Slippin' Into Darkness:

When Will We See the Light at the End of the Tunnel?

by

Manfred Keil[1]

Executive Summary

The current economic contraction will be dated to have started in March 2020. The record breaking economic U.S. expansion, which started in July 2009, comes to an end after 129 months. Most economist agree that this will be the most severe downturn during the post World War II period and will outpace the Great Recession of 2008 to 2009 significantly in terms of output lost and unemployment. Early signs of the massive loss in employment can be seen in internet searches, consumer sentiment, and the stock market collapse.

Some analysts saw the first signs of a potential downturn resulting initially from supply-chain problems in China related to the Corona Virus there. With hindsight, and compared to the current situation, the effect would have been small, primarily impacting certain firms in manufacturing, especially those producing electronic devices such as smartphones and computers. This would have been a short-term problem, especially after the Chinese economy seemed on the road to recovery from a severe shock. What then turned the situation into a depression-like downturn was first the slump in demand as a result of lower consumer confidence/demand. In the second phase, a further decline in demand was forced onto the economy by government restrictions on movement and gathering of people. At the same time, lower oil prices, which are the result of disagreements between Saudi Arabia and Russia, will guarantee additional aggregate demand shocks through fewer investment from the mining sector.

The Inland Empire will be particularly hard hit due to the prominent role played by the logistics sector (warehouse and transportation, wholesale trade). In particular, the part of logistics that depends heavily on U.S. imports will feel the brunt of the blows. As in the rest of the country, retail trade, apart from grocery stores, will be heavily impacted, as will be the leisure and hospitality industry in Coachella Valley (Riverside County). Besides the cancellations of big events such as the Coachella Festival and Stagecoach, the Indian Wells tennis event and golf tournaments also will not take place. On the positive side, the part of the logistics industry that

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depends on distribution will benefit. Amazon, CVS, and others are actually hiring people. All non-essential industries will suffer.

Under an optimistic scenario, the Corona Virus will be brought under control by early May, the U.S. government ultimately will distribute funds at a rate of $3 trillion, existing medicines can be adapted to fight the effects of CONVID-19, a secondary outbreak in September to November 2020 due to school children returning to school and not having been previously infected/immunized can be controlled, and a vaccine can be developed within 12 months. In that case, it is possible for the economy to pick up during the fourth quarter of 2020 (2020:Q4) or the first quarter of 2021 the latest. We will look back at the episode as a V-shaped downturn, rather than a Nike-Swoosh type event.

The IEEP will send out a survey today, and we hope that to obtain better data regarding the crisis than what we can extract from official data sources. Please look at the section written by Prof. Sirotnik (CSUSB) below and give us your thoughts in a timely manner.

The Inland Empire Economic Partnership (IEEP) will post weekly updates regarding aspects of the current economic situation in the Inland Empire (San Bernardino County, Riverside County). The IEEP has an economic analysis group consisting of John Husing (Vice-President, Economics and Politics), Robert Kleinhenz (President, Kleinhenz Economics), Johannes Moenius (Redlands University, Director Institute for Spatial Economic Analysis), Barbara Sirotnik (California State University San Bernardino, Director Institute of Applied Research), Cameron Shelton (Claremont McKenna College, Director Lowe Institute of Political Economy), and myself. Each member will contribute to different aspects of the current situation in the weekly updates.

The IEEP had originally planned to hold its annual economic conference on March 26. The Corona virus (COVID-19) situation forced the postponement of the event, which is currently planned to take place in June. The updates function as an ongoing effort to describe the economic state of the Inland Empire. They are targeted at decision makers who need to navigate ghrtough these challenging times.

The current economic contraction in the Inland Empire started in February 2020 and, in our view using a somewhat optimistic scenario to be discussed below, will last until the end of the third quarter of 2020. We refer to the event as a *contraction*, rather than a *recession*, to stress the fact that this is not your usual downturn resulting from factors such as a monetary tightening, an oil price shock, a build-up of inventories in consumer durables and/or housing, or a financial crisis. Instead, and largely, this contraction is the result of government policies to prevent the spread of the COVID-19 virus. An analogy would be a self-induced coma for a boxer after a knockout in the ring. The intent here is to reduce contacts between individuals ("social distancing") in order to slow-down the spread of the virus, and thereby preventing an overloading of the health care system. The hope is that the government sector ultimately will restart the economy by waking up the patient.

