specified by five-year age groups from age 15 to 44, the next categories are 45-64 followed by 65+. Similarly, there are only three age

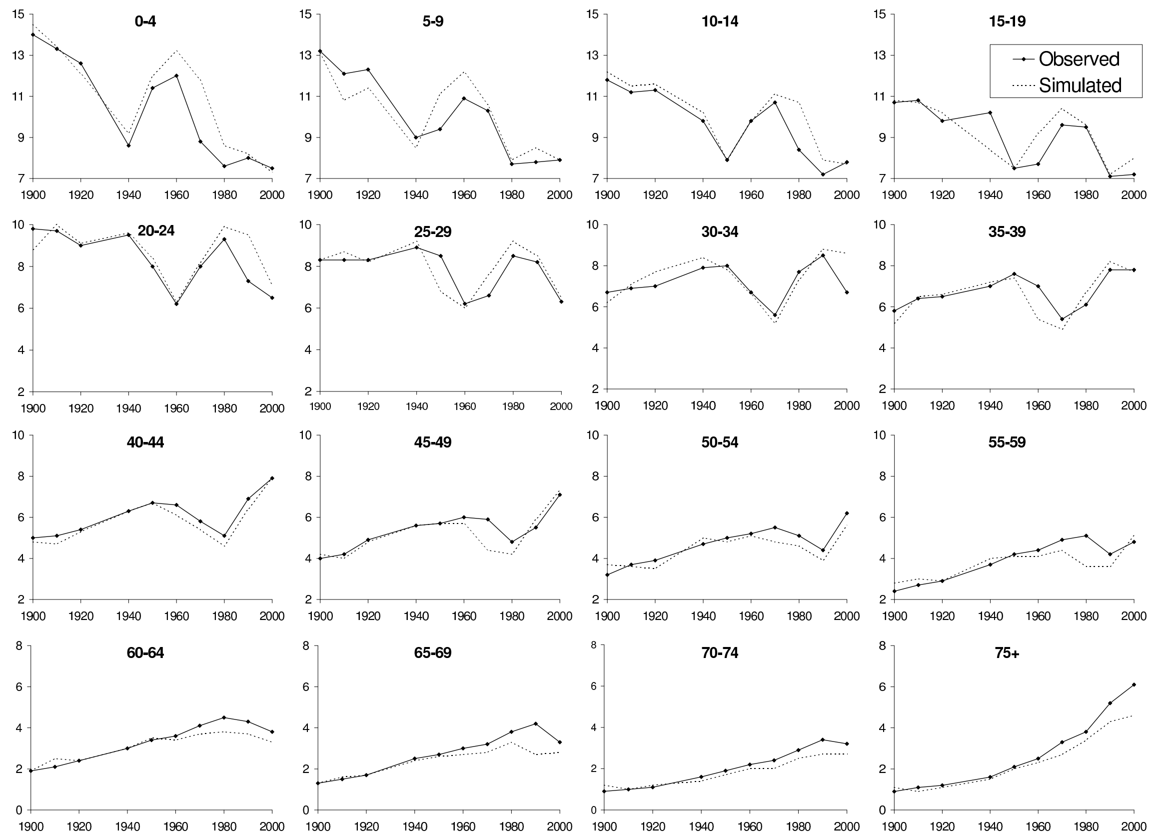


Figure 5.6: Observed versus Simulated - Age Distribution, 1900-2000. Data are percent in each age group for the observed native-born population in the IPUMS (solid lines) and the simulated native-born population (dotted lines). Note that the y-axis ranges vary for the rows of graphs, but all axes represent a range of eight percentage points, making vertical distance comparable in each graph.

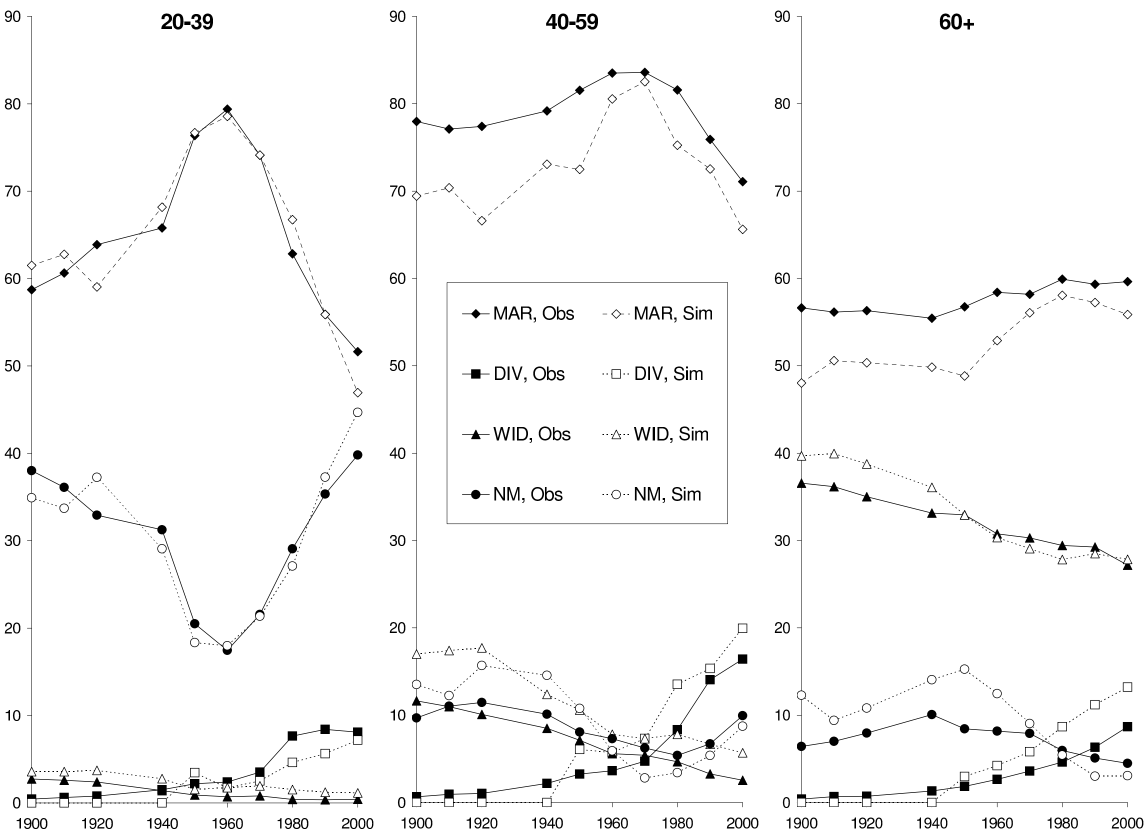


Figure 5.7: Observed versus Simulated - Marital Status, 1900-2000. Data are percent in given marital status for the designated age group of the observed native-born population in the IPUMS (solid lines) and the simulated native-born population (dotted lines).

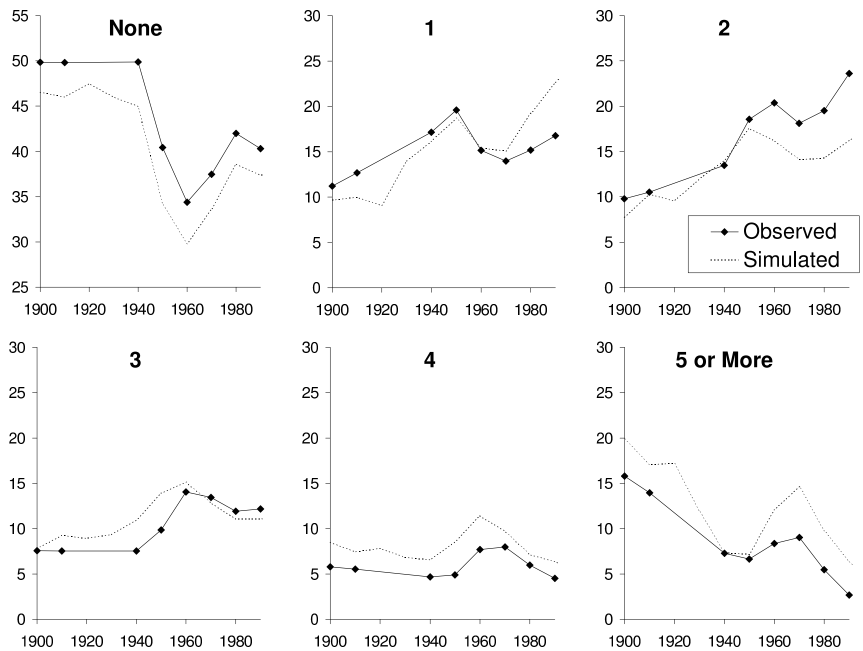


Figure 5.8: Observed versus Simulated - Parity Distribution, 1900-1990. Data are percent at given parity for native-born women age 15-49 combined. Comparison excludes births to never married women before 1970, as the parity information is not recorded in the census for never married women before this time.

categories for widows marrying: 15-44, 45-64 and 65+. These broad age categories may be unable to generate accurate distributions by age, then. Despite the lack of perfect match, however, change over time in the simulation is reasonably reflective of change over time in the IPUMS population. Many young people get married in the 1950s and 60s and many stay married, although divorce rises for all age groups starting at around 1970. Widowhood becomes increasingly rare over time, while young people are delaying marriage more and more as the century ends.

Finally, the parity status of women for the simulation versus the observed distributions are shown in Figure 5.8. The simulation consistently underestimates the proportion of 15-49 year old women with no children, possibly due to the use of total-population rates rather than rates specific to the native-born population. The magnitude of the difference is not large, however. The shape of change in the parity distribution from year to year is very consistent in the simulation compared to the observed IPUMS population. There is some discrepancy by 1980 as to whether one or two is the modal parity category, but the directions of change are largely faithful to observed reality. Overall, the agreement between simulated and observed parity distributions are very close, especially considering the fact that the fertility rates used are not parity specific. The simulation program is able to generate accurate parity distributions because it assigns randomly generated fertility multipliers to women, as discussed in the methodology section on page 102. While the decomposition relies on the parity distribution by age and marital status rather than the parity distribution overall as shown in Figure 5.8, the overall distribution's accuracy does support the claim that the simulations generate accurate fertility distributions. There is more variability in the simulated parity distributions for smaller age and marital status cells, but the use of five-year age groups in the demographic composition vector will allow for some smoothing out of this variability withing that five-year age group. We have not discussed whether the simulation is accurately producing fertility histories, however, as the information in Figure 5.8 represent cross-sections rather than completed fertility. As cross-sectional parities are the relevant facts needed for the decomposition, however, there is no need to focus on completed fertility.

The simulation seems to capture the main facets of population change over the century, and the simulated population responds to changing demographic rates in roughly the same manner as the actual population did. Where there are discrepancies between the simulation and reality, however, they will affect the analysis results. Recall that the overall proportion h living in a certain household type was the cross-product of the demographic composition vector (D) and the household propensity vector (P), $h = D \times P$. The baseline simulation provides slightly different D's over time than were observed in the IPUMS, so the overall household change that is the object of explanation is somewhat different as well. The final comparisons in this section, then, are between the simulated distribution of people across household types, compared to the observed distributions. Recall that the population's simulated household distribution does not represent the simulation of households for simulated individuals, but rather the weighted average of household propensities using the simulated distribution of population characteristics to provide the weights. One comparison, shown in Figure 5.9, is of the distributions of all native-born persons across household types over the century, where the demographic groups are defined by age, sex and marital status. The other comparison, shown in Figure 5.10, is of the distributions of native-born women across household types where demographic groups are defined by age,

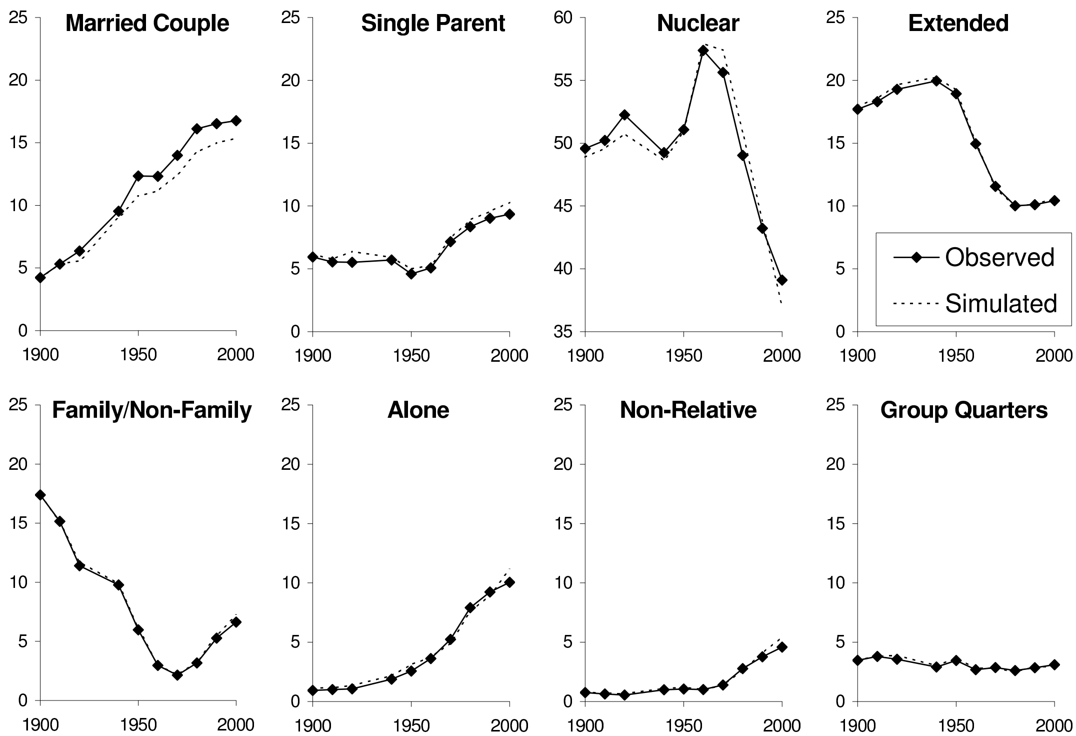


Figure 5.9: Observed versus Simulated - Native-Born Population's Household Distribution. Simulated population household distributions are the product of simulated demographic compositions multiplied by observed conditional (demographic characteristic-specific) household type probabilities. Household membership for individuals is not simulated.

