Alternative Forecast Models

This study combines projections of housing occupancy rates for detailed demographic groups with projections of population numbers for those same groups. Traditional methods of forecasting housing needs make use of fixed ratios and constant standards. The oldest approach is very simple, dividing projected population growth by average household size. The more recent conventional approach is to utilize headship rates and ownership rates that are specific to groups of different age, gender, or race. The rates observed in the most recent census are held constant for the forecast period.

What follows is an explanation of the alternative methods used to forecast housing occupancy rates in this study. Three alternative methods are employed and are briefly identified as follows:

Alternative A — constant rates of housing occupancy (1990 base) within each detailed demographic group;

Alternative B — cohort rates based on the record of 1980-90 trajectories and estimated 1990 and 2000 launching points; and

Alternative C — a mixed model of cohort rates averaged with constant rates.

1. Alternative A—Constant Rates

The projections based on Alternative A assume that future residents will be housed in the same manner as was observed for specific demographic groups in 1990. Demographic groups are defined by the four major race-ethnic groups (non-Latino white, black, Asian, and Latino), by age group, and by immigrant status (native-born, or immigrant arrivals before 1960, or in the1960s, 1970s, 1980s, 1990s, or 2000s. The 1990 rates are held constant in the future by assuming that for future residents housing consumption will depend solely on their race, age and immigrant status. For example, the housing patterns of new immigrants age 35-44 in 2000 will look like those of the same age group who were new immigrants in 1990.

This method resembles the modern conventional approach in that it applies constant rates for detailed subgroups of the population. The one innovation introduced here is that we are able to introduce more detailed population projections than currently exist. As seen in the preceding section, immigrant

status and duration in the US is a very important determinant of occupancy rates. But that factor is not usable for projections unless we can segment the projected population growth by immigrant status and duration. Fortunately, the new population projections prepared for this project now make that possible.

The deficiency of Alternative A is that it holds 1990 rates constant and does not reflect the downturn of housing consumption that has been underway for most groups in California since 1990 and before. For this reason it over predicts household formation in the 1990s and yields the highest projections of future occupied housing. In addition, the constant rates method is not able to account for the continuity of future housing occupancy with the prior levels enjoyed by the same people in the prior decade. For example, a generation starting out at lower levels in 1990 is unlikely to leap in 10 years to the higher level of those who were 10 years older in 1990. The momentum of their housing careers is better captured by the cohort methods described next.

2. Alternative B—Cohort Rates

Under Alternative B, a cohort model is constructed that takes into account the momentum established in housing careers between 1980 and 1990. For each cohort, we preserve the information on their housing occupancy levels as they pass through successive age groups over successive decades. Each cohort's trajectory is projected upward or downward by appending an increment in housing occupancy (e.g., up or down 4 percentage points) to its established trajectory level. The amount of the increment to be added by a cohort is foreshadowed by the changes recorded within the preceding cohort who passed through the same age span (e.g., 35 to 44) in the preceding decade. Similarly, for immigrants, the increment is foreshadowed by the preceding cohort who passed through the same duration of residence interval (e.g., passing from 10 to 19 years of US residence) in the preceding decade.

Projections by this method of *foreshadowed cohort increments* is most reliable for cohorts with established trajectories in the housing market (Pitkin and Myers 1994). For groups who we cannot yet observe—those entering adulthood after 1990 or arriving in the US after 1990—we assume that the pattern of previous new entrants will simply be replicated, including not only the increments but also the starting levels for the trajectories.

A comparison of the findings from the alternative methods can be illustrated with regard to one of our housing outcomes (homeownership) among one specific population groups (native-born non-Hispanic whites). Per capita homeownership rates are displayed in three alternative graphs in Exhibit 12, pertaining to the constant rates and cohort methods, as well as a third, mixed model. For consistency, all three graphs are arranged in cohort format. This

means we do not show separate lines for 1990, 2000, etc. Instead, we display the trajectories of different birth cohorts (the oldest born 1886-95 and the youngest born 1976-85), showing their expected level of homeownership as they pass through different age groups across decades. The first segment in each trajectory pertains to 1980-90, the second to 1990-2000, third to 2000-10, and fourth to 2010-20.

