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THE UCLA ANDERSON FORECAST FOR THE NATION AND CALIFORNIA

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A Gloomy COVID Winter and an Exuberant Vaccine Spring

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A Gloomy COVID Winter and an Exuberant Vaccine Spring

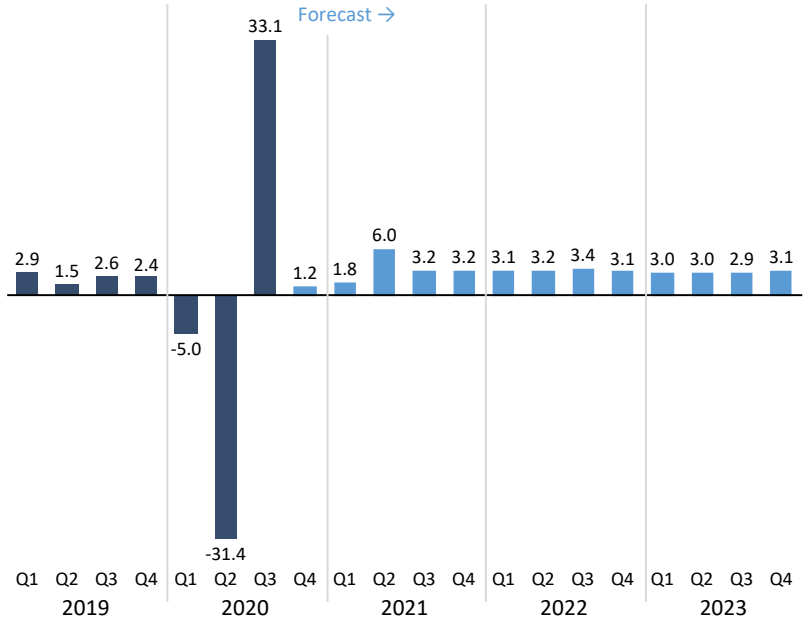
Leo Feler
Senior Economist, UCLA Anderson Forecast
December 2020

- Because of rising COVID infections and increased social distancing, we're forecasting slower growth in real GDP for Q4 2020 and Q1 2021, of 1.2% and 1.8% SAAR, respectively.
- With mass vaccinations, we forecast robust growth in Q2 2021 of 6.0% SAAR, and then consistent growth above 3% well into 2023. We expect the economy will reach its previous peak by the end of 2021.
- These headline numbers don't capture the economic misery that so many are experiencing. Currently, 20.5 million Americans are receiving some form of unemployment insurance benefit. Nearly nine percent of Americans live in households that are not current on rent or mortgage, 12 percent live in households where there was either sometimes or often not enough food to eat, and about one-third live in households where it has been somewhat or very difficult to pay for usual household expenses during the pandemic.
- We expect the housing market to remain hot through at least 2023, with housing starts at their highest levels since 2007.
- Even with a strong recovery beginning in Q2 2021, we expect only modest core inflation, around 2.1–2.2% per year, and gradual improvement in unemployment. We forecast that unemployment will remain above 5% through 2021 and will only fall to 4% by 2023.

1. Mass vaccinations and a release of pent-up demand will lead to a boom in economic activity beginning in the second quarter of 2021, but until then, there will be a lot of unnecessary hardship

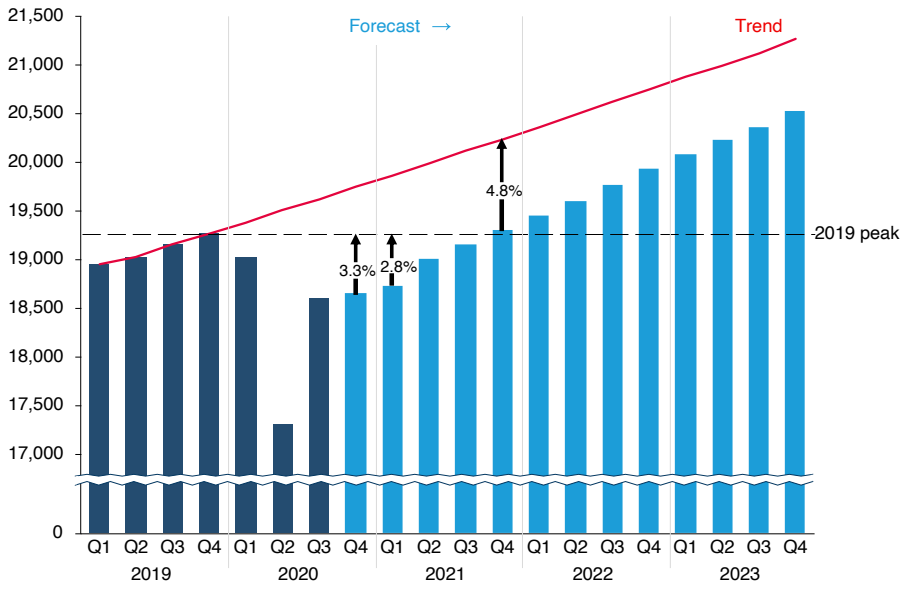
Following a record 33.1% annualized growth rate of real GDP in Q3 2020, we are forecasting a weak 1.2% annualized growth rate in Q4 2020 and 1.8% in Q1 2021 (see Exhibit 1). This leaves the economy 3.3% and 2.8%, respectively, below its peak in Q4 2019. Based on recent vaccine news, we expect limited vaccinations to begin in mid-December for health care workers, frontline workers, and vulnerable populations and for vaccines to be widely available for the general population beginning early in Q2 2021. With mass vaccinations, we forecast robust growth in Q2 2021 of 6.0% at an annualized rate, and then consistent growth above 3% well into 2023. We expect the economy will reach its previous peak by the end of 2021. This, however, will still leave it 4.8% below the trend of where the economy likely would have been without the COVID shock (see Exhibit 2).

Exhibit 1 Real GDP growth rate, SAAR



Source: U.S. Department of Commerce, Bureau of Economic Analysis and UCLA Anderson Forecast
Notes: Real GDP growth rate, seasonally adjusted annual rate.

Exhibit 2 Real GDP levels and trends, $ Billions SAAR



Source: U.S. Department of Commerce, Bureau of Economic Analysis and UCLA Anderson Forecast
Notes: Real GDP growth rate, seasonally adjusted annual rate.

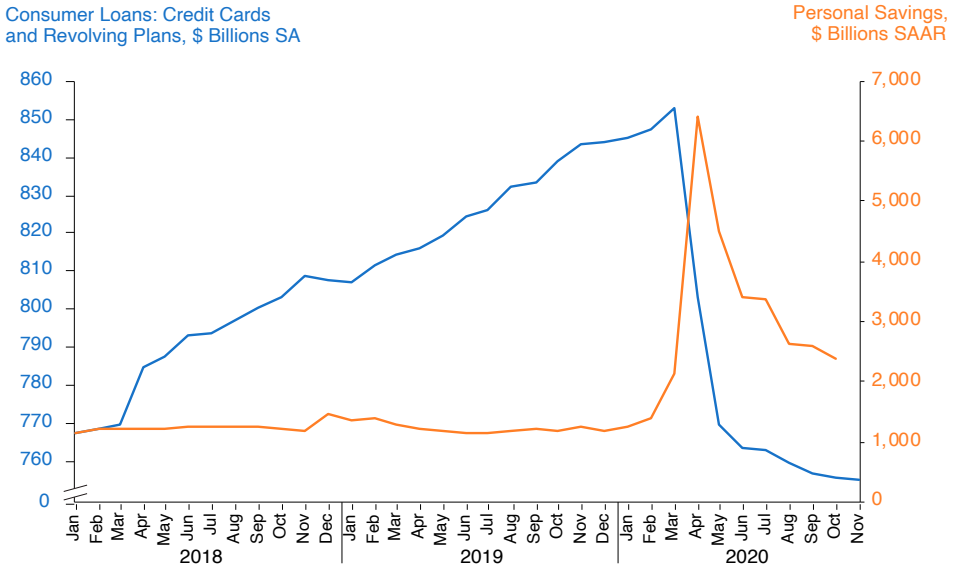
With COVID infections surging and people social distancing more—either by their own choosing or because of renewed government restrictions—consumption of services has fallen and we expect it will continue to fall through the end of the year and early into next year. Emergency social assistance programs, including extended unemployment insurance and eviction, foreclosure, and student loan moratoria, are set to expire at the end of the year. Without renewed fiscal relief, we expect households that are currently receiving these social assistance benefits will cut expenditures and forgo their usual holiday shopping in anticipation of more severe hardship once these programs end. Currently, 20.5 million Americans are receiving some form of unemployment insurance benefit, compared to 1.5 million this time last year.[1] Nearly nine percent of Americans live in households that are not current on rent or mortgage, of which nearly one-third say that eviction or foreclosure in the next two months is either very likely or somewhat likely, and 12 percent live in households where there was either sometimes or often not enough food to eat.[2] About one-third of Americans live in households where it has been somewhat or very difficult to pay for usual household expenses during the pandemic.[3]

On the other end of the spectrum are households that have seen their savings and asset values swell. For those fortunate to maintain employment and income during this pandemic, their financial situation is better than before. Home values have increased, equity values have increased, and limited consumption opportunities during the past nine months mean that these households have been able to accumulate at least an additional $1.6 trillion in savings.

2. Limited holiday celebrations, with more "stuff" and fewer "experiences"

In aggregate, consumers have more spending power now heading into the holidays than they normally would. Credit card and revolving balances are down and personal savings are up (see Exhibit 3). But surging COVID cases and the need to social distance will limit consumers' ability to spend

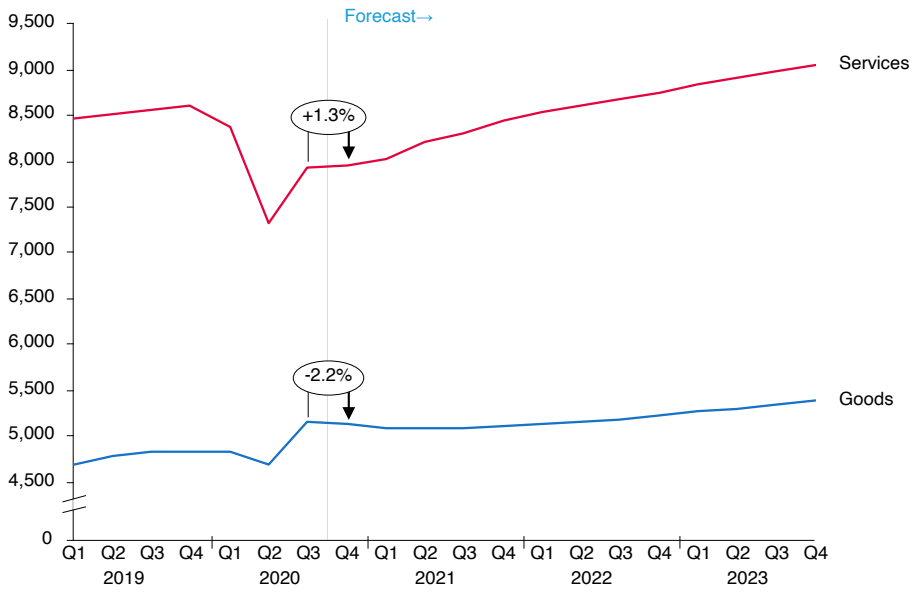
Exhibit 3 Credit card and revolving balances are down, personal savings are up



Source: U.S. Deparment of Commerce, Bureau of Economic Analysis and Federal Reserve Board
Notes: $ billions. Credit card and revolving balances are seasonally adjusted. Personal savings are seasonally adjusted and annualized.

1. Department of Labor, Unemployment Insurance Weekly Claims, November 25, 2020, p. 4, available at: https://www.dol.gov/sites/dolgov/files/OPA/newsreleases/ui-claims/20202177.pdf.
2. United States Census Bureau, Household Pulse Survey, "Housing Insecurity," "Likelihood of Eviction or Foreclosure," and "Food Scarcity," Week 18, available at: https://www.census.gov/data-tools/demo/hhp/#/.
3. United States Census Bureau, Household Pulse Survey, "Difficulty Paying for Usual Household Expenses," Week 18, available at: https://www.census.gov/data-tools/demo/hhp/#/.

Exhibit 4 Real consumption of goods and services, $ Billions SAAR



Source: U.S. Department of Commerce, Bureau of Economic Analysis and UCLA Anderson Forecast
Notes: Real consumer spending in 2012 $ billions, seasonally adjusted annual rate. Annualized % change shown between Q3 and Q4 2020.

on services such as restaurants, vacations, and entertainment, which are labor-intensive. Instead, gift-giving this year will be about buying more "stuff."[4] The only difference this year compared to past years is that Americans have been buying more "stuff" for the past nine months. A key question is whether there's saturation in consumption of goods or whether it's possible for goods consumption to increase even further, given that consumers can't spend as easily on experiences. Our forecast is that services consumption will increase slightly from a low base and goods consumption will decline modestly from a high base between Q3 and Q4 (see Exhibit 4).

Continued weak spending on services and a shift to online purchases of goods will dampen employment gains, especially relative to the usual holiday increase in retail and services employment. In addition, sustained higher goods purchases mean more imports, but this doesn't have as big of an effect on employment gains as services consumption. We expect only modest reductions in the unemployment rate for the remainder of the year and early into 2021, with unemployment averaging 6.8% in Q4 and 6.6% in Q1.

3. More fiscal relief and government spending on vaccine distribution will prop-up a weak economy in the first quarter of 2021

With rising COVID cases following holiday gatherings and continued social distancing, we expect the economy will limp into 2021, with unemployment remaining high. Our assumption is that Congress will pass an additional $1 trillion in fiscal relief in January or early February, with this money entering the economy in Q1 and Q2. Even with additional government support, our forecast is for anemic growth of 1.8% annualized in Q1 2021.

We also assume $200 billion in federal transfers to state and local governments and $50 billion of direct federal spending to support mass vaccination campaigns. This is our estimate for the all-in cost for end-to-end distribution, storage, handling, administration, and outreach associated with mass vaccination.

Both fiscal relief and government spending on vaccinations will help prop-up a weak economy early in 2021. Without additional fiscal relief, the economy may teeter into reces-

4. For a discussion on how the purchase of "stuff" represents "millions of dollars and countless jobs," see https://youtu.be/Yj8mHwvFxMc.

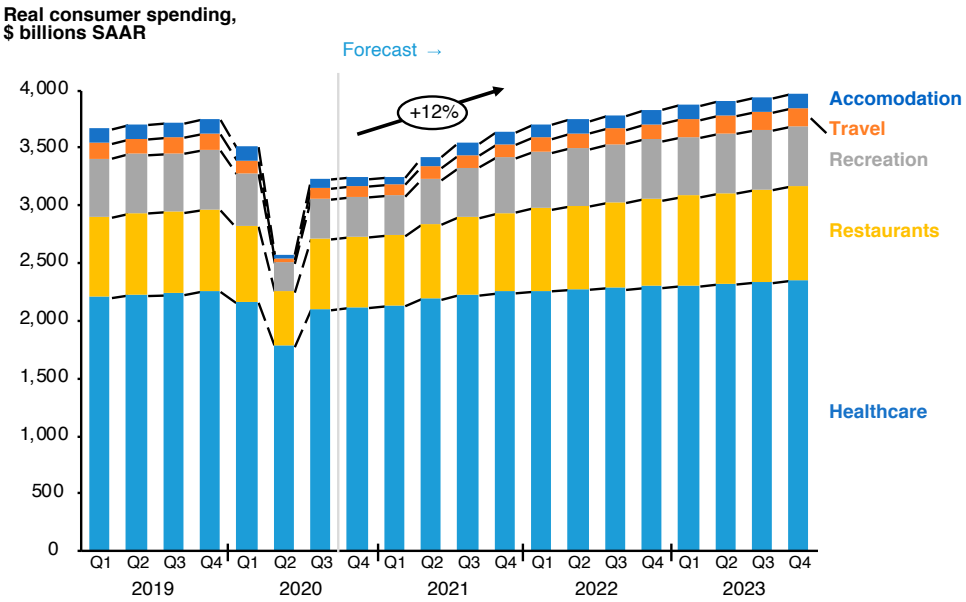
sion in Q1 2021 depending on the prevalence of COVID infections and on the need to continue social distancing.

4. With mass vaccinations by mid-2021, we expect a boom in services, led by leisure, hospitality, entertainment, and recreation

Once vaccines are widely available, our assumption is that households will not only resume their consumption of services, but those that accumulated savings during the pandemic will overcompensate for the past year by consuming more services than they normally would. We expect a significant surge in spending on restaurants, recreation, travel, and accommodation, as well as in healthcare services, as people resume non-urgent and elective healthcare visits (see Exhibit 5). We also expect an increase in clothing purchases as individuals adjust to going out once again. But following a year of higher goods purchases, we expect consumers will reduce consumption of recreational goods, household goods, electronics, and other durable goods (see Exhibit 6).

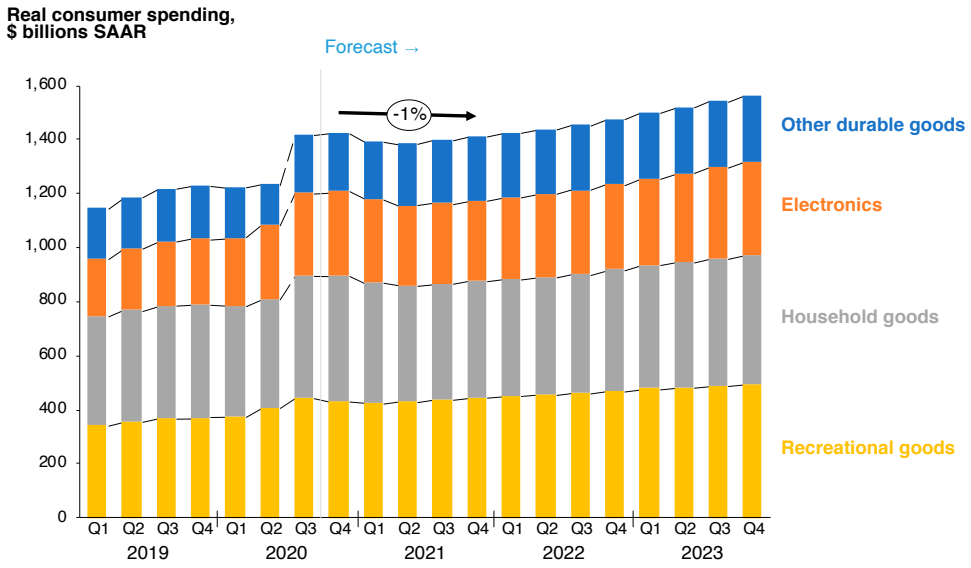
These changes represent a return to our former habits, and in our forecast, it means a reversion to long-run trends. What we did less of during the pandemic, we'll do more of once the pandemic is over. That includes activities involving in-person interaction. What we did more of during the pandemic, we'll do less of once it's over. That includes the stay-at-home purchases of the past year. We may never fully return to pre-pandemic habits, but without the constraints imposed by the pandemic, we'll adjust our consumption behaviors to be more like before.

Exhibit 5 Higher spending on restaurants, recreation, travel, accomodation, and healthcare services



Source: U.S. Department of Commerce, Bureau of Economic Analysis and UCLA Anderson Forecast
Notes: Real consumer spending in 2012 $ billions, seasonally adjusted annual rate. Increase of 12% between 2020 Q4 and 2021 Q4.

Exhibit 6 Lower spending on recreational goods, household goods, electronics, and other durable goods



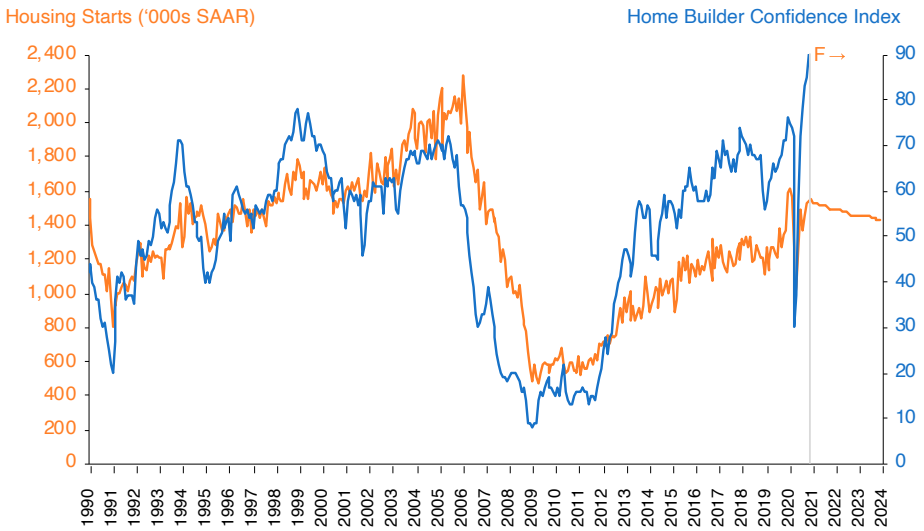
Source: U.S. Department of Commerce, Bureau of Economic Analysis and UCLA Anderson Forecast
Notes: Real consumer spending in 2012 $ billions, seasonally adjusted annual rate. Decrease of 1% between 2020 Q4 and 2021 Q4.

5. Housing will likely remain red-hot well into 2023, mitigating weak construction investment in commercial, state and local, and mines and wells

We forecast that housing will remain strong well into 2023. Home builder confidence is at a record, and permits and housing starts continue to increase (see Exhibit 7). Underlying this are five factors. First, interest rates are likely to remain low for an extended period of time, which will fuel demand for home purchases. Second, without COVID concerns, sellers who were reluctant to put their homes on the market this past year may enter the market and relieve current inventory constraints. This is likely to be a case where supply begets demand, and the increased options induce more people to become buyers. Third, we'll have more clarity on whether working from home will be sustainable over the longer-term once pandemic constraints are no longer binding. This clarity is likely to induce additional rounds of people relocating away from urban cores to suburbs and larger homes. Fourth, there's a demographic bubble of millennials aging into their prime earning and home-buying years (see Exhibit 8).[5] This demographic shift will continue to fuel higher demand for home purchases. And fifth, as unemployment begins to come down and there's less economic uncertainty, buyers who were reluctant to enter the market this past year may be more likely to enter to take advantage of continued low mortgage rates. As for where housing markets will be red-hot, there are a lot of unknowns. Once the economy fully reopens, urban cores will regain some of the amenity value lost during the pandemic, but demographic shifts, with millennials starting families, and continued opportunities to work from home will make the suburbs more attractive.

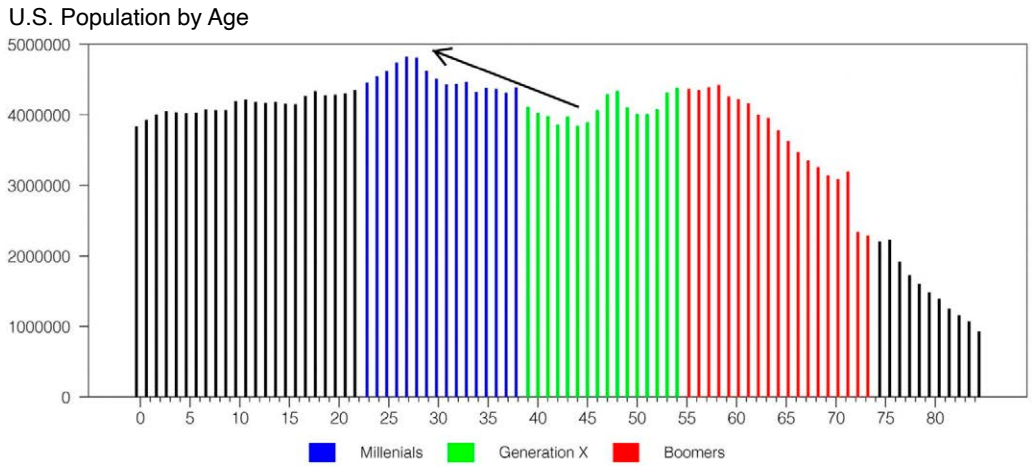
5. *See Tim Duy, Fed Watch, "Quick Note on Demographics," December 1, 2020, available at: https://blogs.uoregon.edu/timduyfedwatch/2020/12/01/quick-note-on-demographics/.*

Exhibit 7 The housing market shows continued strength, propelled by record-low mortgage rates and working-from-home: NAHB/Wells Fargo Housing Market Index reaches new highs and housing starts expected to remain high through 2023



Source: U.S. Census Bureau, U.S. Department of Housing and Urban Development, National Association of Home Builders, and UCLA Anderson Forecast
Notes: The NAHB/Wells Fargo Housing Market Index measures home builder confidence. Data are available through November 2020. Housing starts data are available through October 2020. Forecasts for housing starts are for November 2020 and onwards.

Exhibit 8 Demographic bubble: millennials are aging into their prime earning and home-buying years



Source: Tim Duy, Fed Watch, "Quick Note on Demographics," December 1, 2020, available at: https://blogs.uoregon.edu/timduyfedwatch/2020/12/01/quick-note-on-demographics/.

The flip-side of strong residential investment will be weak investment in commercial, state and local, and oil wells. If the higher rates of working-from-home and online shopping persist to a moderate extent after the pandemic is over, we'll be over-supplied on office and retail space, and there will be little demand for additional commercial investment, at least in urban cores. State and local construction is likely to take a hit as state and local governments reduce infrastructure budgets in response to lower tax revenues and the need to replenish rainy-day funds. Finally, the domestic oil industry has been decimated by low oil prices, and we foresee diminished ongoing investment in oil wells for the next several years.

6. Brick-and-mortar retail and commercial offices will need to adapt to survive and become more about providing experiences

The pandemic has taught us that we can run many of our errands online and we can do much of our work productively from home. This requires rethinking how we use our retail and commercial spaces. In order to compete with online retailers, brick-and-mortar retailers will need to differentiate themselves and provide not just a means to fulfill necessities, but also a shopping experience. This requires providing the ability to sample products (e.g., Apple Stores, Ulta Beauty, Sephora, Costco), offering assistance and recommendations (e.g. Ace Hardware, BestBuy), and cultivating a sense of community engagement (e.g., Lululemon, independent book stores). With the accelerated adoption of e-commerce, brick-and-mortar retailers will need to innovate so that their physical locations focus more on providing experiences while their online marketplaces fulfill necessities.

Similarly, commercial offices are likely to become spaces tailored for interaction and collaboration. Early in the pandemic, there was much discussion about how the open-office concept would revert to workers having dividers or individual offices to allow for separation.[6] But the success of working-from-home has revealed that, for moments when workers require separation for health or individual productivity reasons, they can work effectively from home, and when they need to interact with colleagues, they can go into the office. This past year of working remotely has revealed that there's most likely an optimal mix of in-office and at-home work. This will have important implications for all the businesses that support urban core workers as urban cores are unlikely to achieve the daily density and volume of workers they had before.

7. Even with a strong recovery beginning in Q2 2021, we expect only modest inflation and gradual improvement in unemployment and trade

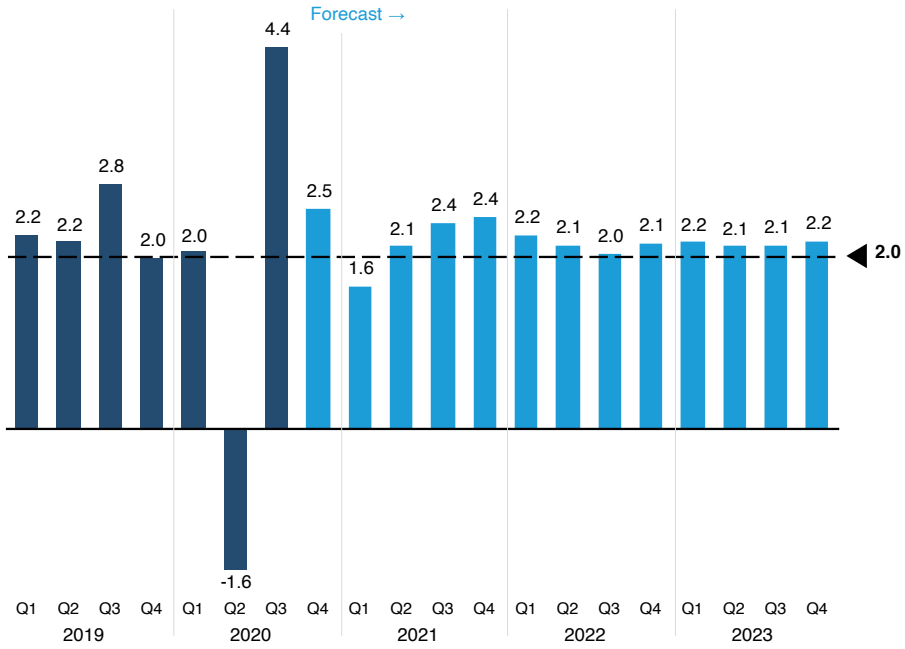
Our forecast is that core inflation will average 1.8% for 2020 and remain muted through 2023, hovering around 2.1–2.2% per year (see Exhibit 9). There is considerable excess capacity to absorb a surge in consumer demand without leading to an increase in prices. This also means there is little risk of the Federal Reserve needing to increase rates to contain inflation, and the Fed Funds Rate is likely to remain near zero at least through the end of 2023.

We forecast that the unemployment rate will decline gradually as the economy picks up and people re-enter the labor force (see Exhibit 10). Nearly 1 million women exited the labor force this fall because of home schooling and caregiving necessities, and more than 2 million have left the labor force since the beginning of the year.[7] Their re-entry into the labor force will mitigate how quickly the unemployment rate will decline. We don't expect the economy will reach 4.0% unemployment until the end of 2023.

6. See, for example, Matt Richtel, "The Pandemic May Mean the End of the Open-Floor Office," New York Times, May 4, 2020, available at: https://www.nytimes.com/2020/05/04/health/coronavirus-office-makeover.html.

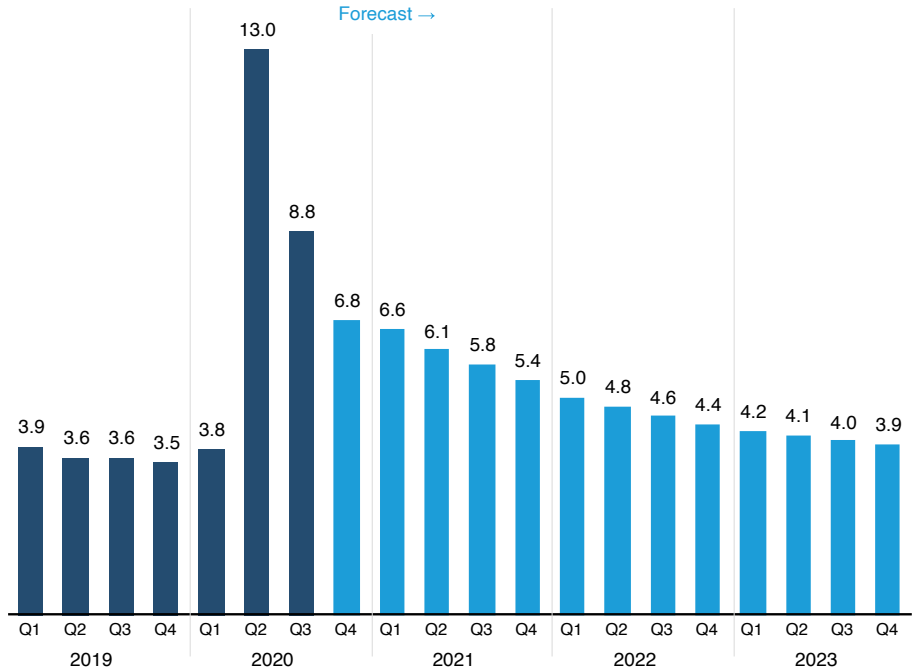
7. See Kathryn A. Edwards, "Sitting it Out? Or Pushed Out? Women Are Leaving the Labor Force in Record Numbers," RAND, October 23, 2020, available at: https://www.rand.org/blog/2020/10/sitting-it-out-or-pushed-out-women-are-leaving-the.html.

Exhibit 9 Core inflation: CPI excluding food and energy



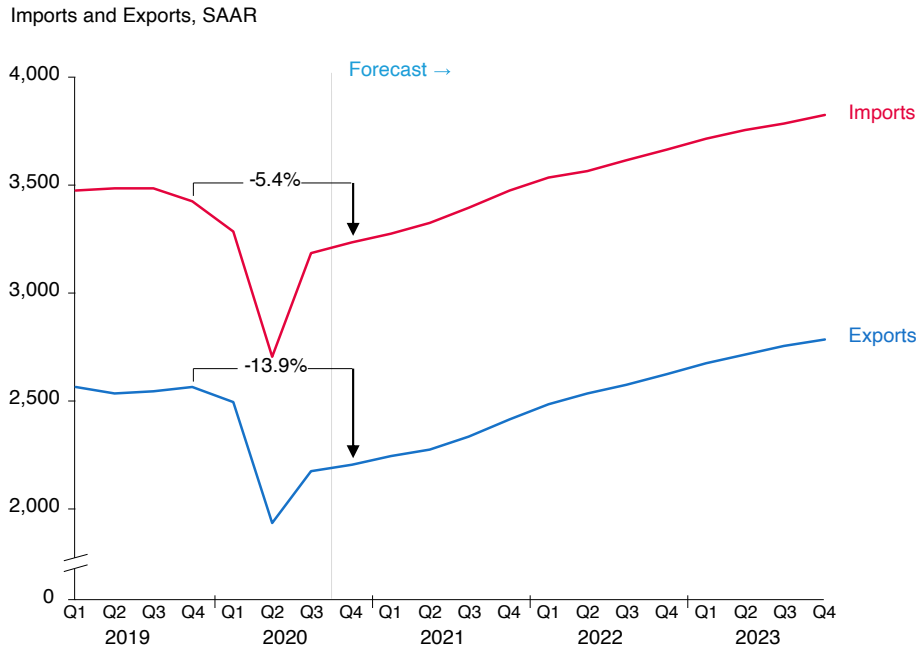
Source: U.S. Bureau of Labor Statistics, Consumer Price Index for All Urban Consumers: All Items Less Food and Energy in U.S. City Average and UCLA Anderson Forecast
Notes: % change, seasonally adjusted annual rate.

Exhibit 10 Unemployment rate



Source: U.S. Bureau of Labor Statistics and UCLA Anderson Forecast

Exhibit 11 Recovering imports, struggling exports



Source: U.S. Department of Commerce, Bureau of Economic Analysis and UCLA Anderson Forecast
Notes: 2012 $ billions, seasonally adjusted annual rate.

The pandemic has also exacted a greater economic toll on the U.S.'s main trading partners and on the sectors where the U.S. has a comparative trading advantage. Our imports are recovering, but our exports are likely to remain suppressed for some time (see Exhibit 11). Even as the dollar loses value—in response to greater global economic stability and the reversal of the flight to safety—export growth is likely to remain weak.

8. The '20s will be roaring, but with several months of hardship first

With a vaccine and the release of pent-up demand, the next few years will be roaring as the economy accelerates and returns to previous growth trends. We expect a surge in services consumption and continued strength in housing markets to propel the economy forward. There will be a few areas of weakness as the economy adjusts to a post-pandemic normal with more working-from-home and online commerce than we had before, and for better and worse, some parts of the economy will never be the same. For better, the pandemic has accelerated technological disruptions that have made education and healthcare more accessible, through online courses and telehealth. For worse, it has permanently eliminated many service and retail sector jobs and made the economy more unequal.

Right now, the key issue is how we will make it through to an exuberant spring. These next few months will be dire, with rising COVID infections, continued social distancing, and the expiration of social assistance programs. Additional timely fiscal relief would prevent unnecessary hardship and allow the economy to maintain the structural relationships that will help us recover more quickly once vaccines become widely available.

Trends in Solar Panel Adoption: The Role of Costs, Benefits, Weather, and Peers

Leila Bengali
Economist, UCLA Anderson Forecast
December 2020

Summary

- Solar panel system installations have increased over time in the U.S.
- Falling costs (such as lower installation costs and higher electricity prices) and rising benefits (such as gains in solar panel efficiency) can help explain the trends in system installations.
- This report also assesses whether local weather patterns and information from peers influence installations.
- While recent local weather patterns do not have a significant effect, there is evidence that peers do have an influence on installations. The magnitude of the estimated relationship rivals that of the relationship between installations and some of the monetary installation costs and benefits.