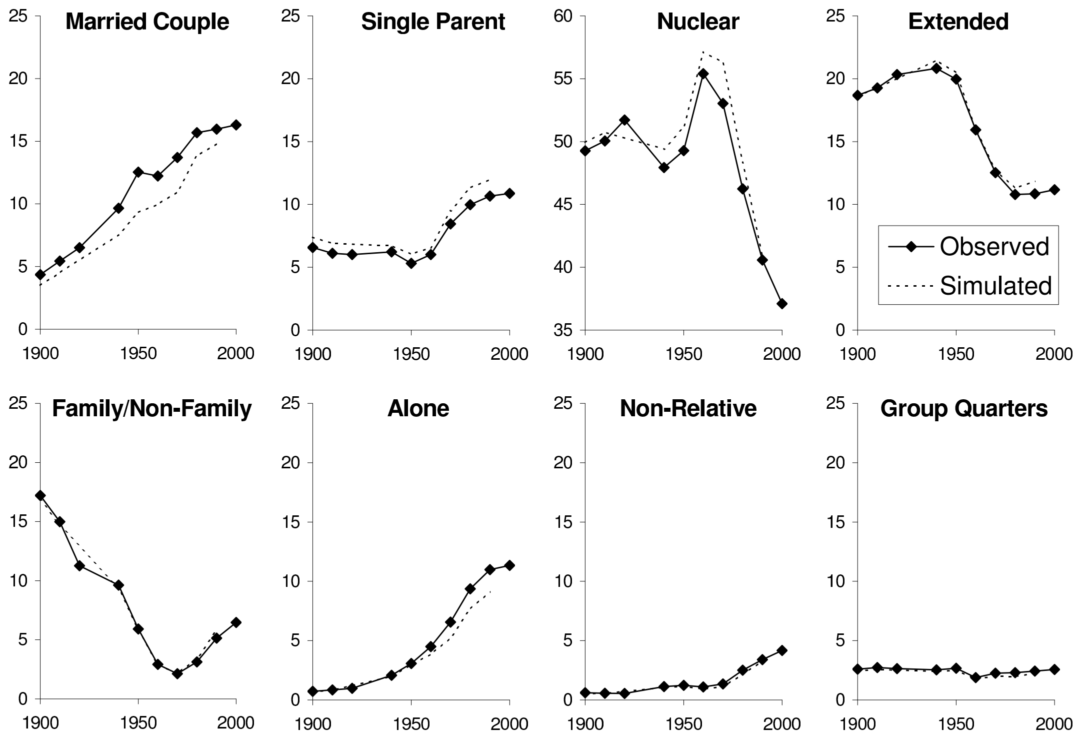


Figure 5.10: Observed versus Simulated - Native-Born Women's Household Distribution. Simulated women's household distributions are the product of simulated demographic compositions multiplied by observed conditional (demographic characteristic-specific) household type probabilities. Household membership for individuals is not simulated. The simulation for 2000 is not shown as there is no parity information for 2000 so it cannot be used in the decomposition for native-born women, where the demographic composition vector contains parity information and the household propensity vector has parity specific conditional probabilities.

marital status, and children ever born. This comparison is only through 1990 as the parity data are only available through this point, so the decomposition can only be done through 1990.

The main discrepancy in the simulated native-born person's household distribution is that there are fewer persons in married couple households than observed, and slightly more in most of the other categories. For the simulation of native-born women, the discrepancy between simulated and observed percentages in married couple households is more acute. The overall increasing trend is there, however, indicating that the decomposition analysis will still be dealing with change moving in the correct direction. The magnitude will be slightly smaller than observed, however.

In addition to making sure that the simulation could reproduce the observed population, this detailed examination of the baseline simulation has supported the claim that the vital rates cause the expected change in the demographic characteristics that are included in the demographic composition vector. This supports the idea that we can now mix and match those vital rates sets in order to isolate the effect of changes in each type of rate.

5.5 Results

While microsimulation is in itself a fascinating topic, it is only a tool in this research project rather than the focus of it. The previous section justified simulation's use as a tool in the research, so we now put it aside and return to the decomposition of household change. The discussion of results will proceed as follows. First the D-effect versus P-effect for the native-born population, where demographic composition is the distribution by age, sex, and marital status, will be presented. This decomposition contains no simulations, just a comparison of observed compositions and propensities from the IPUMS. Following that, the results from the further decomposition of the D-effect into components attributable to changes in fetility, mortality and nuptiality rates, are presented. The simulation program is used in this vital rate decomposition.

Following those results, the D versus P and vital rate decompositions will be examined for the native-born women only. In this iteration of the analysis, deomographic composition is the distribution by age, marital and parity status.

5.5.1 Demographic Composition versus Household Propensities, Native-Born Population

We begin with results from the decomposition of household change into a component due to the changing demographic composition of the population and a component due to changing household propensities. Figure 5.11 shows those results for the analysis of the native-born. Recall that the demographic composition in this analysis is by sex, age and marital status. There is a graph of results for each of the eight possible living arrangements, including seven types of households plus group quarters. Each graph shows four time segments and each segment has a black and a gray bar. The black bar represents the component of demographic composition. The gray bar represents the component of household propensities. The net height of the two bars added together is the total change in the proportion of persons living in that particular household type in that segment. Complete tables of numerical values of results are available in Appendix B. Taking the first segment of the married couple (no children) analysis as an example, we see a black bar with a height of +2.0 and a gray bar with a height of +3.3 next to it. Thus, the total change in the proportion of native-born persons living in married couple households from 1900 to 1940 was +5.3, 2.0 of which was due to compositional change and 3.3 of which was due to the changing propensity of people to live in married couple households as opposed to other types.

It is clear that in most segments, the larger bars are the gray bars, especially for the more complex household types of extended family and family/non-family combination. For the more atomized household types such as married couples and nuclear families, living alone and non-relatives, the magnitudes of compositional versus propensity effects are much closer. Of course, sometimes the effects are moving in opposite directions, as in the first segment of the nuclear family household analysis. During this segment, between 1900 and 1940, the relative size of the birth cohorts fell, moving the population away from children who are very likely to live in nuclear family households. This is the main reason for the negative demographic composition effect. Moving in the opposite direction, the nuclear family household became a more popular choice for many types of people between 1900 and 1940, holding population characteristics constant, causing the positive effect of household propensity to be visible in the results.

Some clues about the nature of the compositional and propensity changes can be

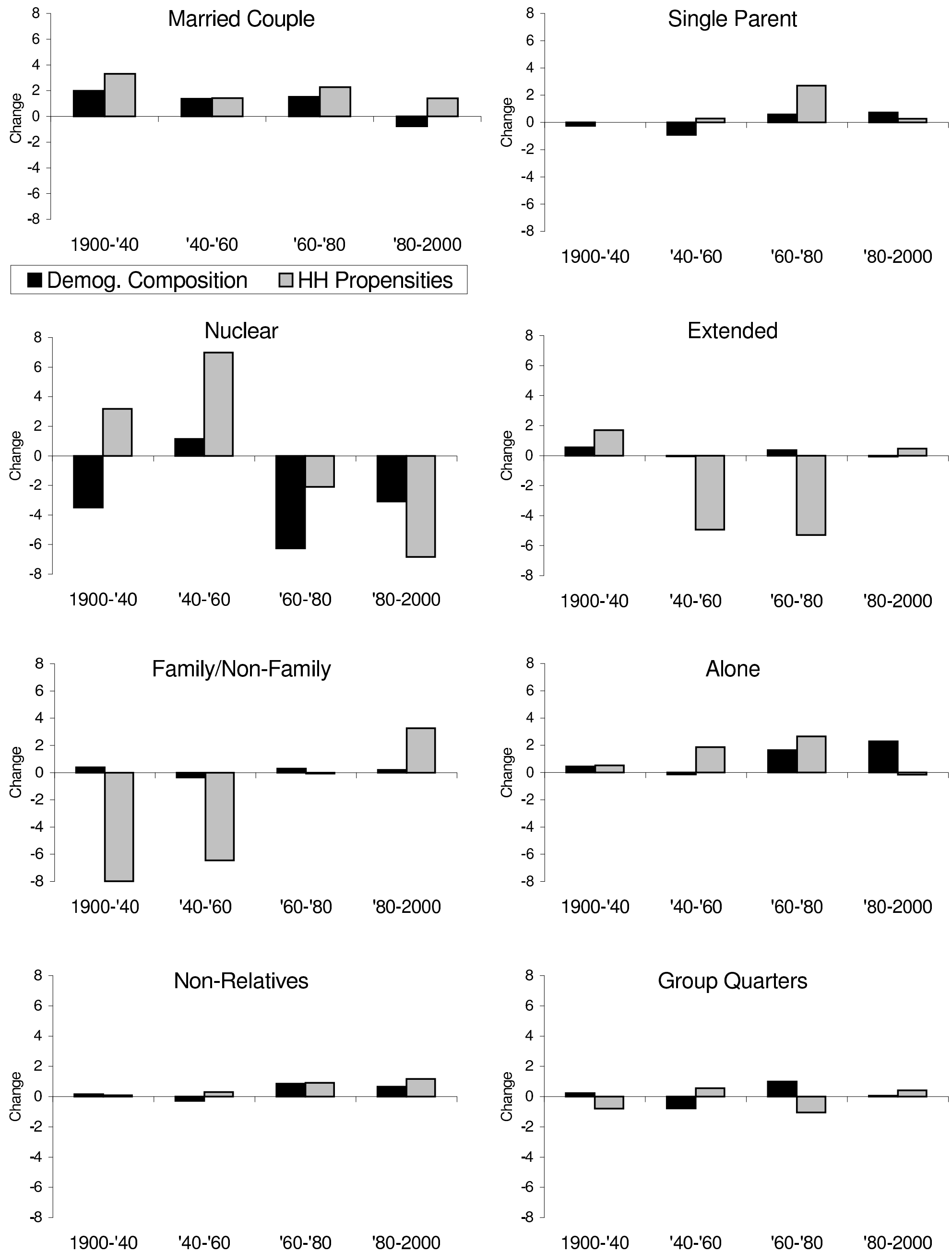


Figure 5.11: Demographic Composition versus Household Propensity Effects on Household Change, All Native-Born. For each time period, the total change in the population proportion in each household type is shown as the sum of bars representing the two decomposition components. All y-axes are the same, making all vertical distances comparable. Numerical results appear in Appendix B.

gathered through observation of where the opposite direction compositional or other effects can be found. In any one time segment, the total net height of all of the black bars must be zero, just as the total net height of all of the gray bars must be zero. The analysis shows that demographic compositional changes favor some types of households, while detracting from others in equal measure. Similarly, increasing household propensities indicate that one particular type of household became more preferable, but always at the expense of another.

Thus, the positive household propensity effect in the first segment nuclear family analysis finds its opposite effect in the negative gray bar for family/non-family combination. We observe persons in the first segment becoming more likely to live in a nuclear family household and less likely to live in a family/non-family combination household. Even while demography was working against the prevalence of nuclear family units in the population over this segment, the disappearance of many border/lodger type arrangements that made for a family/non-family household in 1900 revealed many of those nuclear units as their own households in 1940. The process seems to have continued through the 1940 to 1960 segment, with family/non-family households continuing to be less favored compared to living alone, or in either of the married couple-based household types, holding compositional change constant. It is unexpected that demographic composition had so small an impact on nuclear families, given that this segment contains one of the biggest demographic shifts of the century – the baby boom. It seems as though there should be a large compositional component in the increase in nuclear families in this time segment, but the decomposition does not produce such a result. This will be discussed further in the next section.Extended families also decrease during the period, with no indication that compositional change played a part. In fact, this segment sees very little compositional effect at all.

Moving on to the 1960 to 1980 segment, the baby bust is in evidence in the strong compositional component decreasing the share of nuclear family households and increasing slightly the share of married couple (no children) and living alone. The extended family household became even more scarce during this period, but not due to any compositional effect. The simultaneous positive effect of household propensities on single parent households does suggest that single parent family units that used to be residing with kin before 1960 became much more likely to reside independently. Looking at the final segment of the analysis, demographic composition continued to move away from characteristics that favored nuclear family households and toward characteristics that favored living alone and, to a lesser extent, living with non-relatives or in a single parent household. Household propensities worked against nuclear family households as well, favoring instead the family/non-family combination household, non-relatives and married couple (no children) households.

5.5.2 Vital Rates and the Effect of Demographic Composition, Native-Born Population

We now move on to results that make use of microsimulation to specify the extent to which demographic composition effects were the product of population momentum or changing fertility, mortality, or nuptiality. Recall that the effect of each type of rate over the time period is the effect of holding rates constant at the levels of the decade preceding the time segment, versus letting the rates chagne as they were observed to change in reality. Also, the effect of population momentum is the effect of the population structure at the beginning of the time segment, which exerts in influence on the demographic composition of the end of the time segment, even if all rates are held constant.

Figure 5.12 shows the same gray bars as in Figure 5.11, but now the black bar for the effect of demographic composition is divided into four components: momentum represented in black, fertility shown with diagonal bars, mortality shown with vertical bars, and nuptiality shown in white bars. To take the first segment of the married couple graph again, the positive demographic composition effect of +2.0 is now shown to be made up of +0.7 from population momentum, +1.4 from fertility change, +0.1 from mortality change, and -0.3 from changes in marriage and divorce. The interpretation is now based on rates. The decreased fertility observed between 1900 and 1940 increased the prevalence of married couple (no children) households, as did the lower mortality and the pre-existing demographic composition that, over the forty years in the segment, moved the population toward a structure that favored married couple households somewhat, compared to the structure in 1900. The slight decrease in marriage through the 1930s, however, mostly due to marriage delay, worked against this type of household.

Looking then at this new picture, we can safely say that the large decreases in extended family households and family/non-family combination households were not demographic in nature. There are no counter-acting demographic effects revealed by the new decomposition.[9] Instead, these findings support the idea that there was a broad secular

[9] Note that in the demographic sub-component decomposition, the sub-component bars do not add up to net zero across all household types. Rather, the net height of all of the demographic sub-components added together is zero.

