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An Examination of Domestic Migration from California Counties

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Abstract. California has experienced a net loss of domestic migrants within the United States every year since 1990. This reversal from California's traditional attraction to migrants has been attributed to numerous causes including the high cost of housing, the cyclical downturn in business activity, and a decline in the level of amenities and quality of life that drew thousands of migrants to California each year over several decades. This paper uses Internal Revenue Service county migration data to examine outmigration flows and assesses the influences of proximity and urban classification on migration flows. Simple and augmented gravity models investigate distance and population effects, finding surprisingly little effect of economic variables but significant differences among counties in the roles of distance and population.

1. Introduction

For much of the post WWII period, the State of California experienced a rapid influx of foreign and domestic migrants flocking to the "Golden State." Between 1950 and 1965, net domestic migration averaged 272,000 per year, adding more than four million residents to California (Johnson and Lovelady, 1995). After a less robust period lasting until 1984, California appeared to once again become a migration magnet, resuming average annual net domestic migration above 100,000 per year. Domestic migration along with immigration and natural increases sparked a total population increase from 10.6 million residents in 1950 to 29.8 million in 1990.

Beginning in the early 1990s, however, California entered a period of negative net domestic migration that persists to the present year. Significant losses were seen in the early 1990s. In 1993-1994, the worst year according to Census Bureau estimates, the net loss was more than 400,000. In a pair of papers Gabriel, Mattey and Wascher (1996) and Gabriel and Mattey (1996) postulated that California's domestic migration patterns are strongly influenced by differences in employment opportunities in California versus other states. As the unemployment rate in California increased relative to rates in other states during the years prior to 1995, so did the amount of net outmigration to other areas leading them to conclude that much of the cyclical variation in state-to-state migration was a function of relative economic opportunities while quality-of-life issues played a lesser role in influencing migration streams (Gabriel and Mettay, 1996). Gabriel et al. (1996) went on to predict that "a large part of the unprecedented and sizable domestic out-migration from California is temporary, to be largely reversed in the context of a rebound in the California economy," and, indeed, once economic conditions improved in California in the late 1990s, the net migration loss lessened (see Johnson, 2000, for an illustration), but there was not a return to net inmigration.

Since 2000, in fact, California has seen population loss from domestic outmigration rivaling that of the 1990s, experiencing negative net domestic outmigration every year. In total, California lost an estimated 1.5 million residents to other states from the 2000 Census to mid-2009, a decline so large that population loss associated with the negative migration numbers could result in a reduction of a congressional seat for California for the first time in its history. This consistent outmigration pattern developed despite state unemployment rates that were generally closer to the national rates than they were in the 1990s.

This research analyzes the recent domestic outmigration from California by focusing on the flows occurring between 2006 and 2007. The research has three primary purposes. First, we seek to document and describe the nature of the California outmigration, with a special focus on county-level movements to illustrate the significantly different county experiences in a state with a rich diversity among regions. Second, we provide a descriptive analysis of migration outflows focusing on urban hierarchical relationships and distance effects. Finally, we fit statistical models from a gravity model foundation which incorporate not only population and distance, but also consider urban hierarchical and economic effects. The statistical analysis also more formally examines the different experiences among the counties through the fitting of simple gravity models for many of California's counties.

2. Literature Summary

Numerous early demographic models attributed migration flows between regions to differences in economic opportunity at places of origin and destination (e.g., Lowry, 1964; Rogers, 1967) leading to the "push-pull" hypothesis suggesting that local conditions at the origin effectively motivate people to migrate to destination regions experiencing an excess demand for labor.

Further research has identified additional economic and noneconomic factors existing in destination regions that influence the migration decision. The pull of economic opportunity has been modeled by many including Muth (1971), Greenwood (1975, 1985), and Partridge and Rickman (2006). The impacts of a favorable climate, along with the presence of various amenities were first modeled in the 1950's by Ullman (1954) who recognized that "pleasant living conditions …are becoming the sparks that generate significant population increase."

The relative importance of amenities in the migration decision appears to have increased in recent decades. This is due, in part, to adjustments in lifestyle requirements that have accompanied changes in demographic and income levels of U.S. residents. Vias (1999) attributed the shifts in migration patterns to the changing preferences among Americans who emphasize environmental amenities and a rural lifestyle as opposed to reasons aligned with improving economic opportunities. Vias also recognized the importance of nonemployment income in the migration decision for those persons who are motivated to relocate but who are not seeking employment. The attraction associated with the positive impacts on the quality of life resulting from favorable amenities has been measured by Cushing (1987), Cebula (2005), and Cebula and Payne (2005), while the role of location-specific amenities in the decision to migrate has been investigated by McGranahan (1999), Green (2001), Deller et al. (2001), and Gunderson and Ng (2006). Plane and Jurjevich (2008) consider 'settlement size' to measure the propensity to migrate up or down the urban hierarchy at different points over the course of the life of an individual, and Whisler et al. (2008) conclude that the migration decision occurs for different reasons over the course of a person's life cycle. Graves (1973, 1979, 1980) surmises that increased levels of income and wealth are related to location-specific amenities.

Cebula and Alexander (2006) investigated the impacts of both economic and non-economic factors on net interstate migration and found that median family income, warmer climate, and higher per pupil state and local government expenditures for public education each contributed positively to the migration decision. Higher costs of living, hazardous wastes and toxic chemicals, and higher state income tax burdens each had a negative impact on interstate migration.

Porell (1982) examined the tradeoffs between economic and amenity factors as a means to explain migration activity in metropolitan regions in the late 1960s. Porell found that individuals will accept lower wages and will pay higher rents in order to live in amenity-rich communities, a result verified by Roback (1982), while Blanchflower and Oswald (1994) found that individuals are willing to accept higher levels of unemployment in order to live in these regions. Over time, an increasing amount of research substantiates the hypothesis that economics and amenities each play a role in the migration decision. An additional body of literature has shown that reversals of long-established migratory flows also have been observed in many regions of the U.S. since the 1970's (Fuguitt and Beale, 1978; Fuguitt and Tordella, 1980) particularly in many rural counties across the nation. Thus, the ability to successfully interpret migration flows is a function of a host of conditions that appear at the source (origin) or at the destination region, or both.

Research which examines California net outmigration flows confirms much of the findings in the broader literature. Writing in 1995, Gabriel et al. employed a logistic migration model as a means to evaluate various factors used to explain California domestic migration from 1981 to 1992. They found that changes in state unemployment rate differentials over time were important in explaining a significant amount of the changes in California net migration including the 1989-1992 period of accelerated out-migration from the state.

Johnson and Hayes (2004) used 2000 Census data to examine migration activity in California's Central Valley. They concluded that social networks play an important part in the decision to migrate. Their research showed that persons living in the Central Valley who were born outside of California were among those most likely to leave the region as a result of the social networks they had developed in other locations.

Henrie and Plane (2008) employed Core Based Statistical Area (CBSA) units to examine internal migration flows over the 1995-2000 timeframe. Their results show that the Los Angeles and San Francisco metropolitan areas serve as inward (from the coast) population redistributors, since both areas lost large numbers of persons via outmigration to every other level within the CBSA urban hierarchy. Results of their research led them to conclude that there is a significant movement down the urban hierarchy as a result of population deconcentration not only in California, but across much of the Pacific region of the U.S.

Allen and Turner (2007) and the State of California's Department of Finance (2007) also provided in-depth analyses of migration between 1995 and 2000. Based on the decennial census, both studies focused largely on demographic detail, emphasizing different experiences of various population sub-groups, but they also provided interesting detail about differential county experiences as well. The State of California report shows maps of gross migration flows both into and out of California counties along with sources and destinations elsewhere in the U.S. The report also documents the net interstate loss in all counties relative to other states with the exceptions of Placer and San Francisco.

Allen and Turner mapped and analyzed California outmigrants as a percentage of receiving county population, attributing the much higher percentages in neighboring states more to similar amenities than distance minimization. They also examined outmigrant counts, noting not only the large numbers to metropolitan areas in western states, but also significant flows to metro areas in a number of other states.

3. Migration from the California county perspective

We use Internal Revenue Service Statistics on Income County-to-County migration to examine outmigration as well as net migration for California counties. The IRS tracks population movements by using changes in addresses linked to individual tax returns from one year to the next. The data for this study were compiled from tax returns filed in 2007 that reflect migration flows occurring between 2006 and 2007. Although 2007-2008 data are presently available, 2006-2007 was chosen to better represent a year typical of California's experience prior to the national economic downturn. [1]

To better understand population distribution in the sending state of California, it is useful to first examine its urban area structure, which is summarized in Figure 1, the Census Bureau map of metropolitan and micropolitan areas. The two major Combined Metropolitan Statistical Areas containing Los Angeles and San Francisco along with numerous other metropolitan areas cover much of the state. In addition, nine other counties, mostly in the eastern and northern sections of the state, constitute micropolitan statistical areas. Only twelve of California's counties, again concentrated in the eastern and northern parts of the state, are not in a metropolitan or micropolitan area.

