Understanding the Future of Californians' Fertility: The Role of Immigrants

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2002

PUBLIC POLICY INSTITUTE OF CALIFORNIA

Library of Congress Cataloging-in-Publication Data
Hill, Laura E., 1970–
Understanding the future of Californians' fertility : the role of immigrants / Laura E. Hill, Hans P. Johnson.
p. cm.
Includes bibliographical references.
ISBN 1-58213-042-6
1. Fertility, Human—California. 2. Immigrants—California
I. Johnson, Hans P. II. Title.

HB935.C2 H545 2002
304.6'32'0994—dc21 2002024823

Foreword

Population projections are always a complicated business, but in California they virtually qualify as an extreme sport. The state's migration patterns (both domestic and international), its unique racial and ethnic mix, and its fluctuating birth rates have been known to defy even the leading demographers. In 1967, for example, Berkeley professor Andre Rogers published a report for the state Office of Planning called *Projected Population Growth in California Regions: 1960–1980.* In 1995, Professor Rogers revisited his work to see how well he had done. Not well, he concluded. He had estimated that the state's population would grow to 28 million by 1980, whereas it actually grew to only 23.7 million—an error of some 17 percent. An erroneous fertility assumption led to 33 percent of the total error, and a faulty estimate of domestic migration contributed another 40 percent. Inaccurate mortality and immigration estimates accounted for the rest of the discrepancy.

Reviewing his predictions, Rogers concluded that

> population projections carried out just before the occurrence of major changes in demographic regimes become apparent are notoriously inaccurate. Consequently, demographers rarely look back to examine what went wrong with their forecasts. It's too depressing. Nonetheless, it is important to do so and, in the process, to learn just what went wrong.

One can only hope that other demographers will follow Rogers's lead, if only because policy planning for a state of California's size and complexity requires the most accurate population projections possible.

In this report, Laura Hill and Hans Johnson analyze the single population variable—fertility—that accounted for one-third of Professor Rogers's error. Not surprisingly, they find that personal characteristics (such as educational attainment, marital status, and income) have direct effects on birth rates. The more surprising finding is that another variable—immigrant generation—had no independent effect on fertility once those personal characteristics were controlled for. Compared to their first-generation relatives, second- and third-generation Californians do have lower birth rates, but the declines are the result of changing educational levels, income, and other personal characteristics.

This finding does not mean, however, that immigrant generation cannot be used to *predict* changes in fertility. In fact, the authors conclude that this factor is a very useful proxy for changes in personal characteristics that decrease fertility. In short, the predictive value of this variable may allow demographers to forecast population growth more accurately—even though it does not affect fertility rates directly.

While recognizing the complexity and sophistication of the state government's forecasting models, the authors suggest that considering immigrant generation is worthwhile. If the descendants of immigrants have lower fertility rates than their precursors, current population projections may be too high. As the authors point out, even modest downward changes in fertility rates could decrease the projected population of children under age 10 by 600,000 over the next decade. This sort of adjustment could have very important consequences for state planning in key policy areas, beginning—but by no means ending—with the well-being and education of California's children.

There is much to be learned from Professor Rogers's overestimation of the state's population growth before 1980. Hill and Johnson have looked at one component of California's future growth and concluded that fertility rates will probably continue to fall for some key groups. Given that natural increase—the excess of births over deaths—rather than immigration is likely to account for most of California's population growth for the foreseeable future, a review of the state's growth estimates could help us balance the supply of public services with the demand for them.

David W. Lyon
President and CEO
Public Policy Institute of California

Summary

Current population projections indicate that California could add more than 10 million new residents over the next 20 years. The sheer size of this increase will affect almost all state services and functions, including welfare, education, and transportation. Large increases in the state's population will also have important implications for the protection and allocation of natural resources and the location and nature of the state's economic development.

In the past, immigration and domestic migration have fueled California's tremendous population growth. During the 1990s, however, natural increase—the excess of births over deaths—became the major source of the state's population growth. Of course, many of these births would not have occurred were it not for domestic migration and especially immigration. By the mid-1990s, almost half the births in California were to foreign-born women. Natural increase is expected to be the most important source of population growth in California for the foreseeable future.

Because natural increase is driving California's population growth, which in turn affects state planning at the most basic level, accurate assessments of the state's fertility rates are an important aspect of policy planning. This study seeks to refine our understanding of those fertility rates, especially as they differ by immigrant generation and ethnicity. Although the analysis considers the fertility rates of the state's four major racial and ethnic groups, it focuses on women of Mexican and Central American descent, who constitute an increasing percentage of the childbearing population in California.

Understanding the relationship between immigrant generation and fertility is important for at least two reasons. First, if fertility rates of immigrants differ from those of their descendants, this difference will affect population growth—and, in short order, the demand for schooling, water, infrastructure, and other public services. Current

population projections do not distinguish between immigrants and their descendants when calculating fertility rates for each racial and ethnic group. If fertility rates decline among second and subsequent generations of immigrant families, current population projections may overestimate future population growth. Second, fertility estimates by generation provide important clues about the assimilation or adaptation process among immigrants and their descendants.

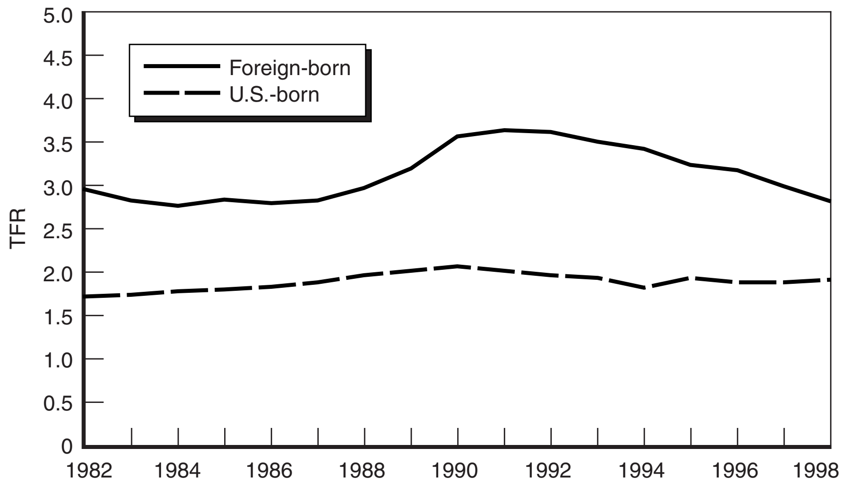
The report is also interested in the way immigrant generation compares to—and interacts with—personal characteristics that are known to affect fertility rates. These characteristics include educational attainment, income levels, and marital status. Finally, the study investigates the ways in which neighborhood characteristics—such as average income levels and racial and ethnic composition—affect fertility rates.

We use several data sources, methods, and definitions of fertility to investigate these questions. The data come from the California Vital Statistics Birth Records for 1982 through 1998, four years of the June Fertility Supplements to the Current Population Survey (1986, 1988, 1995, and 1998), and the 1990 Decennial Census. Several measures of fertility are used, including children ever born (CEB), current fertility, and total fertility rate (TFR). Methods include descriptive statistics as well as statistical modeling.

Key Findings

Our findings indicate that fertility does indeed vary by immigrant generation, with dramatic declines between the first and subsequent generations. However, we also find that the primary determinants of fertility outcomes are not neighborhoods or even immigrant generation, but rather personal characteristics such as educational attainment and marital status.

Immigrants in California have higher fertility rates than U.S.-born residents of the state (Figure S.1). In 1998, the total fertility rate for foreign-born women was 2.8 compared to 1.9 children for U.S.-born women. This relationship also varies by race and ethnicity (Figure S.2). Although fertility rates for U.S.-born Hispanic mothers are substantially higher than the state average, the CEB value for this group is much lower

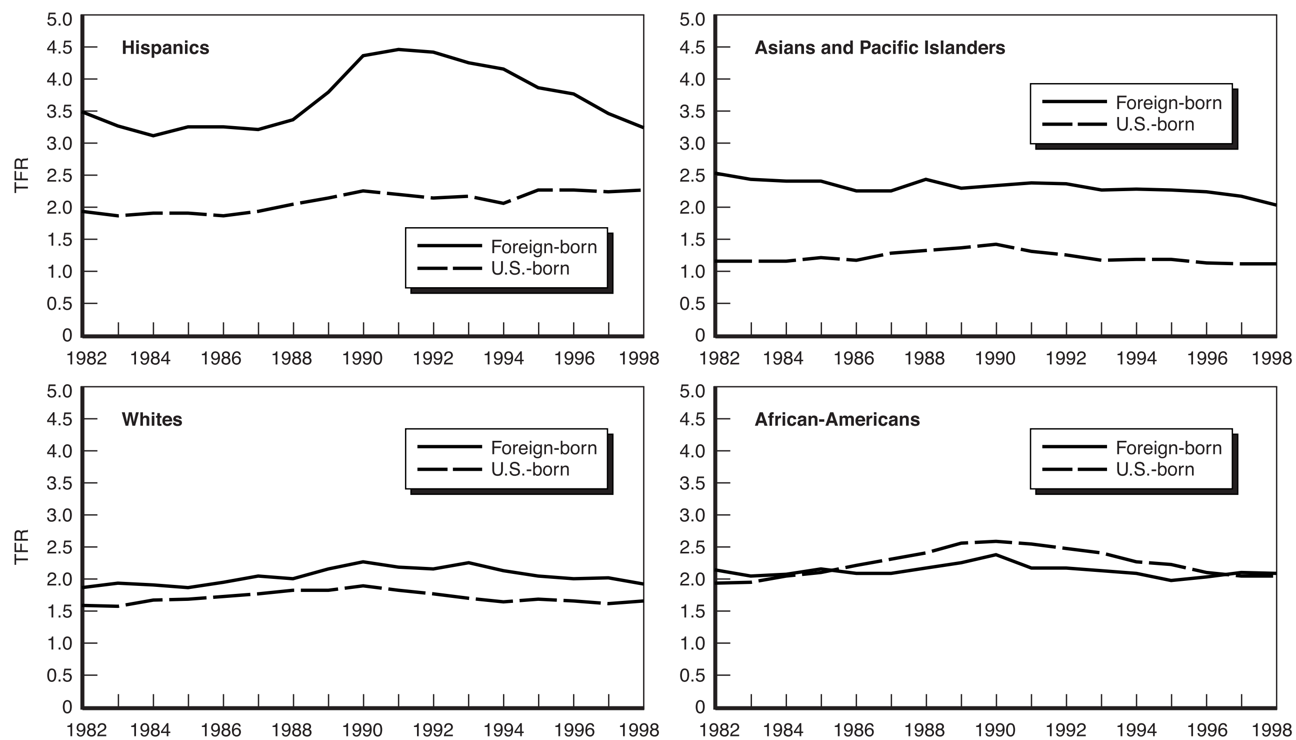


SOURCE: Authors' calculations based on vital statistics data and population estimates.

Figure S.1—Total Fertility Rates in California by Nativity, 1982–1998

than that for Hispanic immigrants. For Asians, fertility rates are relatively low for immigrants but extremely low for U.S.-born mothers. Among whites, there is less difference between the fertility rates of U.S.-born women and immigrants, and among African-Americans, there is virtually no difference. In short, immigrant generation is strongly associated with fertility outcomes for Hispanics and Asians, the two largest immigrant groups in California.

In our analyses of the fertility of immigrants and their descendants from Mexico and Central America, we find that personal characteristics are much more important in understanding outcomes than are neighborhood characteristics or immigrant generation. In fact, generations are no longer independently important once we control for such personal characteristics as educational attainment, marital status, and family socioeconomic status (as measured by poverty). Of those, educational attainment is particularly important. A four-year increase in educational attainment is associated with a .50 decrease in CEB. In short, changes in these personal characteristics between the first and second generations of immigrant families—and not immigrant

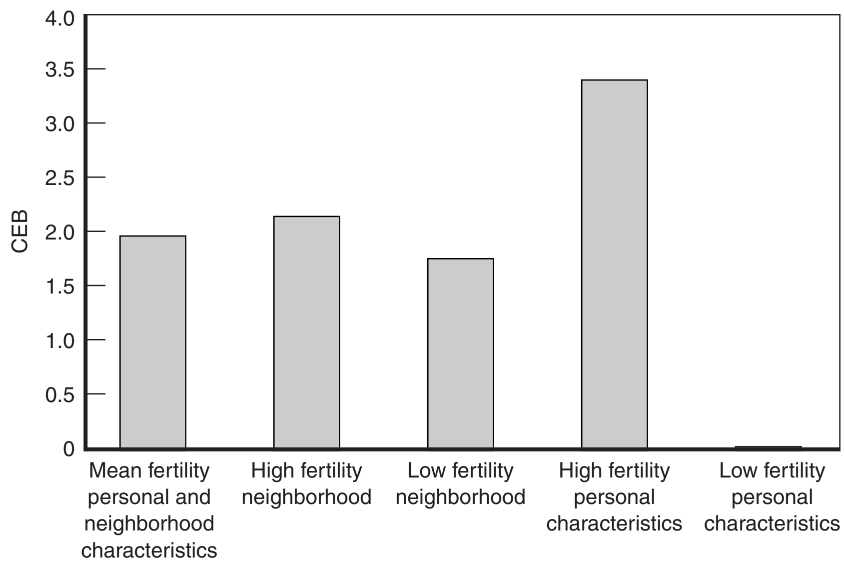


SOURCE: Authors' calculations based on vital statistics data and population estimates.

Figure S.2—Total Fertility Rates in California by Nativity and Race/Ethnicity, 1982–1998

generation as such—account for the lower fertility levels among the second generation.

Neighborhood characteristics bear some relationship to fertility, but that relationship is not nearly as strong as we expected, and it is considerably weaker than that between personal characteristics and fertility (Figure S.3). Among Mexican and Central American immigrants and their descendants, the most consistent neighborhood predictor of fertility at the Census tract level is the percentage of Hispanics adults residing in the neighborhood; and even here, the magnitude of this relationship changes depending on whether we are considering CEB or current fertility. When we consider current fertility by generation, we find that no neighborhood characteristics bear any statistical relationship



SOURCE: Authors' simulations using coefficient estimates from Table D.1 and sample means.

NOTE: The simulation holds the values at an average in the first column to create a simulated CEB for an average woman in an average neighborhood. Each subsequent column varies either neighborhood or personal characteristics one standard deviation in either direction to simulate the hypothetical values of CEB under high and low fertility conditions.

Figure S.3—CEB by Neighborhood and Personal Characteristics

to births. The overall pattern of evidence suggests that the relationship between neighborhood characteristics and fertility may be based on selection into the neighborhood rather than on any neighborhood influences as such.

Policy Implications

Our results suggest that current population projections for California may be too high because they do not consider changes in fertility between first-generation immigrants and their descendants. As these descendants come to dominate the population of women of childbearing age in California, the state's fertility levels should fall substantially. In particular, Hispanic and Asian fertility levels may be substantially lower than currently projected.

Small changes in fertility levels can have substantial effects on population growth and change. For example, current projections predict that the population of children under age 10 is expected to grow by 305,000 in the next decade. Lowering projected fertility rates moderately for Hispanics, we find that the population of children in the state would actually decrease by 350,000 from its level in 2000 (a net change of 655,000). A more dramatic, but still reasonable, decline in fertility among Hispanics in California would lead to a decrease of 585,000 children from current numbers. These changes have important implications for the future population size of California.

To revise the current fertility projections, we suggest incorporating the decline in fertility across generations of Hispanics and Asians. Immigrant generation is not independently related to fertility rates, but its predictive value makes it a convenient proxy for changing characteristics at the individual level. Even using separate fertility rates for the first and subsequent generations could lead to more accurate projections, although the diversity of the state's Asian population would make this refinement difficult to implement for that group. Neighborhood characteristics do not have the same predictive value as immigrant generation, and we therefore conclude that immigrant settlement patterns should not be used to refine population projections.

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Acknowledgments

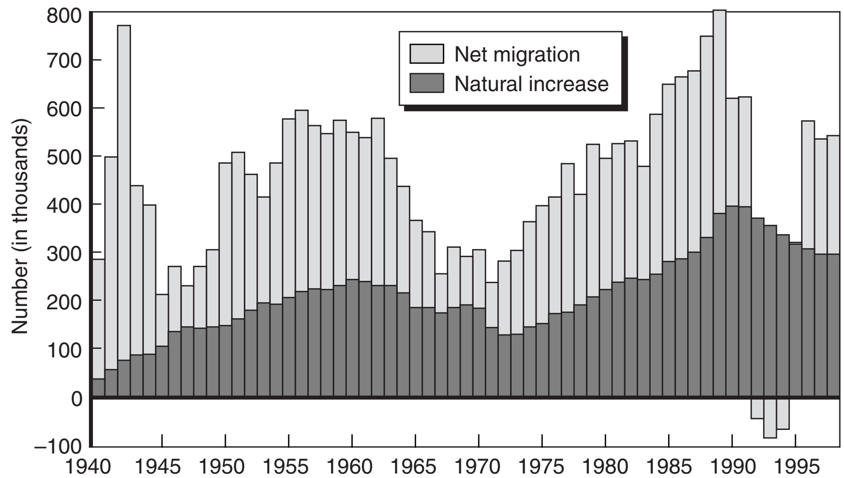
We are grateful to Deborah Reed, Howard Shatz, Heather Rose, Jeff Passel, and Dowell Meyers for their thoughtful reviews of an earlier version of this report. Discussions with Mary Heim provided useful background for this study and Peter Richardson provided excellent editorial assistance. The research in this paper was conducted while we were research associates at the California Census Research Data Center in association with the Center for Economic Studies of the U.S. Bureau of the Census, and we particularly appreciated the able assistance of Michael Clune and Ritch Milby. Last, we wish to acknowledge the invaluable research assistance of Mario Lopez. Although this report reflects the contributions of many people, we are solely responsible for its content. Research results and conclusions expressed are ours and do not necessarily indicate concurrence by the Bureau of the Census, the Center for Economic Studies, or the California Census Research Data Center.

1. Introduction

Population growth, especially future population growth, is an issue of particular concern for California and Californians. The sheer size of the state's population increase has important implications for almost all government services and functions, including welfare, education, and transportation. Large increases in the state's population also have important implications for the protection of natural resources, the distribution of water, agriculture, and the location and nature of development. No less important, but less predictable, is how the changing composition of the state's population will influence the state's economic evolution, its political representation, and its cultural identity or identities.

California's long-term demographic history is one of tremendous population growth fueled primarily by migration. Over time, populations change through births, deaths, and migration. Demographers refer to these three events as the components of population change and refer to the difference between the number of births and deaths as natural increase. Until the last decade, the majority of the state's population growth has been from migration rather than natural increase (Figure 1.1). During the 1990s, however, natural increase became the dominant source of population growth in the state. This excess of births over deaths amounted to 3.4 million people in the 1990s, with births totaling approximately 5.6 million for the decade.[1] Of course, many of these births would not have occurred were it not for migration, especially international migration. Over the past few decades, births to foreign-born mothers have accounted for increasing proportions of the total number of births in California. By the mid-1990s, almost

[1]According to unadjusted Census results for 1990 and 2000, California's population increased 4.1 million from 1990 to 2000. Thus, natural increase accounted for over 80 percent of California's population growth during that decade.



SOURCE: Authors' tabulations of California Department of Finance and Census Bureau data.

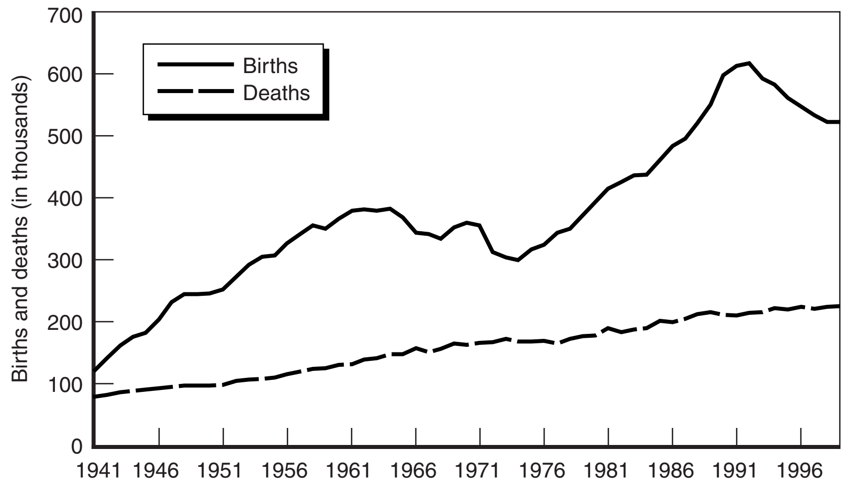
Figure 1.1—Components of Population Change, 1940–1999

half the births in California were to foreign-born women (Tafoya, 2000). The California Department of Finance and the U.S. Census Bureau both project that natural increase will be the most important source of population growth in California in the decades ahead. As shown in Figure 1.2, it is the rise in births rather than any decline in deaths that has led to such high levels of natural increase

In this report, we seek to understand this increasingly important source of population growth in California. We place particular emphasis on understanding fertility patterns as they differ by immigrant generation, ethnicity, and neighborhood. These patterns and trends in California provide important indications of future changes in the state's population.

Objectives of the Research

To refine fertility projections, this study addresses two primary questions. First, how do fertility rates vary by immigrant generation? The answer to this question is important for two reasons. First, variations in fertility by immigrant generation will directly affect state



SOURCE: Authors' tabulations of California Department of Finance data.