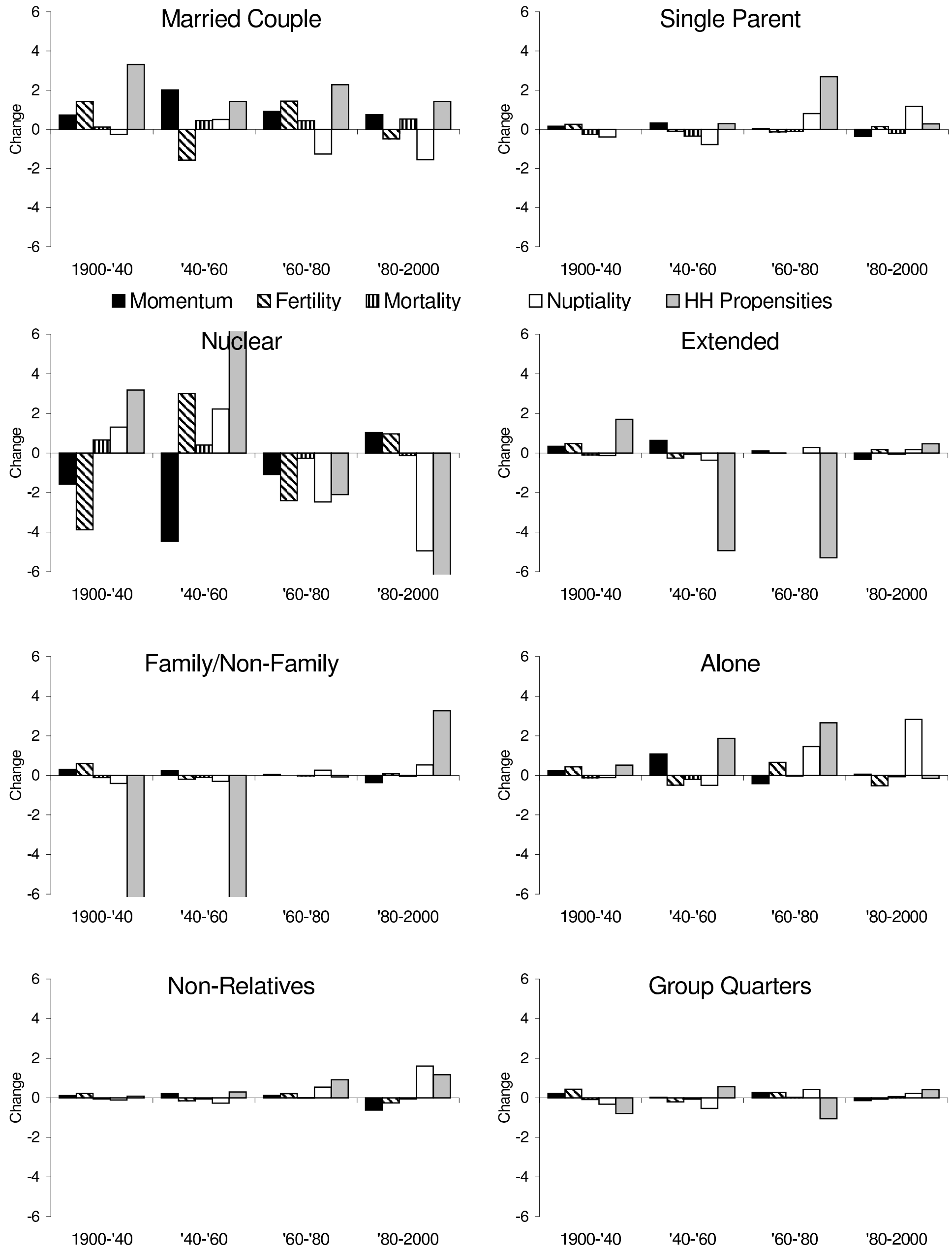


Figure 5.12: Vital Rates Decomposition, All Native-Born. These results are a further decomposition of those shown in Figure 5.11. The demographic composition component in Figure 5.11 is here shown decomposed into four components – momentum, fertility, mortality, and nuptiality. All vertical distances are comparable. Axes are expanded somewhat compared to Figure 5.11, in order to show vital rate component detail. This truncates some of the household propensity factor bars. Full numerical results are given in Appendix B.

trend away from coresiding with kin or in households combining relatives and non-relatives that was not based in the age or sex structure, or in anyone's ability to find a spouse. While the extent to which it was affected by kin availability is not evident from this analysis, we will be able to see in the next section if it was affected by women's parity.

The simulation does allow some indirect examination of the kin availability issue. While the decomposition using the simulation cannot take kin availability into account because we do not know how many of which type of kin are living outside of each type of household, the simulation does give enough information to compare the broad trend of kin availability to the IPUMS information on kin coresidence. Recall the analysis in Figure 4.5 from Chapter 4 showing the average number of persons of various relationships in the households of persons of various age groups. Using the baseline simulation, we can compare the trends in the average number of coresident kin examined in Chapter 4 to the average number of living kin estimated in the baseline simulation. Comparing the trends in the numbers of living kin versus kin coresidence indicates whether kin availability may be an important constraint or not. If the numbers of living kin change very closely with the numbers of coresident kin, this suggests that kin availability may be a constraint. If the numbers of coresident kin fall while there is no change in living kin, this suggests that kin availability is not operating as any strong constraint on coresidence.

The comparison is made for three types of kin in Figure 5.13 - children, parents, and siblings. For the youngest age group, the changes in the observed number of coresident siblings over time tracks the changes in the numbers of living siblings over time, as we would expect for dependent children.[10] Not being able to form their own households, their household configuration is dictated by their parents' marital status and fertility. Moving on to the young adults, we see that they have always had far more siblings living than in their households, on average, and the same for parents. On the other hand, the 18-29 year olds who had children lived with those children to a large extent. Of more interest are the results for the older age groups. Comparing the trends over the century, we see that the increasing number of living parents for those age 30-64 does not seem to have made them more likely to live with those parents. We can also discount somewhat the idea that this gap is due to the effects of the changing number of siblings on an adult's likelihood of living with an elderly parent, as the mean number of this type of kin does not seem to be changing

[10] Note that the simulation predicted fewer siblings than were present in the household. This could be due to the exclusion of step-siblings.

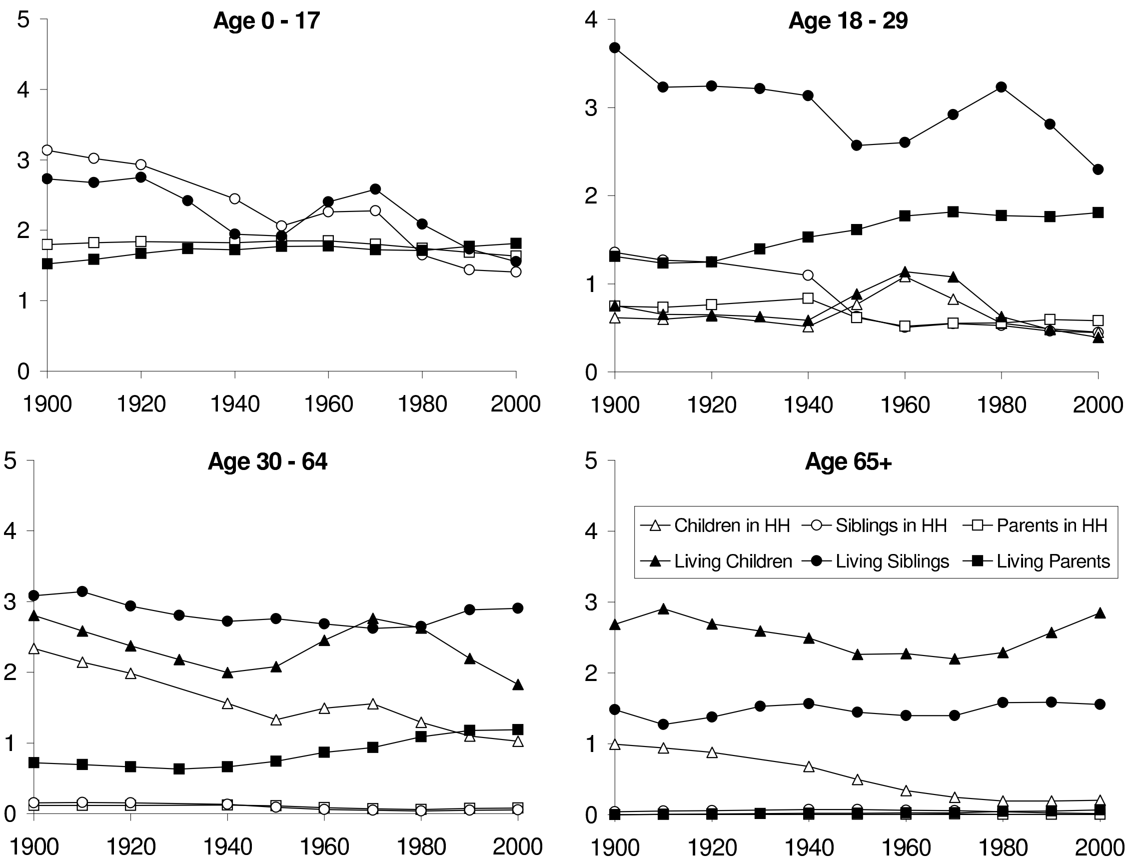


Figure 5.13: Average Number of Simulated Living versus Observed Coresiding Relatives. All graph scales are the same. Relationships are relative to the reference person in that particular age group. Average number in the household is from IPUMS, and includes relationships that are biological, adoption-based, or step-relationships. Average number living are estimated using microsimulation. The number of simulated living parents and children includes biological and step-relationships. Simulated siblings include full- and half-siblings but not step-siblings.

drastically over time. While the number of siblings born has decreased from 1900 to 2000, mortality decline has meant that more of those siblings survive to adulthood. Variability will be important here, but if the constraint is strict availability, rather than of a more nuanced process of compatibility, it does not seem to have been a strong constraint.

For those age 65+, we see the steady decline in their likelihood of coresiding with an adult child, even while the number of living adult children stayed quite high. Some of the decline in numbers of adult children from 1910 through 1970 does track the decline of adult children in the households of those age 65+, but there is no similar increase in coresidence when the number of children increases after 1970. Thus, we can tentatively conclude that numbers of living children do not exhibit a strong constraint on the expression of household preferences of the elderly. However, the elderly parent-adult child coresidence relationship is certainly much subtler than a matter of the existence of a living child. Many more characteristics, demographic and otherwise, act as a filter between a group of adult children and their elderly parents to determine if any of the relatives will coreside (Aquilino 1990).

Similar charts could be made for other types of kin further out in the kin network, although the microsimulation may predict them less accurately than the close kin shown (Wachter, Blackwell, and Hammel 1997). Given that the numbers of living siblings, parents and children do not seem to be decreasing very much over time, it is unlikely that there is any hidden interaction that would cause a decrease in the numbers of living extended kin.

Returning to the vital rates decomposition in Figure 5.12, for the married couple and nuclear family households, we see the varying ways that different demographic phenomena affected these two types of households. The fertility effects between these two types of households are always in the opposite direction. The decreasing fertility of the 1900 to 1940 period reduced the prevalence of nuclear family households while it increased the married couple households. These impacts switched with the fertility increases of the baby boom and switched back with the baby bust and then recovered slightly in the most recent period as fertility rose again slightly. The opposite effects are because decreases in fertility extend the period for married couples between their wedding and the transition to married couple with children families, and for some it delays it permanently. It also shortens the period between childbearing and the return to living as a married couple without children after the children transition to their own households. The fertility effect is larger for nuclear family households than in married couple households because the effect of the relative size of the child cohort is directly felt in the nuclear family household through the abundance or lack of children. It is only indirectly affecting the married couple household by increasing slightly all other household types in keeping the total distribution adding to 100%.

Looking more closely at the vital rates decomposition of effects for nuclear family households in Figure 5.12 reveals the nature of the strange result from the two factor decomposition shown in Figure 5.11 and discussed on page 117. In the two factor results in Figure 5.11, the results for the period from 1940 to 1960 showed a relatively small impact of demographic composition during the period of the baby boom. This does not seem to make sense as the baby boom had such a huge impact on age- and family-composition in the United States. Looking at the full vital rates decomposition in Figure 5.12 however, we can see that the small effect of the demographic composition component masks large, counter-acting effects of fertility and population momentum. The fertility effect is obvious - the baby boom was characterized by increased fertility at all ages. The population momentum effect is due to the fact that the childbearers of the baby boom were from the relatively small birth cohorts of the depression era of the 1930s. Population momentum was thus not favoring large birth cohorts between 1940 and 1960. The huge fertility and marriage increases that characterized the baby boom more than overcame the negative effect of population momentum.

Going back to married couple households, we see that even greater than the volatile fertility effects on this household type were steadily positive effects of population momentum and mortality decline. The population momentum effect can be thought of as a delayed effect of mortality decline. It does not show up as in the mortality component because the mortality change in question acted earlier than that particular time segment. In other words, the surviving spouses of the most recent decades are living in married couple households because they had greater survival rates through childhood and adult years, as well as during their older years in that particular time segment.

Given the large effect of population momentum and aging on married couple households, why do we not see a similar effect on the households of persons living alone? Much of the household change literature does focus on older people, especially elderly widows, living alone, but the results here do not indicate a large role for population aging in increasing the proportion of those living alone. There are several reasons for this. The main reason is that we are combining both sexes in this analysis and the results for men, who are less likely to spend an end-of-life spell without a spouse, dampen those for women. (Effects for women will be discussed in the next section, where population aging effects on those living alone are shown more clearly.) Another reason is that, despite the fact that they make up a large proportion of older age groups and receive a great deal of research concern, elderly widows are not a very large proportion of the overall population. Rather than focusing on older people, this analysis shows larger effects on the overall population prevalence of living alone coming from younger people. The young are delaying marriage more and, once they are married, getting divorced more.

Final comments on the full decomposition of native born persons by age, sex, and marital status focus on the role of marriage. It is shown clearly in the last two decades that the decrease in marriage and increase in divorce acted negatively on the married couple-based households, while favoring single parent households, those living alone and non-relatives. Furthermore, increases in the propensity to live in household types that are likely cohabitation-based combines with these nuptiality changes to produce more family/non-family combination and non-relative households. In other words, nuptiality changes produce more unmarried people, with children and without. Household propensities increasingly sort them into households together rather than apart in independent households, or together in married couple-based households.

5.5.3 Demographic Composition versus Household Propensities, Native-Born Women

Seeing all of the changes demographic composition causes when it includes only the characteristics of age, sex and marital status, we move to the native-born women analysis that defines demographic composition as the joint distribution of age, marital and parity status in the population. To begin with the examination of the demographic composition versus household propensity effects on household change, the decomposition results are shown in Figure 5.14, but only through 1990 because of lack of parity data in 2000. The black bars signaling the contribution of compositional change seem to be consistently larger in this analysis compared to the two sex case shown in Figure 5.11, as we would expect from adding such an important factor on household composition as whether or not a woman had children, and how many she had. The differences are most notable in the two married couple-based household types, but also in the single parent with children and alone households. Some of these differences will be due to the addition of the parity information. Some of them, however, will be due to the fact that men and women have slightly different household

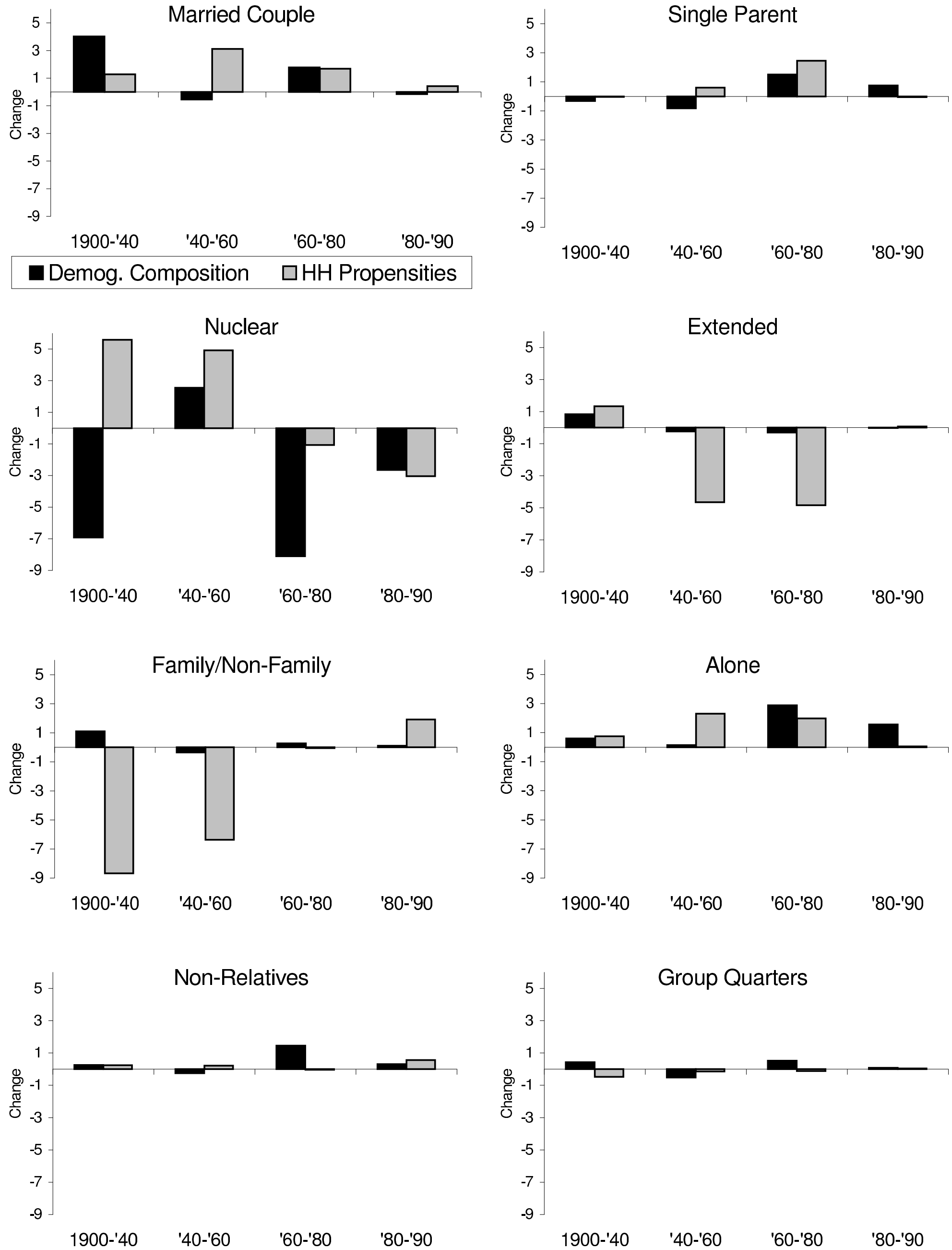


Figure 5.14: Demographic Composition versus Household Propensity Effects on Household Change, Native-Born Women. For each time period, the total change in the population proportion in each household type is shown as the sum of bars representing the two decomposition components. All y-axes are the same, making all vertical distances comparable. Full numerical results are given in Appendix B.

propensities and age and marital status distributions.