Adaptation to, and actions to mitigate, climate change takes and will take many forms. One of those forms is turning to sources of renewable energy to generate electricity, as both an adaptation and mitigation strategy. Encouraging a transition towards renewables is a policy objective at both the state and federal level. California has SB 100 passed in 2018 (the goal of which is to reach 100% of retail end-use electricity generation from renewable and zero-carbon sources) and president elect Biden has indicated that investing in renewable energy will be one of his administration's policy goals. The focus of this report is one form of renewable energy for generating electricity: solar energy generated by photovoltaic panels. This report examines what factors, such as economic costs and benefits, weather patterns, and peers' decisions, predict residential solar panel adoption in the U.S.

Solar energy is a small, but growing source of electricity in the U.S. For some perspective, the most recent data from September 2020 indicate that about 3.3% of net electricity generation in the U.S. came from solar energy. California produces and consumes more solar energy than most other states. During the same month, about 19.8% of net electricity generated in the state came from solar.[1] While solar still generates a relatively small fraction of the nation's energy needs, installation costs have come down, panel efficiency has increased, and the ability to store solar energy for later using batteries has become more available. For these and other reasons, the number of solar panel systems has increased over time.

1. https://www.eia.gov/state/?sid=CA#tabs-4.
U.S. Energy Information Administration Electric Power Monthly Tables 1.1, 1.3A, and 1.17A.

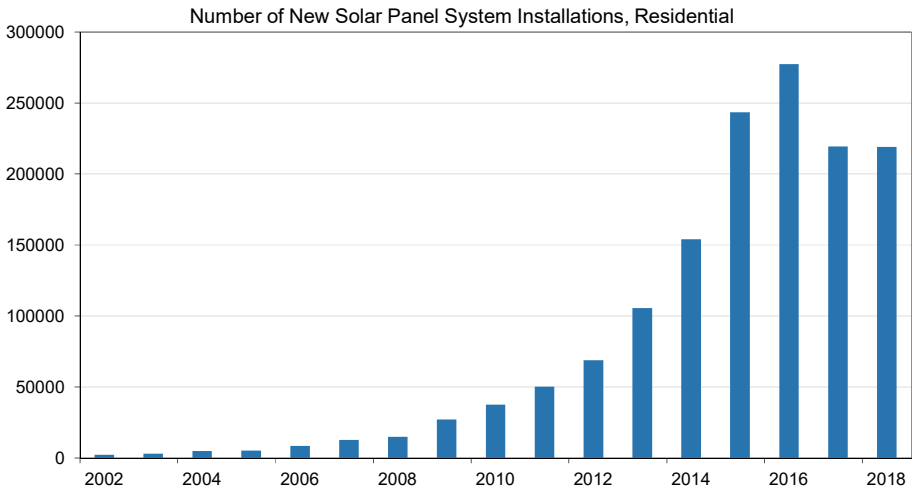
The decision to install a solar panel system is at part an economic one, weighing the costs (such as installation prices) and benefits (such as electricity prices that panel owners can avoid paying). In addition to objective facts about costs and benefits, learning about the suitability of the local area for solar and gathering information from peers could also play a role. This report considers these components (costs, benefits, local weather, and peers), aiming to give some perspective about the role of each in a predictive model of solar panel adoption.

Trends in Residential Solar Panel Installations

The number of new solar panel systems installed each year in the U.S. has grown over time. Figure 1 shows an estimate of new annual installations in the residential segment (which represent the bulk of installations). These estimates are based on data compiled by the Lawrence Berkeley National Laboratory from state agencies and utility companies and cover about 80% of all installations in the U.S.[2] These systems are not evenly spread around the U.S. California has more solar panel systems than any other state, about seven times more than Arizona (a distant second) and about 8 times more than New Jersey (third).

The goal of this report is to understand the forces behind this increase in installations. Looking at aggregate trends in costs and benefits over time can help understand the motivations to install solar panel systems. Natural contenders are factors that affect the economic costs and benefits of solar panel systems, such as the cost of buying and installing panels, up-front subsidies or grants to offset these costs, the cost of electricity from the grid (a substitute for electricity produced by solar panels), panel efficiency, and how favorable the local area is to solar production. These factors are shown in Figures 2 and 3, Table 1, and in the map in Figure 4.[3]

Figure 1 New Installations



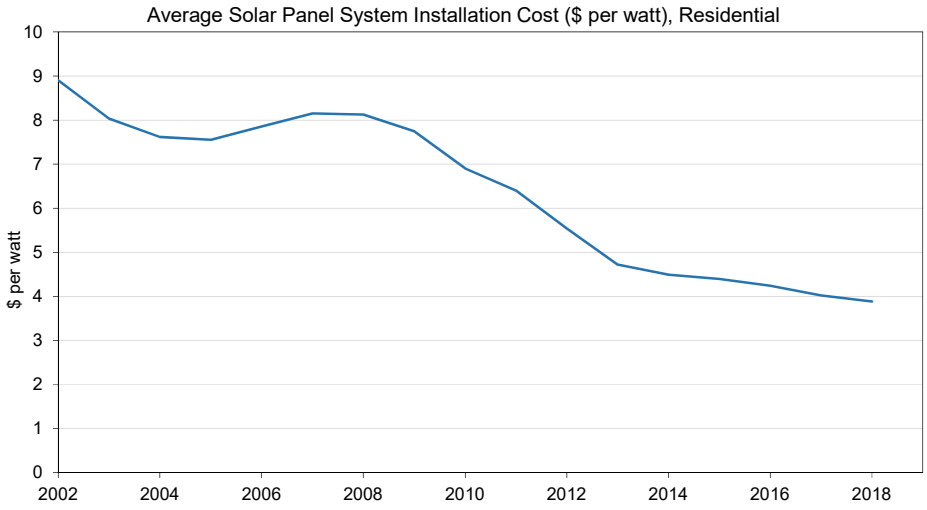
Source: Lawrence Berkeley National Laboratory and author's calculations.

2. The data on solar panel systems in this report come from Lawrence Berkeley National Laboratory's Tracking the Sun project. The data cover photovoltaic solar installations that are connected to the electrical grid and exclude utility scale installations. This dataset is not a perfect record of every system installed in the U.S., but the data represent about 80% of solar installations. Most installations are in CA, AZ, MA, NJ, NY. See https://emp.lbl.gov/tracking-the-sun for more details.

3. These are certainly not the only factors that matter. Others include compensation for electricity generated but not used through programs such as net metering and power purchase agreements.

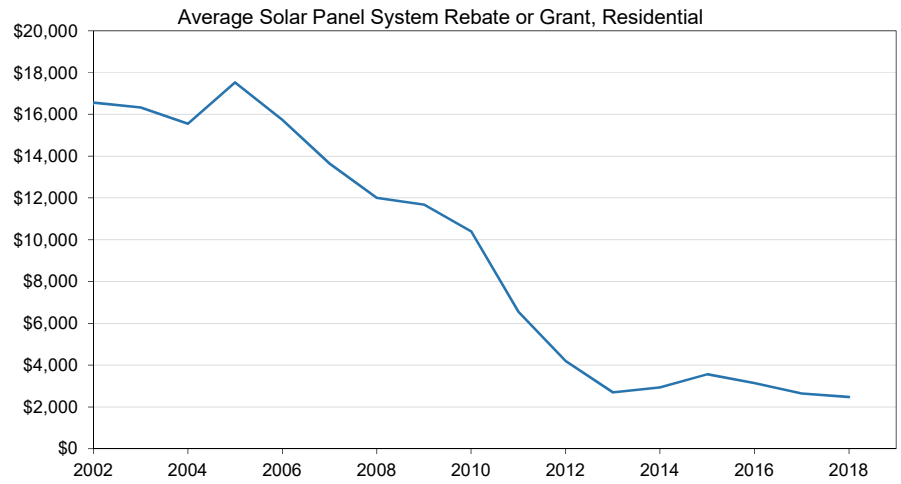
Based on comparisons of costs and benefits, as factors on the cost side of solar panel system installations fall and benefits rise, there should be more installations. Fitting this broad prediction, installation costs have fallen over time: the total installation cost per unit of electricity produced (measured as watts of direct-current the installed system could output in standard test conditions) went from about $9 in 2002 to just under $4 in 2018 (Figure 2). Moving against this pattern, up-front rebates and grants to individuals installing solar panel systems were high during the early 2000's, but have fallen as large incentive programs like the California Solar Initiative wound down and ended in 2016 (Figure 3). This timing may help account for the drop in the number of new systems installed in 2017 and 2018 relative to the level in 2016 (see Figure 1). (Note that the federal Solar Investment Tax Credit which was in place through most of the time period shown, is not included in these tabulations because it offers a reduction in federal taxes owed, rather than an up-front rebate.) On the benefits side, some of the economic benefits of solar are on upward trajectories: panels continue to become more efficient (measured as the fraction of energy captured by the panels that is converted into usable electricity), and the price of electricity from the grid (a substitute) has increased, which should increase demand for solar panel systems (Table 1). Solar panel production potential is also an important factor in the cost-benefit analysis. Installing a solar panel system is more lucrative if you live in Arizona than if you live in Maine. Differences in solar potential are driven in large part by latitude and longitude, and thus do not change as much over time. Figure 4 shows global horizontal solar irradiance (the kind of energy that photovoltaic solar panels can convert to electricity) across the U.S. Both California and Arizona tend to get more global horizontal solar radiance and are also the two states with the most solar panel systems. Taking all of this information on costs and

Figure 2 Installation Price



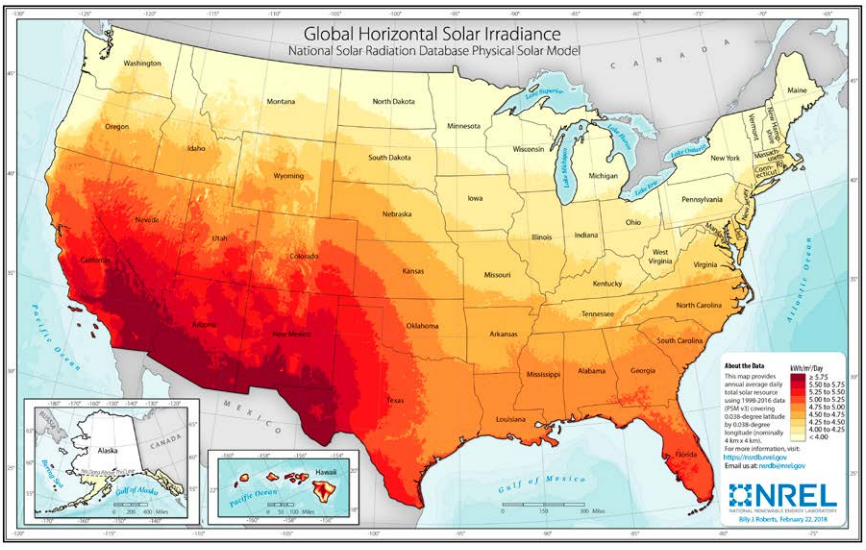
Source: Lawrence Berkeley National Laboratory and author's calculations.

Figure 3 Up-Front Rebates and Grants



Note: Average is over non-zero rebates.
Source: Lawrence Berkeley National Laboratory and author's calculations.

Figure 4 Usable Solar Energy



Source: https://www.nrel.gov/gis/solar.html.

Table 1 Average Solar Panel Efficiency and Electricity Prices (Residential)

	Solar Panel Energy Conversion Efficiency (Percent Converted to Usable Energy)	Electricity Price (Cents per kWh)
2002	13.7%	8.4
2009	14.8%	11.5
2018	18.8%	12.9

Sources: Lawrence Berkeley National Laboratory, author's calculations, and U.S. Energy Information Administration.

benefits together, the patterns over time and across space generally fit with predictions of how consumers would be expected to respond to changes in the costs and benefits of installing solar panel systems.

Explaining Solar Panel System Installations

To provide a more precise test of these predictions, we can use regression models that yield estimates of the relationship between each factor and the number of new installations. To start, consider a model that examines patterns in the U.S. over time at the county level to estimate the relationship between the number of new residential solar panel installations each month and each of the factors in Figures 2 – 4 and Table 1: installation costs, rebates, efficiency, electricity prices, and solar radiation:[4]

> new installations = B0 + B1 (average solar radiation) + B3 (electricity price) + B4 (system installation cost per watt) + B5 (panel efficiency) + B6 (grants and rebates) + (state*month fixed effects),

where the B's are the coefficients, or relationships, to be estimated. The state*month fixed effects are variables included to control for seasonal variation in panel installations, where the seasonality is allowed to be different for each state – March in Arizona is different from March in New Jersey.

The results are much in line with intuition (Table 2; statistically significant coefficients are bold). Areas that are generally more suitable for solar electricity production (areas that have more solar radiation) tend to have more installations each month, though this relationship is only significant at the 10% level, not quite reaching accepted levels of statistical significance. System installations also respond in predicted ways to prices: lower installation costs and higher electricity prices are associated with more installations. Improvements in panel efficiency, which increase the benefit a consumer gets from installing a panel system, are also associated with more installations. The regression model indicates that the relationship between up-front rebates and grants and installations is far from being statistically significant, perhaps reflecting the phase-out of many rebates over time at the same time as installations were generally on an upward trend.

Economic costs and benefits are not the only factors that influence choices. The actions of and ideas provided by a consumer's peers, specifically their friends, and the consumer's own learning about the suitability of solar in their area (by observing local weather trends, for example) could factor into the decision to install solar panels. Existing research supports the idea that local weather patterns affect decisions about solar installations (Lamp 2018, Liao 2020), and another line of research finds that the actions and experiences of one's friends affect consumers' decisions in domains such as real estate (Bailey et al. 2018). Separating the influence of friends from the influence of personal observations of the local weather is difficult because friends

Table 2 Results: Costs, Benefits, and Installations

An increase in ...	... is associatied with
average solar radiation of one MJ per m^2	36.6 more installations
electricity price of one cent per kWh	**17.7 more installations**
system installation cost of one dollar per watt	**11.7 fewer installations**
panel efficiency of one percentage point	**3.8 more installations**
grants and rebates of one dollar	0.0002 fewer installations

4. See the data glossary at the end of the report for details about the variables used in the analysis.

often live in the same area and experience the same local weather, thus a consumer's actions could be attributed either to friends or the weather.

One solution is to look at the actions of geographically distant friends. Doing so reduces the chance that the friends experienced the same recent local weather patterns. Following an idea from Bailey et al. (2018), I use published data from Facebook, the Social Connectedness Index, to calculate a friend-weighted-average of the number of solar panel system installations in counties connected by friendship links on Facebook. To reduce the chance that friends experience similar local weather, I only use friend connections to out-of-state counties. For example, say the Social Connectedness Index between county A (in state S) and county B (in state T) is 5, and between county A and county C (in state E) is 15. If there are 10 solar panel system installations in B and 4 in C in a given month, then the friend-weighted-average number of installations for someone in county A for that month is:

$$[5 / (5 + 15)] * 10 + [15 / (5 + 15)] * 4 = 5.5.$$[5]

To account for recent trends in local weather, I include a measure of solar radiation in the current and six most recent months. I use the concept of a 'weather anomaly' for this measure. There are a number of different ways to measure the 'weather anomaly.' Following a suggestion in Liao (2020), I compare average solar radiation over all days in the current month (June 2015, for example) to the historical average for that time of the year (all days in June from 1980 to 2000). I then transform the difference into standard deviations away from the historical average for that month of the year as a normalization.

Broadly, the results indicate that friends matter more than weather. Current and recent solar radiation does not have a statistically significant effect on solar panel system installations.[6] On the other hand, the actions of consumers in counties where more friends live do appear to make a difference. If the friend-weighted-average number of solar installations increases by one in the current month, the associated increase in own-county installations is about 18 (a relationship that is statistically significant). This estimated relationship is not a trivial size. For comparison, the relationship between a one cent increase in electricity prices and monthly installations is also about 18. The magnitude (and statistical significance) of the relationship between own and friend-county installations falls when comparing the current month's own county installations to the friend-weighted-average number of installations in past months, going from about 18 (same month) to about seven (one month ago) to about one (two months ago, and no longer statistically significant). Since there is typically a delay between the time a consumer decides to install solar panels and the actual installation date, one interpretation of this pattern of magnitude decay is that a consumer's actions are swayed more by friends' plans and ideas than by friends' actions. If actions mattered, then lags of friend-weighted-average installations rather than friend-weighted-average installations in the same month should have more predictive power. An important caveat is that this analysis cannot rule out an alternative interpretation in which friends independently and simultaneously decide to install solar panels at the same time. The story here is that people often choose friends that are similar to themselves in some ways, and those similarities, not the actions or information exchanged between friends, drive the observed relationship between own-county panel installations and installations in counties connected by friendships. So, while the evidence is consistent with friends playing a role in installation decisions, the analysis cannot prove decisively that this is the case.

Taken together, economic costs and benefits and perhaps the information and ideas provided by friends help predict solar panel system installations in the U.S. Since capturing solar energy is often cited as a way to increase society's ability to use renewable energy, these results provide some evidence on how to encourage solar panel adoption in instances where doing so is a policy goal. In addition to focusing on technological advancements that increase efficiency and bring down prices, encouraging installations in one county or state could encourage installations in other areas through networks of friends and the spread of information.

5. The Social Connectedness Index between pairs of counties does not change over time, while the number of installations in connected counties does. The Index is based on data as of August 2020, and thus an implicit assumption in the analysis is that the friendship network is stable over time.

6. Though other research finds that recent local weather does affect choices about residential solar installations, the findings in this report do not necessarily conflict with the existing research. The evidence in this report does not support the interpretation that there is an effect of recent local weather on installations, but also cannot rule out that there is no effect.

Data appendix

Lawrence Berkeley National Laboratory, Tracking the Sun Data project compiles data on solar panel system installations. The data run from 1998 through 2018. The original data were aggregated to be used in the analysis in this report as follows:

» Panel system installations: the number of systems installed by county and month-year

» Installation price per watt: the average system installation price per watt of power output, by state and month-year

» Efficiency: the average percent of solar energy that panels convert into usable electricity, by state and month-year

» Rebates and grants: the average pre-tax value of up-front grants or rebates for installing a solar panel system in dollars, by state and month-year

Historical weather data are from the Oak Ridge National Laboratory (https://daymet.ornl.gov/). The latitude and longitude coordinates from the center of each county were used to extract the weather data.

» Historical average daily solar radiation: the average of daily total solar radiation over all days between 1980 and 2000, by county

» Solar radiation: the average of daily solar radiation over each day in a given month, by county and month-year

Other variables:

» Electricity price: residential electricity prices reported by the U.S. Energy Information Administration in cents per kWh, by state and month-year (https://www.eia.gov/electricity/data.php#sales, Monthly Form EIA-861M)

» The Social Connectedness Index, provided by Facebook, gives a measure of the number of friendship links between pairs of counties in the U.S.

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Uncertainty in the Post-Election and COVID-19 World

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December 2020

The election is over with and there will be a change in administrations come January 20th. However, that does not eliminate all of the uncertainty with respect to U.S. economic policy. There could well be a divided Congress, and the outgoing administration may have some new directives that were not previously forecast. However, over the past two years, in a country that has harbored divided views on domestic policy, a rare consensus on a fundamentally changed view of U.S. economic engagement with Beijing has developed.

As we mentioned in previous reports, the U.S. and China are unlikely to go back to the past era of strategic engagement. What a Biden Administration would change with respect to economic policy towards China is in style and method, not substance. The U.S. is more likely to confront and contain China by leveraging more multilateral frameworks with its allies than unilateral ones. One example is that U.S. could re-enter the CPTPP (Comprehensive and Progressive Agreement for Trans-Pacific Partnership) to bolster its leadership and to expand its interests in Asia. The U.S. could also re-join the WHO and make the WTO more functional as well. And the President-Elect has stated that America would return to the Paris Accord and seek cooperation on climate change issues with China. Though China was the largest CO2 emitter in the world in 2020, it recently committed to carbon neutrality prior to 2060. This is a rare space for increased cooperation in alternative energy and propulsion.

To be sure, there will be more dialogues and efforts between the U.S. and China to address further escalating tensions. In the presidential campaign, however, President-Elect Biden committed to bringing manufacturing, particularly with respect to technologically advanced goods and renewable energy equipment back to the U.S.[1] Thus, a continuation of the intention, if not the method of the past four years of partial economic disengagement should be expected. In this update report, we will discuss trade relations and technology competition between the U.S. and China.

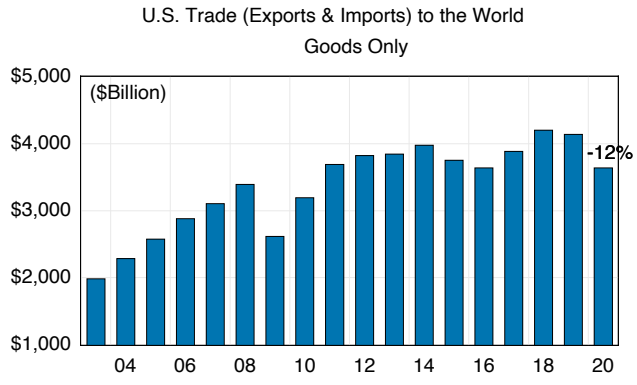
1. In an interview with the New York Times on December 2, 2020, Biden said:" I want to make sure we're going to fight like hell by investing in America first."

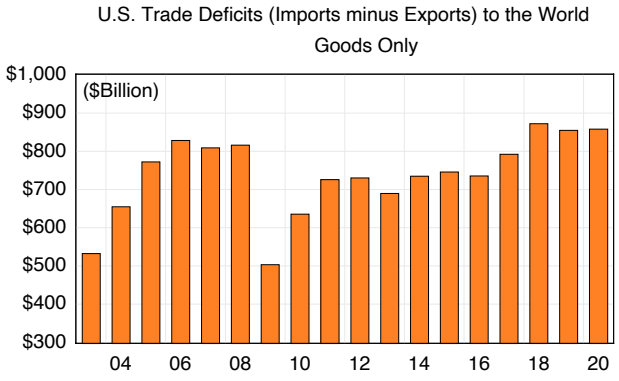
The Slowly Decoupling U.S.-China Trade and "Just-In-Case" Global Supply Chains

Figure 1 (left) shows U.S. nominal goods trade with the rest of the world (imports plus exports). Figure 1 (right) shows U.S. nominal goods trade deficits with the rest of the world (imports minus exports). The numbers in 2020 are based on Anderson Forecast projections. Due to the global pandemic induced recession, it is not surprising to see that U.S. total international trade is estimated to decline by 12% in 2020. In the 2008/2009 recession, the comparable decline in total trade was 19.8%. In both recessions, the circumstances of the downturn interrupted trade flows. In the latest, imports from China to the U.S. plummeted as Chinese factories shutdown and did not pick up until both they and U.S. factories began to reopen. Consequently, the slight decline in the U.S. goods trade deficit should not be taken as an indicator of a trend. Indeed, the deficit widened in the third quarter of 2020.

Note that trade data in Figure 1 only includes goods. We use it for convenience for Figures 1 through 4 because data from the U.S. Bureau of the Census on monthly trade flows by country is available through September 2020, while the net export component of GDP that includes trade in services is only available by country with a considerable lag. For a more comprehensive picture of international trade, we should, of course, also examine trade in services including travel, education, and intellectual property transactions. We do not expect this to show a qualitative difference, however, as the estimated total trade of goods and services should decline by 14% in 2020, similar to the goods only decline (Figure 1A). The trade deficit in goods and services is estimated to have increased by 9% in 2020 with the difference being largely the collapse of international travel and the restrictions on international students coming to the U.S.

Figure 1 U.S. Total Goods Trade and Deficits





Sources: U.S. Census and UCLA Anderson Forecast

Figure 1A U.S. Total Goods and Services Trade and Deficits

Sources: U.S. Census and UCLA Anderson Forecast

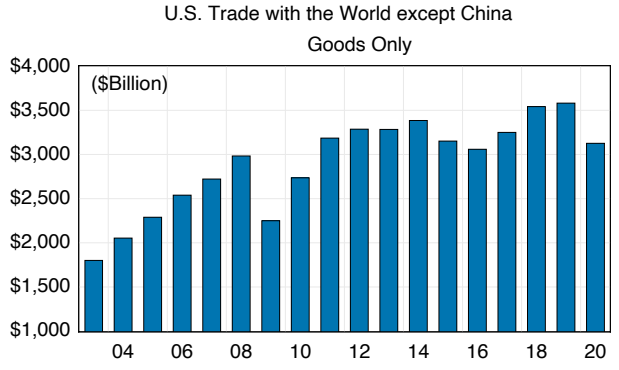
Figure 2 (left) shows total U.S. nominal goods trade with China and Figure 2 (right) shows the U.S. goods trade deficit with China. We can see a clear turn in 2019. U.S. total goods trade with China declined by 15% in 2019, and we estimate that it will decline by another 8% in 2020. U.S. trade deficits with China contracted by a greater amount (-18% in 2019 and an estimated -15% in 2020). The main driver of the differential from the decline in world trade in 2019 and to some extent in 2020 is in the reduction of U.S. imports from China due to tariffs, non-tariff restrictions on trade, and a shift of low-cost labor manufacturing out of the now higher cost China. U.S. imports from China peaked in 2018 at $538 billion, dropped to $452 billion in 2019 (-18%), and to an estimated $402 billion in 2020 (-15%). It should be noted that weak U.S. holiday spending could further the reduction in imports into 2021.

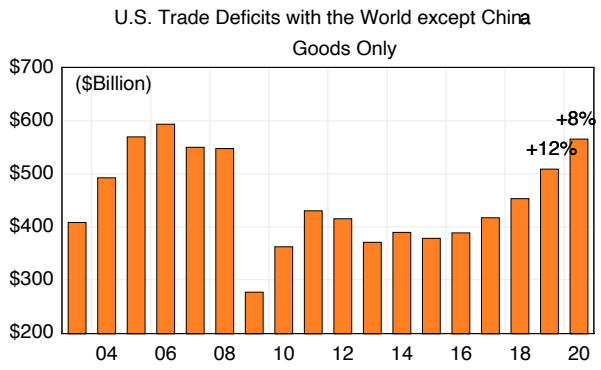
While the total U.S. goods trade deficits decreased slightly (Figure 1), the deficit with China decreased significantly (Figure 2). In contrast to consecutive annual declines in the goods trade deficit with China, U.S. goods trade deficits increased with all other countries by growth rates of 12% in 2019 and 8% in 2020 (Figure 3). This is evidence of U.S.-China decoupling since 2019.

Figure 2 U.S. Total Goods Trade and Deficits to China

Sources: U.S. Census and UCLA Anderson Forecast

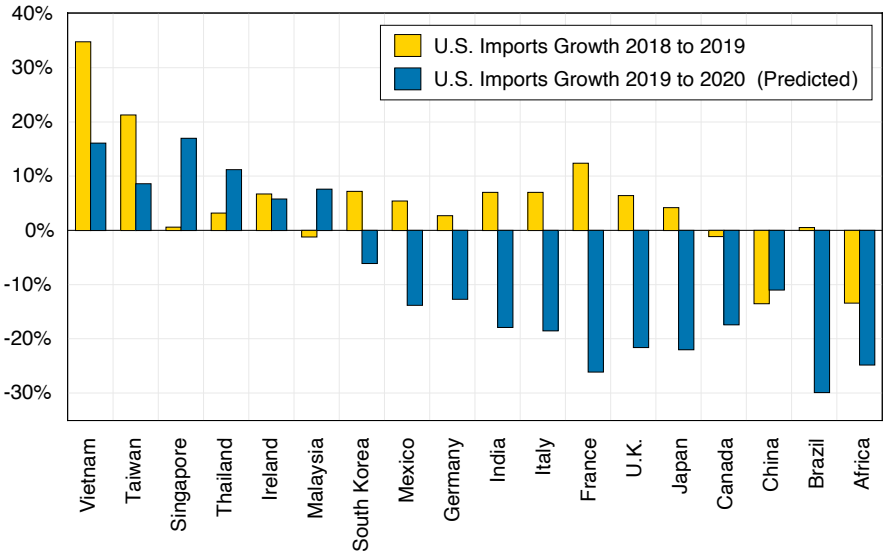
Figure 3 U.S. Total Goods Trade and Deficits to the World (Except China)





Sources: U.S. Census and UCLA Anderson Forecast

Figure 4 U.S. Import Growth from Major Trading Partners, 2018 and 2019



Source: U.S. Census and UCLA Anderson Forecast

Figure 4 presents U.S. import growth from its major trading partners in 2019 (yellow bar) and 2020 (blue bar, estimated). The two gaining the most are Vietnam and Taiwan, both of which have experienced positive export growth to the U.S., including during the current pandemic induced recession year. Singapore, Thailand and Malaysia also have had some modest positive growth in 2020. Much has been said about India becoming the next China due to its reinforced strategic alliance with the U.S. and much lower labor and land costs.[2] But U.S. imports from India declined in 2020. Fundamental change in supply chains take time, and we still expect a China to India shift as part of the decoupling.

Globalization has been long praised by Wall Street, Chambers of Commerce, and economists with its "just-in-time" supply chains providing low inventory costs, maximizing shareholder value, and generating more affordable products.[3] The global pandemic led many to realize that just-in-time global supply chains are fragile, and that they can potentially lead to national security and public health consequences. Though having a higher marginal cost, "just-in-case" supply chains are risk reducing with larger inventories and alternative domestic sources of production inputs. It is then natural to expect both China and the U.S. to enact policy to make sure there will be sufficient products and capacity at home in case of crises, disasters, conflicts, and/or another pandemic.

Technology Competition between the U.S. and China

In late October 2020, the Chinese Government published the major economic development targets in the 14th Five-Year Plan (2021-2025). Among many goals is "technology self-reliance." This is both in response to escalating U.S.-China rivalry, various U.S. sanctions on Chinese tech companies, and as part of China's 2016 "Made in China 2025" initiative. The strategic goals of "Made in China 2025" and "China Standards 2035" have China making major public investments in domestic technology and innovation including advanced technologies such as AI, quantum computing, semiconductor, life science, and aerospace.

2. For instance, Govindarajan and Bagla suggest that India would replace China, if China falls in attractiveness in "As Covid-19 Disrupts Global Supply Chains, Will Companies Turn to India?" Harvard Business Review (May 2020).

3. For example, see Fullerton, McWatters, and Fawson, "An Examination of the Relationships between JIT and Financial Performance," Journal of Operations Management, (2003), 21:4, pp 383-404. Kannan and Tan, "Just In Time, Total Quality Management, and Supply Chain Management: Understanding Their Linkages and Impact on Business Performance," Omega, (2005), 33:2, pp 153-162. Thomas Friedman, "The World is Flat." (2005), Farrar, Straus, and Giroux. In Jagdish Bhagwati ed., "In Defense of Globalization: With A New Afterword." (2004), Oxford University Press.

Recently, President Trump issued an executive order banning U.S. residents from investing in 31 Chinese companies that are purported to engage in "military-civil fusion" activity. The order is to take effect in January 2021. Existing American investment will need to be divested by November 2021. These 31 companies include Huawei, China Mobile, Hikvision, and Aviation and Industry Corporation of China (AVIC). Several of these companies are already in the Department of Commerce's Entity List and 13 of them are publicly traded.

In a report sponsored by the Hinrich Foundation[4] entitled "Strategic U.S.-China Decoupling in the Tech Sector," Alex Capri (2020)[5] suggests six major trends that will emerge from the tech competition between the U.S. and China:

1) Certain strategic value chains will decouple, restructure and diversify out of China.

2) The U.S., EU, and other countries will focus more on countering Beijing's economic nationalism with techno-nationalism initiatives of their own.

3) Re-shoring and ring-fencing of some critical manufacturing.

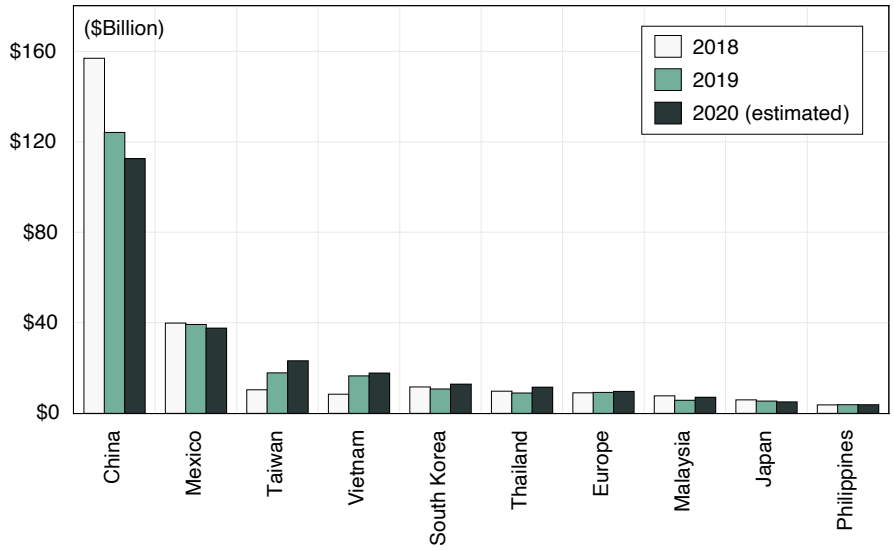
4) New public-private partnerships, and alliances to compete with China.

5) Multinationals will adjust to a world of increasingly fragmented and localized value chains.

6) Businesses will adopt "in-China-for-China" business models in order to access the Chinese market.

What is the early evidence on Points 1 and 3? About 500 of some 22,000 commodity classifications in U.S. merchandise trade are identified as advanced technology.[6] Focusing on two specific sectors: (1) imports of information and communication products, and (2) exports of aerospace, have the largest trade values among all the advanced technology products. Figure 5 lists the top 10 trading regions for U.S. import sources of information and communication products in 2018, 2019, and 2020.[7] The U.S.' top source of information and communication products is China. The trade war, tariffs, and Great Powers competition in the past two years have started a U.S.-China decoupling, in which U.S. imports from China declined from $157 billion in 2018 to $124 billion in 2019, and to $113 billion in 2020. At the same time, U.S. imports from Vietnam, Taiwan, South Korea, and Thailand all increased.

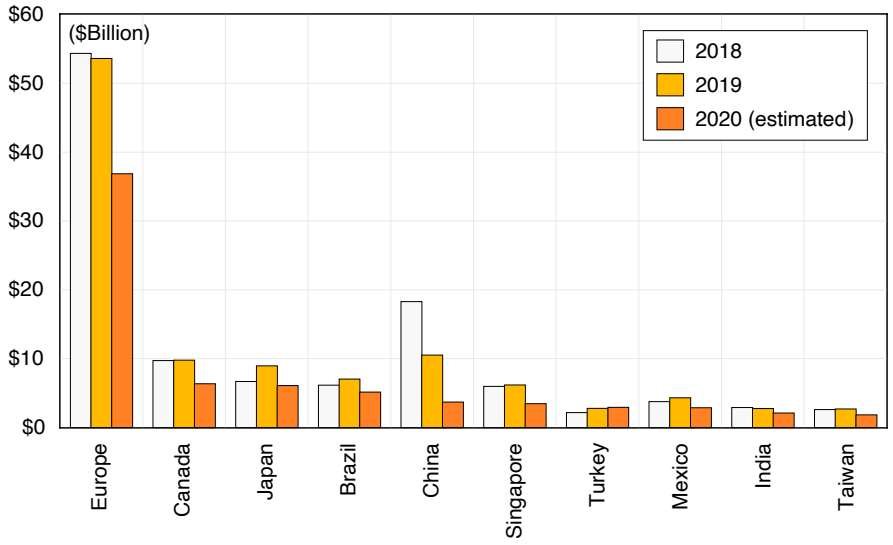
Figure 5 U.S. Imports of Advanced Technology Products--Information & Communications from 10 Major Trading Regions from 2018 to 2020



Source: U.S. Census

4. An Asia-based philanthropic organization that works to advance mutually beneficial and sustainable global trade.
5. A global value chain and international trade scholar and visiting senior fellow at National University of Singapore.
6. There are 10 major sectors: biotechnology, life science, opto-electronics, information & communications, electronics, flexible manufacturing, advanced materials, aerospace, weapons, and nuclear technology.
7. The annual number in 2020 is estimated based on the growth rate in the first nine months of 2020 compared to the first nine months of 2019, seasonally adjusted.