Figure 1.2—Annual Births and Deaths in California, 1941–1999

population projections. The projections developed by the Census Bureau and especially those developed by the California Department of Finance are important. Numerous federal, state, and local agencies use them to plan for the future, and they are also used by private firms. State agencies are mandated to use the California Department of Finance projections, and those projections play a vital role in planning the state's future infrastructure. The state projections are used to plan for infrastructure in such large budget areas as transportation, water, and education, to name but a few. Currently, state population projections treat the racial and ethnic groups with the largest immigrant populations homogeneously. There is one set of fertility projections for Hispanics and one for Asians. We will show that refining these fertility estimates to incorporate fertility patterns specific to generations of immigrants may yield different population projections. Apart from their ability to refine population projections, fertility estimates by generation also provide important clues about the assimilation or adaptation process among first and successive generations of immigrants. Fertility rates are just one of many important measures of adaptation, such as educational attainment, English language acquisition, and labor force outcomes.

The second question addressed in this study considers why fertility rates vary. How can we explain variation in fertility between immigrant generations? In particular, we consider the role of personal characteristics (such as education and marital status) as well as neighborhoods. Examining the role of neighborhoods is important for two reasons. First, California's large population of Hispanics and patterns of residential segregation have led to increasing residential concentrations of Hispanics.[2] Such concentrations are certainly more common in California than in the country on average but may be similar to levels of concentration in some parts of the Southwest and some urban centers. If such relationships do exist, they could have a large effect in California. Second, previous research has shown that in highly segregated neighborhoods, segmented assimilation, or assimilation to a less integrated segment of society, can occur. Numerous studies have found relationships between neighborhood concentrations and cultural or economic assimilation (e.g., Portes and Rumbaut, 1996, and Light et al., 1993). We propose that a similar relationship may exist between fertility and ethnic communities. Research that focuses on neighborhood characteristics generally (without a specific focus on ethnic enclaves) has found relationships between these characteristics and a variety of social and economic outcomes. For example, some research has found a relationship between the level of poverty in a community and high school dropout rates (Patterson, 2000). Yet, little analysis has been done on fertility patterns by neighborhood in the United States. Such studies are more common in the developing regions of the world but generally are small-scale, relying heavily, if not exclusively, on ethnographic data.

Measuring Fertility

In describing trends and patterns in fertility, we rely primarily on two measures, children ever born (CEB) and total fertility rate (TFR). The two are conceptually similar; both describe the number of children born to a woman. However, CEB is a measure specific to individual women whereas TFR is a synthetic measure of children born to an

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[2]Key geographic areas in the state are discussed in Chapter 2.

"average" woman in a given calendar year. We begin here by describing CEB in more detail and then turning to the more complex TFR.

CEB is the number of live births an individual woman has had to date. This number should include any children given up for adoption or who died after birth, but it excludes stillbirths. This measure can easily be constructed from birth certificate data . The average CEB for a group of women can include women of all ages, starting with the teen years and ending only at death. However, in this report we are more interested in recent fertility experience, so we restrict the ages from 15 to 44, the primary childbearing ages. Because numbers of children ever born can accumulate over a woman's lifespan, average CEB does not always accurately reflect current trends in fertility. For example, the CEB for a 44-year-old woman recorded in the year 2000 is likely to include births that occurred 20 years ago. For this reason, where possible, demographers prefer to use a different measure: the total fertility rate.

TFR is a hypothetical measure constructed from births occurring in a given calendar year. It is the average number of children a woman would bear if she had all of her children at today's rates of fertility. To construct the measure, age-specific fertility rates are used, which requires both information about the age of mothers giving birth and estimates of the size of the population of women by age. The resulting measure, which is much better than CEB for describing current birth patterns, is used for projections and can readily provide information about expected population change. For instance, we know that a population is replacing itself in size if TFR measures approximately 2.1.[3] However, TFR does not describe the experience of actual women, and it requires much more data to calculate than is found in typical surveys. For this reason, we rely primarily on CEB when discussing fertility differences by generation and neighborhood characteristics. Table 1.1 summarizes these measures.

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[3]The replacement level is the total fertility rate necessary for births to equal deaths over the long run in a population with no migration. It is slightly greater than 2 to account for the slightly higher percentage of male versus female births and for mortality that occurs before a woman has been able to complete her fertility.

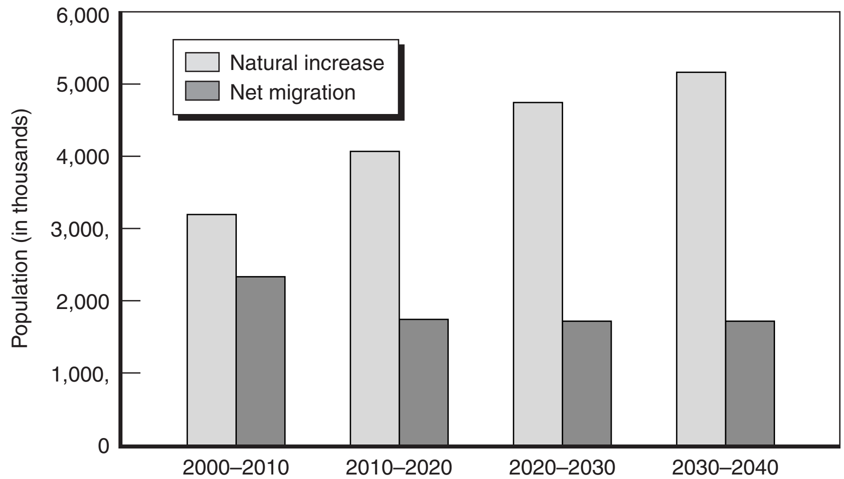
Table 1.1

Fertility Measures

CEB	Recent Fertility	TFR
Construction of Measure		
Ask women (age 15–44) number of live births.	Ask women (age 15–44) number of live births in last 5 years.	Count number of births in a given year occurring to women of each age.
Sum and divide by number of women.	Sum and divide by number of women.	Calculate age-specific rates. Sum age-specific rates.
Advantages of Measure		
Is easy to calculate from survey data.	Is easy to calculate from survey data.	Is a current measure of childbearing patterns.
Does not require many observations.	Does not require many observations.	Can study time trends.
Reflects actual fertility experience of individual women.	Reflects actual fertility experience of individual women.	Is more accurate for projections.
Disadvantages of Measure		
Includes some births that occurred as long as 30 years ago.	Is more current than CEB but time trends difficult to investigate.	Requires much more data. Is a synthetic measure not necessarily experienced by any individual woman.

Population Projections and Fertility

According to projections developed by the California Department of Finance, the U.S. Census Bureau, and others (Johnson, 1999), the greatest source of population growth in California's future will be natural increase rather than migration. This reverses a long-term pattern of demographic change in California in which migration was a more important source of growth than natural increase was (Figure 1.1). Projections by the California Department of Finance suggest that the majority of the state's population growth between 2000 and 2010 will be from natural increase (Figure 1.3). During this period, births are projected to total more than 5.9 million. In subsequent decades, natural increase will play an even more prominent role in state population



SOURCE: Authors' tabulations of California Department of Finance data.

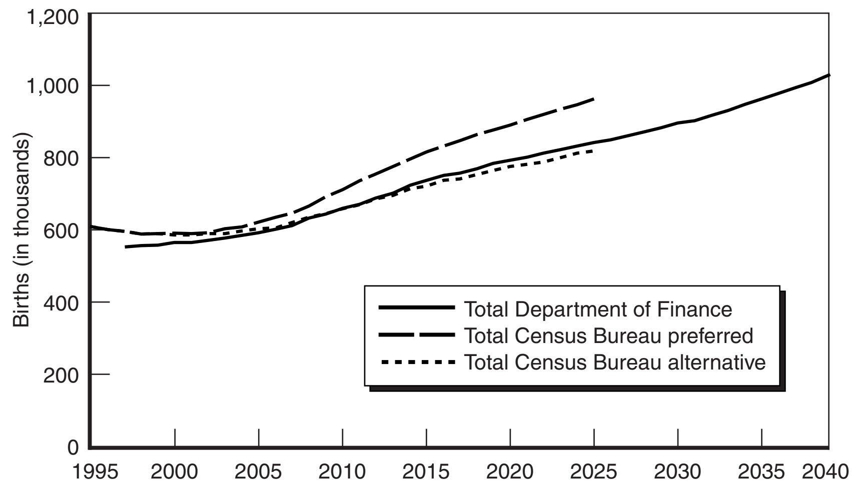
Figure 1.3—California Population Projections by Component of Change

growth according to Department of Finance projections; by the decade of the 2030s, births are projected to total 9.5 million and natural increase to account for 75 percent of the state's population growth. Projections by the U.S. Census Bureau assume an even more important role for natural increase—that net migration will be lower and births will be greater than is assumed by the Department of Finance (see Figure 1.4).

Fertility Projections for California

Current projections for California assume continued high levels of fertility for Hispanics, with the result being that the vast majority of the state's population growth through natural increase is projected to be among Hispanics (Figure 1.5). Whites are expected to experience natural *decrease* (more deaths than births) within the next few years because of their older age structure and lower fertility rates.

The California Department of Finance projections assume virtually no change in age-specific fertility rates (and therefore in total fertility rates) for whites, African-Americans, and Asians and Pacific Islanders (see Figure 1.6). The projections assume a slight decline in fertility rates for

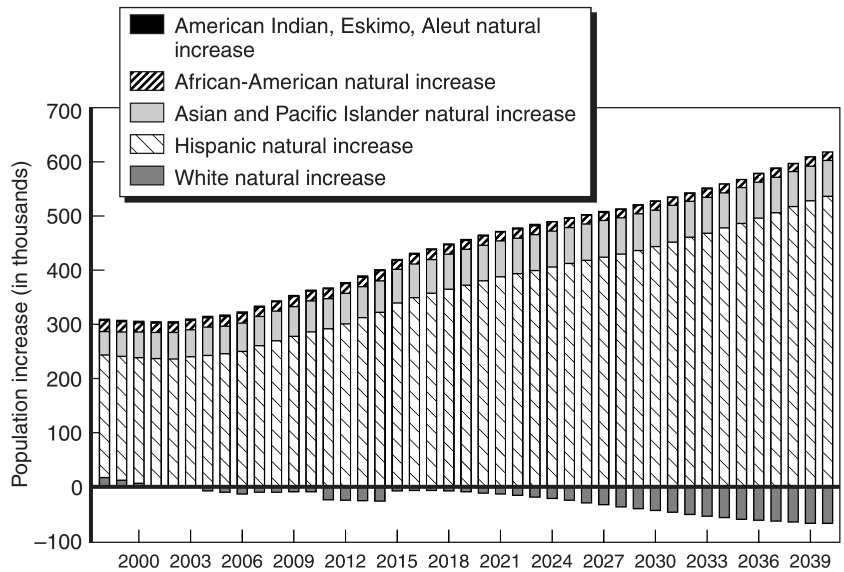


SOURCE: Authors' tabulations of California Department of Finance and U.S. Census Bureau data.

Figure 1.4—Birth Projections for California, 1995–2040

Hispanics, with total fertility rates declining from 3.5 in 1995 to 3.4 in 2040. The total fertility rate for all racial and ethnic groups combined in California is projected to increase throughout the projection period despite declines in Hispanic fertility and constant levels of fertility for each of the other groups. This rise in the overall total fertility rate from 2.4 in 1995 to 2.7 in 2040 is the result of a continuing shift in the composition of the state's population, with Hispanics making up increasing shares of the number of women of childbearing age. Thus, even while the Department of Finance projects declines in Hispanic fertility, the large projected increases in the share of women of childbearing age that are Hispanic will lead to an increase in the total fertility rate for all women in California. Population projections for California developed by the U.S. Census Bureau assume even higher levels of fertility for Hispanics in California. The Census Bureau projections assume California Hispanics will have a total fertility rate of 3.5 in 2025, unchanged from their 1993 estimate.

The most recent historic estimates suggest that fertility rates in the state are *lower* than those used in the projections, and Hispanic fertility



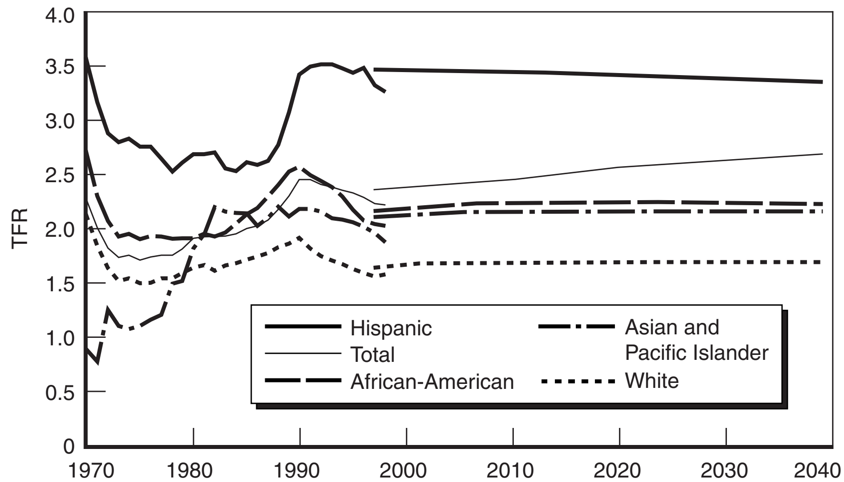
SOURCE: Authors' tabulations of California Department of Finance data.

Figure 1.5—Natural Increase by Race/Ethnicity: Department of Finance 1998 Projections, 1997–2040

in particular seems already to have declined substantially below the projected levels. In its most recent national projections, the Census Bureau has taken note of these declines and now projects that fertility rates for Hispanics nationwide will decline modestly from 2.9 in 1999 to 2.6 in 2050. These most recent trends in Hispanic fertility suggest that a closer examination of the underlying determinants of that fertility will lead to greater understanding of the forces that shape fertility outcomes and population growth in California.

Outline of the Report

Chapter 2 provides background on previous research on fertility and population projections and describes the data and methods used in this report. Using various measures of fertility, Chapter 3 presents our findings on immigrant fertility in California. The chapter includes a discussion of trends and elaborates on differences between various



SOURCE: California Department of Finance, unpublished tables, 1999.

Figure 1.6—Total Fertility Rates in California by Race/Ethnicity: Estimates for 1970–1998 and Projections for 1997–2040

measures. Chapter 4 focuses on the role of neighborhoods in affecting fertility and identifies whether that role varies by specific immigrant generation. Chapter 5 discusses the implications of our findings for state population projections. Finally, the appendices include technical notes and discussions of our statistical models.

2. Previous Research, Data, and Methods

In the first section of this chapter, we review previous research relevant to our study, beginning with research on fertility. We focus in particular on Hispanic fertility and variation by generation because of its importance to the state's population projections. Next, we review previous research that has attempted to disentangle the influences of personal versus neighborhood characteristics on outcomes such as fertility. As described in Chapter 1, neither the Census Bureau nor the Department of Finance has modeled fertility to consider the effects of immigrant generation. Nevertheless, some research on incorporating immigrant generation into population projections has been contemplated, and we review some results here. The second section of this chapter explains the unique data sources we use to accomplish our research objectives, and the third briefly explains our research methods.

Previous Research

Previous Research on the Role of Immigrant Generation

The determinants of fertility behavior are diverse and include social norms and culture as well as economic factors. Place of birth (nativity) is known to be an important predictor of fertility. Fertility patterns of immigrants have been intensely scrutinized in recent research largely because immigrants have higher fertility than natives, which implies that immigrants and their offspring may change the racial and ethnic composition of the nation.

Research undertaken in the 1990s (primarily relying on data from the 1980s) shows that there is great variation in fertility patterns for immigrants. Patterns are influenced by place of birth, length of residence in the United States, socioeconomic characteristics, and generation.

Ford (1990) finds that immigrants who have resided in the United States longer have both lower current and cumulative fertility than do recent arrivals (controlling for age). Kahn (1994) shows that the longer immigrants to the United States reside here, the more their expected family size resembles that of natives. Latin-American and Mexican women have decreasing expected family size with length of residence in the United States, whereas Asian and European immigrants have higher expected family size the longer they reside in the United States. Native-born descendants of Mexican immigrants have lower fertility than the current generation of those Mexican-born (Stephen and Bean, 1992; Bean, Swicegood, and Berg, 1998). Both Blau (1992) and Kahn (1994) find that after adding controls for education, age, marital status (Blau) and income, and education and ethnicity (Kahn), immigrants actually have lower current fertility than do natives. Bean, Swicegood, and Berg (1998) find that the third and successive generations of immigrants have higher fertility than the second.

This research suggests that treating immigrants and their descendants as a homogenous group will lead to incorrect estimates of future fertility patterns and, consequently, unlikely estimates of future group population size. This outcome is especially likely for fertility estimates of women of Mexican and Central American descent living in the United States.

Previous Research on the Role of Neighborhoods

Most research on neighborhoods, social networks, and fertility has focused on the transmission of information about birth control and health technology. Generally, this research is ethnographic and has small sample sizes. It is still evolving and has not yet focused a great deal on fertility per se. None of this research has considered the role of immigrants' communities in the United States as a determinant of the level and pace of childbearing after arrival. Recent fertility studies have emphasized the diffusion of fertility norms, suggesting that this area is ripe for exploration. There has been a call among demographers to consider the relationships among community, family size, and fertility behavior more generally. Forste and Tienda (1996) note that an individual's reference group may matter in determining fertility change. Of course, immigrants may not change their reference group if they settle in communities in the United States similar to those from which they emigrated.[1] Consequently, these immigrants may not have lower fertility as their time in the United States increases.

High school dropout rates, teen pregnancy, earnings, and other measures of "success" have also been studied in their relation to neighborhood characteristics. Early studies considered the role of individual characteristics on the outcome of interest and then added measures of the neighborhood to estimation models. This early research generally found strong relationships between neighborhood characteristics and the outcomes of interest. However, researchers began to recognize that the characteristics influencing choice of neighborhood may be strongly linked to individual or family characteristics but may be unmeasurable.

Even the refinements of this early research suggest that the relationship between neighborhood and outcomes at the individual level is not always straightforward.[2] Our research will control for both neighborhood and personal characteristics. We will not be able to demonstrate whether neighborhoods directly cause observed fertility patterns or are merely associated with them. Because our primary interest in any relationship between fertility and neighborhood is in exploiting it to inform population projections, this question of causality is not of concern in this research.

The Role of Fertility Rates and Other Assumptions in Population Projections

In Chapter 1, we suggested that the state's population projections need to account for variation in fertility by generation. This need is especially important for Hispanics. Here, we briefly discuss standard population projections and other research that has considered refining the more standard projection models.

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[1]The maps later in the chapter demonstrate that such communities could exist in California for Mexicans and Central Americans.

[2]See Brooks-Gunn et al. (1993); Plotnick and Hoffman (1999); Patterson (2000); Evans, Oates, and Schwab (1992) for detail on how unobservable characteristics may be accounted for in neighborhood research, and how doing so may reduce the association between neighborhood characteristics and individual outcomes.

Projections of population size require many assumptions about behavior that is difficult to predict, even when past behavior is perfectly known. For example, standard population projections incorporate assumptions about future fertility, mortality, immigration, and emigration. Year-to-year changes in these rates, especially in fertility and immigration, are quite common. Very different population projections can result from seemingly small differences in these rates (see Johnson, 1999; Dardia and Mameesh, 2001).

National and California population projections have separate starting populations and fertility and mortality assumptions for each racial and ethnic group. Other researchers, notably Passel and Edmonston, have suggested that these projections may be improved by further dividing the racial and ethnic populations to consider generations of immigrants. Projections indicate that these modifications can change population estimates considerably (Edmonston and Passel, 1991, 1992, 1994). The most recent Census Bureau estimates do divide the population into native-born and foreign-born groups. However, Edmonston and Passel suggest in their work that further dividing the population of native-born into second, third, and fourth generations is necessary, as is applying generation-specific fertility, mortality, immigration, and emigration rates. Research presented above suggests that this is certainly justified in the case of Hispanic fertility.

These intensive data requirements can become even more complicated if men and women parent with those of different immigrant generations. To which generation do the children of the union belong? In this research, we construct generations based on the younger parental generation (e.g., a person with a first- and a second-generation parent is defined as second generation). In addition, we do not know if fertility and mortality (or even emigration or immigration) might vary by whether one marries someone of a different immigrant generation (Edmonston and Passel, 1999). Finally, we do not know how children born to parents of different races and ethnicities will identify themselves racially or ethnically,[3] or if their own rates of fertility, mortality, and emigration will differ from those of the racial or ethnic group with which they most strongly identify. Although these topics will be very important in California, they will not be addressed here. Instead, we focus on understanding Hispanic fertility by generation as it relates to personal and neighborhood characteristics.

Data Used in the Study

Data for this research come from three sources: the California Vital Statistics Birth Records for 1982 through 1997 (which we refer to as birth records), two years of the June Fertility Supplements to the Current Population Survey (CPS) (1995 and 1998), and the 1990 Decennial Census.

The birth records contain data for virtually every birth in the state and are collected from birth certificates. Our analysis includes births from every year from 1982 to 1997. Birth records also include information on the mother's nativity, race, Hispanic ethnicity, age, and marital status. Using the racial and ethnicity data and the nativity data, we can subdivide each racial and ethnic group into foreign-born or native. We combine the year of birth of the child with estimates of counts of women "at risk" of childbearing to calculate TFR by nativity, racial and ethnic group, and age (see Chapter 1 for a more detailed explanation of TFR). We use the birth records to document trends in fertility levels in California, but we rely on the CPS to explicate these trends using the more detailed immigration, demographic, and socioeconomic data for individual women.