The crucial questions are:

- How long will the contraction last?
- How severe will the economic consequences be?
- Which sectors are and will be most affected?

Current Situation (weekend of March 21, 2020),

Manfred Keil

The views expressed in this section are primarily based on my analysis of the economic situation and are not necessarily shared by the other members of the economic analysis group.

Up-to-date economic data for real (meaning non-financial) data are notoriously hard to obtain. Financial data is available to us minute by minute or even faster. This data is also widely available, and although the S&P 500 Index is part of the Conference Board's "Index of Leading Economic Indicators," we will not discuss it much here. Most of the readers are familiar with the numbers, such as the Dow Jones Industrial Index having fallen from the record level of roughly 29,550 on February 12, 2020, to close to 18,600 today (March 23, 2020; at some point it went below 18,300). This represents a drop of 35% and we are clearly in Bear Market territory; on Monday, November 7. 2016, the day before the election, the Dow Jones stood at 18,847.66.

When it comes to economic data from the real economy, we are in a similar position as an oil tanker entering a fog bank without radar, when there is clear evidence that icebergs are floating about. This is dangerous, since it takes some time to turn the oil tanker even if we finally spot the obstacle – meaning there is a delay for fiscal and monetary policy to kick in ("policy lags"). Regional data is even harder to obtain. Consequently, we are forced using internet technology to acquire proxies for concurrent economic activity.

Survey results from the Current Population Survey, which the Department of Labor uses to calculate the unemployment rate among others, is only available on the first Friday of each month for the previous months – meaning we will have to wait until April 2 to find out by how much the unemployment rate increased in March from the February level of 3.5%.

The most general level of economic activity, real GDP or national income (roughly), is only measured quarterly for the U.S., and even then, the "preliminary estimate" is not released until the end of April for the first quarter of 2020. Real GDP during the fourth quarter of 2019 (2019:Q4) grew at a solid, but not spectacular, rate of 2.1% (a healthy rate prior to the Great Recession of 2008-2009 was 3%; since then, it has been 2%). Clearly the full impact of the current contraction will only be visible in data for the second quarter (2020:Q2), and we will not see official estimates until the end of July 2020. The Federal Reserve Bank of Atlanta provides an estimate of quarterly

real GDP during the current quarter, and puts the 2020:Q1 (heroically) at 3.1% ("GDPNow" estimate (for those of you interested in following the Atlanta Fed estimate, go to frbatlanta.org/cqer/research/dgpnow.aspx).

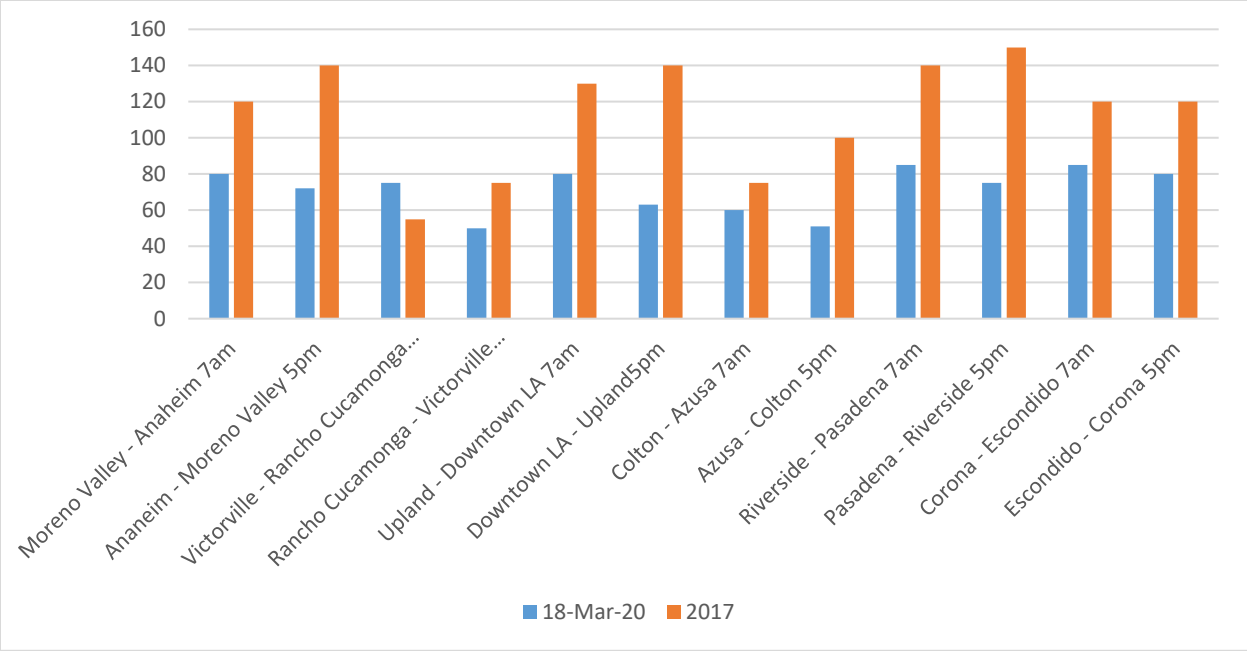
Enough of the whining, here is some of data that we currently have available.

