

**Projections of the Population of California by Nativity and Year of Entry to the U.S., in Addition to Age, Sex, Race and Hispanic Origin**

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Immigration has emerged as the dominant population issue of our time. It is certainly the most debated, exceeding even our social and political focus on race, which so preoccupied our civic discussions since the dawning of the civil rights era. Immigration also has supplanted in prominence our longtime interest in gender equality, not to mention our society's much broader, but weaker, preoccupation with issues of age. This newfound interest reflects the relative novelty of the subject and also the perceived threat that growing numbers of immigrants pose to long-accustomed cultural patterns in many parts of the nation.

Indeed, it is the rapidly rising numbers of immigrants and their growing proportion of the population that command so much attention. At the height of the turmoil in the civil rights and women's equality movements, immigrants were only a very small fraction of the nation's population (4.7% in 1970). Thereafter, immigration began to increase in a few gateway states and then nationwide. By 2009, one-eighth of the nation's population (12.5%) was foreign born and roughly one-quarter was either foreign born or the children of immigrants.

California is the leading state for immigration, serving as the principal gateway in the 1970s and 1980s. As of 1990, 21.7% of the state's population was foreign born, although the share grew more slowly thereafter, leveling off at 26.9% in 2009 (American Community Survey, ACS). Together with their children, the foreign born account for fully half of California's population. How much more this population might grow and what are its future characteristics is a great question in California, as it is in other states ranging from Arizona to South Carolina to New York.

Information about the growth in foreign-born residents is poorly provided by demographers. The standard cohort component method of population projection focuses solely on dimensions of age, sex, and race or Hispanic-origin. Those methods served us well in a day when attention was focused on race, gender, or age. The growing numbers of immigrants resident in the United States are present in those numbers but they are not separately identified. That leaves the door open for politically charged fantasies that all Asians and Hispanics are immigrants and that the growth in these populations is due to new immigrants. A widely held conception, this "Peter Pan fallacy" assumes immigrants never grow older and never change in any way over time (Myers 2007: 104-05). The absence of data on real life-cycle trajectories enables widespread fears and myths to propagate about the future of the population.

This paper presents new projections of the population of California, disaggregated by age, sex, race and Hispanic origin, just as produced by other cohort component models, but further stratified by nativity, generation, and year of entry to the U.S. by the foreign-born. We begin with a brief discussion of the great utility to be gained from incorporating a nativity dimension into population projections. This is accompanied by consideration of the difficulties entailed, including the barriers that may have blocked this modeling evolution in the past. Following that we turn to our desired structure of the population and how it can be addressed through our model structure. What is presented is the third generation of the California Demographic Futures model, a modeling system under development since 2000 (Myers and Pitkin 2001; Myers, Pitkin and Park 2005) and earlier (Pitkin and Simmons 1996). The model structure and individual components are

overviewed, as are the estimation, calibration, and projections phases. Illustrative trial results from the model will be presented for years through 2040. The final development of the 2011 edition of the projections awaits the summary file results from Census 2010 that will be released this summer.

## **BACKGROUND**

### **Utility and Difficulty of Nativity Projections**

Adding a nativity dimension to population projections promises great benefits but also poses substantial challenges, especially in the case of a subnational population.

The benefits stem, first, from the greater accuracy that follows from constructing more disaggregated projections. The traditional dimensions of age, sex, and race have long been recognized as important if not essential for purposes of modeling population change at both the U.S. and subnational levels, due to the substantial differences observed along these dimensions in vital rates as well as rates of migration. Without these explicit considerations, models of population change over time are subject to major biases stemming from unaccounted compositional change.

The same objective of capturing essential variation applies with equal force for stratification of population projections by nativity, whether foreign or native-born, and by foreign-born year of entry to the U.S. Rates of fertility (Johnson, Hill, and Heim 2002), mortality (Sevak and Schmidt 2008), emigration (Ahmed and Robinson 1994, van Hook et.al. 2006), and domestic migration (Pitkin 2004) have each been found to differ substantially between the native and foreign-born populations, or between newly arrived and long settled immigrants. Accordingly, explicit account of these compositional dimensions has potential to improve the accuracy of population projections.

A second set of benefits flows from the application of the population projections to a host of outcome topics. Traditional age-sex-race stratifications have been usefully applied in making projections in a variety of areas, ranging from health care utilization to labor force and housing. Research on immigrant assimilation with current and historical data has found that many dimensions of social, economic, and political status vary strongly according to nativity and duration of residence in the U.S. Examples of such studies, to name just a few, are Stevens (1994) and Hakimzadeh and Cohn (2007) on acquisition of English language skills, Portes and Rumbaut (1996) on acquisition and use of English and linguistic isolation, Ramakrishnan and Espenshade (2001) on voting, Wong (2000) on political party identification, Alba and Logan (1992) and Myers and Lee (1998) on homeownership, and White and Glick (2009) and Myers and Cranford (1998) on occupational status.

The absence of population projections stratified by nativity and duration of residence in the U.S. has prevented researchers from exploring future changes in these many behavioral outcomes of interest. One early example application demonstrated by the authors was a projection of reduced poverty among the California foreign born that was issued in 2001 before the 2000 census results were released. As described in Myers

(2007: 112-16), the logic was that immigrant cohorts had demonstrated substantially lower poverty rates one and two decades after arrival. Our projection of the future duration composition of the foreign born suggested a growing share were longer settled, hence, the aggregate poverty rate was expected to decline in ways that closely matched the eventual census results.

There are obvious difficulties in preparing projections that extend the traditional cohort-component framework to incorporate a nativity dimension. Vital rates ideally should to be obtained or estimated separately for immigrant and foreign-born components of the population, including for arrival cohorts of different duration or age at arrival. It is especially difficult to estimate rates of immigration and emigration in order to reconstruct the baseline population, as well as to represent future scenarios. Further, in a subnational context, it is necessary to account for domestic migration exchanges with the remainder of the nation. However substantial background research is required, and some compromises with the ideal must therefore be struck.

The benefits of added population detail are achieved by incorporating new dimensions but at considerable cost of added effort. Only in cases where the foreign born are a substantial share of the population, or where immigrants are considered an important group, would this effort be considered worthwhile. The first innovation in the U.S. was by Edmonston and Passel (1994) but despite its success, that national demonstration was not sustained or adopted by others, perhaps for reasons of difficulty and perceived low importance. California, however, concentrates the importance of nativity projections, given that by 1990, 21.7% of its population already was foreign born. Hence, it should not be surprising that recognition of this need took root there during the 1990s, giving birth to the continuing project on California Demographic Futures at the University of Southern California. Indeed, consideration of nativity seems almost a necessity for credible population projections in California. More recently, the growth of the Hispanic population has attracted substantial attention, and the Pew Hispanic Center has focused substantial resources on understanding that growth, including support for projections that incorporate a nativity dimension (Passel and Cohn 2008). Canada is a country that also has a large foreign-born population, one nearly as large as California's, and Edmonston (2010) has fruitfully reconstructed the immigrant contribution to Canada's population growth through the fourth generation of settlement. The U.S. Census Bureau has lagged behind on these innovations, perhaps for several reasons. An early venture that tested addition of a nativity dimension has not been repeated (U.S. Bureau of the Census, 2000). One problem is that the change in the race question in 2000 to a "check all that apply" format has called for even greater race detail in projections that consumes all energies for innovation. A second difficulty is that projections for the states must address not only California but also Wyoming, where immigrants are few and cell sizes thin. Yet a third obstacle may be the political flak encountered in projections that could be said to "call for higher numbers of immigrants" in the future. The politicized context of discussions about immigration only adds to the difficulty of marshaling resources for the added effort required.