The CPS is a national survey of approximately 50,000 households (5,000 in California) collected monthly, but it includes data on fertility only occasionally. Here we use data from two months of the CPS that collect data on both fertility and nativity: June 1995 and June 1998. The CPS allows us to calculate CEB but does not have enough observations to permit the calculation of TFRs.

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[3]For the first time, the 2000 Decennial Census allowed respondents to choose more than one race. It is possible that future population projections could include projections of a multiracial group.

The CPS includes not only the country of birth of the mother but also her year of arrival in the United States and the nativity of her parents. This detail allows us to create measures of the first generation, second generation (those born in the United States to parents born abroad), and third-plus generation (all others). Within the first generation of migrants, we will compare women of the same nativity and age—but of different ages at time of arrival—to assess whether age at arrival affects fertility. Women younger than age 10 at arrival may be more likely to have fertility levels similar to those of their U.S.-born counterparts because they were mostly raised and educated in the United States. Those arriving after the age of 10 may be likely to have fertility levels more similar to those in their country of origin.

The third source of data used in this research is the 1990 Decennial Census. Census data supply information about neighborhood characteristics, which we then link to individual-level data (fertility levels, nativity, and socioeconomic characteristics) in the CPS. Public files of the CPS do not contain the information required to make links between individuals and their neighborhoods. Because we were able to obtain special permission to use the internal (nonpublic) files of the 1995 and 1998 CPS data, we are able to create a unique dataset that contains fertility and nativity information for individuals and data for the neighborhoods in which they reside. No other study of fertility patterns in neighborhoods has been undertaken on a statewide or national scale.

There are two concerns about the use of the 1990 Census data to measure the relationship between neighborhood and fertility: We use Census tracts as a proxy for neighborhoods, and the neighborhood and fertility data were not collected in the same year.

Regarding the first concern, our measures for neighborhoods are at the Census tract level. States and counties are divided into Census tracts, which are intended to include no more than 6,000 residents on average. Tracts are smaller than zip codes but larger than Census block groups. In 1990, California had 5,858 tracts. Although the Census does disaggregate data to smaller levels of geography, such as Census block groups and Census blocks, this level of geographic detail is not available in the CPS data. In many cases, the tract may be larger than a true "neighborhood," but block groups would probably be too small.

Both the sizes of tracts and the percentage Hispanics among them in 1990 vary tremendously. The San Francisco Bay Area shows clear variation among Census tracts in the percentages Hispanic (Figure 2.1). One can locate the Mission District in San Francisco by following the tracts of increasing concentrations of Hispanics from Daly City to San Francisco along Mission Street. Similarly, the concentration of Hispanics in San Jose is clearly observed in the southeast quadrant of the map. Many of these tracts are geographically quite small—a collection of a few city blocks at most—and are readily considered neighborhoods. In the Los Angeles area, tracts range from 0–14 percent to 75–100 percent Hispanic, but there are large regions of Los Angeles where nearly all the tracts are over 75 percent Hispanic (Figure 2.2). The individual tracts are relatively small, but where other similar tracts surround them,

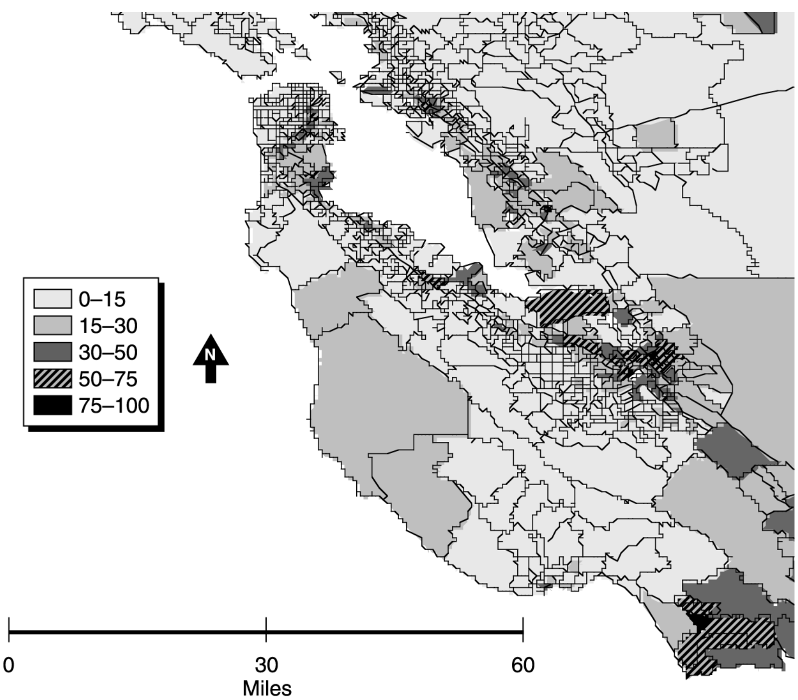


Figure 2.1—Percentage Hispanic by Tract in the San Francisco Bay Area, 1990

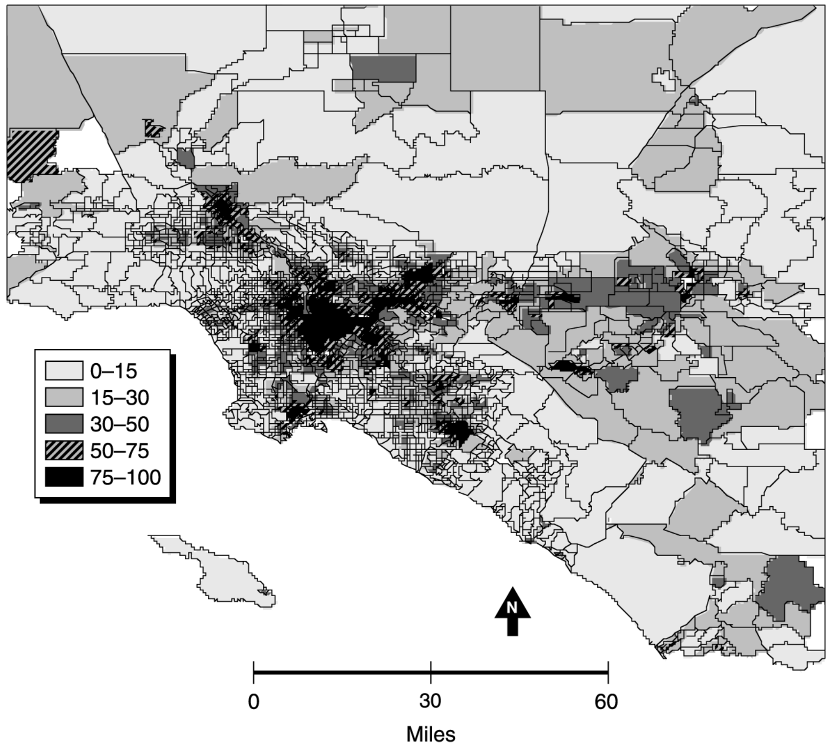


Figure 2.2—Percentage Hispanic by Tract in the Los Angeles Area, 1990

there are large regions in which the vast majority of residents are Hispanic. The rural areas in the San Joaquin Valley have much larger tracts than do urban ones (Figure 2.3). However, even some of these large tracts have concentrations of Hispanics upward of 75 percent, and although the area of the tract is large, the population of the tract may be centralized. Despite the large area a tract may cover, there still may be a sense of "neighborhood" even in rural areas.

Regarding the second concern, our neighborhood data from 1990 are five to eight years older than the fertility data we analyze. We might expect a lag between entering a neighborhood and any observed relationship between the neighborhood and fertility levels for an individual. However, when the 2000 Census data are published, we

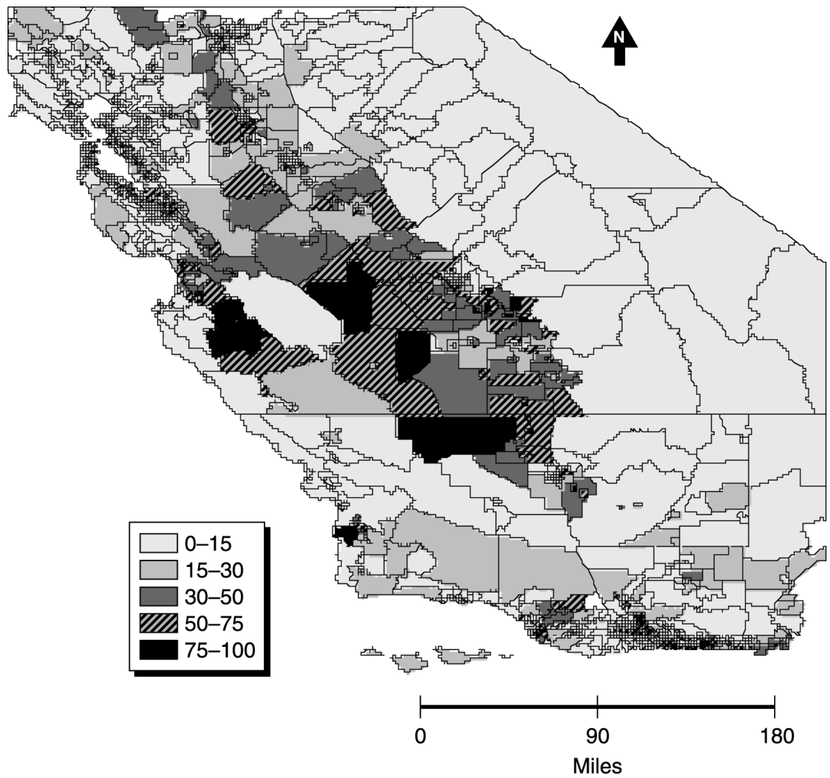


Figure 2.3—Percentage Hispanic by Tract in the San Joaquin Valley, 1990

will try to validate our results with the more recent measures of neighborhood characteristics.

To create this unique dataset, the individual fertility and nativity data from the CPS are merged with the tract-level neighborhood data from the Census using the Census tract identifier in each. Whenever data are matched or merged, some are likely to be lost. In this case, approximately 93 percent of our sample was retained after the matching process. Most of the 7 percent of individual cases from the CPS that did not successfully match with Census data failed to do so because tract identifiers were not recorded in the CPS. Furthermore, the unmatched cases were not appreciably different in demographic characteristics such as race and ethnicity or nativity, nor were they different in terms of our key fertility variable of interest, children ever born. The details of this data merge are explained in Appendix A.

Research Methods

In subsequent chapters, we analyze a variety of fertility data, employing different methods and using different fertility measures. In Chapter 3, we chart TFRs by ethnicity and by nativity. We also chart CEB by detailed generational status. In Chapter 4, we explore in tabular analysis whether the fertility patterns observed by generation seem to be associated with generational differences in personal or neighborhood characteristics. Finally, we use multivariate regression techniques to control for generation, personal characteristics, and neighborhood characteristics simultaneously. The results of these multivariate analyses are presented graphically.

3. Fertility Rates by Immigrant Generation

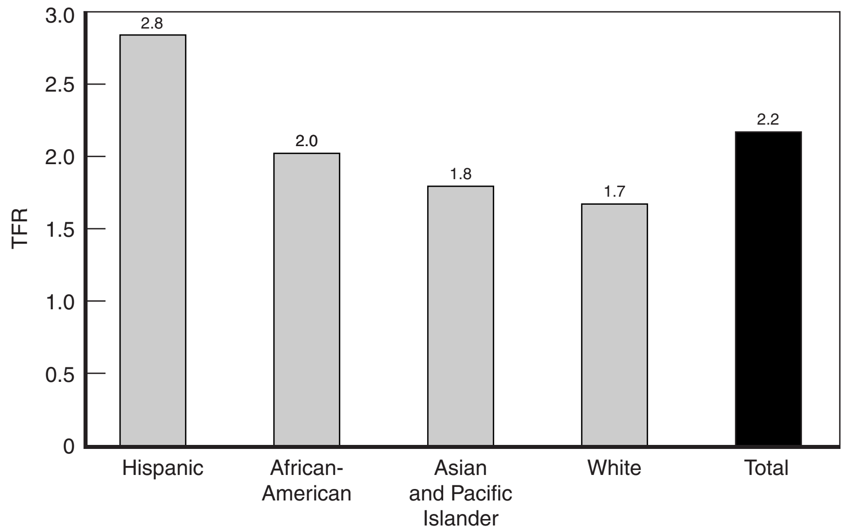
In this chapter, we present our findings on fertility rates in California by mothers' ethnicity, nativity, and immigrant generation. The first section of the chapter discusses our findings on fertility rates and trends in California for four ethnic groups (Hispanic, African-American, Asian and Pacific Islander, and white). The second section examines fertility rates by nativity and ethnicity. In these two sections, we rely on administrative vital statistics data collected by the state. The advantage of such data is the ability to develop time trends spanning almost 30 years for four racial and ethnic groups and almost 20 years for nativity; the primary disadvantage is that we can distinguish between only U.S.-born and foreign-born mothers (that is, we cannot identify fertility rates for the second generation apart from the third generation). In the third section of this chapter, we use CPS data to explore fertility rates for specific generations of Mexican and Central American immigrants.[1]

We find substantial and persistent differences between the fertility rates of U.S.-born women in California and immigrant women in the state. Foreign-born women, especially Hispanics, have much higher birth rates than U.S.-born women. An examination of birth rates across generations for women of Mexican and Central American ancestry reveals sharp declines from the first generation to the second generation, with apparently little change between second and third generations.

Total Fertility Rates by Ethnicity

Fertility rates vary substantially by ethnicity (Figure 3.1). In California, total fertility rates for Hispanics were more than 40 percent higher than for any other group in 1998 and were well above the

[1]See Chapter 2 for a more complete description of each data source.



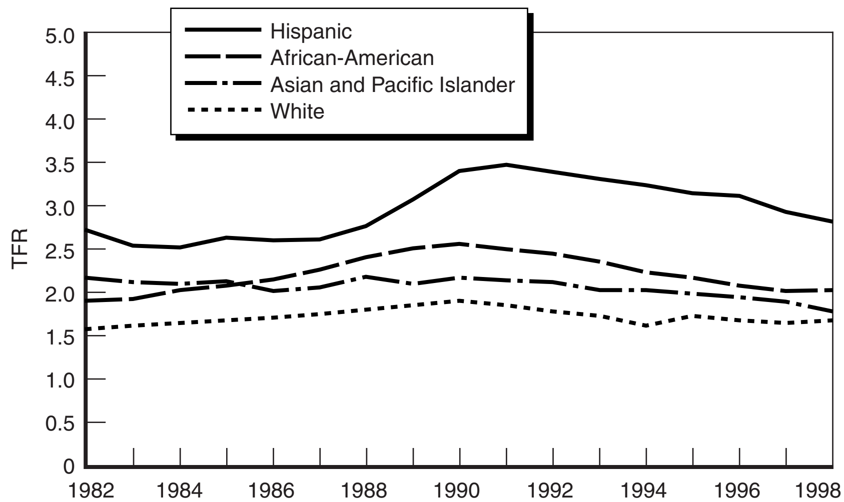
SOURCE: Authors' calculations based on vital statistics data and population estimates.

Figure 3.1—Total Fertility Rates in California by Race/Ethnicity, 1998

replacement level of 2.1 children per woman. African-American and Asian and Pacific Islander women experienced fertility rates of just below the replacement level, and whites had total fertility rates well below the replacement level, averaging only 1.7 children per woman.

These patterns reflect differences between ethnic groups in the prevalence of certain personal (socioeconomic) characteristics that are important determinants of fertility. For example, better educated women tend to have fewer children than women with little formal schooling, and in California, Hispanic women tend to have much less education than women of other racial and ethnic groups. Other important determinants of fertility that vary between ethnic groups include nativity, age at first marriage, labor force status, and income.

Over the past 30 years, fertility rates in California have changed substantially. Total fertility rates for all California women are much higher today than they were in the mid-1970s (Figure 3.2). At the nadir of the baby bust in 1973, total fertility rates in California had declined to



SOURCE: Authors' calculations based on vital statistics data and population estimates.

Figure 3.2—Total Fertility Rates in California by Race/Ethnicity, 1982–1998

1.7 children per woman, well below the replacement level of 2.1.[2] Between 1975 and 1991, total fertility rates in California increased to almost 2.5 children per woman, well above the replacement level. This dramatic increase contributed to a much stronger baby boom echo in California than in the rest of the United States. During the 1990s, however, fertility rates declined slightly—from 2.5 in 1991 to 2.2 seven years later.

Part of the rise in fertility rates since the late 1970s can be attributed to changes in the composition of women of childbearing age. That population of women in California is increasingly composed of Hispanics, who tend to have more children than other groups. By 1998, whites constituted half of the women of childbearing age in California, compared to almost two of every three in 1980. Meanwhile, Hispanics increased from about 20 percent of women of childbearing age in the state in 1980 to 30 percent by 1998 (Figure 3.3).

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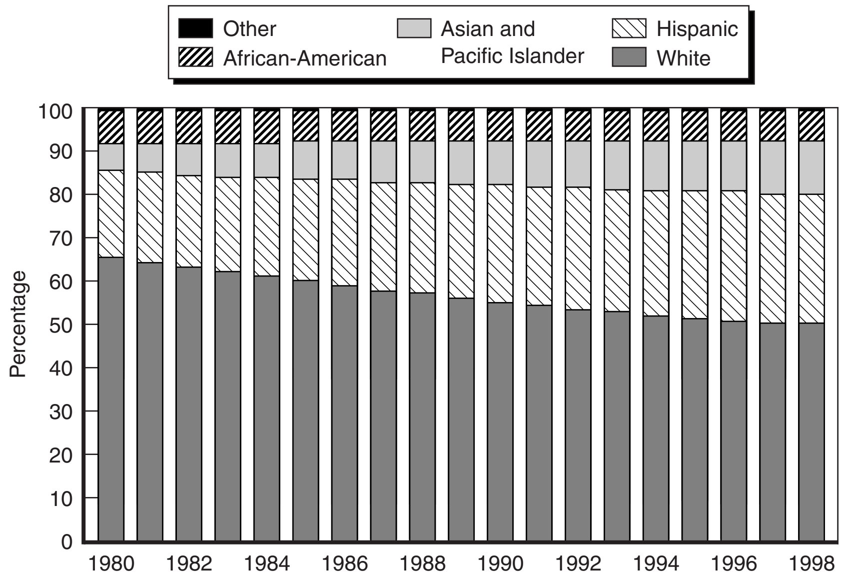
[2]The baby bust period lasted from 1965 to the late 1970s.



SOURCE: Authors' tabulations of California Department of Finance data.
NOTE: Childbearing age is defined to be age 15 to 44.

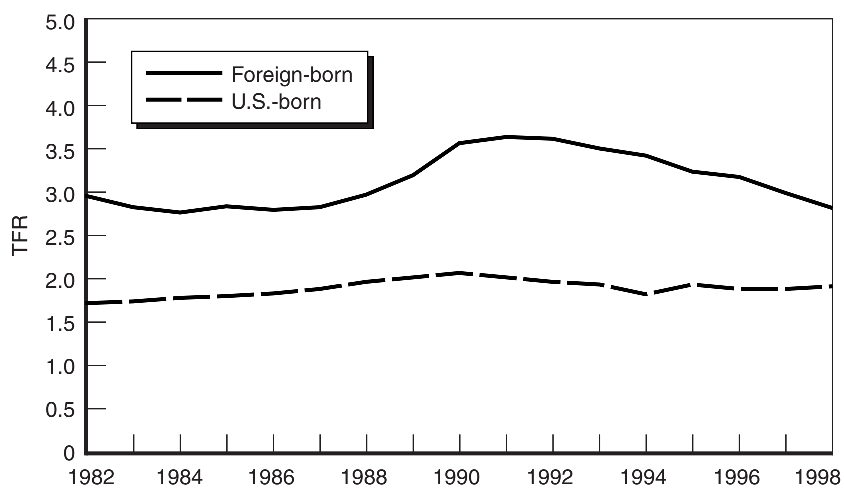
Figure 3.3—Racial and Ethnic Composition of Women of Childbearing Age in California, 1980–1998

Temporal patterns in fertility rates also vary substantially by race and ethnicity (Figure 3.2). Again, trends for Hispanics differ sharply from those of other ethnic groups in California. During the late 1980s, total fertility rates for Hispanics rose considerably, from 2.6 children per woman in 1987 to 3.5 children per woman only four years later. (As we will see, this large increase was partly the result of increased immigration.) During the 1990s, fertility rates declined for all racial and ethnic groups. For Hispanics, the declines were substantial. Although African-Americans and whites experienced increasing birth rates from 1982 to 1990, the increases were small compared to those for Hispanics, and both groups experienced moderate declines in the 1990s. For both whites and African-Americans, fertility rates in the late 1990s were at or near the historic lows recorded during the baby bust a quarter century earlier. Asians and Pacific Islanders experienced dramatic increases in fertility from the early 1970s to the early 1980s (largely as a result of immigration) and experienced slight declines in the 1990s.

