

Testing DRU* California Population Forecast

**DRU stands for California Department of Finance Demographic Research Unit*

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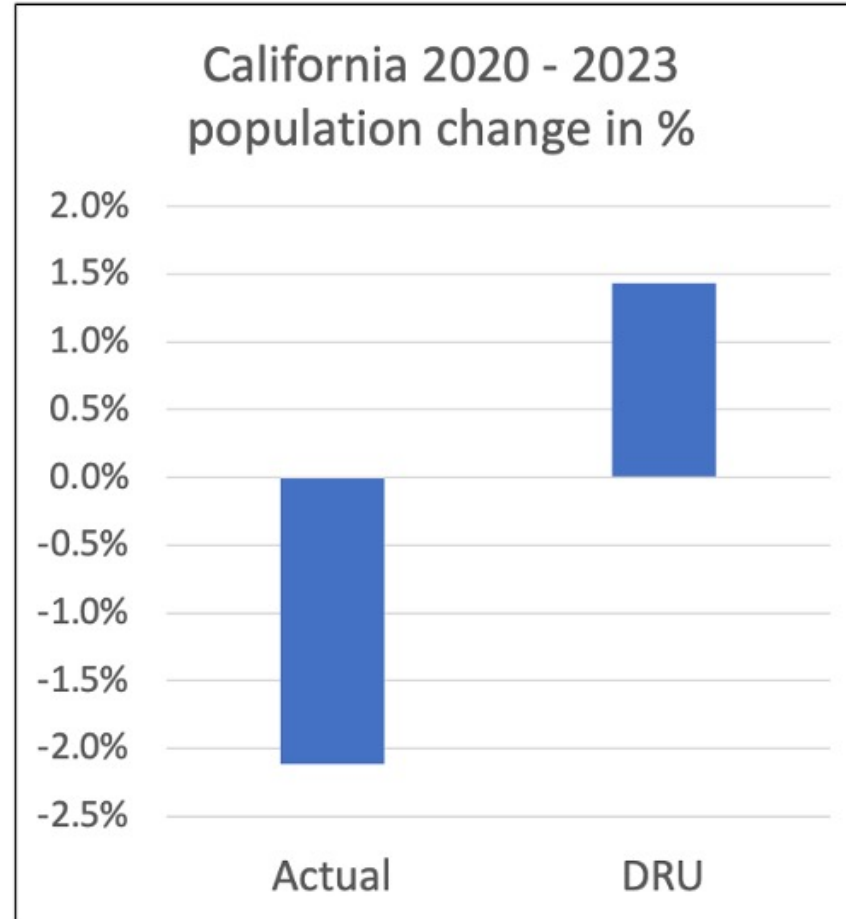
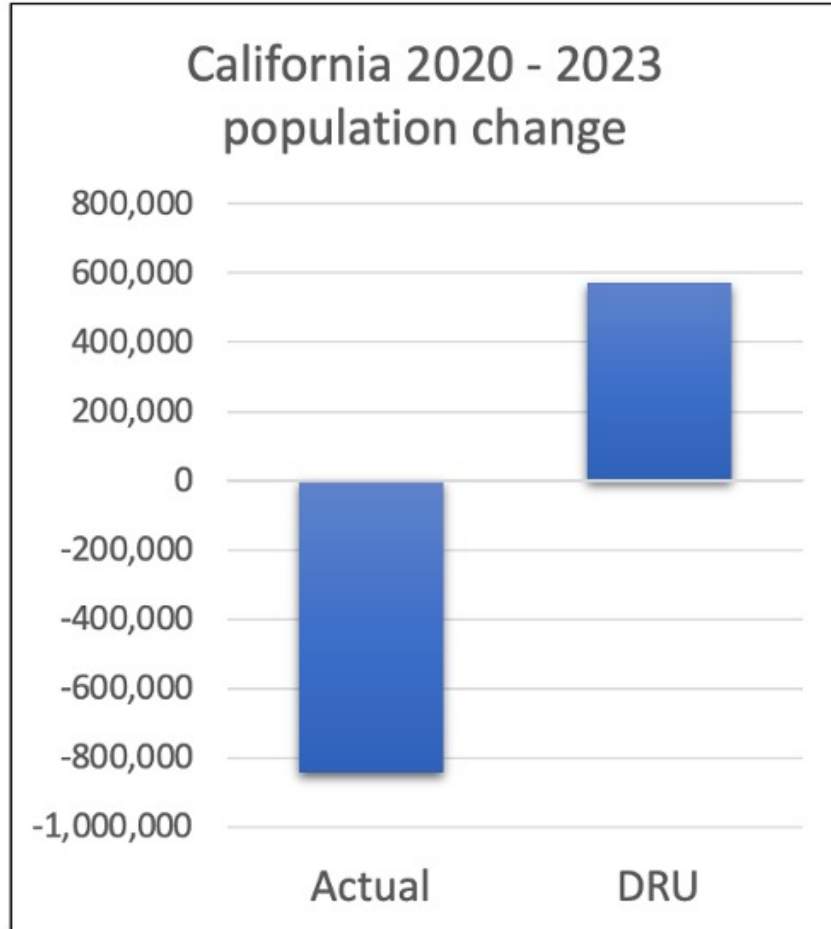
Just 3 years into its forecast, DRU already overestimated California's population by over 1.4 million by 2023.