## **Population Structure**

Explicit consideration of a nativity dimension affords a richer conceptualization of population structure. Although traditional cohort-component projection models include

numbers of future immigrants as an assumed input, they do not track immigrant origins within the existing population. Immigrant additions are merely merged into the existing age-sex-race/ethnic categories. The result for example is that we might project an Hispanic population of 100 million at some future date but there will be no knowledge about how much of that group is likely to be comprised of U.S.-born members, how much will be comprised of previous immigrant arrivals who will be long settled, and how much will be comprised of new immigrant arrivals.

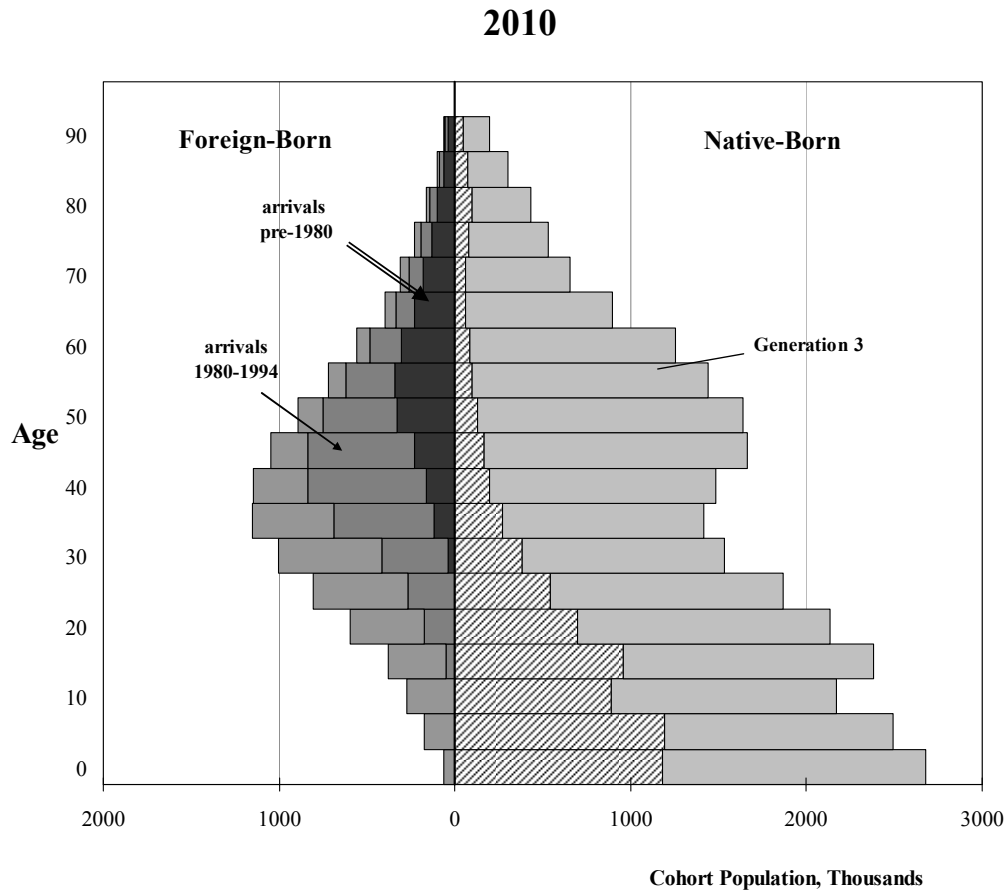
The population structure we envision essentially is portioned into two segments or “halves.” One half is native-born and is fully described by the traditional age-sex-race/ethnic cohort component model. The population grows through additions at age 0 via the fertility of women of child-bearing ages. And the population loses members through mortality at all ages, especially the oldest. In a subnational context we need to also conceptualize how migration brings new members into each of the age groups or sends them out.

The other “half” of the population is foreign-born and grows through immigration and emigration processes. Once settled in the U.S., this population is subject to all the processes that attend the native-born population. However, an added feature of the foreign-born is the attribute of their decade of arrival. Although there may be a certain amount of revolving migration early in their settlement in the U.S., we can conceive of these arrival cohorts as becoming fixed groups like birth cohorts that age over time. The foreign-born population grows through the addition of new layers of arrivals each decade and previous arrivals either extend their residence and grow older, or they emigrate out of the U.S.

The two halves of the population are linked by fertility of the foreign born in the U.S. The children of immigrants who are U.S. born comprise the “second generation” of immigrant settlement, and these population members can be distinguished on the native-born side from population members who have immigrants as grandparents or more distant ancestors (what we term the third or higher generation).

An illustration of this population structure for the year 2010 is provided in Exhibit 1. This population pyramid summarizes the dimensions discussed, with ages displayed in a vertical stack of layers, but rather than portray males and females on the left and right sides, the gender dimension is collapsed into the others. Instead, the horizontal axis highlights the number of foreign-born and native-born on the left and right. Each side of the pyramid is further stratified by the dimensions just discussed. Foreign-born are detailed by period of arrival in the U.S., while native-born are detailed by their second or third and higher generation status. As will be described below, projection of population changes can be displayed in this framework.

Exhibit 1



**MODEL STRUCTURE AND RATES**

**1. Temporal structure**

The model is an annual model, with one-year age groups (to 99 or older) and one-year foreign-born entry cohorts (starting in 1980). It is run in *calibration mode* from April 1, 2000 to April 1, 2011, after which it is *re-benchmarked* to January 1, 2011, and then runs in *projection mode* forward to January 1, 2012 and later years.

**2. Spatial structure**

The model is centered on California but also tracks the populations of the rest of the United States, with which California exchanges domestic migrants. It is thus a two-region model. The population of the rest of the United States region is modeled in order to establish the population at risk of migrating to California in the future. This approach to modeling domestic migration flows is deemed more reliable than the method often used for state-level projections of net migration flows, e.g., as implemented by the California Department of Finance (State of California, Department of Finance 2007), in cases such as this, where substantial changes in the population structure, including age, origin and nativity, of the sending region are expected in the period of projection.