A large fraction (20%) of the labor force residing in the Inland Empire commutes to work. The vast majority of the morning drive is to the Greater Los Angeles area (Los Angeles County, Orange County) with the small remainder driving to San Diego County on the I-15 south. We calculated commuting times for six strategic routes about three years ago, that is, prior to the current crisis. You can use the Google Maps App to find the longest commutes going west (south) and east (north). These turned out to be Thursdays at 7:00 a.m. driving to work, and Thursdays at 5:00 p.m. returning home. We then calculate the same travel times for last Wednesday (March 18, 2020), the day before Governor Newsom ordered Californians to stay home. Driving times obviously decreased further dramatically for Thursday and especially Friday, March 20, 2020.

The routes analyzed were (with miles in parenthesis):

- Moreno Valley to Anaheim (47 miles)
- Victorville to Rancho Cucamonga (45 miles)
- Upland to Downtown Los Angeles (38 miles)
- Colton to Azusa (41 miles)
- Riverside to Pasadena (55 miles)
- Corona to Escondido (67 miles)

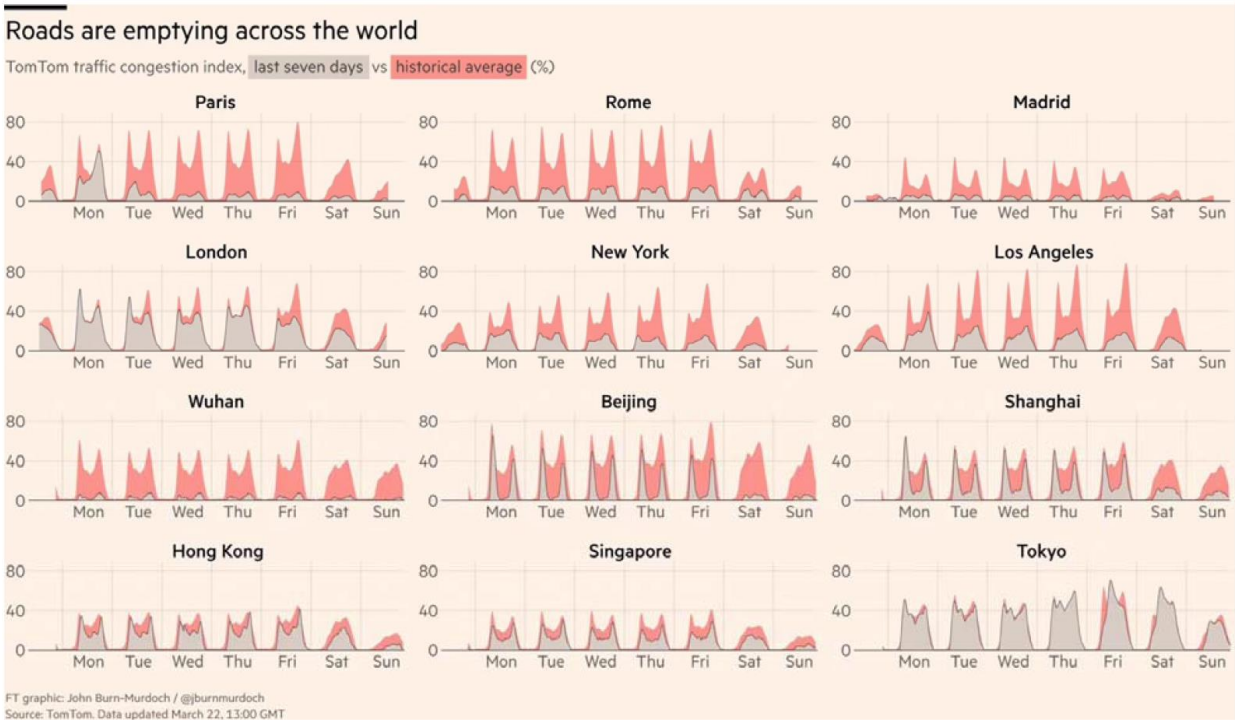
Here is the change in commuting time (measured in minutes):