Figure 6 U.S. Exports of Advanced Technology Products--Aerospace to 10 Major Trading Regions from 2018 to 2020



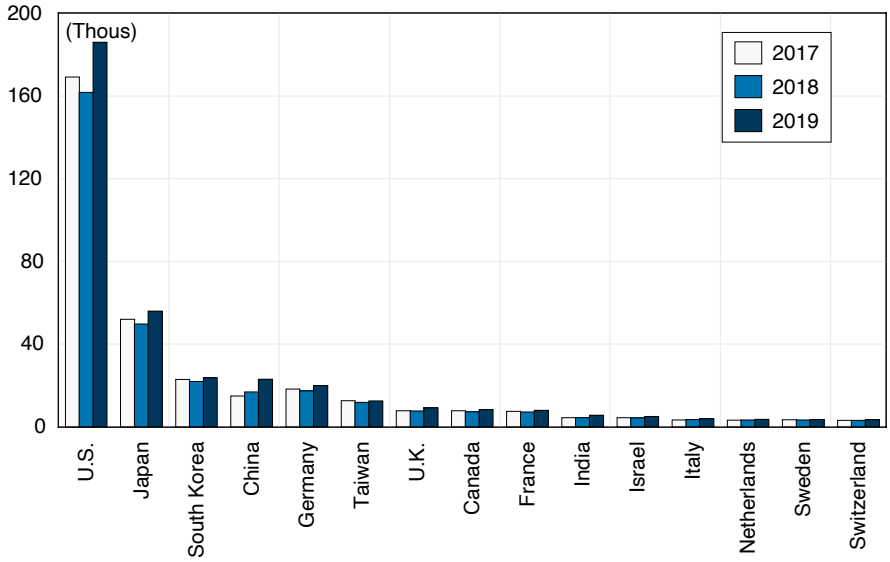
Source: U.S. Census

Figure 6 illustrates the top 10 trading regions for U.S. exports of aerospace products in 2018, 2019, and 2020. In 2020, due to the pandemic and disruption of the airline industry, we see across-the-board decline of U.S. exports. China was a major purchaser of Boeing airplanes before the 737 MAX grounding and the COVID-19 pandemic. We can see a dramatic decline of exports to China from $18 billion in 2018 to $11 billion in 2019, and $3.7 billion in 2020. Though the 2020 decline is across all regions, the 2019 is more specifically a decline in exports to China.

The State of Technology Competitiveness: Intellectual Property and R&D

Although it is generally recognized that the U.S. is further along in technology development and innovation than China, that gap has been closing. The number of patents is one way to measure innovation and technology advances of a country. Figure 7 lists the number of patents granted by the U.S. Patent and Trademark Office to individuals or companies by their country of origin. The U.S. is, of course, at the top with the most patents granted (186,000 in 2019), followed by Japan with 56,000, South Korea with 23,600, and China with 23,000. Although China's number is low compared to the U.S., it has had historically high growth rates. From 2017 to 2019 filings at the U.S. Patent Office grew from 14,900 to 23,000: a 55% increase. Over the past two years, China surpassed Germany in the of number of patents issued in the U.S.. Beyond the U.S. market, through Patent Cooperation Treaty System (PCT) at World Intellectual Property Organization (WIPO), China (58,990) has surpassed the U.S. (57,840) as the top country for international patent applications in 2019. Recent moves to restrict Chinese technology exports to the U.S. is expected to reverse the trend in patents filed in the U.S. by Chinese companies, but not the trend in the number of patents issued beyond the world market. The reversal will be exacerbated if the implementation of "China Standards 2035" results different technology protocols than are used in the U.S.

Figure t Number of Total Patents Granted in the U.S. by Country of Origin



Source: U.S. Patent and Trademark Office

One area where China is lagging the U.S. in technology development is in R&D expenditures. To be sure, local cost differentials make comparisons of R&D across countries only suggestive. However, the 14th Five Year Plan explicitly recognizes the differential illustrated below. Figure 8 lists the top 20 companies in the U.S. with the most R&D expenditures in 2016. The top American companies were Alphabet (Google), Microsoft, Intel, and Apple.

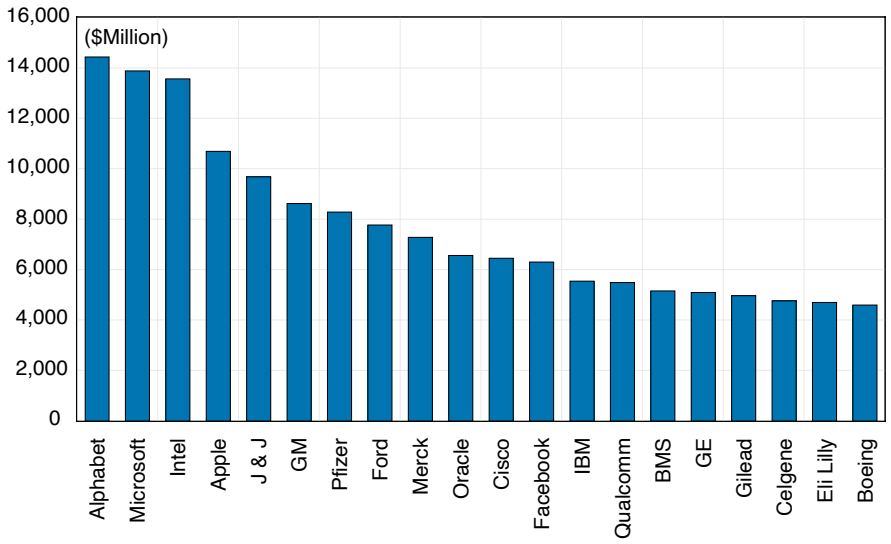
Figure 9 shows the top 20 Chinese companies with the most R&D expenditures in 2016. The top four are Huawei, Alibaba, ZTE, and Tencent. However, besides Huawei[8] and PetroChina, the technology prowess in terms of R&D in these top 20 Chinese firms are still lagging far behind top 20 in the U.S.. Note that these numbers only reflect company R&D, not reflective of government R&D. According to OCED, R&D expenditures in whole China in 2018 was about $468 billion, still lower than $582 billion of the U.S., but higher than $465 billion of whole 28 EU countries.

How this will change in the coming years is well illustrated by the case of Huawei. Huawei is the leading tech company in China and the largest communication equipment maker in the world, and it has become a target of U.S. actions. Following an accusation of Huawei stealing trade secrets from six American companies, the U.S. with its allies, Australia, U.K., Japan, India, and Brazil, have banned or restricted Huawei's communication equipment because of security concerns. In addition, the U.S. expanded its export control requirements, the Foreign Direct Product Rule (FDPR) in May 2020. Now, foreign companies are required to get a license before selling finished products if the manufacturing process involves certain American software, designs, tooling and equipment.

The action involves a crucial player in the tech/semiconductor supply chain: Taiwan Semiconductor Manufacturing Company (TSMC), the world's largest contract chipmaker. If TSMC is not allowed to sell to Chinese companies such as Huawei, there would be a big hole in China's tech value supply chain and its technology ambitions. As yet there are no Chinese semiconductor companies that can produce the required high-quality microchips. HiSilicon, Huawei's fabless chip designer for smartphones and 5G infrastruc-

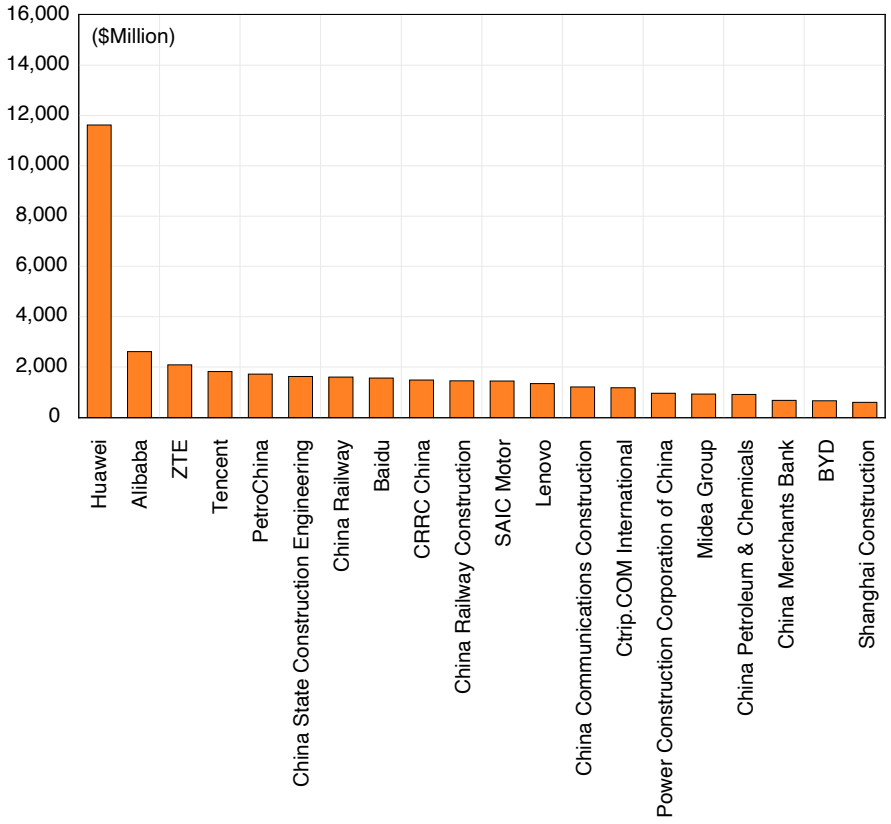
8. Huawei's R&D spending (US$15. 3 billion) in 2019 might have surpassed Apple, Intel, and Microsoft.

Figure 8 Top 20 U.S. Companies in terms of R&D Expenditures



Source: OECD

Figure 9 Top 20 Chinese Companies in terms of R&D Expenditures



Source: OECD

ture, relies on TSMC for chips. According to Capri (2020), TSMC depends on U.S. semiconductor manufacturing technology from Applied Materials, LAM research, KLA Tenor, Synopsys, and Cadence Design Systems; companies that control a majority of the global market. With the U.S. imposed FDPR, TSMC cannot make cutting edge chips for HiSilicon and Huawei.

Note that TSMC currently makes computer chips used in Lockheed Martin F-35 fighter jet and is a key supplier for Apple, AMD, Qualcomm, Broadcom, and Nvidia. Washington has pressured TSMC to produce the chips that are used inside U.S. military hardware within the U.S. in order to ensure U.S. tech supply chains are free from any Chinese interference. TSMC has decided to invest $12 billion to set up a wholly-owned subsidiary in Arizona in 2021. This is a further example of manufacturers diversifying supply chains from "just-in-time" to include "just-in-case", and though it involves a Taiwanese company, it has direct implications for China as well.

Conclusions

- The U.S. is expected to change its economic policy toward China in style but not in substance under the new Biden administration.
- U.S./China decoupling of trade with China has begun, is ongoing, and is expected to continue. This decoupling will speed the development of self-sufficiency in contested sectors in both the U.S. and China.
- Tech competition is the leading edge of both the U.S. and China decoupling strategy. As this can be justified by both countries as a strategic necessity, we expect technology related goods and services to bear the brunt of the decoupling, but consumer non-durable goods, to the extent that they can still be produced cost effectively in China, to continue to be imported into the U.S., and machinery, aircraft and agricultural products, to the extent that they do not involve excluded sensitive technology, to continue to be imported into China.

THE UCLA ANDERSON FORECAST FOR THE NATION

DECEMBER 2020 REPORT

Tables

Table 1: Summary of the UCLA Anderson Forecast for the Nation	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
GDP and Monetary Aggregates (% Ch.)												
Real GDP	2.2	1.8	2.5	3.1	1.7	2.3	3.0	2.2	-3.7	3.6	3.4	3.1
GDP Price Index	1.9	1.8	1.8	1.0	1.0	1.9	2.4	1.8	1.2	1.9	2.1	2.1
Money Supply (M1)	12.9	8.3	9.9	5.7	9.1	8.1	3.0	6.1	42.0	-6.5	4.0	5.1
Money Supply (M2)	7.6	6.1	5.8	5.7	7.3	4.9	3.5	6.7	24.2	-9.0	-3.5	-0.8
Interest Rates (%) on:												
Federal Funds	0.1	0.1	0.1	0.1	0.4	1.0	1.8	2.2	0.4	0.1	0.1	0.1
90-day Treasury Bill	0.1	0.1	0.0	0.1	0.3	0.9	1.9	2.1	0.4	0.1	0.1	0.1
10-yr Treasury Bond	1.8	2.4	2.5	2.1	1.8	2.3	2.9	2.1	0.9	1.1	1.3	1.5
30-yr Treasury Bond	2.9	3.4	3.3	2.8	2.6	2.9	3.1	2.6	1.6	1.9	2.2	2.4
Moody's AAA Corp. Bond	3.7	4.2	4.2	3.9	3.7	3.7	3.9	3.4	2.5	2.1	2.1	2.3
30-yr Bond Less Inflation	1.0	2.1	1.9	2.6	1.6	1.1	1.0	1.1	0.4	0.1	0.3	0.5
Federal Fiscal Policy (% Ch.)												
Defense Purchases												
Current $	-2.4	-6.1	-2.7	-1.8	-0.1	2.5	6.3	7.3	3.5	3.5	2.4	-0.3
Constant $	-3.4	-6.7	-4.1	-2.1	-0.5	0.8	3.3	5.6	3.2	1.6	0.1	-2.4
Other Expenditures												
Transfers to Persons	-1.1	1.9	4.4	5.2	3.2	2.9	4.6	5.4	45.5	-13.2	-6.9	3.2
Grants to S&L Govít	-5.9	1.3	10.0	7.7	4.5	0.5	4.1	4.4	44.3	-8.6	-10.3	-0.1
Billions of Current Dollars, Unified Budget Basis, Fiscal Year												
Receipts	2509	2825	3093	3275	3242	3344	3330	3497	3424	3613	3792	4034
Outlays	3570	3384	3581	3750	3824	4025	4203	4520	6746	5295	4912	4948
Surplus or Deficit (-)	-1061	-560	-487	-475	-582	-681	-873	-1022	-3321	-1682	-1120	-914
As Shares of GDP (%), NIPA Basis												
Revenues	16.7	18.7	18.8	18.9	18.5	18.0	17.3	17.3	17.5	17.5	17.4	17.5
Expenditures	23.3	22.5	22.2	22.0	22.0	21.7	21.8	22.2	32.2	25.2	22.4	21.6
Defense Purchases	5.0	4.6	4.2	4.0	3.9	3.8	3.9	4.0	4.2	4.1	4.0	3.8
Transfers to Persons	14.2	13.9	13.9	14.1	14.1	14.0	13.8	14.0	20.9	17.2	15.2	14.9
Surplus or Deficit (-)	-6.6	-3.8	-3.4	-3.1	-3.6	-3.7	-4.5	-4.9	-14.7	-7.7	-5.0	-4.1
Details of Real GDP (% Ch.)												
Real GDP	2.2	1.8	2.5	3.1	1.7	2.3	3.0	2.2	-3.7	3.6	3.4	3.1
Final Sales	2.1	1.6	2.7	2.8	2.4	2.4	2.8	2.2	-3.0	2.7	3.3	3.1
Consumption	1.5	1.5	3.0	3.8	2.8	2.6	2.7	2.4	-4.1	3.9	3.8	3.3
Nonres. Fixed Investment	9.5	4.1	7.2	2.3	0.5	3.7	6.9	2.9	-4.9	1.9	5.8	5.4
Equipment	11.0	4.7	7.0	3.0	-1.7	3.2	8.0	2.1	-5.7	6.6	4.5	3.4
Intellectual Property	5.0	5.4	4.8	3.8	7.6	4.2	7.8	6.4	0.0	0.9	7.4	7.3
Structures	13.0	1.3	11.0	-0.9	-4.4	4.2	3.7	-0.6	-10.9	-6.0	5.8	6.3
Residential Construction	13.2	12.5	3.7	10.2	6.6	3.9	-0.6	-1.8	5.0	8.7	-1.9	-0.9
Exports	3.4	3.6	4.2	0.4	0.3	3.9	3.0	-0.1	-13.7	5.3	10.2	7.0
Imports	2.7	1.5	5.0	5.2	1.7	4.7	4.1	1.1	-10.5	8.5	6.8	4.9
Federal Purchases	-1.9	-5.5	-2.6	-0.0	0.6	0.3	2.8	4.0	4.2	0.1	-0.4	-1.9
State & Local Purchases	-2.2	-0.3	0.2	2.9	2.6	1.2	1.2	1.3	-0.9	0.8	-0.2	2.1
Billions of 2012 Dollars												
Real GDP	16197	16495	16912	17432	17731	18144	18688	19092	18384	19040	19683	20290
Final Sales	16126	16387	16826	17295	17706	18128	18634	19043	18467	18958	19580	20187
Inventory Change	71	109	86	138	25	16	53	49	-83	82	103	103

Table 2: Summary of the UCLA Anderson Forecast for the Nation

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Industrial Production and Resource Utilization												
Production (% Ch.)	3.0	2.0	3.1	-1.0	-2.0	2.3	3.9	0.9	-7.5	1.9	3.8	3.4
Capacity Util. Manuf. (%)	74.5	74.4	75.2	75.3	74.2	75.1	76.6	75.6	69.5	71.5	73.3	74.5
Real Bus. Invest. (% of GDP)	15.7	16.3	17.0	17.1	17.1	17.3	17.7	17.7	17.8	17.8	17.9	18.0
Nonfarm Employment (mil.)	134.2	136.4	138.9	141.8	144.3	146.6	148.9	150.9	142.4	147.2	151.9	155.1
Unemployment Rate (%)	8.1	7.4	6.2	5.3	4.9	4.4	3.9	3.7	8.1	6.0	4.7	4.1
Inflation (% Ch.)												
Consumer Price Index	2.1	1.5	1.6	0.1	1.3	2.1	2.4	1.8	1.3	2.2	2.6	2.2
CPI less Food & Energy	2.1	1.8	1.8	1.8	2.2	1.8	2.1	2.2	1.8	2.2	2.2	2.1
Consumption Chain Index	1.9	1.3	1.5	0.2	1.0	1.8	2.1	1.5	1.2	1.8	1.9	1.9
GDP Chain Index	1.9	1.8	1.8	1.0	1.0	1.9	2.4	1.8	1.2	1.9	2.1	2.1
Producers Price Index	0.5	0.6	0.9	-7.2	-2.7	4.4	4.3	-1.0	-3.0	4.8	2.4	3.0
Factors Related to Inflation (% Ch.)												
Nonfarm Business Sector												
Total Compensation	2.6	1.3	2.8	3.1	1.1	3.5	3.4	3.6	5.9	0.5	1.4	3.1
Productivity	0.9	0.5	0.9	1.6	0.3	1.2	1.4	1.7	2.4	-0.8	0.2	1.5
Unit Labor Costs	1.8	0.8	1.9	1.5	0.7	2.2	1.9	1.9	3.5	1.3	1.1	1.6
Farm Price Index	3.2	1.4	1.1	-11.9	-9.6	3.1	-0.6	0.4	-3.8	0.2	1.8	4.2
Crude Oil Price ($/barrel)	94.2	97.9	93.3	48.7	43.2	51.0	64.9	57.0	38.6	43.9	52.6	56.2
New Home Price ($1000)	242.1	265.1	283.2	293.7	306.5	321.6	323.1	319.3	339.0	359.4	369.4	383.7
Income, Consumption and Saving (% Ch.)												
Disposable Income	5.3	0.0	5.6	4.4	3.0	4.9	5.8	3.7	6.7	-0.9	2.7	4.9
Real Disposable Income	3.3	-1.3	4.1	4.2	2.0	3.1	3.6	2.2	5.4	-2.6	0.8	2.9
Real Consumption	1.5	1.5	3.0	3.8	2.8	2.6	2.7	2.4	-4.1	3.9	3.8	3.3
Savings Rate (%)	8.9	6.4	7.4	7.6	6.9	7.2	7.9	7.6	15.9	10.4	7.8	7.4
Housing and Automobiles (Millions of Units)												
Housing Starts	0.784	0.928	1.000	1.107	1.177	1.207	1.248	1.295	1.382	1.512	1.472	1.446
Auto & Light Truck Sales	14.4	15.5	16.5	17.4	17.5	17.1	17.2	17.0	14.3	15.8	16.2	16.1
International Trade (% Ch.)												
Nominal												
U.S. Dollar												
Industrial Countries	3.6	3.0	3.1	15.7	1.2	-0.5	-2.3	3.5	-1.1	-6.2	-2.6	-0.7
Developing Countries	2.6	-0.5	3.0	10.6	8.0	-0.1	0.7	3.1	5.5	-3.6	-3.4	-0.6
Exports	4.2	3.7	4.3	-4.5	-1.7	6.6	6.5	-0.6	-16.2	7.4	12.0	8.5
Imports	2.9	0.2	4.2	-3.0	-1.9	6.9	7.1	-0.4	-12.4	10.3	8.1	5.8
Net Exports (bil. $)	-568.6	-490.8	-507.7	-526.6	-512.5	-555.5	-609.5	-610.5	-628.9	-756.3	-729.3	-702.2
Real												
U.S. Dollar												
Industrial Countries	7.6	5.1	5.1	18.6	2.6	0.1	-0.2	6.7	0.7	-7.0	-3.3	-0.8
Developing Countries	6.6	1.6	5.0	13.5	9.5	0.9	2.7	6.5	6.6	-3.5	-3.8	-1.6
Exports	3.4	3.6	4.2	0.4	0.3	3.9	3.0	-0.1	-13.7	5.3	10.2	7.0
Imports	2.7	1.5	5.0	5.2	1.7	4.7	4.1	1.1	-10.5	8.5	6.8	4.9
Net Exports (bil. í12$)	-568.6	-532.8	-577.2	-719.5	-763.6	-816.8	-877.7	-917.6	-901.5	-1047.7	-1042.4	-1040.4

Table 3: Summary of the UCLA Anderson Forecast for the Nation

	2020Q1	2020Q2	2020Q3	2020Q4	2021Q1	2021Q2	2021Q3	2021Q4	2022Q1	2022Q2	2022Q3	2022Q4	2023Q1	2023Q2	2023Q3	2023Q4
GDP and Monetary Aggregates (Annualized % Ch.)																
Real GDP	-5.0	-31.4	33.1	1.2	1.8	6.0	3.2	3.2	3.1	3.2	3.4	3.1	3.0	3.0	2.9	3.1
GDP Price Index	1.4	-1.8	3.6	2.0	1.7	2.5	1.8	1.6	2.3	2.4	1.9	2.0	2.1	2.0	2.1	2.1
Money Supply (M1)	13.8	128.9	35.1	15.5	-10.3	-7.7	-5.0	-2.9	2.2	4.5	4.5	4.8	5.8	4.3	5.5	5.0
Money Supply (M2)	10.3	64.6	18.7	10.5	-12.8	-7.5	-6.6	-9.1	-5.4	-3.9	-2.7	-1.8	-1.7	-1.1	-0.8	0.6
Interest Rates (%) on:																
Federal Funds	1.3	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
90-day Treasury Bill	1.1	0.1	0.1	0.1	-0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
10-year Treasury Bond	1.4	0.7	0.7	0.9	0.9	1.0	1.1	1.2	1.2	1.3	1.4	1.4	1.5	1.5	1.5	1.6
30-year Treasury Bond	1.9	1.4	1.4	1.6	1.7	1.9	2.0	2.1	2.1	2.2	2.3	2.3	2.4	2.4	2.4	2.4
Moody's Corp. Aaa Bond	2.9	2.4	2.2	2.5	2.4	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.2	2.2	2.3	2.4
30-yr Bond Less Inflation	0.6	3.0	-2.3	-0.1	0.4	-0.2	-0.1	-0.1	0.4	0.4	0.5	0.2	0.4	0.6	0.5	0.5
Federal Fiscal Policy (Annualized % Ch.)																
Defense Purchases																
Current $	-0.4	1.2	5.0	2.2	4.9	3.4	3.4	2.4	2.6	2.1	2.5	-1.0	-1.0	-1.1	-1.1	0.6
Constant $	-0.3	3.8	3.0	-0.5	2.8	1.4	1.2	-0.0	0.2	-0.2	0.2	-3.1	-3.1	-3.1	-3.1	-1.5
Other Expenditures																
Transfers to Persons	12.4	1535.6	-77.8	-43.4	32.5	-3.2	-32.4	-6.3	-1.5	-1.2	-1.6	2.7	7.3	3.0	3.2	3.1
Grants to S&L Govt	8.3	2351.0	-92.6	17.7	15.3	35.4	-9.7	-31.7	0.0	-12.4	-14.3	2.5	3.9	4.4	2.6	2.1
Billions of Current Dollars, Unified Budget Basis, Fiscal Year																
Receipts	797	657	1160	811	790	1064	891	868	837	1107	929	920	895	1163	1000	976
Outlays	1184	2657	1548	1357	1406	1361	1270	1258	1272	1219	1220	1201	1249	1222	1251	1226
Surplus or Deficit (-)	-387	-2001	-388	-546	-616	-297	-379	-390	-435	-112	-291	-281	-354	-59	-251	-249
As Shares of GDP (%), NIPA Basis																
Revenues	17.4	17.7	17.6	17.2	17.7	17.5	17.4	17.4	17.4	17.4	17.4	17.4	17.5	17.5	17.6	17.5
Expenditures	22.7	46.7	34.1	26.7	27.0	26.4	24.3	23.3	22.9	22.5	22.2	21.9	21.9	21.7	21.5	21.3
Defense Purchases	4.1	4.5	4.2	4.2	4.2	4.1	4.1	4.1	4.1	4.0	4.0	4.0	3.9	3.8	3.8	3.7
Transfers to Persons	14.5	32.2	20.4	17.6	18.7	18.2	16.3	15.8	15.5	15.3	15.0	14.9	15.0	14.9	14.9	14.8
Surplus or Deficit (-)	-5.3	-28.9	-16.5	-9.5	-9.3	-8.8	-7.0	-6.0	-5.6	-5.2	-4.8	-4.5	-4.3	-4.2	-4.0	-3.8
Details of Real GDP (Annualized % Ch.)																
Real GDP	-5.0	-31.4	33.1	1.2	1.8	6.0	3.2	3.2	3.1	3.2	3.4	3.1	3.0	3.0	2.9	3.1
Final Sales	-3.3	-28.0	24.6	0.3	1.7	5.1	2.9	3.2	3.2	3.2	3.2	3.1	3.1	3.0	3.1	3.2
Consumption	-6.9	-33.2	40.7	0.1	1.2	6.1	3.6	5.3	3.2	2.9	3.2	3.6	3.4	3.1	3.2	3.2
Nonres. Fixed Investment	-6.7	-27.2	20.3	2.3	0.2	0.1	5.8	5.8	6.8	6.6	6.1	4.7	5.2	5.5	5.3	5.6
Equipment	-15.2	-35.9	70.1	9.4	-1.2	-0.3	9.1	4.9	5.3	3.4	2.9	3.5	4.2	4.0	1.8	2.7
Intellectual Property	2.4	-11.4	-1.0	1.3	0.6	0.6	7.4	6.2	9.1	8.6	7.3	7.0	7.2	7.2	7.2	7.3
Structures	-3.7	-33.6	-14.6	-10.3	2.7	0.1	-3.9	7.2	6.0	10.0	11.1	3.2	4.0	5.6	9.2	8.4
Residential Construction	19.3	-36.0	59.9	24.2	5.2	4.4	-3.9	-3.2	-3.5	-0.2	-0.3	-1.8	-1.0	-0.8	-0.3	-0.3
Exports	-9.5	-64.4	59.7	6.7	6.2	7.2	10.5	14.6	11.3	8.0	7.1	8.1	7.3	6.3	5.7	5.8
Imports	-15.0	-54.1	91.1	7.3	4.4	6.6	8.2	9.9	7.1	4.3	5.0	6.1	5.6	4.1	3.8	3.8
Federal Purchases	1.6	16.4	-6.2	-3.2	1.1	1.2	0.7	-0.7	-0.4	-0.9	-0.5	-2.2	-2.2	-2.4	-2.4	-1.4
State & Local Purchases	1.1	-5.4	-3.3	-3.0	5.1	8.3	-0.6	-8.8	1.7	2.1	1.8	2.0	2.1	2.4	2.2	2.3
Billions of 2012 Dollars (SAAR)																
Real GDP	19011	17303	18584	18639	18721	18996	19145	19298	19448	19600	19766	19918	20067	20215	20360	20517
Final Sales	19092	17590	18585	18600	18680	18911	19045	19197	19350	19504	19657	19808	19959	20107	20261	20421
Inventory Change	-81	-287	-1	39	41	84	100	101	98	96	109	110	108	107	100	96

Table 4: Summary of the UCLA Anderson Forecast for the Nation

	2020Q1	2020Q2	2020Q3	2020Q4	2021Q1	2021Q2	2021Q3	2021Q4	2022Q1	2022Q2	2022Q3	2022Q4	2023Q1	2023Q2	2023Q3	2023Q4
Industrial Production and Resource Utilization																
Production (Ann. % Ch.)	-6.8	-42.9	39.8	1.3	-2.1	6.2	2.5	2.6	4.1	4.5	4.5	3.4	3.5	3.0	2.5	3.0
Capacity Util. Manuf. (%)	73.9	63.1	70.3	70.6	70.0	71.7	72.0	72.2	72.5	73.0	73.5	73.9	74.2	74.5	74.6	74.7
Real Bus. Invest. (% GDP)	17.8	17.9	17.7	18.0	18.0	17.8	17.8	17.8	17.8	17.9	17.9	17.9	18.0	18.0	18.1	18.1
Nonfarm Emp. (mil.)	151.9	133.7	140.8	143.1	144.9	146.5	147.9	149.2	150.5	151.6	152.4	153.3	154.1	154.8	155.5	156.0
Unemployment Rate (%)	3.8	13.0	8.8	6.8	6.6	6.1	5.8	5.4	5.0	4.8	4.6	4.4	4.2	4.1	4.0	3.9
Inflation (Annualized % Ch.)																
Consumer Price Index	1.2	-3.5	5.2	2.3	1.4	2.4	3.0	3.0	2.4	2.5	2.3	2.4	2.2	1.8	2.1	2.1
Total less Food & Energy	2.0	-1.6	4.4	2.5	1.6	2.1	2.4	2.4	2.2	2.1	2.0	2.1	2.2	2.1	2.1	2.2
Consumption Chain Index	1.3	-1.6	3.7	1.7	1.3	2.0	2.1	2.3	1.7	1.8	1.8	2.1	2.0	1.8	1.9	1.9
GDP Chain Index	1.4	-1.8	3.6	2.0	1.7	2.5	1.8	1.6	2.3	2.4	1.9	2.0	2.1	2.0	2.1	2.1
Producers Price Index	-4.5	-18.6	13.7	8.1	6.2	5.3	2.6	2.6	1.9	1.7	2.3	3.6	3.4	2.8	3.2	2.5
Factors Related to Inflation (Annualized % Ch.)																
Nonfarm Business Sector																
Total Compensation	9.2	20.0	-4.4	-0.1	-0.0	-0.4	0.1	0.9	1.7	1.9	2.1	2.7	3.3	3.6	3.8	4.0
Productivity	-0.3	10.6	4.9	-7.8	-3.0	2.6	-1.0	-0.4	-0.5	0.8	1.6	1.0	1.5	1.6	1.8	2.3
Unit Labor Costs	9.6	8.5	-8.9	8.4	3.1	-2.9	1.2	1.3	2.2	1.1	0.4	1.7	1.8	1.9	2.0	1.7
Farm Price Index	-14.0	-43.8	48.3	32.1	-28.3	11.8	-2.6	6.8	-1.7	2.3	0.8	1.9	13.4	0.7	1.0	2.0
Crude Oil Price ($/barrel)	45.8	27.8	40.9	39.8	40.1	41.4	45.4	48.6	49.9	51.7	53.5	55.2	56.3	55.8	56.3	56.6
New Home Price ($1000)	329.6	322.8	326.4	377.2	353.9	361.5	361.0	361.2	365.4	370.9	370.3	371.3	374.4	385.7	386.8	388.1
Income, Consumption and Saving (Annualized % Ch.)																
Disposable Income	3.9	44.3	-13.2	-12.5	5.6	0.5	-3.8	3.1	4.0	4.2	4.3	4.4	5.4	5.0	5.1	5.1
Real Disposable Income	2.6	46.6	-16.3	-14.0	4.2	-1.5	-5.8	0.8	2.3	2.4	2.4	2.3	3.3	3.2	3.2	3.1
Real Consumption	-6.9	-33.2	40.7	0.1	1.2	6.1	3.6	5.3	3.2	2.9	3.2	3.6	3.4	3.1	3.2	3.2
Savings Rate (%)	9.6	25.7	15.8	12.4	12.9	11.2	9.2	8.2	8.0	7.9	7.7	7.5	7.4	7.4	7.4	7.4
Housing and Automobiles (Millions of Units, SAAR)																
Housing Starts	1.484	1.079	1.430	1.535	1.526	1.515	1.513	1.493	1.489	1.480	1.464	1.455	1.458	1.455	1.441	1.431
Auto & Light Truck Sales	15.0	11.3	15.3	15.4	15.6	15.7	15.8	16.0	16.2	16.2	16.2	16.3	16.4	16.2	16.1	15.9
International Trade (Annualized % Ch.)																
Nominal																
U.S. Dollar																
Industrial Countries	3.4	4.0	-17.1	-8.6	-4.9	-1.4	-6.1	-5.0	-1.6	-0.8	-0.2	-2.9	-0.1	0.1	-0.4	-0.1
Developing Countries	6.0	28.0	-10.8	-5.7	-6.1	-0.1	-5.7	-5.6	-5.2	-1.2	-0.5	-0.4	-0.8	-1.3	0.1	0.4
Exports	-11.7	-71.1	80.2	11.9	8.4	8.4	12.3	17.1	13.3	9.6	8.6	9.7	8.8	7.8	7.2	7.2
Imports	-16.2	-59.9	108.3	10.8	5.1	7.1	12.1	14.9	6.3	2.7	7.1	8.1	6.4	4.4	4.2	4.3
Net Exports (bil. $)	-494	-545	-731	-745	-738	-744	-764	-780	-753	-717	-721	-726	-722	-708	-695	-683
Real																
U.S. Dollar																
Industrial Countries	6.1	7.4	-17.5	-9.9	-6.4	-3.3	-5.4	-5.2	-2.5	-2.1	-1.3	-3.6	-0.1	0.6	0.3	0.5
Developing Countries	6.2	29.5	-9.9	-9.0	-4.6	0.8	-5.4	-5.9	-5.8	-2.1	-1.2	-1.2	-1.8	-2.3	-1.0	-0.9
Exports	-9.5	-64.4	59.7	6.7	6.2	7.2	10.5	14.6	11.3	8.0	7.1	8.1	7.3	6.3	5.7	5.8
Imports	-15.0	-54.1	91.1	7.3	4.4	6.6	8.2	9.9	7.1	4.3	5.0	6.1	5.6	4.1	3.8	3.8
Net Exports (bil. í12$)	-788	-775	-1011	-1032	-1034	-1047	-1056	-1055	-1050	-1039	-1039	-1042	-1045	-1042	-1039	-1036