From these home locations nearly 1.4 million Californians relocated to another county in the U.S. between 2006 and 2007. More than half of those movers were from the six-county Los Angeles – San Diego region, with all but Ventura generating at least 75,000 outmigrants, as shown in Table A1 of the Appendix. The data also reveal a secondary Bay Area cluster with seven counties each generating at least 25,000 outmigrants. While significant numbers of outmigrants left several other counties in central

[1] Subsequent data have revealed a decrease in overall migration and modification to the patterns observed in 2006-2007, with far less net outmigration from California. Frey (2009) attributes much of the shift to the housing markets and worsened economic conditions in typical destination states. As of now, the current migration pattern seems more the aberration, with 2006-2007 perhaps a more 'typical' California year.

and southern California, the less populated counties of eastern and northern California generated relatively few outmigrants. Of course, some of the smaller flows constitute larger percentages (e.g., out-of-state migration approaching four per cent of 2006 population in Alpine and Mono counties), but the focus here is on the migration counts.

The outmigration from California counties was split roughly 40% out-of-state and 60% in-state, putting total migration out of California to all other counties within the U.S. at 562,641 during 2006-07. Migration out of the state (Figure 2) features a pattern similar to overall outmigration, with the six-county southern cluster share rising to almost sixty per cent of all out-of-state migration. Los Angeles County alone provides nearly a quarter of out-of-state outmigrants.

Source: U.S. Census Bureau.

Figure 1. California metro- and micropolitan areas.

Net migration patterns (Figure 3) provide a better picture of the relative attractiveness of California counties compared to other states. The state as a whole experienced net outmigration of more than 200,000 residents. The six-county southern California cluster now accounts for about seventy percent of the net loss, with Los Angeles County accounting for almost one third of the net loss by itself. Several of the other more populous counties had much smaller net losses, with the lone exception of San Francisco. In fact, every California county except San Francisco experienced net interstate outmigration in the 2006-2007 year.

The related measure of demographic efficiency (or effectiveness) also summarizes the relative success of counties, scaling net migration by the sum of in- and out-migration (i.e., demographic efficiency = 100x(net migration/inmigration + outmigration). Here (Figure 4) we again find Los Angeles County, joined by San Bernardino County, in the most extreme group having a demographic efficiency rating of -30 or worse. They are joined by a cluster of five counties just east of the Bay Area and Sierra County on the Nevada border. Of the other four high outmigration counties in the southern part of the state, Orange and Riverside have demographic efficiencies only slightly better than Los Angeles, but San Diego County has a far higher value, indicating a more balanced exchange. After San Francisco County, the highest demographic efficiencies, although still negative, are found in several other Bay Area counties and Shasta County in the northern part of the state.

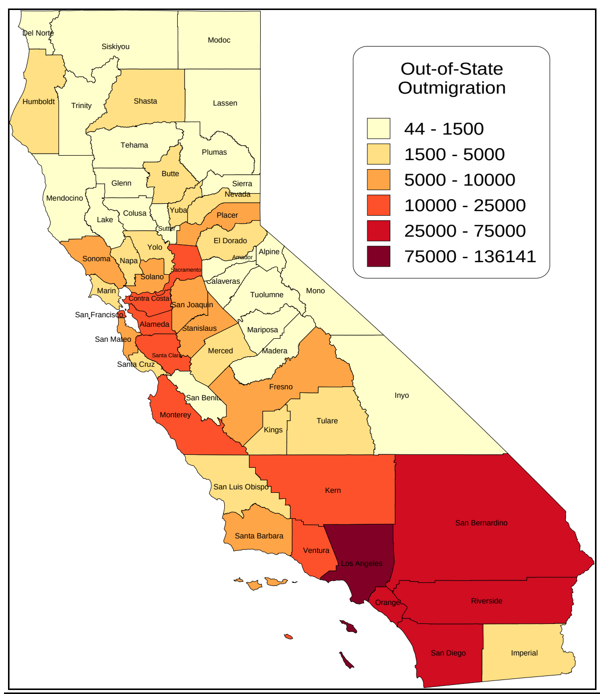

Figure 2. Out-of-State outmigration.

What is perhaps more striking about the demographic efficiency map is the large number of counties, spread across the state of California, with sizeable negative values. The predominance of outmigration relative to other states is not limited to the large, metropolitan counties.

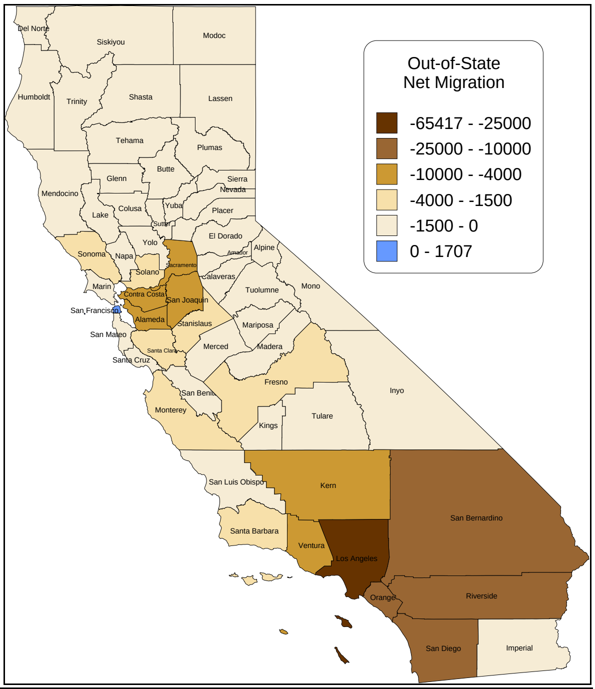

Figure 3. Out-of-state net migration.

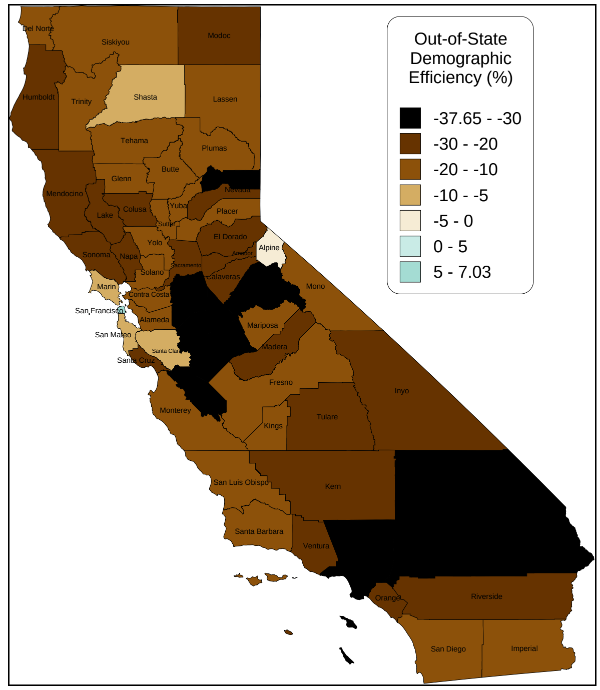

Figure 4. Out-of-state demographic efficiency.

There is an interesting Bay Area 'split' between San Francisco, Marin, and San Mateo, which have low negative to positive values, and Alameda and Contra Costa to the east of the Bay, which have more negative values. Despite the success relative to other states, however, San Francisco has the most negative in-state demographic efficiency (see Table A1), so it still serves to redistribute population out in that sense. These results are consistent with the small negative overall demographic efficiency found for the San Francisco MSA in Henrie and Plane, although it should be noted that, in addition to our introducing an in-state/out-of-state split, we also allow for migration within the MSA, while Henrie and Plane treat MSAs as integrated units.

For the Los Angeles MSA, both counties and neighboring Ventura have demographic efficiencies around -30 out-of-state, and Los Angeles has a similar in-state value while Orange is smaller (-11) and Ventura is positive. San Bernardino and Riverside have similar strongly negative out-of-state values, but both are positive in-state, Riverside enough so that its overall demographic efficiency is positive. The LA and Riverside MSAs are also consistent with the 1995-2000 Henrie-Plane results. A clear change, however, is found in San Diego County, where we find a modest negative out-of-state demographic efficiency and a very small negative demographic efficiency in-state.

4. Outmigraton patterns: spatial effects

4.1. California state and county outmigration to other states

The map in Figure 5 provides a graphic picture of county-level destination areas for California outmigrants for the 2006-2007 timeframe. These values should be regarded with some caution, since detailed information on migration movements was suppressed to protect the identity of individual persons for cases where outmigration flows were recorded in fewer than ten IRS returns. Therefore, the specific county-to-county outmigration flows that are available in the dataset only capture 428,335 of the 562,641, or 71.6 percent of the total outmigrants.

Even a casual review of the map indicates that factors related to distance, climate and economic opportunity are evident in the migration flows with the largest streams of migrants relocating to counties in the adjacent states of Arizona, Nevada and Oregon along with amenity-rich regions in Colorado, Washington and Florida and counties experiencing expanded economic opportunities in Texas.