The weaknesses of Alternative A are evident in the discontinuities observed for each cohort's expected trajectories. In addition, at younger ages we see that the newer cohorts would require very steep increases in homeownership to close the gap from their lower starting levels in 1990. Conversely. at elderly ages, cohorts would need to reverse their upward climbs to match the lower ownership rates implied by the constant model.

The strength of Alternative B is that the cohort method captures the continuity of cohorts' housing careers observed from 1980 to 1990, with projections forward two more decades. The deficiency of the method, however, is that it preserves both cohorts' lower trajectory levels and flatter increments. This method projects the lagging achievements of newer cohorts to be permanent and without chance for accelerated catch-up in future years. Thus, Alternative B yields the lowest projections of our alternatives, but also comes closest to replicating actual trends of the 1990s. Given the pessimistic structure of this forecast method, it may not be desirable to embrace its forecast targets for policy purposes.

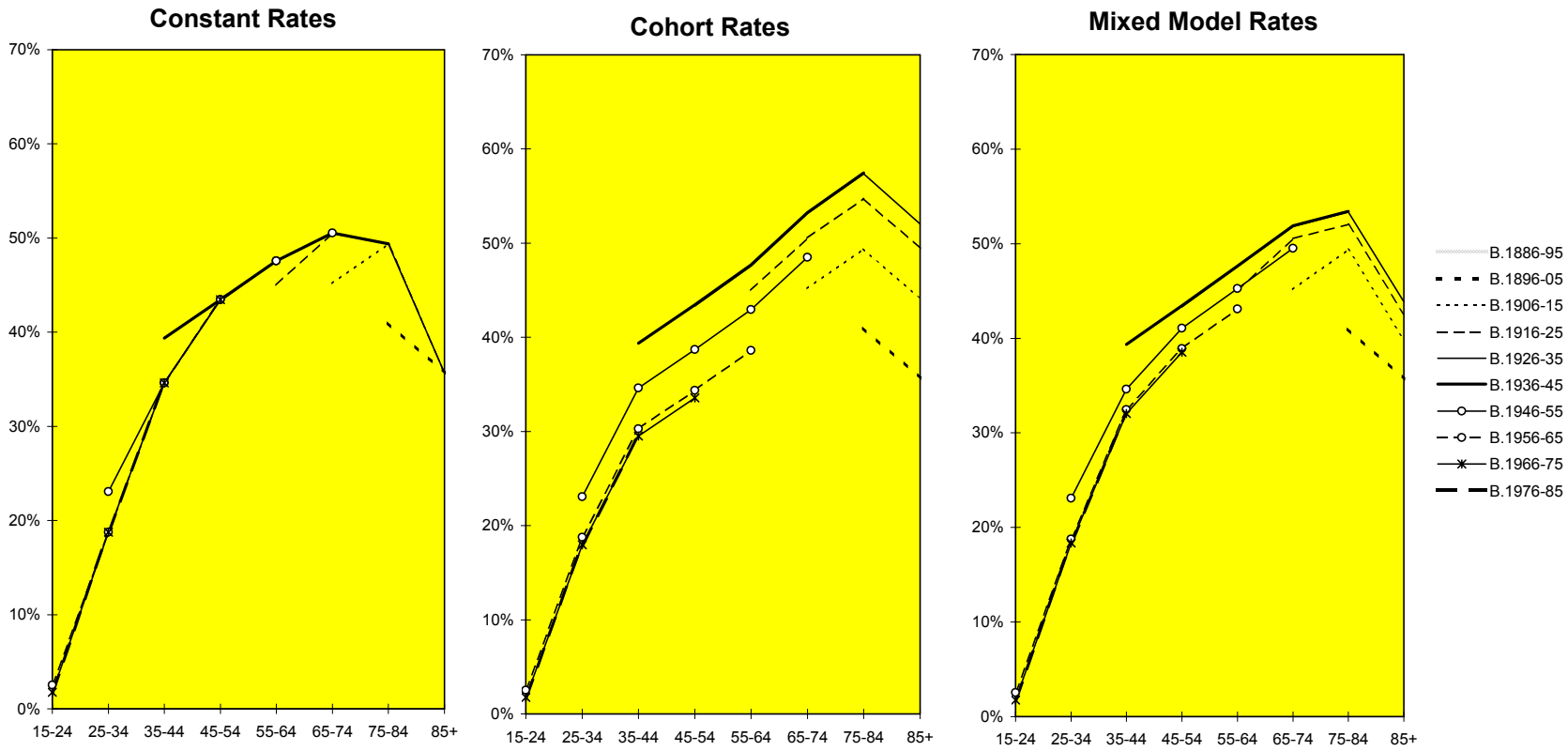
3. Alternative C—Mixed Model

The projections based on Alternative C are a compromise between those of Alternative A (constant rates) and Alternative B (cohort rates). The mixed model of Alternative C averages the forecast results of the other two methods. The resulting forecast targets allow for some catch-up from the initial cohort pattern, closing half the gap between cohort forecast and age group expectations based on 1990 constant rates. These projections can be conceptualized as assuming that cohorts will close half the gap between themselves and their predecessors. This is visible in the right panel of Exhibit 12, where the cohorts retain much of their parallel form seen in the cohort alternative, but with much smaller gaps between cohorts. Those gaps are closed in this alternative projection by steeper increases of young cohorts in the second segment (1990-2000) of their trajectories. (For example, compare homeownership achievements at age 35-44 for the cohort and mixed models.) The mixed model doesn't move California's residents all the way to the housing occupancy levels enjoyed in 1990, but it does allow for some catch-up.

The strength of this alternative is that it embeds the realism of the cohort projections while avoiding the pessimistic assumption that residents will never

Exhibit 12

Homeownership Rates by Age Cohort for White Native Borns in California



be able to break free from the record of their previous low achievement. For policy purposes, Alternatives C or A are clearly preferable to Alternative B.

Household Formations

1. Evaluation of the Alternative Models for the 1990 to 2000 Period