DRU California population forecast vs. actual over 2020 - 2023

Period	Year	DRU Forecast	Actual	DRU overstated	
				in numbers	in %
Period 0	2020	39,782,419	39,782,419		
Period 1	2021	39,953,269	39,430,547	522,723	1.3%
Period 2	2022	40,146,003	39,078,674	1,067,329	2.7%
Period 3	2023	40,354,217	38,940,231	1,413,986	3.6%

The actual 2021 population figure was extrapolated as being half way between the 2020 and 2022 actual ones. This estimation has no impact on the finding that DRU's estimate is over 1.4 million too high or 3.6% above the actual figure in 2023. This is a gigantic error just 3 years into the forecast.

DRU ignored the impact of COVID and Work From Home. That's even though DRU published its forecast in July of 2021, already 16 months into the COVID and WFH era.



	2023		DRU overestimate	
	Actual	DRU forecast	in number	in %
California	38,940,231	40,354,217	1,413,986	3.6%
1 Los Angeles County	9,761,210	10,222,748	461,538	4.7%
2 San Diego County	3,269,755	3,369,636	99,881	3.1%
3 Orange County	3,137,164	3,227,671	90,507	2.9%
4 Riverside County	2,439,234	2,535,310	96,076	3.9%
5 San Bernardino County	2,182,056	2,234,540	52,484	2.4%
6 Santa Clara County	1,886,079	2,001,338	115,259	6.1%
7 Alameda County	1,636,194	1,701,203	65,009	4.0%
8 Sacramento County	1,572,453	1,586,033	13,580	0.9%
9 Contra Costa County	1,147,653	1,177,674	30,021	2.6%
10 Fresno County	1,011,499	1,036,949	25,450	2.5%
11 Kern County	907,476	939,622	32,146	3.5%
12 San Francisco County	831,703	902,614	70,911	8.5%
13 Ventura County	825,653	853,937	28,284	3.4%
14 San Joaquin County	786,145	792,428	6,283	0.8%
15 San Mateo County	737,644	780,650	43,006	5.8%
16 Marin County	252,959	257,610	4,651	1.8%
Sum of counties	32,384,877	33,619,963	1,235,086	3.8%

This 2023 data discloses figures for the State and the 15 largest counties. We also added Marin County.

DRU's overestimation at the County level is volatile ranging from 0.9% for Sacramento County to 8.5% for San Francisco County.

This table discloses information on the change over the 2020 – 2023 period.