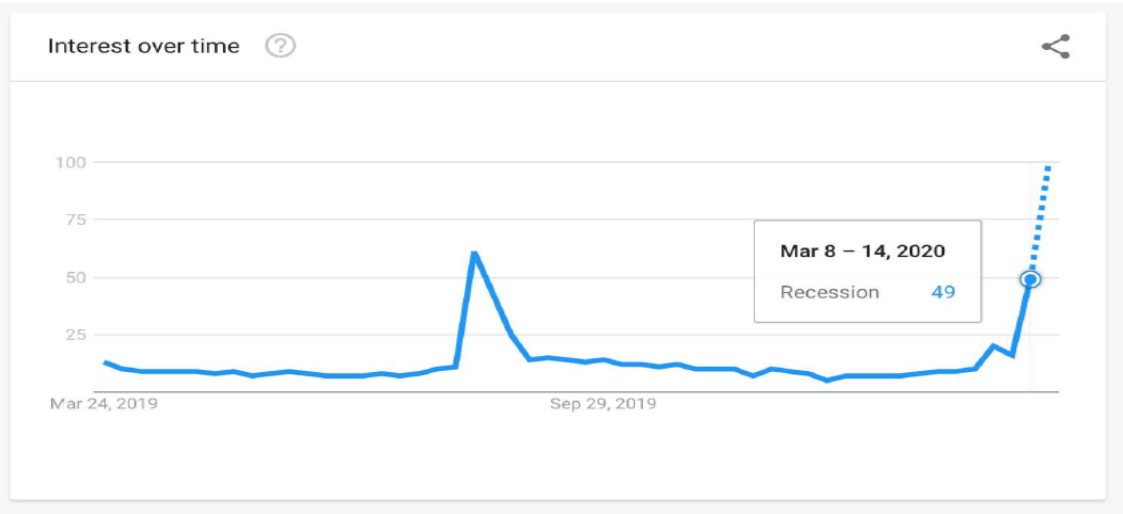
We also recorded the driving time for Upland to Downtown LA on Friday, March 20, and it was reduced further to 47 minutes.

Many of the drives were slashed in half and resemble driving times at midnight. This suggests that employment already was significantly reduced in the first half of March, that is, before the drastic action taken by the Governor on March 19 took effect. Unemployment rates and employment numbers will reflect this. Unfortunately we have little comparison for commutes within the Inland Empire (Victorville to Rancho Cucamonga being the exception – which did not change much and actually increased slightly for the morning commute), but we can also assume that these would indicate a dramatic fall in employment and a rise in unemployment. There is one caveat: commuters not driving to work does not imply that they have lost their job, since they potentially will be able to work from home in some professions – especially those that are outside the most affected sectors of leisure and hospitality, retail sales, and logistics (Transportation and Warehousing, Wholesale Trade).

Finally, we are not alone in this. The “empty roads” phenomenon can be observed worldwide (see graph below from the Financial Times). I don’t mean for this to be comforting (it is not); simply showing the facts.