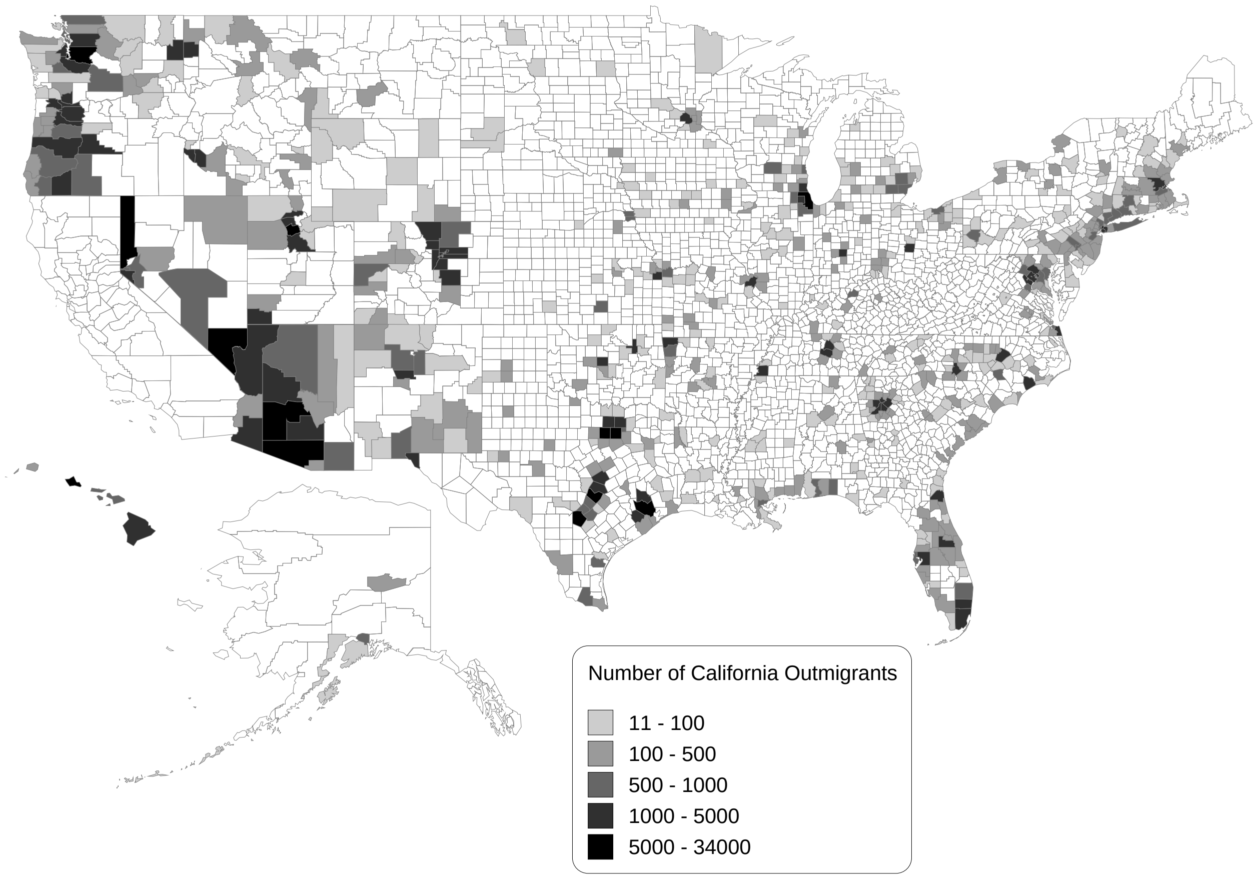

Figure 5. County destinations of California outmigrants.

The Top 10 states receiving the highest numbers of migrants from California over the period are shown in Table 1. Texas was the largest recipient state with over 82,000 Californians relocating to Texas. Arizona received nearly 56,000 and Nevada received almost 47,000 of those persons relocating from California. Washington, Oregon and Colorado complete the rest of the top six receiving states. As a fraction or percentage of total outmigration, one in six of California's outmigrants moved to Texas, one in eight to Arizona, one in nine to Nevada, and about seven percent to Washington, six percent to Oregon, and five percent to Colorado. The table also illustrates significant variation between states in terms of the percentage of outmigrants whose destination county was identified.

The percentages migrating from each California county to the top destination states are shown in Table A2. This table also clearly shows the effect of data suppression on the number of outmigrants whose destination county and state are identified. This loss is severe in many less populous counties.

Table 1. Number of outmigrants to top 10 receiving states.

State	Number of California Outmigrants	Accounted for in County Flows	Percent Accounted For
Texas	82,537	71,103	86.1%
Arizona	55,911	53,645	95.9%
Nevada	46,971	44,874	95.5%
Washington	35,094	29,420	83.8%
Oregon	29,689	24,534	82.6%
Colorado	24,716	20,539	83.1%
Florida	20,120	14,716	73.1%
Utah	18,924	16,507	87.2%
Georgia	16,306	11,116	68.2%
New York	16,133	12,631	78.3%

Source: Internal Revenue Service Statistics on Income County-to County Migration 2006-2007.

Even though we can trace the destination county for 76.2% of total outmigrants, we have no detail at all for five counties, and we have detail on less than ten percent of outmigrants for five other counties. We have locations on more than half of outmigrants for only 21 of the 58 counties. The highest percentage is, not surprisingly, Los Angeles County, where the relatively large flows capture almost 94 percent of outmigrants. Keeping in mind the caveat that we don't know all destinations, we can still observe the destination of the majority of outmigrants.

When we examine individual county spatial outmigration profiles, we see dramatic differences, especially for the four nearby destinations. In five counties, all of the identified outmigration went to Nevada, and another four counties sent more than half of their outmigrants to Nevada. Figure 6 shows the clear spatial proximity effect of border counties or other nearby counties sending high percentages to Nevada. For two other counties, all outmigrants moved to Oregon, and another three counties sent more than half of all outmigrants to Oregon. When the Oregon and Washington outmigration percentages are summed, we again see a clear spatial effect (Figure 7), with the northern counties oriented toward the northern destination states. Interestingly, the southern counties have higher percentages than the Nevada border counties, although this may be at least partially due to the suppression problem.

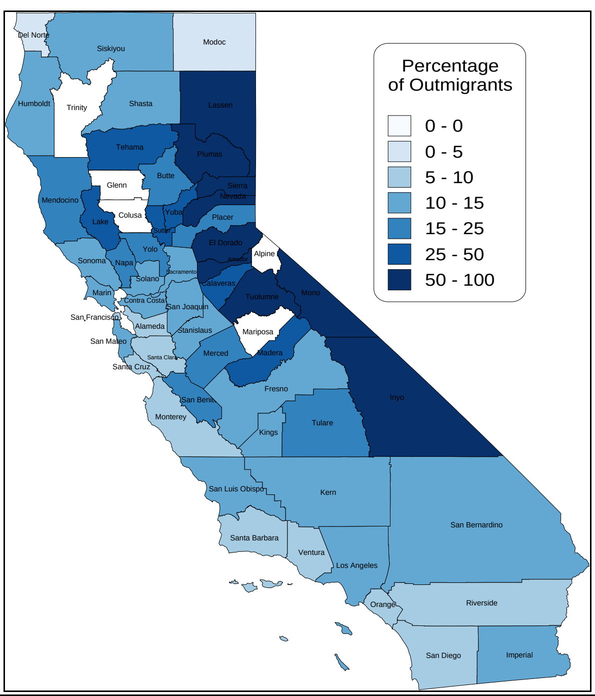

Figure 6. Percentage of outmigrants to Nevada.

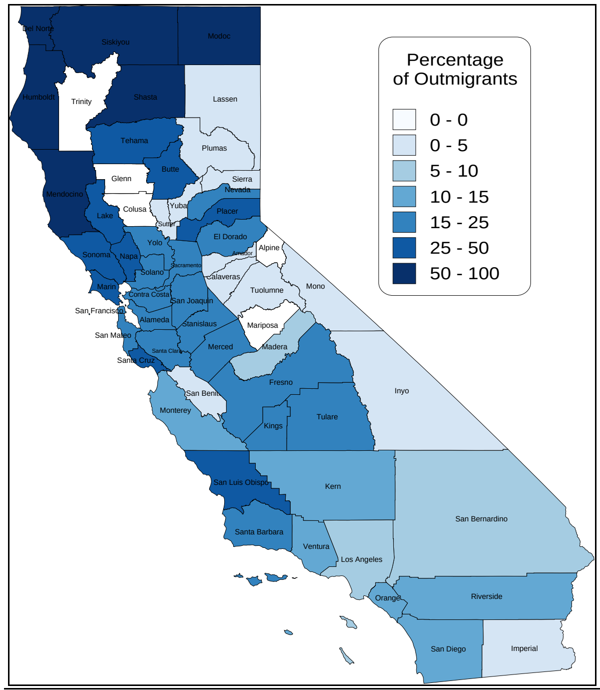

Figure 7. Percentage of outmigrants moving to Washington or Oregon.

Arizona and Texas generate different patterns. Only three counties sent a majority of outmigrants to Arizona, but only twelve of the counties reporting county-specific migration sent *less* than ten percent of outmigrants to Arizona. Spatially (Figure 8), we can see that two of the three counties with high Arizona percentages are actually in Central California. With the exception of the Nevada and Washington/Oregon dominated counties, there is little distinctive difference throughout the rest of the state.

Despite Texas' status as the top outmigration destination, no county sends as much as thirty percent of its outmigrants to Texas. However, the five large outmigration source counties in southern California send between 13 and 21.5 percent of their outmigrants to Texas, largely accounting for Texas being the single largest recipient of outmigrants.