The foreign-born population is identified by six broad regions of origin (birth) chosen to correspond as closely as possible to race categories and at the same time facilitate comparison with statistics on immigration from the Office of Immigration Statistics (formerly the Immigration and Naturalization Service).<sup>1</sup>

### **3. Components of population change**

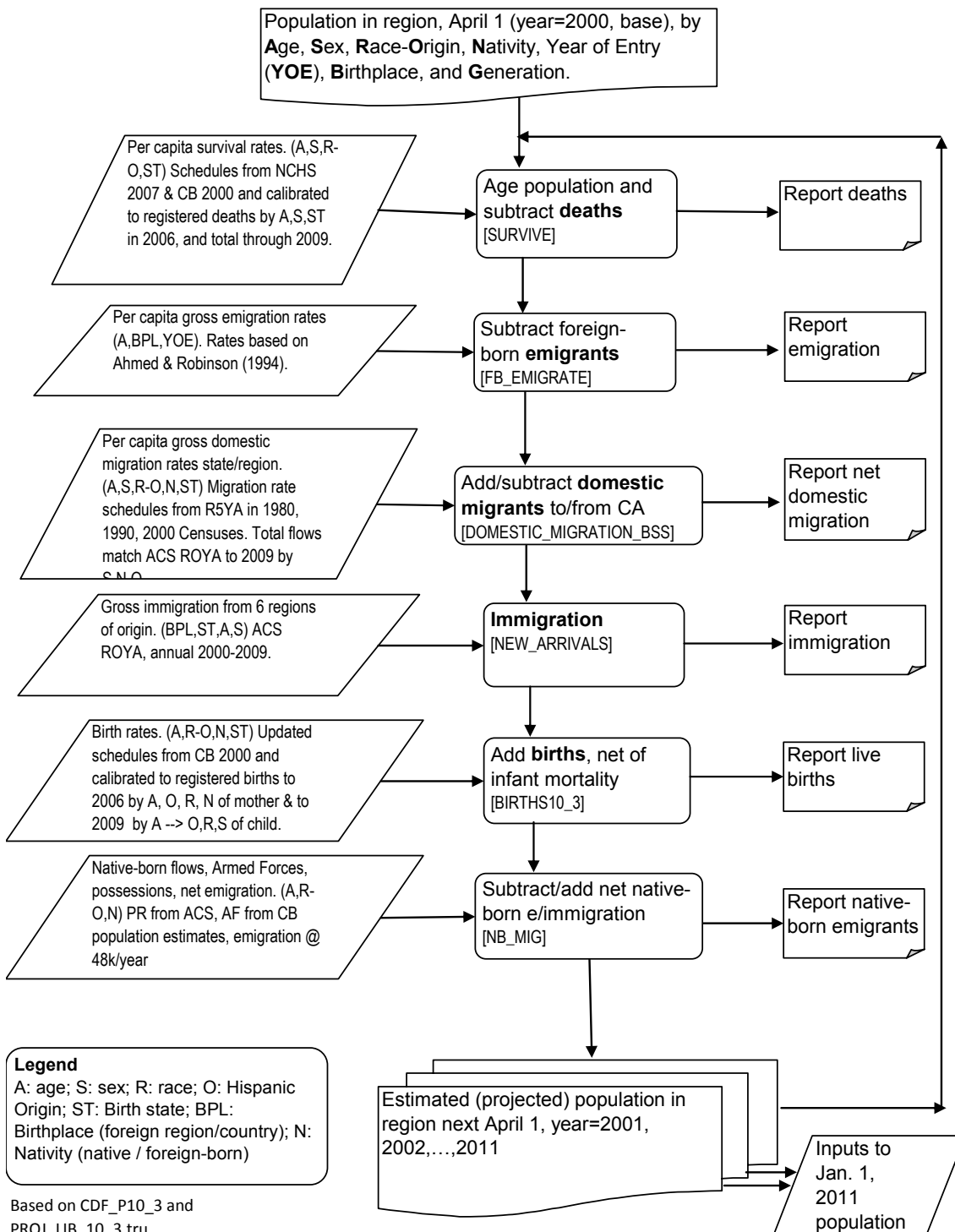
The components of population change are modeled in the structure shown in Exhibit 2, which is a flowchart of the calibration stage of the model.

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<sup>1</sup> Mexico and Central America, Other Latin America and the Caribbean, Asia and Pacific Islands, Europe-the former USSR-Canada-Australia-New Zealand, Middle East and North Africa, and Sub-Saharan Africa.

Exhibit 2

Flow Chart of CDF Population Projection Model Calibration Stage



As can be seen from the description of the components, on the left-hand side of the flowchart, the components are modeled as population-based rates, with the exception of immigration and native-born emigration, which are modeled as absolute flows. The population-based rates vary across population characteristics, as shown in the flowchart. For example, fertility (birth rates) varies by women's nativity (N in the flowchart) but

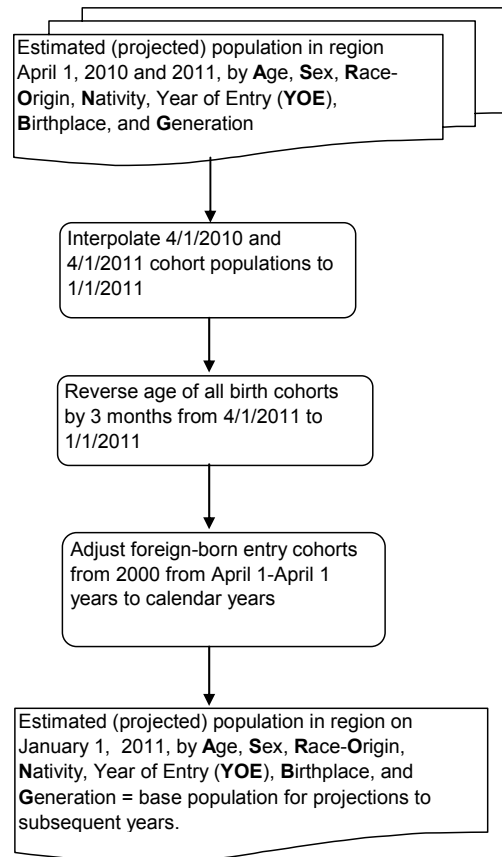


mortality (survival rates) does not. At present, no component rates vary by immigrant generation (2nd / 3rd+), which is simply tracked and reported as a population characteristic of intrinsic use for other purposes.

At the end of the calibration stage, the population is rebenchmarked to a launch date of January 1, 2011 by interpolation between the calibrated populations for April 1, 2010 and 2011. The flowchart for this procedure is shown in Exhibit 3.