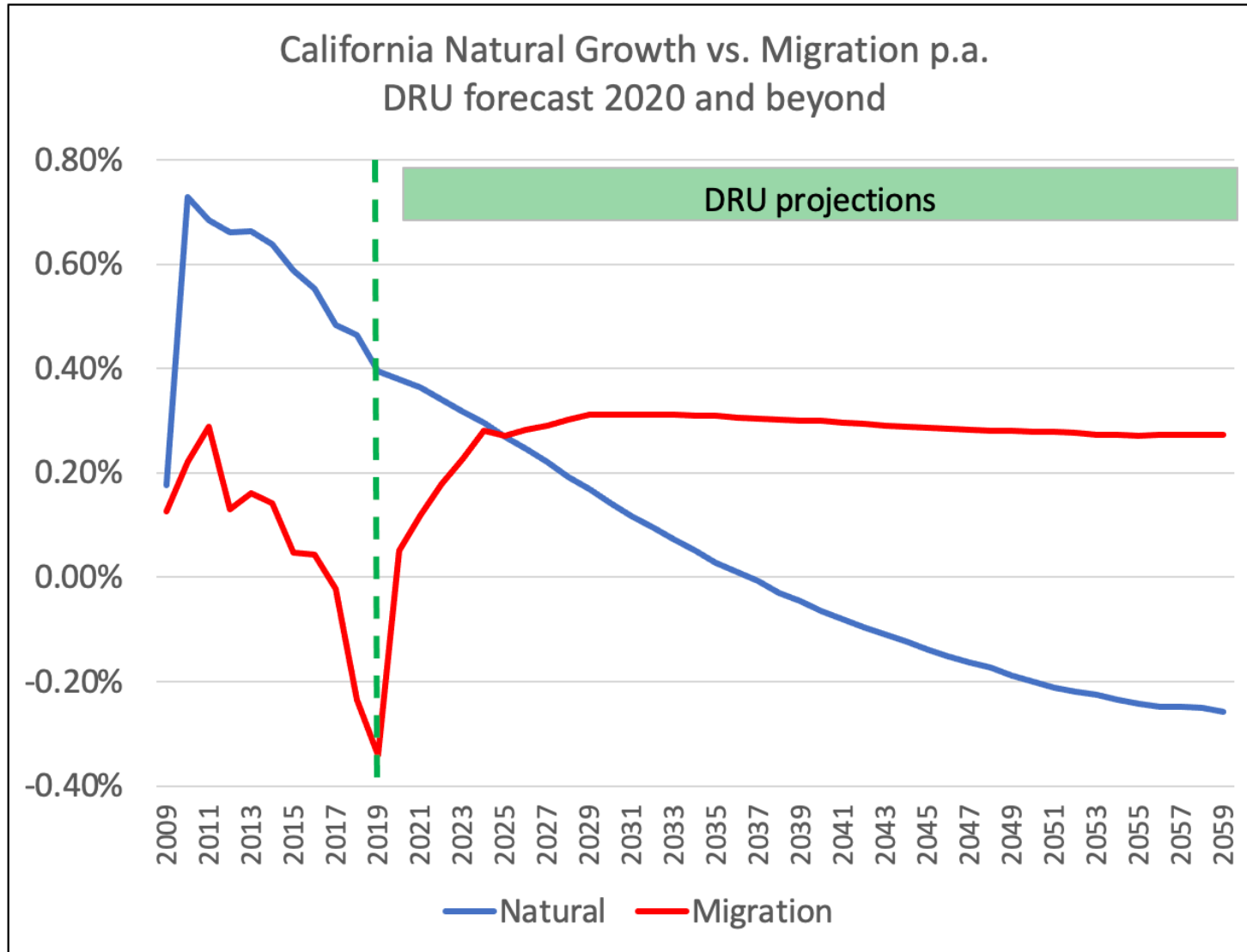
	Actual		DRU 2023 forecast	2020 - 2023 change		2020 - 2023 % change	
	2020	2023		Actual	DRU	Actual	DRU
California	39,782,419	38,940,231	40,354,217	-842,188	571,798	-2.1%	1.4%
1 Los Angeles County	10,171,593	9,761,210	10,222,748	-410,383	51,155	-4.0%	0.5%
2 San Diego County	3,352,145	3,269,755	3,369,636	-82,390	17,491	-2.5%	0.5%
3 Orange County	3,190,832	3,137,164	3,227,671	-53,668	36,839	-1.7%	1.2%
4 Riverside County	2,449,299	2,439,234	2,535,310	-10,065	86,011	-0.4%	3.5%
5 San Bernardino County	2,184,112	2,182,056	2,234,540	-2,056	50,428	-0.1%	2.3%
6 Santa Clara County	1,962,251	1,886,079	2,001,338	-76,172	39,087	-3.9%	2.0%
7 Alameda County	1,671,855	1,636,194	1,701,203	-35,661	29,348	-2.1%	1.8%
8 Sacramento County	1,562,242	1,572,453	1,586,033	10,211	23,791	0.7%	1.5%
9 Contra Costa County	1,149,800	1,147,653	1,177,674	-2,147	27,874	-0.2%	2.4%
10 Fresno County	1,026,358	1,011,499	1,036,949	-14,859	10,591	-1.4%	1.0%
11 Kern County	912,975	907,476	939,622	-5,499	26,647	-0.6%	2.9%
12 San Francisco County	899,891	831,703	902,614	-68,188	2,723	-7.6%	0.3%
13 Ventura County	841,439	825,653	853,937	-15,786	12,498	-1.9%	1.5%
14 San Joaquin County	776,068	786,145	792,428	10,077	16,360	1.3%	2.1%
15 San Mateo County	775,132	737,644	780,650	-37,488	5,518	-4.8%	0.7%
16 Marin County	258,956	252,959	257,610	-5,997	-1,346	-2.3%	-0.5%
Sum of counties	33,184,948	32,384,877	33,619,963	-800,071	435,015	-2.4%	1.3%