Table 5A: Gross Domestic Product	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Billions of Current Dollars												
Gross Domestic Product	16197	16785	17527	18238	18745	19543	20612	21433	20891	22053	23272	24488
Personal Consumption Expenditures	11007	11317	11823	12297	12770	13340	13993	14545	14124	14943	15805	16638
Durable Goods	1144	1189	1242	1308	1350	1411	1482	1534	1615	1688	1703	1740
Autos and Parts	397	418	442	475	486	504	523	522	535	577	587	598
Nondurable Goods	2494	2541	2621	2615	2648	2762	2890	2978	3032	3111	3239	3362
Services	7369	7587	7960	8374	8772	9168	9621	10032	9477	10143	10863	11536
Gross Private Domestic Investment	2622	2826	3044	3237	3188	3351	3633	3751	3566	3918	4165	4384
Residential	432	510	560	634	699	760	798	807	876	987	1000	1020
Nonres. Structures	479	493	578	584	560	599	631	650	586	563	615	672
Equipment	983	1027	1092	1119	1089	1122	1213	1241	1170	1254	1326	1378
Intellectual Property	656	692	730	763	812	853	932	1004	1012	1031	1116	1205
Change in Inv.	71	105	84	137	28	16	58	49	-78	82	107	108
Net Exports	-569	-491	-508	-527	-513	-556	-609	-610	-629	-756	-729	-702
Exports	2191	2273	2372	2266	2227	2375	2529	2515	2107	2263	2535	2750
Imports	2760	2764	2879	2792	2740	2930	3138	3125	2736	3020	3264	3453
Government Purchases	3137	3132	3168	3230	3299	3407	3595	3748	3829	3948	4033	4168
Federal	1287	1227	1215	1221	1235	1264	1339	1419	1482	1522	1537	1541
Defense	814	764	743	730	729	747	794	852	882	914	935	932
Other	472	462	472	491	506	517	545	567	599	608	602	608
State and Local	1850	1906	1953	2009	2065	2143	2256	2329	2348	2427	2495	2627
Billions of 2012 Dollars												
Gross Domestic Product	16197	16495	16912	17432	17731	18144	18688	19092	18384	19040	19683	20290
Personal Consumption Expenditures	11007	11167	11497	11934	12265	12587	12928	13240	12704	13205	13703	14154
Durable Goods	1144	1214	1302	1401	1482	1585	1693	1775	1883	1976	2017	2098
Autos & Parts	397	415	439	473	489	513	535	532	534	556	557	564
Nondurable Goods	2494	2538	2605	2694	2762	2834	2910	3001	3072	3126	3176	3247
Services	7369	7415	7595	7849	8036	8195	8367	8521	7887	8238	8626	8928
Gross Private Domestic Investment	2622	2801	2959	3122	3075	3183	3385	3443	3227	3489	3639	3776
Residential	432	485	504	555	592	616	612	602	632	686	674	668
Nonres. Structures	479	485	539	534	510	532	551	548	488	459	485	516
Equipment	983	1029	1101	1135	1115	1150	1242	1268	1196	1275	1332	1378
Intellectual Property	656	691	725	752	810	844	910	968	968	977	1049	1125
Change in Inv.	71	109	86	138	25	16	53	49	-83	82	103	103
Net Exports	-569	-533	-577	-720	-764	-817	-878	-918	-901	-1048	-1042	-1040
Exports	2191	2270	2365	2375	2382	2476	2550	2547	2198	2314	2549	2727
Imports	2760	2802	2942	3095	3146	3292	3427	3464	3099	3362	3592	3767
Government Purchases	3137	3061	3033	3088	3144	3172	3230	3304	3338	3354	3345	3365
Federal	1287	1215	1184	1184	1191	1194	1228	1277	1331	1331	1326	1300
Defense	814	760	728	713	710	715	739	780	805	818	818	798
Other	472	456	455	470	480	478	488	497	525	514	508	502
State and Local	1850	1845	1849	1903	1952	1976	2000	2026	2008	2023	2020	2063

Table 5B: Gross Domestic Product	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Annual Rates of Change of Current Dollar GDP Components (%)												
Gross Domestic Product	4.2	3.6	4.4	4.1	2.8	4.3	5.5	4.0	-2.5	5.6	5.5	5.2
Personal Consumption Expenditures	3.4	2.8	4.5	4.0	3.8	4.5	4.9	3.9	-2.9	5.8	5.8	5.3
Durable Goods	4.6	3.9	4.4	5.3	3.3	4.5	5.0	3.6	5.3	4.5	0.8	2.2
Autos and Parts	8.6	5.3	5.9	7.5	2.1	3.7	3.9	-0.3	2.6	7.9	1.6	1.9
Nondurable Goods	2.8	1.9	3.2	-0.2	1.3	4.3	4.7	3.0	1.8	2.6	4.1	3.8
Services	3.5	3.0	4.9	5.2	4.7	4.5	4.9	4.3	-5.5	7.0	7.1	6.2
Gross Private Domestic Investment	12.4	7.8	7.7	6.3	-1.5	5.1	8.4	3.3	-4.9	9.9	6.3	5.3
Residential	14.0	18.0	9.8	13.2	10.4	8.7	5.0	1.1	8.5	12.7	1.3	2.0
Nonres. Structures	18.5	2.7	17.3	1.2	-4.1	6.9	5.4	3.0	-9.8	-4.0	9.2	9.2
Equipment	11.6	4.4	6.3	2.5	-2.8	3.1	8.1	2.3	-5.7	7.2	5.8	3.9
Intellectual Property	5.5	5.5	5.6	4.4	6.4	5.1	9.2	7.7	0.9	1.9	8.2	8.0
Exports	4.2	3.7	4.3	-4.5	-1.7	6.6	6.5	-0.6	-16.2	7.4	12.0	8.5
Imports	2.9	0.2	4.2	-3.0	-1.9	6.9	7.1	-0.4	-12.4	10.3	8.1	5.8
Government Purchases	-0.4	-0.1	1.1	2.0	2.1	3.3	5.5	4.2	2.2	3.1	2.1	3.4
Federal	-1.0	-4.7	-0.9	0.5	1.1	2.4	6.0	6.0	4.4	2.7	1.0	0.2
Defense	-2.4	-6.1	-2.7	-1.8	-0.1	2.5	6.3	7.3	3.5	3.5	2.4	-0.3
Other	1.6	-2.1	2.0	4.1	3.1	2.1	5.5	4.0	5.7	1.5	-1.0	1.1
State and Local	0.1	3.0	2.5	2.9	2.7	3.8	5.3	3.2	0.8	3.4	2.8	5.3
Annual Rates of Change of Constant Dollar GDP Components (%)												
Gross Domestic Product	2.2	1.8	2.5	3.1	1.7	2.3	3.0	2.2	-3.7	3.6	3.4	3.1
Personal Consumption Expenditures	1.5	1.5	3.0	3.8	2.8	2.6	2.7	2.4	-4.1	3.9	3.8	3.3
Durable Goods	6.0	6.1	7.2	7.6	5.8	6.9	6.8	4.8	6.1	4.9	2.1	4.0
Autos & Parts	7.2	4.7	5.8	7.6	3.3	5.0	4.3	-0.5	0.2	4.2	0.1	1.3
Nondurable Goods	0.4	1.8	2.6	3.4	2.5	2.6	2.7	3.1	2.4	1.8	1.6	2.2
Services	1.2	0.6	2.4	3.3	2.4	2.0	2.1	1.8	-7.4	4.5	4.7	3.5
Gross Private Domestic Investment	11.0	6.9	5.6	5.5	-1.5	3.5	6.3	1.7	-6.3	8.1	4.3	3.8
Residential	13.0	12.4	3.8	10.2	6.6	4.0	-0.6	-1.7	5.1	8.6	-1.8	-0.8
Nonres. Structures	13.0	1.3	11.0	-0.9	-4.4	4.2	3.7	-0.6	-10.9	-6.0	5.8	6.3
Equipment	11.0	4.7	7.0	3.0	-1.7	3.2	8.0	2.1	-5.7	6.6	4.5	3.4
Intellectual Property	5.0	5.4	4.8	3.8	7.6	4.2	7.8	6.4	0.0	0.9	7.4	7.3
Exports	3.4	3.6	4.2	0.4	0.3	3.9	3.0	-0.1	-13.7	5.3	10.2	7.0
Imports	2.7	1.5	5.0	5.2	1.7	4.7	4.1	1.1	-10.5	8.5	6.8	4.9
Government Purchases	-2.1	-2.4	-0.9	1.8	1.8	0.9	1.8	2.3	1.0	0.5	-0.3	0.6
Federal	-1.9	-5.5	-2.6	-0.0	0.6	0.3	2.8	4.0	4.2	0.1	-0.4	-1.9
Defense	-3.4	-6.7	-4.1	-2.1	-0.5	0.8	3.3	5.6	3.2	1.6	0.1	-2.4
Other	0.9	-3.5	-0.1	3.3	2.2	-0.5	2.1	1.8	5.7	-2.2	-1.2	-1.1
State and Local	-2.2	-0.3	0.2	2.9	2.6	1.2	1.2	1.3	-0.9	0.8	-0.2	2.1

Table 6: Employment	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Employment (Millions)												
Total	142.5	143.9	146.3	148.8	151.4	153.3	155.8	157.5	148.0	153.9	158.0	160.5
Nonagricultural	134.2	136.4	138.9	141.8	144.3	146.6	148.9	150.9	142.4	147.2	151.9	155.1
Natural Res. & Mining	0.8	0.9	0.9	0.8	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6
Construction	5.6	5.9	6.2	6.5	6.7	7.0	7.3	7.5	7.3	7.3	7.5	7.6
Manufacturing	11.9	12.0	12.2	12.3	12.4	12.4	12.7	12.8	12.3	12.2	12.5	12.7
Trans. Warehous. Util	5.0	5.0	5.2	5.4	5.6	5.7	6.0	6.2	5.9	6.0	6.3	6.5
Trade	20.4	20.7	21.1	21.4	21.6	21.7	21.6	21.5	20.7	21.6	21.5	20.7
Financial Activities	7.8	7.9	8.0	8.1	8.3	8.4	8.6	8.7	8.7	8.8	9.3	9.5
Information	2.7	2.7	2.7	2.8	2.8	2.8	2.8	2.9	2.7	2.8	2.9	2.9
Professional & Bus.	18.0	18.6	19.1	19.7	20.1	20.5	21.0	21.3	20.4	21.4	23.2	24.2
Education & Health	20.8	21.1	21.4	22.0	22.6	23.2	23.6	24.2	23.2	24.1	24.4	24.9
Leisure & Hospitality	13.8	14.3	14.7	15.2	15.7	16.1	16.3	16.6	13.3	14.6	15.2	16.2
Other Services	5.4	5.5	5.6	5.6	5.7	5.8	5.8	5.9	5.4	5.7	6.1	6.3
Government	21.9	21.8	21.9	22.0	22.2	22.3	22.4	22.6	21.9	21.9	22.5	23.1
Federal	2.8	2.8	2.7	2.8	2.8	2.8	2.8	2.8	2.9	2.9	2.9	2.9
State & Local	19.1	19.1	19.1	19.3	19.4	19.5	19.6	19.8	18.9	19.0	19.6	20.2
Population and Labor Force (Millions)												
Population aged 16+	249.2	251.4	253.7	255.9	258.3	260.4	262.2	264.0	265.9	268.1	270.3	272.6
Labor Force	155.0	155.4	155.9	157.1	159.2	160.3	162.1	163.5	161.0	163.6	165.8	167.3
Unemployment (%)	8.1	7.4	6.2	5.3	4.9	4.4	3.9	3.7	8.1	6.0	4.7	4.1

Table 7: Personal Income and Its Disposition	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Billions of Current Dollars												
Personal Income	14010	14181	14992	15724	16161	16949	17852	18552	19625	19583	20176	21210
Wages & Salaries	6927	7113	7475	7859	8089	8471	8894	9309	9289	9786	10278	10832
Other Labor Income	1126	1195	1227	1271	1294	1346	1431	1474	1453	1494	1550	1610
Nonfarm Income	1286	1315	1378	1367	1389	1467	1543	1608	1612	1558	1651	1777
Farm Income	61	88	70	56	36	42	43	50	54	41	47	61
Rental Income	518	557	605	649	683	722	759	787	805	841	898	963
Dividends	835	793	953	1033	1077	1161	1305	1290	1261	1236	1317	1415
Interest Income	1331	1273	1349	1439	1474	1578	1642	1677	1640	1597	1589	1590
Transfer Payments	2363	2424	2542	2685	2777	2855	2970	3125	4283	3833	3684	3843
Contributions for Soc. Ins.	-437	-578	-607	-635	-658	-693	-735	-770	-771	-802	-839	-882
Pers. Tax & Nontax Payments	1510	1676	1785	1940	1958	2047	2085	2203	2188	2300	2423	2593
% of Pers. Income	10.8	11.8	11.9	12.3	12.1	12.1	11.7	11.9	11.1	11.7	12.0	12.2
Disposable Income	12501	12505	13207	13784	14203	14902	15767	16349	17437	17283	17753	18617
Consumption	11007	11317	11823	12297	12770	13340	13993	14545	14124	14943	15805	16638
Interest Payments	232	230	244	265	273	297	333	362	306	339	348	370
Transfers To Gov. & Foreigners	155	158	170	183	185	193	203	210	203	206	217	226
Personal Saving	1107	800	971	1039	975	1071	1237	1231	2804	1795	1383	1383
Personal Saving Rate (%)	8.9	6.4	7.4	7.6	6.9	7.2	7.9	7.6	15.9	10.4	7.8	7.4

Table 8: Personal Consumption Expenditures By Major Types	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Billions of Current Dollars												
Personal Consumption	11007	11317	11823	12297	12770	13340	13993	14545	14124	14943	15805	16638
Durable Goods	1144	1189	1242	1308	1350	1411	1482	1534	1615	1688	1703	1740
Autos and Parts	397	418	442	475	486	504	523	522	535	577	587	598
Nondurable Goods	2494	2541	2621	2615	2648	2762	2890	2978	3032	3111	3239	3362
Services	7369	7587	7960	8374	8772	9168	9621	10032	9477	10143	10863	11536
Billions of 2012 Dollars												
Personal Consumption	11007	11168	11502	11943	12279	12614	12970	13297	12842	13340	13820	14273
Durable Goods	1144	1214	1302	1401	1482	1585	1693	1775	1883	1976	2017	2098
Autos and Parts	397	415	439	473	489	513	535	532	534	556	557	564
Nondurable Goods	2494	2538	2605	2694	2762	2834	2910	3001	3072	3126	3176	3247
Services	7369	7415	7595	7849	8036	8195	8367	8521	7887	8238	8626	8928
Annual Rates of Real Growth												
Personal Consumption	1.5	1.5	3.0	3.8	2.8	2.7	2.8	2.5	-3.4	3.9	3.6	3.3
Durable Goods	6.0	6.1	7.2	7.6	5.8	6.9	6.8	4.8	6.1	4.9	2.1	4.0
Autos and Parts	7.2	4.7	5.8	7.6	3.3	5.0	4.3	-0.5	0.2	4.2	0.1	1.3
Furniture	2.9	5.8	8.5	9.2	8.0	8.0	6.9	3.4	6.2	-0.6	1.2	6.4
Other Durables	4.1	4.9	8.2	7.8	2.0	3.4	5.7	5.1	-1.6	15.6	2.8	2.1
Nondurable Goods	0.4	1.8	2.6	3.4	2.5	2.6	2.7	3.1	2.4	1.8	1.6	2.2
Food and Beverages	0.9	1.1	1.9	1.5	3.1	3.4	2.4	1.7	6.9	-1.4	-0.5	0.8
Gasoline and Oil	-0.6	1.6	-0.3	4.6	0.7	-0.4	-0.3	-0.3	-12.7	8.5	3.2	1.7
Fuel	-11.9	5.9	4.9	5.3	-2.9	-3.4	-4.0	-2.9	11.1	6.4	0.8	-0.1
Clothing and Shoes	0.2	0.5	2.6	3.5	2.3	1.6	3.7	3.7	-8.7	9.7	5.4	4.1
Other Nondurables	1.0	3.0	4.6	4.6	2.7	3.2	3.6	5.3	5.9	1.3	2.1	3.0
Services	1.2	0.6	2.4	3.3	2.4	2.0	2.1	1.8	-7.4	4.5	4.7	3.5
Housing	0.6	0.2	1.9	3.1	1.9	1.0	0.8	1.3	1.2	1.3	1.5	1.3
Transportation Serv.	1.9	4.5	5.0	3.7	4.3	3.7	3.8	1.6	-22.3	10.6	9.3	9.5
Health Care	1.8	0.6	3.3	5.4	4.0	2.3	2.4	2.7	-8.5	7.9	3.4	2.4
Recreational Service	2.5	2.0	2.5	3.7	2.9	1.1	2.2	1.3	-31.0	17.5	23.4	3.3
Food Svcs. Accom.	2.4	1.7	3.4	4.3	2.2	2.5	2.8	1.2	-21.4	12.7	14.2	7.7
Financial Services	-1.4	-0.6	0.3	2.4	-2.0	2.1	0.3	2.1	0.7	-2.4	-0.3	3.2
Other Services	0.5	-1.4	2.4	2.7	2.9	3.3	2.9	3.4	-13.2	5.3	6.4	6.1

Table 9: Residential Construction and Housing Starts	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Housing Starts (Millions of Units)												
Housing Starts	0.784	0.928	1.000	1.107	1.177	1.207	1.248	1.295	1.382	1.512	1.472	1.446
Single-family	0.537	0.619	0.646	0.712	0.785	0.851	0.872	0.893	0.993	1.169	1.099	1.060
Multi-family	0.247	0.309	0.354	0.394	0.392	0.356	0.376	0.403	0.389	0.343	0.373	0.386
Residential Construction Expenditures (Billions of Dollars)												
Current Dollars	432.0	510.0	560.2	633.8	699.5	760.3	798.5	807.1	875.7	987.2	1000.4	1020.2
2012 Dollars	432.0	485.5	504.1	555.4	592.1	615.7	612.0	601.5	632.1	686.2	673.7	668.4
% Change	13.0	12.4	3.8	10.2	6.6	4.0	-0.6	-1.7	5.1	8.6	-1.8	-0.8
Related Concepts												
Treas. Bill Rate	0.1	0.1	0.0	0.1	0.3	0.9	1.9	2.1	0.4	0.1	0.1	0.1
Mortgage Rate Conv. 30-Yr.	3.7	4.0	4.2	3.9	3.6	4.0	4.5	3.9	3.1	3.1	3.2	3.3
New Home Price ($1000)	242.1	265.1	283.2	293.7	306.5	321.6	323.1	319.3	339.0	359.4	369.4	383.7
% Change	7.9	9.5	6.8	3.7	4.3	4.9	0.5	-1.2	6.2	6.0	2.8	3.9
Real Disp. Income	12500.6	12504.7	13207.1	13784.3	14202.8	14901.9	15766.5	16348.6	17437.0	17283.3	17752.9	18617.1
% Change	3.3	-1.3	4.1	4.2	2.0	3.1	3.6	2.2	5.4	-2.6	0.8	2.9

Table 10: Nonresidential Fixed Investment and Inventories	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Billions of Current Dollars												
Nonres. Fixed Investment	2119	2211	2400	2467	2460	2574	2777	2895	2769	2848	3057	3255
Equipment	983	1027	1092	1119	1089	1122	1213	1241	1170	1254	1326	1378
Intellectual Property	656	692	730	763	812	853	932	1004	1012	1031	1116	1205
Nonresidential Structures	479	493	578	584	560	599	631	650	586	563	615	672
Buildings	192	204	235	285	321	329	347	359	336	301	348	407
Commercial	76	84	103	119	145	154	164	167	162	137	161	189
Industrial	47	50	58	80	76	68	70	77	70	69	84	96
Other Buildings	69	70	74	86	99	107	113	115	104	95	104	121
Utilities	112	109	126	133	135	132	132	141	151	163	149	138
Mining Exploration	153	156	188	137	76	108	125	121	71	68	84	92
Other	23	24	28	29	29	30	28	30	29	30	34	36
Billions of 2012 Dollars												
Nonres. Fixed Investment	2119	2206	2365	2420	2433	2524	2699	2777	2641	2690	2846	3000
Equipment	983	1029	1101	1135	1115	1150	1242	1268	1196	1275	1332	1378
Intellectual Property	656	691	725	752	810	844	910	968	968	977	1049	1125
Nonresidential Structures	479	485	539	534	510	532	551	548	488	459	485	516
Buildings	192	199	222	264	291	290	292	288	263	237	268	299
Commercial	76	82	98	111	134	139	142	138	131	114	132	148
Industrial	47	49	55	74	70	61	60	63	55	51	60	67
Other Buildings	69	68	69	79	87	90	91	88	77	72	76	85
Utilities	112	108	123	128	129	124	119	121	128	132	116	108
Mining Exploration	153	155	168	120	69	96	121	118	72	64	76	82
Other	23	23	26	26	25	25	23	23	22	22	23	23
Percent Change in Real Nonresidential Fixed Investment												
Nonres. Fixed Investment	9.5	4.1	7.2	2.3	0.5	3.7	6.9	2.9	-4.9	1.9	5.8	5.4
Equipment	11.0	4.7	7.0	3.0	-1.7	3.2	8.0	2.1	-5.7	6.6	4.5	3.4
Intellectual Property	5.0	5.4	4.8	3.8	7.6	4.2	7.8	6.4	0.0	0.9	7.4	7.3
Nonresidential Stuctures	13.0	1.3	11.0	-0.9	-4.4	4.2	3.7	-0.6	-10.9	-6.0	5.8	6.3
Buildings	9.6	3.9	11.4	18.8	10.5	-0.6	1.0	-1.5	-8.8	-9.7	12.9	11.7
Commercial	9.6	9.1	19.0	12.8	20.7	3.6	2.2	-2.6	-5.2	-12.9	15.8	12.2
Industrial	15.2	4.2	12.9	34.4	-4.9	-13.4	-1.8	4.6	-11.9	-6.8	16.4	11.2
Other Buildings	6.1	-1.9	1.2	14.8	10.6	2.9	1.0	-3.7	-11.9	-6.6	6.0	11.1
Utilities	19.8	-4.1	14.4	4.1	0.7	-4.3	-3.8	2.1	5.8	2.7	-11.8	-6.7
Mining Exploration	11.9	1.6	8.0	-28.6	-42.1	38.8	25.2	-2.1	-39.1	-10.8	17.9	8.9
Other	17.7	3.3	12.5	-1.2	-4.3	1.5	-10.1	3.3	-6.8	0.6	4.0	1.4
Related Concepts												
Annual Growth-Price Deflator:												
Producers Dur. Equip.	0.6	-0.2	-0.6	-0.5	-1.1	-0.1	0.1	0.2	-0.0	0.5	1.2	0.5
Structures	4.9	1.5	5.7	2.1	0.3	2.6	1.7	3.6	1.2	2.1	3.3	2.7
Moody's AAA Corp. Rate (%)	3.7	4.2	4.2	3.9	3.7	3.7	3.9	3.4	2.5	2.1	2.1	2.3
Cap. Util. in Manufacturing (%)	74.5	74.4	75.2	75.3	74.2	75.1	76.6	75.6	69.5	71.5	73.3	74.5
Final Sales (bil. i12$)	16126	16387	16826	17295	17706	18128	18634	19043	18467	18958	19580	20187
Change in Business Inventories (Billions $)												
Current Dollars	71.2	104.5	84.0	136.8	28.4	16.3	57.7	49.1	-78.0	82.4	107.1	108.4
2012 Dollars	71.2	108.7	86.3	137.6	24.5	15.8	53.4	48.5	-82.6	81.5	103.0	102.7

Table 11: Federal Government Receipts and Expenditures	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
						Billions of Current Dollars						
Unified Budget Basis (FY)												
Receipts	2509	2825	3093	3275	3242	3344	3330	3497	3424	3613	3792	4034
Outlays	3570	3384	3581	3750	3824	4025	4203	4520	6746	5295	4912	4948
Surplus or Deficit (-)	-1061	-560	-487	-475	-582	-681	-873	-1022	-3321	-1682	-1120	-914
National Income & Products Accounts Basis, Calendar Year												
Current Receipts	2700	3139	3292	3448	3463	3524	3568	3711	3655	3854	4049	4296
Current Tax Receipts	1573	1745	1900	2024	2020	2015	2017	2132	2065	2170	2292	2456
Pers. Current Taxes	1166	1303	1404	1533	1548	1615	1618	1713	1686	1774	1865	2000
Corp. Income Taxes	275	298	340	329	312	245	211	217	200	199	222	242
Prod. & Import Taxes	115	125	136	140	136	131	163	174	151	167	175	182
From Rest of the World	17	18	20	22	24	25	26	28	28	30	31	32
Contributions for Soc. Ins.	938	1092	1140	1191	1225	1284	1345	1402	1414	1474	1542	1621
Income Receipts on Assets	141	243	172	160	140	139	123	111	119	151	154	156
Current Transfer Receipts	56	69	87	76	80	85	84	68	57	59	61	64
Surplus of Govít. Enterprises	-8	-10	-7	-3	-1	1	-1	-2	-0	0	0	0
Current Expenditures	3773	3771	3889	4008	4132	4247	4499	4758	6731	5563	5210	5291
Consumption Expenditures	999	957	951	954	967	985	1044	1097	1140	1166	1178	1186
Defense	650	611	599	587	590	602	636	677	695	720	738	739
Nondefense	349	346	353	367	377	383	407	421	445	447	440	447
Transfer Payments	2294	2338	2441	2568	2651	2726	2853	3006	4373	3796	3536	3648
Gov't Social Benefits	1782	1822	1881	1970	2025	2099	2196	2323	3418	2924	2744	2856
To Rest of the World	18	19	20	20	21	22	23	24	28	27	28	30
Grants-in-Aid	494	498	541	578	605	606	634	658	927	845	763	763
To S&L Gov't	444	450	495	533	557	560	583	608	877	802	720	719
To Rest of the World	49	48	46	45	48	46	51	50	49	43	44	44
Interest Payments	423	416	439	429	454	476	541	582	552	474	426	394
Subsidies	58	59	58	57	61	59	63	73	665	127	70	62
Surplus or Deficit (-)	-1073	-632	-597	-560	-669	-722	-932	-1047	-3076	-1709	-1161	-994

Table 12: State and Local Government Receipts and Expenditures	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
						Billions of Current Dollars						
Current Receipts	2056	2146	2258	2373	2432	2515	2643	2743	3011	3029	3080	3194
Tax Receipts	1415	1491	1542	1598	1639	1719	1810	1877	1883	1970	2085	2185
As % of GDP	8.7	8.9	8.8	8.8	8.7	8.8	8.8	8.8	9.0	8.9	9.0	8.9
Pers. Current Taxes	343	374	381	407	410	432	468	490	502	526	558	593
Corp. Income Taxes	51	54	57	56	53	54	60	70	64	70	82	83
Prod. & Import Taxes	1021	1063	1105	1135	1175	1233	1282	1318	1316	1374	1445	1509
Contributions For Social Ins.	17	18	19	19	20	20	21	22	20	20	21	22
Income on Assets	82	82	84	82	85	91	95	97	98	102	107	111
Transfer Receipts	550	561	616	675	690	691	723	753	1024	951	875	881
Federal Grants-in-Aid	444	450	495	533	557	560	583	608	877	802	720	719
From Persons	65	66	70	76	77	80	84	88	90	92	96	100
From Business	40	45	46	66	56	51	54	56	56	57	59	62
From Rest of the World	0	0	5	1	0	0	1	1	0	0	0	0
Surplus of S&L Gov't Enterprises	-8	-6	-4	-2	-3	-6	-5	-6	-14	-15	-8	-5
Expenditures	2339	2411	2495	2589	2671	2754	2857	2951	2999	3118	3218	3388
As % of GDP	14.4	14.4	14.2	14.2	14.2	14.1	13.9	13.8	14.4	14.1	13.8	13.8
Purchases	1517	1575	1614	1653	1694	1758	1848	1898	1896	1972	2033	2148
Transfer Payments	541	564	618	665	693	707	727	755	818	862	890	934
Interest Payments	281	271	263	270	283	288	281	298	285	283	294	306
Subsidies	0	0	0	1	1	1	1	1	1	1	1	1
Surplus or Deficit (-)	-283	-265	-238	-216	-239	-239	-214	-208	11	-89	-138	-194

Table 13: U.S. Exports and Imports of Goods and Services	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Billions of Current Dollars												
Net Exports -- Goods & Serv.	-569	-491	-508	-527	-513	-556	-609	-610	-629	-756	-729	-702
Current Account Balance	-418	-337	-368	-407	-395	-365	-450	-480	-683	-763	-691	-623
Merchandise Balance	-780	-737	-777	-793	-777	-835	-902	-889	-875	-974	-985	-985
Exports -- Goods & Serv.	2191	2273	2372	2266	2227	2375	2529	2515	2107	2263	2535	2750
Merchandise	1522	1559	1615	1495	1444	1542	1664	1637	1399	1535	1703	1833
Food, Feeds & Beverages	133	136	144	128	131	133	133	131	136	131	137	147
Industrial Supplies	483	492	501	418	388	459	537	527	442	465	541	596
Motor Vehicles & Parts	146	153	160	152	150	158	159	162	128	159	183	189
Capital Goods Ex. MVP	527	535	552	540	520	534	563	548	470	559	607	643
Computer Equipment	49	48	49	47	45	46	50	47	41	48	46	46
Aircraft	94	105	113	119	121	121	131	126	71	99	134	152
Other	384	382	390	373	354	367	383	375	357	412	426	445
Consumer Goods Ex. MVP	181	188	198	197	193	197	206	205	168	167	174	189
Other	51	55	61	60	62	61	66	63	56	54	61	69
Services	670	714	757	771	783	833	865	878	708	728	832	917
Imports -- Goods and Serv.	2760	2764	2879	2792	2740	2930	3138	3125	2736	3020	3264	3453
Merchandise	2301	2296	2392	2288	2221	2377	2566	2526	2274	2509	2688	2818
Food, Feeds & Beverages	111	116	127	129	131	139	148	152	153	164	170	173
Petroleum & Products	434	388	354	197	160	197	239	207	125	160	220	238
Indus. Supplies Ex. Petr	289	291	316	291	278	306	336	312	283	274	279	232
Motor Vehicles & Parts	298	310	329	350	351	359	372	377	316	440	433	421
Capital Goods Ex. MVP	552	559	599	607	594	643	695	681	638	682	701	709
Computer Equipment	122	121	122	120	115	128	142	131	141	145	142	136
Aircraft	40	47	53	55	50	51	55	63	47	54	63	70
Other	389	391	423	432	429	463	497	487	449	483	496	503
Consumer Goods. Ex. MVP	519	533	559	596	585	603	648	656	627	640	732	886
Other	98	100	108	118	123	129	127	141	131	148	153	160
Services	458	468	488	504	519	553	573	600	462	511	577	634
Billions of 2012 Dollars												
Net Exports -- Goods & Serv.	-569	-533	-577	-720	-764	-817	-878	-918	-901	-1048	-1042	-1040
Exports -- Goods & Serv.	2191	2270	2365	2375	2382	2476	2550	2547	2198	2314	2549	2727
Imports -- Goods & Serv.	2760	2802	2942	3095	3146	3292	3427	3464	3099	3362	3592	3767
Exports and Imports -- % Change												
Current Dollars												
Exports	4.2	3.7	4.3	-4.5	-1.7	6.6	6.5	-0.6	-16.2	7.4	12.0	8.5
Imports	2.9	0.2	4.2	-3.0	-1.9	6.9	7.1	-0.4	-12.4	10.3	8.1	5.8
Constant Dollars												
Exports	3.4	3.6	4.2	0.4	0.3	3.9	3.0	-0.1	-13.7	5.3	10.2	7.0
Imports	2.7	1.5	5.0	5.2	1.7	4.7	4.1	1.1	-10.5	8.5	6.8	4.9
Production Indicators -- % Change												
U.S. Industrial Production	3.0	2.0	3.1	-1.0	-2.0	2.3	3.9	0.9	-7.5	1.9	3.8	3.4
Real GDP-Industrial Countries	1.2	1.6	2.2	1.6	1.4	2.8	1.8	1.4	-6.7	3.8	3.2	2.0
Real GDP-Developing Countries	4.2	3.8	3.7	3.4	2.9	3.6	3.2	1.6	-5.6	5.0	3.3	3.0
Price Indicators												
Price Deflators (% Ch.)												
Exports	0.8	0.2	0.1	-4.9	-2.0	2.6	3.4	-0.4	-3.1	2.2	1.7	1.4
Imports	0.2	-1.4	-0.8	-8.0	-3.5	2.2	2.9	-1.5	-2.2	2.0	1.2	0.8
Crude Oil Prices ($/barrel)	94.2	97.9	93.3	48.7	43.2	51.0	64.9	57.0	38.6	43.9	52.6	56.2
Real U.S. Dollar												
Ex. Rate-Indust. Countries	1.00	1.05	1.10	1.31	1.34	1.35	1.34	1.43	1.44	1.34	1.30	1.29
% Change	7.6	5.1	5.1	18.6	2.6	0.1	-0.2	6.7	0.7	-7.0	-3.3	-0.8
Ex. Rate-Dev. Countries	1.00	1.02	1.07	1.21	1.32	1.34	1.37	1.46	1.56	1.50	1.44	1.42
% Change	6.6	1.6	5.0	13.5	9.5	0.9	2.7	6.5	6.6	-3.5	-3.8	-1.6

Table 14: Price Indices for GDP and Other Inflation Indicators (Percent Change)

	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Implicit Price Deflators												
GDP	1.9	1.8	1.8	1.0	1.0	1.9	2.4	1.8	1.2	1.9	2.1	2.1
Consumption	1.9	1.3	1.5	0.2	1.0	1.8	2.1	1.5	1.2	1.8	1.9	1.9
Durables	-1.3	-2.0	-2.6	-2.2	-2.4	-2.3	-1.7	-1.2	-0.8	-0.3	-1.2	-1.7
Motor Vehicles	1.4	0.5	0.0	-0.1	-1.2	-1.2	-0.4	0.2	2.2	3.7	1.5	0.6
Furniture	0.0	-1.9	-3.4	-2.4	-2.6	-2.8	-1.1	0.7	0.4	-2.2	-2.6	-2.0
Other Durables	-0.8	-2.1	-4.0	-3.6	-0.8	-1.3	-1.8	-2.3	-2.5	-2.3	-0.7	-1.4
Nondurables	2.4	0.1	0.5	-3.5	-1.3	1.6	1.9	-0.1	-0.5	0.9	2.5	1.5
Food	2.4	1.0	1.9	1.1	-1.0	-0.1	0.5	1.0	3.4	1.3	1.9	1.5
Clothing & Shoes	3.6	1.0	0.3	-1.2	-0.3	-0.6	0.1	-1.4	-5.2	-1.9	-0.1	-0.0
Gasoline	3.4	-2.7	-3.6	-26.7	-11.5	13.0	13.7	-3.5	-16.2	2.3	12.0	4.0
Fuel	1.4	-1.2	-0.5	-28.8	-17.1	15.3	20.9	-4.5	-22.6	0.5	10.6	4.8
Motor Vehicle Fuel	3.5	-2.8	-3.8	-26.5	-11.2	12.8	13.2	-3.4	-15.8	2.4	12.1	3.9
Services	2.2	2.3	2.4	1.8	2.3	2.5	2.8	2.4	2.1	2.5	2.3	2.6
Housing	2.3	2.3	2.7	3.1	3.3	3.4	3.4	3.4	2.9	2.6	2.8	2.8
Utilities	-0.2	3.2	4.2	-0.5	0.0	3.3	1.4	0.8	1.1	2.0	1.5	3.2
Electricity	-0.0	2.1	3.6	0.6	-1.1	2.2	0.7	0.2	0.2	1.4	1.3	2.2
Natural Gas	-9.7	4.8	7.1	-11.9	-2.4	8.0	0.1	-1.5	-0.1	2.1	-2.0	4.3
Water & Sanit.	5.3	4.4	3.6	4.3	3.6	3.3	3.5	3.2	3.1	3.0	3.3	4.4
Health Care	1.8	1.4	1.1	0.6	1.2	1.5	1.9	1.8	2.5	2.0	1.7	2.2
Transportation	2.0	1.0	1.3	0.4	0.8	1.2	2.1	2.0	-1.5	1.8	3.7	2.5
Recreation	2.8	1.7	1.8	1.6	2.4	2.8	2.1	2.0	2.5	2.8	2.3	2.5
Food & Accomm.	2.8	2.1	2.6	2.8	2.6	2.1	2.3	2.8	2.0	4.6	3.9	3.2
Financial & Insur.	4.2	5.3	5.4	2.9	4.9	4.8	6.1	2.9	1.5	2.7	1.3	2.8
Other Services	2.6	2.9	2.5	1.9	2.0	2.2	2.8	2.4	2.2	2.2	1.8	2.4
Investment Deflators:												
Nonresidential	1.5	0.3	1.2	0.4	-0.8	0.9	0.9	1.3	0.6	1.0	1.4	1.0
Structures	4.9	1.5	5.7	2.1	0.3	2.6	1.7	3.6	1.2	2.1	3.3	2.7
Equipment	0.6	-0.2	-0.6	-0.5	-1.1	-0.1	0.1	0.2	-0.0	0.5	1.2	0.5
Intellectual Prop.	0.5	0.1	0.7	0.6	-1.1	0.8	1.3	1.3	0.8	0.9	0.8	0.7
Residential	1.0	5.1	5.8	2.7	3.5	4.5	5.6	2.8	3.2	3.9	3.2	2.8
Government Purchases	1.7	2.3	2.1	0.2	0.3	2.4	3.6	1.9	1.1	2.6	2.4	2.8
Federal	0.9	0.9	1.7	0.5	0.6	2.1	3.1	1.9	0.2	2.6	1.5	2.2
State and Local	2.3	3.3	2.3	-0.0	0.2	2.5	4.0	1.9	1.7	2.6	3.0	3.1
Exports	0.8	0.2	0.1	-4.9	-2.0	2.6	3.4	-0.4	-3.1	2.2	1.7	1.4
Imports	0.2	-1.4	-0.8	-8.0	-3.5	2.2	2.9	-1.5	-2.2	2.0	1.2	0.8
Other Inflation Related Indicators												
Cons. Price Index - All Urban	2.1	1.5	1.6	0.1	1.3	2.1	2.4	1.8	1.3	2.2	2.6	2.2
Producers Price Index	0.5	0.6	0.9	-7.2	-2.7	4.4	4.3	-1.0	-3.0	4.8	2.4	3.0
Nonfarm Sector Indicators												
Total Compensation	2.6	1.3	2.8	3.1	1.1	3.5	3.4	3.6	5.9	0.5	1.4	3.1
Productivity	0.9	0.5	0.9	1.6	0.3	1.2	1.4	1.7	2.4	-0.8	0.2	1.5
Unit Labor Costs	1.8	0.8	1.9	1.5	0.7	2.2	1.9	1.9	3.5	1.3	1.1	1.6
Crude Oil Prices ($/barrel)												
West Texas Intermediate	94.2	97.9	93.3	48.7	43.2	51.0	64.9	57.0	38.6	43.9	52.6	56.2