Each of the alternative models holds certain advantages. An initial approach to evaluating their usefulness is to test which model can best replicate the housing growth in the 1990s when 1990 is used as a starting point for the projection. The forecast results can be compared to current estimates of household growth 1990-2000 that are prepared by the Department of Finance on the basis of building permit and other data.

As shown in Exhibit 13, the number of households or occupied units in California is estimated by the Department of Finance to have grown by 1.012 million between 1990 and 2000. Of the three alternative growth projections, Alternative A expects much greater growth, while Alternative B comes very close to replicating the estimated growth. Accordingly, on purely descriptive grounds, the cohort model underlying Alternative B is most consistent with recent growth trends.

Please observe the necessary tautology between housing availability and number of households. Because households are defined by the Census Bureau and others as *occupied* units, the number of households is always limited by the number of housing units constructed. If more units had been constructed, the number of households very possibly would have expanded. Nevertheless, the trend in the *expected* number of households has great bearing on what we should expect in manner of future construction.

2. Comparison of Alternative Household Projections

A longer view of the alternative growth projections is afforded in Exhibit 14. This exhibit plots the growth in 1980-90, 1990-2000, and 2000-10, and contrasts this with building permits that are already known for the first two decades. Also shown is the actual household growth estimated each decade from the census and the Department of Finance.

Given that the three projections are calibrated with known data from 1980 and 1990, there is no disagreement about growth in the 1980s (1.738 million households). After that decade the three alternatives diverge markedly, with Alternative A foreseeing sustained growth and the others decline in growth. As

Exhibit

Department of Finance versus Alternative Estimated Households

Number of Households	
STF1 1990	10,381,206
Department of Finance Mid 2000	11,393,192
Household Projections, 2000	
Alternative A	12,022,290
Alternative B	11,392,863
Alternative C	11,707,577
Household Growth, 1990-2000	
Department of Finance	1,011,986
Alternative A	1,641,084
Alternative B	1,011,657
Alternative C	1,326,371

Source: California Department of Finance, Table 1: County/State Population and Housing Estimates, 1990, 1999, 2000 ; Alternatives A, B, and C provided by the California Housing Futures project

discussed above, Alternative B comes very close to replicating both the estimated growth of the 1990s and the level of construction.