*Why is DRU's forecast way off?
It way overestimated migration*

Migration rate per year		
	Actual est.	DRU
2021	-1.25%	0.12%
2022	-1.23%	0.18%
2023	-0.67%	0.23%

The actual estimates were derived by using the population figures, DRU’s own natural growth forecast (that is very reasonable), and calculating the resulting migration rates that would reconcile with the mentioned population figures. As a result, these migration rates are not exact; but, they are directionally most representative. Whether, the yearly migration rates are off by 10 or 20 basis points, does not matter. We know for sure that they had to reach down into record negative levels for California’s population to decrease as rapidly as it did between 2020 and 2023.

The migration forecast is highly unrealistic relative to California's own history



The DRU migration rate forecast is highly unrealistic (red line). Instead, of record negative migration rates over the 2020 – 2023 period, it shows a rapid rebound after 2019. Migration reaches near historical record level at 0.28% by 2024 (record in data going back to 2009 is 0.29% in 2011). The migration forecast then keeps on rising to 0.31% much above actual figures in the historical data. And, it remains close to that level till 2060.

The DRU natural growth rate forecast is very reasonable (blue line). It reflects California ongoing population aging. It turns negative in 2037; and, it becomes increasingly negative out to 2060.

The migration forecast is highly unrealistic relative to California's own history