Table 15: Producer Price Indexes	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
						Annual Percent Change						
All Commodities	0.5	0.6	0.9	-7.2	-2.7	4.4	4.3	-1.0	-3.0	4.8	2.4	3.0
Industrial Commodities	0.0	0.4	0.6	-7.5	-2.3	5.0	5.2	-1.5	-3.6	5.3	2.5	3.1
Textiles & Apparel	0.3	0.8	1.5	-1.0	-0.5	1.2	2.9	0.9	-0.6	3.6	1.1	1.2
Fuels	-1.8	-0.2	-0.9	-23.5	-9.1	12.3	10.9	-7.1	-15.6	11.3	4.2	5.8
Chemicals	0.5	0.9	0.6	-5.3	-0.3	5.9	5.1	-2.0	-3.1	5.7	3.3	3.4
Rubber & Plastics	2.3	1.1	0.6	-1.7	-1.3	2.4	3.2	0.5	-0.8	2.9	1.4	2.2
Lumber & Wood	3.5	6.5	4.3	-1.0	0.4	3.5	5.8	-2.9	6.6	6.3	-0.1	1.5
Pulp & Paper	-0.4	1.9	0.7	-0.7	-0.4	2.8	2.1	-0.2	0.1	5.3	2.5	1.9
Metals & Products	-2.7	-2.9	0.7	-6.9	-2.9	6.9	7.6	-1.1	-0.6	6.4	1.4	2.8
Equipment	1.1	0.7	0.8	0.5	-0.1	0.7	1.8	2.2	1.2	2.1	1.2	1.6
Trans. Equipment	2.2	1.2	1.4	1.4	0.4	0.9	1.3	0.9	0.6	2.1	3.0	2.5
Farm	3.2	1.4	1.1	-11.9	-9.6	3.1	-0.6	0.4	-3.8	0.2	1.8	4.2
Processed Foods & Feeds	3.9	1.5	3.9	-3.4	-2.7	1.0	0.3	1.4	1.4	3.2	2.1	1.7
By Stage of Processing												
Crude Materials	-3.2	2.1	1.1	-24.2	-8.3	10.0	4.9	-7.1	-11.5	10.2	1.8	4.4
Intermediate Materials	0.5	0.1	0.5	-6.9	-3.1	4.7	5.3	-1.4	-3.2	4.1	1.4	2.2
Finished Goods	1.9	1.2	1.9	-3.3	-1.0	3.2	3.0	0.8	-1.4	2.2	2.9	2.1
Finished Consumer Goods	1.9	1.4	2.1	-4.8	-1.5	4.0	3.6	0.3	-2.2	4.8	2.7	2.9
Finsihed Producer Goods	1.9	0.9	1.4	1.2	0.4	1.0	1.6	2.1	1.3	2.1	1.9	2.0

Table 16: Money and Interest Rates	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
						Billions of Dollars						
Money Supply (M1)	2436	2637	2898	3064	3342	3613	3721	3949	5606	5241	5450	5731
Money Supply (M2)	10342	10971	11603	12263	13156	13800	14278	15236	18923	17217	16622	16493
						Percent Change						
Money Supply (M1)	12.9	8.3	9.9	5.7	9.1	8.1	3.0	6.1	42.0	-6.5	4.0	5.1
Money Supply (M2)	7.6	6.1	5.8	5.7	7.3	4.9	3.5	6.7	24.2	-9.0	-3.5	-0.8
						Interest Rates (Percent)						
Short-Term Rates												
3-Month Treas. Bill	0.1	0.1	0.0	0.1	0.3	0.9	1.9	2.1	0.4	0.1	0.1	0.1
Prime Bank Loans	3.3	3.3	3.3	3.3	3.5	4.1	4.9	5.3	3.5	3.3	3.3	3.3
U.S. Government Bond Yields												
5-Year Maturity	0.8	1.2	1.6	1.5	1.3	1.9	2.7	2.0	0.5	0.5	0.7	0.9
10-Year Maturity	1.8	2.4	2.5	2.1	1.8	2.3	2.9	2.1	0.9	1.1	1.3	1.5
30-Year Maturity	2.9	3.4	3.3	2.8	2.6	2.9	3.1	2.6	1.6	1.9	2.2	2.4
State and Local Government Bond Yields												
Domestic Municipal Bond	3.7	4.3	4.2	3.7	3.3	3.7	4.0	3.6	2.7	2.3	2.4	2.5
Corporate Bond Yields												
Moody's AAA Corp. Bond	3.7	4.2	4.2	3.9	3.7	3.7	3.9	3.4	2.5	2.1	2.1	2.3
Mortgage Rate												
Conventional 30-Year	3.7	4.0	4.2	3.9	3.6	4.0	4.5	3.9	3.1	3.1	3.2	3.3

THE UCLA ANDERSON FORECAST FOR THE NATION

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Charts

Chart 1: Annualized % Change in Real GDP

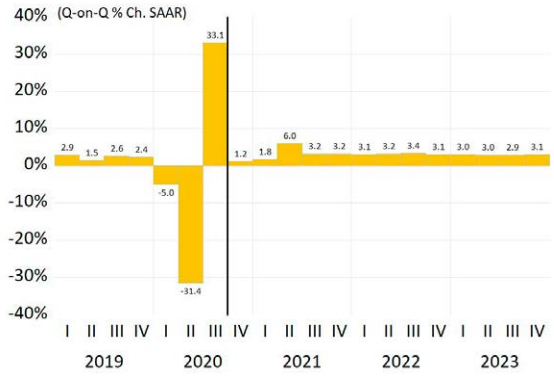


Chart 2: Real GDP

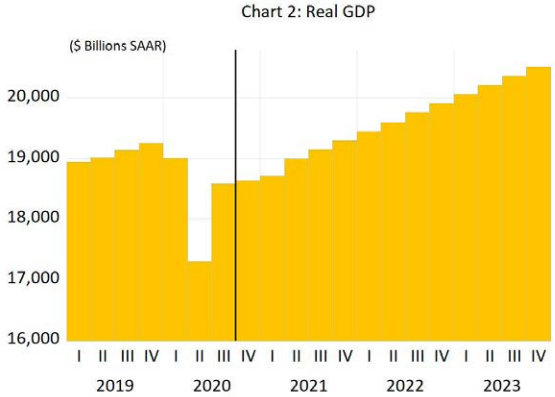


Chart 3: Q4-to-Q4 % Change in Real GDP

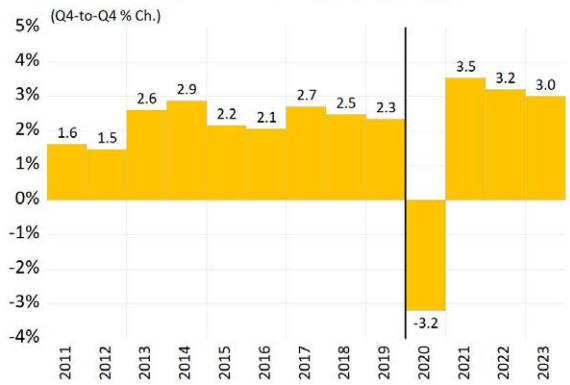


Chart 4: Unemployment Rate

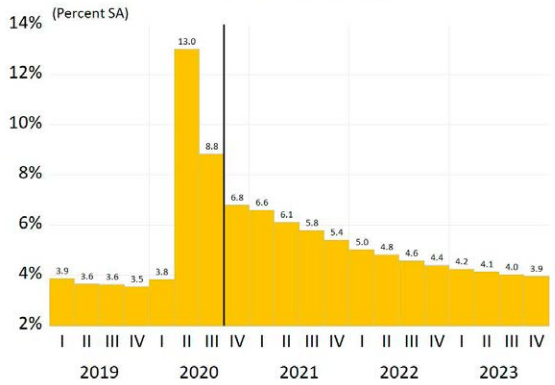


Chart 5: CPI Inflation, All-Urban

Chart 6: Core CPI Inflation, Excl. Food & Energy, All-Urban

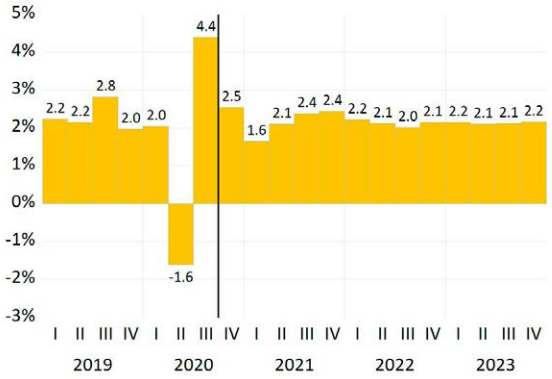


Chart 7: Real Pers. Disp. Income and Consumer Spending

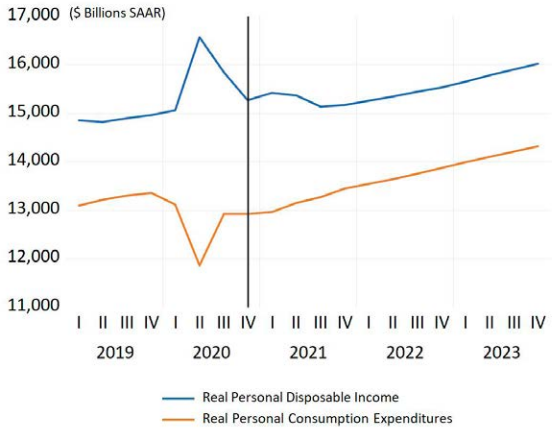


Chart 8: Real Consumer Spending on Goods and Services, Levels

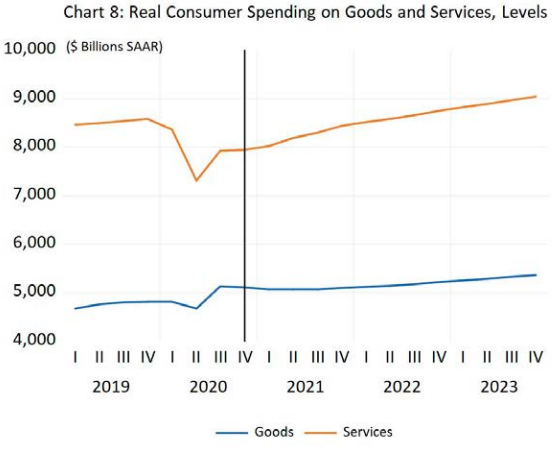


Chart 9: Real Consumer Spending on Goods and Services, % Change

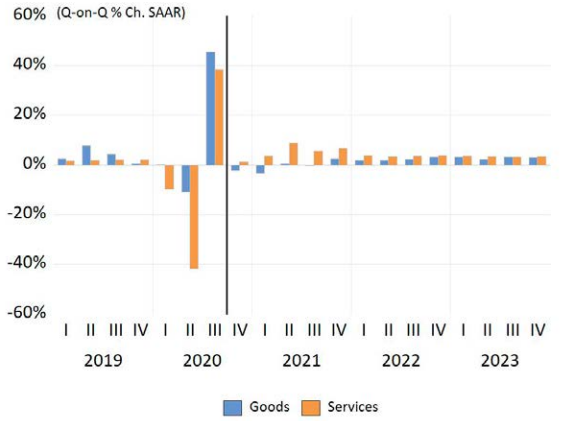


Chart 10: Personal Saving, % of Disposable Income

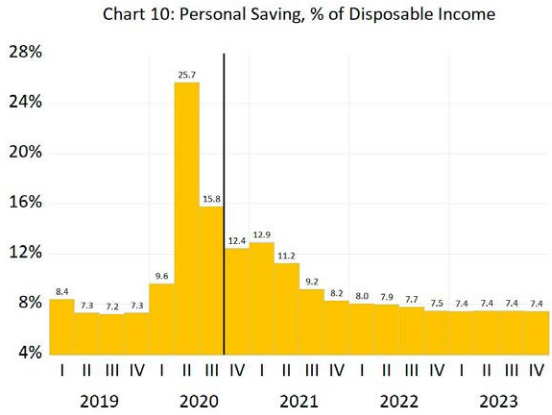


Chart 11: Real Private Non-Residential Fixed Investment

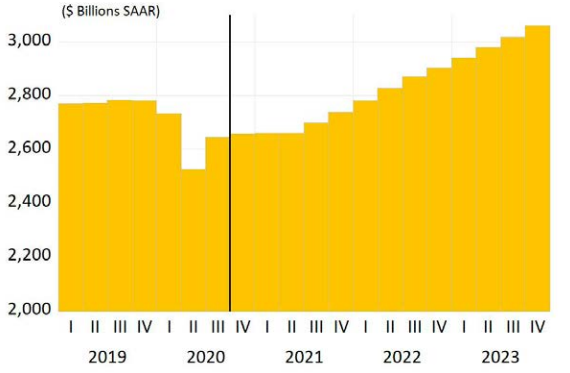


Chart 12: Housing Starts

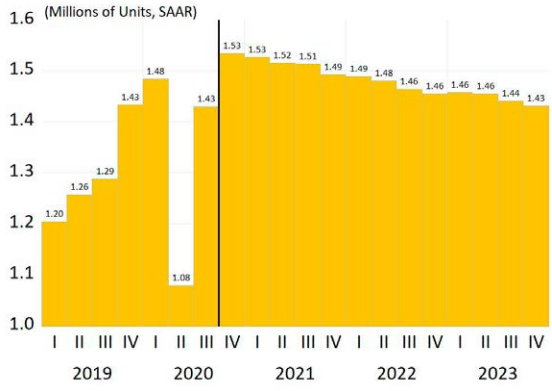


Chart 13: Government Purchases, Transfers, and Receipts as % of GDP

Chart 14: Federal Deficit, % of GDP

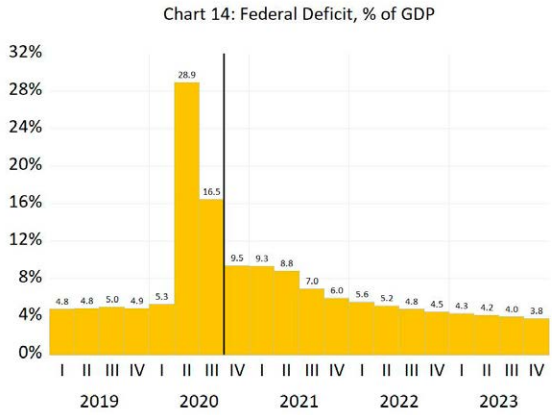


Chart 15: Real Exports and Imports of Goods and Services

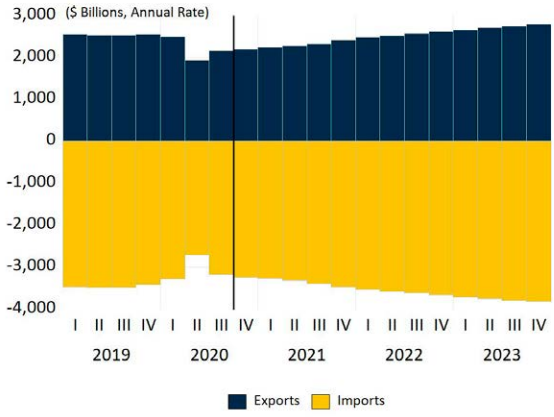
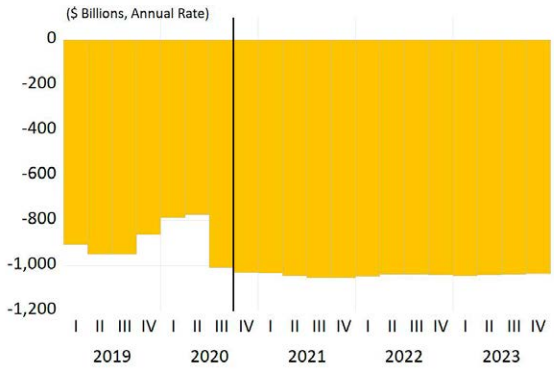


Chart 16: Real Net Exports of Goods and Services



THE UCLA ANDERSON FORECAST FOR CALIFORNIA

DECEMBER 2020 REPORT

The Economic/Pandemic Question: To Close or Not to Close?

Sea Level Rise and Its Impact on California Housing Markets

The Economic/Pandemic Question: To Close or Not to Close?

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December 2020

Summary

- As 2020 draws to a close, labor markets in California are weaker than those in the U.S. overall.
- Non-pharmaceutical interventions (such as mask mandates and restrictions on business operations) tend to be more restrictive in CA than elsewhere.
- Across the U.S. in October 2020, states with more restrictive non-pharmaceutical interventions tended to have higher unemployment rates, though historical evidence suggests that more restrictive non-pharmaceutical interventions may not significantly affect economic activity in the near term and may help in the long term.
- Looking to the future, the forecast for the state is for the technology sectors, residential construction, and logistics to lead the recovery, and for California post-pandemic to grow faster than the U.S.

Introduction

Since the pandemic-induced recession began last March, we have said that the course of the pandemic, and the public health policy response to it, is critical to the economic forecast. As well, we have pointed out that we do not know what the future will bring with respect to the pandemic. What we do know is that the pandemic is raging across the country once again. California has responded, as before, with more restrictive non-pharmaceutical interventions (NPI) via mask mandates, closures, and gathering restrictions. We expect that to continue, particularly through the holiday season as significant traveling by Americans has thus far presaged further increases in COVID cases.[1] We also know that at least three vaccines are in the latter stages of testing and approval. Does this mean that we are out of

1. Though total domestic and foreign air travel remained significantly below a year ago, from the last week in October to the last week in November, the total number of passengers processed by TSA increased by 16%. A year previous the increase was 8%. https://www.tsa.gov/coronavirus/passenger-throughput

the woods soon? The answer is maybe. There is still much that is unknown, however for purposes of our forecast, we are assuming that by summer a large number of people will have received one of the vaccines. In this California report we ask two questions: where are we now? And what are the likely future effects of the more restrictive NPIs on the state's economy? The short answer is that the state has higher unemployment than in the U.S. overall, and the state is due to grow faster than the U.S. once restrictions are lifted and the pandemic is in the rear view mirror.

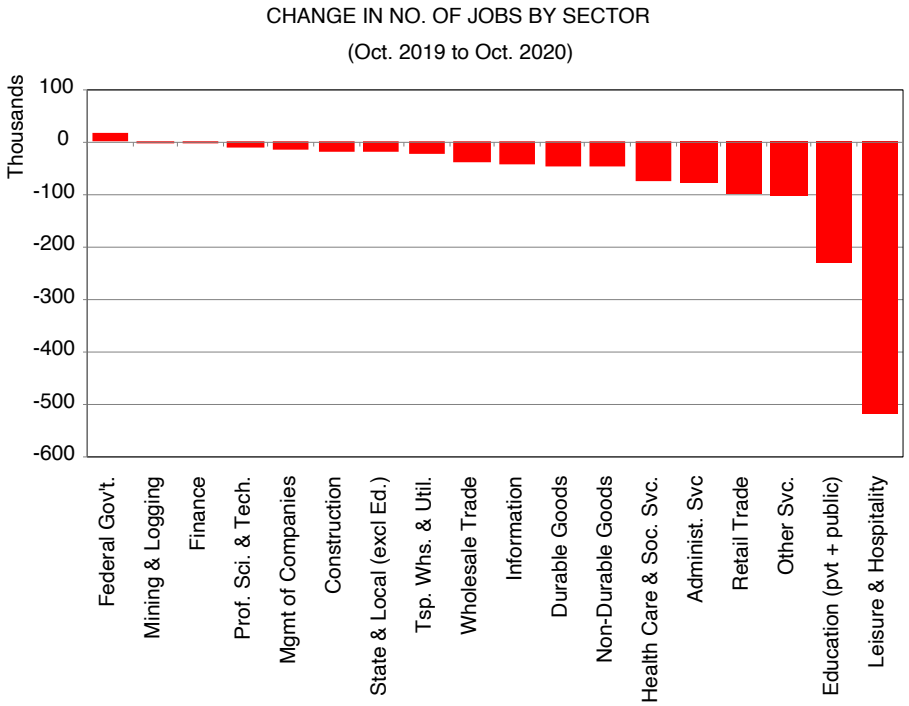
Sectoral employment retrospective

The near-term recovery in employment in the state depends critically on the course of the pandemic. As we move through Thanksgiving to New Year's Eve and usher 2020 out, we are confronting new highs in COVID cases and changing restrictions on economic activity. How this plays out is an open question, however, to make our forecast we must first make an assumption about the pandemic and the policy response. Our assumption is that the elevated number of cases will remain for the balance of the year, and households will remain cautious when it comes to holiday activities including in-store shopping. This will mean a weak growth rate through the balance of the year and into early 2021. With at least three vaccines in the latter stages of testing and approval, for the purposes of our forecast we also assume that a large number of people will have received one of the vaccines by summer, ushering in the beginning of a return to normalcy.

In the 2020 recession a few sectors have been shouldering the brunt of the job loss.

On a year over year basis, including the recovery of some of the lost employment occurring between April and October, leisure and hospitality, retail, and education remain the weakest (Figure 1). Since October 2019, 1.37 million non-farm payroll jobs in California have been lost. Leisure and hospitality and education account for 55% of the job loss, with almost 80% of the education employment decline in the public sector. Another 15% of the job loss is in retail and other services for a total of 70% of all unemployment in the state. These sectors will also be impacted by the rate of recovery as they each involve a higher level of human contact than other economic activity.

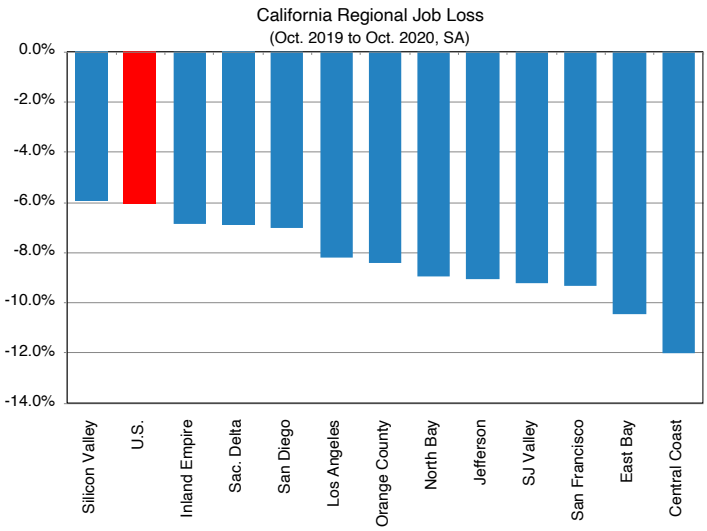
Figure 1 Change in Number of Jobs by Sector



Source: California EDD

Regionally the recession has been uneven as well (Figure 2). However, unlike the great recession, there is not the bifurcated impact of inland vs coastal California. San Francisco, the North and East Bay, the Great State of Jefferson, and the San Joaquin Valley have all contracted by about the same percentage. The Inland Empire, Silicon Valley, San Diego, Sacramento and the Delta have fared better and contracted less. Some of this is due to the impact of a shutdown in tourism. San Francisco is a major destination for international tourists, and Napa and Sonoma for domestic tourists. The Inland Empire has been rebounding with residential construction and logistics, and Silicon Valley with the demand for new software technologies for the new way in which business and socializing are being conducted today. Also important in understanding regional differences is the way in which commuters appear in the data. The data on unemployment are from the CPS (Current Population Survey also known as the Survey of Households). This survey polls individuals by their domicile. The payroll employment data shown here in Charts 1 and 2 are from the Current Employment Statistics survey which collects data on payroll jobs by the employer's location. For example, the Inland Empire lost 6.9% of its payroll jobs from October 2019 to October 2020 while Orange County lost 8.39%. However the unemployment rate in both places rose about the same amount, about 5 percentage points (3.9% to 9.0% in the IE and 2.6% to 7.5% in Orange County). The differential stems from the fact that commuters into Orange County from the less expensive communities in the Inland Empire, particularly those working in the northern parts of the county's leisure and hospitality industry, are counted as unemployed in Riverside County and not in Orange County. We find the same pattern with San Joaquin and the East Bay relative to Silicon Valley and San Francisco in Northern California. Since lower income sectors are projected to grow slower than higher income sectors, and commuters from inland counties are more likely to be lower income, the spillover effects of the growth of technology, advanced manufacturing, and professional services in the coastal cities may be less pronounced than in previous recessions.

Figure 2 California Regional Jobs Loss



Source: California EDD

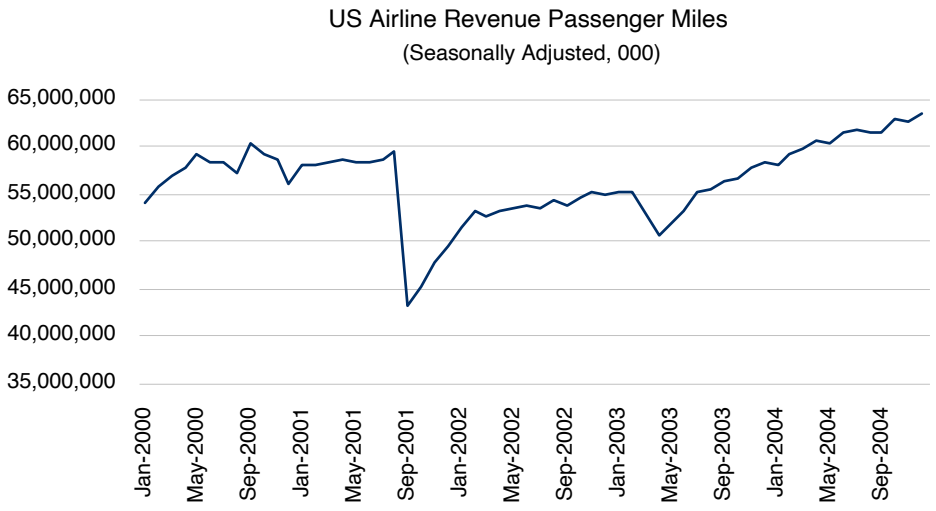
Human contact sectors: How long until recovery

In previous California reports we wrote about our analysis of fear-of-flying data and how that informs our forecast for the current downturn. It bears repeating as it is an important element of the forecast. What is different now from last June when we did this analysis is the new, more acute, wave of infections. It is possible that we are in for a long winter and that the pandemic will not cease to have a major impact on the leisure and hospitality, retail, other services, and education sectors until widespread vaccination occurs. In our national forecast we assume that this is late spring to early summer 2021. What that means for the recovery of the human contact intensive sectors is that their recovery, which began in June, will experience a hiatus until the coming June.

To understand how long it will take, we turned to an analysis of the loss in passengers from the 9/11 attacks on American aviation. Though quite different than a pandemic, it is similar in two respects. First, the demand for domestic air travel is discretionary, and second, the decline in demand was a consequence of safety concerns. Figure 3 shows the decline in traffic and the return to the previous peak. There is a 31 month recovery in commercial airline domestic travel as measured by revenue-passenger-miles. However, the decline and recovery, then as now, is confounded with a recession. Beginning in March of 2001 and extending through November of the same year the economy contracted. It was a mild recession, however that loss of income affected the demand for passenger traffic as well.

In a 2004 study by Ito and Lee,[2] these and other factors affecting the demand for air traffic were separated out. They found that while there was a 30% instantaneous decline in demand right after 9/11, there was a relatively rapid recovery of all but 7.5% of that decline. That residual persisted through the extent their data. This result is consistent with other studies of the economic impact of accidents on air traffic (see for example Barnett and LoFazo (1983) and Squalli (2005)[3]). Applying their model to the leisure and hospitality demand in California presents a somewhat gloomy picture. Specifically, the sector remains at 20% below its previous peak at the end of our forecast horizon (2023) due to both the safety and income effects. That translates to 200,000 relatively low-income Californians with long-term unemployment for 30 months following the end of the pandemic.

Figure 3 U.S. Airline Revenue Passenger Miles



Source: U.S. Department of Transportation

2. Harumi Ito and Darin Lee. 2005. "Assessing the Impact of the September 11 terrorist attacks on US airline demand." Journal of Economics and Business. Vol:57 (1). Pp:75-95.

3. Barnett, A. and LoFaso, A. J. 1983. "After the Crash: The Passenger Response to the DC-10 Disaster." Management Science. Vol:29. Pp:1225–1236.

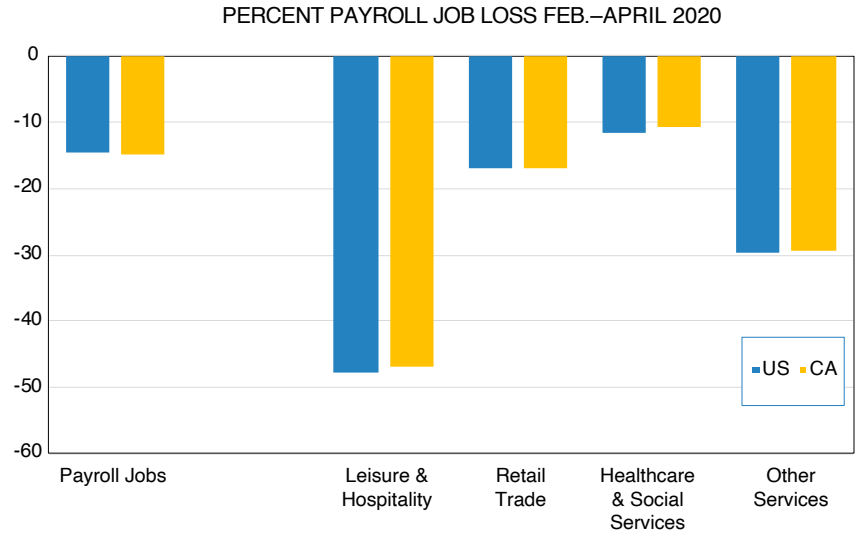
Squalli, J. 2005. "Do Consumers Have Imperfect Recollection about Airline Safety?" Applied Economics Letters. Vol:12. Pp:169–176.

To be sure, some will find employment in other sectors, but in an economy that is demanding technical skills, it will be challenging. There is one important caveat. Our shelter-in-place and zoom-fatigue has been said to create an enormous pent-up demand for human interaction. That being the case, we can expect a little more rapid recovery than suggested by this fear-of-flying analysis. Nevertheless, 2024 remains the most likely return-to-previous peak employment in these sectors.

Is California Falling Behind?

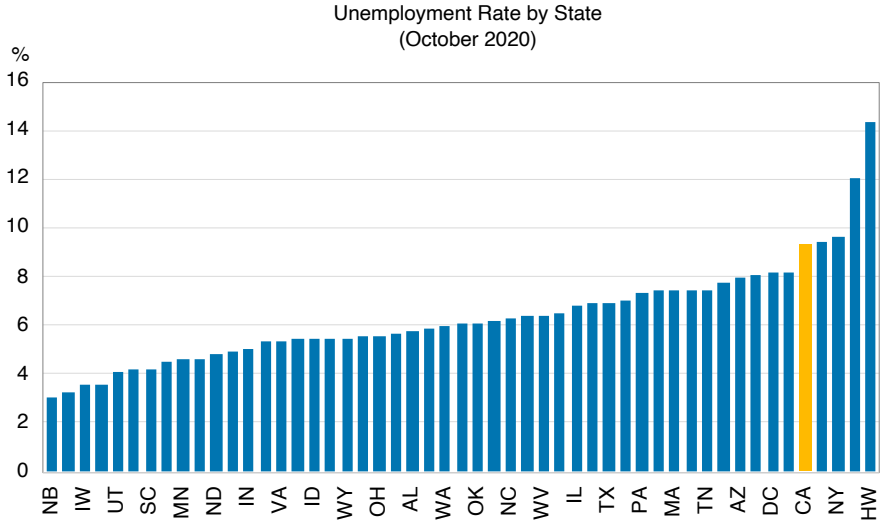
Through the initial phase of the recession, March/April 2020, the contraction in employment in California looked much like the contraction nationwide (Figure 4). One would expect California to recover pari passu with the national economy based on these data. The differences would be in the faster growth from the tech sectors and the slower growth from the sectors serving international tourists. Otherwise, for a

Figure 4 Percent Payroll Job Loss Feb-April 2020



Source: EDD.ca.gov, BLS.gov

Figure 5 Unemployment Rate by State



Source: BLS.gov

change, California looked to be quite average in the recessions impact.

However, the expansions in the state and in the U.S. overall look a bit different (Figure 5). California has one of the highest unemployment rates in the U.S. Tourism is one reason. Another is that the extent of the government intervention in California via NPI compared to other states is somewhat different, and that raises the question, what are the near term and long term economic impacts of the NPI policies in California?

Economic implications of closures

To begin to answer the question we look at the relationship between non-pharmaceutical interventions (NPI), a fancy way of saying shutdowns, gathering restrictions and mask mandates, and indicators of the labor market (the unemployment rate and employment growth rates). To analyze the relationship between labor markets and NPIs, we culled data gathered by the University of Oxford and aggregated by the New York Times.[4] From these data we assigned each state a value with 0 indicating the least restrictive NPIs, 1 moderate, and 2 most restrictive during the month of October 2020.

In a regression of unemployment rates on this measure of public health policy, policy variation explained just under a quarter of the unemployment rate differences between states (as measured by the regression's R-squared). Using this model, we derived an unemployment for each state as if all states were at the least restrictive NPI level (Figure 6). While California is not in the middle of the pack, it is not far off, about 1.3 percentage points higher than the average. A higher implied unemployment rate in the state is due, at least in part, to the fact that California is host to over 20% of all foreign tourists coming to the U.S.; tourists who are no longer making the journey. If we repeat this exercise using a model that includes an indicator control for states with significant international tourism (California, Nevada, Hawaii, New York and Florida), California's implied unemployment rate is lower than the average for all other states.

We can also look at the relationship between payroll employment and NPIs. Using the same NPI variable as before in a regression to explain the change in total non-farm payroll employment by state from October 2019 to October 2020, we find similar results (Figure 7). The NPI variable explains a third of the variation in growth rates in employment across states. Moreover, in this regression, the counterfactual growth of employment in California with all states set to have the least restrictive level of NPIs rests squarely in the middle of the pack.

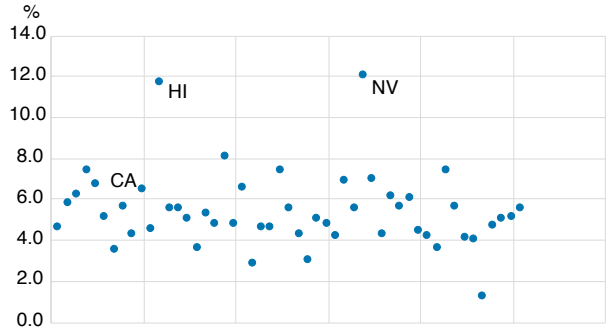
From these simple regressions we learn two things about the forecast. First, since California, as a matter of public health policy, tends towards more restrictive NPIs than many other states, so long as the pandemic rages, employment growth will be slower and the unemployment rate higher than in the rest of the nation. Second, the underlying economy is not necessarily weaker than other states in the U.S., though each state has its own labor market idiosyncrasies.