Viewing California outmigration at a broader regional level is also instructive, especially as one considers the role of California as a redistributor of U.S. population to other western states, as emphasized in other recent papers. For the state as a whole, 44.5% of outmigrants moved to other states in the West Census region (states west of the Plains states from Texas to North Dakota). If one includes the Plains states, we get another 18%, mostly Texas (16.6% by itself). A full 37.5% moved to destinations further east. There is some 'western' redistribution, but much interaction with the east as well.

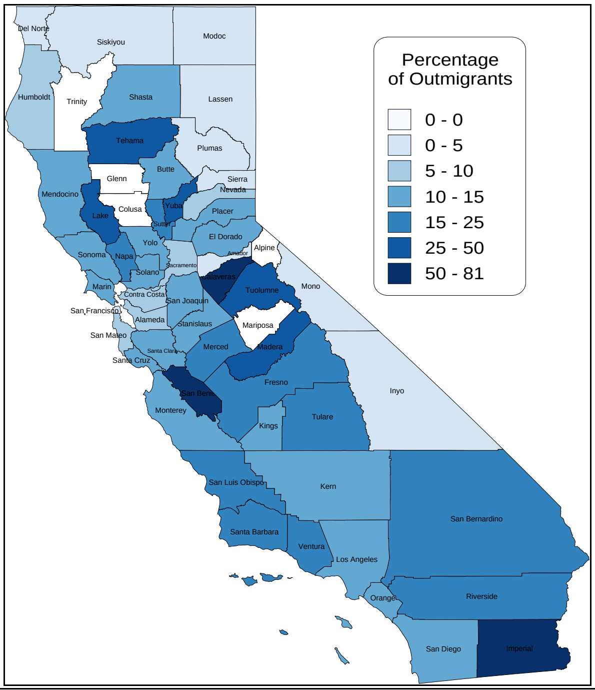

Figure 8. Percentage of outmigrants to Arizona.

If we focus on three major MSA central counties, we find that only a third of San Francisco outmigrants stay west of the Plains, which rises to 42% if you add Texas, but still the majority heads east of the Plains. San Diego only sends 40% west of the Plains, with another 13% to Texas, leaving almost half moving further east. Los Angeles sends 45% west of the Plains and another 19% to Texas, leaving 36%, around the state percentage, east of the Plains.

4.2. California state and county outmigration to particular counties

Table 2 contains information on all counties which were the recipients of 5,000 or more California outmigrants. Clark County in Nevada (33,988) and Maricopa County in Arizona (32,674) were by far the largest beneficiaries of the outmigration. Harris County in Texas (11,680) was a distant third, receiving only about one-third the number of migrants to Clark and Maricopa. King County in Washington (10,936) was the only other county to receive over ten thousand California migrants.

Table 3 shows the largest origin-destination flows for specific counties in California to counties elsewhere in the U.S. Clark and Maricopa were the top receiving counties for each of the four largest sending counties (Los Angeles, Orange, San Diego and San Bernardino). Maricopa County (Phoenix) and Clark County (Las Vegas) are the two closest major metropolitan regions to these southern California counties. Thus the large number of migrants to these counties suggests the importance that both proximity (distance) and urbanization exert on the decision of where to migrate. Additional large flows of Los Angeles County outmigrants moved to the counties containing Houston, Ft. Worth, and San Antonio in Texas, and Seattle, Washington.

Table 2. Counties Receiving > 5,000 migrants.

County	State	# of Migrants
Clark (Las Vegas)	NV	33,988
Maricopa (Phoenix)	AZ	32,674
Harris (Houston)	TX	11,680
King (Seattle)	WA	10,936
Bexar (San Antonio)	TX	9,799
Tarrant (Ft. Worth)	TX	9,009
Washoe (Reno)	NV	7,313
Salt Lake (Salt Lake City)	UT	6,530
Dallas (Dallas)	TX	6,099
Honolulu (Honolulu)	HI	5,892
Cook (Chicago)	IL	5,841
Pima (Tucson)	AZ	5,638
Travis (Austin)	TX	5,323
New York (New York City)	NY	5,035

Source: Internal Revenue Service Statistics on Income County-to-County Migration 2006-2007.

Table 3. Top 12 Largest county-to-county flows.

From:	To:	State:	Number:
Los Angeles (1)	Clark	NV	13,921
Los Angeles (2)	Maricopa	AZ	10,397
Los Angeles (3)	Harris	TX	4,603
Los Angeles (6)	Bexar	TX	3,298
Los Angeles (8)	Tarrant	TX	3,053
Los Angeles (12)	King	WA	2,510
Orange (4)	Maricopa	AZ	3,552
Orange (7)	Clark	NV	3,208
San Diego (5)	Maricopa	AZ	3,492
San Diego (10)	Clark	NV	2,938
San Bernardino (9)	Clark	NV	3,024
San Bernardino	Maricopa	AZ	2,605

Source: IRS SOI County-to-County Migration 2006-2007.

4.3 Impact on receiving areas

The state and regional percentages detailed in Section 4.1 illustrate that California's outmigrants venture to a wide range of locations, often outside of the West region. This does not, however, preclude an exaggerated effect on other Western states; although only 44.5% of California's outmigrants move to the other Western states, this percentage is much larger than the 12.6% percent of the 2007 non-California U.S. population living in those states.

Focusing more narrowly on states, California outmigration as a percentage of migration received by a state can reveal how prominent and significant the outflows may be to the destinations (Table 4). Nearly forty percent of Nevada's immigrants come from California, more than seven times the number from any other state. Nearly a third of Oregon's inmigrants come from California. Even though a smaller percentage, roughly a quarter, of inmigrants in Arizona and Utah come from California, their presence is more prominent compared to any other sending state.

Table 4. Percentage of destination state's inmigrants from California.

	Percent of Receiving State's Inmigrants	Next (or Largest) Sending State Percentage	California to Next/Largest Flow Ratio
Texas	17.9%	7.0%	2.57
Arizona	27.6%	6.0%	4.59
Nevada	39.5%	5.3%	7.42
Washington	21.8%	13.0%	1.68
Oregon	31.3%	18.0%	1.74
Colorado	16.7%	9.5%	1.75
Florida	4.5%	13.5%	0.33
Utah	25.1%	8.1%	3.10
Georgia	5.9%	21.1%	0.28
New York	7.4%	14.8%	0.50

Disaggregating further, individual counties also experience significant impacts of inmigration. Many specific counties with high net migration percentages relative to selected California counties were evident in other Western states in the Henrie and Plane (2008) analysis, and Allen and Turner (2007) also examined California migrants as a percentage of destination county population. The map of 2006-2007 California inmigrants as a percentage of county population is shown in Appendix Figure A1. This map shows many of the characteristics of Figure 5, with the pronounced concentration of higher percentages in other western states and urban areas throughout the country, most notably the Texas concentrations in metropolitan Dallas and Houston and in the San Antonio-Austin corridor. It is understandable that residents in these areas, especially those western counties that have experienced years of such inmigration, may worry about the 'Californification' of their communities described in the Economist (2007). Some of the other metropolitan areas outside of the west are less prominent, including the interesting clusters around Atlanta and Nashville and in North Carolina.

5. Urban hierarchy effects

Much recent literature has focused on migration flows between levels of the urban hierarchy. Numerous ways of defining the hierarchy exist, among which we prefer the detailed classification offered by the Rural-Urban Continuum Codes (RUCC), also known as Beale Codes, developed by the Economic Research Service of the USDA. Table 5 provides a summary of the nine codes, which range from a top category of counties in metropolitan areas of one million or more people to a bottom category of completely rural or less than 2,500 urban population, not adjacent to a metropolitan area.

Table 5. Rural-Urban Continuum Codes.

RUC Code	Description
Metro Counties:	
1	metro area with 1 million population or more
2	metro area of 250,000 to 1 million population
3	metro area of fewer than 250,000 population
Nonmetro Counties:	
4	Urban population of 20,000 or more, adjacent to a metro area
5	Urban population of 20,000 or more, not adjacent to a metro area
6	Urban population of 2,500-19,999, adjacent to a metro area
7	Urban population of 2,500-19,999, not adjacent to a metro area
8	Completely rural or less than 2,500 urban population, adj. to metro area
9	Completely rural or less than 2,500 urban population, not adj. to metro area

Source: Economic Research Service, U.S. Department of Agriculture.

Migration to differing county types from California counties is shown in Table A3, organized by the RUCC of the sending county. In addition, the percentage migrating to each RUCC level is summarized for the group. As one would expect, outmigrants from the large metropolitan areas tend to migrate toward other metropolitan areas, with almost two-thirds relocating to large metropolitan areas and another 30 percent to smaller metropolitan areas. Only one percent moved to counties without an urban center of more than 20,000. Outmigrants from counties in mid-sized metropolitan areas had similar percentages, but without such a strong tendency for moving toward the largest out-of-state metropolitan areas.

Outmigrants from smaller metropolitan areas also concentrated in metropolitan destinations, but fewer than half located to the largest metropolitan areas, roughly balanced by those moving to smaller metro areas. Even for this group, though, less than ten percent moved to nonmetropolitan areas. Outmigrants from urbanized counties adjacent to metro areas (RUCC 4) also focused on metropolitan destinations, but for this group only about a quarter moved to the largest metropolitan areas, while about two-thirds moved to smaller metro areas. Even in this group less than ten percent moved to nonmetro locations. More migration to nonmetropolitan locations is seen among outmigrants of less urbanized counties, but even in those counties significant percentages moved to metropolitan areas.