Total Fertility Rates by Nativity and Ethnicity

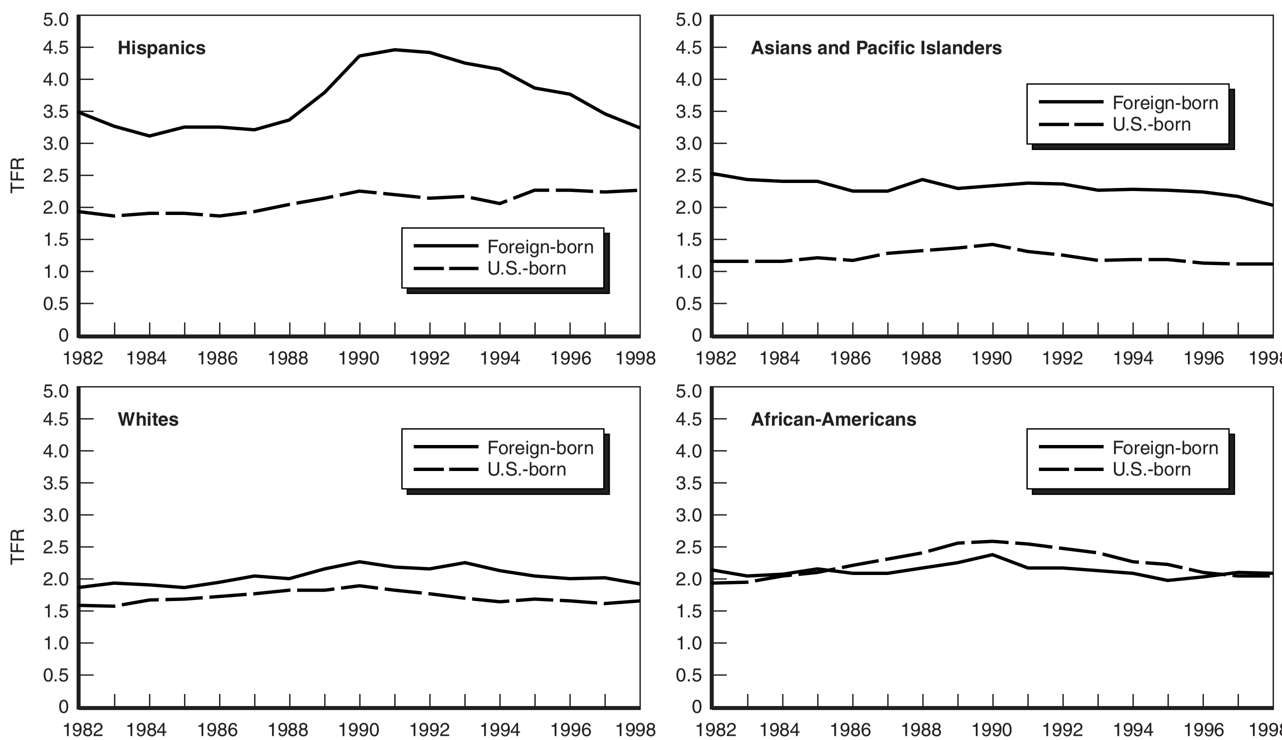
Nativity, or place of birth, is an important predictor of fertility rates. Foreign-born women in California have much higher birth rates than their U.S.-born counterparts. In 1998, total fertility rates for immigrant women in California averaged 2.8 children compared to only 1.9 children for U.S.-born women in the state (Figure 3.4). After increasing dramatically from the late 1980s to the early 1990s, immigrant fertility declined in the late 1990s. The fertility of U.S.-born women in California rose moderately from the early 1980s to 1990 and has declined a bit since then. The relatively small changes for U.S.-born women in California could reflect choices about the timing of births and do not suggest significant changes regarding fertility behavior and desired family size. The large changes for immigrants, however, are noteworthy.

Among Hispanics, Asians and Pacific Islanders, and whites, fertility rates are higher for immigrants than for U.S. natives (Figure 3.5). The



SOURCE: Authors' calculations based on vital statistics data and population estimates.

Figure 3.4—Total Fertility Rates in California by Nativity, 1982–1998



SOURCE: Authors' calculations based on vital statistics data and population estimates.

Figure 3.5—Total Fertility Rates in California by Nativity and Race/Ethnicity, 1982–1998

differences are especially large for Hispanics and Asians and Pacific Islanders, with immigrant fertility being at least 40 percent greater than fertility among U.S.-born Hispanics and almost twice as high among foreign-born Asians and Pacific Islanders as among U.S.-born Asians and Pacific Islanders.

For Asians and Pacific Islanders, much of the difference between immigrant and native fertility is compositional: Those born in the United States comprise different subgroups than those born abroad. Native-born Asians and Pacific Islanders consist primarily of second- and third-generation Chinese, Filipinos, and Japanese. Asian immigrants consist primarily of Chinese, Filipinos, Southeast Asians, and Koreans. Socioeconomic characteristics of these immigrants vary tremendously, as do fertility rates in their countries of origin.[3] In 1990, Korea had a TFR of 1.6 whereas Laos had a TFR of 6.4 (U.S. Census Bureau, 2001). In general, U.S.-born Asians and Pacific Islanders tend to be better educated and from countries with lower fertility rates than many foreign-born Asians and Pacific Islanders.

Although fertility rates for foreign-born Asians and Pacific Islanders are much higher than those for their U.S.-born counterparts, the levels are not especially high. By 1998, the total fertility rate for immigrant Asians and Pacific Islanders was at the replacement level of 2.1 children per woman. More remarkable are the very low levels of fertility among native Asians and Pacific Islanders, who consistently have the lowest total fertility rates of any group in California. In 1998, the total fertility rate of U.S.-born Asians and Pacific Islanders was only 1.1 children per woman. These are among the lowest recorded fertility rates of any population in the world. Internationally, only Bulgaria and the Czech Republic have TFRs of 1.1 children per woman (Population Reference Bureau, 2001).

Fertility rates for Hispanics, especially the foreign-born, are relatively high. By the late 1990s, total fertility rates among U.S.-born Hispanics reached 2.3 children per woman. Between 1987 and 1991, total fertility rates for foreign-born Hispanics increased from 3.2 to 4.4. This

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[3]Because of small sample sizes, we cannot disaggregate our estimates for Asian subgroups.

dramatic rise was the primary force behind the overall increase in the state's total fertility rate during this period. Were it not for the large increase in fertility among Hispanic immigrants, fertility rates in California would have increased very little between 1987 and 1991.

Why did total fertility rates increase so dramatically for Hispanic immigrants? First, the composition of the Hispanic immigrant population in California changed as a result of the Immigration Reform and Control Act (IRCA) of 1986. In California alone, 1.6 million unauthorized immigrants applied for amnesty (legal immigrant status) under this act. The vast majority were young men, and many were agricultural workers who settled permanently in the United States. Previous research indicates that many of those granted amnesty were joined later by spouses and relatives in the United States (Johnson, 1997). As a result, many young adult Hispanic women came to California during the late 1980s. We also know that unauthorized immigrants tend to have less education than other immigrants and that they are more likely to come from rural areas. Both characteristics are associated with high levels of fertility. As a result, changes in the composition of the Hispanic immigration population probably increased fertility rates.

Another possible reason for the sudden increase in fertility rates for Hispanic immigrants is also related to IRCA. Because many of those granted amnesty and their spouses had been apart for some time, their reunion in California prompted a "catch-up" effect in the timing of births. This effect should dissipate over time, and, indeed, total fertility rates for foreign-born Hispanics declined from 4.4 in the early 1990s to 3.3 by 1998.

A third possibility is measurement error. We are confident about the number of births to Hispanic immigrants in California—births are nearly universally recorded, and there is no reason to expect mothers to overreport as foreign-born—but the total number of Hispanic immigrants is less certain. If the Hispanic population had been undercounted during this time, birth rates for this population would have been overestimated. Although the 1990 Census provides the best data we have on immigrant populations, it undercounted Hispanics more than other groups, and we have not added that undercount to our base populations. It is also possible that some of these births were to Hispanic immigrants who were not residents (legal or otherwise) of California or the United States; as a result, they would not be included in estimates of the number of women of childbearing age in California. The extent of these measurement errors is uncertain.

For whites and African-Americans, fertility rates for both immigrants and U.S. natives are relatively low, and differences between immigrants and natives are not great (see Figure 3.5). By the late 1990s, native and foreign-born African-Americans had nearly identical total fertility rates of 2.0. U.S.-born whites experienced a total fertility rate of only 1.6 compared to 1.9 children per woman for foreign-born whites. All four groups—native and foreign-born whites and African-Americans—experienced slight gains in fertility during the 1980s. Much of that increase resulted from changes in the way women timed their births. In particular, younger women delayed their childbearing, thereby depressing birth rates in the 1970s. These cohorts then compressed their births in the late 1980s, causing slight increases in fertility rates.

Fertility Rates by Immigrant Generation for Mexicans and Central Americans

The relationship between immigrant generation and fertility can be further explored with CPS data. These data (as noted in Chapter 2) allow for the specific identification of first-generation immigrants, second-generation immigrants, and third-plus-generation immigrants. Sample sizes are not large enough to support analyses for Asians, but they are sufficient to consider the case of Mexicans and Central Americans. Large differences between first- and second-generation immigrants are evident (Figure 3.6). Surveys conducted in the 1980s (1986 and 1988) and in the 1990s (1995 and 1998) show that the average number of children ever born to Mexican and Central American immigrants was almost a full child higher than for second-generation descendants of such immigrants.[4] Fertility levels were slightly lower in the 1990s than in the 1980s but only marginally so.

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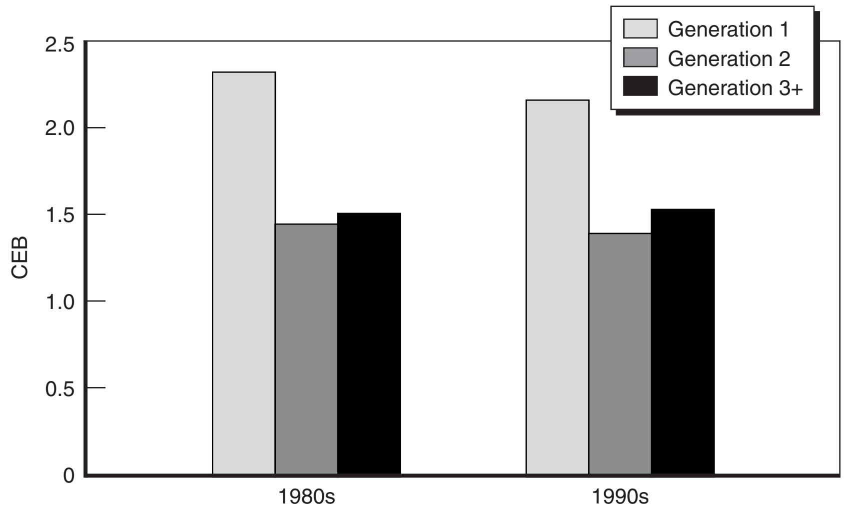
[4]We have adjusted these averages for age-group differences. We do so through a technique known as "age standardization." We chose the entire female population of



SOURCE: Authors' calculations based on CPS June supplements.

NOTE: These figures have been age-standardized using the age distribution of non-Hispanic whites in California in 1986 as the standard.

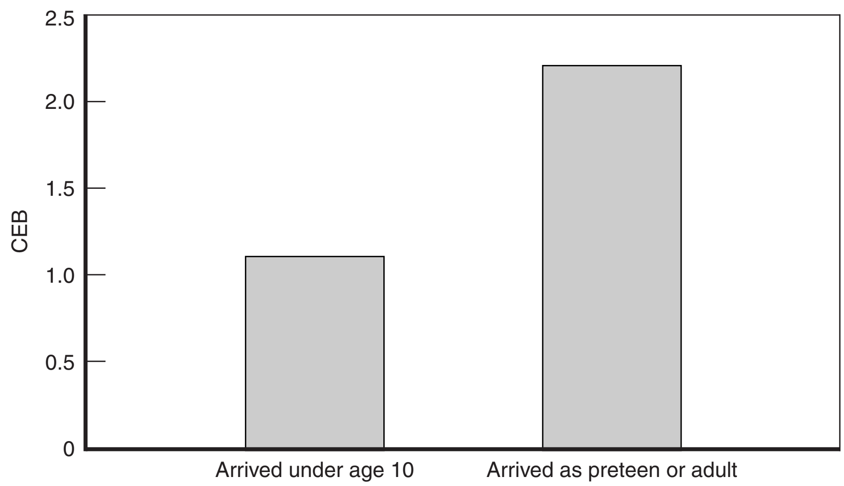
Figure 3.6—CEB Among Mexican/Central Americans in California by Generation

The average CEB for third-plus-generation descendants was also substantially lower than for first-generation immigrants but was marginally higher than for the second generation. The higher levels for the third and subsequent generation could be a consequence of the identification of third-generation descendants of Mexican and Central American immigrants. Because we did not have data on grandparents' nativity, we used responses to an ancestry question to identify third-plus-generation descendants. It is likely that women who identify as of Mexican or Central American ancestry have higher fertility than women who have at least one grandparent born in Mexico or Central America but who do not identify as of Mexican or Central American ancestry.[5]

California as our standard, using five-year age groups for women age 15 to 44. Contact the authors for further details.

[5]Hispanic self-identity is associated with lower socioeconomic status (Portes and MacLeod, 1996, Eschbach and Gomez, 1998), and lower socioeconomic status is associated with higher fertility.

We can also identify fertility patterns for immigrants who came to the United States as young children. The fertility rates of these immigrants, often referred to as “generation 1.5,” can be expected to differ from those of immigrants who came to the United States as young adults (generation 1). Specifically, members of generation 1.5 are likely to have their attitudes about fertility shaped much more by their experience in the United States than by that in their countries of origin. Fertility levels for generation 1.5 are in fact much lower than for first-generation immigrants who arrived in the United States as preteens and adults (Figure 3.7).



SOURCE: Authors’ calculations based on CPS 1995 and 1998 June supplements.

Figure 3.7—CEB Among Mexican/Central American Immigrants by Age Group at Arrival

4. What Drives Differences in Fertility Rates by Immigrant Generation?

In this chapter, we attempt to understand why fertility varies by generation. In particular, we include a rich array of socioeconomic characteristics measured at both the individual and neighborhood level to explore these relationships among the largest immigrant group in California: those of Mexican and Central American descent. After examining differences in personal and neighborhood characteristics by generation and type of neighborhood, we use these differences to predict CEB numbers and estimate current fertility (births to women within the last five years).

The Sample

To explore the role of both personal and neighborhood characteristics, we use a dataset with a high degree of geographic detail: individual fertility records from the 1995 and 1998 CPS Fertility Supplement linked to neighborhood characteristics data from the 1990 Decennial Census.[1] Compared to the California Vital Statistics Birth Records, CPS samples of immigrant populations are small. We therefore limit our analysis to the largest immigrant group in California: women of Mexican and Central American descent.

We group Mexican and Central American women together because their fertility patterns, language, and socioeconomic characteristics are similar enough to justify doing so. We do exclude Hispanics of other places of origin, such as Puerto Rico and Cuba, because their fertility

[1] Access to these data are restricted by the Census Bureau. Our project obtained special approval to use the data at the California Census Research Data Center at the University of California, Berkeley.

levels,[2] settlement patterns, and socioeconomic characteristics are so different. Although we study immigrants and successive generations from Mexico and Central America for the entire United States, we focus attention on the fertility patterns in California.

Once we have restricted the sample for our study to women age 15 to 44 of Mexican and Central American descent, we further divide the sample into generations. Members of the first generation are those born in Mexico or Central America. This group is further divided into generation 1.0 (those arriving in the United States at age 10 or older) and generation 1.5 (those arriving in the United States before age 10). The second generation is defined as those born in the United States to a parent born in Mexico or Central America. The third (and subsequent) generation consists of those born in the United States whose parents were also born in the United States and who self-identify as being of Hispanic or Mexican, Central American, or South American descent.[3]

Measures of Personal and Neighborhood Characteristics

Our unique dataset allows us to evaluate the role of both personal and neighborhood characteristics in explaining fertility variation by immigrant generation. Below, we describe the personal and neighborhood measures we use and how we expect them to operate in explaining fertility for individuals.

Personal Characteristics

Age is one of the most important correlates of fertility, and it continues to be included in each of our analyses. In earlier chapters, we considered age in our comparisons of children ever born, through a process called age standardization (see the note on Figure 3.6 for more detail), and in our comparisons of TFR, which explicitly consider age in

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[2]In 1998, CEB for Cuban-born women in the United States was 1.28, for Puerto Rican women it was 1.87, and for Mexican women it was 2.01.

[3]It is impossible to separate third-generation Central and South American Hispanics from one another in this dataset. Because of the small numbers of first-generation women from South America in California, we assume that the majority of third-generation Central or South American Hispanics in California are Central American.

their construction. Ethnicity, or self-identification as Hispanic, is potentially important in estimating fertility as well. We expect to find that those who self-identify as Hispanic will have, on average, higher levels of fertility relative to those who do not. Finally, marital status is an important correlate of fertility. Although nonmarital fertility has been increasing in recent decades, current levels are still far below those of marital fertility.

Among the variables that measure immigration experience, we expect each to be correlated with higher levels of fertility. We consider whether Spanish is the only language spoken in the home and expect that to be a measure of integration in the wider community. Those who speak only Spanish could be expected to maintain the higher levels of fertility more prevalent in their communities of origin. Similarly, we would expect those who have spent fewer years in the United States to have higher levels of fertility.[4]

Our socioeconomic variables include measures of poverty and education. We expect that the poor will have higher levels of fertility and that higher levels of educational attainment and current school enrollment will correlate with lower levels of fertility. Measures of income and employment are not considered because of the endogenous nature of these two measures with women's fertility.[5]

Neighborhood Characteristics

Our measures of neighborhood characteristics are from the 1990 Decennial Census at the census tract level. Census tracts are areas designated by the Census Bureau for use in decennial enumerations. They are commonly used in other data collection efforts as well and have the particular advantage for this research of being used in the CPS data collection. Census tracts, described in greater detail in Chapter 2, are generally smaller than zip code area designations and contain 3,000 to 6,000 people.

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[4]In the regression models that follow, we include only an indicator for whether the individual is a recent immigrant.

[5]See Becker (1981) for a discussion of the price and income effect of women's wages on fertility.

Data from these Census tracts could have been incorporated into our study of immigrant fertility in several ways. Many other researchers have designated a threshold level of neighborhood ethnic concentration or neighborhood "quality" that they consider important. To protect the confidentiality of the individuals in the CPS data, the Census Bureau preferred that we use variables that are continuous rather than a threshold measure. Another option would have been to create a scale that combines all the neighborhood characteristics that could be relevant. The third approach, and the one that we use in this research, is to allow all the relevant variables that describe the neighborhood to enter separately into our fertility model.

We considered a number of measures of neighborhood characteristics that may be relevant in predicting fertility for our sample and ultimately settled on five:

- Percentage of adults who are Hispanic,
- Percentage of immigrants who arrived within the last five years,
- Percentage of Hispanics in poverty,
- Percentage of women working, and
- Percentage of adults who are Asian or Pacific Islander.

We expect the first two measures to capture the degree to which the neighborhood was cohesive and similar to the immigrant's community of origin. We include the percentage of Hispanics in poverty because individual fertility is strongly associated with income at the individual and aggregate level. Previous research on neighborhoods (Patterson, 2000) has found that the poverty rate of one's own reference group is more important in determining outcomes (such as teen pregnancy and high school dropout rates) than is the poverty rate for all residents of the tract. We include the percentage of women working in the neighborhood because the labor force participation of women is negatively associated with fertility at the individual level, and we expected that it may also be relevant at the neighborhood level. If most women work, that fact can signal individual fertility levels as well as preferences in that neighborhood for large family sizes. We also considered the percentage of Asian adults in the community because there may be different peer group effects associated with that neighborhood composition.

We also considered the percentage of adults who are foreign-born,[6] the percentage of neighborhood residents who are Hispanic, and the percentage of neighborhood residents who speak no English, but these were excluded because the correlations among them were too high (Table 4.1). For example, neighborhoods that are highly Hispanic (by either the overall measure or the percentage of adults who are Hispanic) are very likely to have a high proportion of foreign-born residents and a high proportion of residents who speak no English (with correlations of 0.63 and 0.79, respectively). The correlations among the variables we selected are all less than 0.55.

Generation, Personal Characteristics, and Neighborhood Characteristics

The relationships between immigrant generations, neighborhoods, and fertility have not yet been explored in the United States. In this section, we begin to tackle this question by examining characteristics of individuals by generation—both personal and neighborhood characteristics.[7] In later sections of this chapter, we attempt to control for immigrant generation, personal characteristics, and neighborhood characteristics simultaneously.

As we saw in Chapter 3, CEB varies by generation: Mean CEB falls from generation 1.0 to the second generation but increases somewhat from the second generation to the third. Recent fertility falls in each generation, although it is essentially unchanged between the second and third generations. We can examine whether it is variation in personal characteristics or in neighborhood characteristics that is associated with decreasing fertility by generation. Can these fertility patterns be explained by differences in personal and neighborhood characteristics by immigrant generation?

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[6]This measure includes persons of all nativities.

[7]Appendix B addresses concerns about sample clustering in the data that arise from linking individual data to neighborhood data.

Table 4.1

Correlation Matrix of Neighborhood Variables in Tracts with CPS Observations

	Percentage Hispanic	Percentage of Adults Hispanic	Percentage of Adults Asian or Pacific Islander	Percentage Foreign-Born	Percentage Who Speak No English	Percentage of Immigrants Who Arrived Within Last 5 Years	Percentage of Hispanics in Poverty	Percentage of Women Working
Percentage Hispanic	1.00	1.00	–0.07	0.63	0.79	0.13	0.40	–0.50
Percentage of adults Hispanic		1.00	–0.07	0.65	0.80	0.11	0.37	–0.50
Percentage of adults Asian or Pacific Islander			1.00	0.39	0.18	0.22	–0.13	0.16
Percentage foreign-born				1.00	0.90	0.38	0.21	–0.23
Percentage who speak no English					1.00	0.36	0.33	–0.41
Percentage of immigrants who arrived within last 5 years						1.00	0.13	0.00
Percentage of Hispanics in poverty							1.00	–0.54
Percentage of women working								1.00

Judging by the personal characteristics of generation 1.0, we would expect them to have high levels of fertility. The women of generation 1.0 are older and the most likely to be married; nearly one-third speak only Spanish in their households, and they have been in the United States for the shortest periods of time (Table 4.2). Over half live in poverty, they have the lowest levels of educational attainment, and they are the least likely to be employed. There are large differences between generations 1.0 and 1.5 on each of these dimensions, which may explain why generation 1.5 has lower fertility: They are less likely to be married, less likely to identify as Hispanic, more likely to speak English in their homes, and have been in the United States longer.