Will more restrictive NPIs have longer term adverse effects on the California economy? There is not a lot of evidence to work with, but recent studies of the 1918/1919 Influenza Pandemic suggest the opposite. For example, a research project by economists at the Federal Reserve and MIT found that over the course of the influenza pandemic, NPIs had no statistically significant impact on economic activity.[5] The reason for this was twofold. First, in cities with less restrictive NPIs, more employees were sick and therefore produced less output. Second, because health outcomes were worse, consumers were more reticent to purchase goods and services involving higher degrees of human contact. Thus there was both a demand and supply consequence for those cities with less restrictive NPIs. Subsequent to the pandemic, and adjusting for population size and migration, they found that cities with more restrictive NPIs experienced faster post-pandemic growth. To be sure, the economy of 2020 is quite different than that of 1918. It is less rural, more urbanized, more globalized, and more mobile between regions. Nevertheless, the results are informative. Thus, with the expectation that the tech sectors along with residential construction and logistics will be leading the recovery, our forecast has California, post-pandemic, once again growing faster than the U.S.

4. https://covidtracker.bsg.ox.ac.uk , https://www.nytimes.com/interactive/2020/11/18/us/covid-state-restrictions.html?name=styln-coronavirus&region=TOP_BANNER&block=storyline_menu_recirc&action=click&pgtype=Interactive&impression_id=6b50d752-2b45-11eb-be08-77c2b2e224fa&variant=1_Show

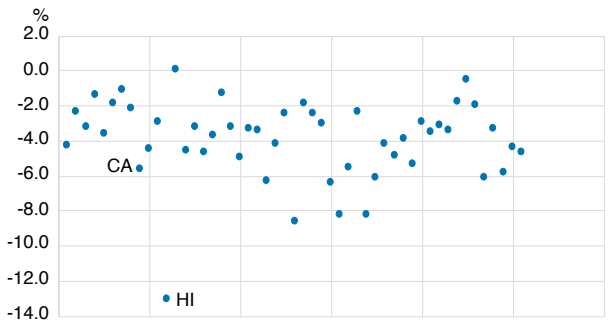
5. Correia, Sergio and Luck, Stephan and Verner, Emil, Pandemics Depress the Economy, Public Health Interventions Do Not: Evidence from the 1918 Flu (June 5, 2020).
http://dx.doi.org/10.2139/ssrn.3561560

Figure 6 Implied October 2020 U-Rate With Less Restrictive NPI for All States



Sources: New York Times, Oxford University, UCLA Anderson Forecast

Figure 7 Impled Oct 2019 to Oct 2020 Growth Rate With Less Restrictive NPI, Non-Farm Payroll Jobs



Sources: New York Times, Oxford University, UCLA Anderson Forecast

The Forecast

Although the timing may be offset with California beginning a significant recovery later than some other states, we expect the California recovery to ultimately look very much like the U.S.[6] The recovery in CA will be slower in the leisure and hospitality and retail sectors due to the disproportionate reliance on international tourism[7], and mixed in transportation and warehousing due to the shift to online shopping on the one hand and the expected continuation of the trade war with China in a Biden administration on the other[8], but faster in business, scientific and technical services and in the information sector due to the demand for new technologies for the new way we are working and socializing, and faster in residential construction as California's shortage of housing relative to demand drives new developments.

The unemployment rate for the 4th quarter of this year is expected to be 8.9%, and for the entire years 2021, 2022 and 2023 we expect average unemployment rates of 6.9%, 5.2% and 4.4% respectively.

Our forecast for 2021, 2022 and 2023 is for total employment growth rates to be 6.1%, 3.4% and 2.2%. Non-farm payroll jobs are expected to grow 3.6%, 3.8% and 2.5% during the same three years. Real personal income is forecast to fall by -1.0% in 2021 as transfers from the stimulus packages expire and grow by 2.1% and 3.4% in 2022 and 2023. In spite of the recession, the continued demand for a limited housing stock coupled with low interest rates leads to a forecast of a relatively rapid return of homebuilding. Our expectation is for 123K net new units in 2021; a 16.2% increase from 2020 and continuing to grow to 132K for 2023. Needless to say, this level of home building means that the prospect for the private sector building out of the housing affordability problem over the next three years is nil.

6. Leo Feler, "A gloomy COVID winter and an exuberant vaccine spring" UCLA Anderson Forecast. December 2020.
7. California's share of international tourists to the United States in 2018 was 21.39%. U.S. National Travel and Tourism Office. https://travel.trade.gov/outreachpages/inbound.general_information.inbound_overview.asp
8. William Yu and Jerry Nickelsburg. "The Pandemic and the Trade Agreement." Cathay Bank. March 2020. And "The Economic implications of the National Security Law" Cathay Bank. May 2020.

Sea Level Rise and Its Impact on California Housing Markets

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December 2020

Summary

- The impact of sea level rise (SLR) on coastal California housing markets are estimated as follows:
- Number of homes affected -- 1 foot: 10,900, 2 feet: 19,000, 4 feet: 66,600
- Number of people affected -- 1 foot: 27,000, 2 feet: 46,000, 4 feet: 155,600
- Property value loss -- 1 foot: $11 billion, 2 feet: $20 billion, 4 feet: $68 billion
- Coastal California zip codes are divided into three zones by the percentage of housing units impacted by SLR of 4 feet: Green Zone (0%, 196 zip codes), Yellow Zone (below 4%, 81 zip codes), and Red Zone (above 4%, 30 zip codes).
- We do not find evidence that homebuyers have seriously factored SLR risk into their investment decisions in California. Red Zone houses are still in high demand by high-income and high-education households.

The latest report from the United Nations' Intergovernmental Panel on Climate Change (IPCC) predicts that global mean sea levels will mostly likely rise between 0.95 feet and 3.6 feet by the end of the century.[1] Their forecasted range of sea level rise (SLR) is based on two assumptions from Representative Concentration Pathways (RCP):

1) Low scenario (RCP2.6) represents a low greenhouse gas emissions and high mitigation future with projected global mean surface temperature increased by 1.6 degrees Celsius by 2100, causing SLR of 0.95 feet;

2) High scenario (RCP8.5) represents high greenhouse gas emissions in the absence of policies to combat climate change leading to a temperature increase of 4.3 degrees Celsius by 2100, causing SLR of 3.6 feet.[2]

Based on IPCC's forecasts and assumptions, this report will analyze how and where SLR would impact California coastal housing markets.

The Direct Impact on California Housing Markets

To measure how many houses would be affected and where they would be exposed to SLR, we use the data from the Union of Concerned Scientists (UCS)[3] based on Zillow Transaction and Assessment Dataset (ZTRAX). They provide data to project how many homes and people will be at risk of chronic inundation due to SLR by zip code in the U.S. by the year 2100. Figure 1 shows the number of people and homes in California and Figure 2 shows their estimated

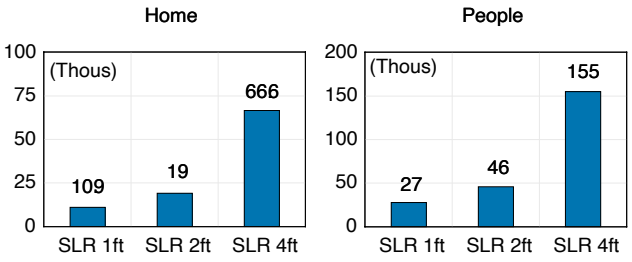
1. See IPCC's Special Report on the Ocean and Cryosphere in a Changing Climate. https://www.ipcc.ch/srocc/
2. Alternatively, National Oceanic and Atmospheric Administration (NOAA) develops three scenarios: (1) Low scenario: SLR 1.6 feet by 2100; (2) Intermediate scenario: SLR 1 foot by 2035 and 4 feet by 2100; (3) High scenario: SLR 2 feet by 2045 and 6.5 feet by 2100.
3. See its report "Underwater—Rising Seas, Chronic Floods, and the Implications for US Coastal Real Estate." And https://ucsusa.maps.arcgis.com/apps/MapJournal/index.html?appid=0befd6dac46f4e0dbee2c3d8f539ab1a#

total home values at risk of SLR by three scenarios: 1 foot (low scenario by IPCC and intermediate scenario by 2035 by NOAA), 2 feet (high scenario by 2045 by NOAA), and 4 feet (high scenario by IPCC and intermediate scenario by 2100 by NOAA). With an SLR of 1 foot, 10,900 homes on the California coastline would face chronic inundation[4]; 27,000 people would be impacted directly; and the loss of total home value would amount to $11 billion. The number of homes and people impacted by SLR are from UCS, and the total estimated loss of property values are calculated from the percentage of homes impacted by SLR multiplied by the median home value in each zip code provided by American Community Survey (ACS) in 2018.[5] If we use Zillow's median home value in October 2020, the total loss will rise to $15.6 billion.

If the SLR reaches 2 feet, 19,000 homes in California will be at risk; 46,000 people will be impacted directly; and the loss of total home value will climb to $20 billion ($27 billion from Zillow's median home value in Oct. 2020). If the SLR goes to 4 feet, 66,600 homes in California will be at risk; 155,000 people will be impacted directly; and the loss of total home value will surge to $68 billion ($93 billion from Zillow in Oct. 2020). Note that the economic loss of SLR on the local economy is not limited to loss of residential properties. Additional loss includes damage on commercial properties, foregone property tax revenues and foregone local consumption and business by residents.

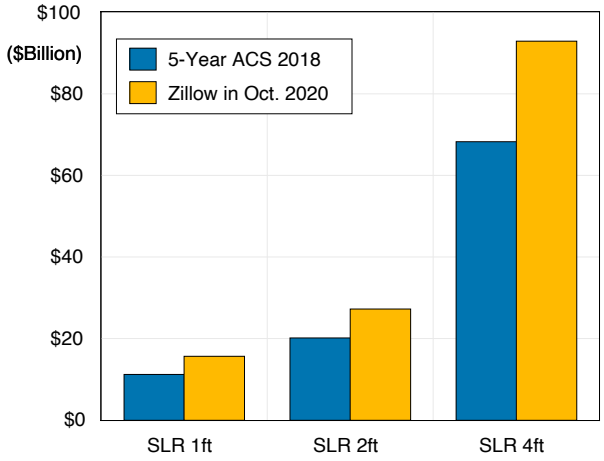
Based on 2018 ACS numbers, there were 136 million housing units in the U.S. and 14 million in California. The percentage of homes impacted by SLR in the U.S. and California are 0.1% in the U.S. and 0.08% in California with SLR of 1 foot; 0.22% in the U.S. and 0.13% in California with SLR of 2 feet; and 0.9% in the U.S. and 0.5% in California with SLR of 4 feet. That said, SLR risk on California real estate is milder than the national average. The real estate in Florida, on the East Coast, and in the Gulf Coast regions will face more severe damage than in California should SLR meet predictions. Murfin and Spiegel (2020)[6] estimate that Florida, New York, and New Jersey will encounter more loss of total home value than California due to SLR. In particular, Florida's loss is estimated at around 5 times as California.

Figure 1 Impact of Sea Level Rise on Number of Homes, People in California



Sources: Union of Concerned Scientists, American Community Survey and Author's Calculation

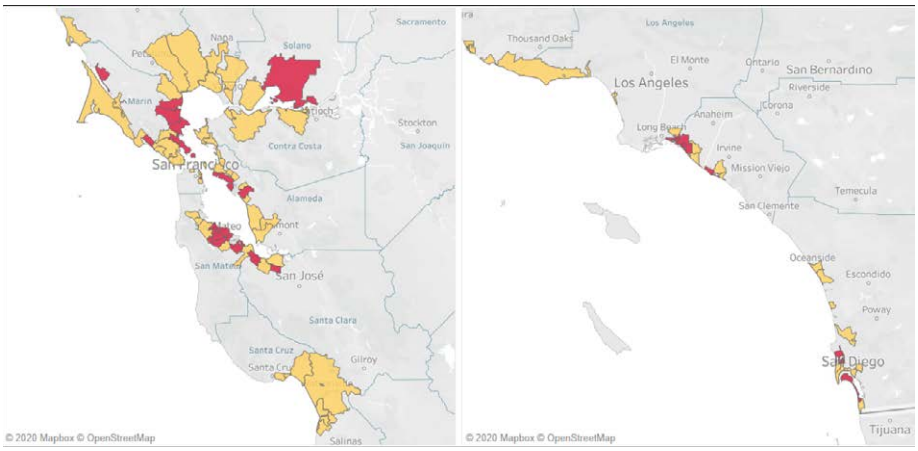
Figure 2 Impact of Sea Level Rise on Total Home Value in California by Two Measures



Sources: Union of Concerned Scientists, American Community Survey and Author's Calculation

4. Chronic inundation refers to any area where high tide floods usable, non-wetland area at least 26 times per year.
5. It is a 5-year ACS, for the period of 2014 to 2018. So the median home value might reflect the value prior to 2018.
6. "Is the Risk of Sea Level Rise Capitalized in Residential Real Estate?" Review of Financial Studies, (2019), 33:3, pp 1217-1255

Figure 3 Zip Codes in California Impacted by Sea Level Rise of 4 Feet for Selected Regions in California



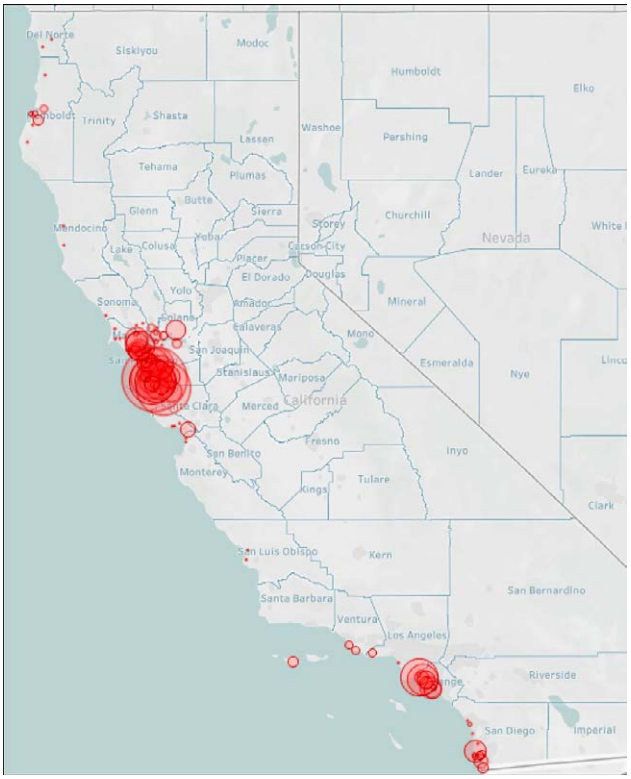
Sources: Union of Concerned Scientists, American Community Survey and Author's Calculation

The Three Zones of Coastal California

To simply the analysis, we use the intermediate scenario of SLR of 4 feet for the rest of the report. To show the degree of risk in California coastal zip codes impacted by SLR of 4 feet, we calculate the percentage of homes at risk of SLR over the total housing units for each zip code. There are about 111 zip codes facing risk from SLR of 4 feet with a varying degree of percentages of impacted housing units. For instance, the zip code with the highest percentage (77%) of housing units facing SLR risk is 94065 in Redwood City, followed by 94404 (64%) in Foster City and 92661 (46%) in Newport Beach. We arbitrarily categorize the zip codes with more than 4% of homes impacted by SLR of 4 feet as the Red Zone and the rest of the zip codes (below 4%) as the Yellow Zone. As shown in Figure 3, there are 30 zip codes in the Red Zone and 81 zip codes in the Yellow Zone. The details of zip codes in the Red and Yellow Zones are shown in the Appendix.

Figure 4 uses the size of circle to display the number of residents that will be directly impacted by SLR of 4 feet: the larger the circle, the more people will be affected. Similar to Figure 2, it is clear that the Bay Area would be the most impacted by SLR. For example, the zip code with the most people being impacted by SLR is 94404 in Foster City, in which there will be 23,000 people directly affected by SLR of 4 feet, followed by 94303 in Palo Alto with 16,000 people and 94403 in San Mateo with 11,400 people.

Figure 4 Number of People by Zip Code in California Impacted by SLR of 4 Feet



Sources: Union of Concerned Scientists, American Community Survey and Author's Calculation

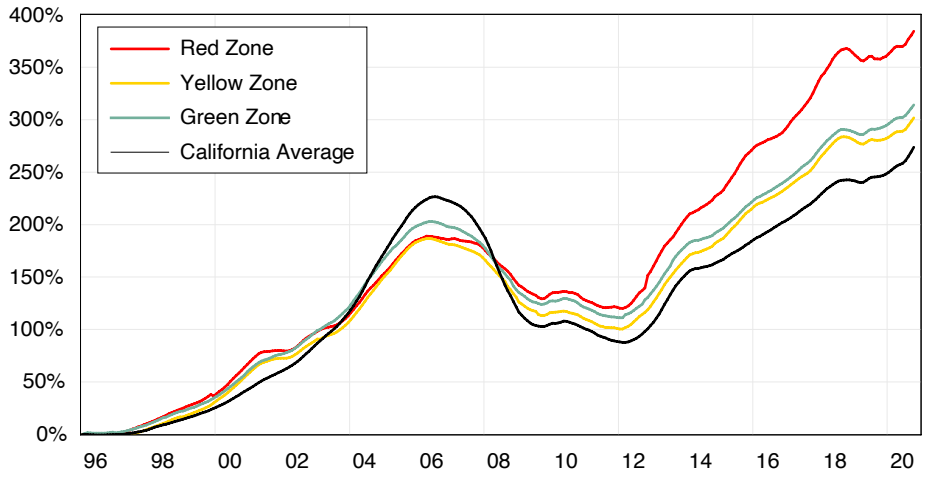
The Characteristics of the Three Zones

Now let's take a look at the characteristics of housing markets in coastal California. It is worth noting that although for years we have heard of climate change and SLR risks on the coastline, coastal real estate is still in high demand in the U.S., whether in California or on any other coast. An ocean view and proximity to the beach continue to make these properties more expensive and attractive to buyers despite warnings of danger. This means the loss on homes due to SLR will be higher on coastal real estate than on an average house in the U.S.

According to Zillow, total housing values in the U.S. amount to $33 trillion (median home value: $205,000). Total home values in California are about $7.3 trillion (median home value: $476,000). Among 14 million housing units in California, 3.1 million units are in the coastal zip codes (within 5 miles of shoreline). Among these zip codes, there are 30 in the Red Zone (with a total of 320,000 housing units) and 81 in the Yellow Zone (with a total of 846,000 units) as shown in Figure 2. The rest of the zip codes on the coastline (totaling 2 million housing units) are in the Green Zone, which is not at risk with SLR up to 4 feet.

Figure 5 presents the percentage change of home values[7] since 1996 for coastal California zip codes, in which the Red Zone is at high risk to SLR of 4 feet, the Yellow Zone is at medium risk, and the Green Zone is at low risk, as well as the average of California homes. If home buyers and investors are rational, aware of climate change and SLR risks, and consider it when making home purchase decisions, we might expect to see the price growth in the Red Zone slower than in the Yellow Zone, and the Yellow Zone's slower than in the Green Zone's, and the Green Zone's slower than California's average. This did not quite happen. Rather, the Red Zone had the highest growth rate of home value, and the Yellow Zone had higher growth than the California average.

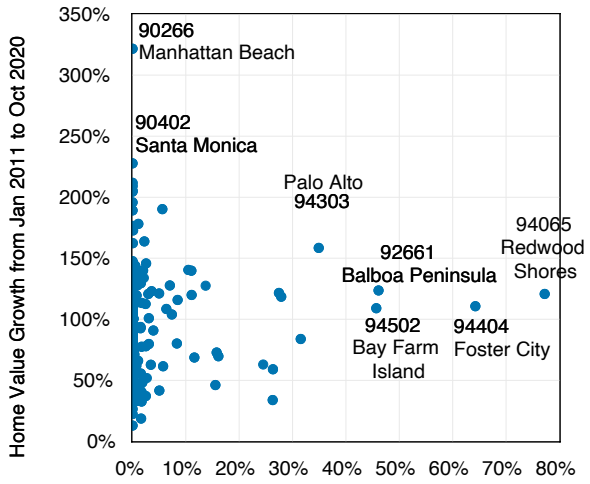
Figure 5 Percentage Change of Median Home Values in Coastal California Zip Codes and All of California Since 1996



Sources: Zillow and Author's Calculation

7. *Based on Zillow's home values index for all houses (SFR and Condo), smoothed and seasonally adjusted.*

Figure 6 Correlation between % of Homes Exposed to SLR of 4 Feet and Home Value Growth from January 2011 to October 2020 by Coastal Zip Codes in California



Sources: Union of Concerned Scientists, American Community Survey, Zillow and Author's Calculation

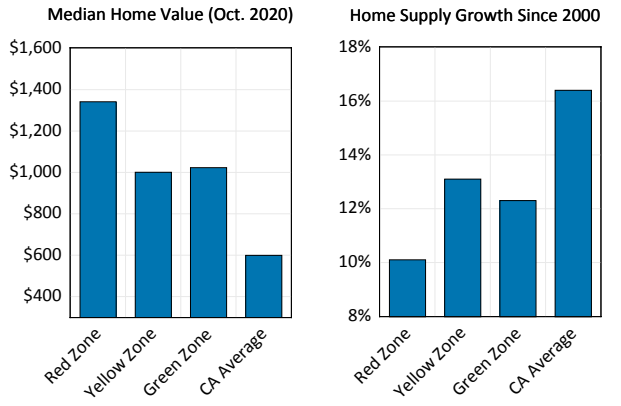
Figure 6 shows the correlation between percentage of homes exposed to SLR of 4 feet and home value growth from January 2011 to October 2020 by coastal zip codes in California. There is no clear correlation. If homebuyers and investors are concerned with SLR risk, we should see a negative correlation. But in fact, if we run a regression in which home value growth is the dependent variable with two explanatory variables – (1) the percentage of homes exposed to SLR and (2) whole zip-code population – we will get a significant and positive correlation. That means zip codes with more SLR risk have seen more home value growth after controlling for population. That is consistent to the outperforming Red Zone line in Figure 5.

Figure 7 (left) illustrates the median home values from Zillow in October 2020 by three zones in coastal California and California as a whole. The median home value in the Red Zone is $1,341,000 for two possible reasons: (1) superior amenities as mentioned before and (2) many zip codes are located in the heart of Silicon Valley, which has experienced a robust tech boom over the past several years. The median home value in the Yellow and Green Zones are both around $1 million. If we assume that natural amenities are similar in these three zones, then there is no evidence of a price discount due to SLR exposure. Note that the median rent could be more likely to reveal amenity value free of SLR concern. In other words, in terms of reacting to future SLR risk, price discount is more likely to be reflected in current home values than in the current rents by controlling the same amenity in the same zip code. So if homebuyers in California are rational, we should see that the ratio of home value to rent to be inversely correlated to % of home exposed to SLR. Figure 8 is the correlation of these two variables but we cannot see a significantly negative correlation.

Bernstein et al. (2019)[8] suggest that homes exposed to SLR sell for approximately 7% less than equivalent properties without exposure. Why did we not find it in California? There are two possible reasons: (1) They used individual property data while we use weighted average zip code data, or (2) They analyzed all coastal property in the U.S. It is likely that home price discount due to SLR is mostly driven in Florida and on the East and Gulf Coasts.[9]

Figure 7 (right) illustrates the home supply growth since 2000. The three zones in coastal California had lower housing supply growth than the whole of California for three possible reasons: (1) there is less space available on the coast, (2) it is more difficult to build on the coast, and (3) home builders, lenders, and local governments did factor the SLR risk into their decisions. Note that the Red Zone had

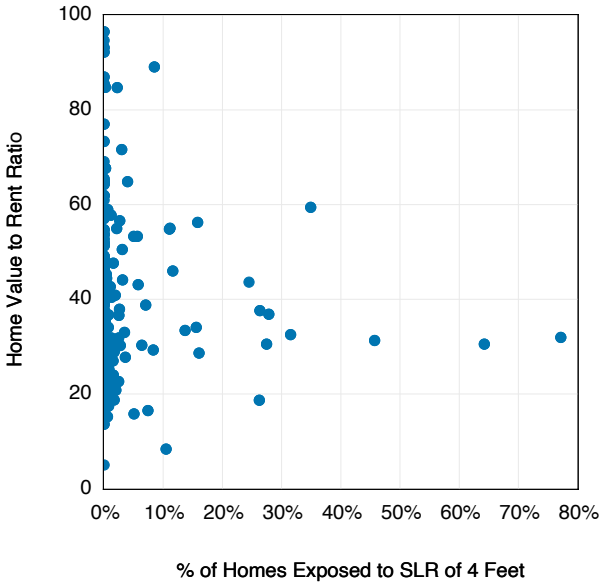
Figure 7 Median Home Values in October 2020 and Home Supply Growth Since 2000 in Coastal California Zip Codes and All of California



Sources: Zillow and American Community Survey

8. See Bernstein, Gustafson, and Lewis, "Disaster on the Horizon: The Price Effect of Sea Level Rise," Journal of Financial Economics, (2019), 134, pp 253-272.
9. See Figure 1 in their article (P257).

Figure 8 Correlation between % of Homes Exposed to SLR of 4 Feet and Ratio of Home Value to Annual Rents by Coastal Zip Codes in California



Sources: Union of Concerned Scientists, American Community Survey, Zillow and Author's Calculation

lower housing supply growth than the Yellow and Green Zones. That could suggest relatively risk-averse behavior, but a 10% growth might still be too high to indicate serious consideration of risk.

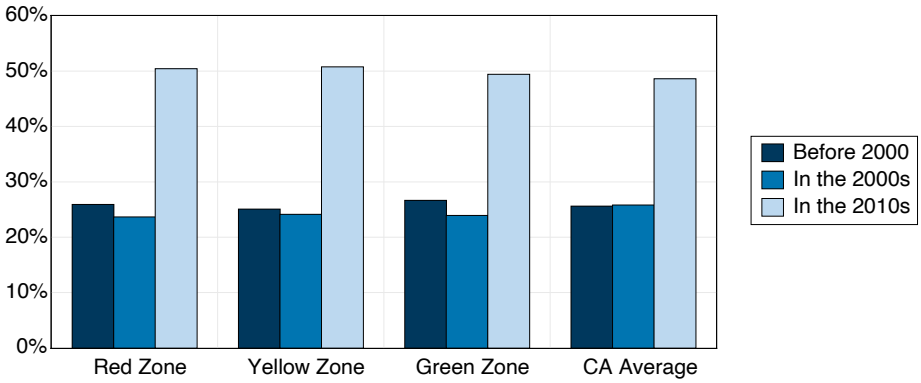
Figure 9 shows percentages of households (for both homeowners and renters) moved in by zone in three periods: before 2000, during the 2000s, and during the 2010s. It is interesting to see that around 50% of residents have moved into their residence since 2010. We see a similar pattern across these three zones and in California as a whole. This could imply that SLR risk has not yet discouraged home purchases in the Red and Yellow Zones.

Would banks lend money to homebuyers when the collateral property might be at risk with SLR during its 30-year mortgage period? So far, the answer seems to be yes. Figure 10 presents the percentage of homes with mortgages by the three zones and in all of California. We do not see significant evidence that the Yellow Zone has less access to mortgages compared to the Green Zone, even though the Red Zone does have a slightly lower percentage of mortgages. Red Zone homeowners have higher mortgage costs compared to the Green Zone. It is unclear why the banks have not priced the SLR risk into their decisions.

The first possible reason could be that the average effective mortgage holding period is less than 30 years. In fact, Figure 9 suggests that the median duration of a mortgage holder staying in a house is around 10 to 15 years in California. That is, starting from 2020, the median mortgage will end by 2035 when the current homeowners move on. The second possible reason is that all these mortgages will be sold to Fannie Mae and Freddie Mac, two federal agencies who have a mandate to provide liquidity to homebuyers, and be turned into mortgage-back securities for investors. There might be some political reasons for Fannie and Freddie to not raise the price of mortgage on properties with high SLR risk.

Note that the high-risk flood insurance provided by the National Flood Insurance Program (NFIP) can only secure

Figure 9 Percentages of Households Moved in by Three Periods in Coastal California Zip Codes and All of California



Source: American Community Survey

coverage of up to $250,000 for a residential building. That amount is significantly lower than a median home value in coastal California, making it less relevant when facing SLR risk. Will the insurance industry be able to provide some sort of market-rate climate insurance in the future to protect homeowners from SLR risks? It is likely, but we suggest the insurance premium will be extremely expensive because any SLR will hit all of the coastal U.S. at once. Unlike most other natural disasters, it will be difficult for insurers to diversify the SLR risk across the nation or the globe.

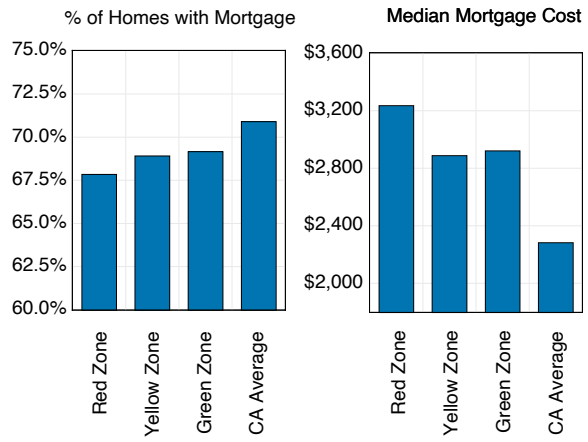
Figure 11 (left) displays the median household income in the three zones and all of California. It is not surprising to see the highest household income in the Red Zone, followed by the Green/Yellow Zone, which is consistent to the home values as shown in Figure 7. Figure 11 (right) shows that education level is consistent with homeowners' income level. That said, those who live in the Red Zone and are facing the highest risk of SLR in the future are also more educated and have the highest earning power. It is comforting to know they are more capable than middle-income or low-income households to navigate financial damage if faced with SLR in the future.

California vs. Florida

Using the same data source from UCS, Keys and Mulder (2020)[10] suggest that since 2013 homebuyers started to factor in SLR, resulting in lower home sales volume (by 20%) in most SLR-exposed communities (similar to the Red Zone in this report) than in less SLR-exposed areas (Green Zone) in coastal Florida. And since 2018, home prices in the Red Zone started to grow more slowly than in the Green Zone in Florida. That article suggests that homebuyers became more aware of climate change and SLR risk partially because of events including severe damage on the East Coast caused by Hurricane Sandy in October 2012.

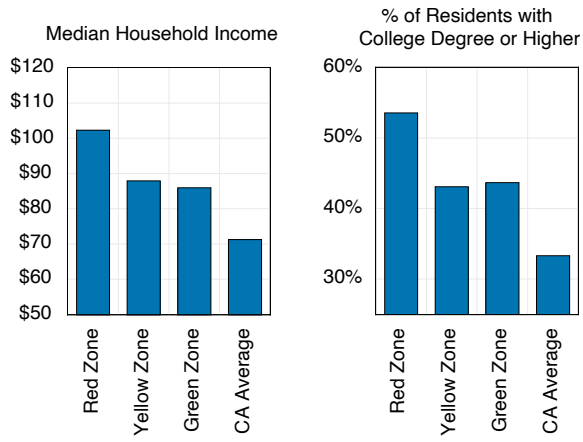
Why do we not see the same pattern in California? The first possible reason could be hurricanes do not strike the West Coast. Residents in California are less likely to imagine SLR risk compared to their Florida counterparts who have experienced horrific hurricane damage periodically.[11] The second possible reason is that SLR will affect homes in California later than in Florida as homes in California are in higher elevation than those in Florida. For example, according to California's Legislative Analyst's Office (LAO)'s

Figure 10 Percentage of Homes with Mortgage and Median Mortgage Cost in Coastal California Zip Codes and All of California



Source: American Community Survey

Figure 11 Median Household Income and Percentage of Residents with College Degree or Higher in Coastal California Zip Codes and All of California



Source: American Community Survey

10. See their paper, "Neglected No More: Housing Markets, Mortgage Lending, and Sea Level Rise," NBER Working Paper 27930.
11. One example is the following quote by Clifford Rossi, a former risk officer at both Fannie Mae and Freddie Mac, "It never reaches the point of people really kind of being forward-thinking about this until the crisis is upon you or about to hit you in the face." November 30, 2020, Politico. https://www.politico.com/news/2020/11/30/climate-change-mortgage-housing-environment-433721

report,[12] SLR will reach 1 foot in 2035 and 2 feet in 2060 in California coastline.

Using a comprehensive database of all of U.S. coastal home sales until 2017 merged with data on elevation relative to local cities, Murfin and Spiegel (2020)[13] suggest there is no evidence of a price discount for those homes subject to SLR risk. This implies there might be variation of perception, experiences, and reaction in response to SLR risk across coastal communities in the U.S. Californians for sure are now more aware of wildfire risks than residents in other states.

Conclusions

The take-aways of the report are as follows:

- The projected impact of sea level rise (SLR) on coastal California housing markets are as follows:
  - Number of homes affected -- 1 foot: 10,900, 2 feet: 19,000, 4 feet: 66,600
  - Number of people affected -- 1 foot: 27,000, 2 feet: 46,000, 4 feet: 155,600
  - Property value loss -- 1 foot: $11 billion, 2 feet: $20 billion, 4 feet: $68 billion
  - We divide coastal California zip codes into three zones by the percentage of housing units impacted by SLR of 4 feet: Green Zone (0%, 196 zip codes), Yellow Zone (below 4%, 81 zip codes), and Red Zone (above 4%, 30 zip codes).
  - We do not find evidence that homebuyers have seriously factored SLR risk into their investment decisions in California. Red Zone houses are still in high demand by high-income and high-education households.

12. "What Threat Does Sea-level Rise Pose to California?" August, 2020. https://lao.ca.gov/Publications/Report/4261
13. Murfin and Spiegel, "Is the Risk of Sea Level Rise Capitalized in Residential Real Estate?" (2020) Review of Financial Studies, 33:3, 1217-1255.