The location pattern percentages described for the groups are far from uniform within RUCC class, as shown in Table A4. Among the large metro area counties, for example, 84 percent of San Francisco County outmigrants moved to other large metropolitan areas, as did more than seventy percent of outmigrants from neighboring Alameda, Marin, and San Mateo Counties. Los Angeles and Orange Counties each sent around two-thirds of their outmigrants to large metro areas, but many other large metropolitan southern California counties sent smaller percentages to large out-of-state metro areas. Outmigrants from mid-sized metro areas were more similar to one another in their pattern of relocation, but widely varying tendencies are observed among the nonmetropolitan counties.

6. Modeling migration influences

6.1. Models including all counties together

Regression modeling was used to bring together spatial effects and the relative attractiveness of destinations of different sizes. Initially, a traditional gravity/spatial interaction model was fit. Distances were measured as highway miles, as provided between all pairs of U.S. counties by the Center for Transportation Analysis, and the July 1, 2006, U.S. Census estimates of population for the California counties and the destination counties were used.

The traditional basic gravity formulation of

$$M_{ij} = k\frac{P_i P_j}{d_{ij}^{\beta}} \qquad (1)$$

was used for the initial model, where M_{ij} is the outmigration flow from California county i to out-of-state county j, P_i is the California county population, P_j is the destination county population, d_{ij} is the distance between the counties, β is the distance decay parameter, and k is a constant. In keeping with the multiplicative nature of the traditional spatial interaction model, the logs of migration flow, distance, and populations were used to transform the model into a functional form suitable for OLS regression. The initial model with origin and destination county population counties entered separately revealed very similar coefficients, so the product of the populations was used in all of the models for this study. The number of observations was pared back to exclude the Alaska and Hawaii observations, for which distance data were not comparable, leaving 4,160 observations.

The basic model, using only population and distance, revealed highly significant coefficients on both variables in the expected directions (Table 6). The distance decay parameter, while negative, was only -0.8, revealing a somewhat modest effect. The gravity model explained about half of the variation among the migration flows.

In order to investigate any possible effect of the urban hierarchy beyond that captured by population, two versions of RUCC differences between counties were used. In the first, the destination RUCC was subtracted from the origin county RUCC, generating possible values from -8 (from a large metro county to a rural county) to 8 (the opposite movement). If movement tends to be up the urban hierarchy, we would expect positive values, although it is clear that much migration actually occurs between similar counties or adjacent types.

To allow for the similarity effect, the absolute value was also used as an explanatory variable, with the expectation that larger absolute differences would generate smaller migration flows.

The results of the expanded regressions with the RUCC terms have population and distance decay parameters similar to the simple model. The RUCC coefficients have the expected sign and are statistically significant. However, both regressions provided only a slight gain in predictive power over the simple model.

An additional model was fit to allow for the effect of two important summary economic measures of economic vitality. The first economic variable is the difference in unemployment rates between the origin and destination counties. The unemployment rates for 2006 were obtained from the Bureau of Labor Statistics website. Differences in per capita incomes between these counties were also included. The per capita income data, also for 2006, were obtained from the Bureau of Economic Analysis' Regional Economic Information System website. Including the new variables entailed the loss of 65 observations, most likely Virginia independent cities for which data are not always collected.

The new model (Model 4 on Table 6) included the distance and population measures, the absolute RUCC measure, and both economic measures. The coefficients on the previously used variables changed little. The per capita income variable was significant in a negative direction, as would be expected as people would be less likely to migrate to counties with significantly lower per capita incomes (i.e., with higher values of origin minus destination per capita income). The unemployment variable coefficient was positive, as would be expected, but it was not statistically significant. Despite the addition of the significant per capita income variable, the percentage of explained variation remained around fifty percent.

Table 6. Regression results for state-level gravity models.

Variable	Model 1: Basic Gravity Model		Model 2: Add RUCC Difference		Model 3: Add RUCC Difference Abs. Value		Model 4: Add Economic Variables	
Intercept	-5.05		-4.84		-3.99		-3.93	
	-23.87	***	*-22.48*	***	*-16.83*	***	*-16.11*	***
ln(Distance)	-0.802		-0.805		-0.831		-0.840	
	-44.18	***	*-44.46*	***	*-45.59*	***	*-45.99*	***
$\ln(Pop_i Pop_j)$	0.550		0.544		0.522		0.522	
	59.76	***	*58.75*	***	*54.49*	***	*53.47*	***
$RUCC_i$-$RUCC_j$			0.0340					
			4.9	***				
Abs. Value of					-0.0852		-0.0820	
$RUCC_i$-$RUCC_j$					*-9.42*	***	*-9.01*	***
$Unemp_i$-$Unemp_j$							0.00248	
							0.38	
PCI_i-PCI_j							-0.00000328	
							-4.08	***
F Value	1899.81	***	1281.55	***	1322.9	***	800.19	***
R^2	0.4775		0.4805		0.4885		0.4946	
Adjusted R^2	0.4773		0.4802		0.4881		0.4939	
n	4160		4160		4160		4095	

*Note: Numbers italics are t-statistics. *** Indicates significance at 0.0001 level.*

6.2 County-specific effects

Since the descriptive analysis above suggests that distance and county population/urbanization have varying degrees of influence on different counties, the migration model was tested for county-specific effects. The test was restricted to the simple gravity model formulation, allowing for county-specific intercepts and, via interaction terms, population and distance effects. The level of explanation rose by twelve percentage points (R^2 = 0.5989; $\overline{R}^2$ = 0.5843), and the model-wide F-test for the inclusion of all of the county-specific effects revealed a significant effect despite the inclusion of 144 new variables. The separate intercept, distance, and population variable groups were all found to be significant by Type III sums of squares F-statistics (7.79, 7.73, and 11.14, respectively, all with p-values less than 0.0001).

To more clearly capture the individual county effects, separate models were fit for the individual counties to see if they differed significantly in terms of population and distance effects. Given the small amount of explanation added through the RUCC and economic variables, the models were kept simple, involving only the destination county population and distance. All of the variables were kept in logs for the county estimations. We chose to run these models on only those counties with at least twenty reported flows to out-of-state locations.

The county estimation results, summarized in Table 7, revealed several interesting differences in coefficients. With the exception of the Monterey County model, which had a very poor fit and odd parameter values, the county models seem reasonable, typically having significant coefficients for both independent variables. The distance decay parameters varied from about -0.3 to -1.3. San Francisco County, with its distinctive migration pattern to primarily large cities, often at large distances away, had one of the lowest coefficients, while Los Angeles County had one of the highest along with Orange and Riverside Counties. Los Angeles had the largest population coefficient, 0.94, and other more populous counties (Alameda, Orange, San Diego, San Francisco) also had large population coefficients. The lower coefficients belonged to less populous counties with smaller numbers of outmigration flows. Several of the county models had R^2 values well in excess of 0.5, the highest being in Los Angeles County, where more than seventy percent of the variation in migration flow magnitude is explained through a simple gravity specification. San Francisco County had one of the lower R^2 values, with only about 38 percent of the variation explained.

Table 7. County-specific gravity models.

		Coefficients		
County	N	ln(Dist)	ln(Pop_j)	R^2
Alameda	189	-0.788	0.755	0.57
Butte	22	-0.696	0.411	0.68
Contra Costa	138	-0.884	0.614	0.56
El Dorado	23	-1.146	0.363	0.80
Fresno	75	-0.852	0.560	0.64
Kern	104	-0.541	0.358	0.38
Los Angeles	614	-1.332	0.941	0.71
Marin	30	-0.366	0.273	0.36
Monterey	90	-0.144	0.144	0.04
Orange	334	-1.229	0.797	0.62
Placer	48	-0.715	0.482	0.45
Riverside	274	-1.153	0.547	0.58
Sacramento	178	-0.800	0.529	0.47
San Bernardino	313	-0.978	0.468	0.45
San Diego	563	-0.874	0.754	0.60
San Francisco	132	-0.390	0.696	0.38
San Joaquin	73	-0.521	0.480	0.46
San Luis Obispo	40	-0.859	0.271	0.58
San Mateo	89	-0.775	0.727	0.55
Santa Barbara	73	-0.485	0.259	0.23
Santa Clara	193	-0.887	0.720	0.49
Santa Cruz	29	-0.803	0.347	0.60
Shasta	22	-0.743	0.403	0.69
Solano	74	-0.342	0.345	0.29
Sonoma	55	-0.889	0.493	0.51
Stanislaus	58	-0.504	0.486	0.55
Tulare	27	-0.758	0.248	0.39
Ventura	143	-0.994	0.470	0.52

7. Conclusions

Since 1990, the State of California has experienced substantial net outmigration of residents to other locations within the U.S. Although California's overall population continues to increase, domestic net migration flows have reversed course from their long-term trend where more people were moving into the state than leaving the state for other destinations. Almost sixty percent of the outmigration activity can be attributed to the five heavily populated counties in and around the Los Angeles-San Diego region. However, outmigration over the 2006-2007 timeframe was apparent in all fifty-eight of the California counties with the lone exception of San Francisco County.

Descriptive analyses revealed a clear role of distance and urbanization in the choice of destination counties. Northern and eastern county clusters appeared when classifying according to Washington/Oregon and Nevada destinations, respectively. Urban hierarchy effects were evident in an attraction generally to more populous areas but with lower percentages to the largest metropolitan areas for less urbanized origin counties. However, wide variation among individual counties within the same urbanization class was observed.