5.5.4 Vital Rates and the Effect of Demographic Composition, Native-Born Women

Figure 5.15 shows the full vital rate decomposition of the demographic composition effect for women only. The effect of adding parity information is shown in the increasing magnitude of the bars showing the fertility component of change, when comparing them with the fertility bars for the two-sex analysis in Figure 5.12 when parity was not a part of the demographic composition. While the information on parity does increase the demographic contribution, the method used here would still have missed a case of household change through severely restricted kin sets. Given the analysis of living versus coresident kin in the previous section, however, that does not seem to have been an issue over the period in question.

The effect of restricting the analysis to women only in Figure 5.15 instead of women and men together as in Figure 5.12 is shown clearly in the alone household type. Population aging plays a larger role here, shown by the consistently positive effect of population momentum. Women are more likely to be the ones left behind after the death of an elderly spouse, and they are likely to live even more years after that death than their widowed counterparts in the past.

5.6 Conclusions

5.6.1 Understanding the Past

To summarize the discussion of results in the previous section, complex household types have become less prevalent over the century due to changing preferences, economic and social factors, but not due to the large population changes seen during the twentieth century in the United States. Given the fact that, by their very complexity, these household types include persons of all different demographic profiles, the low explanatory power of demography in predicting change in these types of households is expected. Demographic compositional changes are those caused by the increase or decrease in a particular type of person favoring a particular household type. If a household type draws in many different types of people, it cannot be greatly affected by the demographic regime's favoring of one

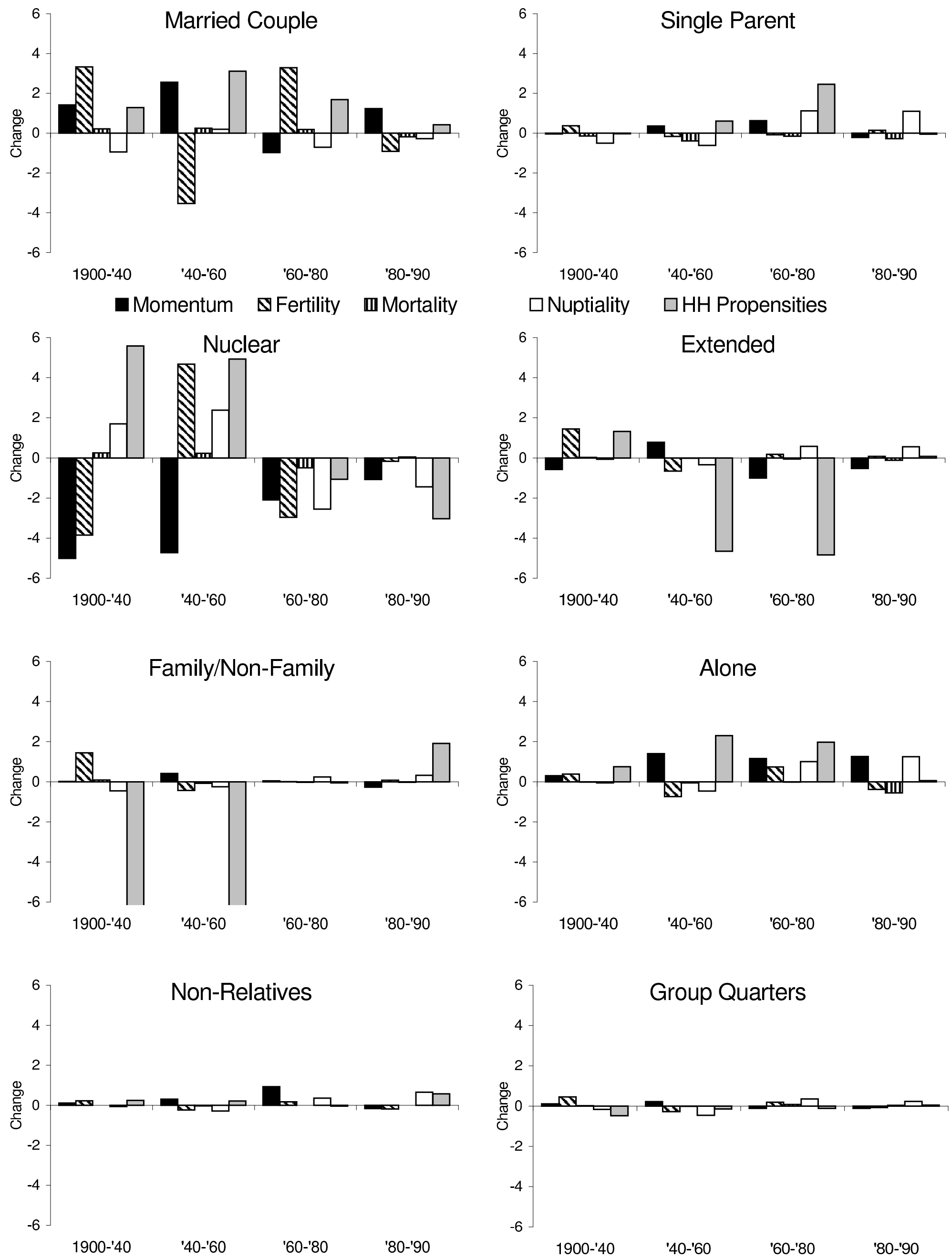


Figure 5.15: Vital Rates Decomposition, Native-Born Women. These results are a further decomposition of those shown in Figure 5.14. The demographic composition component in Figure 5.14 is shown here decomposed into four components – momentum, fertility, mortality, and nuptiality. All vertical distances are comparable. Axes are expanded somewhat compared to Figure 5.14, in order to show vital rate component detail. This truncates some of the household propensity factor bars. Full numerical results are given in Appendix B.

or another specific type of person in the population.

Among the less complex household types, demographic change played a much larger role. Clearly, the size of birth cohorts makes a large difference for the population prevalence of nuclear family households. The volatility of fertility over the century is therefore reflected in the volatility of the proportion of people living in nuclear family households. Married couple households had an inverse relationship with nuclear family households, as lower fertility was often the product of delayed childbearing after a couple was married. It also resulted in an earlier transition back to a married couple household for parents for whom a smaller number of children meant a shorter time spent sharing a household with them. We do not see the proportion of persons living in married couple households behaving with the same volatility as nuclear family households, however, because of the century-long trend toward longer lives. Mortality decline and the steady momentum of population aging meant both that older couples who managed to stay married after the childbearing years enjoyed ever more years of the "second honeymoon" after the children left home, but also that these couples' share of the population grew and grew over time.

Of course, the "second honeymoon" only lasts while both spouses are alive and married. As the average life expectancy gap between men and women widened in the second half of the century, more women found themselves living for some time as widows at the oldest ages. As divorce increased during this period also, more women found themselves living as divorced women also. These demographic changes came at or after many changes in household propensities that led widowed and divorced elderly women to live alone much more often than with family.

5.6.2 Imagining the Future

The analysis in this chapter suggests some ways to think about household change in the future. While the changes in complex household types were not the product of demographic change, they bring us to a household distribution at the end of the century tilted toward less complex household types. Because these less complex types are more affected by changes in the composition of the population, household change in the future is more likely to be demographically driven. As the trend of population aging is not likely to be reversed, then, this seems to suggest that we can expect more married couple no children households, as well as more alone households made up of older divorced or widowed women.

Other demographic trends, such as fertility and marriage, are less certain in the future.

There is potential, however, for the household propensities to change, turning around from favoring less complex household types to favoring more complex ones. There is an indication that the rise of cohabitation and decrease in marriage since 1980 has already begun that process somewhat, turning some of the persons who would have made up married couple no children households in the past into non-relative households, and combining some single parent families and persons living alone into family/non-family household due to the cohabitation of the parent and an unmarried partner. Apart from cohabitation, the rise of persons of Hispanic ethnicity in the population could increase the prevalence of extended family households, which are much more common among Hispanics than non-Hispanics (Burr and Mutchler 1993; Angel and Tienda 1982). While such a change was folded into the household propensity effect in the research shown here, given enough ethnicity-specific data it could be included as a demographic characteristic. While this would call for a reformulation of the theoretical model of households used in this chapter, it might be very useful analytically and generate interesting results.

What the research and techniques developed in this chapter give us, ultimately, is a specific data-driven way to imagine these different future scenarios by performing the same type of mix-and-match demographic composition with household propensities that made up the decomposition technique. The next chapter will present the results of some scenarios which will then generate not just directions of future change, but rough estimates of their magnitudes as well.

Chapter 6

Demographic Rates and Future Household Change

6.1 Introduction

One of the conclusions of the previous chapter was that demographic rates will have a large part to play in shaping household change in the future. The purpose of this chapter is to show examples of what that role might be and how the population, and thus households, might change in the future. Two different scenarios are imagined for future demographic rates: that they might stay as they were in the 1990s, and that they might change along the same trend observed from the 1980s to the 1990s. Populations are projected through the year 2030 and combined with the most recent household propensities to produce projections of the future distribution of persons across household types.

One additional scenario is presented: that demographic rates stay fixed at their most recent levels through 2030, but that household propensities return to levels observed in 1950. The purpose of this scenario is to show the magnitude of household change that large changes in household propensities might cause.

The scenarios generate both expected and unexpected versions of the future. The proportion of persons living alone has risen since mid-century and the analysis in Chapter 5 showed that demographic composition made a substantial positive contribution to this trend, mainly through population aging. The projections indicate that positive demographic effects on living alone should continue if demographic rates remain at their current levels or continue changing according to recent trends. Similarly, decreasing fertility has had a major negative impact on the proportion living in nuclear family households over the century, excepting the baby boom discontinuity. Projections support the expectation that this negative effect of demographic rates on the proportion living in nuclear family households will continue.

The projections of married couple (no children) households produced unexpected results. Looking at the history of the twentieth century, demographic change contributed positively to the steady increase in persons living in married couple households, mainly through population aging. The projections indicate, however, that future demographic compositional change in the form of more divorce and delayed or foregone marriage may overwhelm the population aging effect and bring an end to the long, steady increase in married couple households.

While the scenarios presented in this chapter may not represent very good guesses about the direction of future change, they are not intended to be a projection along those realistic lines. Rather, they are illustrative of ways that microsimulation and the two stage model of demographic composition versus household propensities can be used to imagine future household change. Subsequent sections discuss other ways in which this projection procedure could be used to examine specific kinds of demographic and household change.

6.2 Methodology

As with the decomposition analysis in Chapter 5, projection scenarios will be shown two ways: for the entire native-born population, grouping population by age, sex and marital status, followed by the same projection scenario for native-born women, grouping them by age, marital and parity status. The analysis for all native-born persons will look at change from 2000 to 2030 using the household propensities of 2000. The analysis for native-born women will look at change from 1990 to 2030 using the household propensities of 1990. The difference in final observed decade is due to the lack of parity information for women in the 2000 census.

Population projections through 2030 are produced by running the SOCSIM baseline simulation for 1900 to 2000 described in the previous chapter forward in time through 2030, using decadal rate sets as specified in the projection scenario for the decades from 2000 to 2030. This generates projected populations that are turned into projections of demographic composition, or projected D vectors, in the notation used in Chapter 5. These projected D vectors are multiplied by the P, or household propensity, vectors calculated from the IPUMS for the final observed decade (2000 for the native-born population analysis and 1990 for the native-born women analysis). This generates an estimated distribution of people across household types. To continue with the vector notation, the native-born population projection will compare the distribution of people across households for 2000, $h_{2000} = D_{2000} \times P_{2000}$, where D_{2000} comes from the baseline simulation and P_{2000} is calculated from the IPUMS, with a projected distribution of people across households based on population change only, $h_{2030}^{proj} = D_{2030}^{proj} \times P_{2000}$. For the native-born women analysis, the comparison is between $h_{1990} = D_{1990} \times P_{1990}$ and $h_{2030}^{proj} = D_{2030}^{proj} \times P_{1990}$. As in the native-born population analysis, D_{1990} comes from the baseline simulation and P_{1990} is calculated from the IPUMS.

For the scenario where change in the household propensity vector is added on top of the change caused by population momentum, the comparison is between the constant rates projection scenario to 2030 holding propensities constant versus the constant rates projection to 2030 varying household propensities. Specifically, $h_{2030}^{proj1} = D_{2030}^{proj} \times P_{2000}$ is compared to $h_{2030}^{proj2} = D_{2030}^{proj} \times P_{1950}$ for the native-born population analysis and, for the native-born women analysis, $h_{2030}^{proj1} = D_{2030}^{proj} \times P_{1990}$ is compared to $h_{2030}^{proj2} = D_{2030}^{proj} \times P_{1950}$.

The 2030 projection horizon was chosen to balance the desire to reach forward in time for interesting results with the knowledge that projections that reach past the short-term are often so unreliable as not to be worth comment.

Immigrants are added into the projection scenario in roughly similar fashion to the procedure used in the twentieth century simulations. Recalling the implementation of immigration into the Chapter 5 simulations, lists of immigrants were created to add at the end of each decade, in order to match the distribution of foreign-born persons by age and sex in the simulation to that observed in the IPUMS. Immigration is handled in these projections by adding the list of immigrants created for the year 2000 after each projected decade. In other words, the list of immigrants for 2000 is added to the baseline population in year 2000. The same list is added to the projected population in 2010, after adjusting the birthdays to create the same age and sex groups ten years later. The list is added again in 2020 after another ten year birthday adjustment. Projection results are shown for only native-born persons, however, so there is no need to add any immigrants in 2030.