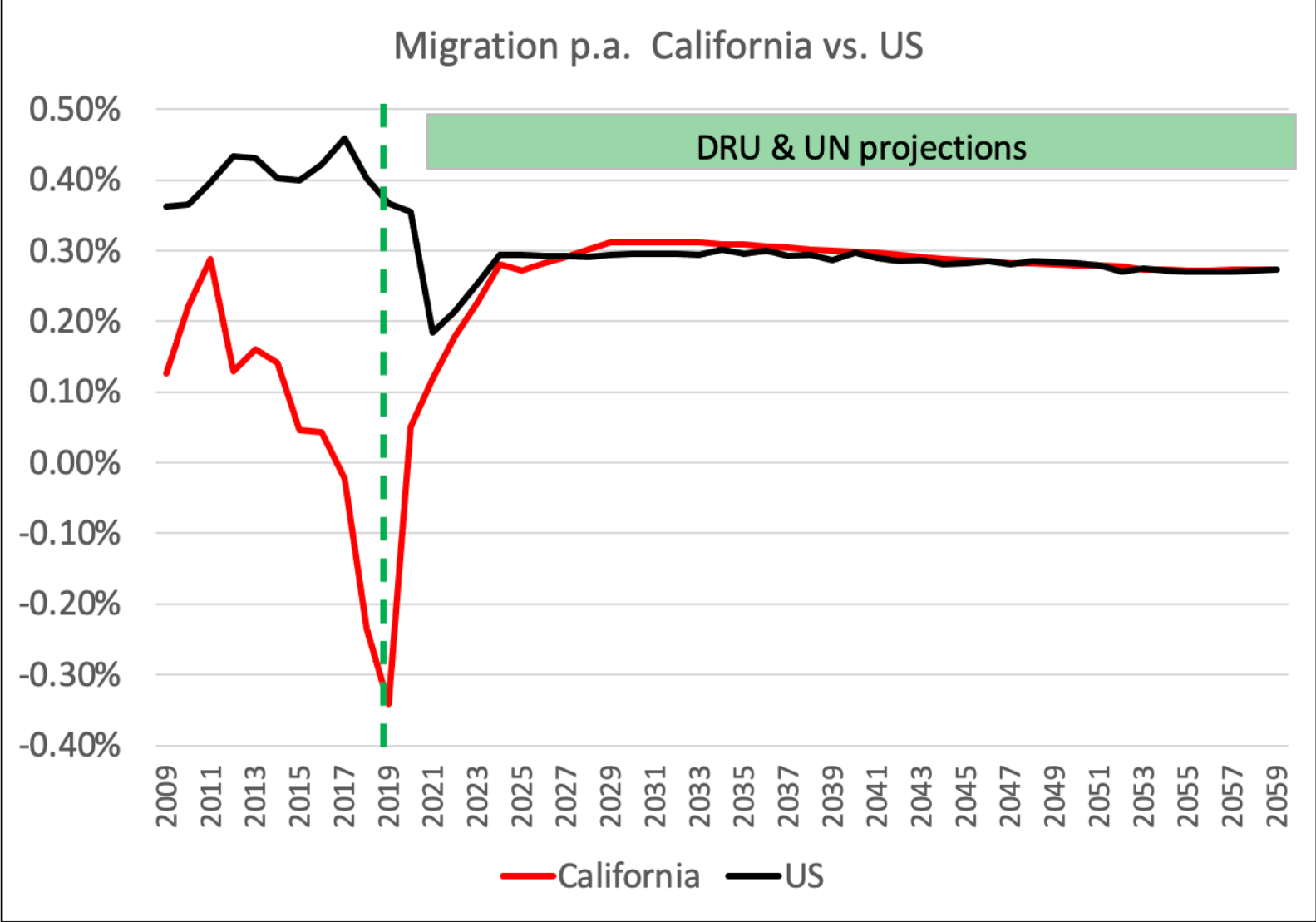
Distribution of Migration rate per year				
		History	DRU	DRU
		2009 - 2023	2020 - 2030	2020 - 2060
	Max	0.29%	0.31%	0.31%
Percentiles	95%	0.24%	0.31%	0.31%
	75%	0.14%	0.30%	0.30%
	50%	0.04%	0.28%	0.28%
	25%	-0.51%	0.20%	0.27%
	5%	-1.24%	0.08%	0.17%
	Min	-1.25%	0.05%	0.05%

This is just a statistical approach to convey how unrealistic the DRU migration rates are.

The DRU (2020 – 2030) migration rate bottom 5th percentile at 0.08% is 2 x higher than the Median (50th percentile) during the history (2009 – 2023).

The DRU (2020 – 2060) migration rate bottom 5th percentile at 0.17% is much higher than the 75th percentile of 0.14% during the history (2009 – 2023).

The migration forecast is highly unrealistic relative to the US



The DRU migration forecast suggests it will bounce right back up and track the US medium level scenario from the UN Population Division. But, during the history (2009 – 2019), California’s migration rate is far lower than the US.

Remember WFH affects California. But, it does not affect the US.

Over the long term DRU's overstating California's population growth is likely to grow much above the current level of 1.4 million.