### Exhibit 3

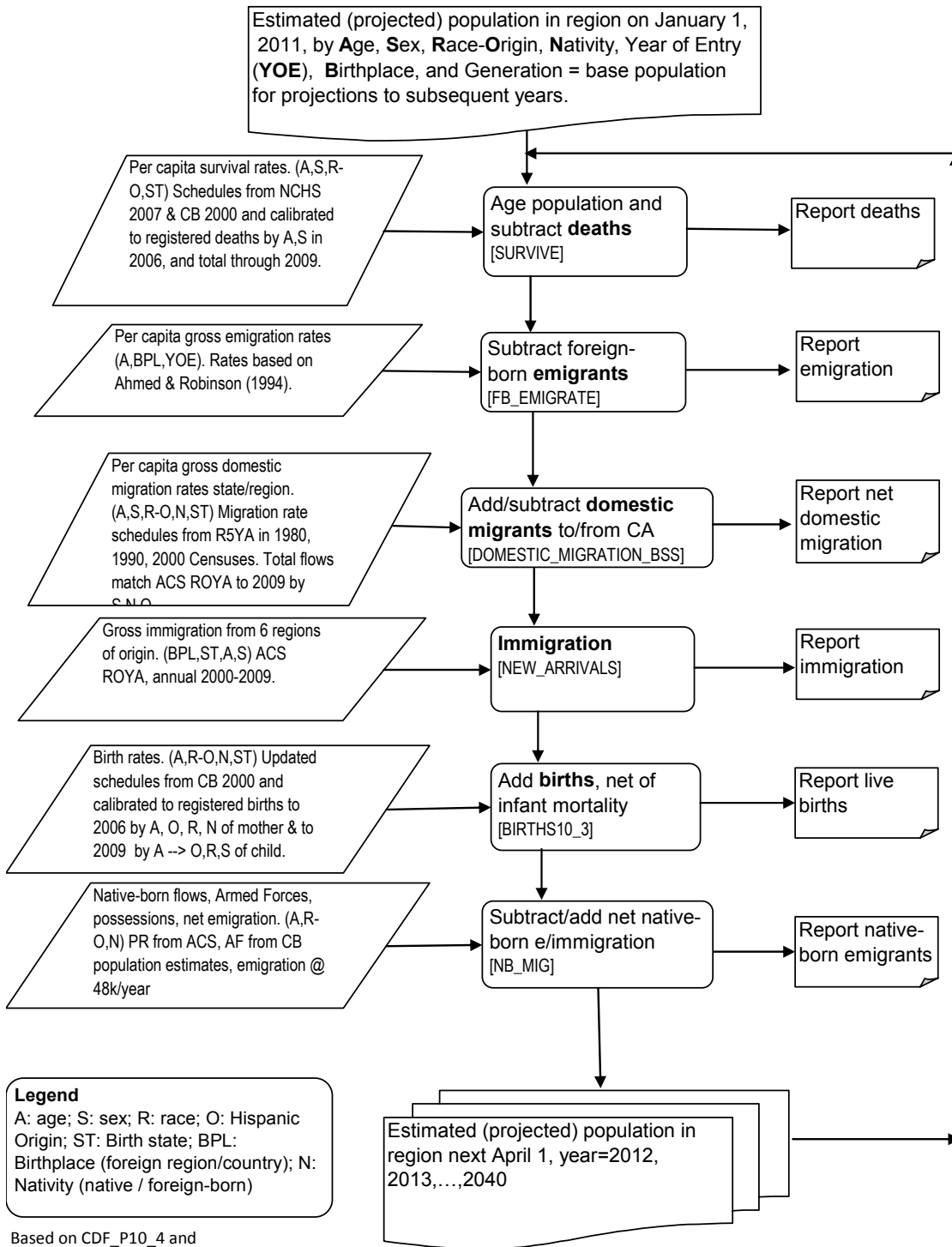
#### Flow Chart of CDF Population Projection Rebenchmarking to Date of Launch



Starting from this launch population, future components of change are modeled in the projection stage using the same structure and methods as in calibration mode. The flowchart of the projection phase of the model is shown in Exhibit 4.

Exhibit 4

**Flow Chart of CDF Population Projection Model Projection Stage**



**Legend**  
 A: age; S: sex; R: race; O: Hispanic Origin; ST: Birth state; BPL: Birthplace (foreign region/country); N: Nativity (native / foreign-born)

Based on CDF\_P10\_4 and PROJ\_LIB\_10\_3.tru

#### **4. Population-Based Rates of Change and Population Flows**

##### a) Births

U.S. rates by age, race, and origin of woman are adopted that are used in the annual projections by the U.S. Census Bureau (2000).

##### b) Deaths

U.S. rates for Hispanic, non-Hispanic White, and Black populations are from life tables published by the National Center for Health Statistics (Arias 2010); U.S. rates for AIAN and Asian and Pacific Islander populations from life tables developed for projections by the U.S. Census Bureau (2000).

##### c) Domestic Migration

Native-born: Population-based rates of migration between California and the rest of the U.S., by age, race, and state of birth, are fixed at 10-year average (1985-90, and 1995-2000), estimated from the 1990 and 2000 Census questions on place of residence 5 years previously. These rates imply net domestic migration that is near the long-term (1970-2000) average.

Foreign-born: Population-based rates of migration between California and the rest of the U.S., by age, origin (birthplace), and duration since entry to U.S. These are fixed at the 5-year average (1995-2000) estimated from the 2000 Census questions on place of residence 5 years previously.

##### d) Foreign-Born Emigration

Foreign-born emigration rates are fixed for population by age, sex, country of origin, and years since immigrant arrival in the U.S.. These are estimated by a residual method between the 1980 and 1990 Censuses by Ahmed and Robinson (1994). These rates are lower than those estimated by Van Hook, et.al., (2006) from matched Current Population Survey data and above those currently used by the Census Bureau for making population estimates. ()

##### e) Immigration

Calibration period flows (level and characteristics) are estimated from American Community Survey and Supplementary Surveys, 2001-2009 data on residence one year ago for foreign-born population.

##### f) Net International Migration of Native-Born

Flows of native-born abroad, to/from U.S. possessions, and of Armed Forces Abroad estimated during calibration phase and fixed in projection phase. Sources; U.S. Census Bureau vintage 2009 Current Population Estimates, ACS 2001-2009, and U.S. Census Bureau (2009). An earlier (2005) generation of the CDF projection model also included a component of population-based emigration of 2nd generation children under the age of

1. These rates were modeled on the residual between the numbers of births in the years prior to Census 2000 and the number of children of foreign-born women tallied in that census. It was assumed that these differences were due to the departure of the children born to temporary residents or for other reasons. See Pitkin and Park (2005) for a discussion of these residual estimates. This component is dropped from the current generation of the CDF model pending release of 2010 Census data with age detail and evaluation of whether the birth-population differences recur. See below for a discussion of the effect of dropping this component of emigration.

## **BASE POPULATION AND POPULATION CHARACTERISTICS**

### **1. Base population**

The April 1, 2000 population by age (birth cohort), sex, race, and origin is from Census 2000 SF 1, with races bridged to pre-2000 categories (National Center for Health Statistics).