6.3 Constant Rates

6.3.1 Demographic Composition in Constant Rate Scenario

The first projection scenario involves simulating the population forward in time to 2030 assuming that demographic rates remain at the levels observed in the 1990s. In other words, the rate sets for 1990-1999 are used for the entire projection period from 2000 to 2030. Immigration is held fixed at the level estimated for 2000, although the results shown are still for the native-born population only. This scenario, then, shows the population having moved through the decades, changing due to its own initial composition at 2000, rather than any changes occurring in the underlying rates. Characteristics of the resulting projected native-born population in 2030 are shown in Figure 6.1, compared to the population characteristics in 2000 from the baseline simulation.

The population has grown older as the large baby boom cohorts move into their elderly years. Note that the simulated baby boom begins somewhat later than the actual baby boom because, as mentioned in the vetting of the baseline simulation section in Chapter 5, average rates for each decade are used in the simulation instead of changing the rates each year. Fertility in the late 1940s in the baseline simulation is not as high as in the actual beginning of the baby boom because the decadal average rate is held down by the low fertility of the early 1940s. Similarly, the simulated baby boom lasts through 1969 rather than trailing off at the end of the 1960s, as it did in reality, because the average used for 1960-1960 is higher than the actual rates by the end of the decade.

Even as the population ages, however, there does not seem to be a large increase in the population female at oldest ages. This is because the final decade mortality rates (1990-1999) show something of a catch up for males relative to females at older ages compared to mortality rates in previous decades.

The proportion of men and women currently married decreases due to the effect of continuing high divorce rates and delay of marriage in the 1990s rate set compared to prior decades. Proportions never married increase, as do proportions divorced. Widowhood does not rise substantially even though the population ages. This is partly due to the slight decrease in proportion female at the oldest ages, mentioned above, which means that more elderly women's spouses are alive. It is also partly due to continuing the higher rates of remarriage after widowhood or divorce observed in the 1990s through the 30 year projection. There also may be an effect of generally higher divorce – if more marriages end in divorce

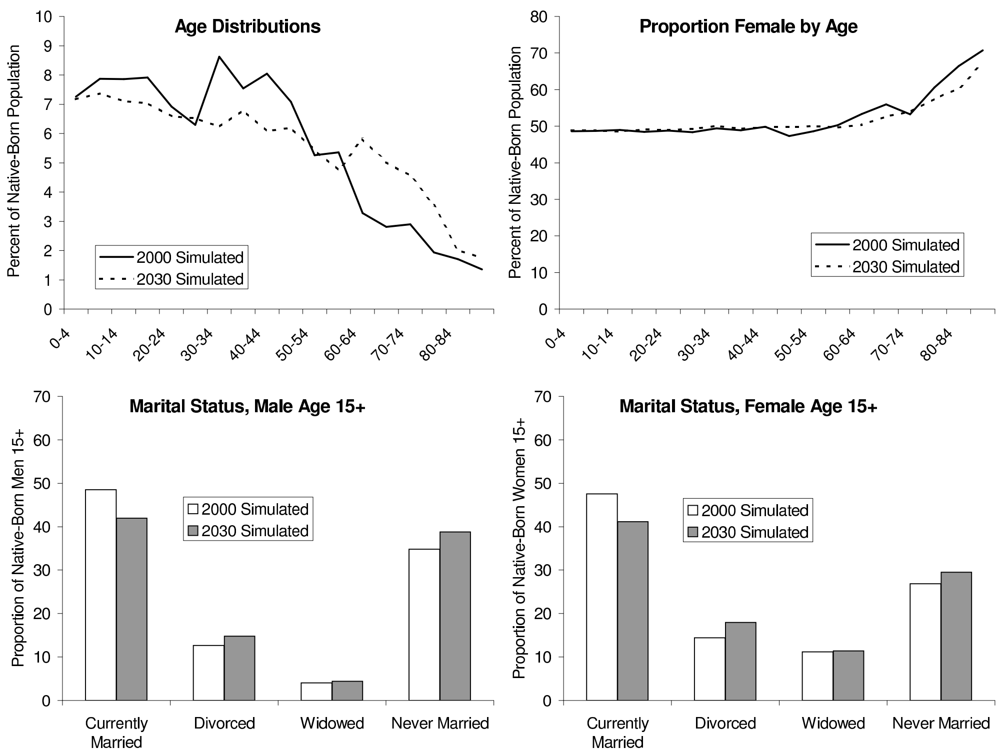


Figure 6.1: Simulated Native-Born Population Characteristics Holding Rates Constant, 2000 and 2030.

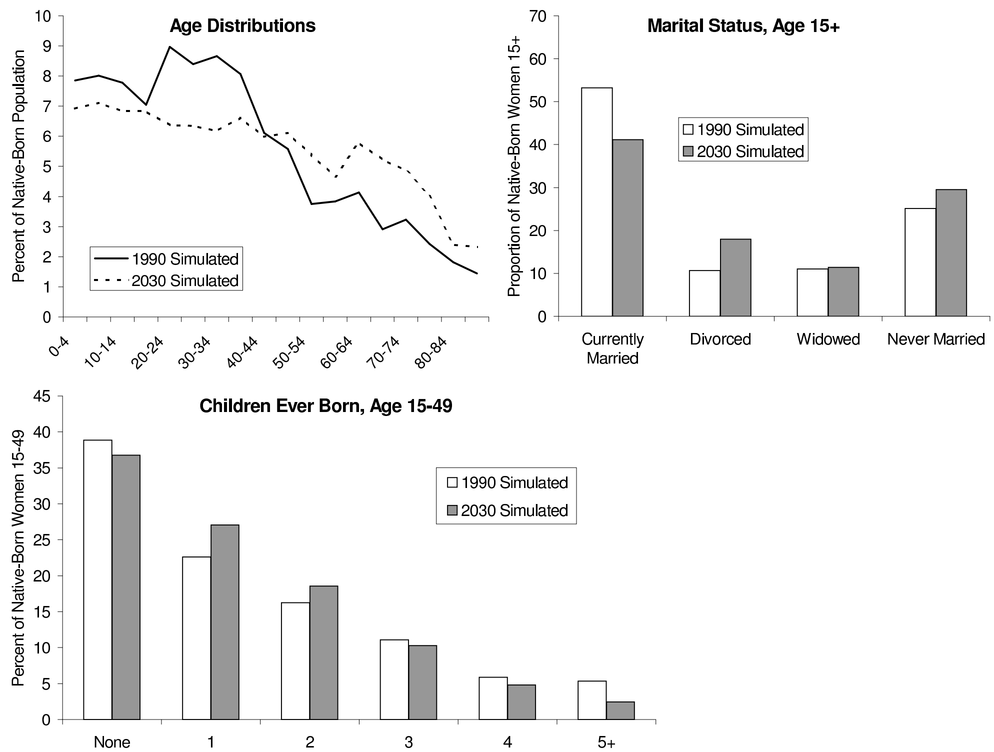


Figure 6.2: Simulated Native-Born Women Population Characteristics Holding Rates Constant, 1990 and 2030.

they are not at risk for ending due to the death of a spouse.

Figure 6.2 shows the demographic characteristics of native-born women projected to 2030, compared to their baseline simulation characteristics in 1990. The age change from 1990 to 2030 is somewhat more drastic than that shown for the native-born population between 2000 and 2030, both because of greater time difference for the women-only scenario (40 years instead of 30) and its restriction to the female population which has an age distribution skewed slightly older relative to the male age distribution. The shifts in marital status composition are similar for the women-only analysis as well, only more acute.

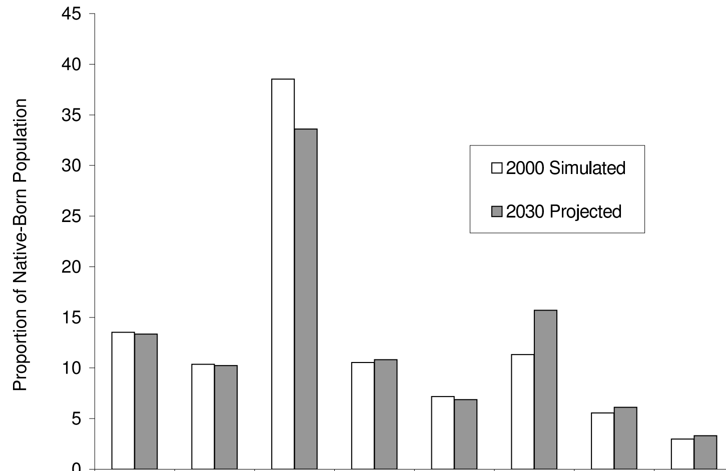
What we gain from adding the women-only analysis is the ability to examine the effect of fertility on the projected population and, as we will see in the next section, on the projected household distribution. For native-born women age 15-49, the parity distribution shown in the bottom panel of Figure 6.2, becomes much more concentrated at one or two births by the year 2030, compared to 1990. The projection uses 1990-1999 rates for the entire 40-year projection, so the change in the parity distribution is due to older, higher parity women aging out of the statistic. The oldest women in the statistic in 1990 had their childbearing years during the 1950s to the 1970s, so they would have gotten started very early in the baby boom and experienced the baby bust during years when the fertility decline was steepest at ages they had already passed.

6.3.2 Household Distributions in Constant Rate Scenario

So what might an older, less female at older ages, and less married population, mean for the distribution of people across the various household types? Figure 6.3 shows the net effects on the household distribution of the changing native-born population from 2000 to 2030, based on changes in the age, sex and marital status distributions. Large changes occur in the proportion of persons living in a nuclear family household, decreasing by 4.9%, while the proportion living alone increases by 4.4%. This is the effect of continued population aging, shifting the population to older ages where people are more likely to live alone and away from childhood age groups where people are more likely to live in a nuclear family household, according the the household propensities of 2000. Less marriage and rising divorce contributed to both of these household types as well. Non-relatives increased somewhat, by 0.5%, due to these nuptiality changes, as non-relative households are mostly favored by younger unmarried persons. Later marriage means a large supply of younger unmarried people, who by 2000 showed a strong propensity to cohabit in non-relative households.

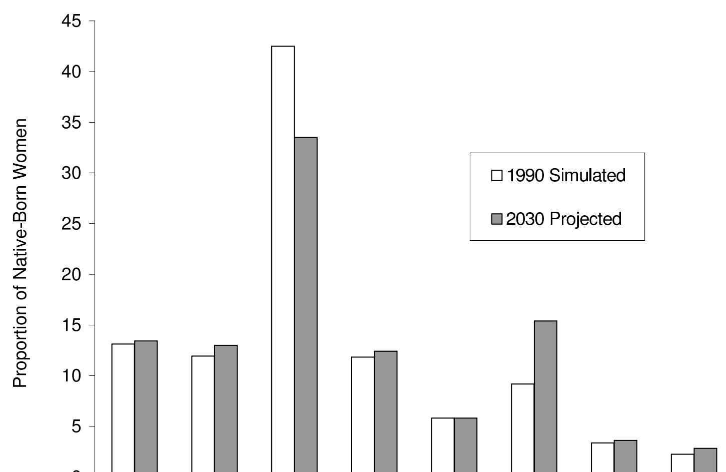
While the stability in the other household types seems to indicate that population momentum will not have much effect on these household types, in the case of married couple households, the non-result is striking. Given population aging's century-long positive contribution to the proportion of people living in married couple households, we would expect that proportion to keep rising as the projected population is certainly older than that observed in 2000. The positive affect on married couple households from population aging, however, seems to be overwhelmed finally by the negative effect on these households from increasing divorce and later marriage.

Figure 6.4 shows the constant rate scenario for native-born women only. Here the projected distribution of women across household types for 2030 is compared to 1990, which contains the effect of the projected parity change discussed previously, as well as the



	Married Couple	Single Parent	Nuclear	Extend	Family/ Non-Family	Alone	Non-Relatives	Group Quarters
2000 Simulated	13.5	10.4	38.5	10.6	7.2	11.3	5.6	3.0
2030 Projected	13.3	10.2	33.6	10.8	6.9	15.7	6.1	3.3

Figure 6.3: Simulated Native-Born Household Distribution Holding Rates Constant, 2000 and 2030.



	Married Couple	Single Parent	Nuclear	Extend	Family/ Non-Family	Alone	Non-Relatives	Group Quarters
1990 Simulated	13.1	11.9	42.5	11.8	5.8	9.2	3.4	2.3
2030 Projected	13.4	13.0	33.5	12.4	5.8	15.4	3.6	2.8

Figure 6.4: Simulated Native-Born Women Household Distribution Holding Rates Constant, 2000 and 2030.

effect of the parity distribution's differences by age and marital status in 2030 compared to 1990. The same increase in living alone and decrease in living in a nuclear family household is observed here as in the native-born analysis shown in Figure 6.3, although the change is more acute because it is relative to 1990. The difference between the women-only projections versus the all native-born projections are seen in the proportions of single parent and extended families projected for 2030. Including parity information and restricting the results to women only finds about 3% more in single parent households and 2% more in extended family households. This is because many of the children born in the projection through 2030 are born to unmarried women. According to the 1990 household propensities unmarried women are more likely to live independently with their children in single parent family households, or to turn to kin for support through coresidence, creating an extended family household with themselves, their children, and another relative. Results in Chapter 4 suggested that by 1990, the other relative of the unmarried mother was most likely her parent or parents. Earlier in the century, the relatives were more likely to have been a sibling of the unmarried mother and possibly the sibling's family.

What do these projections mean? The constant rate scenario shows the effect of today's population structure on future household change. It can be thought of as a minimum amount of household change we can expect if nothing changes in the next 30 years but time. In other words, there is no mortality progress, no individual behavior changes – including demographic event behaviors and household formation behaviors and preferences – no changes at all over 30 years but the passage of time. The results indicate that, barring changes in vital rates or household propensities, movement away from nuclear family households and toward living alone will likely continue, while the trend toward increasing married couple families may be stopped by divorce and delay of marriage. Apart from particular household type changes, however, the projection also demonstrated that a surprising amount of change could occur during a 30 year period where nothing changed but time. This indicates the extent of household change "baked in" to a population because of its existing demographic composition.

6.4 Rates Following Trends Since 1980

6.4.1 Demographic Composition in Trend Scenario

Another demographic scenario is one in which demographic rates change from 2000 through 2030 along the same trend as was observed from 1980 to 1990. Specifically, new rate files for 2000-2009 are constructed by multiplying the rates for the 1990-1999 decade by a trend factor. The trend factor is the percentage change in all of the sub-group specific decadal average demographic rates from the 1980-1989 decade to the 1990-1999 decade. Recall that these rates are age-specific for mortality, age- and marital status-specific for fertility, age- and marital status-specific for marriage, and duration-specific for divorce. The rates so calculated for 2000-2009 are multiplied by the same change factor to generate rates for 2010-2019, and again to generate rates for 2020-2029. This extrapolates out the mortality trends observed since 1980 of overall lower death rates and of male death rates declining somewhat faster than female death rates, closing the female mortality advantage somewhat. The fertility trends are of decreasing fertility at the younger ages and increasing fertility in the older ages, and increasing fertility for the unmarried. Marriage rates decrease overall, especially at younger ages. Divorce rates decrease somewhat, carrying out the decrease in divorce rates observed between 1980 to the mid-1990s. As in the last projection scenario, immigration is held fixed at the level estimated for 2000, with the list of immigrants created for the baseline simulation in 2000 added to the projected population in 2010 and 2020. The same analyses are shown here as for the constant rates scenario: native-born for 2000 to 2030 by age, sex and marital status, and native-born women for 1990 to 2030 by age, marital and parity status.