After the 1990s, all three alternatives foresee an upturn in household growth. The range of expectations for 2000-10 is quite broad, from 1.951 to 1.288 million additional households. Even under the low growth projections of the cohort model (Alternative B), an increase of 22% greater household growth is expected in the coming decade.

Homeownership

1. Evaluation of the Alternative Models for the 1990 to 2000 Period

Unlike the case of household formations, it is not possible to evaluate projection models in the light of observed experience. Neither the Department of Finance or any other agency issues estimates of homeowners and renters, and available survey estimates from the Current Population Survey have too much uncertainty to provide an accurate estimate of current conditions for comparison to our projections.

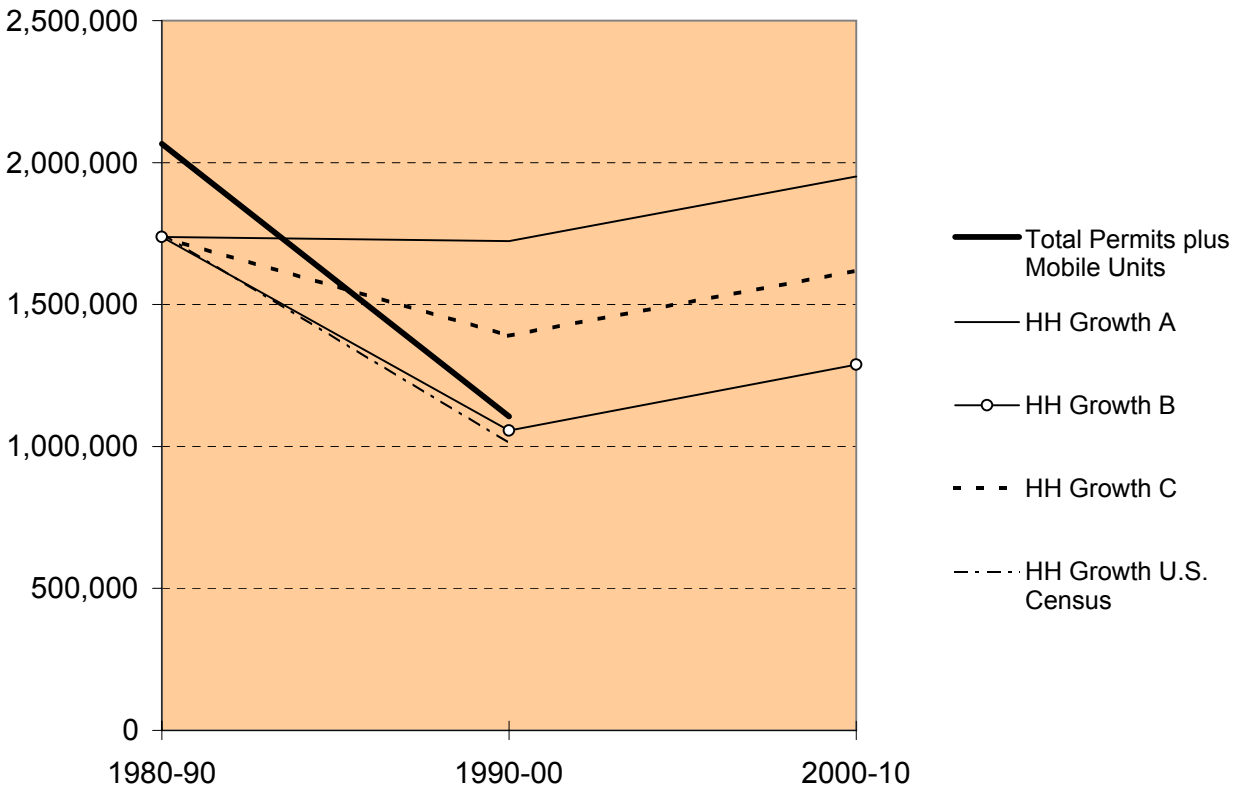
2. Summary of Alternative Projections of Owners and Renters

Nonetheless, the alternative growth projections can be compared over three decades, as was done for household formations (Exhibit 15). This exhibit plots the growth in homeowners 1980-90, 1990-2000, and 2000-10, and contrasts that with building permits for single-family units the first two decades. Please observe that the latter has only a loose approximation to ownership construction. A small proportion of owned units are in multifamily structures, but an even larger proportion of rented homes are in single-family units. Thus single-family construction is a very rough proxy for ownership construction.