The population in each age, sex, origin, and race group is distributed by nativity (foreign and native-born) and year of arrival of the foreign-born in proportions estimated from the Census 2000 Public Use Microdata 5 % Sample (PUMS) file.

The distribution of the native-born population into second and third-generations is from two sources. For the population under age 15, it is from the Census 2000 PUMS, and is based on the nativity of mothers who live in the same household. For the population age 15 and older, it is based on generation distributions tabulated from the combined average of the 2000-2002 Current Population Survey monthly data.

### **2. Immigrant generations**

The model categorizes the native-born population by immigrant generation, the foreign-born being the “first generation” or “immigrants.” The children of foreign-born mothers are defined as the “second generation” and children of native-born mothers as the “third generation.”

It must be noted that substantial ambiguity attaches to definition of the second generation, whether these are the children of two immigrant parents, of one immigrant and one native-born parent, or of an immigrant mother. The latter definition is used, primarily because there is much more complete and, presumably, accurate data on the nativity of mothers in birth records than on the nativity of fathers. According to the 2004 Current Population Survey, fewer adults age 18 or older are classified as second generation under the strict two-parent rule (14.6%) than under the looser, one-parent definition (20.8%). The mother-based definition yields an intermediate prevalence of second generation status (17.6%), and we apply that definition consistently over time in our model.

### **3. Characteristics of post-2000 immigrants**

The total number foreign-born persons entering the U.S. each year after April 1, 2000 is determined by a parameter that is estimated, in the calibration stage, and later projected by assumption, in the projection stage. The distribution of new entrants by region of location (California / other), region of origin and sex ratios are similarly controlled by model parameters. The age distribution of new entrants from each region of origin is fixed and based on 1998-2000 arrivals, by region of origin, in the 2000 Census.

#### **4. Characteristics of post-2000 births**

The population born later than April 1, 2000 are assigned characteristics both by rule and probabilistically. As noted above, generational status is determined according to the nativity of the mother. Sex is set probabilistically by the sex ratio at birth. Race and origin are also assigned probabilistically at rates that vary according to the race, origin, and nativity of the mother, i.e., most but not all children are identified as being of the same race and origin as their mother. The assignment ratios are empirically determined based on the characteristics of co-resident minor children and their mothers in the 2000 Census PUMS.

### **MODEL CALIBRATION AND PROJECTIVE ESTIMATE OF 4/1/2010 POPULATION**

#### **1. Deaths**

Model life-table survival rates are adjusted so that modeled deaths 2000-2006 (total) match reported (NCHS vital statistics) by age, sex, and region (state).

#### **2. Domestic Migration**

Domestic migration rates to California are adjusted so that modeled 2000-2009 net domestic migration matches total of ACS 2001-2009 flows to California based on residence one year ago by nativity, Hispanic origin, and sex.

#### **3. Births**

Fertility rates are adjusted according to age, race-origin, nativity, and state of residence of mother so that modeled 2000-2008 births match registered births by age, race-origin, nativity and state of residence of mother for all years combined and total births by state of residence of mother<sup>2</sup> for 2009.

#### **4. Immigration**

Estimates based on residence one year ago (2000-2009 ACS, annual) are adjusted so that total population on 4/1/2010 equals 2010 Census population. Net immigration is balanced as a residual after accounting for the components of registered births and deaths and domestic migration, which is assumed to be measured more completely by the ACS than immigration.

#### **5. Calibration Results**

Based on the foregoing calibration, completed in early March 2011, after the release of the 2010 Census counts and before the PL94-171 redistricting data that include population by race and origin, the CDF model generated a 4/1/2010 population total within ~.01 percent of the Census count. More significantly, the estimated Hispanic population was 66 thousand (.5 percent) below the Census count of 14.01 million. This was somewhat closer than the most comparable ACS (and vintage 2009 Census Bureau population estimates) estimate, for 7/1/2009 (which is 332 thousand below the Census) even after allowance is made for the difference in dates. Another result from this calibration of the CDF model is that the foreign-born made up 27.1 percent of the state's population, slightly above the 2009 ACS estimate of 26.9 percent.

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<sup>2</sup> Preliminary 2009 birth data available at time of writing does not include maternal characteristics.

These results after calibration are described as predictive estimates of the eventual 4/1/2010 population count in a research brief issued before release of the PL94-171 data for California. (Pitkin and Myers 2011). See also Pitkin and Myers (2010), which proposed a range of estimates for California prior to release of the state census counts. These two reports, including the estimate of 27.1 percent foreign born, are part of a series titled *What the Census Would Show*, because these are the expected findings if we had census results known ahead of their release and if the census questionnaire asked all the important questions, including place of birth, that have been asked for decades.

## **TRIAL PROJECTIONS TO 2040**

### **1. Assumptions**

The following assumptions were made about future component rates and flows as inputs to trial population projections for California:

**Mortality.** Model schedules are held constant, leading to a cumulative large increase in projected deaths due to aging of the population, from 271 thousand in 2011 to 462 thousand in 2039.

**Domestic migration.** Per capita rates continue at the annual average for the calibration period. This assumption results in decreases in net domestic migration from -166 thousand a year (average) during 2000-2009 to -106 thousand in 2011 to -40 thousand in 2039 due to aging of the state's population and of the population in the rest of the nation that is its exchange region.

**Fertility.** Model rates by age and race-origin are projected to evolve as in U.S. Census Bureau (2000) projections, holding constant the calibrated adjustments (to 2000-2005) by age, race-origin, nativity, and state of residence of mother. This leads to a gradual increase in projected births from 532 thousand in 2011 to 551 thousand in 2039.

**Immigration.** Flows level off at approximately 160 thousand per year (net), similar to the average of the last five years of the calibration period and below the average of 200 thousand for the entire calibration period.