The effects of population and distance were combined in a basic gravity model, using the logs of migration flow, distances between all pairs of counties and the populations of the origin and destination counties were to transform the model into a form appropriate for performing OLS regression. The coefficients for the distance and population variables in the simple gravity model were both highly significant in the expected directions, and just under forty-eight percent of the variance in migration activity was explained by the model. When additional variables were added as a means of measuring the possible effects of individuals moving up and down the urban hierarchy, the coefficients were again, highly significant; however, they did little to increase the predictive power above that explained in the basic model. Further analyses were performed using differences in employment rates and per capita income levels between origin and destination counties. While differences in unemployment rates were not significant, the differences in per capita income levels were significant and of the proper sign; however the amount of predictive power was not substantially increased.

Finally, regression models were also run on the individual counties to better identify the differing impacts of population and distance. For most counties, both variables were significant, although the size of the coefficients and the R^2 values varied widely across counties.

While documenting an interesting and important trend in migration, the analysis provided here is just a step in better understanding California's outmigration, with additional research needed in order to further explain the reasons behind the migration flows. Although the models capture from half (without individual county effects) to about sixty percent (with the effects) of the variation in the size of migration flows from California counties, the models still lack additional key aspects of migration. In particular, demographic disaggregation and attention to amenities could greatly enhance our understanding of the migration flows.

The demographic aggregation in the current models is an unfortunate consequence of working with the annual IRS dataset which only tracks migration flows for the entire population covered by the matched returns. A deeper analysis would require shifting to a Census Bureau count, with the 2000 Census data providing the most recent data with county-level and disaggregated demographic detail. While more recent patterns would be lost, the disaggregated data could provide a much greater understanding of migration motivations.

Likewise, the inclusion of amenities, cited earlier as a key migration motivation, also could greatly enhance the migration flow modeling. For both the demographic variables and amenities, one could imagine modifications of the effects of all of the factors incorporated in the simple models included here. The omitted variables might reveal that some distance effects are exaggerated in that large flows to nearby states and counties may have a significant amenity component. Those same flows also might be exaggerated by age and/or ethnic or racial influences. Better accounting for amenities also may reveal stronger economic effects, as the absence of the potentially strong influence of amenities may be suppressing the effect on migration of differences in economic environments. It would also be quite interesting to see the extent to which omitted variables alter the finding of large differences among counties.

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Appendix

Figure A1. California migrants as a percentage of 2006 population of destination counties.

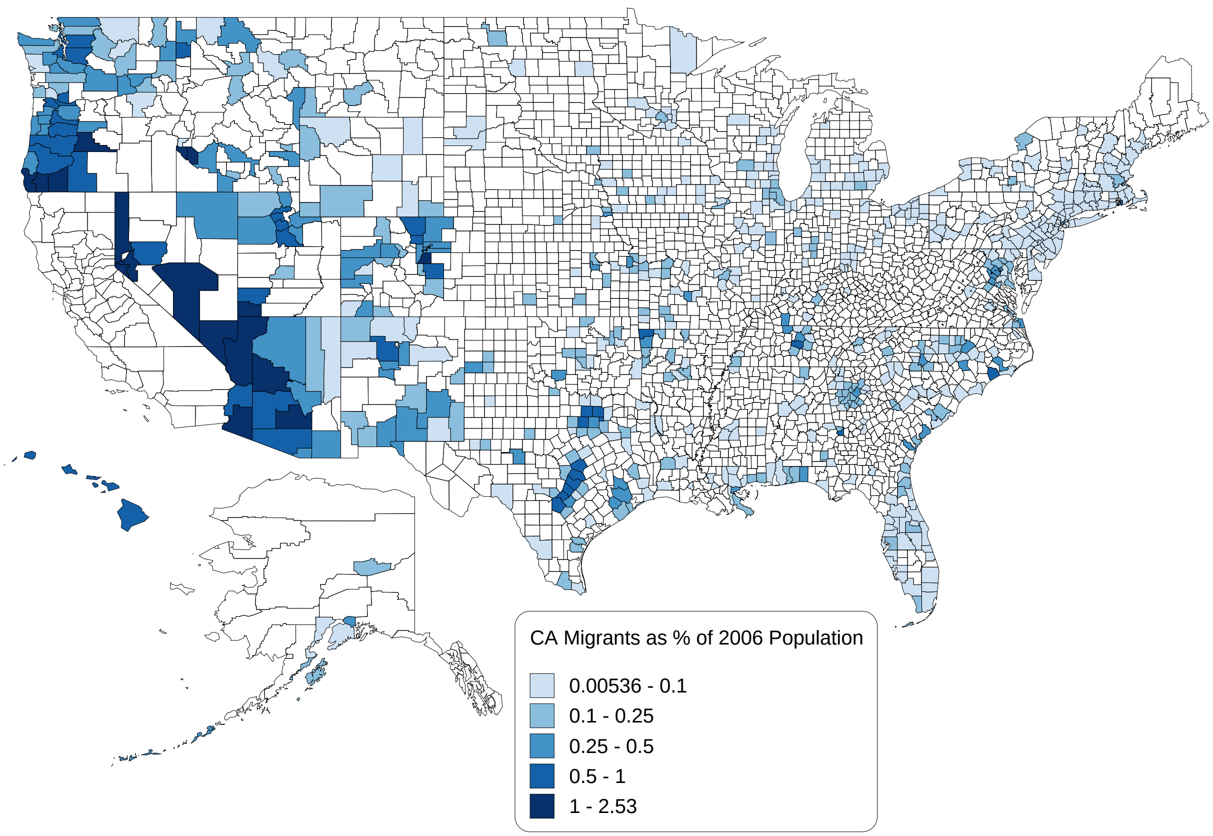

Table A1. County migration by in-state and out-of-state destination.

	Total				With Other States				Within State			
County	**Out**	**In**	**Net**	**Efficiency**	**Out**	**In**	**Net**	**Efficiency**	**Out**	**In**	**Net**	**Efficiency**
State	1379249	1174232	-205017	-8.0	562517	357500	-205017	-22.3	816732	816732	0	0.0
Alameda	68239	57084	-11155	-8.9	18680	14106	-4574	-14.0	49559	42978	-6581	-7.1
Alpine	86	87	1	0.6	44	43	-1	-1.1	42	44	2	2.3
Amador	1360	1681	321	10.6	405	260	-145	-21.8	955	1421	466	19.6
Butte	7790	7580	-210	-1.4	2571	1950	-621	-13.7	5219	5630	411	3.8
Calaveras	1959	2347	388	9.0	610	348	-262	-27.3	1349	1999	650	19.4
Colusa	1044	885	-159	-8.2	206	132	-74	-21.9	838	753	-85	-5.3
Contra Costa	40540	40675	135	0.2	13095	8825	-4270	-19.5	27445	31850	4405	7.4
Del Norte	1004	1123	119	5.6	565	428	-137	-13.8	439	695	256	22.6
El Dorado	8165	8359	194	1.2	3369	2079	-1290	-23.7	4796	6280	1484	13.4
Fresno	22495	20973	-1522	-3.5	8436	5755	-2681	-18.9	14059	15218	1159	4.0
Glenn	1172	1122	-50	-2.2	277	191	-86	-18.4	895	931	36	2.0
Humboldt	4814	3777	-1037	-12.1	2253	1432	-821	-22.3	2561	2345	-216	-4.4
Imperial	5592	6527	935	7.7	2280	1727	-553	-13.8	3312	4800	1488	18.3
Inyo	937	902	-35	-1.9	462	278	-184	-24.9	475	624	149	13.6
Kern	23153	27636	4483	8.8	11915	7295	-4620	-24.0	11238	20341	9103	28.8
Kings	6955	6607	-348	-2.6	2985	2283	-702	-13.3	3970	4324	354	4.3
Lake	2349	2379	30	0.6	789	492	-297	-23.2	1560	1887	327	9.5
Lassen	1245	1223	-22	-0.9	563	442	-121	-12.0	682	781	99	6.8
Los Angeles	295374	158441	-136933	-30.2	136141	70724	-65417	-31.6	159233	87717	-71516	-29.0
Madera	5288	5711	423	3.8	1430	774	-656	-29.8	3858	4937	1079	12.3
Marin	9223	9107	-116	-0.6	2846	2481	-365	-6.9	6377	6626	249	1.9
Mariposa	841	1000	159	8.6	302	207	-95	-18.7	539	793	254	19.1
Mendocino	2988	2257	-731	-13.9	1112	696	-416	-23.0	1876	1561	-315	-9.2
Merced	10208	9935	-273	-1.4	2713	1405	-1308	-31.8	7495	8530	1035	6.5
Modoc	481	412	-69	-7.7	244	153	-91	-22.9	237	259	22	4.4
Mono	1018	842	-176	-9.5	497	342	-155	-18.5	521	500	-21	-2.1
Monterey	20308	14456	-5852	-16.8	10148	7061	-3087	-17.9	10160	7395	-2765	-15.8
Napa	5388	5398	10	0.1	1614	1045	-569	-21.4	3774	4353	579	7.1
Nevada	4121	4250	129	1.5	1758	1158	-600	-20.6	2363	3092	729	13.4
Orange	122660	86253	-36407	-17.4	47690	26125	-21565	-29.2	74970	60128	-14842	-11.0
Placer	15676	20092	4416	12.3	5074	3957	-1117	-12.4	10602	16135	5533	20.7
Plumas	1045	996	-49	-2.4	478	343	-135	-16.4	567	653	86	7.0
Riverside	82991	116236	33245	16.7	33328	18902	-14426	-27.6	49663	97334	47671	32.4
Sacramento	52634	48582	-4052	-4.0	18668	12223	-6445	-20.9	33966	36359	2393	3.4
San Benito	3093	2478	-615	-11.0	810	367	-443	-37.6	2283	2111	-172	-3.9
San Bernardino	100237	97758	-2479	-1.3	42220	19929	-22291	-35.9	58017	77829	19812	14.6
San Diego	114794	100109	-14685	-6.8	72782	58544	-14238	-10.8	42012	41565	-447	-0.5
San Francisco	40621	36921	-3700	-4.8	11301	13008	1707	7.0	29320	23913	-5407	-10.2
San Joaquin	27016	25240	-1776	-3.4	8205	4108	-4097	-33.3	18811	21132	2321	5.8
San Luis Obispo	9286	9489	203	1.1	3465	2313	-1152	-19.9	5821	7176	1355	10.4
San Mateo	34522	30104	-4418	-6.8	7653	6408	-1245	-8.9	26869	23696	-3173	-6.3
Santa Barbara	16178	12701	-3477	-12.0	7476	5066	-2410	-19.2	8702	7635	-1067	-6.5
Santa Clara	63991	54018	-9973	-8.5	22388	19276	-3112	-7.5	41603	34742	-6861	-9.0
Santa Cruz	9952	7930	-2022	-11.3	2870	1878	-992	-20.9	7082	6052	-1030	-7.8
Shasta	5742	6331	589	4.9	2445	2026	-419	-9.4	3297	4305	1008	13.3
Sierra	199	149	-50	-14.4	74	34	-40	-37.0	125	115	-10	-4.2
Siskiyou	1687	1701	14	0.4	847	624	-223	-15.2	840	1077	237	12.4
Solano	21395	18393	-3002	-7.5	7711	5210	-2501	-19.4	13684	13183	-501	-1.9
Sonoma	14796	12668	-2128	-7.7	5993	3548	-2445	-25.6	8803	9120	317	1.8
Stanislaus	19894	18583	-1311	-3.4	6531	3189	-3342	-34.4	13363	15394	2031	7.1
Sutter	4602	4995	393	4.1	1148	898	-250	-12.2	3454	4097	643	8.5
Tehama	2422	2816	394	7.5	778	536	-242	-18.4	1644	2280	636	16.2
Trinity	482	474	-8	-0.8	148	106	-42	-16.5	334	368	34	4.8
Tulare	11292	11687	395	1.7	4038	2664	-1374	-20.5	7254	9023	1769	10.9
Tuolumne	2070	1989	-81	-2.0	773	412	-361	-30.5	1297	1577	280	9.7
Ventura	31065	26320	-4745	-8.3	15244	8614	-6630	-27.8	15821	17706	1885	5.6
Yolo	9645	10448	803	4.0	2478	1910	-568	-12.9	7167	8538	1371	8.7
Yuba	5249	6065	816	7.2	1715	1240	-475	-16.1	3534	4825	1291	15.4