Appendix. Zip Codes in Red Zone and Yellow Zone of Coastal California

Zone	Zip Code	% of Home to SLR Risk	Total # of homes	Total population	Zone	Zip Code	% of Home to SLR Risk	Total # of homes	Total population
Red	94065	77.2%	5,275	12,579	Yellow	95076	1.5%	25,359	86,703
Red	94404	64.2%	15,149	36,905	Yellow	93035	1.4%	12,158	29,404
Red	92661	46.1%	2,568	3,225	Yellow	94111	1.3%	2,624	3,620
Red	94502	45.7%	5,262	14,619	Yellow	94559	1.2%	11,070	27,523
Red	94303	34.9%	14,699	48,039	Yellow	94070	1.2%	12,154	31,049
Red	94158	31.5%	4,265	7,291	Yellow	94603	1.1%	10,434	34,593
Red	94403	27.8%	17,241	44,300	Yellow	92101	1.1%	27,236	39,313
Red	94401	27.4%	13,511	35,414	Yellow	92106	1.0%	8,074	19,080
Red	94925	26.3%	4,053	9,866	Yellow	94801	0.9%	10,311	29,958
Red	95564	26.2%	202	432	Yellow	95501	0.8%	11,107	23,467
Red	90803	24.4%	18,166	32,389	Yellow	92104	0.8%	23,304	45,202
Red	94940	23.9%	138	234	Yellow	95039	0.7%	424	1,195
Red	94949	16.0%	7,721	17,452	Yellow	94945	0.7%	7,503	19,035
Red	94939	15.8%	3,520	7,108	Yellow	95551	0.6%	665	1,374
Red	92649	15.5%	15,082	34,406	Yellow	92660	0.6%	16,942	36,906
Red	94063	13.7%	10,598	34,503	Yellow	94010	0.5%	17,378	42,730
Red	94970	12.9%	874	689	Yellow	94589	0.5%	10,097	30,668
Red	94901	11.6%	16,336	42,482	Yellow	94565	0.5%	29,369	96,081
Red	92663	11.1%	12,246	21,572	Yellow	90815	0.5%	14,883	41,026
Red	94402	11.0%	10,225	25,764	Yellow	95555	0.4%	224	337
Red	94089	10.5%	8,474	22,313	Yellow	94965	0.4%	6,459	11,408
Red	94920	8.5%	5,954	12,797	Yellow	92107	0.3%	14,706	31,148
Red	94903	8.3%	12,587	30,048	Yellow	94710	0.3%	3,231	7,461
Red	94585	7.4%	9,572	29,599	Yellow	92008	0.3%	13,051	27,330
Red	94501	7.0%	26,889	63,843	Yellow	94608	0.3%	15,194	30,289
Red	94577	6.4%	17,922	48,088	Yellow	92625	0.2%	6,804	12,148
Red	92109	5.7%	26,213	48,417	Yellow	94555	0.2%	11,941	38,388
Red	92118	5.6%	10,884	22,484	Yellow	95012	0.2%	2,739	10,792
Red	90740	5.1%	13,714	24,494	Yellow	94956	0.2%	916	1,224
Red	94002	5.0%	11,015	27,202	Yellow	94956	0.2%	916	1,224
Yellow	94904	3.9%	5,665	12,590	Yellow	95548	0.2%	582	1,224
Yellow	94587	3.6%	22,455	74,601	Yellow	94043	0.2%	13,777	31,488
Yellow	93013	3.4%	7,565	16,644	Yellow	95410	0.2%	629	1,159
Yellow	94030	3.1%	8,591	22,710	Yellow	95536	0.2%	1,270	2,898
Yellow	94941	3.1%	14,226	32,013	Yellow	90293	0.2%	7,059	12,694
Yellow	94025	3.0%	16,036	42,788	Yellow	94130	0.1%	708	3,064
Yellow	92647	2.7%	22,068	62,718	Yellow	95010	0.1%	4,847	9,030
Yellow	94937	2.6%	732	816	Yellow	94601	0.1%	16,489	52,299
Yellow	94607	2.6%	12,397	26,254	Yellow	94503	0.1%	5,639	20,306
Yellow	94107	2.5%	15,981	29,689	Yellow	93402	0.1%	6,850	16,350
Yellow	95503	2.5%	10,799	25,503	Yellow	94553	0.1%	19,612	49,699
Yellow	94066	2.5%	15,238	43,124	Yellow	92121	0.1%	1,883	4,655
Yellow	90265	2.2%	9,818	18,389	Yellow	94804	0.0%	15,303	41,510
Yellow	91932	2.1%	10,488	26,701	Yellow	92054	0.0%	17,787	42,173
Yellow	94924	2.1%	858	1,134	Yellow	92054	0.0%	17,787	42,173
Yellow	94590	2.0%	16,069	37,377	Yellow	94606	0.0%	16,245	38,303
Yellow	92648	1.9%	21,180	46,890	Yellow	95062	0.0%	16,798	38,028
Yellow	94579	1.8%	7,310	22,040	Yellow	94123	0.0%	15,200	25,941
Yellow	94572	1.7%	3,395	10,411	Yellow	95476	0.0%	17,420	36,792
Yellow	93041	1.7%	8,463	24,506	Yellow	92007	0.0%	4,838	11,234
Yellow	95002	1.7%	594	2,146	Yellow	94105	0.0%	6,403	9,155
Yellow	95521	1.6%	9,470	21,462	Yellow	93442	0.0%	6,505	10,976
Yellow	94923	1.6%	1,286	846	Yellow	95437	0.0%	7,072	14,632
Yellow	94545	1.6%	9,675	32,525	Yellow	95531	0.0%	9,535	23,470
Yellow	94510	1.5%	11,698	28,262	Yellow	95003	0.0%	11,883	24,837
					Yellow	94954	0.0%	14,138	38,414

THE UCLA ANDERSON FORECAST FOR CALIFORNIA

DECEMBER 2020 REPORT

Tables

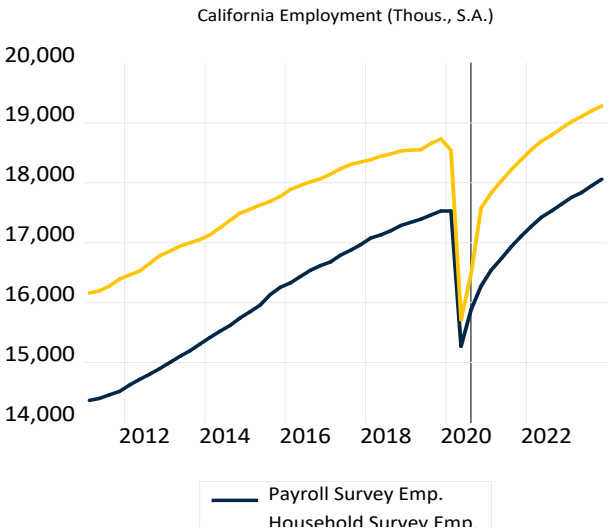
Summary of the UCLA Anderson Forecast for California by Calendar Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Personal Income and Taxable Sales											
Personal Income											
(Bil. $)	1886.4	2021.0	2172.9	2273.6	2383.1	2514.5	2632.3	2777.2	2813.0	2952.5	3126.8
(% Ch.)	1.8	7.1	7.5	4.6	4.8	5.5	4.7	5.5	1.3	5.0	5.9
Real Personal Income											
(Bil. 2012 $)	1858.0	1956.1	2073.6	2120.8	2159.0	2196.5	2234.9	2313.9	2291.0	2338.3	2418.5
(% Ch.)	0.3	5.3	6.0	2.3	1.8	1.7	1.7	3.5	-1.0	2.1	3.4
Taxable Sales											
(Bil. $)	586.4	615.4	638.3	654.1	678.7	708.0	733.8	670.6	725.1	735.9	754.4
(% Ch.)	5.1	4.9	3.7	2.5	3.8	4.3	3.6	-8.6	8.1	1.5	2.5
Real Taxable Sales											
(Bil. 2012 $)	577.6	595.7	609.2	610.1	614.8	618.4	622.9	558.5	590.5	582.9	583.5
(% Ch.)	3.5	3.1	2.3	0.2	0.8	0.6	0.7	-10.3	5.7	-1.3	0.1
Price Inflation (% Change)											
Consumer Prices	1.5	1.8	1.4	2.3	3.0	3.7	2.9	1.9	2.3	2.8	2.4
Employment and Labor Force (Household Survey)											
Employment (% Ch.)	2.1	2.1	2.0	1.8	1.5	1.1	0.9	-8.3	6.1	3.4	2.2
Labor Force (% Ch.)	0.5	0.5	0.6	1.0	0.8	0.6	0.6	-2.0	2.3	1.5	1.4
Unemployment Rate (%)	8.9	7.5	6.2	5.5	4.8	4.3	4.1	10.3	6.9	5.2	4.4
Nonfarm Employment (Payroll Survey, % Change)											
Total Nonfarm	2.6	2.8	3.0	2.7	2.1	2.1	1.5	-6.8	3.6	3.8	2.5
Natural Resources & Min.	-0.1	3.3	-9.6	-15.6	-1.9	2.6	0.4	-1.6	-2.1	-0.3	1.4
Construction	8.0	5.8	8.5	6.0	4.5	6.2	2.7	-3.7	3.6	1.1	2.2
Manufacturing	0.2	1.4	1.8	0.5	0.2	0.9	0.0	-6.2	0.8	2.7	3.1
Nondurable Goods	0.5	1.2	1.3	0.9	-0.6	-1.2	-0.8	-9.2	1.7	3.3	3.5
Durable Goods	-0.0	1.6	2.1	0.3	0.6	2.0	0.5	-4.5	0.2	2.4	2.8
Tran., Warehousing & Utility.	3.2	4.1	6.2	6.7	6.3	5.2	5.4	-1.7	2.8	3.3	3.4
Trade	1.8	2.1	1.7	0.9	0.5	-0.1	-1.3	-6.5	3.7	-0.4	-0.8
Information	3.1	2.9	5.3	7.9	0.6	2.6	3.5	-4.9	5.2	4.7	5.0
Financial Activities	1.2	-0.0	2.5	2.6	1.2	0.6	0.4	0.1	2.1	1.1	1.6
Professional & Bus. Servs.	4.4	3.4	2.6	1.6	2.0	3.4	2.0	-4.2	4.8	6.8	3.3
Educational & Health Servs.	3.4	3.0	3.6	3.6	3.8	2.7	3.0	-3.6	3.0	2.6	1.5
Leisure & Hospitality	4.9	4.9	4.1	4.1	2.7	2.0	2.0	-23.2	12.7	7.6	4.7
Other Services	2.4	3.7	1.6	1.8	1.9	1.4	0.8	-16.1	5.4	9.4	4.1
Federal Government	-1.9	-1.3	0.8	1.3	0.2	-0.8	0.9	5.2	-1.8	-0.0	0.3
State and Local Government	0.1	2.0	2.2	2.3	1.7	1.2	1.0	-4.9	-1.1	4.7	3.2
Nonfarm Employment (Payroll Survey, Thousands)											
Total Nonfarm	15150.8	15575.0	16048.6	16479.3	16827.1	17173.1	17430.4	16239.9	16829.4	17466.6	17900.8
Natural Resources & Min.	28.3	29.2	26.4	22.3	21.9	22.4	22.5	22.2	21.7	21.6	21.9
Construction	637.7	674.6	731.8	775.4	810.2	860.3	883.8	850.7	881.7	891.5	911.1
Manufacturing	1261.7	1279.7	1302.3	1309.1	1311.7	1323.0	1323.0	1240.9	1250.3	1283.8	1323.2
Nondurable Goods	470.1	475.7	481.6	486.1	483.4	477.7	473.8	430.0	437.4	451.8	467.8
Durable Goods	791.6	804.0	820.7	823.0	828.3	845.3	849.3	810.9	812.9	832.0	855.5
Tran., Warehousing & Utility	503.7	524.5	557.2	594.5	632.0	664.6	700.6	688.6	707.6	730.6	755.5
Trade	2264.5	2311.0	2351.1	2372.9	2384.4	2382.7	2351.2	2198.4	2280.6	2270.4	2252.0
Information	450.2	463.5	488.2	526.6	529.9	543.5	562.5	534.8	562.8	589.5	619.0
Financial Activities	783.1	782.8	802.4	823.0	832.8	838.2	841.4	842.1	859.5	869.1	883.2
Professional & Bus. Servs.	2348.0	2427.2	2490.4	2531.4	2581.7	2669.4	2723.9	2610.8	2736.3	2922.9	3018.6
Educational & Health Servs.	2308.7	2378.1	2464.4	2552.3	2650.5	2722.3	2805.0	2702.7	2784.5	2855.9	2898.3
Leisure & Hospitality	1675.3	1756.7	1828.6	1902.9	1954.1	1993.7	2032.7	1560.6	1758.8	1892.6	1981.2
Other Services	515.7	534.8	543.4	553.5	563.8	571.8	576.4	483.4	509.7	557.7	580.3
Federal Government	245.6	242.5	244.4	247.5	248.1	246.2	248.5	261.5	256.7	256.7	257.5
State and Local Government	2128.4	2170.4	2217.9	2268.0	2306.3	2335.0	2358.9	2243.3	2219.2	2324.2	2399.1
Construction Activity, Auto Registrations, and Population											
Residential Building Permits (Thous. Units)	85.4	86.5	98.5	101.3	114.1	117.2	112.7	106.2	123.4	128.6	131.6
Nonresidential Construction											
Value (Mil. 2012 $)	22280.6	21977.6	24081.1	24940.8	25578.6	29216.6	27104.7	19311.1	19453.7	21094.8	23028.6
Value (Mil. $)	22617.7	23571.9	26347.4	27369.6	28821.5	33464.5	32168.0	23202.8	23864.5	26726.2	29976.9
Auto Registrations (Mil.)	1.7	1.8	2.0	2.0	1.9	1.9	1.8	1.4	1.5	1.5	1.5
Net Immigration (Thous., Past Year)	69.0	73.4	66.4	34.6	55.6	37.4	-11.7	-9.2	-25.2	-33.0	-40.8
Population (Thous.)	38372.9	38700.1	39012.4	39279.0	39552.3	39784.3	39936.6	40092.8	40256.3	40403.5	40534.4
(% Ch.)	0.8	0.9	0.8	0.7	0.7	0.6	0.4	0.4	0.4	0.4	0.3

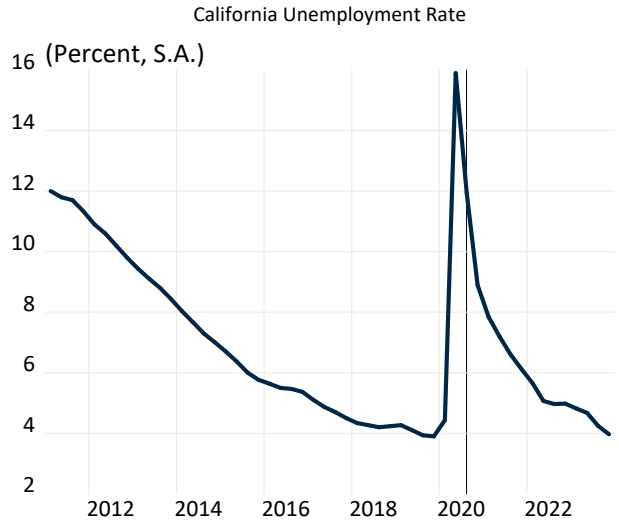
Summary of the UCLA Anderson Forecast for California by Quarter	2020Q3	2020Q4	2021Q1	2021Q2	2021Q3	2021Q4	2022Q1	2022Q2	2022Q3	2022Q4	2023Q1
Personal Income and Taxable Sales											
Personal Income											
(Bil. $, S.A. Annualized)	2792.4	2734.7	2788.1	2808.6	2808.2	2847.0	2888.7	2932.5	2973.2	3015.6	3062.5
(% Ch. A. R.)	-11.5	-8.0	8.0	3.0	-0.0	5.6	6.0	6.2	5.7	5.8	6.4
Real Personal Income											
(Bil. 2012 $, S.A. Annualized)	2321.6	2260.8	2295.9	2297.6	2278.8	2291.8	2310.3	2329.8	2347.7	2365.4	2388.0
(% Ch. A. R.)	-14.5	-10.1	6.4	0.3	-3.2	2.3	3.3	3.4	3.1	3.0	3.9
Taxable Sales											
(Bil. $, S.A. Annualized)	694.8	715.8	719.8	723.0	726.4	731.1	732.4	734.5	736.1	740.7	746.3
(% Ch. A. R.)	95.7	12.7	2.2	1.8	1.9	2.6	0.7	1.2	0.9	2.6	3.0
Real Taxable Sales											
(Bil. 2012 $, S.A. Annualized)	577.7	591.8	592.7	591.5	589.4	588.5	585.7	583.5	581.2	581.0	581.9
(% Ch. A. R.)	89.0	10.1	0.6	-0.8	-1.4	-0.7	-1.9	-1.5	-1.6	-0.1	0.6
Price Inflation (% Change Annualized Rate)											
Consumer Prices	3.5	2.3	1.6	2.7	3.3	3.3	2.6	2.7	2.5	2.7	2.4
Employment and Labor Force (Household Survey)											
Employment (% Ch. A. R.)	21.1	29.4	5.8	4.6	4.2	3.8	3.7	3.1	2.2	2.5	2.4
Labor Force (% Ch. A. R.)	0.7	13.0	1.0	1.7	1.5	1.6	1.6	0.5	1.7	2.5	1.7
Unemployment Rate (%, S.A.)	11.9	8.9	7.8	7.2	6.6	6.1	5.7	5.1	5.0	5.0	4.8
Nonfarm Employment (Payroll Survey, % Change Annualized Rate)											
Total Nonfarm	17.0	10.3	6.7	4.7	4.8	4.2	3.9	3.6	2.5	2.6	2.6
Natural Resources & Min.	-10.4	8.6	-6.0	0.1	-1.1	-0.9	-0.4	-0.7	1.8	0.1	2.4
Construction	17.2	16.6	2.7	1.8	0.3	2.9	0.3	0.8	0.9	1.4	3.1
Manufacturing	7.5	4.6	1.5	1.7	4.3	2.3	3.4	1.0	2.4	4.2	3.9
Nondurable Goods	11.5	8.4	2.5	3.1	6.5	0.1	5.5	2.1	2.4	3.5	4.7
Durable Goods	5.5	2.6	1.0	1.0	3.2	3.5	2.3	0.4	2.4	4.6	3.4
Tran., Warehousing & Utility	10.8	8.4	2.7	3.9	2.3	4.7	5.2	1.1	0.3	5.2	4.3
Trade	25.6	13.8	10.9	-3.4	0.2	-1.1	1.5	-1.8	-0.9	0.3	-0.6
Information	6.1	9.3	9.1	17.9	6.9	2.8	4.3	2.9	2.9	5.7	4.9
Financial Activities	4.8	6.5	2.6	1.0	0.2	1.5	0.1	1.1	3.5	1.3	1.9
Professional & Bus. Servs.	10.3	8.7	5.0	7.5	7.1	10.8	6.8	7.1	1.9	3.5	3.5
Educational & Health Servs.	17.0	3.1	4.4	8.2	1.9	2.6	1.5	5.0	0.0	0.7	2.9
Leisure & Hospitality	97.4	54.2	23.2	11.5	23.6	2.5	5.7	5.0	8.2	4.8	1.7
Other Services	38.7	24.7	12.5	6.4	3.5	15.2	9.5	9.4	12.3	2.5	4.7
Federal Government	43.6	-18.7	-9.6	-0.2	-0.2	0.0	-0.0	0.0	-0.0	0.4	0.4
State and Local Government	-8.0	-2.0	3.7	2.3	2.3	6.3	6.0	5.2	3.9	3.0	2.9
Nonfarm Employment (Payroll Survey, Thousands, S.A.)											
Total Nonfarm	15882.5	16278.1	16543.4	16733.5	16932.7	17108.1	17271.6	17423.0	17529.5	17642.2	17755.2
Natural Resources & Min.	21.6	22.1	21.7	21.8	21.7	21.6	21.6	21.6	21.7	21.7	21.8
Construction	838.2	871.0	876.8	880.8	881.4	887.8	888.4	890.2	892.1	895.2	902.1
Manufacturing	1219.6	1233.3	1237.9	1243.2	1256.4	1263.6	1274.3	1277.5	1285.1	1298.5	1310.9
Nondurable Goods	420.3	428.8	431.5	434.7	441.7	441.7	447.7	450.1	452.8	456.7	462.0
Durable Goods	799.3	804.4	806.4	808.5	814.8	821.9	826.5	827.4	832.3	841.8	848.9
Tran., Warehousing & Utility	680.0	693.9	698.6	705.3	709.2	717.4	726.5	728.5	729.1	738.4	746.3
Trade	2166.5	2237.6	2296.2	2276.6	2278.0	2271.8	2280.3	2270.0	2264.8	2266.6	2263.3
Information	516.8	528.4	540.0	562.8	572.3	576.2	582.3	586.5	590.6	598.8	606.0
Financial Activities	838.2	851.6	857.0	859.0	859.4	862.7	862.8	865.3	872.8	875.5	879.6
Professional & Bus.Servs.	2572.0	2626.3	2658.9	2707.1	2753.9	2825.2	2872.3	2921.8	2935.9	2961.5	2987.0
Educational & Health Servs.	2683.0	2703.4	2732.9	2787.1	2800.1	2817.9	2828.6	2863.1	2863.3	2868.5	2888.7
Leisure & Hospitality	1426.2	1589.3	1674.5	1720.8	1814.4	1825.6	1851.3	1874.0	1911.4	1933.7	1941.8
Other Services	456.8	482.7	497.1	504.9	509.2	527.5	539.6	551.8	568.0	571.5	578.1
Federal Government	277.4	263.4	256.8	256.7	256.6	256.6	256.6	256.6	256.6	256.9	257.2
State and Local Government	2186.2	2175.1	2195.0	2207.6	2220.0	2254.3	2287.1	2316.1	2338.2	2355.5	2372.5
Construction Activity, Auto Registrations, and Population											
Residential Building Permits (Thous. Units, S.A. Annualized)	114.3	125.2	122.2	122.9	122.9	125.6	126.2	127.5	129.8	130.8	130.7
Nonresidential Construction											
Value (Mil. 2012 $, S.A. Annualized)	19497.5	19250.4	19440.5	19448.0	19261.3	19665.1	20093.9	20806.7	21614.6	21864.0	22175.7
Value (Mil. $, S.A. Annualized)	23402.8	23220.4	23567.5	23744.4	23710.7	24435.7	25173.3	26261.7	27476.8	27993.0	28585.0
Auto Registrations (Mil., S.A. Annualized)	1.4	1.5	1.6	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Net Immigration (Thous., Past 4 Qtrs.)	-18.4	-20.3	-22.3	-24.2	-26.2	-28.1	-30.1	-32.0	-34.0	-35.9	-37.9
Population (Thous.)	40114.9	40156.7	40197.6	40237.4	40276.2	40314.1	40350.9	40386.6	40421.4	40455.1	40487.9
(% Ch. A. R.)	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.3	0.3	0.3

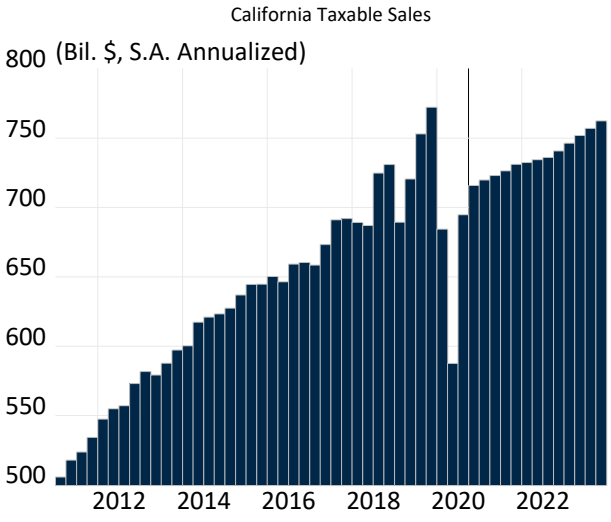
THE UCLA ANDERSON FORECAST FOR CALIFORNIA

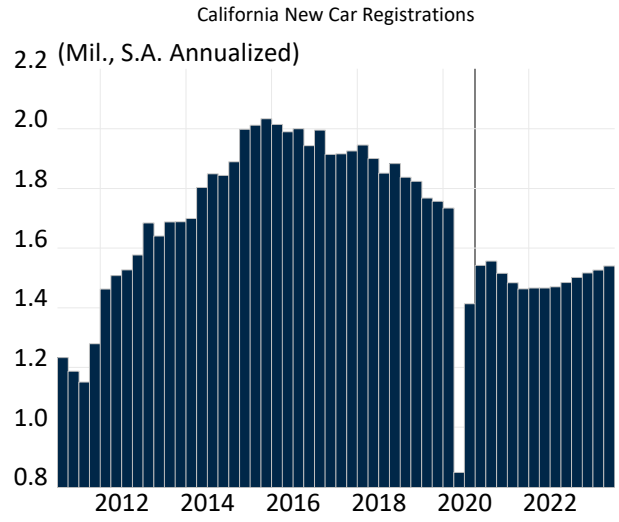
DECEMBER 2020 REPORT

Charts

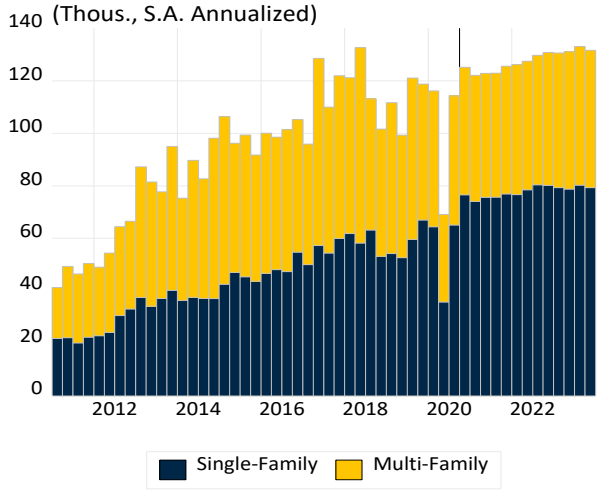

California Employment (Thous., S.A.)
20,000
19,000
18,000
17,000
16,000
15,000
14,000
2012
2014
2016
2018
2020
2022
Payroll Survey Emp.
Household Survey Emp


California Unemployment Rate
(Percent, S.A.)
16
14
12
10
8
6
4
2
2012
2014
2016
2018
2020
2022

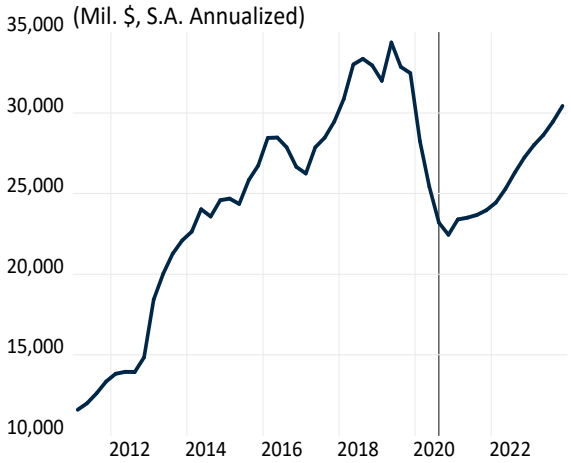

California Taxable Sales
800
(Bil. $, S.A. Annualized)
750
700
650
600
550
500
2012
2014
2016
2018
2020
2022


California New Car Registrations
2.2
(Mil., S.A. Annualized)
2.0
1.8
1.6
1.4
1.2
1.0
0.8
2012
2014
2016
2018
2020
2022

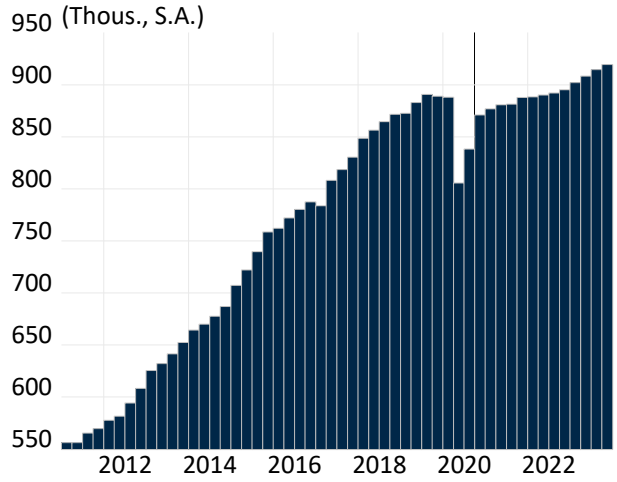
California New Residential Units Authorized By Building Permits



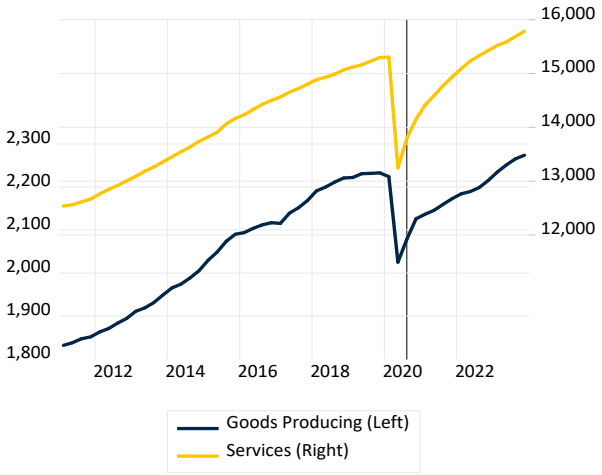
California Nonresidential Construction Authorized By Building Permits, Value (3-qtr. moving avg.)



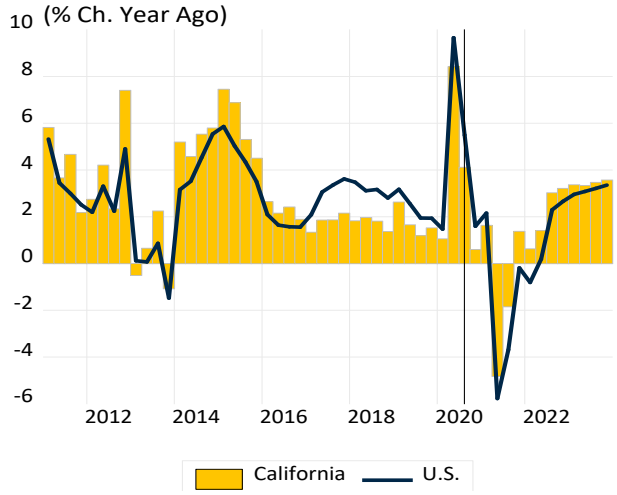
California Construction Employment



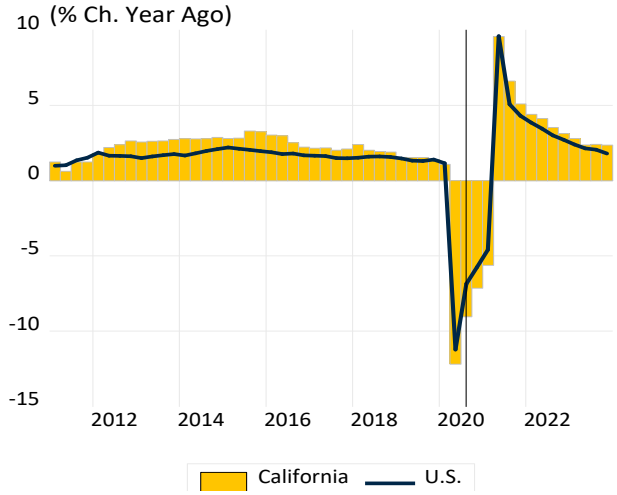
California Employment by Sector (Thous., S.A.)



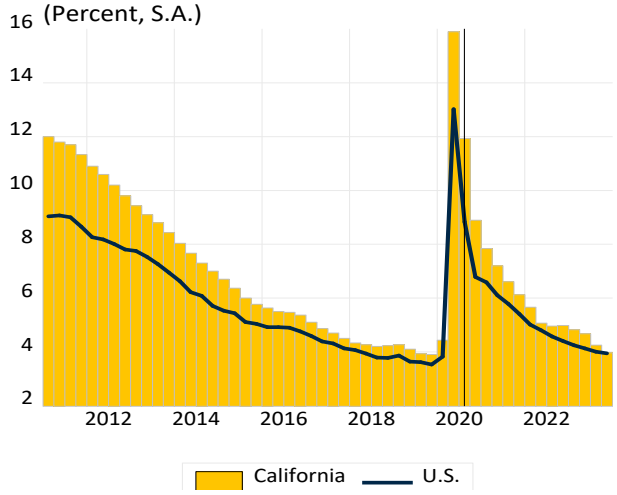
Real Personal Income California versus U.S.



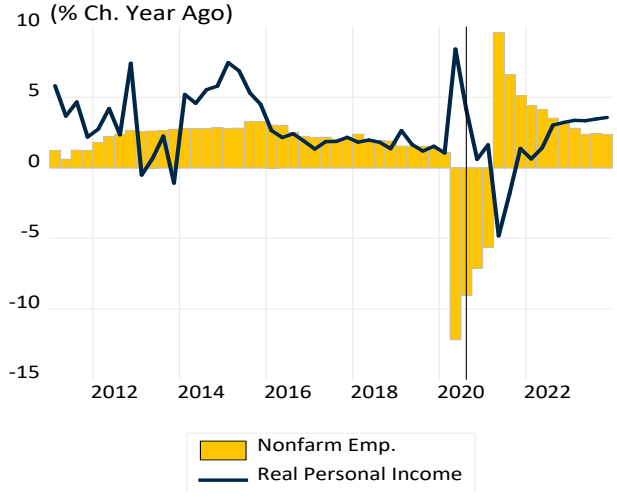
Nonfarm Employment California versus U.S.



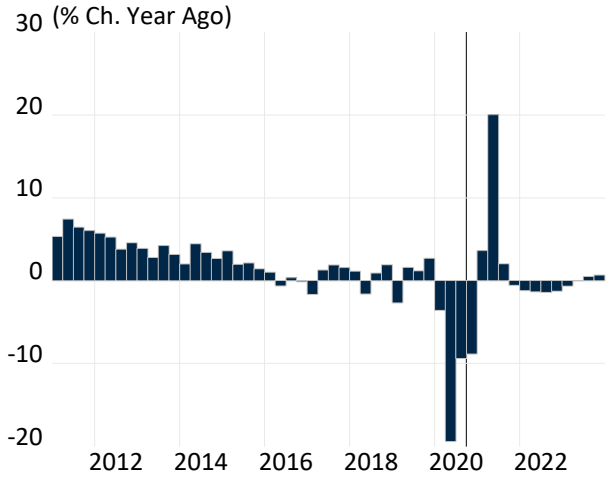
Unemployment Rate California versus U.S.



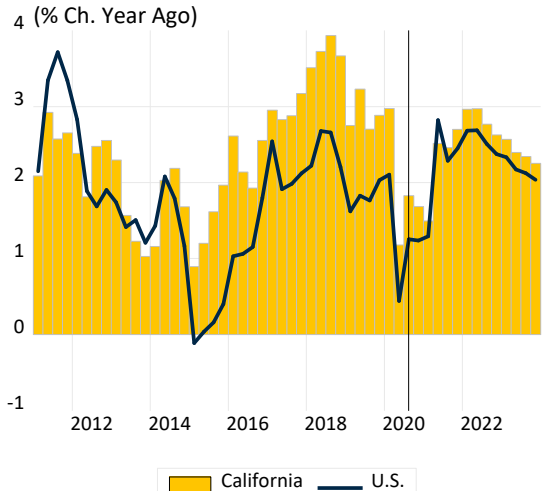
California Employment and Real Personal Income



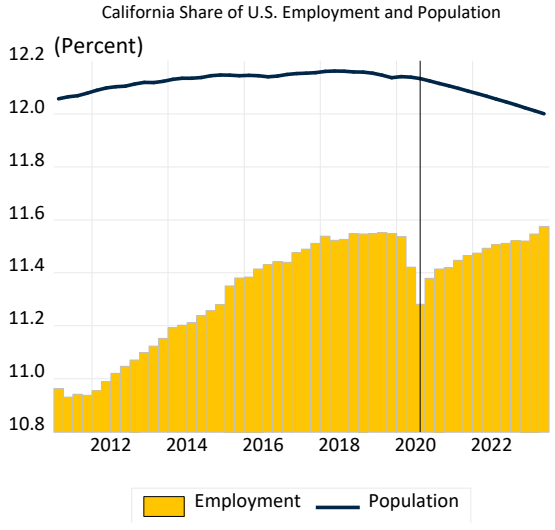
California Real Taxable Sales



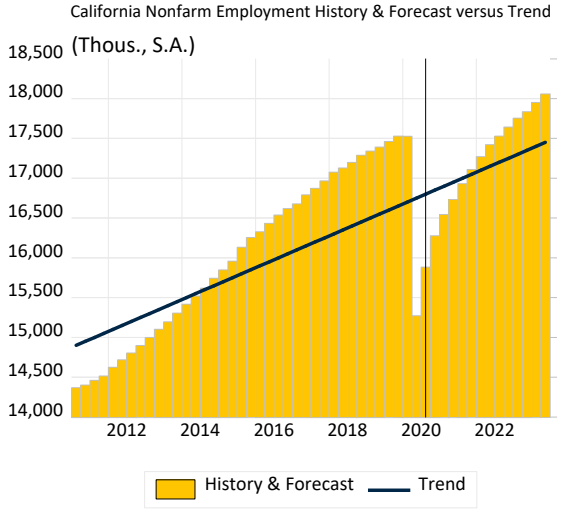
Consumer Price Index California versus U.S.