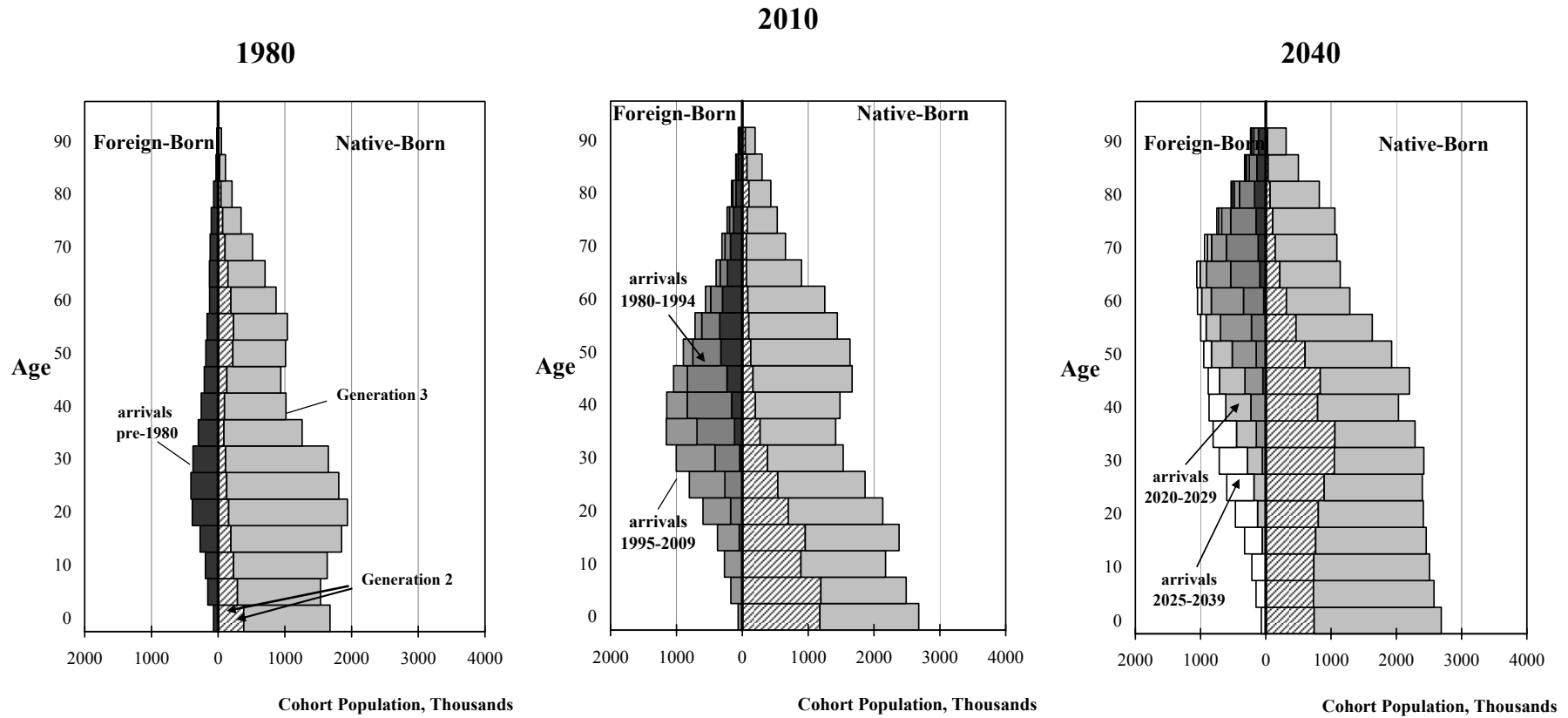
### **2. Results of Trial Projections to 2040**

When the projection model is run to 2040 with the foregoing assumptions the average annual growth in total population for California in the period is 216 thousand, or 2.16 million per decade. This is below the level of recent decades.

The population structure that results – by age and nativity – can be seen in the population pyramid for 2040 in Exhibit 5. By comparison, the age-nativity pyramids for 2010 and 1980 show very different population structures. As compared with 2010, the foreign-born population in 2040, on the left side of the pyramid is substantially older, and younger recent arrivals (shaded white in 2040) a smaller share of the total. The native-born population in 2040, on the right side of the pyramid, is less young than it is in 2010, -- thicker in the middle ages – and the youngest ages are now dominated by the third generation rather than evenly between divided second and third generations.



# Age-Nativity Population Pyramids, California, with Arrival Decade and Generation





### 3. Three Generational Waves of the Hispanic Population

By looking at the age structure of different immigrant generations of Hispanics in California in more detail, we can get a clearer picture of how the model is working and the potential implications of the projections that it will generate.

Starting with the first generation, the foreign born, the age distribution as of 2000 is shown in Exhibit 6. It is unimodal with a well-defined peak at age 30, almost a normal distribution with a truncated left tail. In Exhibit 7, we see the same population projected forward at ten-year intervals to 2040. The peak birth cohort advances 10 years between decades, shrinking gradually due to emigration, domestic migration, and mortality. The population below age 35 shrinks by half by 2040, reflecting the declining size of new arrival cohorts in the projections. On average, the age structure ages substantially between 2000 and 2040 as a result. This exhibit reflects the specific assumptions about future immigration as well as migration and mortality. It bears repeating that these age distributions are trial projections, not predictions. Nonetheless, they do show the kind of insights about the future that can be generated by the CDF population model.

Exhibit 6

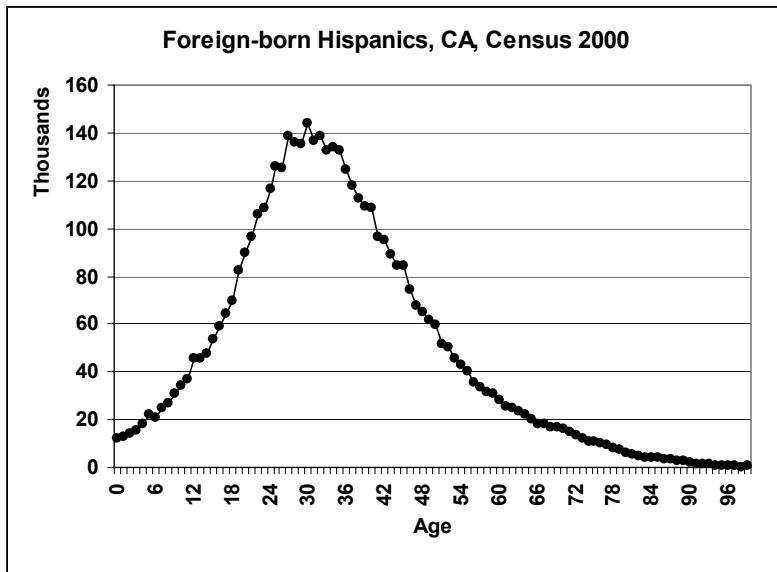
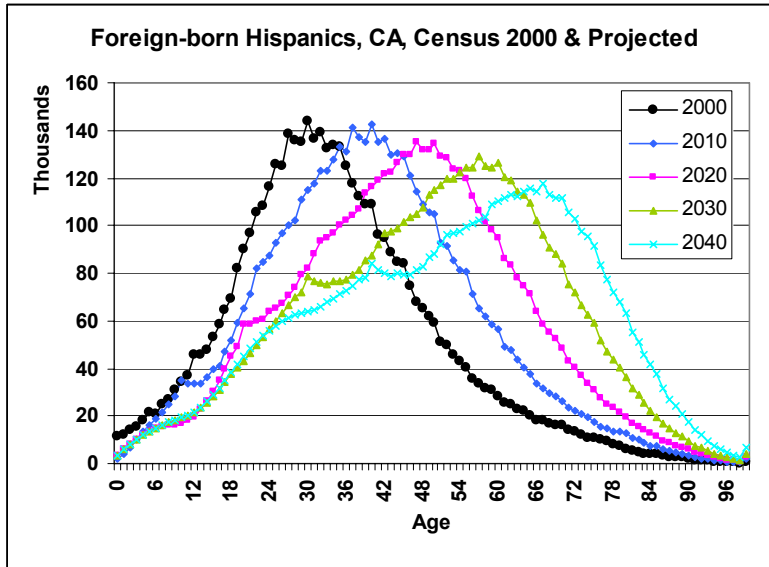


Exhibit 7



The 2000 age distribution of the next generation, of U.S.-born Hispanic children of foreign-born mothers, Gen 2, is shown in Exhibit 8. It clearly echoes the structure of the Gen 1 parents, with a lag in peak ages of 23 years. It is a much younger age distribution than the parents' generation. The projective estimate for 2010, in Exhibit 9, however, unlike that for Gen 1, shows a sharp discontinuity in the size of cohorts born after 2000, a difference of 30-40 thousand. A small part of the break may be due to the calibration procedure for adjusting birth rates in different years during the 2000-9 decade. The remainder of the gap, as much as 30 thousand (20 percent of the cohort size), is problematic both for the projections and the demographic analysis of the second generation population in California.