The 2030 population characteristics under this extrapolation scenario are shown for the native-born population in Figure 6.5, compared to the baseline simulation characteristics for 2000. They reveal some startling results. The large baby boom in 2030 is the product of drawing out the trend for more extramarital childbearing at the same time as the trend for less marriage continues. The extramarital fertility is so high after 30 years because it was increasing a great deal between 1980 and 1999. This is probably not very realistic, but could possibly happen in a less exaggerated way in the future. We see that the trend simulation brings the sex ratio closer to 50/50 at all adult ages, as males catch up somewhat with females in their progress to lower mortality. The effect of this sex ratio change is seen in the marital status distributions by sex. Males become somewhat more likely to experience

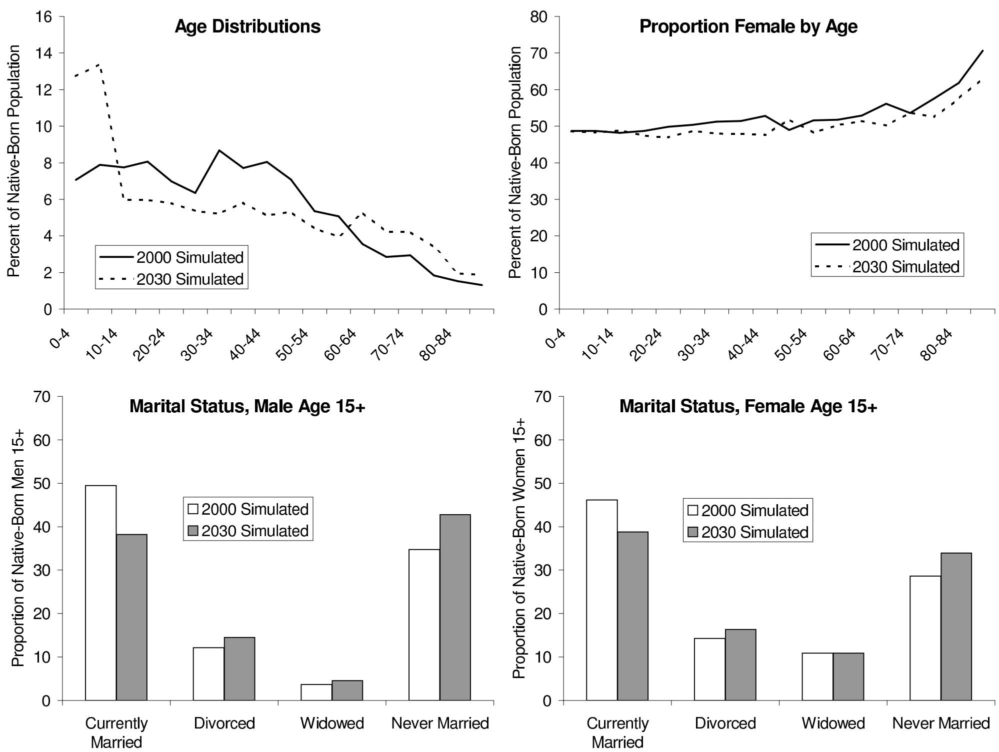


Figure 6.5: Simulated Native-Born Population Characteristics, Rates Follow 1980-1999 Trend, 2000 and 2030.

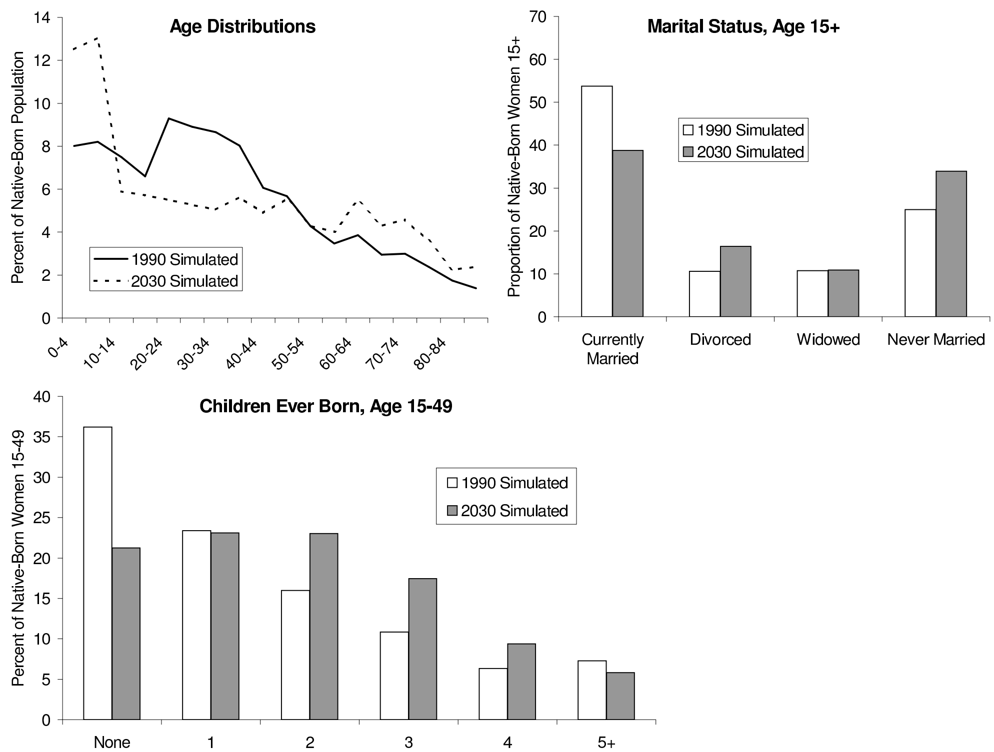


Figure 6.6: Simulated Native-Born Women Population Characteristics, Rates Follow 1980-1999 Trend, 1990 and 2030.

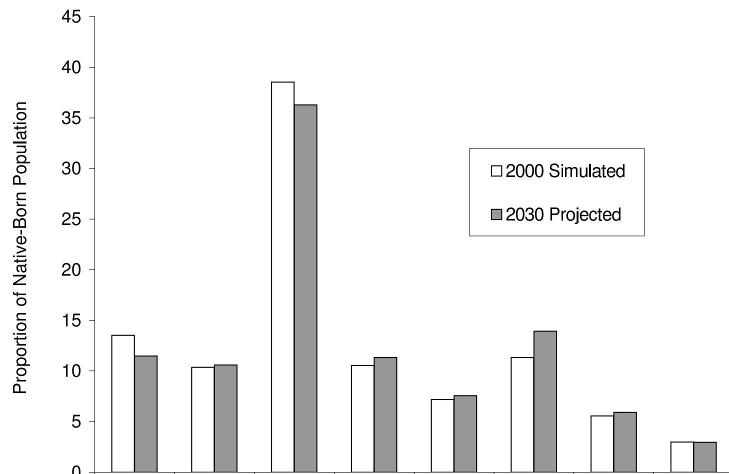
widowhood, while females stay at about the same level even though the adult population (setting aside the modern baby boom effects visible in the age structure) ages somewhat toward ages where women are more likely to be widowed. Proportions currently married decline due to delay of first marriage, but also because of the continuing metabolism of divorce rates. The projection here shows how the prevalence of divorce can rise over time, even while divorce rates themselves decline if remarriage is not very high.

Figure 6.6 shows the effect of extrapolating rate trends on the demographic characteristics of native-born women projected to 2030, compared to their baseline simulation characteristics in 1990. As in the constant rates scenario, the age and marital status changes from 1990 to 2030 are somewhat more drastic than those in the native-born population between 2000 and 2030. The addition of parity information for the women-only analysis does show the big baby boom caused by the extrapolation of the increasing trend in unmarried women's fertility from 1980 to 1999. While the simulated mothers of 2030 still do not have as many 5+ parity women in the 15-49 age group as their 1990 counterparts had, they have far fewer women with no children and far more at parities two, three and four. Many of these children are born to unmarried mothers, or to significantly older mothers, due to the extrapolation of the trends in extramarital births at younger ages and higher fertility at older ages. It is unlikely that either of these trends would occur to the extent imagined here, but the scenario is instructive for demonstrating an extreme case. We now move to the question of what such an extreme case of demographic compositional change would mean for household change.

6.4.2 Household Distributions in Trend Scenario

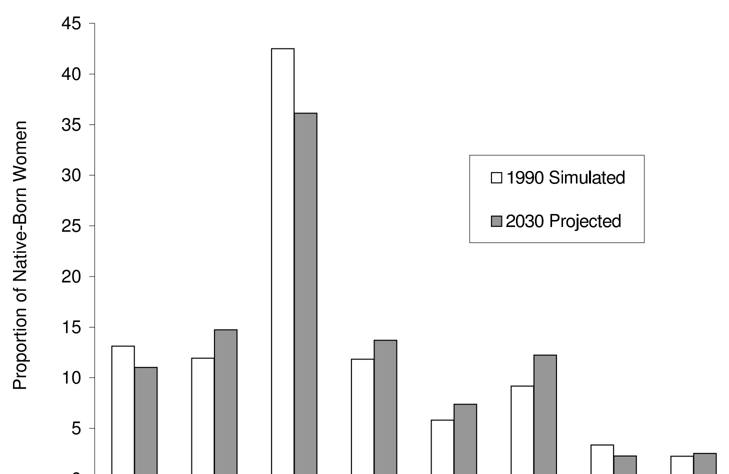
The trend scenario produces a very different baby boom from the one experienced in the United States after World War II. While the post-war baby boom featured early marriage and high fertility at all ages, this modern trend baby boom is largely outside of marriage at younger ages and for older women, married and unmarried. The post-World War II baby boom caused large increases in the proportion of persons living in nuclear families, but we should not necessarily expect that household outcome from this modern baby boom scenario. What does the modern day baby boom scenario mean for the distribution of people across household types, then?

We see in the results shown in Figures 6.7 and 6.8 that the share of persons in



	Married Couple	Single Parent	Nuclear	Extend	Family/ Non-Family	Alone	Non-Relatives	Group Quarters
2000 Simulated	13.5	10.4	38.5	10.6	7.2	11.3	5.6	3.0
2030 Projected	11.5	10.6	36.3	11.3	7.5	13.9	5.9	3.0

Figure 6.7: Simulated Native-Born Household Distribution, Rates Follow 1980-1999 Trend, 2000 and 2030.



	Married Couple	Single Parent	Nuclear	Extend	Family/ Non-Family	Alone	Non-Relatives	Group Quarters
1990 Simulated	13.1	11.9	42.5	11.8	5.8	9.2	3.4	2.3
2030 Projected	11.0	14.7	36.1	13.7	7.4	12.2	2.3	2.5

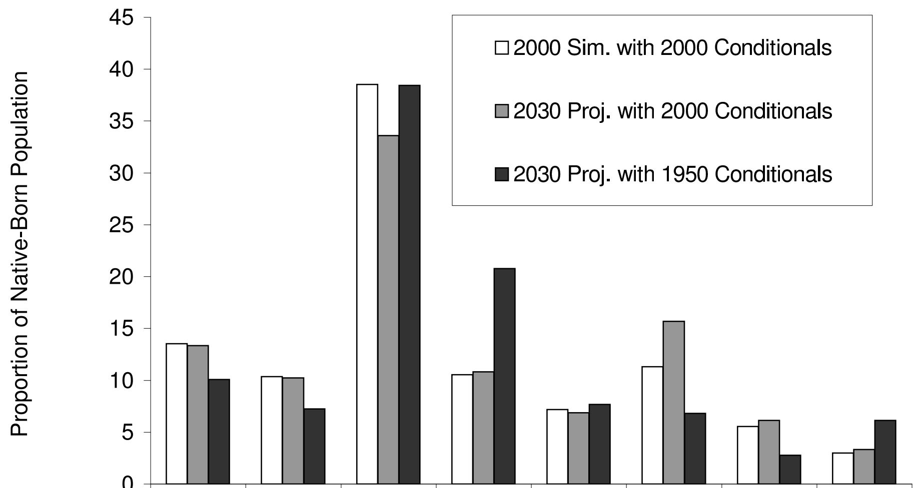
Figure 6.8: Simulated Native-Born Women Household Distribution, Rates Follow 1980-1999 Trend, 1990 and 2030.

nuclear family households continues the declining trend seen over the twentieth century, even as the population becomes much younger with the large youth cohorts. These young cohorts are being born to unmarried parents quite often, so they do not end up in nuclear family households. Instead, we see an increase in single parent family households, especially in the women-only analysis, where parity information is taken into account. The effect is also greater because the population is restricted to females who, as adults, are much more likely to be the heads of single parent families than men. We also see an increase in the more complex household types, such as extended family and family/non-family combination households, often favored by younger unmarried parents. The results are again more acute for women who will tend to be the ones moving with the children into a household with others. Recall, though, that this scenario assumes household propensities of unmarried parents will remain as they were at the end of the twentieth century.

The proportion living alone continues to increase in this new scenario, but this is more due to increasing numbers of unmarried younger people. The population aging effect of longer life spans, normally associated with an increase in living alone, is swamped somewhat by the baby boom's skew of the age distribution away from older ages. The levels of living alone projected in the trend scenario are thus not as high as those in the constant rates scenario. Also, while the constant rates projection scenario showed the proportion in married couple households to be flat from the beginning to the end of the projection, extrapolating the trends since 1980 produces a population in which the married couple proportions seem likely to decline. This is in part the effect of the extramarital baby boom tilting the age distribution to the pre-marriage ages, but is also the consequence of extrapolating out the trend to delay or forgo marriage.

6.5 Varying Household Propensities

Up to now, all of the scenarios have been shown holding household propensities – the representative of all non-demographic factors affecting households – at the level observed in 2000 for the native-born projections or 1990 for the native-born women projections. How might the distribution of people across household types change if the household propensities changed? This section takes the constant rate projections of demographic composition discussed earlier, but multiplies them by 1950 household propensities. This is certainly an extreme change, as 1950 household propensities strongly favored kin coresidence, as



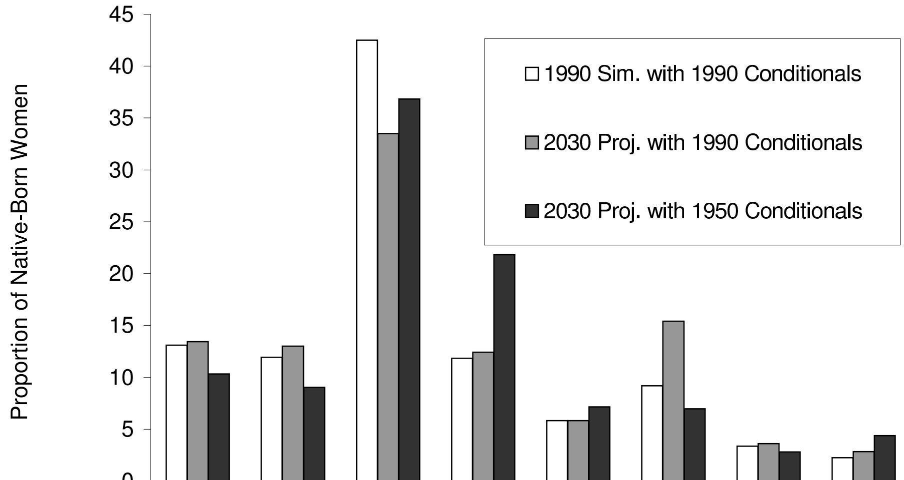
	Married Couple	Single Parent	Nuclear	Extend	Family/ Non-Family	Alone	Non-Relatives	Group Quarters
2000 Sim. with 2000 Conditionals	13.5	10.4	38.5	10.6	7.2	11.3	5.6	3.0
2030 Proj. with 2000 Conditionals	13.3	10.2	33.6	10.8	6.9	15.7	6.1	3.3
2030 Proj. with 1950 Conditionals	10.1	7.3	38.4	20.8	7.7	6.8	2.8	6.1

Figure 6.9: Simulated Native-Born Household Distribution, Constant Rates Simulation to 2030 with 2000 and 1950 Conditional Probabilities

opposed to cohabitation or independence, when compared with propensities at the end of the century. It is instructive, however, in imagining a ceiling of change that could be caused by a massive shift in processes of household formation and dissolution.