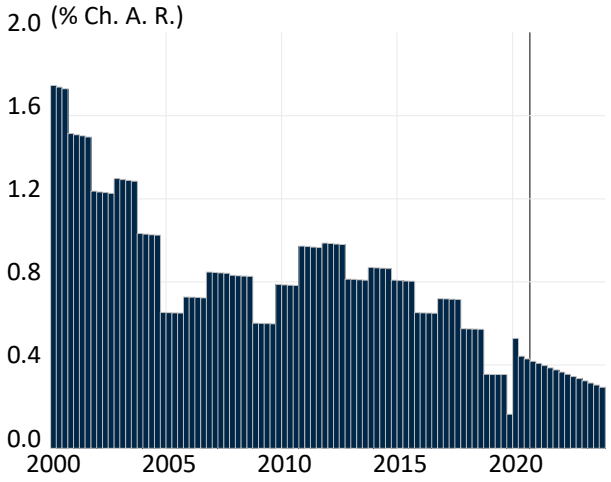
California Share of U.S. Employment and Population



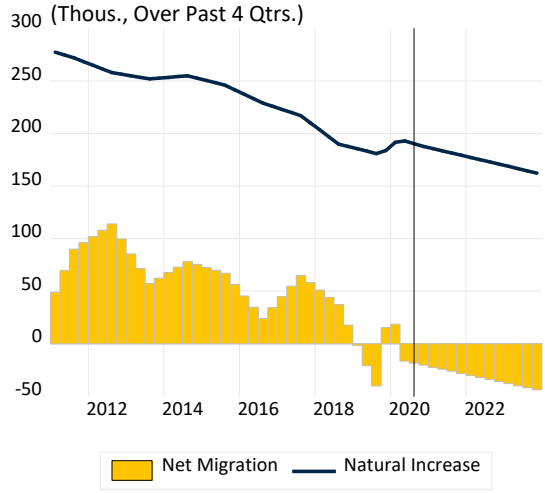
California Nonfarm Employment History & Forecast versus Trend



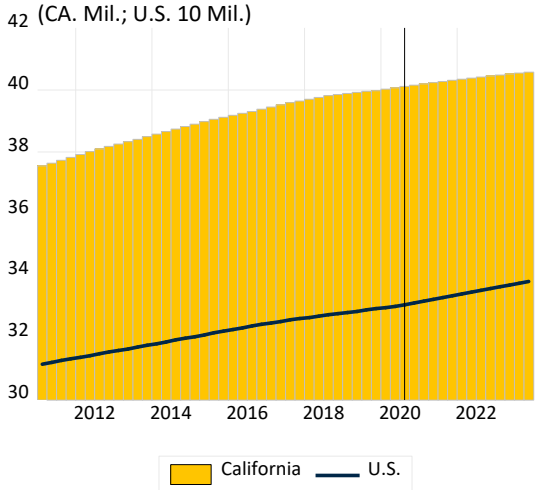
California Population Growth



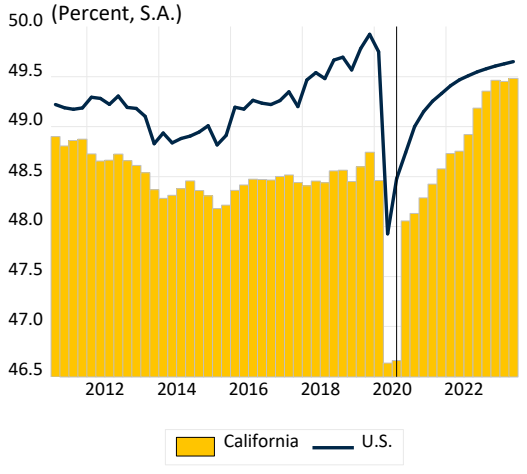
California Net Natural Population Increase and Net Migration



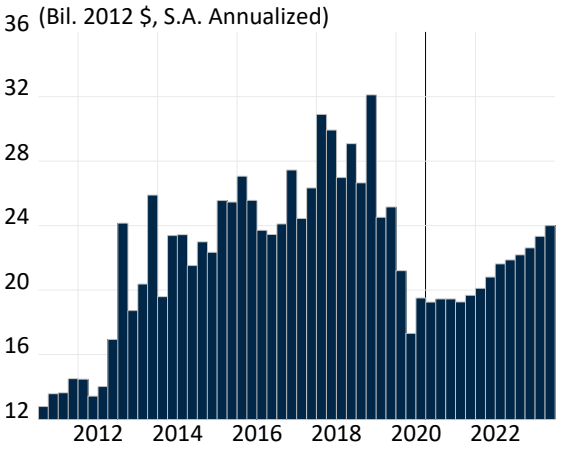
Population of California versus U.S.



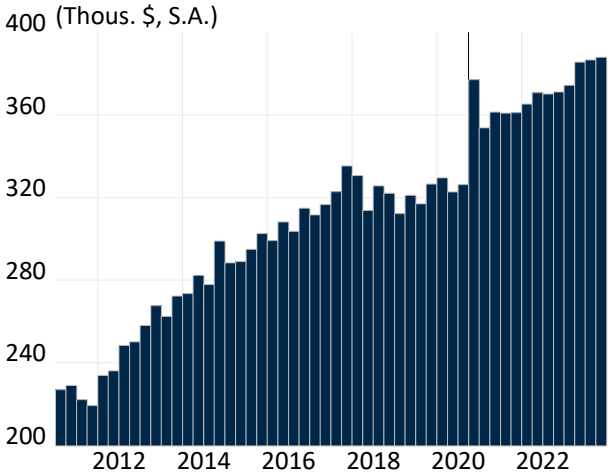
Gross Labor Force Participation Rate (Labor Force/Total Population)
California versus U.S.



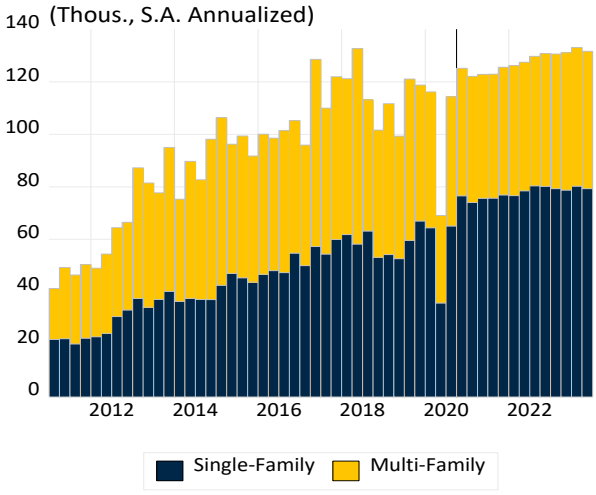
California Nonresidential Construction Authorized By Building Permits, Real Value



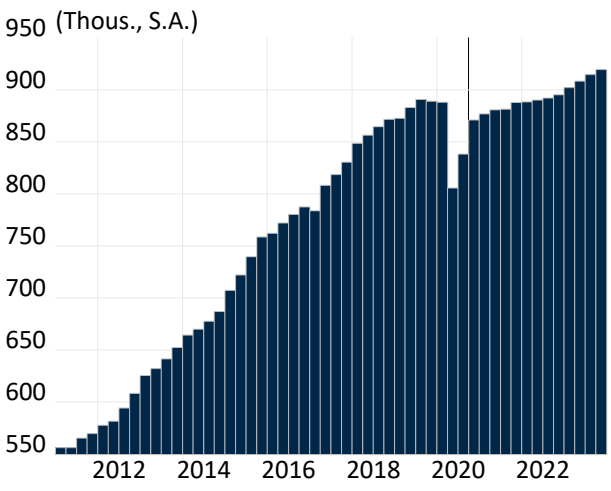
U.S. Median Price of New Single-Family Homes



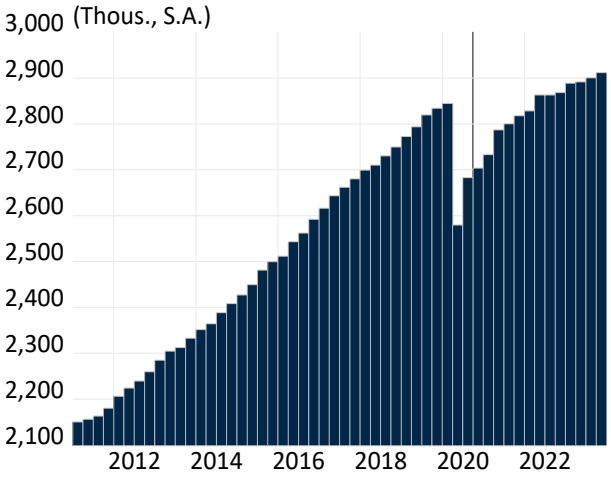
California New Residential Units Authorized By Building Permits



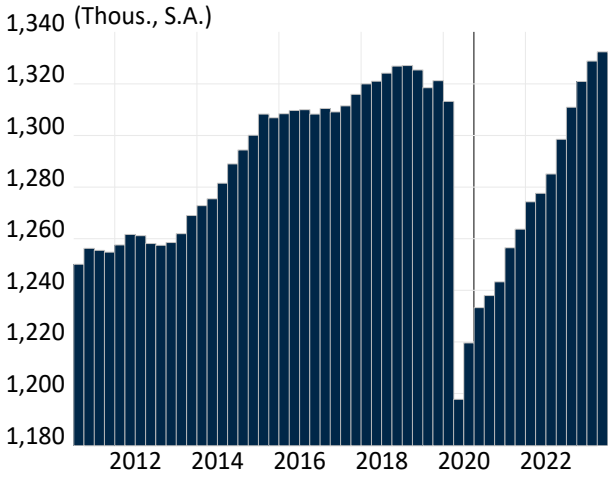
California Construction Employment



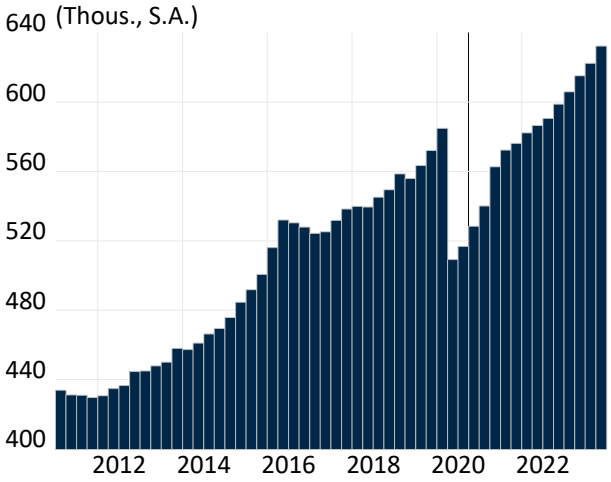
California Employment in Education and Health Services



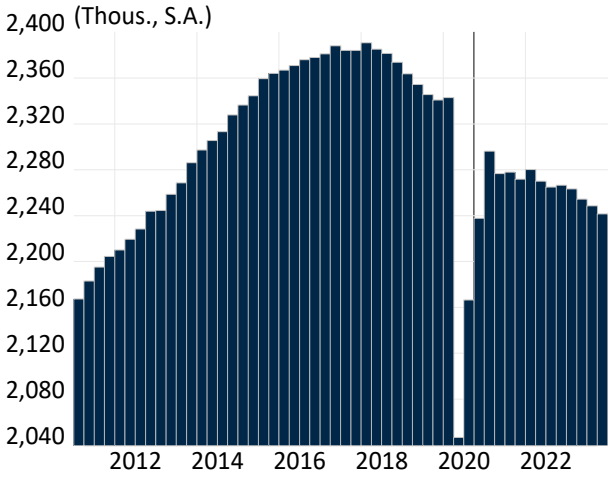
California Employment in Manufacturing



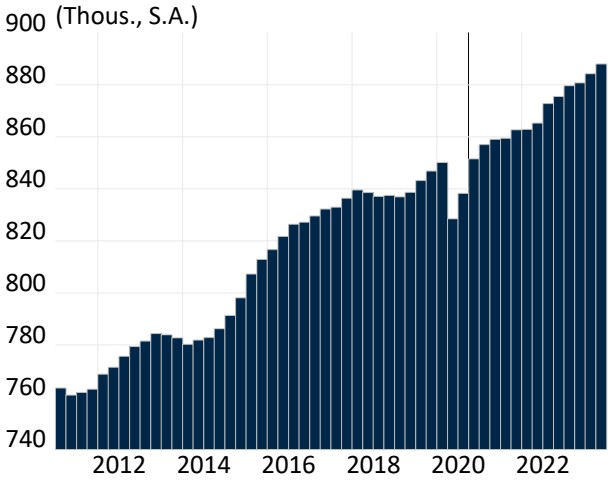
California Employment in Information



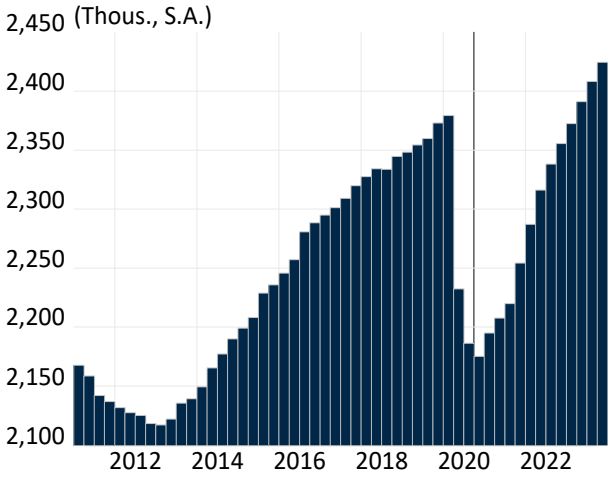
California Employment in Trade



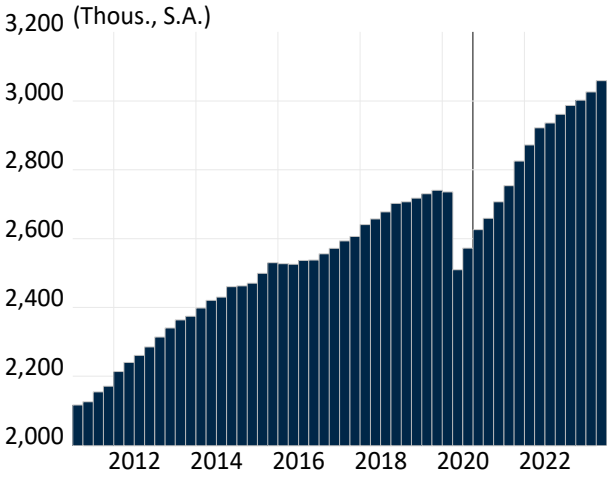
California Employment in Financial Activities



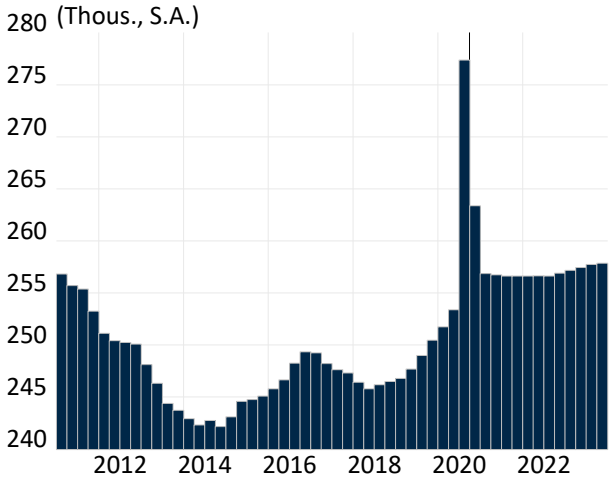
California Employment in State and Local Government



California Employment in Professional & Business Services



California Employment in Federal Government



The Los Angeles Department of Water and Power (DWP), established at the beginning of the century is the largest municipally-owned utility in the nation. It exists under and by virtue of the Charter of the City of Los Angeles enacted in 1925.

With a work force in excess of 9,000, the DWP provides water and electricity to some 3.5 million residents and businesses in a 464-square-mile area.

DWP's operations are financed solely by the sale of water and electric services. Capital funds are raised through the sale of bonds. No tax support is received.

A five-member Board of Water and Power Commissioners establishes policy for the DWP. The Board members are appointed by the Mayor and confirmed by the City Council for five-year terms.

The Los Angeles County Metropolitan Transportation Authority (Metro) is unique among the nation's transportation agencies. It serves as transportation planner and coordinator, designer, builder and operator for one of the country's largest, most populous counties. More than 9 million people – one-third of California's residents – live, work, and play within its 1,433-square-mile service area.

Besides operating over 2,000 coaches in the Metro Bus fleet, Metro also designed, built and now operates over 73 miles of Metro Rail service. The Metro Rail system currently consists of 62 stations and several more are in the planning and/or design stage.

In addition to operating its own services Metro funds 16 municipal bus operators and funds a wide array of transportation projects including bikeways and pedestrian facilities, local road and highway improvements, goods movement, and the popular Freeway Patrol and Call Boxes.

Recognizing that no one form of transit can solve urban congestion problems, Metro's multimodal approach uses a variety of transportation alternatives to meet the needs of the highly diverse population in the region.

Metro's Mission is to insure the continuous improvement of an efficient and effective transportation system for Los Angeles County. In support of this mission, our team members provide expertise and leadership based on their distinct roles: operating transit system elements for which the agency has delivery responsibility, planning the countywide transportation system in cooperation with other agencies, managing the construction and engineering of transportation system components and delivering timely support services to the Metro organization.

Metro was created in the state legislature by Assembly Bill 152 in May 1992. This bill merged the Los Angeles County Transportation Commission (LACTC) and the Southern California Rapid Transit District (RTD) to become the Los Angeles County Metropolitan Transportation Authority. The merger became effective on April 1, 1993.

Metro is governed by a 13-member Board of Directors comprised of: the five Los Angeles County Supervisors, the Mayor of Los Angeles, three Los Angeles mayor-appointed members, four city council members representing the other 87 cities in Los Angeles County and one non-voting member is appointed by the Governor of California.

Inland Empire Center for Economics and Public Policy

Mission Statement

The mission of the Inland Empire Center for Economics and Public Policy (IEC) at Claremont McKenna College is to provide Inland Empire leaders with expert analysis of the region's unique political and economic landscape.

Background

The IEC was founded in 2010 as a collaborative effort by the Rose Institute of State and Local Government and the Lowe Institute for Political Economy, both based at Claremont McKenna College. While the Inland Empire is one of California's fast growing areas, there was little political and economic analysis specific to the region. Recognizing this void and the increasing importance of the area to California's economy, the two research institutes saw the need for an organization that could deliver analysis on current issues impacting the Inland Empire.

The Rose Institute and the Lowe Institute were uniquely positioned to create the IEC because their staffs both specialized in political and economic analysis and were familiar with the Inland Empire. The IEC brings together experts from both founding institutions. Marc Weidenmier, Ph.D., director of the Lowe Institute, is a Research Associate of the National Bureau of Economic Research and a member of the Editorial Board of the Journal of Economic History. Andrew Busch, Ph.D., director of the Rose Institute, is an expert in American government and politics. Manfred Keil, Ph.D., an expert in comparative economics, has extensive knowledge on economic conditions in the Inland Empire. Kenneth P. Miller, J.D., Ph.D., is an expert in California politics and policy who studies political developments in the Inland Empire.

The primary ways that the IEC presents its analysis is through publications and conferences. The Inland Empire Outlook, which provides analysis on the Inland Empire's political and economic developments, is the IEC's predominant recurring publication. Its inaugural issue was published in Winter 2010. Besides publications, the IEC also hosts conferences throughout the Inland Empire. The conferences bring together panels of experts and business and political leaders in the Inland Empire to address current topics affecting the region. The annual economic forecast conference held at the Citizens Business Bank Arena in Ontario is in cooperation with the UCLA Anderson Forecast.

The nonpartisan Legislative Analyst's Office (LAO) has been providing fiscal and policy advice to the California Legislature for more than 65 years. It is particularly well known for its fiscal and programmatic expertise and nonpartisan analyses relating to the state budget, including making recommendations for operating programs in the most effective and cost-efficient manner possible. Its responsibilities also include making economic and demographic forecasts for California, and fiscal forecasts for state government revenues and expenditures. It also prepares fiscal analyses for all propositions that appear on the California statewide ballot, including bond measures.

For more information about the LAO, please visit our website at www.lao.ca.gov or call us at 916-445-4656.

As the state's primary energy policy and planning agency, the California Energy Commission is committed to reducing energy costs and environmental impacts of energy use - such as greenhouse gas emissions - while ensuring a safe, resilient, and reliable supply of energy.

The State of California's Department of Finance is responsible for submitting to the State's fiscal year budget to the Governor in January of each year. The Department is part of the State's Executive Branch and part of the Governor's Administration. The Director of Finance is appointed by the Governor and is his chief fiscal advisor. The Director sits as a member of the Governor's cabinet and senior staff. Principal functions include:

Establish appropriate fiscal policies to carry out the Administration's Programs.

Prepare, enact and administer the State's Annual Financial Plan.

Analyze legislation which has a fiscal impact.

Develop and maintain the California State Accounting and Reporting System (CALSTARS).

Monitor/audit expenditures by State departments to ensure compliance with approved standards and policies.

Develop economic forecasts and revenue estimates.

Develop population and enrollment estimates and projections.

Review expenditures on data processing activities of departments.

In addition, the Department of Finance interacts with the Legislature through various reporting requirements, by presenting and defending the Governor's Budget and in the legislature.

The Department interacts with other State departments on a daily basis on terms of administering the budget, reviewing fiscal proposals, establishing accounting systems, auditing department expenditures and communicating the Governor's fiscal policy to departments.

The energy industry is changing rapidly and dramatically. As global competition transforms the way companies do business, energy issues are no longer simply local, or even national. At the same time, its clear that the importance of providing reliable local service has never been more important.

Our heritage at Southern California Edison is based on reliability. For more than 100 years we have provided high-quality, reliable electric service to more than 4.2 million business and residential customers over a 50,000 square mile service area in coastal, central, and southern California.

Of course, recent changes in the California's electric industry have affected us as well. In 1997, as part of the restructuring of the electric industry in our state, SCE sold its 12 fossil fuel generating stations and overhauled nearly every aspect of its business to prepare for the changing environment. While we still own and operate hydro and nuclear power facilities that serve our area, our main role is that of power transmission and distribution. The power needed for our customers is largely purchased from the California Power Exchange and provided by SCE to our customers without a price markup.

At SCE we want you to know that even in times of change, we retain our proven commitment to service, reliability, innovation, and the community.

The Labor Market Information Division (LMID) of the Employment Development Department is the official source for California's labor market information.

The LMID promotes California's economic health by providing information to help people understand California's economy and make informed labor market choices.

We collect, analyze, and publish statistical data and reports on California's labor force, industries, occupations, employment projections, wages, and other important labor market and economic data.

California's vast labor market includes over 1.5 million employers covered by Unemployment Insurance and over 19 million people in its civilian labor force.

For more information, visit our website at http://www.labormarketinfo.edd.ca.gov/ or call

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Allen Matkins

From its Los Angeles base, Allen Matkins has conquered California, opening up offices in San Francisco, San Diego, Century City, and Irvine. With approximately 200 lawyers, the firm is known as a top real estate practice in the Golden State.

Grown in the City of Angels

Allen Matkins has built its empire in the state where residents elect bodybuilders and shrug off earthquakes. Founded in Los Angeles in 1977, Allen Matkins has achieved notable success in corporate and hospitality work, as well as in the securities, employment, bankruptcy, and tax arenas. The firm has earned accolades from west coast publications like the Los Angeles Business Journal and the San Diego Business Journal. Its real strengths lie, however, in its real estate and litigation practices. The firm's litigation department has focuses in real estate, commercial, financial services, construction, environmental, and labor and employment litigation.

The firm has not only worked with local clients-like representing a public-private partnership to modernize the Los Angeles Air Force Base-but has also secured nationally known clients including Wells Fargo Bank, Sares-Regis Group, AT&T, Black & Decker, Met Life, The Home Depot, Blackstone Real Estate Advisors, and Capmark Finance.

Buying and Selling Up the California Coast

Real estate is where the firm shines-Allen Matkins has ranked the No. 1 real estate law firm in California for a decade, according to Chambers & Partners. California Real Estate Journal has also placed Allen Matkins on the top of its real estate firm list, which was based on the number of real estate attorneys in each outfit. The firm's real estate practice handles all aspects of the real estate world, including litigation over construction, land use, landlord tenant, and condemnation issues.

And handling the real estate transactions of the present is not enough for the firm; Allen Matkins seeks to predict the future. The firm has developed a partnership with UCLA Anderson Forecast, an organization of economists who attempt to posit unbiased forecasts for California's economy and the nation's. Allen Matkins and the Anderson Forecast put out commercial real estate forecasts, covering rental and vacancy rates.

State Controller Betty T. Yee was elected in November 2014, following two terms of service on the Board of Equalization. As Controller, she continues to serve the Board as its fifth voting member.

The State Controller is the Chief Fiscal Officer of California, the sixth largest economy in the world. She helps administer two of the largest public pension funds in the nation and serves on 78 state boards and commissions. These are charged with duties ranging from protecting our coastline to helping build hospitals. The Controller is the state's independent fiscal watchdog, providing sound fiscal control over more than $100 billion in receipts and disbursements of public funds a year, offering fiscal guidance to local governments, and uncovering fraud and abuse of taxpayer dollars.

The State Controller's Functions

- Account for and control disbursement of all state funds.
- Determine legality and accuracy of every claim against the State.
- Issue warrants in payment of the State's bills including lottery prizes.
- Administer the Uniform State Payroll System.
- Audit and process all personnel and payroll transactions for state civil service employees, exempt employees and California State University employees.
- Responsible for auditing various state and local government programs.
- Inform the public of the State's financial condition.
- Administer the Unclaimed Property Law.
- Inform the public of financial transactions of city, county and district governments.

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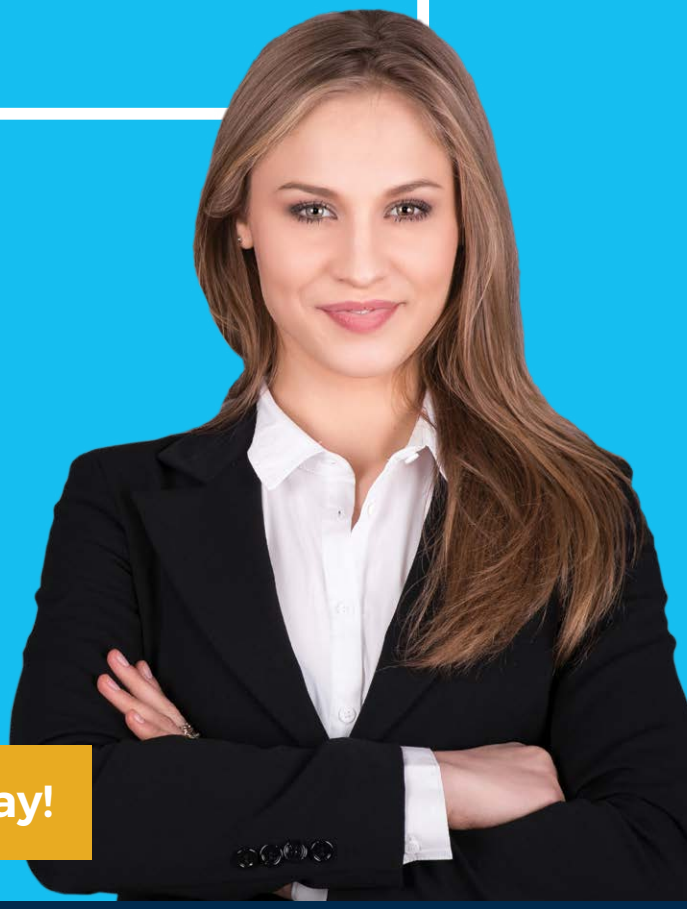

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UCLA Anderson Forecast

Jerry Nickelsburg
Director

Jerry Nickelsburg joined the UCLA's Anderson School of Management and The Anderson Forecast in 2006. Since 2017 he has been the Director of The Anderson Forecast. He teaches economics in the MBA program with a focus on Asian economies. As the Director of The Anderson Forecast he plays a key role in the economic modeling and forecasting of the National, and California economies. He has conducted research in the areas of labor economics, industrial organization, statistics, and international monetary economics, focusing on the development of new data and the application of economic theory and statistical methods to policy issues. His current academic research is on specific skills, structural unemployment, and on energy efficiency in transportation. He is a regular presenter at Economic Conferences and is cited in the national media including the Financial Times, Wall Street Journal, New York Times, Los Angeles Times, and Reuters.

He received his Ph.D. in economics from the University of Minnesota in 1980 specializing in monetary economics and econometrics. He was formerly a professor of Economics at the University of Southern California and has held executive positions with McDonnell Douglas, FlightSafety International, and FlightSafety Boeing during a fifteen-year span in the aviation business. He also held a position with the Federal Reserve Board of Governors developing forecasting tools, and has advised banks, investors and financial institutions.

From 2000 to 2006, he was the Managing Principal of Deep Blue Economics, a consulting firm he founded. He has been the recipient of the Korda Fellowship, USC Outstanding Teacher, India Chamber of Commerce Jubilee Lecturer, and he is a Fulbright Scholar. He has published over 100 scholarly and popular articles on monetary economics, economic forecasting and analysis, labor economics, and industrial organization and he is the author of two books on monetary economics and exchange rates.

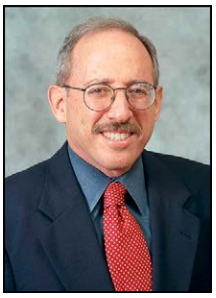
UCLA Anderson Forecast

William Yu
Economist

William Yu joined the UCLA Anderson Forecast in 2011 as an economist where he focuses on the economic modeling, forecasting and Los Angeles economy. He also conducts research and forecasts on China's economy, and its relationship with the U.S. economy. His research interests include a wide range of economic and financial issues, such as time series econometrics, data analytics, stock, bond, real estate, and commodity price dynamics, human capital, and innovation. Currently, he teaches business forecasting and data science courses at UCLA Anderson and UCLA Extension. He also serves as a faculty advisor for the Applied Management Research Program at UCLA Anderson.

He has published over a dozen research articles in Journal of Forecasting, International Journal of Forecasting, Journal of International Money and Finance, etc. He also published op-ed articles in Los Angeles Times and other newspapers. He developed the City Human Capital Index and the Los Angeles City Employment Estimate. He has been cited in the local, national and overseas media frequently including Wall Street Journal, Los Angeles Times, Washington Post, Time, Bloomberg, CBS Money Watch, Al Jazeera, U-T San Diego, LA Daily News, LA Daily Breeze, Straits Times, NBC, ABC, CNBC, CNN, and NPR, as well as various Chinese and Korean media. Yu has been invited as a speaker for various events, including the annual Woo K. Greater China Business Conference and National Association for Business Economics.

Yu received his bachelor's degree in finance from National Taiwan University in 1995 and was an analyst in Fubon Financial Holding in Taipei from 1997 to 2000. In 2006, he received his Ph.D. degree in economics from the University of Washington where he was also an economics instructor and won two distinguished teaching awards. In 2006, he worked for the Frank Russell Investment Group for Treasury and corporate yields modeling and forecasting. From 2006 to 2011, he served as an assistant and an associate professor of economics at Winona State University where he taught courses including forecasting methods, managerial economics, international economics, and macroeconomics.



UCLA Anderson Forecast

David Shulman
Senior Economist Emeritus

David Shulman is Distinguished Visiting Professor and a "Managing Director" at the Financial Leadership Program at Baruch College where he mentors students seeking front-office careers on Wall Street, and a Visiting Scholar/Senior Economist at the UCLA Anderson Forecast where he is responsible for U.S. Macro. In addition, he is currently Managing Member of his LLC where he is engaged in investment and litigation consulting. He comments on his blog, http://shulmaven.blogspot.com.

In December 2005, he retired from Lehman Brothers where he was Managing Director and Head REIT analyst. From 2001-04 he was voted on the Institutional Investor All Star Teams including First Team in 2002. Prior to joining Lehman Brothers in 2000 he was a Member and Senior Vice President at Ulysses Management LLC (1998-99) an investment manager of a private investment partnership and an offshore corporation whose total investment capital approximated $1 billion at the end of 1999.

From 1986-1997, Mr. Shulman was employed by Salomon Brothers Inc in various capacities. He was Director of Real Estate Research from 1987-91 and Chief Equity Strategist from 1992-97. In the latter capacity he was responsible for developing the Firm's overall equity market view and maintaining the Firm's list of recommended stocks. Mr. Shulman was widely quoted in the print and electronic media and he coined the terms "Goldilocks Economy" and "New Paradigm Economy". In 1991, he was named a Managing Director and in 1990 he won the first annual Graaskamp Award for Excellence in Real Estate Research from the Pension Real Estate Association.

Prior to joining Salomon Brothers Inc., he was Vice President and Director of Research Planning at TCW Realty Advisors in Los Angeles. Earlier in his career Mr. Shulman was an academic. He was an Associate Professor of Management and Economics at the University of California at Riverside and Financial Economist at the UCLA Business Forecasting Project. In 2017, the David Shulman Endowed Excellence in Teaching Award Fund was established by a former student of his.

A graduate of Baruch College (1964), Mr. Shulman received his Ph.D. (1975) with a specialization in Finance and a M.B.A. (1966) from the UCLA Graduate School of Management. He is married and has three grown children.

UCLA Anderson Forecast

Edward Leamer
Distinguished Professor

Edward Leamer served as UCLA Anderson's Chauncey J. Medberry Professor of Management and professor of economics, professor of statistics and director of the UCLA/Anderson Business Forecast Project. His philosophy on education is straightforward.

After serving as assistant and associate professor at Harvard University, Leamer joined the UCLA faculty in 1975 as professor of economics. In 1990 he moved across campus to UCLA Anderson and was appointed to the Chauncey J. Medberry Chair. He is a fellow of the American Academy of Arts and Sciences, and a fellow of the Econometric Society. In 2014 he won the award for Outstanding Antitrust Litigation Achievement in Economics, awarded annually by the American Antitrust Institute.

Leamer's work has been impactful beyond the classroom and his academic research. As director of the UCLA Anderson Forecast, he influenced business practitioners in every field. For example, in his December 2000 forecast, the UCLA Anderson Forecast stood virtually alone in predicting the 2001 recession. In a special release on December 12, 2001, the Forecast correctly analyzed the likely unimportance of 9/11 for the evolution of the recession. In December 2002, Leamer began warning about a momentum-driven overheated housing market that was sure to cause problems for the economy in the future.

Leamer is a research associate of the National Bureau of Economic Research and has been an occasional visiting scholar at the IMF and the Board of Governors of the Federal Reserve System. He has served on the Councils of Economic Advisors or Governor Wilson, Governor Schwarzenegger and Mayor Garcetti. He has been on the Advisory Board of the Bureau of Economic Analysis.

He has published over 120 articles and five books and reminds those interested to hurry to Amazon.com to purchase his most recent books: either Macroeconomic Patterns and Stories, or The Craft of Economics. His research papers in econometrics have been collected in Sturdy Econometrics, published in the Edward Elgar Series of Economists of the 20th Century. His research in international economics and econometric methodology has been discussed in New Horizons in Economic Thought: Appraisals of Leading Economists.

Leila Bengali
Economist

Leila Bengali is an economist at The Anderson Forecast. She joined in 2019. As an economist, and a native Californian, she focuses on modeling the California economy and on policy issues that are relevant to California. Having studied behavioral economics both in college and in graduate school, she brings insights from this field to her work at The Anderson Forecast. She received her Ph.D. in economics from Yale University in 2019 where she was selected for the Russell Sage Foundation Summer Institute in Behavioral Economics and awarded the Whitebox Advisors Doctoral Fellowship. Her fields of concentration were behavioral economics and public finance.

After graduating from Swarthmore College in 2011 with a B.A. in economics (major) and psychology (minor), she worked as an analyst at Analysis Group in the San Francisco Bay Area. During her time in economic consulting, she worked with a team of economists and experts to provide litigation support and research for major national and international companies in industries ranging from manufacturing to information technology. After working in economic consulting, Leila joined Economic Research at the Federal Reserve Bank of San Francisco. Working with prominent economists on issues of employment, education, and economic mobility, Leila conducted research supporting U.S. monetary policy, writing reports for both internal and external audiences.

Leila's research lies at the intersection of behavioral economics and public finance. Within these fields, she focuses on how and why individuals use or ignore information when making decisions and on the resulting implications for policy. Leila has also worked with local governments to design and implement policy evaluations and has published in the field of labor economics.

Leo Feler
Senior Economist

Leo Feler joined the UCLA Anderson School of Management and the UCLA Anderson Forecast in 2020. He has conducted research and written articles in the areas of labor economics, urban economics, trade, banking and mergers and antitrust. He is responsible for the U.S. macroeconomic forecast.

Prior to joining UCLA, Leo worked in management consulting at Cornerstone Research and Boston Consulting Group. At Cornerstone Research, he advised the U.S. government and corporations on antitrust litigation and economic disputes. At Boston Consulting Group, he advised clients in the consumer retail industry on revenue growth and supply chain optimization strategies.

From 2010 to 2016, Leo was an assistant professor of international economics at Johns Hopkins University. He also worked at the World Bank, where he was an advisor to the country director for Brazil.

Leo received his Ph.D. in economics from Brown University in 2010, specializing in urban and labor economics; his M.A. in international policy studies from Stanford University in 2002; and his B.A. in economics and international relations from Stanford University in 2002.