Exploring California population scenarios using specified percentiles migration rates levels

We used 2020 – 2023 actual population figures, DRU’s natural growth forecast, and migration rates at different migration percentile levels. Remember, the migration rate Median or 50th percentile is 0.04%; and the 95th percentile is at 0.20%. We also assumed that the migration rates increase from deep into negative territory in 2023 to 0% by 2026; and they reach their constant level at a specified percentile by 2028.

California population scenarios using different migration percentile levels					
		2030	2040	2050	2060
Migration Percentile	95%	39,608,622	40,664,326	41,066,062	41,072,308
	90%	39,547,827	40,423,866	40,643,918	40,471,378
	80%	39,476,212	40,141,959	40,151,375	39,773,591
	70%	39,454,235	40,055,735	40,001,237	39,561,613
	60%	39,384,905	39,784,635	39,530,744	38,899,527
	50%	39,336,298	39,595,373	39,203,685	38,441,257
	DRU	41,860,549	43,353,414	44,049,015	44,228,057

The DRU forecast with unrealistic migration rates comes in way higher than any of the scenarios using migration rate percentile levels.

Resulting DRU population forecast in excess of migration percentiles scenarios

DRU forecast in excess of migration percentiles scenarios					
		2030	2040	2050	2060
Migration Percentile	95%	2,251,927	2,689,088	2,982,953	3,155,749
	90%	2,312,722	2,929,548	3,405,097	3,756,679
	80%	2,384,337	3,211,455	3,897,640	4,454,466
	70%	2,406,314	3,297,679	4,047,778	4,666,444
	60%	2,475,644	3,568,779	4,518,271	5,328,530
	50%	2,524,251	3,758,041	4,845,330	5,786,800

DRU's overestimation of California's population could increase from 1.4 million in 2023 to about 2.4 million by 2030 and 3.2 – 5.8 million by 2060.

DRU forecast in excess of migration percentiles scenarios in %					
		2030	2040	2050	2060
Migration Percentile	95%	5.7%	6.6%	7.3%	7.7%
	90%	5.8%	7.2%	8.4%	9.3%
	80%	6.0%	8.0%	9.7%	11.2%
	70%	6.1%	8.2%	10.1%	11.8%
	60%	6.3%	9.0%	11.4%	13.7%
	50%	6.4%	9.5%	12.4%	15.1%

DRU's overestimation of California's population could increase from 3.6% in 2023 to about 6.0% by 2030 and 7.7% to 15.1% by 2060.

If a forecast is already off by 3.6% by the third year, it is not a stretch of the imagination that this forecast would be off by 6% by the 10th year (2030) and by 7.7% to 15.1% by the 40th year (2060).

Appendix I: California demographics history before COVID & WFH

California's demographic history is distinguished by 3 very different periods

The Boom years (1950 – 1989). During this period California grew a lot faster than the US.