Figure 6.9 shows the native-born population's household distribution three ways. The white bars represent the baseline simulation in the year 2000. The gray bars show the same distribution as was generated in the constant rate scenario discussed previously. The black bars show the distribution of persons across household types if the constant rate scenario demographic composition is combined with the 1950 household propensities.

The biggest change that occurs when 1950 household propensities are added to the constant rates projected population is in the proportion living in extended family households. This occurs because 1950 household propensities were far less likely to find older people living alone, rather than with offspring. Single parent families were also less likely to live independently using 1950 household propensities. The group quarters proportion



	Married Couple	Single Parent	Nuclear	Extend	Family/ Non-Family	Alone	Non-Relatives	Group Quarters
1990 Sim. with 1990 Conditionals	13.1	11.9	42.5	11.8	5.8	9.2	3.4	2.3
2030 Proj. with 1990 Conditionals	13.4	13.0	33.5	12.4	5.8	15.4	3.6	2.8
2030 Proj. with 1950 Conditionals	10.3	9.0	36.8	21.8	7.2	7.0	2.8	4.4

Figure 6.10: Simulated Native-Born Women Household Distribution, Constant Rates Simulation to 2030 with 2000 and 1950 Conditional Probabilities.

increases as well when the change to 1950 household propensities occurs, mostly due to the relatively high proportions in the oldest old population, which were more likely to be in group quarters in 1950 than 2000. This is somewhat surprising given that there seemed to be so much more kin coresidence in 1950. The oldest-old, however, were relatively rare in 1950 compared to 2000, however, and the oldest-old of 1950 were probably more likely to be frail and sick, thus requiring institutional care.

The results for women, shown in Figure 6.10, reveal similar patterns as the whole native-born population analysis, when examining the effect of combining the population of 2030 with the residential propensities of 1950. Women seem to have been somewhat less likely then men to live in group quarters in 1950, as the women-only group quarters share does not rise as much when moving from the gray to the black bar.

6.6 Other Household Projections Based on Demographic Composition

While these scenarios are interesting to examine and instructive in giving us ways to imagine future change, they are not particularly realistic. The purpose of these projections was not to pinpoint a best guess projection, however. Rather, they have served to demonstrate how the method – projection of demographic change using microsimulation, combined with observed household propensities – can be used to generate illustrative results.

This method could be combined with official projections of future population change, generated for the United States by the Census Bureau or the Social Security Administration, and generated for other countries by the United Nations. In this implementation of the method, the demographic profile can contain as many or as few characteristics as the official rate projections allow. For example, if official projections do not go further than fertility and mortality rates by age, then only age and parity can be included in the demographic composition. Other characteristics could be included and “held constant” but then the projections would not include the effects of changes in those characteristics on the projected distribution of persons across household types.

Anther demographic scenario of interest could be the Northern European marriage and childbearing pattern of low fertility, delayed marriage and frequent extra- or pre-marital childbearing (van de Kaa 2001). Another could be the emerging United States pattern of sequential or serial family building where remarriage after a divorce is frequently followed by the birth of a child (Lillard and Waite 1994). The methods demonstrated here could be used to predict what the future household effects of these changing family patterns might be.

6.7 Conclusions

These scenario-based projections have given several indications of where household change in the future may come from and which trends observed over the twentieth century in United States households are likely to continue and which seem to have reached their end.

The simulations indicate that the decrease in the proportion living in nuclear family households seems bound to continue, due to continued population aging, decreases in marriage, and high levels of divorce. Although not as consistently predicted, another trend that the projections suggest will continue into the future is the increase in persons living alone. This is also largely due to the delay in marriage, but also to population aging. A change in household propensities, however, could reverse this trend. A similar situation exists for non-relative households. As many of these households are unmarried cohabiting young people, continued low marriage rates in the future will continue to contribute positively to the proportion of the population in such living arrangements. If birth rates change such that more of those unmarried persons are having children, extended families could increase again as unmarried parents are more likely to live with kin in extended households than the unmarried childless or the married childless.

On the other hand, the projection scenarios seem to indicate that the consistent trend toward more married couple families is unlikely to continue unless divorce decreases or marriage increases. Even with population aging and the concentration of women at low parity, the projection scenarios do not foresee an increase in married couple families.

Beyond household trends, the extrapolation projection scenario revealed that the trend toward increasing extramarital childbearing has little room to continue. Trends in extramarital childbearing extrapolated into the future lead to a baby boom that is very unlikely. The extrapolation of rates was done in a crude manner, of course, as change on a percentage basis can be very high when starting at fairly small numbers, as is the case with extramarital childbearing. However, even this gross exaggeration of what will probably happen in the future is indicative of the direction the population is heading, based on the last twenty years' experience.

Chapter 7

Conclusions

7.1 Review of Results

The descriptive results painted a clear picture of a process of household atomization over the twentieth century whereby the prevalence of large complex households decreased and smaller households consisting of fewer types of kin ties or even no other persons at all came to predominate. Specifically, the proportion of people living in households made up of extended kin declined. Population proportions also declined in households made up of family groups plus unrelated persons. These unrelated persons may have worked for the family, or they were borders and lodgers who paid the family, in effect, to become extended family members. At the same time, living alone or with just a spouse or nuclear family increased. The pattern, however, was not monotonic over the century and the most recent decades have seen the increasing prevalence of more complex household types probably based on cohabitation.

While much of the atomization process was attributed to changes in the propensity to live in one type of household or another, demographic factors such as population aging, caused by declining mortality and fertility, interacted with changes in household propensities to increase the proportions of persons living in married couple (no children) households and living alone. Changes in marriage, namely less marriage, later marriage, and more divorce, were also largely responsible for the increases in household complexity in the final decades, from cohabitation-based living arrangements.

Finally, projections of future change were suggestive of which of the twentieth century trends were likely to continue in the twenty-first century and which of the trends would probably not continue unless demographic rates changed from their recent paths. Namely, the increase in married couple households will probably not continue unless marriage rates return to their early levels and divorce declines. Alternately, remarriage rates would have to rise to continue the trend of increasing population in married couple households. This seems to be the case even combined with the increasing population aging expected in future decades which would favor married couple households. On the other hand, living alone is very likely to continue its increase and living in a nuclear family household is likely to continue its decrease, due both to population aging and less marriage. Finally, the projections suggested that the rise of extramarital fertility and decrease in marriage could lead to a new era of increasing household complexity if the traditional nuclear family is no longer the major locus of childbearing and childrearing.

7.2 What Do We Know Now That We Did Not Know Before?

Much research has gone into the question of whether or not changes in the prevalence of extended family households was fueled by demographic change or not. While most of that research focused on the situation of preindustrial populations, the results here for the twentieth century United States context suggest that the decrease in extended family households in the United States over the twentieth century was not due to any particular demographic constraint imposed by the lack of particular types of kin or by compositional changes in the population. The same can be said for the decrease in households that combined family and non-family members. The decline of these types of households seems to have been due to a constellation of socioeconomic and normative changes that were not connected to vital rates of population structures.

Arguing for the importance of demographic change in determining the nature of households, though, is the fact that the process of household atomization increases the likelihood that future household change will be demographically-driven. This is because the smaller households of today are more closely associated with certain points in the life cycle and family cycle, and so are more subject to changes in age distribution and other types of population change in the determination of their prevalence in the overall household distribution. This is important in that it makes large fluctuations in future household distributions more likely, but also makes household change in the future more amenable to projection based on demographic projections.

Although it was not one of the main objectives of the research, another issue that is more clear now than before is the extent of microsimulation's ability to reproduce the facts of an observed population, given the vital rates that produced the observed population. The simulation of the native-born U.S. population, compared with the native-born population observed in census samples showed high degrees of agreement. Age structures were reproduced accurately, as were cross-sectional parity distributions. Marital status was somewhat more problematic, but that is most likely due to the poor quality of available data on marriage and divorce rates rather than an issue with the implementation of marriage in the microsimulation. Given that the SOCSIM program used in the microsimulation is a closed simulation program in which marriage partners must be found within the existing population, as opposed to an open simulation in which marriage partners are generated when necessary, the extent of accuracy in marital status distributions is encouraging. These encouraging results invite further validation of the simulation of the twentieth century United States population. The more external validation of the simulation's ability to recreate reality along observed dimensions, the more confidence we can have in examining the simulated population for information that is not available anywhere else, such as the availability of close and extended kin.

7.3 Future Research Directions

Chapter 6 discussed ways in which the research could be used in different projections of future household change, but there are many ways in which the historical research could be broadened as well.

One obvious way is to include more characteristics in the demographic composition. Race or ethnicity could be included, as could immigrant status. These extensions would pose theoretical challenges, namely a rethinking of the theoretical and analytical implications of separating the demographic composition component from the household propensity component. More practically, it poses data challenges as well, as including race or ethnicity depends upon the availability of the necessary demographic rates by age and marital status for each racial or ethnic group of interest. Such rates at the national level are only available for recent periods if at all. An alternative to using published rates would be to calculate rates using a nationally representative longitudinal survey, if the survey was large enough to allow accurate rate estimation. Again, that would probably only be possible for recent periods. Thus, any inclusion of race, ethnicity or immigration in the analysis would probably require sacrificing the broad historical sweep of the work to gain purchase on the effects of race, ethnicity and nativity on household change.

Another set of information that could be added to the demographic composition relates to the kin network. While the analysis mentioned many times that in this context extended kin were not crucial for household formation, close kin are important. Addressing the particular issue of coresidence of elderly parents with adult children, modern survey data could be used to include parental and kin characteristics in the demographic composition vector. For example, we would include not just the changing distribution of women by age and parity, but also by whether their children were married or not, or had children of their own. We would not need to use different demographic rates for such an analysis, but survey data would be necessary to calculate the household propensities by the additional categories. This would again require sacrificing historical sweep, but could reveal a great deal of cross-sectional variation, with a different implementation of the decomposition.

Finally, the whole methodology could be moved to other national contexts where living arrangements and population structures are undergoing broad historical change.

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Appendix A

Sources and Calculation of Vital Rates for Microsimulation

A.1 Mortality

Construction of Rate Files for Simulation. Mortality rate files used in the simulation for each decade are for each sex by single years of age and are computed as the average of single year ${}_1q_x$ values from the beginning to the end of the decade. (${}_1q_x$ is the probability of dying in the year for those age x to $x+1$.) The rate file for the 1920s, for example, is computed using the probability of death for each year from 1920 to 1929. As probabilities by single years of age and sex only are used, no interaction between mortality and marital status or parity is considered in the analysis.

Data Sources. The probabilities of death from 1900 to 1958 are computed using period life tables constructed by the Office of the Actuary of the Social Security Administration (SSA), made available by the Berkeley Mortality Database, or BMD (Wilmoth 2003). The life tables were constructed for each sex by single years of age and time by the SSA. Probabilities of death from 1958 on are also derived from period life tables by sex for single years of age and time, from the Human Mortality Database, or HMD (Wilmoth and Shkolnikov 2003). These probabilities are calculated using vital event and exposure data made available by the National Center for Health Statistics.

Sources of Mortality Data Shown in Figures. The mortality rates for five years of age by one year of time used in Figure 5.5 are from the BMD for 1900 to 1958, computed by the Berkeley Mortality Database based on the SSA life tables. The same rates for 1959 on are computed by the HMD. Similarly, the life expectancy series shown in Figure 5.3 is from the original SSA estimates available from the BMD for 1900-1958, and calculated by the HMD for 1959-1999.

A.2 Fertility

Construction of Rate Files for Simulation. Age-specific fertility rate files for each decade are for varying age groups of women aged 10 to 49. Most of the age groupings are five years, although from 1970 on the rates have the 15-19 year age group broken down into 15-17 and 18-19. The rate files are computed as the average of the single year rates, as described for the mortality rates above. The construction of fertility rate sets is somewhat more complex than that for mortality due to the need to have rates specific to marital status. Such data are available for 1940-1999, for unmarried and for married women, and for those decades the rate files are constructed as the average of each of the decade's single year published rates.

Prior to 1940, the simplifying assumption is made that no extramarital births occurred. This makes it possible to estimate age-specific fertility rates for married women based on the published rates for all women because the numerator of the all-women birth rate for a particular age group is assumed to refer to babies born to married women of that age group only. The all-women rate can then be inflated to reflect the rate applying to married women only by dividing through by the proportion of women in the age group who are married. This proportion is estimated for census years using the IPUMS data for that census year, and intercensal years are estimated using linear interpolation between the available IPUMS points.

Finally, the all-women fertility rates broken down into age groups are only available back to 1918. For each year from 1900 to 1917, the birth rate for all women age 15-44 combined is available. Age-specific rates for married women are estimated from this all-women all-age rate as follows. The age pattern of fertility by five-year age groups for ages 15-44 for the years 1900 to 1917 is assumed to be the same as that calculated by averaging the age pattern of fertility observed in the published rates for 1918, 1919 and 1920. Using this age pattern and the age distribution of women calculated by linear interpolation from the IPUMS age distributions for 1900, 1910 and 1920, the all-women all-age rate is broken down into age-specific all-women rates. Then the age-specific married women rates are calculated from the age-specific all-women rates and estimated age-specific percent married as described above for the years 1918 to 1940.

Data Sources. Starting from the most recent data, fertility rates specific to five-year age groups for women aged 10 to 49 years are available for all women and married versus unmarried women for each year from 1940 to 1999. Rates for the 1990's have been revised since their publication in the National Center for Health Statistics' annual Vital Statistics of the United States and those revised rates are used here (Hamilton, Sutton, and Ventura 2003, Tables 7 and 8). Rates for 1960-1980 are as published in the annual Vital Statistics publication for 1999 (National Center for Health Statistics 2001, Tables 1-18 and 1-19), and rates for 1940-1959 are from a National Center for Health Statistics special study (Grove and Hetzel 1968, Tables 14 and 15). Prior to 1940, only the age-specific rates for all women are available from 1918 to 1939 (Linder and Grove 1947, Table 46). Data used here are for each calendar year from 1918 to 1939. Prior to 1918, the fertility rate for women age 15-44 combined is used (U. S. Bureau of the Census 1961, Table B 5-10).