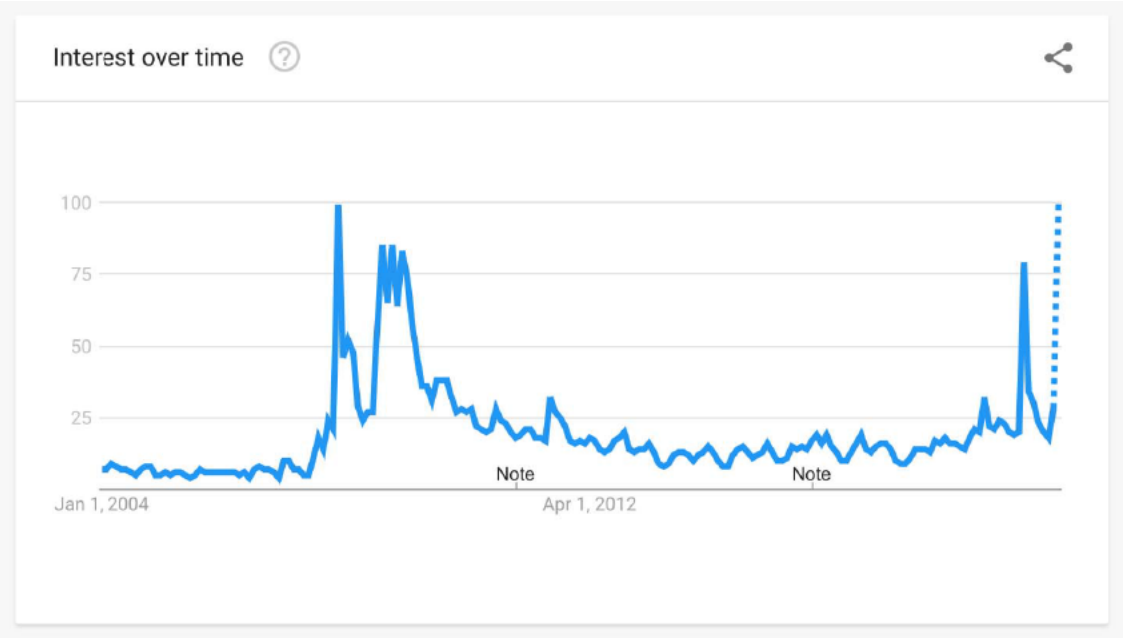


Another tool available on the internet is "Google Trends." It allows looking at the number of hits that a certain term received from users in a certain location. We chose the string "recession" as searched in the United States over the last 12 months. Here is the outcome:



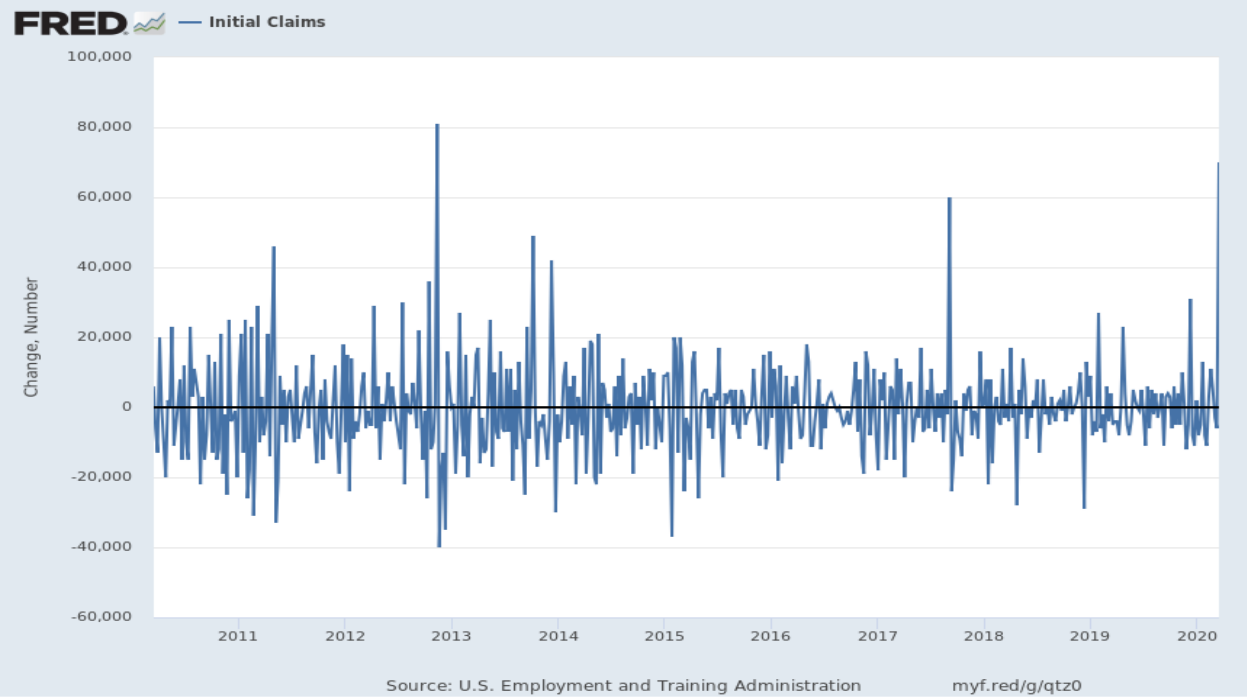
The previous peak occurred in 2019 late in the summer when the Trump administration signaled that trade negotiations with China were not progressing as positively as hoped, and that many of the tariffs on Chinese goods were being kept in place. Note that Google Trends creates a peak of 100 whenever a new record of hits is registered. The dotted line indicates a dramatic increase in the number of searches involving the word "recession." The previous smaller peak also coincides with a significant drop in consumer sentiment, as measured by the University of Michigan (to be discussed further below).

How does this compare to the previous "Great Recession"? Google Trends allows you to analyze internet hits all the way back to 2004. We have done so here:



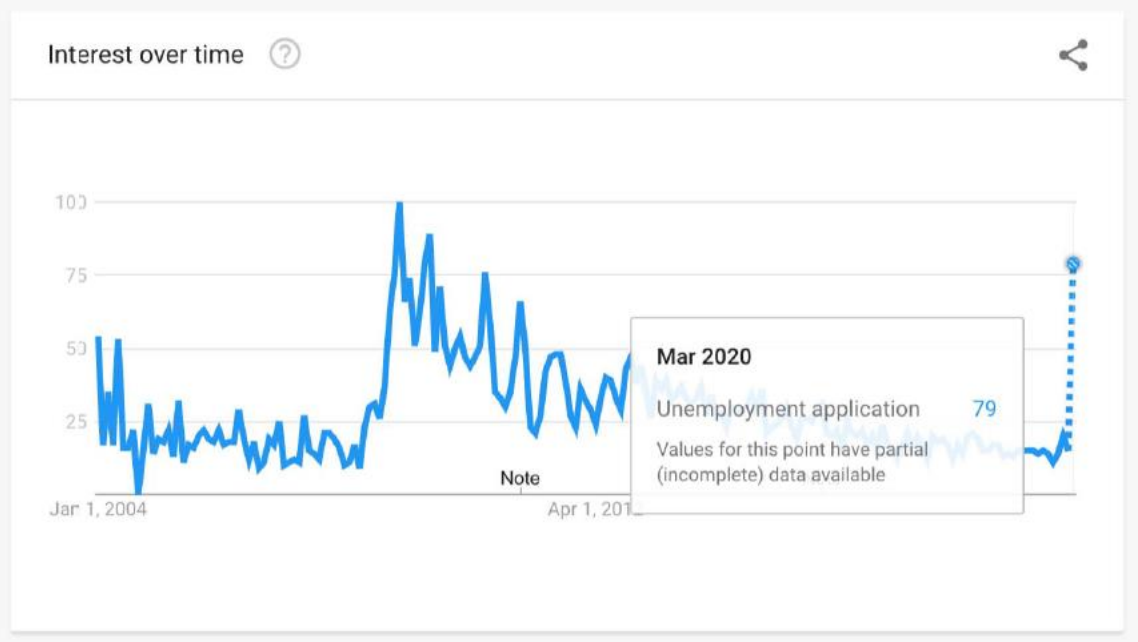
The Google Trend graph shows that we have reached a new peak, which is of the same magnitude as observed during the Great Recession. While it is possible that we have more internet users than 12 years ago, there is little doubt that in the coming weeks we will see a new high. Clearly, "recession" is on everybody's mind.