There are few differences between generations 1.0 and 1.5 on neighborhood characteristics, although there are large differences between generation 1.0 and the second and third generations. Compared to second and subsequent generations of Hispanics, generations 1.0 and 1.5 live in neighborhoods with higher percentages of Hispanic adults (more than half live in neighborhoods that are at least 30 percent Hispanic), higher percentages of adults who speak no English, and higher percentages of foreign-born residents, and of those, a higher percentage who arrived within the last five years. There are no real differences in neighborhood female employment or poverty rates for any of the generations.

The second generation has the lowest observed CEB values. Its members are the most likely to be never married and the least likely to self-identify as Hispanic (77 percent). Very few of the second-generation women reside in households where only Spanish is spoken. In terms of socioeconomic status, the values observed for the second generation are also suggestive of lower levels of fertility. They are the most likely to be enrolled in school and have mean levels of educational attainment on par with the third generation (12 years), although a greater percentage have not completed high school and a greater percentage have at least some college. The second generation is nearly as likely to be employed as the third generation (despite higher levels of school enrollment) and has low levels of poverty relative to generations 1.0 and 1.5.

The notable differences between the second and third generations are found primarily in the demographic characteristics. Third-generation

Table 4.2

Mean Characteristics of Individuals and Their Neighborhood by Generation: Mexican and Central American Women Age 15 to 44 Living in the United States

	Generation 1.0	Generation 1.5	Generation 2	Generation 3
Fertility levels[a]				
CEB	2.11	1.18	1.00	1.37
Current fertility	0.54	0.41	0.34	0.33
Personal characteristics[a]				
Demographic				
Age	31	25	25	28
Race				
White	84%	87%	87%	87%
Nonwhite	16%	13%	13%	13%
Ethnicity				
Hispanic	96%	91%	77%	100%
Non-Hispanic	4%	9%	23%	—
Marital status				
Currently married	69%	40%	34%	40%
Previously married	10%	8%	9%	14%
Never married	21%	51%	57%	47%
Immigration				
Language				
Spanish only	29%	13%	5%	1%
Not only Spanish	71%	87%	95%	99%
Years in United States	10	20	—	—
Arrival year for immigrants				
Recent (within 5 years)	27%	1%	—	—
Not recent	73%	99%	—	—
Socioeconomic status				
Poverty status				
In poverty	51%	42%	34%	32%
Above poverty	49%	58%	66%	68%
Employment				
Currently employed	44%	46%	51%	55%
Not employed	56%	54%	49%	45%
Years of education	9	11	12	12
Educational thresholds				
Less than high school diploma	65%	48%	40%	34%
High school diploma	21%	26%	25%	33%
Some college +	14%	26%	35%	33%
School enrollment				
Currently enrolled	2%	13%	19%	10%
Not enrolled	98%	87%	81%	90%

Table 4.2 (continued)

	Generation 1.0	Generation 1.5	Generation 2	Generation 3
Neighborhood characteristics [b]				
% of adults who are Hispanic	39	37	33	32
% of adults who are API	5	5	5	4
% of Hispanics in poverty	25	24	22	24
% of women working	50	51	51	51
% no English spoken	15	13	11	7
% foreign-born	29	25	21	14
% recent immigrants	28	26	22	20
% enclave residents	58	55	49	47
State of residence				
California	47%	47%	37%	23%
Other	53%	53%	63%	77%
Year of survey				
1995	50%	45%	46%	48%
1998	50%	55%	54%	52%
No. of observations	1,611	369	679	1,202

[a]SOURCE: 1995 and 1998 Fertility Supplement to the Current Population Survey.

[b]SOURCE: 1995 and 1998 June Supplement to the Current Population Survey and 1990 Decennial Census.

women are slightly older (28 compared to 25 years) and are more likely to be currently or previously married. The socioeconomic variables provide a bit of a puzzle. Their values suggest that the third generation should have lower levels of fertility than the second generation. These women are the least likely to be in poverty, the most likely to be currently working, and have levels of educational attainment equal to those of the second generation. However, they have higher average levels of CEB and current fertility.

The neighborhoods in which second- and third-generation women live provide little additional insight on this point. In general, there are few differences between the generations in the characteristics of their neighborhoods. Third-generation women live in neighborhoods where the poverty rate is slightly higher (24 percent compared to 22 percent), but on all other measures we would expect neighborhood conditions to be associated with lower levels of fertility. Third-generation women live in neighborhoods where English is more prevalent, where the percentage of foreign-born residents is lower, and where the percentage of immigrants who are recent arrivals is lower.

Some key personal characteristics vary tremendously by generation, especially between the first and second generations and the second and third generations. The same is true for neighborhood characteristics: As generation increases, the percentage of Hispanic residents in the neighborhood, the percentage of adults who speak English, and the percentage of adults who are immigrants decrease. From this analysis alone, it is not clear what explains fertility patterns for any of the generations.

Without considering the characteristics of individuals and their neighborhoods simultaneously, we cannot tell a priori which characteristics might dominate the relationships we observe in Figure 3.6 and in Table 4.2. The first generation has much higher fertility than the others, and both personal characteristics and neighborhood characteristics appear to be associated with the subsequent decline in fertility. Only by including all of these measures simultaneously in a fertility model can we understand which characteristics , if any, dominate and whether neighborhood data could serve as a useful tool in population projections.

Children Ever Born

To better understand the relationships among individual characteristics, neighborhood characteristics, and individual fertility levels, we estimate multivariate models to predict CEB for women age 15 to 44 and of Mexican or Central American descent.[8]

All Generations Combined

We begin predicting CEB by using the personal characteristics we discussed above. Table D.1 shows these results in the column headed Model I. Because CEB is a measure that accumulates with age, we take

[8]The estimates described in this section result from models using Ordinary Least Squares (OLS). We also predict CEB using generalized Poisson regressions, and Appendix C explains the merits of each type of regression. Results from both OLS and Poisson estimation are presented in Appendix D.

care to model age appropriately by including a squared term and interactions with other key variables.[9] Similarly, because educational attainment proved to be such a powerful predictor of CEB, we have interacted it with other personal characteristics and have created variables to measure for any possible role of educational thresholds: having a high school diploma or having at least some college education.

As a result of the multiple interaction terms, it is nearly impossible to read the tables presented in Appendix D and understand the relationship of any particular variable to CEB. Therefore, we describe most of our results with the assistance of graphs. However, there are a few important items to note from Table D.1. Controlling for personal characteristics, we find that each generation has higher CEB than generation 1.0, which is in sharp contrast to the results presented in Figure 3.6 and Table D.2. We conclude, therefore, that generational membership itself is not uniquely related to fertility but that variation in personal characteristics by generation matters. We also find that age, marital status, education, and poverty status are all important predictors of CEB. However, Hispanic ethnicity, school enrollment, speaking only Spanish in the household, and being a California resident do not appear to be important.[10]

Next, we add our measures of neighborhood characteristics to our estimates of CEB (Model II in Table D.1). We find that neighborhood characteristics do not provide much predictive value.[11] Only two measures of neighborhoods are statistically significant: the percentage of Hispanic adults and the percentage of Asian and Pacific Islander adults.[12] Both appear to have a negative (although slight) relationship with CEB—as the percentage of each increases, CEB decreases.

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[9]Other estimates also included age^3 and age^4 as well as interactions of age^2 with the other personal characteristics, but these additional age variables did not add explanatory power to the model.

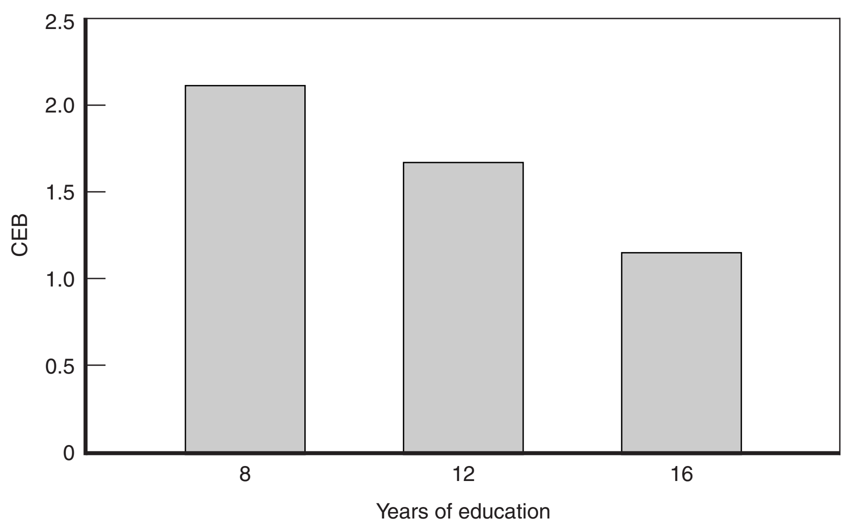
[10]We also estimated models using CPS sample weights, but the results were identical. See DuMouchel and Duncan (1983) for a complete discussion of the role of stratified sample weights in multivariate estimation.

[11]The measure of the overall fit of the model (adjusted R-squared) changes very little with the addition of the neighborhood variables, moving from 0.468 to 0.469.

[12]However, the five neighborhood variables are jointly significant.

We find that age, marital status, education, and poverty are still the most important predictors of CEB even after including neighborhood measures. The net effect of being either currently married or previously married is a level of CEB nearly 0.75 higher than if a woman is never married. We display the contribution of educational attainment and poverty to CEB graphically. If a woman were to increase her educational attainment from eight to 12 years or from 12 to 16 years, CEB falls by 0.5 (Figure 4.1).[13] Poverty status bears a similar relationship to CEB; moving above the poverty threshold lowers CEB by 0.5 (Figure 4.2).[14]

The sum of personal characteristics is much more important than the sum of neighborhood characteristics in predicting CEB. Variations in neighborhood characteristics are associated with small changes in CEB relative to similar variations in personal characteristics (Figure 4.3).

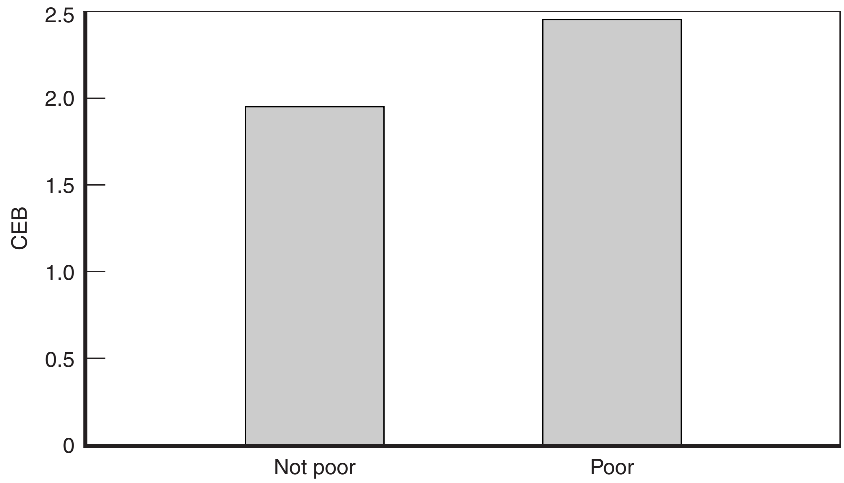


SOURCE: Authors' simulations using coefficient estimates from Table D.1 and sample means.

Figure 4.1—CEB for Average Mexican/Central American Women Age 15 to 44 by Educational Attainment

[13]Holding all other characteristics constant and at their average values.

[14]Holding all other characteristics constant and at their average values.



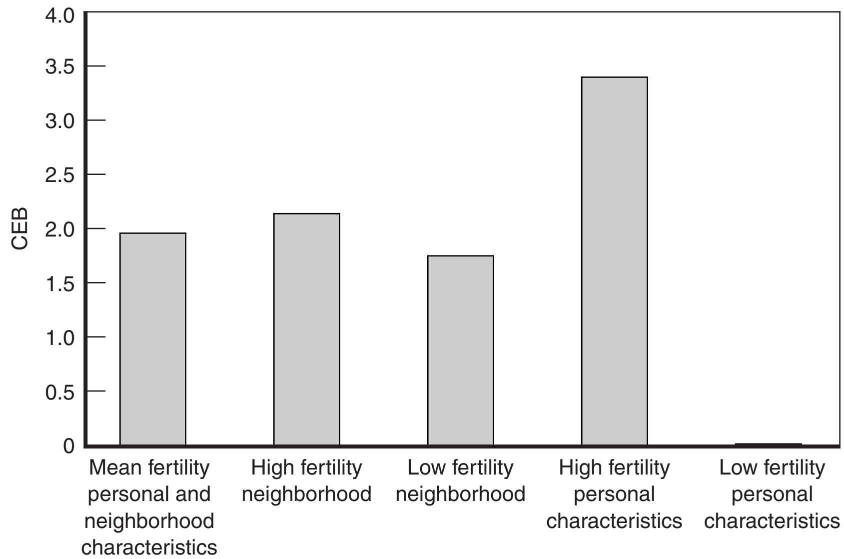
SOURCE: Authors' simulations using coefficient estimates from Table D.1 and sample means.

Figure 4.2—CEB for an Average Woman by Poverty Status

The first bar plots CEB values for women with average personal characteristics (e.g., age 29, married, with 11 years of education) and living in an average neighborhood (e.g., 36 percent Hispanic and 51 percent of women working). By varying neighborhood characteristics one standard deviation in either direction, we find that CEB changes 0.4 (the difference between the second and third bars). When we vary personal characteristics one standard deviation in either direction, we find a much larger change in CEB: 3.5. Thus, we find that personal characteristics dominate neighborhood characteristics in their relationship with CEB and that personal characteristics drive the CEB differences by generation observed in Chapter 3.

Each Generation Separate

Because it seems likely that the effects of changes in personal and neighborhood characteristics are likely to depend on the generation, we



SOURCE: Authors' simulations using coefficient estimates from Table D.1 and sample means.

NOTE: The simulation holds the values at an average in the first column to create a simulated CEB for an average woman in an average neighborhood. Each subsequent column varies either neighborhood or personal characteristics one standard deviation in either direction to simulate the hypothetical values of CEB under high and low fertility conditions.

Figure 4.3—CEB by Neighborhood and Personal Characteristics

predict CEB for each generation separately. The results of the estimates for each generation are displayed in Table D.2.[15]

We find that different measures of neighborhood characteristics are important depending on immigrant generation. In generation 1.0, higher percentages of Hispanic and Asian or Pacific Island adults are associated with lower levels of CEB. This result is statistically significant and consistent with what we observed in the overall model

[15]We find that the model fits much better for generations 1.5, 2, and 3 than it does for generation 1.0. Generations 1.5, 2, and 3 have adjusted R-squared measures of approximately 0.5, whereas the adjusted R-squared measure for generation 1.0 is only 0.36.

(Table D.1).[16] In generation 2, increases in the percentage of Hispanic adults and the percentage of women working are associated with lower CEB, although the latter is more than twice as important as the former.[17] None of the neighborhood variables is statistically significant for either generation 1.0 or generation 3.

We find that the same personal characteristics that were important in estimating CEB for all generations combined are also important when CEB is estimated for each generation separately (Table D.2). Age, educational attainment, poverty status, and marital status are all significantly related to CEB. Only Hispanic self-identity, current school enrollment, and speaking only Spanish are not statistically significant. There are two important differences among the generations, however. First, being a recent immigrant (arrived within the last five years) in the first generation suppresses CEB by –0.36. In generation 3, residing in California is associated with higher CEB (0.18), although it is not important for any other generation.

Educational attainment is clearly important to CEB levels, and its relationship changes somewhat by generation. In Figure 4.4, we plot CEB by both generation and educational attainment in one-year increments while holding all other personal and neighborhood characteristics at their average values. As a result, we find that there are important threshold effects in moving from an 11th grade education to a high school diploma and from a high school diploma to at least one year of college. These thresholds appear to be associated with approximately equal reductions in CEB for generations 1.5, 2, and 3. Generation 1.0 CEB does not appear to be as responsive to the high school diploma threshold as it is to the "some college" threshold. At every level, however, it is the CEB of the third generation that is most responsive to increases in educational attainment. CEB for generation 1.0 is the least responsive to such increases.[18]

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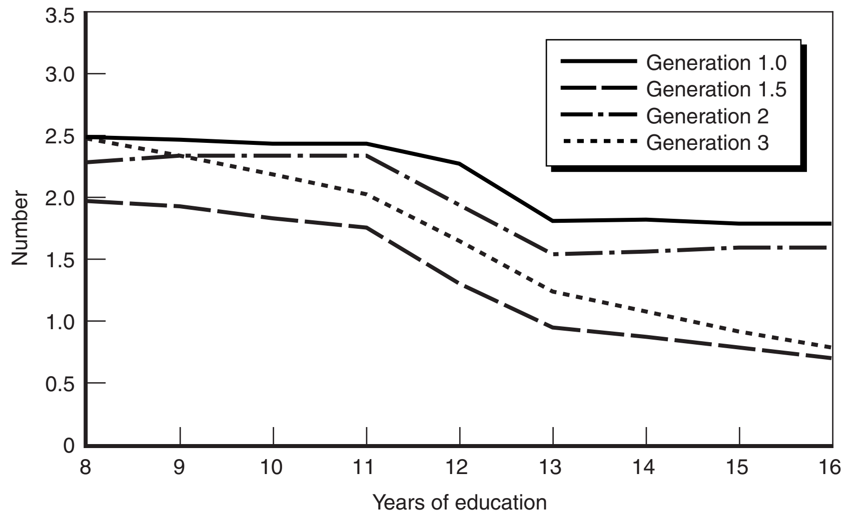
[16]The neighborhood variables are jointly significant at the 5 percent level for generation 1.0.

[17]The neighborhood variables are not jointly significant for generation 2.

[18]Generation 1.5 has the lowest simulated CEB values because sample means (rather than the values specific to generation1.5) were used. Table 4.2 shows the actual values of



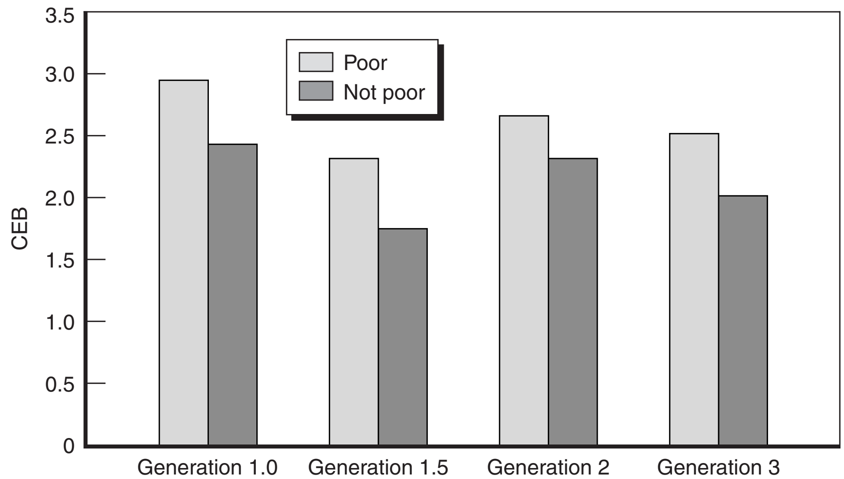
SOURCE: Authors' simulations using coefficient estimates from Table D.2 and sample means.

Figure 4.4—CEB for an Average Woman by Educational Attainment and Generation

Poverty status is also associated with statistically significant differences in CEB for every generation (see Figure 4.5). It appears that generation 2 has the weakest relationship between poverty status and CEB, but it is still relatively large—moving from poor to nonpoor is associated with a reduction in CEB of 0.35. For each of the other generations, the reduction in poverty is associated with a reduction in CEB of half a child.

The sum of personal characteristics has a stronger relationship to CEB than does the sum of neighborhood characteristics for every generation. For each generation, we present the CEB for an average woman in an average neighborhood (Figure 4.6, first bar). In the second bar, we present net changes in CEB that result from changing personal characteristics one standard deviation in either direction. The third bar present the results of the converse exercise—we hold personal

CEB for each generation, illustrating the responsiveness of each generation to educational attainment rather than demonstrating actual CEB values.



SOURCE: Authors' simulations using coefficient estimates from Table D.2 and sample means.