Exhibit 8

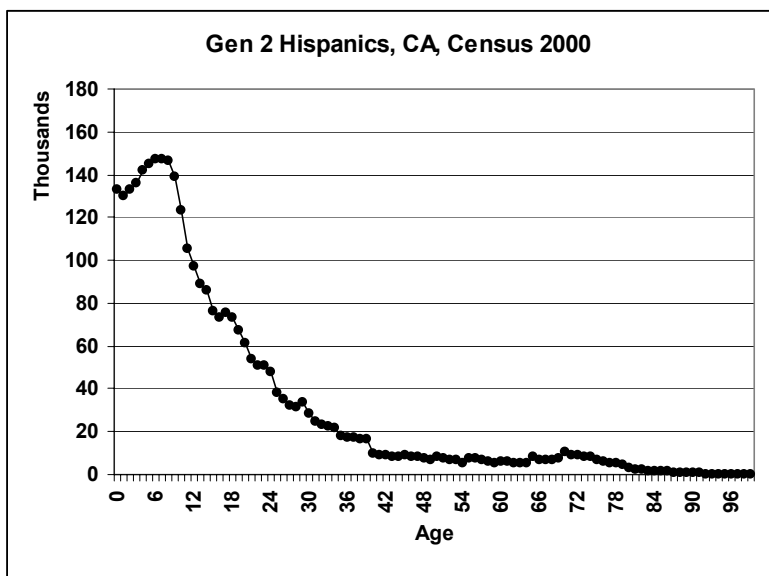
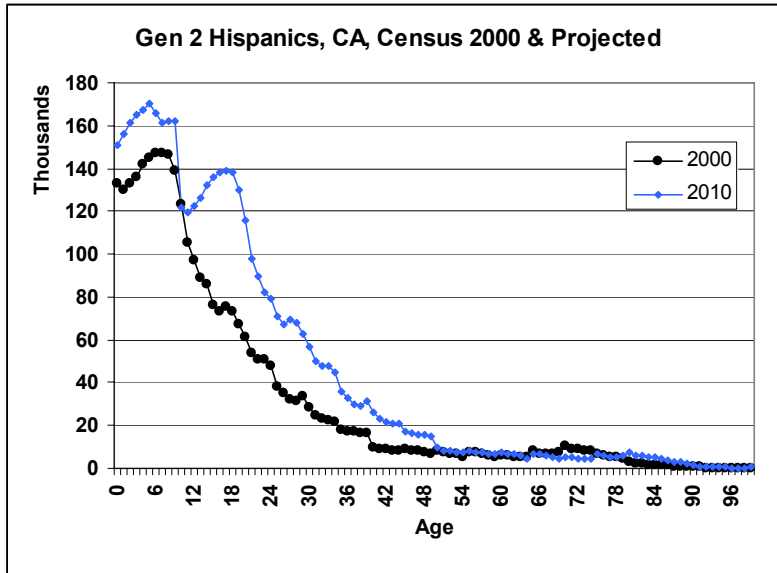


Exhibit 9



As noted previously, the previous generation of the CDF model included a component of emigration of Gen 2 children under the age of 1 that would mitigate or eliminate this apparent break in cohort sizes. This component was dropped pending confirmation of its size with 2010 Census data by age. The justification for it was detailed in paper by Pitkin and Park (2005) and is worth revisiting here.

Exhibit 10 is a table from that paper. It shows a comparison between 2000 Vital Statistics births for Hispanic women in California between 4/1/1995 and 3/31/2000 and 2000 Census PUMS populations under age 5. The births are adjusted for mortality, and the populations are for all children born in California and resident in the U.S. (net of domestic migration), and origin and race are assigned by that of co-resident mothers in households, otherwise by that of the child. The amount by which survived births exceed the number of children counted is shown in the top row of the lower panel of the table. For the children of foreign-born Hispanic women, there are 12.9 percent fewer children than recorded births. There is an even larger shortfall, 14.6 percent, for the children of native-born Hispanic women. This raises the possibility that this is an issue of population coverage. However, other evidence from school enrollments for older cohorts casts some doubts on this explanation. Also, looking down the middle column, we see an even larger deficit for the children of Asian and Pacific Islander women, 13.7 percent, as well a smaller one, 4.9 percent, for children of non-Hispanic White women.