Once again, the cohort model in Alternative B tracks best with recent construction. There is no disagreement about ownership growth in the 1980s (1.097 million owner-occupied units). After that decade the three alternatives diverge markedly, with Alternative A foreseeing higher growth in owners, no change for Alternative C, and decreased growth for Alternative B (0.820 million owner-occupied units). Of the three alternatives, only Alternative B suggests a downturn in occupancy that parallels the downturn in single-family construction from the 1980s to the 1990s. As with household growth, the cohort model (Alternative B) appears best able to explain the ownership downturn of the 1990s.

Exhibit

Growth Each Decade in the Number of Households Under Three Alernatives versus the Level of Construction



Source: Construction Industry Research Board, California Department of Finance, U.S. Census Bureau

After the 1990s, all three alternatives foresee an upturn in ownership growth. The range of expectations for 2000-10 is fairly broad, from 1.355 to 0.873 million additional owner-occupied units. Even under the low growth projections of the cohort model (Alternative B), an increase of 6.5% greater ownership growth is expected in the coming decade.

The slighter increase of owner growth than household growth means that more of the coming growth is expected to be in the rental sector. Since owners and renters are simply complements summing to total households, we need not detail trends for renters separately. Fuller detail on renters as well as owners is offered in the next section.

Discussion of Overall Forecast

The preceding projection descriptions can all be summarized in a single table. Exhibit 16 describes the past and projected growth of households, owners and renters. The 1980-90 experience is presented for comparison in the first column, followed by the 1990-2000 projection based on Alternative B (cohort model), which best fit the observed construction trends. For the future decade, 2000-10, two alternatives are presented, Alternative B and Alternative C. We do not include Alternative A here because it seems outside of the range of reasonable possibilities.

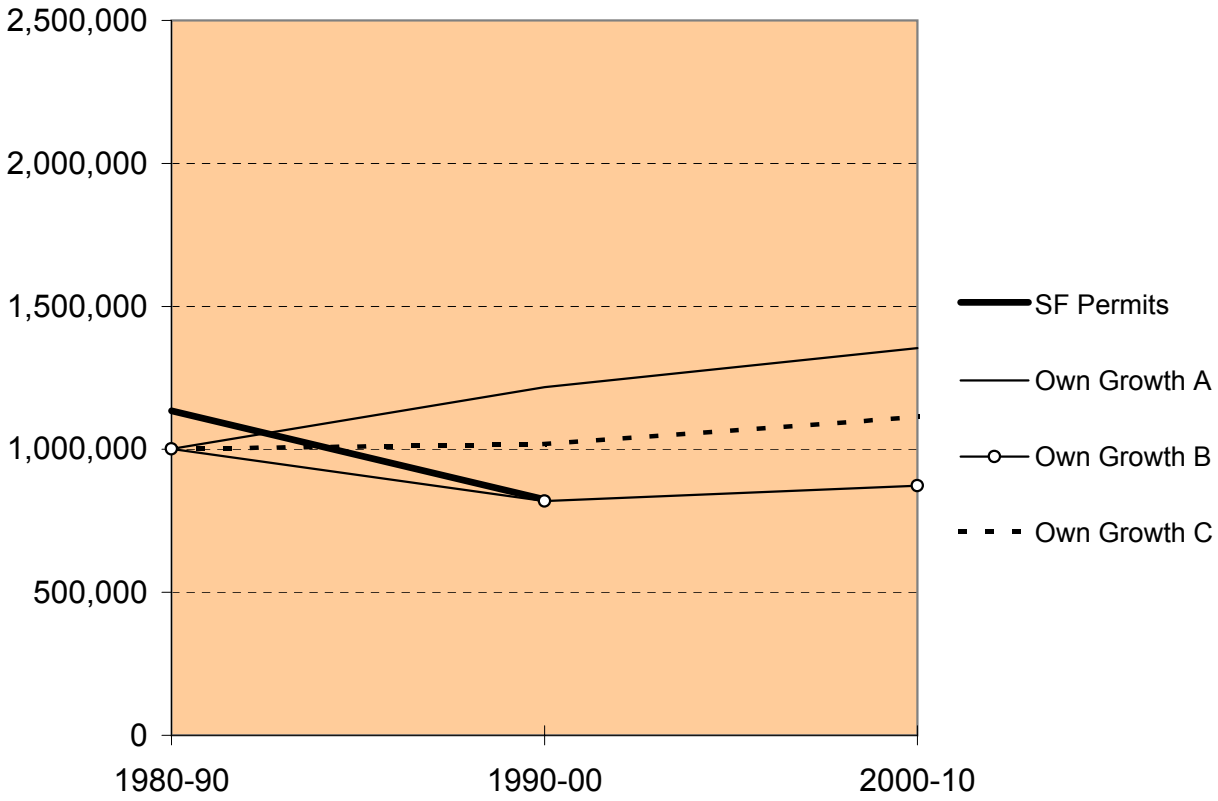
Although Alternative B tracks most closely with recent construction trends, this is not a projection that we should embrace. Following Isserman's (1984) distinctions, this "projection" needs to be modified before we believe it as a "forecast" and before we can accept is as the basis for a preferred plan.