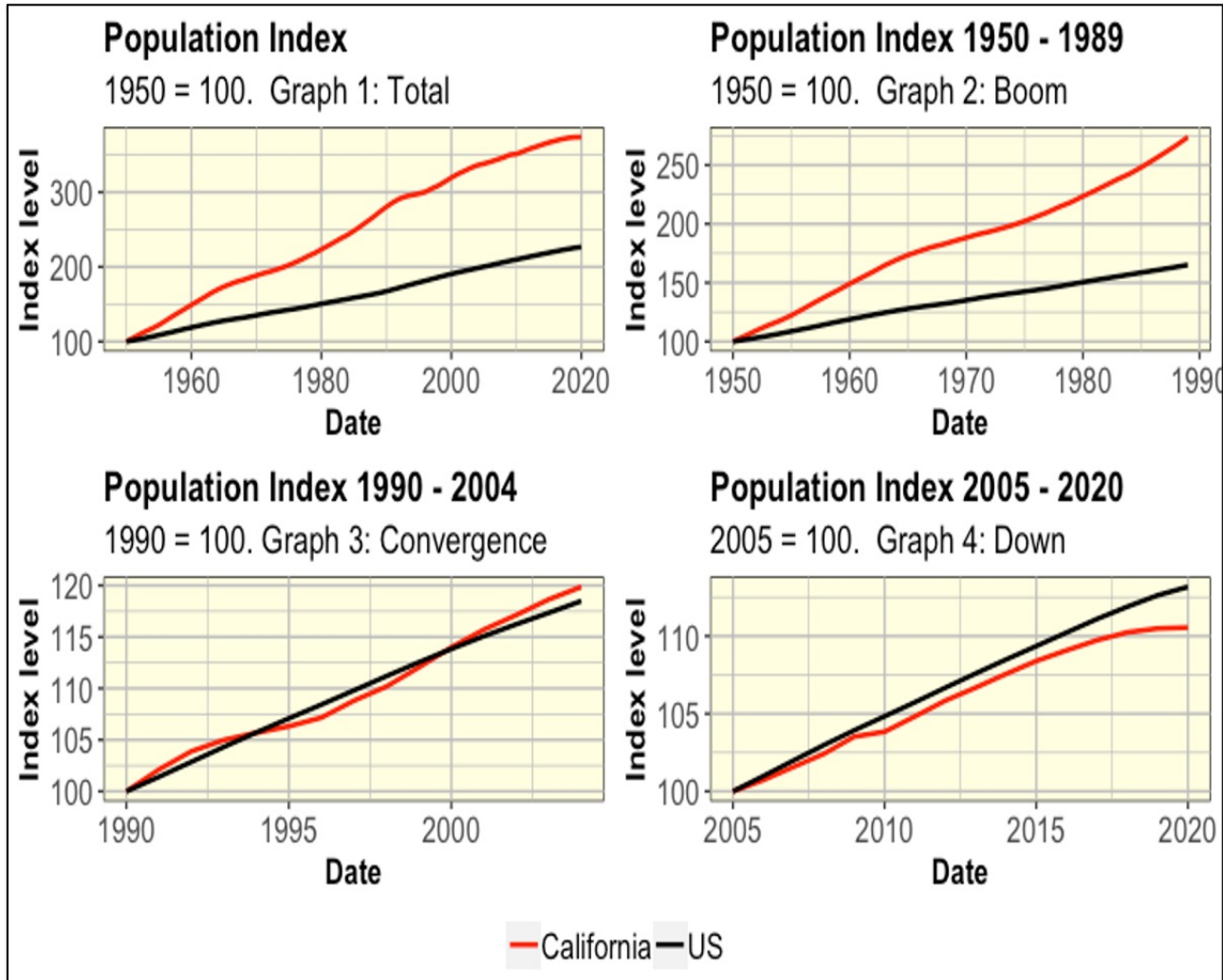
Convergence (1990 – 2004). California's growth slowed down and converged towards US level.

Down (2005 – 2020). California's population slowed down further and is now much lower than the US.

	Period	# Years	Growth over period		Growth per year	
			California	US	California	US
Boom	1950 - 1989	39	173.8%	65.2%	2.62%	1.30%
Convergence	1990 - 2004	14	19.9%	18.5%	1.30%	1.22%
Down	2005 - 2020	15	10.5%	13.2%	0.67%	0.83%

When we will get updated data till 2023, there is little doubt that California's population will show a far more rapid decline over recent years than the US due to the impact of WFH.

Visual data on the 3 periods



Graph 1: Total. This graph is interesting because it hides the relative slow down in California's population growth vs. the US. It is only when you split the time series into the 3 distinct periods that you see what is going on.

In summary, till 1989 California grew a lot faster than the US. Since 2005, it has grown much slower than the US.

And, after 2020 (beyond this data set) California's population has most probably shrunk a lot faster than the US (WFH impact).

Data source:

For California:

California Department of Finance Demographic Research Unit

<https://dof.ca.gov/Forecasting/Demographics/>

For the US:

Our World in Data

<https://ourworldindata.org/explorers/population-and-demography?facet=none&Metric=Population&Sex=Both+sexes&Age+group=Total&Projection+Scenario=None&country=~USA>