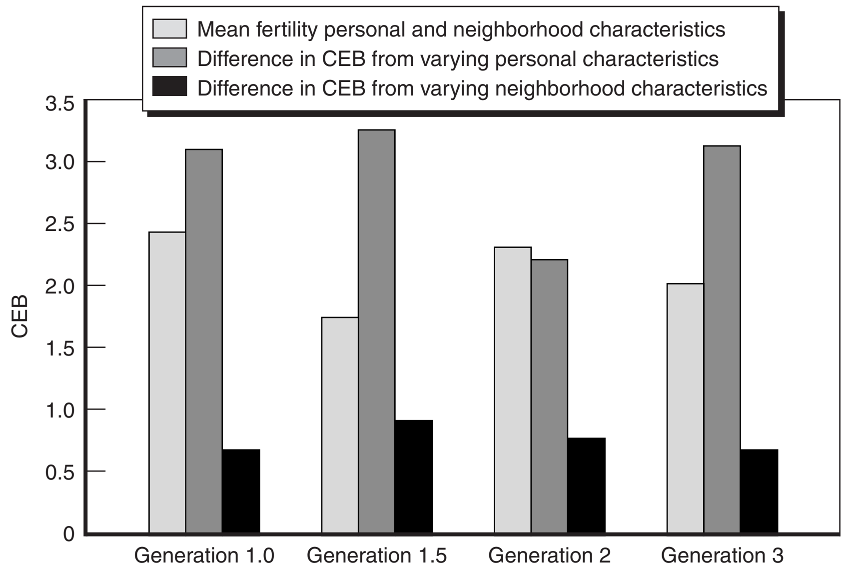
Figure 4.5—CEB for an Average Woman by Poverty Status and Generation

characteristics at their mean level and vary neighborhood characteristics a standard deviation in either direction. We find that CEB is extremely responsive to these changes in personal characteristics at the generation level. Generations 1.0, 1.5, and 3 all exhibit changes in CEB of 3.0 or greater. Generation 2 exhibits a change in CEB of 2.2. CEB is also responsive to changes in neighborhood characteristics, although much less so than to changes in personal ones. In each case, changes in CEB are under 1.0. It appears from this exercise that generation 1.5 is the most responsive to the neighborhood environment.[19] They were only statistically significant for generations 1.0 and 2.

Current Fertility, All Generations Combined

We know from Table 4.2 that the differences in current fertility (CF) by generation are small. However, we do not know from Table 4.2 whether the factors determining CF vary by generation. We expect

[19]None of the neighborhood variables was statistically significant for that generation, but this is likely due to the smaller sample size of generation 1.5 (n = 369).



SOURCE: Authors' simulations using coefficient estimates from Table D.2 and sample means.

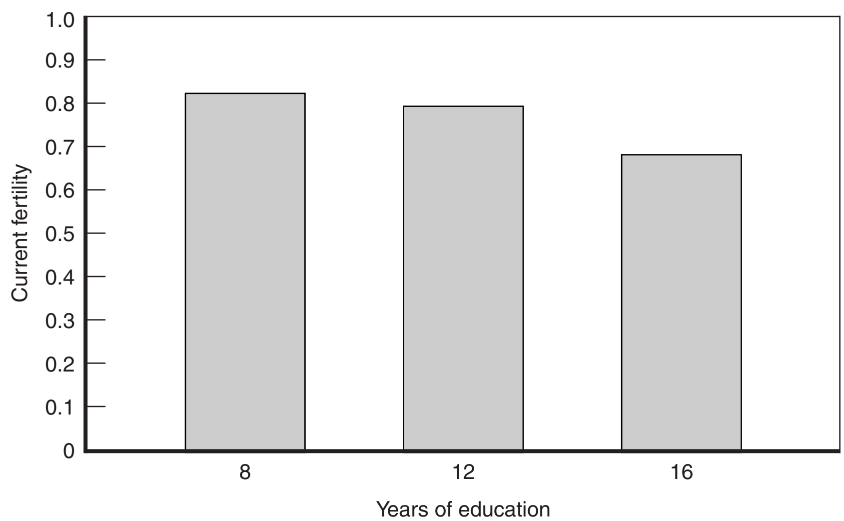
NOTE: The simulation holds the values at an average in the first column within each generation to create a simulated CEB for an average woman in an average neighborhood. Each subsequent column plots the difference between the simulated high and low values of either personal or neighborhood characteristics.

Figure 4.6—Variation in CEB for an Average Woman by Neighborhood and Personal Characteristics

personal characteristics to bear a strong relationship to recent fertility, as they do with CEB. In this section, we pursue the possibility that neighborhood characteristics do not bear as strong a relationship to fertility levels because the fertility measure, CEB, includes births that may have occurred before the woman entered her current neighborhood or even before moving to the United States (in the case of generation 1.0). To capture current fertility, we create a measure that captures births that occurred within the last five years.[20]

[20]This measure is constructed from household rosters. All women were asked the date of birth of their last child and how many children they had in total. Any woman whose most recent birth occurred within the last five years was assigned one child and was

Many of the variables that were statistically significant in estimating CEB are also important for current fertility. These include age, marital status, education, and poverty (Table D.3). Immigrant generation, self-identification as Hispanic, speaking only Spanish at home, and being enrolled in school are not statistically significant. Years of education are statistically important, although the magnitude of a change resulting from increasing education levels is low.[21] An increase in a woman's educational attainment from 12 to 16 years is associated with a reduction in CF of approximately 0.1, whereas the reduction in CF associated with increasing education from eight to 12 years is considerably less (Figure 4.7). In general, educational attainment is less important than either marital status or poverty in the relationship with CF. Adding neighborhood characteristics to the model does not improve its fit, nor



SOURCE: Authors' simulations using coefficient estimates from Table D.3.

Figure 4.7—Current Fertility for an Average Woman by Educational Attainment

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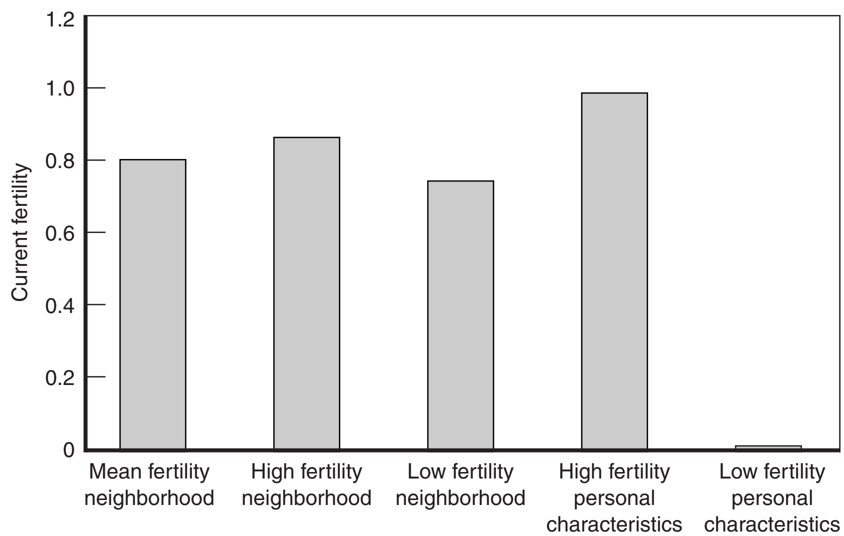
then linked to any other remaining children in the household of the appropriate age (older than the most recent birth, but five years old or younger).

[21]Poisson estimates (Table D.7) suggest that being enrolled in school is more important.

are any of the neighborhood characteristics statistically significant either individually or when tested jointly. Altering all the neighborhood variables by one standard deviation to create high and low fertility neighborhoods results in a change in CF of about 0.12 (Figure 4.8), which is similar to the change in CF associated with changing from not being enrolled to being enrolled in school. However, altering personal characteristics results in a change of nearly one child born in the last five years.

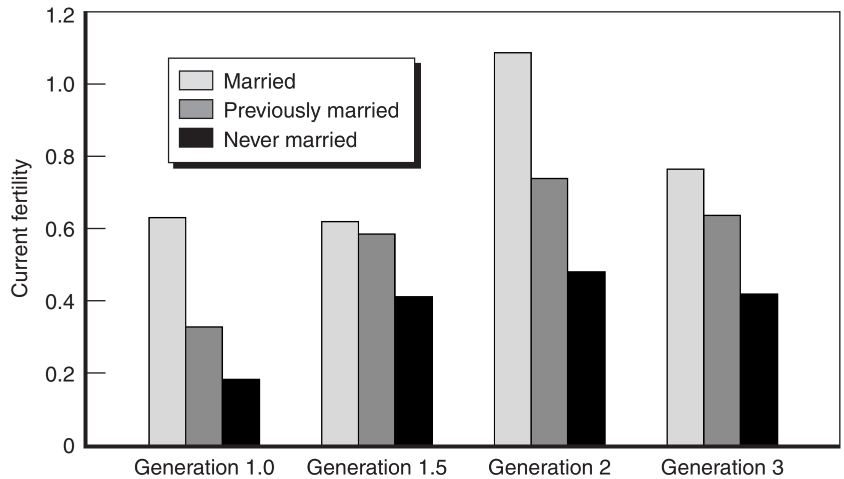
We find that marital status is important, although the differences in CF are smallest and not statistically significant for generation 1.5 (Figure 4.9). We see that years of educational attainment are associated with lower current fertility for generations 1.5, 2, and 3 but not for generation



SOURCE: Authors' simulations using coefficient estimates from Table D.3 and sample means.

NOTE: The simulation holds the values at an average in the first column to create a simulated CEB for an average woman in an average neighborhood. Each subsequent column varies either neighborhood or personal characteristics one standard deviation in either direction to simulate the hypothetical values of CEB under high and low fertility conditions.

Figure 4.8—Current Fertility for an Average Woman by Neighborhood and Personal Characteristics



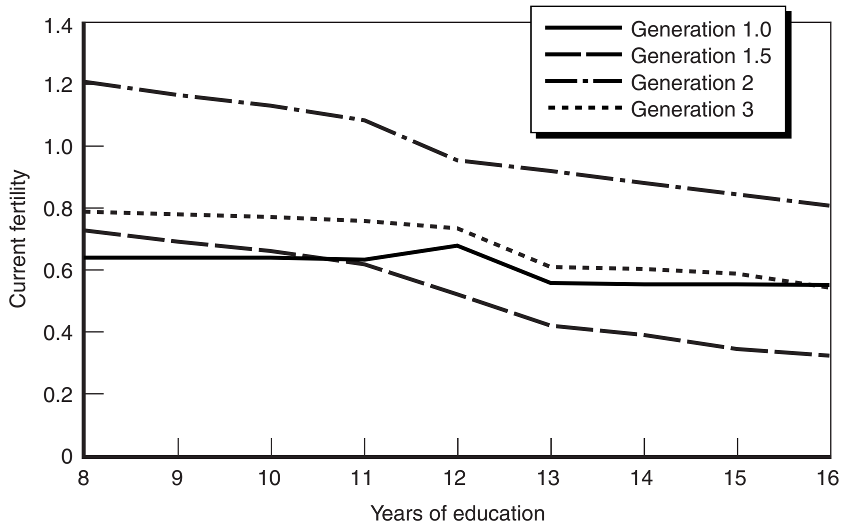
SOURCE: Authors' simulations using coefficient estimates from Table D.4 and sample means.

Figure 4.9—Current Fertility for an Average Woman by Generation and Marital Status

1.0 (Figure 4.10). School enrollment does not bear a uniform relationship to CF by generation in either magnitude or sign.[22] Being poor increases CF by approximately 0.15 births for every generation (Figure 4.11). Poverty status and marital status appear to be the most important predictors of CF. Both are measures of current conditions, unlike educational attainment. It is therefore surprising that current school enrollment bears little relationship to CF.[23] Notably, in the third generation, speaking only Spanish at home appears to be strongly associated with lower fertility. Perhaps maintaining strong Spanish language skills in the third generation is linked to high levels of education in the household, and third-generation women who speak

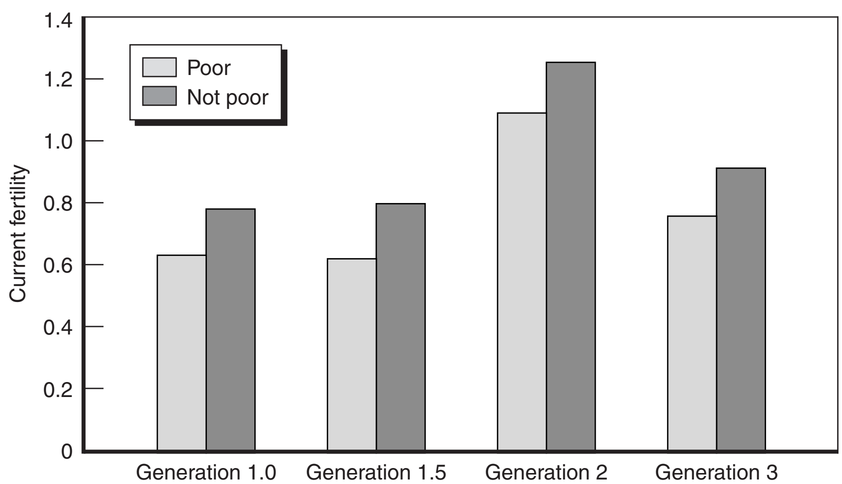
[22]The second generation has the highest simulated CF values because sample means (rather than the values specific to the second generation) were used. Table 4.2 shows the actual values of CF for each generation. Figure 4.10 illustrates the responsiveness of each generation to educational attainment rather than demonstrating actual CF values.

[23]It does appear more important in the Poisson estimates (see Table D.8).



SOURCE: Authors' simulations using coefficient estimates from Table D.4 and sample means.

Figure 4.10—Current Fertility by Generation and Educational Attainment

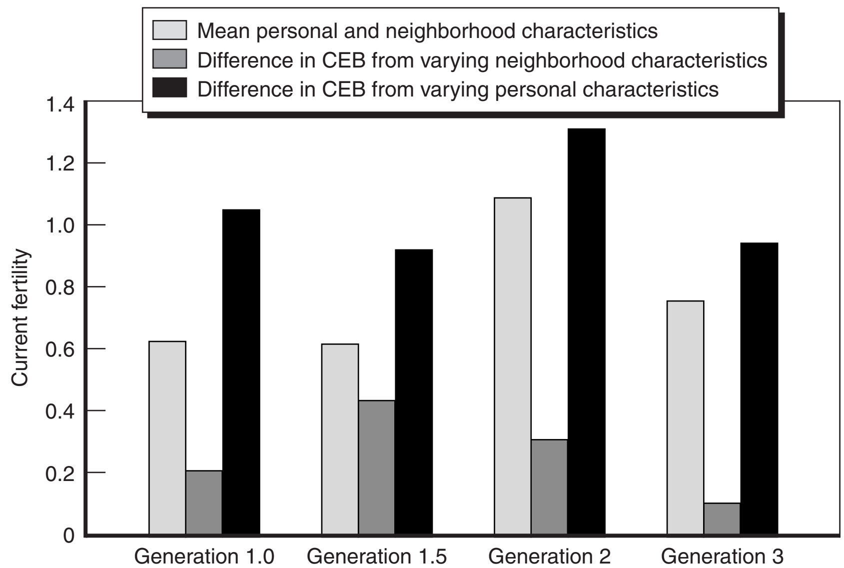


SOURCE: Authors' simulations using coefficient estimates from Table D.4 and sample means.

Figure 4.11—Current Fertility by Generation and Poverty Status

Spanish with their families may be trying to provide language enrichment for their children.

Neighborhood changes (see Figure 4.12) are most important for generations 1.5 and 2, although none are statistically significant (Table D.4) [24] and are on the order of magnitude of a change in marital status. Clearly, as was the case with CEB, changes in all the neighborhood characteristics would be dwarfed by the change in CF resulting from changes in all the personal characteristics, which are nearly one child for each generation.



SOURCE: Authors' simulations using coefficient estimates from Table D.4 and sample means.

NOTE: The simulation holds the values at an average in the first column within each generation to create a simulated CEB for an average woman in an average neighborhood. Each subsequent column plots the difference between the simulated high and low values of either personal or neighborhood characteristics.

Figure 4.12—Current Fertility Variation by Neighborhood and Personal Characteristics

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[24]The models fit best for generations 1.5 and 2, with adjusted R-squares of 0.28 and 0.27, respectively.

Conclusion

The most important determinants of fertility change among Hispanics are personal characteristics. Once we control for these, generations are no longer independently important, and the relationship between neighborhood and fertility matters little. Education is particularly important. A four-year increase in educational attainment decreases CEB by half a child. Other relevant characteristics that are associated with increasing fertility (both CEB and current fertility) are age, marital status, and family socioeconomic status (as measured by poverty).

Although we find that neighborhoods matter relatively little, this may be because our definition of neighborhood (the Census tract) is too large. However, visual inspection of tract maps and the success other researchers have had in using tracts as proxies for neighborhoods lead us to conclude otherwise. It is possible that we need better measures for our neighborhood data. For instance, a preferable measure might have been the percentage of adults who are foreign-born Hispanics, but this measure is not available with our dataset. Also the time lag between the collection of the neighborhood data (1990) and individual data (1995 and 1998) may be too long. Finally, we find that neighborhood characteristics are more relevant in predicting CEB than CF. Because CEB is the fertility measure that accumulates with time for women—as opposed to CF, which considers only the last five years—we believe that any neighborhood effect could be a measure of selection into the community rather than an effect of community characteristics. This belief places our research in the context of other studies of neighborhood effects, which find that adequately controlling for personal and family characteristics often diminishes the role of the neighborhood in determining the outcome of interest.

For the purposes of this study, however, we are more concerned with measuring any relationship between neighborhoods and fertility than we are with establishing a cause-and-effect relationship. Our data lead us to conclude that neighborhoods do not have predictive value for population projections. Despite the increasing prevalence of predominantly Hispanic communities, especially in California, this prevalence is unlikely to change the fertility adaptation we observe, although we would like to confirm this conclusion with both 1980 and 2000 data. In contrast, generations do have predictive value, although they clearly serve as a proxy for changing characteristics at the individual level, most notably educational attainment. Because these personal characteristics are difficult to measure and use in population projections, generations are an adequate and useful way of thinking about and projecting fertility change.

5. Conclusions and Implications

Conclusions

Our research set out to answer two questions that could inform population projections for California. First, we wanted to ascertain whether fertility varies by immigrant generation and, if so, by how much. Second, we wanted to understand the relationships among personal characteristics, neighborhood characteristics, and immigrant fertility.

In Chapter 3, we demonstrated that immigrant fertility does indeed vary by generation, with a dramatic decline between the first and subsequent generations. This is the case for both Asians and Hispanics. Among Hispanics, we find that fertility decline begins even within the first generation. Immigrant women who arrive before the age of 10 have lower CEB numbers than those who arrive as preteens or adults, holding their current ages constant.

When we consider the joint relationships among immigrant generation, personal characteristics, neighborhood, and fertility for women of Mexican and Central American descent, we find that generation serves as a proxy for changes in other personal characteristics that are associated with decreases in fertility. In fact, after considering a wide array of personal characteristics—such as educational attainment, marriage, ethnicity, and family economic resources—we discover that fertility would have risen slightly from first to third generation if not for the concurrent increase in educational attainment, decrease in poverty, and decrease in the percentage ever married. However, generational status remains a useful proxy for fertility decline and can be used to inform population projections.

Neighborhood characteristics bear some relationship to fertility, but that relationship was not nearly as strong as we had anticipated; their effects on fertility were consistently weaker than those of personal characteristics. The most consistent predictor of fertility at the neighborhood level is the percentage of adults who are Hispanic, although the magnitude, and even the direction, of this relationship changes depending on whether we are considering CEB or current fertility. In fact, when we consider current fertility by generation, we find that no neighborhood characteristics bear any statistical relationship to recent births. Given that the primary relationships we observe between neighborhood and fertility are for CEB rather than current fertility (which is more likely to have occurred in the current neighborhood), the relationship is more likely based on selection into the neighborhood rather than on the effects of neighborhood characteristics as such on fertility change. In any case, we conclude that the relationships between neighborhood characteristics and fertility are insufficient to justify using immigrant settlement patterns as a method to refine population projections.

Implications

The strong connections between fertility and socioeconomic characteristics by generation have important implications for California's population projections. First, we find that as educational attainment increases, fertility falls (as measured by both children ever born and current fertility). Women whose families are in poverty have higher fertility according to both measures. These patterns hold for every generation of immigrant. Educational attainment and poverty rates for each generation (shown in Table 4.2) indicate that Mexican and Central American women age 15 to 44 are less likely to live in poverty by increasing generation and are likely to become more educated. Integration or adaptation increases by generation as measured by education and poverty.

However, the rates of progress as measured by these two variables start to decrease as the generation increases. Poverty rates fall by nearly 10 percentage points between generations 1.0 and 1.5 and again between generations 1.5 and 2. Between generations 2 and 3, poverty rates fall only 2 percentage points. Similarly, average educational attainment increases by two years between generations 1.0 and 1.5, one year between generations 1.5 and 2, and by just a tenth of a year between generations 2 and 3.

We conclude that California's fertility projections for Hispanics may need to be revised downward. The projections for 1998 indicated that TFRs for Hispanics would be about 3.5 births per woman (Figure 1.7). By 1998, actual TFRs for Hispanics were already considerably lower: 2.8. In considering how best to revise fertility projections, we suggest incorporating the decline in fertility across generations of Hispanics, and acknowledging the shifting distribution of Hispanics across generations. Even using separate fertility rates for the first and subsequent generations could lead to more accurate projections. These suggestions could also be considered for projecting fertility among Asians, although this may be more difficult to implement given the diversity in the state's Asian population.

In future research, we hope to work more extensively on these fertility projection modifications. Here, we take a cursory look at the effect of adjustments to fertility projections for Hispanics on population projections. In Table 5.1, we consider the change in population growth from 2000 to 2010 with the current population projections, and with two alternative population projection scenarios.