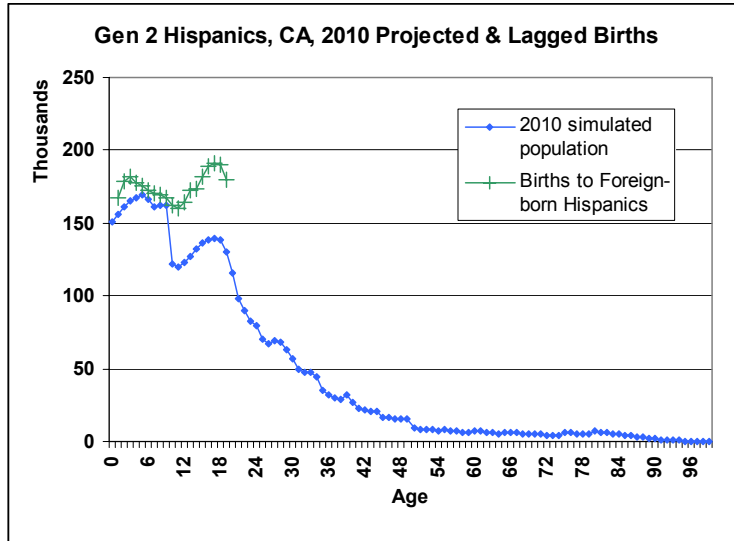
Exhibit 10

**Table 2.1**

<b>Survived Births to California Residents, 4/1/1995-3/31/2000, and U.S. Population Under Age 5 and Born in California, Census 2000, by Spanish Origin, Race, and Nativity of Mother</b>							
Spanish Origin and Race of Mother		Native-Born Mother	Foreign-Born Mother	Total	Native-Born Mother	Foreign-Born Mother	Total
<b>Survived Births (=Births-Deaths)</b>				<b>Population, Census 2000</b>			
Hispanic		426607	828314	1254921	364394	721849	1086243
Non-Hispanic	White	809892	93112	903004	813574	88519	902093
	Black	166421	12833	179254	151880	12968	164848
	Indian	12855	202	13057	16296	628	16924
	API*	42563	241852	284415	38070	208688	246758
<b>Total</b>		<b>1458337</b>	<b>1176314</b>	<b>2634651</b>	<b>1384214</b>	<b>1032652</b>	<b>2416866</b>
<b>Total-Non-Hispanic Black</b>		<b>1291916</b>	<b>1163481</b>	<b>2455397</b>	<b>1232334</b>	<b>1019684</b>	<b>2252018</b>
<b>Deficit (Surplus) of Census Population Relative to Survived Births</b>							
		<b>Native-Born Mother</b>		<b>Foreign-Born Mother</b>		<b>Total</b>	
		<b>% of Births</b>	<b>S.E.</b>	<b>% of Births</b>	<b>S.E.</b>	<b>% of Births</b>	<b>S.E.</b>
Hispanic		14.6%	1.4%	12.9%	1.0%	13.4%	0.8%
Non-Hispanic	White	-0.5%	1.1%	4.9%	3.2%	0.1%	1.0%
	Black	8.7%	2.3%	-1.0%	8.9%	8.0%	2.3%
	Indian	-26.8%	10.0%	-210.7%	124.3%	-29.6%	10.0%
	API*	10.6%	4.6%	13.7%	1.9%	13.2%	1.7%
<b>Total</b>		<b>5.1%</b>	<b>0.8%</b>	<b>12.2%</b>	<b>0.9%</b>	<b>8.3%</b>	<b>0.6%</b>
<b>Total-Non-Hispanic Black</b>		<b>4.6%</b>	<b>0.0%</b>	<b>12.4%</b>	<b>0.0%</b>	<b>8.3%</b>	<b>0.0%</b>
Source:		U.S. National Center for Health Statistics. Vital and Health Statistics, Natality Data Sets.					
Notes:		Births to mothers of unknown Spanish origin, race, or nativity allocated.					
		* API : Asian or Pacific Islander					

We can make a similar though more approximate comparison between recorded annual births since 1990 and Gen 2 Hispanic population resident in California in the projective model estimates for 2010, as shown in Exhibit 11. It is important to remember that the cohort sizes over age 9 are inherited from the 2000 Census and the younger cohorts are from the model, which is calibrated to recorded births by nativity and origin of the mother. The year-to-year changes in cohort sizes in the estimates closely follow those in the birth data with the one large exception of 1999-2000, corresponding to the switch in method for determining cohort size.

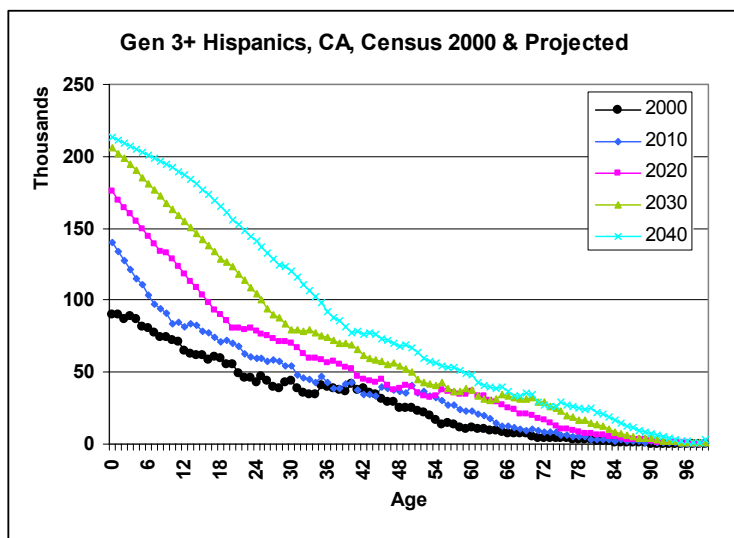
Exhibit 11



These findings raise questions for both population projections and demographic analysis for which satisfactory answers have yet to be found. How much of this is an issue of population coverage? Will the “missing” young children in 2000, emerge in later censuses as the undercounted young black men have tended to as they age? If so, projections by an inflation-deflation method might be indicated. Or are the missing children really gone, brought home by “birth tourist” mothers or to be raised across the border by grandparents? And is this purely a California phenomenon, or did it just happen to surface there first because of the large foreign-born presence?

Returning to our review of the trial projections for the Gen 3 Hispanic children of the Gen 2 (and the longer settled Gen 3) generations, shown in Exhibit 12, we see no break in the continuity of change between successive cohorts. There is a steadily advancing “frontier” of third generation Hispanic population in California due to population aging and steady increases in cohort sizes. Between 2000 and 2030, the sizes of the cohorts at the youngest ages more than double.

Exhibit 12



## DISCUSSION OF RESULTS AND NEXT STEPS

In this paper we have described a new, third generation of a population model designed to project the population of California by nativity characteristics, including place of birth, foreign and domestic, year of arrival of the foreign born, and immigrant generation of native-born. The development of this California Demographic Futures model to date has included the estimation and calibration phases and the beginning of the phase of developing a set of interim projections, trial projections from 2010 forward that are benchmarked to PL94-171 redistricting data from the 2010 Census. Once the Census populations by detailed age are released, a further round of calibration of domestic migration and other rates will be made, and a final set of 2010 Census-based projections will be developed.

We expect, and have shown, that projections from this model will have relevance for a wide range of issues and applications beyond those that can be addressed by standard age-sex-race only projections of the population. The additional nativity detail also promises to improve model accuracy for components of change that vary strongly by nativity, including fertility, domestic migration, emigration, and, potentially, mortality. In order to reap these benefits, it is necessary of course to estimate population based rates with the necessary nativity detail. For some rates, the information base is stronger and for others it is weak or missing. As has been shown, our approach has been to prioritize efforts in areas with the greatest impact on population projections, and if necessary use approximate solutions in order to maintain the richness of the model.

This more exacting model is plainly sensitive to problems of data quality that only become apparent when the dimension of nativity is added to that of traditional demographic analysis. This unexpected benefit of our modeling enterprise is demonstrated in this paper. The benefit is due in large part to the fact that our model places demands on population data that other models do not. For example, understanding the reasons for the shortfall of Gen 2 children relative to births in the 2000 Census will give us both a more accurate picture of the population *today* and a sounder basis for projecting what it will be *tomorrow*.

Now that the census long and short forms have been divorced, we have entered a new era when analysts themselves must integrate data from different surveys for different purposes. It will be a challenge to glean information on nativity from a census that includes no information about nativity or place of birth. We have demonstrated that a population model such as we have developed can be a useful aid for developing this information.

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