Table A2. County out-flow data summary including major destination states.

County	County-Specific Flow	Total Out-of-State Outmigration	Percent Reported	Percentage of County Out-of-State Outmigrants Relocating to: Arizona	Nevada	Oregon	Texas	Washington	Total To Top 5	Other (%)
Alameda	14676	18680	78.6	8.1	9.2	7.9	13.4	9.0	47.5	
Alpine	0	44	0.0							
Amador	19	405	4.7		100.0				100.0	
Butte	870	2571	33.8	12.9	21.0	23.3	2.2	19.9	79.3	
Calaveras	49	610	8.0	63.3	36.7				100.0	
Colusa	0	206	0.0							
Contra Costa	9335	13095	71.3	9.7	10.3	10.3	14.3	10.3	54.9	
Del Norte	170	565	30.1			100.0			100.0	
El Dorado	1407	3369	41.8	10.4	56.3	9.0	1.9	6.6	84.3	
Fresno	4423	8436	52.4	16.2	13.2	10.4	18.0	11.3	69.0	
Glenn	0	277	0.0							
Humboldt	725	2253	32.2	8.3	10.2	53.9		13.4	85.8	Idaho (10)
Imperial	1191	2280	52.2	80.7	13.6		5.7		100.0	
Inyo	89	462	19.3		100.0				100.0	
Kern	6581	11915	55.2	12.6	13.5	4.3	23.3	7.4	61.2	
Kings	847	2985	28.4	10.5	14.1		19.2	18.5	62.3	Virginia (12)
Lake	90	789	11.4	26.7	28.9	44.4			100.0	
Lassen	109	563	19.4		100.0				100.0	
Los Angeles	127802	136141	93.9	12.0	12.0	3.6	18.6	5.0	51.1	
Madera	192	1430	13.4	31.8	44.8	8.3	15.1		100.0	
Marin	1176	2846	41.3	10.0	10.0	16.7	6.5	11.7	54.9	
Mariposa	0	302	0.0							
Mendocino	170	1112	15.3	14.7	22.9	62.4			100.0	
Merced	652	2713	24.0	24.5	23.0	5.1	29.4	10.3	92.3	
Modoc	20	244	8.2			100.0			100.0	
Mono	163	497	32.8		84.0				84.0	Utah (15)
Monterey	6582	10148	64.9	15.0	8.1	5.4	15.4	5.8	49.7	
Napa	382	1614	23.7	19.1	24.6	24.9		7.3	75.9	
Nevada	606	1758	34.5	8.7	69.5	9.7		5.8	93.7	
Orange	41351	47690	86.7	13.6	9.1	4.7	16.5	6.6	50.6	
Placer	2617	5074	51.6	10.7	24.6	13.4	12.9	12.3	73.9	
Plumas	113	478	23.6		100.0				100.0	
Riverside	25625	33328	76.9	17.4	9.3	4.7	20.9	6.2	58.5	
Sacramento	13473	18668	72.2	8.4	11.1	10.2	14.3	10.7	54.6	
San Benito	98	810	12.1	78.6	21.4				100.0	
San Bernardino	33604	42220	79.6	15.6	10.7	3.3	21.5	5.1	56.2	
San Diego	64116	72782	88.1	10.6	5.6	3.7	13.0	6.5	39.3	
San Francisco	9317	11301	82.4	4.5	5.2	7.1	7.7	8.2	32.8	New York (17)
San Joaquin	4445	8205	54.2	14.2	13.9	13.1	20.6	9.6	71.4	
San Luis Obispo	1495	3465	43.1	17.1	12.2	19.6	8.0	9.2	66.2	
San Mateo	5233	7653	68.4	8.8	10.4	9.5	13.2	10.1	51.9	
Santa Barbara	4072	7476	54.5	15.3	9.8	7.8	11.4	8.6	52.8	Colorado (11)
Santa Clara	18541	22388	82.8	10.0	8.2	7.7	16.4	8.8	51.1	
Santa Cruz	1248	2870	43.5	12.7	9.1	22.9	6.5	15.8	67.0	
Shasta	803	2445	32.8	13.0	14.7	39.1	2.7	21.4	90.9	
Sierra	30	74	40.5		100.0				100.0	
Siskiyou	360	847	42.5	4.7	14.4	80.8			100.0	
Solano	4103	7711	53.2	10.8	11.9	6.5	20.3	12.3	61.8	
Sonoma	3125	5993	52.1	13.0	13.0	22.6	9.0	13.0	70.6	
Stanislaus	3201	6531	49.0	14.1	13.7	13.3	24.9	11.2	77.1	
Sutter	146	1148	12.7	23.3	41.1				64.4	UT; CO (23; 13)
Tehama	59	778	7.6	28.8	42.4	28.8			100.0	
Trinity	0	148	0.0							
Tulare	1426	4038	35.3	24.7	19.4	9.6	16.6	11.4	81.6	
Tuolumne	69	773	8.9	26.1	73.9				100.0	
Ventura	10609	15244	69.6	17.1	9.7	6.4	17.5	7.8	58.5	
Yolo	648	2478	26.2	12.3	19.1	10.8	11.0	11.4	64.7	
Yuba	242	1715	14.1	27.7	26.9		19.4		74.0	AK; CO (13; 13)
State	428495	562641	76.2	12.5	10.5	5.7	16.6	6.9	52.2	CO; UT (5; 4)

Table A3. Migration by sending and receiving county rural-urban codes.