In the first column, we see that the total population of children age 0 to 10 is expected to grow by 305,000 in the next 10 years. This projection assumes a Hispanic TFR of 3.37. If we instead use a Hispanic TFR of 2.9 (the current TFR in Mexico), we find that the population of

Table 5.1

Ten-Year Changes in California Population Projections from Reducing Hispanic TFR

	TFR = 3.37	TFR = 2.9	TFR = 2.5
Number of children age 0 to 10	6,070,000	5,765,000	5,485,000
Change in number of children age 0 to 10	+305,000	–350,000	–585,000
Elementary school (K–6) student-teacher ratio[a]	22.1	19.7	18.8

[a]Calculated by dividing the projected number of students in K–6 schools by the current number of teachers (full-time equivalents) in K–6 schools (1997). Data are from Betts, Rueben, and Danenberg (2000), Table 2.1.

children in the state would actually decrease by 350,000 from its level in 2000 (a net change of 655,000). In the third column, we use a Hispanic TFR of 2.5 (the lowest measured Hispanic TFR in the state's recent history; see Figure 1.7). We find that the population of children age 0 to 10 could be expected to fall by 585,000 from its current level in 2000. To provide a bit more context, we consider the implications for elementary school student-teacher ratios in the last row of Table 5.1. In 1997, elementary school student-teacher ratios were 21.0 (Betts, Rueben, and Danenberg, 2000). Given current fertility assumptions, the population growth in the number of school-age children (holding the number of teachers constant) would result in a student-teacher ratio of 22.1 by 2010. However, using our moderate middle fertility assumption for Hispanics, the student-teacher ratio could fall to 19.7 without hiring additional teachers.

In summary, we find that neighborhoods are not independently linked to fertility among immigrants from Mexico and Central America and their descendants. We do find a decline in fertility across generations of Mexican and Central American women, especially from first to subsequent generations. This decline begins with the first generation. The decline between the second and third generations is less clear and is probably explained by our reliance on self-identification of Hispanic ethnicity to construct the third generation. Previous research has shown that Hispanic self-identification is associated with lower socioeconomic status. Therefore, our third-generation immigrants may have high fertility in part because we had to rely on Hispanic self-identification (rather than grandparents' nativity) to define this group. We also find that the decline in fertility among generations has more to do with assimilation or adaptation in other personal characteristics, such as educational attainment and family resources, than with any generational effect. In fact, because we observe diminishing rates of progress in these measures, we suggest these areas may be ripe for additional research and possible policy intervention. However, generation is an important tool for guiding future fertility and population projections, work which we hope to undertake in upcoming research projects.

Appendix A

Merging CPS and Census Data

Chapter 2 described our data sources briefly. In this appendix, we explain how two of our data sources (the CPS and Census data) were merged to create a unique source of fertility data that includes information both on individuals and on their neighborhoods. Recall that our individual fertility and nativity data are from the 1995 and 1998 June supplements to the CPS and that the neighborhood data are from the 1990 Census Summary Tape Files (3A). Merging these two sources was quite successful; approximately 93 percent of individuals in the CPS were matched with neighborhood data in the Census files. However, even though such a small proportion of individuals were not successfully matched, we use this appendix to compare the characteristics of those who matched with those who did not.

To make the link between the two datasets, state, county, and Census tract (neighborhood) variables are required because Census tract numbers are unique only within a county. Once these links were made, we found that approximately 7 percent of the individuals from the CPS could not be matched with data from the Census. As is seen in Table A.1, there was no appreciable difference in the success rate of the merge between 1995 and 1998. A close inspection of the data revealed that the vast majority of individuals in the CPS whom we could not match with tract data from the Census failed to match because there was no tract

Table A.1

Sample Size Before and After Merge of 1995/1998 CPS and 1990 Census Data

	June 1995	June 1998
Before merge	12,344	12,068
After merge	11,367	11,288
Percentage lost	7.9%	6.5%

number entered in the CPS. Some cases failed to merge because the tract numbers entered appeared to be erroneous, but these were relatively few.

We next investigated whether those individuals in the CPS for whom we could match neighborhood data differed from those who could not be matched based on nativity or racial and ethnic group. In Table A.2, it is clear that these differences are minor. Those born in Mexico or countries other than the United States were slightly more likely to have been matched successfully with neighborhood data than are those born in the United States. Similarly, African-Americans were more likely than whites to have been matched successfully, as were those of Hispanic origin. The higher match rate for these minority groups may suggest that the CPS is not particularly good at capturing representative minorities in its sampling strategy. It suggests that the CPS has success finding a cross section of whites, but the minorities it finds are in more established communities. This is a known problem with the Decennial Census, and it is thought to be somewhat worse for the CPS.

For those key racial and ethnic groups, we also compare differences in one of our key fertility measures for those who did and did not merge successfully. Table A.3 displays the difference in CEB for those lost and retained in our merging procedure. It appears that values for CEB that did not merge successfully varied slightly in 1995 from in 1998, although

Table A.2

Percentage Lost in Merge for Key Nativity and Racial/Ethnic Groups

	1995	1998
Place of birth		
United States	10	10
Mexico	7	7
Other	8	10
Race		
White	11	11
African-American	5	5
Hispanic origin		
Mexican	7	8
Central/South American	4	5

Table A.3

Difference in CEB for Those Lost and Retained in Data Merge

	1995	1998
Place of birth		
United States	0.12	–0.02
Mexico	0.15	–0.13
Other	0.13	–0.02
Race		
White	0.09	–0.03
African-American	0.29	0.04
Hispanic origin		
Mexican	0.20	–0.08
Central/South American	0.19	0.04

the net differences were small in all cases (greater than one-quarter of a child in only one case). In 1995, the greatest net difference is found among African-Americans and those of Mexican origin, and in 1998, the greatest net difference is found among those born in Mexico.

Both the number and type of cases that were lost in the merging procedure gave us little concern about the quality of our resulting dataset. There were no appreciable differences in types of cases lost according to race/ethnicity or nativity. There were slight differences in the values for CEB that failed to merge, but these depended on the year in question. To consider these slight differences in our estimation of the relationship between immigrant generation and neighborhood, we include dummy variables for year in the models estimated in Chapter 4.

Appendix B

Clustering Corrections

The CPS is not a simple random sample. Because certain tracts are oversampled, it is necessary to correct standard errors associated with the statistical models employed in our analyses. As shown in Table B.1, clustering by tract is not especially predominant in our sample. The number of respondents per tract is often only one and rarely more than several. Given the general lack of clustering in our sample, it is not surprising that we find that the correction for clustering does not change our primary findings (as discussed below).

We used Stata statistical software to adjust the standard errors in the regression models employed with our sample. Standard errors adjusted for clustering are only slightly higher than those without adjustments. For example, in OLS regressions on children ever born for all generations combined, the average standard error was about 1.1 times greater in the regressions adjusting for clustering than in the unadjusted regressions.

Table B.1

Distribution of Tracts by Number of Observations

Quantile	Number of Observations
100% max	47
99%	17
95%	8
90%	6
75% Q3	3
50% median	2
25% Q1	1
10%	1
5%	1
1%	1
0% min	1

Standard error corrections were not uniform across all variables; standard error corrections for the coefficients of certain variables were somewhat greater than the average correction. For example, the cluster-corrected standard error for the parameter estimate for years of education was 1.3 times greater than the unadjusted standard error. Still, the increase in standard errors associated with the clustering correction did not change our primary findings. With very few exceptions, the significance level of the parameter estimates remained unchanged. And where the significance level did change, it was only for variables that already were only marginally significant. For example, in OLS regressions on CEB for all generations combined, the significance level changed for only one variable: The percentage of Hispanics in poverty in the tract was positively correlated with CEB at the 10 percent level of significance in the regressions that did not correct for clustering,[1] but it was not significant in the regressions with the clustering correction. Results for other regression models were similar, with significance levels changing only for variables that were marginally significant before the correction.

[1]The magnitude of the effect was small, with a 50 percent increase in the poverty rate associated with only a 0.1 increase in CEB.

Appendix C

Distributional Assumptions and Allocation in Fertility Data

This appendix addresses two concerns that could affect the results of our multivariate estimations. The first is the distributional assumptions of the estimation techniques we employ, and the second is the degree of allocation in one of our dependent variables, CEB.

Distributional Assumptions

The most common estimation technique, OLS, assumes that the data being fitted have a conditional distribution that is normal, or bell-curved. This is generally not the case with fertility data. By definition, the fertility of individuals is count data—that is, it takes on whole number values. Fractions and decimals are not possible in the measurement of children born to an individual woman. In addition, counts of children can be only positive (zero or greater); and for U.S. data, they tend to have modes of two children per woman, with high numbers of zeros and ones, few of three or more, but can reach as many as 12 or more. Some research has demonstrated that such data are better estimated with methods that assume different conditional distributions, such as the Poisson or negative binomial distribution (Wang and Famoye, 1997). In this section, we examine which estimation techniques make the most sense given the data we use.

Both the Poisson and negative binomial distributions are ideal for estimating models describing count data such as measures of CEB and CF. Both are discrete distributions and use maximum likelihood estimators (MLE). Models estimated using maximum likelihood produce estimates that fit the observed data with the greatest probability. In the case of fertility data, MLE estimators should be more efficient estimators than OLS. This means that although the coefficient estimates should be approximately the same, the standard errors will be smaller.

There are a few diagnostic tests for deciding which of the two likely MLE estimation methods should be used in the analysis of the existing data. Table C.1 presents the results of one such test. To use estimation methods relying on the Poisson distribution, the data must be equidispersed. This requires that the conditional mean and variance be equal. If the variance is less than the mean, the data are said to be underdispersed and many researchers will then use the generalized Poisson regression model. If, on the other hand, the variance is greater than the mean, the data are overdispersed and estimation methods relying on the negative binomial distribution are suggested. The results in Table C.1 indicate that both CEB and current fertility would best be estimated using the generalized Poisson regression models. In both cases, the variance is less than the mean

In practice, we estimated all of our models with OLS and with the generalized Poisson. There are few differences between the two estimations. Levels of statistical significance vary only slightly, and the relative magnitudes of coefficients change even less. For simplicity, in the body of the report, our figures and discussions were based on the coefficients from the OLS estimation. Appendix D reports both sets of coefficient estimates (OLS and the estimates based on alternative distributions) for each dependent variable of interest (CEB and CF).

Table C.1

Conditional Distribution of Data

	CEB	Current Fertility
Mean	1.60	0.43
Variance	1.39	0.33

NOTE: Mean and variance are conditioned on personal and neighborhood characteristics.

Allocation of CEB

A second concern is the extent of allocation done by the CPS in the construction of our key dependent variable, CEB. Because we constructed CF using household rosters, we do not have concerns about allocation in that variable. Most women answered the question about the number of live births they had ever had, but approximately 9 percent did not. For that 9 percent, the CPS allocated children ever born using household rosters. Below, we examine how prevalent the allocation of CEB is by year and by other important variables in our sample of Mexican and Central American women. Sample size is sufficiently large in 1995 to provide breakdowns by these variables, but it is not in 1998.[1]

Clearly, allocation is a larger problem in 1995 than in 1998. This may explain why some of the multivariate estimates found that fertility was significantly lower in 1995 than in 1998. Greater use of allocation in 1995 may have led to underestimates of CEB. In addition, we find that CEB is more likely to be allocated for first-generation Mexican and Central American women than for the second and third generation combined. Lack of English language proficiency may explain some of this increased allocation for the first generation relative to the others. Perhaps the respondent did not understand the question and gave no answer or gave one that was recoded by the interviewer later. However, individuals in neighborhoods with higher concentrations of Hispanics do not appear to be different in terms of levels of CEB allocation.

To assess the possible effect of allocation in our dependent variable, we estimated all CEB models without the individuals where CEB had been allocated. We cannot report those coefficients here because of confidentiality concerns, but the results are essentially unchanged. We find that the dummy for 1995 is no longer significant once allocated CEB records are dropped in estimations where generations are combined, but that it retains its significance for the third generation, although its magnitude is decreased. We conclude, therefore, that allocation is not a serious problem in our measure of CEB (see Table C.2).

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[1]Sample size was less than 75, the minimum required for disclosure when using restricted access data through the California Census Research Data Center.

Table C.2

Allocation of CEB

	Percentage Allocated
Overall	9
1995	12
1998	7
By generation	
1st	11
2nd plus	7
Percentage Hispanic in tract	
<30	10
≥30	9
Language	
Spanish only	10
Not only Spanish	6

Appendix D

Regression Results

Table D.1

CEB, All Generations, OLS

	Model I		Model II	
	Estimate	SE	Estimate	SE
Intercept	–2.5497	0.4467	–2.2153	0.4902
Generation 1.5	0.1526	0.0720	0.1456	0.0721
Generation 2	0.1297	0.0633	0.1183	0.0636
Generation 3	0.1701	0.0543	0.1514	0.0552
Age	0.2491	0.0241	0.2482	0.0242
Age^2	–0.0030	0.0004	–0.0031	0.0004
Hispanic	–0.0463	0.0817	–0.0307	0.0824
Years of education	–0.1049	0.0390	–0.1113	0.0394
Currently enrolled	–0.1602	0.5827	–0.1444	0.5830
Only high school diploma	0.5783	0.2253	0.5875	0.2255
Some college or more	0.2476	0.2808	0.2607	0.2814
Married	–0.7551	0.2259	–0.7583	0.2259
Previously married	0.8712	0.0796	0.8661	0.0796
Spanish only	–0.3066	0.2602	–0.2999	0.2615
In poverty	0.4941	0.0413	0.4933	0.0416
Age*years of education	0.0007	0.0012	0.0008	0.0012
Age*enrolled	–0.0320	0.0364	–0.0327	0.0364
Age*only high school diploma	–0.0283	0.0076	–0.0286	0.0076
Age*some college or more	–0.0292	0.0095	–0.0293	0.0095
Age*married	0.0394	0.0061	0.0391	0.0061
Age*Spanish only	–0.0050	0.0068	–0.0050	0.0068
Age*poverty	0.0001	0.0001	0.0002	0.0002
Years of education*enrolled	0.0640	0.0461	0.0642	0.0461
Years of education*married	0.0415	0.0123	0.0417	0.0123
Years of education*Spanish only	0.0357	0.0153	0.0360	0.0153
Years of education*poverty	–0.0001	0.0003	0.0001	0.0004
1995 CPS	–0.0413	0.0377	–0.0383	0.0377
California	0.0100	0.0404	0.0705	0.0461
Neighborhood variables				
% adults Hispanic			–0.0014	0.0008
% adults Asian or Pacific Islander			–0.0062	0.0026
% Hispanics in poverty			–0.0037	0.0061
% women work			–0.0030	0.0024
% immigrants who are recent			–0.0014	0.0016
Adjusted R^2	0.4684		0.4692	

Table D.2

CEB, Each Generation, OLS

	Generation 1.0		Generation 1.5		Generation 2		Generation 3	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Intercept	–2.2574	0.9357	–1.8882	1.7323	–0.0938	1.0357	–2.0901	0.9203
Age	0.2483	0.0465	0.2261	0.0914	0.1785	0.0522	0.2773	0.0421
Age^2	–0.0029	0.0007	–0.0021	0.0013	–0.0030	0.0009	–0.0035	0.0006
Hispanic	–0.1608	0.1688	0.2204	0.2071	–0.0232	0.0977		
Years of education	–0.0582	0.0651	–0.1509	0.1565	–0.2606	0.1050	–0.1850	0.0875
Currently enrolled	0.8227	2.0606	–1.7415	1.3071	–0.1066	0.8186	–0.0301	0.8887
Only high school diploma	0.3155	0.4774	1.2888	0.6779	1.2053	0.4687	0.6201	0.3415
Some college or more	–0.2674	0.6446	1.2705	0.8637	1.2242	0.5824	0.2124	0.4413
Married	–0.9301	0.3927	–1.6857	0.7536	–0.4195	0.5487	0.0661	0.5022
Previously married	0.8302	0.1497	1.1235	0.2481	0.8938	0.1695	0.7840	0.1168
Spanish only	0.1961	0.3822	–0.7429	0.9255	–1.3475	1.0560	–1.2031	1.3633
In poverty	0.5352	0.0704	0.5388	0.1240	0.3446	0.0834	0.4812	0.0726
Recent immigrant	–0.3668	0.0860						
Age*years of education	0.0000	0.0019	–0.0011	0.0060	0.0073	0.0036	0.0009	0.0028
Age*enrolled	–0.0241	0.1085	–0.0342	0.0831	–0.0305	0.0576	–0.1100	0.0625
Age*only high school diploma	–0.0163	0.0152	–0.0567	0.0261	–0.0549	0.0180	–0.0289	0.0115
Age*some college or more	–0.0107	0.0201	–0.0663	0.0326	–0.0692	0.0228	–0.0232	0.0149
Age*married	0.0455	0.0112	0.0505	0.0206	0.0185	0.0151	0.0258	0.0098
Age*Spanish only	–0.0164	0.0103	–0.0314	0.0265	–0.0187	0.0287	0.0189	0.0285
Age*poverty	–0.0001	0.0003	0.0006	0.0005	0.0011	0.0003	0.0000	0.0002
Years of education*enrolled	–0.0431	0.0900	0.2066	0.1173	0.0603	0.0822	0.1793	0.0903
Years of education*married	0.0446	0.0191	0.1032	0.0511	0.0584	0.0444	0.0012	0.0350
Years of education*Spanish only	0.0315	0.0195	0.1268	0.0689	0.1603	0.0957	0.0214	0.1151
Years of education*poverty	–0.0010	0.0006	0.0007	0.0017	–0.0024	0.0011	0.0017	0.0009
1995 CPS	0.0474	0.0682	0.0426	0.1158	–0.0960	0.0742	–0.1299	0.0615
California	0.0111	0.0773	0.1009	0.1326	0.0876	0.0900	0.1776	0.0856

Table D.2 (continued)

	Generation 1.0		Generation 1.5		Generation 2		Generation 3	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Neighborhood variables								
% adults Hispanic	–0.0027	0.0014	0.0020	0.0024	–0.0039	0.0016	0.0000	0.0013
% adults Asian or Pacific Islander	–0.0109	0.0046	–0.0127	0.0081	0.0032	0.0047	–0.0046	0.0047
% Hispanics in poverty	0.0120	0.0124	–0.0200	0.0207	0.0065	0.0120	–0.0160	0.0116
% women work	–0.0058	0.0042	0.0007	0.0072	–0.0092	0.0046	0.0036	0.0039
% immigrants who are recent	0.0006	0.0028	0.0016	0.0052	–0.0036	0.0032	–0.0015	0.0025
Adjusted R^2	0.3597		0.5111		0.5093		0.4881	

Table D.3

CF, All Generations, OLS

	Model I		Model II	
	Estimate	SE	Estimate	SE
Intercept	–0.8304	0.2208	–0.7729	0.2426
Generation 1.5	–0.0362	0.0356	–0.0373	0.0357
Generation 2	0.0054	0.0313	0.0055	0.0315
Generation 3	–0.0154	0.0269	–0.0140	0.0273
Age	0.1149	0.0119	0.1154	0.0120
Age^2	–0.0023	0.0002	–0.0023	0.0002
Hispanic	–0.0060	0.0404	–0.0093	0.0408
Years of education	–0.0418	0.0193	–0.0403	0.0195
Currently enrolled	–0.3704	0.2881	–0.3634	0.2885
Only high school diploma	0.1073	0.1114	0.1078	0.1116
Some college or more	–0.3388	0.1388	–0.3336	0.1393
Married	0.7576	0.1117	0.7564	0.1118
Previously married	0.1833	0.0394	0.1847	0.0394
Spanish only	–0.1356	0.1286	–0.1463	0.1294
In poverty	0.1566	0.0204	0.1533	0.0206
Age*years of education	0.0007	0.0006	0.0007	0.0006
Age*enrolled	0.0057	0.0180	0.0053	0.0180
Age*only high school diploma	–0.0039	0.0038	–0.0039	0.0038
Age*some college or more	0.0082	0.0047	0.0080	0.0047
Age*married	–0.0184	0.0030	–0.0183	0.0030
Age*Spanish only	0.0032	0.0034	0.0034	0.0034
Age*poverty	0.0000	0.0001	–0.0001	0.0001
Years of education*enrolled	0.0128	0.0228	0.0128	0.0228
Years of education*married	0.0166	0.0061	0.0165	0.0061
Years of education*Spanish only	0.0075	0.0076	0.0079	0.0076
Years of education*poverty	0.0002	0.0001	0.0001	0.0002
1995 CPS	–0.0107	0.0186	–0.0111	0.0187
California	0.0126	0.0200	0.0155	0.0228
Neighborhood variables				
% adults Hispanic			–0.0002	0.0004
% adults Asian or Pacific Islander			–0.0011	0.0013
% Hispanics in poverty			0.0011	0.0030
% women work			–0.0016	0.0012
% immigrants who are recent			0.0007	0.0008
Adjusted R^2	0.2271		0.2268	