Sources of Fertility Data Shown in Figures. The total fertility rates shown in Figures 5.3 and 5.5 are computed from all-women age-specific rates described above for 1918-2000. The TFR's shown before 1918 in Figure 5.3 are researcher estimates based on census data (Haines 1989).

A.3 Marriage and Divorce

Construction of Rate Files for Simulation. The marriage rate files used in the simulation are computed as the average of the year's rates in the relevant decade where those rates were available. They are age- and sex-specific and specific to three marital statuses: never married, widowed and divorced. The age groups vary a great deal over time and by marital status. For never married persons, the sex-specific age groupings were generally five-year age groups from age 15 to 44, followed by wider age groups until the 65+

group. Only those age groupings available for the entire decade were used to compute the decade average. For widows, the groups for most decades were 15-44, 45-64 and 65+. Age group specificity for divorced persons was somewhere in between that for never married and widowed. This detailed data was available for 1950 and for single years from 1960 to 1990. From these data, marriage rate files were constructed for the decades 1960-1969, 1970-1979, and 1980-1989 as the average of ten years of age-, sex-, and marital status-specific rates. The file for 1950-1959 is the average of the rates for 1950 and 1960. The file for 1990-1999 is constructed by extrapolating the linear trend in the 1980-1990 rates to 1995. For decades prior to 1950, marriage rates used were estimated by Kenneth Wachter for U.S. whites and adjusted for differing age pattern on an ad hoc basis to increase agreement between observed and simulated marital distributions.

Although there is some age- or duration-specific divorce rate information available for some recent years, the only consistent series for the century was the overall divorce rate for married women age 15+, available for 1900, 1910, and each year from 1920 to 1996. The simulation assumes no divorce, however, prior to 1940 because the available data is based on a marriage registration area of only a few states. The divorce rate is calculated as the average of the ten years of overall divorce rates for the decades from 1940-1949 through 1980-1989. The rates for 1990-1999 are the average of rates from 1990 to 1996. As the simulation uses duration-specific divorce rates, the calculated decade's rates apply to marriages of one to 30 years, thus assuming no divorce before the first or after the thirtieth year of marriage. The same set of rates were used to apply to both sexes.

Gathering accurate marriage and divorce rates for the century posed the biggest data challenge in implementing the simulation and the available rates pose many difficulties when applying them to the simulations – the representativeness of the rates for the whole nation in the early years of the century is questionable, age groups for marriage rates are often very wide at older ages and for certain marital statuses, and divorce rates were not available by duration. For these reasons, marriage and divorce rates were adjusted slightly on an ad hoc basis to increase agreement between observed and simulated proportions in various marital statuses by age and sex.

Data Sources. Marriage rate data by age, sex, and previous marital status described above are available for 1950 from a Vital Statistics special report (Grove and Hetzel 1968, Table 4). For 1960-1988 the source is annual Vital Statistics System publications

(National Center for Health Statistics 1996 and prior years). (The relevant tables for each yearly publication are as follows: 1960 Table 1-O, 1963 Table 1-6, 1964 to 1988 Table 1-7.) Data for 1989 and 1990 are from a Monthly Vital Statistics report (Clarke 1995, Table 6). Divorce rate data, specifically divorces per 1,000 married women age 15+, from 1940-1984 are from one Vital Statistics of the United States annual publication (National Center for Health Statistics 1996, Table 2-1). Rates from 1985 to 1996 were reported in the Statistical Abstract of the United States (U. S. Bureau of the Census 2001, Table No. 117).

Sources of Marriage and Divorce Data Shown in Figures. The overall marriage rates (marriages per 1,000 unmarried women age 15+) shown in Figures 5.3 and 5.5 are from various sources. From 1991 to 1996, they were reported in the Statistical Abstract of the United States (2001, Table No. 117). Prior to that, the marriage rates for 1940-1990 come from a Monthly Vital Statistics report (Clarke 1995, Table 1). Prior to 1940, the marriage rates are from a special report of the National Vital Statistics System (Plateris 1973, Tables 3 and 4). All divorce rates shown in figures are from the same sources used to make the rate files, described above.

A.4 Computation of Monthly Event Probabilities from Annual Rates

The computations described above give average rates (or probabilities in the case of mortality) for the decade on an annual basis while the simulation requires monthly event probabilities. The final step in preparing the rate files, then is to convert the annual figure into a monthly probability. Equating an annual rate with a probability, the conversion to a monthly probability is as follows:

$$\text{Monthly Probability} = 1 - (1 - \text{Annual Rate/Probability})^{\frac{1}{12}}$$

Appendix B

Decomposition Results

The following tables provide the numerical results of the decomposition analyses that are presented graphically in Figures 5.11 through 5.15. The tables of the demographic composition versus household propensities decomposition show the total proportion in each household type in the first line for each household type. The lines following show the change from the decade listed in the previous column to the decade listed for that column, for the total change for that household type and then for demographic compositional component and household propensity component. The final column sums up change for the whole time period. Recall that for the native-born population the analysis covers the entire century from 1900 to 2000. For the native-born women-only analysis, the time period covered is 1900 to 1990.

For the tables showing the sub-division of the demographic composition component into its vital rates components, each column represents change over the time period listed in the column heading. The components for momentum, fertility, mortality and nuptiality add to the number listed as the demographic composition component in that analysis' demographic composition versus household propensity decomposition table.

Table B.1: Demographic Composition versus Household Propensities, All Native-Born

		1900	1940	1960	1980	2000	1900-2000
Married Couple							
Proportion		4.24	9.53	12.32	16.12	16.76	
Change	Total		5.30	2.79	3.80	0.64	12.52
	Demog. Comp.		1.99	1.37	1.52	-0.77	4.11
	HH Propensity		3.31	1.42	2.27	1.41	8.41
Single Parent							
Proportion		5.95	5.70	5.07	8.35	9.34	
Change	Total		-0.25	-0.63	3.28	1.00	3.40
	Demog. Comp.		-0.24	-0.91	0.59	0.72	0.15
	HH Propensity		0.00	0.28	2.69	0.28	3.25
Nuclear							
Proportion		49.57	49.25	57.37	49.03	39.11	
Change	Total		-0.32	8.12	-8.35	-9.91	-10.46
	Demog. Comp.		-3.50	1.15	-6.25	-3.08	-11.69
	HH Propensity		3.18	6.98	-2.10	-6.83	1.22
Extended							
Proportion		17.70	19.95	14.96	10.02	10.43	
Change	Total		2.26	-4.99	-4.94	0.40	-7.27
	Demog. Comp.		0.56	-0.06	0.36	-0.06	0.80
	HH Propensity		1.70	-4.94	-5.30	0.46	-8.07
Family/Non-Family							
Proportion		17.38	9.78	2.97	3.18	6.63	
Change	Total		-7.61	-6.81	0.21	3.46	-10.75
	Demog. Comp.		0.38	-0.35	0.29	0.19	0.51
	HH Propensity		-7.99	-6.46	-0.08	3.27	-11.26
Alone							
Proportion		0.93	1.88	3.62	7.91	10.04	
Change	Total		0.96	1.73	4.30	2.13	9.12
	Demog. Comp.		0.44	-0.14	1.64	2.29	4.24
	HH Propensity		0.52	1.87	2.65	-0.16	4.88
Non-Relatives							
Proportion		0.75	0.99	1.01	2.78	4.59	
Change	Total		0.24	0.02	1.77	1.81	3.83
	Demog. Comp.		0.16	-0.28	0.85	0.65	1.38
	HH Propensity		0.08	0.30	0.92	1.16	2.45
Group Quarters							
Proportion		3.48	2.91	2.68	2.62	3.10	
Change	Total		-0.57	-0.23	-0.06	0.48	-0.38
	Demog. Comp.		0.22	-0.78	1.00	0.06	0.50
	HH Propensity		-0.79	0.55	-1.06	0.41	-0.88

Table B.2: Decomposition of Demographic Compositional Component, All Native-Born

	1900-1940	1940-1960	1960-1980	1980-2000	1900-2000
Married Couple					
Momentum	0.73	2.01	0.91	0.75	4.40
Fertility	1.41	-1.57	1.44	-0.49	0.78
Mortality	0.11	0.44	0.43	0.52	1.51
Nuptiality	-0.27	0.50	-1.26	-1.55	-2.58
Single Parent					
Momentum	0.16	0.32	0.04	-0.37	0.14
Fertility	0.25	-0.11	-0.14	0.14	0.15
Mortality	-0.27	-0.35	-0.11	-0.20	-0.93
Nuptiality	-0.39	-0.78	0.80	1.16	0.79
Nuclear					
Momentum	-1.58	-4.46	-1.09	1.03	-6.11
Fertility	-3.88	2.99	-2.41	0.97	-2.33
Mortality	0.65	0.40	-0.27	-0.13	0.65
Nuptiality	1.31	2.22	-2.48	-4.95	-3.90
Extended					
Momentum	0.33	0.63	0.10	-0.33	0.73
Fertility	0.47	-0.26	-0.01	0.16	0.36
Mortality	-0.10	-0.06	-0.01	-0.06	-0.23
Nuptiality	-0.14	-0.37	0.28	0.16	-0.06
Family/Non-Family					
Momentum	0.30	0.25	0.05	-0.36	0.24
Fertility	0.60	-0.20	0.00	0.08	0.48
Mortality	-0.12	-0.10	-0.02	-0.05	-0.29
Nuptiality	-0.41	-0.31	0.27	0.53	0.08
Alone					
Momentum	0.25	1.08	-0.43	0.06	0.96
Fertility	0.43	-0.50	0.65	-0.52	0.06
Mortality	-0.12	-0.21	-0.03	-0.07	-0.44
Nuptiality	-0.12	-0.51	1.45	2.83	3.65
Non-Relatives					
Momentum	0.11	0.20	0.13	-0.63	-0.19
Fertility	0.21	-0.15	0.20	-0.26	0.00
Mortality	-0.06	-0.06	-0.02	-0.06	-0.19
Nuptiality	-0.11	-0.27	0.54	1.60	1.76
Group Quarters					
Momentum	0.21	0.02	0.27	-0.14	0.37
Fertility	0.43	-0.20	0.27	-0.07	0.43
Mortality	-0.09	-0.07	0.03	0.05	-0.07
Nuptiality	-0.33	-0.54	0.42	0.22	-0.23

Table B.3: Demographic Composition versus Household Propensities, Native-Born Women

		1900	1940	1960	1980	1990	1900-1990
Married Couple							
Proportion		4.35	9.65	12.23	15.69	15.97	
Change	Total		5.30	2.58	3.46	0.28	11.61
	Demog. Comp.		4.02	-0.54	1.78	-0.15	5.11
	HH Propensity		1.28	3.12	1.68	0.42	6.50
Single Parent							
Proportion		6.57	6.23	6.01	9.97	10.66	
Change	Total		-0.35	-0.22	3.96	0.69	4.08
	Demog. Comp.		-0.32	-0.82	1.50	0.74	1.11
	HH Propensity		-0.03	0.60	2.46	-0.05	2.98
Nuclear							
Proportion		49.26	47.93	55.41	46.24	40.57	
Change	Total		-1.33	7.48	-9.17	-5.67	-8.69
	Demog. Comp.		-6.92	2.56	-8.10	-2.64	-15.10
	HH Propensity		5.59	4.92	-1.06	-3.03	6.41
Extended							
Proportion		18.67	20.83	15.94	10.79	10.84	
Change	Total		2.15	-4.89	-5.14	0.05	-7.83
	Demog. Comp.		0.83	-0.23	-0.31	-0.03	0.26
	HH Propensity		1.33	-4.66	-4.84	0.08	-8.09
Family/Non-Family							
Proportion		17.21	9.63	2.92	3.13	5.14	
Change	Total		-7.58	-6.71	0.21	2.01	-12.07
	Demog. Comp.		1.10	-0.35	0.26	0.10	1.11
	HH Propensity		-8.68	-6.36	-0.05	1.91	-13.18
Alone							
Proportion		0.72	2.07	4.51	9.36	10.99	
Change	Total		1.35	2.43	4.86	1.63	10.27
	Demog. Comp.		0.60	0.14	2.88	1.57	5.19
	HH Propensity		0.75	2.30	1.97	0.06	5.07
Non-Relatives							
Proportion		0.61	1.12	1.09	2.52	3.40	
Change	Total		0.51	-0.03	1.42	0.88	2.79
	Demog. Comp.		0.26	-0.25	1.46	0.31	1.79
	HH Propensity		0.24	0.22	-0.04	0.57	0.99
Group Quarters							
Proportion		2.59	2.54	1.89	2.30	2.43	
Change	Total		-0.05	-0.65	0.41	0.13	-0.16
	Demog. Comp.		0.43	-0.51	0.52	0.09	0.53
	HH Propensity		-0.48	-0.14	-0.11	0.05	-0.68

Table B.4: Decomposition of Demographic Composition Component, Native-Born Women

	1900-1940	1940-1960	1960-1980	1980-1990	1900-1990
Married Couple					
Momentum	1.41	2.56	-0.98	1.24	4.23
Fertility	3.33	-3.54	3.29	-0.92	2.17
Mortality	0.22	0.24	0.18	-0.19	0.45
Nuptiality	-0.94	0.20	-0.71	-0.28	-1.74
Single Parent					
Momentum	-0.04	0.36	0.63	-0.22	0.72
Fertility	0.37	-0.16	-0.09	0.14	0.26
Mortality	-0.15	-0.39	-0.16	-0.28	-0.98
Nuptiality	-0.50	-0.62	1.12	1.10	1.10
Nuclear					
Momentum	-5.01	-4.73	-2.10	-1.07	-12.91
Fertility	-3.85	4.68	-2.96	-0.17	-2.30
Mortality	0.25	0.23	-0.49	0.05	0.03
Nuptiality	1.70	2.38	-2.55	-1.45	0.08
Extended					
Momentum	-0.57	0.78	-1.01	-0.53	-1.33
Fertility	1.44	-0.66	0.18	0.07	1.03
Mortality	0.03	-0.02	-0.06	-0.12	-0.17
Nuptiality	-0.07	-0.34	0.58	0.55	0.72
Family/Non-Family					
Momentum	0.01	0.41	0.05	-0.27	0.20
Fertility	1.45	-0.43	0.00	0.07	1.09
Mortality	0.09	-0.08	-0.02	-0.02	-0.03
Nuptiality	-0.45	-0.25	0.24	0.33	-0.14
Alone					
Momentum	0.30	1.40	1.16	1.26	4.12
Fertility	0.38	-0.74	0.74	-0.39	-0.01
Mortality	-0.02	-0.05	-0.02	-0.56	-0.64
Nuptiality	-0.06	-0.47	1.00	1.25	1.72
Non-Relatives					
Momentum	0.11	0.31	0.93	-0.16	1.19
Fertility	0.23	-0.24	0.18	-0.18	-0.02
Mortality	-0.01	-0.03	0.00	0.00	-0.04
Nuptiality	-0.07	-0.29	0.36	0.66	0.66
Group Quarters					
Momentum	0.11	0.22	-0.11	-0.12	0.11
Fertility	0.45	-0.27	0.20	-0.07	0.31
Mortality	0.02	-0.01	0.08	0.04	0.14
Nuptiality	-0.16	-0.45	0.35	0.23	-0.03