Alternative B simply carries forward the implied cohort trends calibrated in an earlier period and applies these to projected population. (Here we assume that the population numbers are beyond the grasp of policy to modify and so we take those projections as given.) The sustained downturn of the 1990s may well have generated pent-up demand that is ripe for expression and that could lead to some catch-up in the coming decade. Therefore it is credible to believe that some movement toward higher housing consumption rates is possible. That potential rebound is likely no greater than what is projected under Alternative C, and so we discard Alternative A from future consideration.

Not knowing whether Alternative B or C is more likely to occur, we must consider them both feasible forecasts. However, under policy grounds, Alternative C is much preferred. That scenario moves Californians closer to the housing standards of 1990 or before and it represents a more desirable goal toward which to strive. In fact, the California Department of Housing and Community Development has expressed policy preference for Alternatives A

Exhibit

Growth Each Decade in the Number of Homeowner Households Under Three Alernatives versus the Construction of Single-Family Units



Source: Construction Industry Research Board, California Department of Finance, U.S. Census Bureau

Exhibit

Growth in Owners, Renters, and Non-Householders in California 1980-2010

	1980-1990 Growth	1990-2000 Growth	2000-2010 Growth	
			Alternative B	Alternative C
Total Households	1,737,893	1,055,763	1,288,481	1,619,700
Owners	1,002,071	816,189	873,304	1,113,958
Renters	735,822	239,574	415,177	505,742
Non-Householders	2,757,689	2,004,317	3,330,454	2,999,235
Total Population (Age 15+)	4,495,582	3,060,080	4,618,935	4,618,935

and C, to the exclusion of B. They view the housing needs fulfillment under Alternative C as an acceptable target, with those of Alternative A the most ideal.[1] Nonetheless, our view is that Alternative A is unattainable and we hold Alternative C as the only target that is both feasible (forecasted) and policy preferred (to be planned for).

Under either growth alternative in the exhibit, a substantial upturn in construction is expected. Total households would rise from barely one million per decade to 1.288 or 1.620 million additional households. Our preferred growth target also would call for a sustained increase in construction around 60% in excess of that last decade's average.

We foresee much lower increase in owner-occupied households than of rental households. Growth in owners might increase to a level approximating the 1980s, but owner growth did not slump substantially, by our estimates, during the 1990s. Accordingly the future expansion is not proportionally great.

In contrast, dramatic changes are called for regarding rental housing. As shown in a previous section, multifamily construction contracted most sharply during the 1990s, and our estimates of rental growth in the 1990s indicate a decline from 0.736 million added renters in the 1980s to 0.240 million added renters in the 1990s. Our forecasts for the coming decade call for an upturn in rental growth of either 0.415 or 0.506 million added renters. Thus the growth of renters can be expected to approximately double in the coming decade, and construction will need to rebound accordingly.

[1] These preferences are expressed in internal memoranda and in the selection of housing needs targets distributed in summer 2000 to regions in the Central Valley.