Table D.4

CF, Each Generation, OLS

	Generation 1.0		Generation 1.5		Generation 2		Generation 3	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Intercept	–0.3761	0.4469	–1.8403	0.8919	–0.2454	0.5897	–0.9314	0.4576
Age	0.0927	0.0222	0.2383	0.0470	0.1270	0.0297	0.1193	0.0210
Age^2	–0.0019	0.0003	–0.0041	0.0007	–0.0036	0.0005	–0.0021	0.0003
Hispanic	–0.0131	0.0806	0.1178	0.1066	–0.0237	0.0556		
Years of education	–0.0448	0.0311	–0.1469	0.0806	–0.1452	0.0598	–0.0158	0.0435
Currently enrolled	–0.2590	0.9842	–0.1778	0.6730	–0.0383	0.4661	–0.7512	0.4419
Only high school diploma	0.1627	0.2280	0.5962	0.3490	–0.1333	0.2669	0.0871	0.1698
Some college or more	–0.3900	0.3079	–0.3302	0.4447	–0.2056	0.3316	–0.4690	0.2194
Married	0.7270	0.1876	0.1836	0.3880	1.3915	0.3125	0.5878	0.2497
Previously married	0.1404	0.0715	0.1859	0.1278	0.2548	0.0965	0.2141	0.0581
Spanish only	0.0825	0.1825	–0.2278	0.4765	–0.9984	0.6013	–1.4020	0.6779
In poverty	0.1440	0.0336	0.1740	0.0638	0.1589	0.0475	0.1592	0.0361
Recent immigrant	–0.0524	0.0411						
Age*years of education	0.0007	0.0009	0.0009	0.0031	0.0055	0.0020	–0.0006	0.0014
Age*enrolled	0.0283	0.0518	–0.0755	0.0428	–0.0211	0.0328	0.0199	0.0311
Age*only high school diploma	–0.0041	0.0073	–0.0229	0.0134	0.0009	0.0102	–0.0031	0.0057
Age*some college or more	0.0109	0.0096	0.0068	0.0168	0.0038	0.0130	0.0119	0.0074
Age*married	–0.0182	0.0053	–0.0312	0.0106	–0.0074	0.0086	–0.0171	0.0049
Age*Spanish only	–0.0030	0.0049	0.0066	0.0136	0.0051	0.0163	0.0277	0.0142
Age*poverty	0.0001	0.0002	–0.0005	0.0003	0.0001	0.0002	–0.0002	0.0001
Years of education*enrolled	–0.0473	0.0430	0.1327	0.0604	0.0317	0.0468	0.0249	0.0449
Years of education*married	0.0230	0.0091	0.0852	0.0263	–0.0515	0.0253	0.0219	0.0174
Years of education*Spanish only	0.0053	0.0093	0.0179	0.0355	0.0824	0.0545	0.0448	0.0572
Years of education*poverty	0.0000	0.0003	0.0018	0.0009	–0.0005	0.0006	0.0006	0.0004
1995 CPS	0.0516	0.0326	0.0059	0.0596	–0.0819	0.0423	–0.0573	0.0306
California	0.0180	0.0369	–0.0772	0.0683	0.0090	0.0512	0.0403	0.0426

Table D.4 (continued)

	Generation 1.0		Generation 1.5		Generation 2		Generation 3	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Neighborhood variables								
% adults Hispanic	–0.0001	0.0007	0.0017	0.0013	–0.0009	0.0009	–0.0007	0.0006
% adults Asian or Pacific Islander	–0.0020	0.0022	–0.0011	0.0042	0.0006	0.0027	–0.0011	0.0024
% Hispanics in poverty	–0.0047	0.0059	–0.0079	0.0106	0.0056	0.0068	0.0004	0.0058
% women work	–0.0021	0.0020	0.0026	0.0037	–0.0033	0.0026	–0.0007	0.0019
% immigrants who are recent	0.0004	0.0013	0.0009	0.0027	–0.0004	0.0018	0.0011	0.0012
Adjusted R^2	0.1848		0.2807		0.2671		0.2101	

Table D.5

CEB, All Generations, Poisson

	Model I		Model II	
	Estimate	SE	Estimate	SE
Intercept	–4.5275	0.3973	–4.5249	0.4364
Generation 1.5	0.0997	0.0539	0.0945	0.0541
Generation 2	0.0827	0.0489	0.0732	0.0493
Generation 3	0.0958	0.0368	0.0847	0.0375
Age	0.2941	0.0196	0.2966	0.0200
Age^2	–0.0039	0.0003	–0.0039	0.0003
Hispanic	–0.0224	0.0619	–0.0154	0.0622
Years of education	–0.0977	0.0313	–0.0982	0.0316
Currently enrolled	–3.2204	1.0446	–3.1628	1.0469
Only high school diploma	0.2427	0.1946	0.2853	0.1953
Some college or more	–0.9453	0.2675	–0.8900	0.2689
Married	0.3241	0.1681	0.3214	0.1684
Previously married	0.5318	0.0548	0.5307	0.0548
Spanish only	–0.1240	0.2055	–0.1435	0.2060
In poverty	0.3273	0.0283	0.3235	0.0285
Age*years of education	0.0011	0.0009	0.0013	0.0009
Age*enrolled	0.1638	0.0527	0.1619	0.0527
Age*only high school diploma	–0.0112	0.0058	–0.0125	0.0058
Age*some college or more	0.0154	0.0079	0.0137	0.0079
Age*married	–0.0025	0.0045	–0.0027	0.0045
Age*Spanish only	–0.0018	0.0054	–0.0013	0.0054
Age*poverty	–0.0001	0.0001	–0.0002	0.0001
Years of education*enrolled	–0.0431	0.0630	–0.0443	0.0631
Years of education*married	0.0402	0.0078	0.0403	0.0078
Years of education*Spanish only	0.0139	0.0095	0.0148	0.0095
Years of education*poverty	0.0004	0.0002	0.0003	0.0002
1995 CPS	–0.0295	0.0258	–0.0287	0.0259
California	0.0096	0.0275	0.0493	0.0317
Neighborhood variables				
% adults Hispanic			–0.0008	0.0005
% adults Asian or Pacific Islander			–0.0046	0.0020
% Hispanics in poverty			0.0061	0.0050
% women work			–0.0016	0.0016
% immigrants who are recent			–0.0005	0.0011
Log likelihood	–1608		–1603	

Table D.6

CEB, Each Generation, Poisson

	Generation 1.0		Generation 1.5		Generation 2		Generation 3	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Intercept	–3.5223	0.6313	–5.1653	1.8145	–3.4054	1.5152	–4.1259	1.1123
Age	0.2367	0.0305	0.3922	0.0859	0.3149	0.0609	0.3154	0.0413
Age^2	–0.0031	0.0004	–0.0054	0.0012	–0.0049	0.0009	–0.0043	0.0005
Years of education	–0.0648	0.0401	–0.2467	0.1467	–0.2962	0.1498	–0.1951	0.1035
Currently enrolled	–1.9786	3.5404	–9.2907	3.1583	–1.0119	1.9182	–3.9795	1.9589
Only high school diploma	–0.0493	0.3139	0.8247	0.6952	0.8794	0.5973	0.3977	0.3646
Some college or more	–1.1740	0.4676	–0.2539	0.9425	–0.0651	0.8338	–0.8014	0.5281
Married	0.1009	0.2503	–0.0563	0.6694	0.4094	0.5422	0.4261	0.399
Previously married	0.4140	0.0823	0.6868	0.1889	0.6887	0.1647	0.5463	0.0935
Spanish only	0.0856	0.2340	–0.1791	0.9762	–2.0525	1.5392	–2.8182	1.6102
In poverty	0.2625	0.0373	0.4942	0.1117	0.4515	0.0950	0.3525	0.0578
Recent immigrant	–0.2014	0.0499						
Age*years of education	0.0008	0.0011	0.0028	0.0050	0.0061	0.0043	0.0017	0.0029
Age*enrolled	0.1550	0.1722	0.1805	0.1485	0.2112	0.1052	0.0180	0.105
Age*only high school diploma	–0.0019	0.0093	–0.0331	0.0235	–0.0285	0.0191	0.0138	0.0106
Age*some college or more	0.0225	0.0133	–0.0071	0.0310	–0.0083	0.0265	0.0157	0.0151
Age*married	0.0036	0.0069	–0.0124	0.0173	–0.0146	0.0142	0.0092	0.0081
Age*Spanish only	–0.0063	0.0063	–0.0306	0.0277	0.0024	0.0367	0.1076	0.055
Age*poverty	–0.0002	0.0002	–0.0003	0.0005	–0.0001	0.0003	0.0004	0.0002
Years of education*enrolled	–0.1965	0.0883	0.4640	0.2345	–0.3027	0.1488	0.3316	0.1815
Years of education*married	0.0365	0.0107	0.1162	0.0439	0.0755	0.0418	0.0484	0.0256
Years of education*Spanish only	0.0122	0.0102	0.1113	0.0601	0.1827	0.1122	0.1185	0.1213
Years of education*poverty	–0.0004	0.0003	0.0013	0.0014	–0.0006	0.0010	0.0016	0.0007
1995 CPS	0.0192	0.0354	0.0131	0.1056	–0.1549	0.0823	0.0890	0.0503
California	0.0090	0.0406	0.0833	0.1170	0.0759	0.1067	0.1817	0.0711

Table D.6 (continued)

	Generation 1.0		Generation 1.5		Generation 2		Generation 3	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Neighborhood variables								
% adults Hispanic	–0.0013	0.0007	0.0027	0.0022	–0.0022	0.0018	0.0002	0.0011
% adults Asian or Pacific Islander	–0.0054	0.0026	–0.0080	0.0066	0.0040	0.0057	0.0046	0.0044
% Hispanics in poverty	0.0084	0.0075	–0.0047	0.0214	0.0154	0.0146	0.0016	0.0113
% women work	–0.0024	0.0022	–0.0007	0.0067	–0.0064	0.0048	0.0038	0.0033
% immigrants who are recent	0.0005	0.0015	0.0025	0.0047	–0.0038	0.0031	0.0011	0.0021
Log likelihood	–409		–169		–355		–602	

Table D.7

CF, All Generations, Poisson

	Model I		Model II	
	Estimate	SE	Estimate	SE
Intercept	–6.3494	0.7265	–6.2410	0.7910
Generation 1.5	–0.0549	0.0930	–0.0609	0.0932
Generation 2	0.0488	0.0859	0.0426	0.0863
Generation 3	–0.0202	0.0739	–0.0265	0.0751
Age	0.4617	0.0407	0.4666	0.0413
Age^2	–0.0087	0.0006	–0.0087	0.0006
Hispanic	–0.0065	0.1184	–0.0171	0.1191
Years of education	–0.0653	0.0590	–0.0644	0.0595
Currently enrolled	–2.4594	1.3830	–2.4251	1.3868
Only high school diploma	0.3311	0.3687	0.3631	0.3702
Some college or more	–1.4349	0.5033	–1.3763	0.5073
Married	0.4721	0.3285	0.4717	0.3297
Previously married	0.5298	0.1124	0.5306	0.1126
Spanish only	–0.4174	0.3756	–0.4419	0.3771
In poverty	0.3683	0.0540	0.3591	0.0544
Age*years of education	–0.0006	0.0019	–0.0005	0.0019
Age*enrolled	0.1445	0.0698	0.1427	0.0699
Age*only high school diploma	–0.0130	0.0133	–0.0141	0.0134
Age*some college or more	0.0411	0.0176	0.0391	0.0178
Age*married	–0.0146	0.0101	–0.0148	0.0101
Age*Spanish only	0.0118	0.0113	0.0125	0.0114
Age*poverty	–0.0001	0.0002	–0.0003	0.0003
Years of education*enrolled	–0.0927	0.0775	–0.0921	0.0775
Years of education*married	0.0770	0.0168	0.0773	0.0168
Years of education*Spanish only	0.0156	0.0186	0.0161	0.0187
Years of education*poverty	0.0005	0.0004	0.0003	0.0005
1995 CPS	–0.0337	0.0500	–0.0373	0.0503
California	0.0234	0.0534	0.0334	0.0609
Neighborhood variables				
% adults Hispanic			–0.0002	0.0011
% adults Asian or Pacific Islander			–0.0034	0.0037
% Hispanics in poverty			0.0048	0.0093
% women work			–0.0042	0.0032
% immigrants who are recent			0.0007	0.0020
Log likelihood	–2549		–2547	

Table D.8

CF, Each Generation, Poisson

	Generation 1.0		Generation 1.5		Generation 2		Generation 3	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Intercept	–3.9608	1.0821	–8.7711	3.3836	–6.6190	2.5647	–7.5250	2.1627
Age	0.3203	0.0580	0.7340	0.1750	0.6929	0.1328	0.6630	0.0995
Age^2	–0.0066	0.0009	–0.0126	0.0026	–0.0171	0.0026	–0.0124	0.0015
Years of education	–0.0957	0.0751	–0.3545	0.2738	–0.4339	0.2662	–0.1614	0.2094
Currently enrolled	–6.5600	5.7305	–4.4332	5.8725	0.5580	2.6875	–4.2480	2.3454
Only high school diploma	0.2662	0.5867	1.8421	1.2821	–0.9827	1.1873	0.1048	0.7377
Some college or more	–1.1394	0.8327	–1.3588	1.7451	–2.2949	1.5807	–1.9537	1.0816
Married	0.4166	0.4824	0.5910	1.1832	0.8730	0.9354	–0.3867	0.8625
Previously married	0.3782	0.1829	0.4625	0.3608	0.7629	0.2956	0.6407	0.1857
Spanish only	0.2560	0.4329	0.3591	1.7067	–3.1199	2.6064	–8.4909	4.2934
In poverty	0.2721	0.0732	0.3766	0.1810	0.5935	0.1636	0.4540	0.1157
Recent immigrant	–0.0888	0.0854						
Age*years of education	0.0008	0.0024	0.0027	0.0105	0.0156	0.0095	–0.0009	0.0075
Age*enrolled	0.3816	0.2787	0.5651	0.4033	0.0527	0.1707	0.0864	0.1216
Age*only high school diploma	–0.0070	0.0202	0.0738	0.0505	0.0310	0.0456	–0.0021	0.0279
Age*some college or more	0.0347	0.0276	0.0340	0.0656	0.0778	0.0606	0.0595	0.0398
Age*married	–0.0104	0.0152	0.0837	0.0378	0.0130	0.0353	–0.0188	0.0211
Age*Spanish only	–0.0090	0.0132	0.0128	0.0508	0.0454	0.0651	0.2215	0.0987
Age*poverty	0.0007	0.0004	0.0010	0.0011	0.0000	0.0009	–0.0009	0.0006
Years of education*enrolled	–0.2342	0.1109	1.2316	0.7785	0.1937	0.2503	0.1862	0.2221
Years of education*married	0.0719	0.0229	0.2169	0.0715	0.0067	0.0746	0.1504	0.064
Years of education*Spanish only	0.0087	0.0200	0.0417	0.0953	0.1918	0.1772	0.1303	0.3312
Years of education*poverty	0.0001	0.0007	0.0039	0.0026	0.0018	0.0020	0.0021	0.0017
1995 CPS	0.1006	0.0714	0.0204	0.1775	0.3726	0.1413	–0.1865	0.1043
California	0.0313	0.0805	0.1134	0.1984	0.0528	0.1694	0.0931	0.1478

Appendix E

History of Births in California

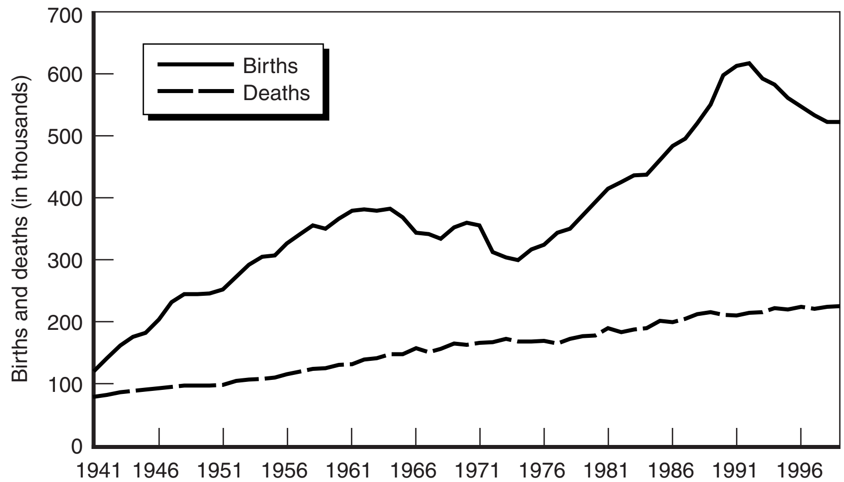
The number of births in any population is determined by the number of women of childbearing age and by the fertility rates of those women. Changes in the number of women of childbearing age and in fertility rates have led to four distinct periods of fertility since World War II in California: the baby boom, the baby bust, the baby boomlet, and the most recent era, which we might term the baby bustlet. Throughout these periods, the role of foreign-born women has changed substantially. Table E.1 summarizes these trends.

During the baby boom, the number of births in California increased dramatically (Figure E.1). From the mid-1940s to the early 1960s, the number of births in California more than doubled. This increase was the result of two changes: an increase in the number of women of

Table E.1

Four Distinct Periods of Fertility in California

		Causes	
Period	Years	Women of Childbearing Age	Fertility Rates
Baby boom	1940s to early 1960s	Increase, primarily as a result of domestic migration	High levels
Baby bust	Mid-1960s to late 1970s	Increase, primarily as a result of domestic migration	Decline to low levels
Baby boomlet	Late 1970s to 1990	Increase, as a result of the aging of the baby boomers, domestic migration, and international migration	Increase to moderate levels
Baby bustlet	1990s	Decrease, as a result of the aging of the baby boomers	Slight decline

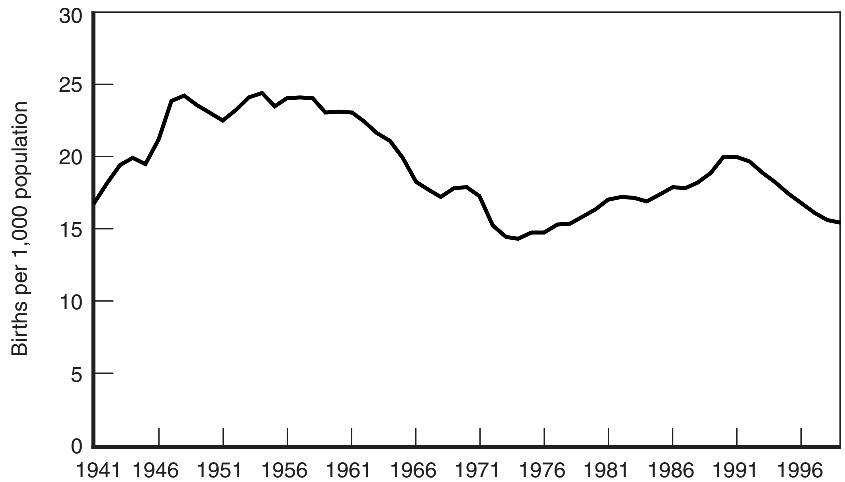


SOURCE: Authors' tabulations of California Department of Finance data.

Figure E.1—Annual Births and Deaths in California, 1941–1999

childbearing age—a consequence of large flows of mostly domestic migrants to California; and large increases in the fertility rates of women of childbearing age. During the baby boom, an average woman in California had a completed family size of between three and four children, and birth rates reached their peak of almost 25 births per 1,000 state residents in the 1950s (Figure E.2). The proportion of women of childbearing ages who were foreign-born remained quite low throughout the baby boom. Thus, the baby boom was a phenomenon created mostly by U.S.-born women.

The baby bust of the mid-1960s and the 1970s was marked by absolute declines in the number of births in the state. Although the number of women of childbearing age continued to increase, fertility rates declined dramatically. By the mid-1970s, an average woman in California had a completed family size of fewer than two children. Just as the baby boom was a national phenomenon shared by California, so too was the baby bust. Changing concepts of families and women's roles are thought to be the primary drivers behind these declines, as women entered the work force in dramatic numbers. As during the baby boom,



SOURCE: Authors' tabulations of California Department of Finance data.

Figure E.2—Birth Rates in California, 1941–1999

the role of foreign-born women was not substantial during the baby bust. In 1970, for example, less than 9 percent of the state's population was composed of immigrants.

The baby boomlet was a period marked by increases in the number of women of childbearing age and increases in fertility rates of those women. In California, the total number of births more than doubled from 1974 to 1991, reaching over 600,000 by 1991. Indeed, the number of births at the height of the baby boomlet in California vastly exceeded the number of births at the height of the baby boom.[1] The increase in the number of women of childbearing age was partly a consequence of the earlier baby boom. In California, the baby boom peaked in the late 1950s and early 1960s, and those women began entering their prime childbearing years in the 1980s. The number of women of childbearing age also increased in California because of continuing flows of domestic migrants and increasingly large flows of

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[1]In contrast, in the rest of the United States the number of births at the height of the baby boomlet was lower than the number of births at the height of the baby boom (NCHS, 2000).

international migrants. Most migrants, both domestic and international, are concentrated in young adult ages.

The role of immigrants was especially significant in the 1980s. Births in California to foreign-born women increased from 30 percent of the total in 1982 to 45 percent by the early 1990s. In California, the baby boomlet was also fueled by slight increases in fertility rates of women of childbearing age. By 1990, the average completed family size for women in California was 2.5 children. Part of this increase could be attributed to changes in the composition of California's population, from groups with lower fertility to groups with higher fertility. In particular, immigrants tend to have higher fertility rates than U.S.-born residents, and the increasing share of the state's population that is composed of immigrants explains some of the shift toward higher fertility rates.

During the 1990s, the number of births in California declined. By 1998, the number decreased by almost 100,000 from the peak earlier in the decade. Fertility rates for women of childbearing age declined but the primary reason for the decline appears to have been a reduction in the number of women of childbearing age, which can be attributed to the aging of the baby bust. As the relatively small cohort of women born in the late 1960s and 1970s enters primary childbearing years, it replaces the much larger cohorts of baby boomers who are aging out of that stage. The share of births to foreign-born women remained relatively stable throughout the 1990s.

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