	Receiving County Rural-Urban Continuum Code								
	1	2	3	4	5	6	7	8	9
RUCC1 Counties:									
Alameda	10577	3061	675	193	114	56	0	0	0
Contra Costa	6296	2114	530	174	163	58	0	0	0
El Dorado	415	414	172	300	45	61	0	0	0
Los Angeles	87157	24953	9132	3024	2057	1065	381	0	33
Marin	850	243	48	0	19	0	16	0	0
Orange	27754	8603	3068	1052	625	200	49	0	0
Placer	1275	992	179	71	72	28	0	0	0
Riverside	15109	5780	2577	1210	544	327	78	0	0
Sacramento	7846	3863	906	378	252	194	34	0	0
San Benito	98	0	0	0	0	0	0	0	0
San Bernardino	18912	7703	3797	1847	823	432	90	0	0
San Diego	37663	14827	7252	2007	1532	554	252	29	0
San Francisco	7820	1191	188	19	99	0	0	0	0
San Mateo	3940	1023	166	30	74	0	0	0	0
Santa Clara	12954	4135	1002	180	214	56	0	0	0
Yolo	429	199	20	0	0	0	0	0	0
Totals	239095	79101	29712	10485	6633	3031	900	29	33
Group Percentage	64.8%	21.4%	8.1%	2.8%	1.8%	0.8%	0.2%	0.0%	0.0%
RUCC2 Counties:									
Fresno	2627	1166	404	120	80	26	0	0	0
Kern	3517	1736	885	342	68	33	0	0	0
Monterey	3357	2157	932	110	26	0	0	0	0
San Joaquin	2539	1255	366	118	101	38	28	0	0
Santa Barbara	2225	1139	482	84	142	0	0	0	0
Santa Cruz	731	320	122	0	75	0	0	0	0
Solano	2417	1081	472	65	22	46	0	0	0
Sonoma	1560	847	408	170	85	55	0	0	0
Stanislaus	1732	1014	199	104	116	36	0	0	0
Tulare	814	409	173	30	0	0	0	0	0
Ventura	6657	2423	927	419	138	45	0	0	0
Totals	28176	13547	5370	1562	853	279	28	0	0
Group Percentage	56.6%	27.2%	10.8%	3.1%	1.7%	0.6%	0.1%	0.0%	0.0%
RUCC3 Counties:									
Butte	396	332	71	0	32	22	17	0	0
Imperial	438	101	620	32	0	0	0	0	0
Kings	485	166	59	89	23	25	0	0	0
Madera	160	32	0	0	0	0	0	0	0
Merced	425	194	33	0	0	0	0	0	0
Napa	209	101	56	0	16	0	0	0	0
San Luis Obispo	657	451	208	90	89	0	0	0	0
Shasta	371	269	70	56	37	0	0	0	0
Sutter	60	86	0	0	0	0	0	0	0
Yuba	108	134	0	0	0	0	0	0	0
Totals	3309	1866	1117	267	197	47	17	0	0
Group Percentage	48.5%	27.4%	16.4%	3.9%	2.9%	0.7%	0.2%	0.0%	0.0%
RUCC4 Counties:									
Lake	24	39	27	0	0	0	0	0	0
Mendocino	76	44	29	0	0	0	21	0	0
Nevada	113	420	51	0	22	0	0	0	0
Tehama	17	25	17	0	0	0	0	0	0
Tuolumne	37	32	0	0	0	0	0	0	0
Totals	267	560	124	0	22	0	21	0	0
Group Percentage	26.9%	56.3%	12.5%	0.0%	2.2%	0.0%	2.1%	0.0%	0.0%
RUCC5 Counties:									
Humboldt	305	215	90	74	16	0	25	0	0
Group Percentage	42.1%	29.7%	12.4%	10.2%	2.2%	0.0%	3.4%	0.0%	0.0%
RUCC6 Counties:									
Amador	0	19	0	0	0	0	0	0	0
Calaveras	49	0	0	0	0	0	0	0	0
Lassen	0	109	0	0	0	0	0	0	0
Modoc	0	0	0	0	20	0	0	0	0
Totals	49	128	0	0	20	0	0	0	0
Group Percentage	24.9%	65.0%	0.0%	0.0%	10.2%	0.0%	0.0%	0.0%	0.0%
RUCC7 Counties:									
Del Norte	0	0	50	26	0	0	94	0	0
Inyo	19	37	0	0	0	33	0	0	0
Mono	0	72	0	60	0	31	0	0	0
Plumas	0	113	0	0	0	0	0	0	0
Siskiyou	36	51	136	20	117	0	0	0	0
Totals	55	273	186	106	117	64	94	0	0
Group Percentage	6.1%	30.5%	20.8%	11.8%	13.1%	7.2%	10.5%	0.0%	0.0%
RUCC8 Counties:									
Sierra	0	30	0	0	0	0	0	0	0
Group Percentage	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Table A4. Migration percentages to receiving county rural-urban codes.

	County	*Receiving County Rural-Urban Continuum Code*								
County	RUCC	1	2	3	4	5	6	7	8	9
Alameda	1	72.1	20.9	4.6	1.3	0.8	0.4	0.0	0.0	0.0
Amador	6	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Butte	3	45.5	38.2	8.2	0.0	3.7	2.5	2.0	0.0	0.0
Calaveras	6	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Contra Costa	1	67.4	22.6	5.7	1.9	1.7	0.6	0.0	0.0	0.0
Del Norte	7	0.0	0.0	29.4	15.3	0.0	0.0	55.3	0.0	0.0
El Dorado	1	29.5	29.4	12.2	21.3	3.2	4.3	0.0	0.0	0.0
Fresno	2	59.4	26.4	9.1	2.7	1.8	0.6	0.0	0.0	0.0
Humboldt	5	42.1	29.7	12.4	10.2	2.2	0.0	3.4	0.0	0.0
Imperial	3	36.8	8.5	52.1	2.7	0.0	0.0	0.0	0.0	0.0
Inyo	7	21.3	41.6	0.0	0.0	0.0	37.1	0.0	0.0	0.0
Kern	2	53.4	26.4	13.4	5.2	1.0	0.5	0.0	0.0	0.0
Kings	3	57.3	19.6	7.0	10.5	2.7	3.0	0.0	0.0	0.0
Lake	4	26.7	43.3	30.0	0.0	0.0	0.0	0.0	0.0	0.0
Lassen	6	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Los Angeles	1	68.2	19.5	7.1	2.4	1.6	0.8	0.3	0.0	0.0
Madera	3	83.3	16.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Marin	1	72.3	20.7	4.1	0.0	1.6	0.0	1.4	0.0	0.0
Mendocino	4	44.7	25.9	17.1	0.0	0.0	0.0	12.4	0.0	0.0
Merced	3	65.2	29.8	5.1	0.0	0.0	0.0	0.0	0.0	0.0
Modoc	6	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
Mono	7	0.0	44.2	0.0	36.8	0.0	19.0	0.0	0.0	0.0
Monterey	2	51.0	32.8	14.2	1.7	0.4	0.0	0.0	0.0	0.0
Napa	3	54.7	26.4	14.7	0.0	4.2	0.0	0.0	0.0	0.0
Nevada	4	18.6	69.3	8.4	0.0	3.6	0.0	0.0	0.0	0.0
Orange	1	67.1	20.8	7.4	2.5	1.5	0.5	0.1	0.0	0.0
Placer	1	48.7	37.9	6.8	2.7	2.8	1.1	0.0	0.0	0.0
Plumas	7	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Riverside	1	59.0	22.6	10.1	4.7	2.1	1.3	0.3	0.0	0.0
Sacramento	1	58.2	28.7	6.7	2.8	1.9	1.4	0.3	0.0	0.0
San Benito	1	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
San Bernardino	1	56.3	22.9	11.3	5.5	2.4	1.3	0.3	0.0	0.0
San Diego	1	58.7	23.1	11.3	3.1	2.4	0.9	0.4	0.0	0.0
San Francisco	1	83.9	12.8	2.0	0.2	1.1	0.0	0.0	0.0	0.0
San Joaquin	2	57.1	28.2	8.2	2.7	2.3	0.9	0.6	0.0	0.0
San Luis Obispo	3	43.9	30.2	13.9	6.0	6.0	0.0	0.0	0.0	0.0
San Mateo	1	75.3	19.5	3.2	0.6	1.4	0.0	0.0	0.0	0.0
Santa Barbara	2	54.6	28.0	11.8	2.1	3.5	0.0	0.0	0.0	0.0
Santa Clara	1	69.9	22.3	5.4	1.0	1.2	0.3	0.0	0.0	0.0
Santa Cruz	2	58.6	25.6	9.8	0.0	6.0	0.0	0.0	0.0	0.0
Shasta	3	46.2	33.5	8.7	7.0	4.6	0.0	0.0	0.0	0.0
Sierra	8	0.0	100.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Siskiyou	7	10.0	14.2	37.8	5.6	32.5	0.0	0.0	0.0	0.0
Solano	2	58.9	26.3	11.5	1.6	0.5	1.1	0.0	0.0	0.0
Sonoma	2	49.9	27.1	13.1	5.4	2.7	1.8	0.0	0.0	0.0
Stanislaus	2	54.1	31.7	6.2	3.2	3.6	1.1	0.0	0.0	0.0
Sutter	3	41.1	58.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Tehama	4	28.8	42.4	28.8	0.0	0.0	0.0	0.0	0.0	0.0
Tulare	2	57.1	28.7	12.1	2.1	0.0	0.0	0.0	0.0	0.0
Tuolumne	4	53.6	46.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ventura	2	62.7	22.8	8.7	3.9	1.3	0.4	0.0	0.0	0.0
Yolo	1	66.2	30.7	3.1	0.0	0.0	0.0	0.0	0.0	0.0
Yuba	3	44.6	55.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
State	NA	63.3	22.3	8.5	2.9	1.8	0.8	0.3	0.0	0.0