There is also evidence that unemployment claims increased significantly, even though the latest data available is for the week ending on Saturday, March 14, 2020. Initial claims increased by 70,000 during that week, which is of a magnitude not seen since the second week of November in 2012.



According to the Wall Street Journal, Goldman Sachs estimates for these numbers to increase by 2,000,000 (in words, two million) in the following week. Unfortunately we can only obtain these statistics at the U.S. level, rather than for the region. For California, the picture looks worse. Including the numbers for March 15 – 17 and following the Governor's recent remarks, the level reached 190,000, when during the Great Recession, it peaked at close to 110,000.

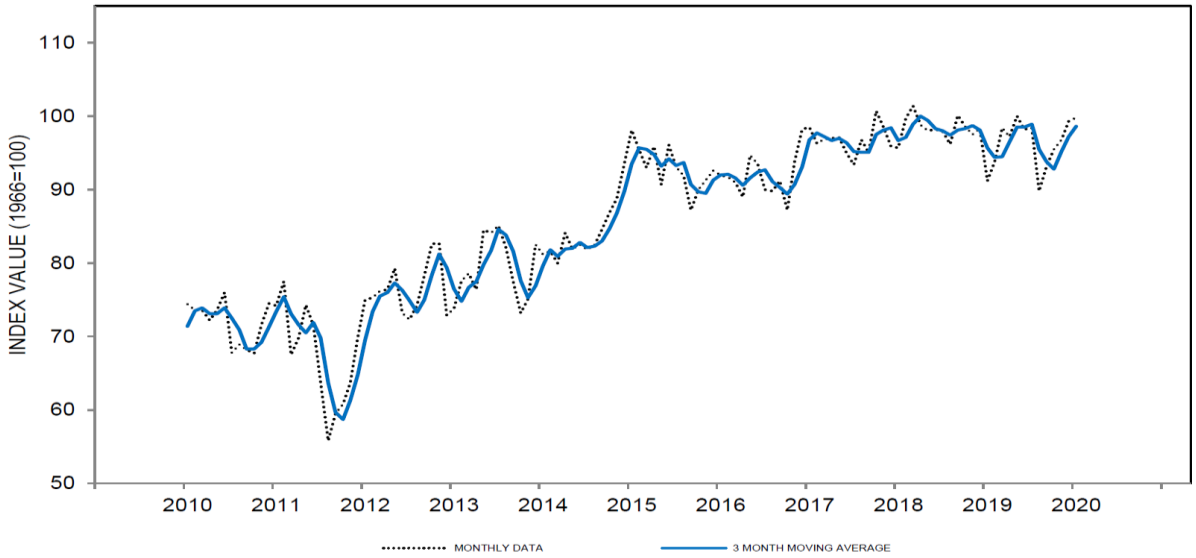
One way to gather more information was suggested by Paul Krugman in the New York Times, namely to search for "Unemployment Offices." Instead we looked at "Unemployment Application" for California, using the maximum data available (2004 until now). Again, there is a significant increase in searches for March 2020, and while this cannot prove an increase in actual unemployment or loss in employment, it suggests, at a minimum, that employees have been sufficiently concerned about losing their jobs that they are searching on how to apply for unemployment insurance.



We will keep you posted with updates for this data and post official data from statistical agencies as they become available.

Finally, there is another forward looking measure, the "Consumer Sentiment Index" collected by the University of Michigan. The latest data available is for survey respondents in February. Despite an increasing number of filled-out surveys commenting on the imminent crisis, the index rose to 101.0 or February. Data for March 2020 is not available yet, but a preliminary reading, published by the University of Michigan on March 20, 2020, shows the index having fallen to 95. We expect to find a significantly lower reading by the end of the month.

Here is the most recently available chart from the University of Michigan:

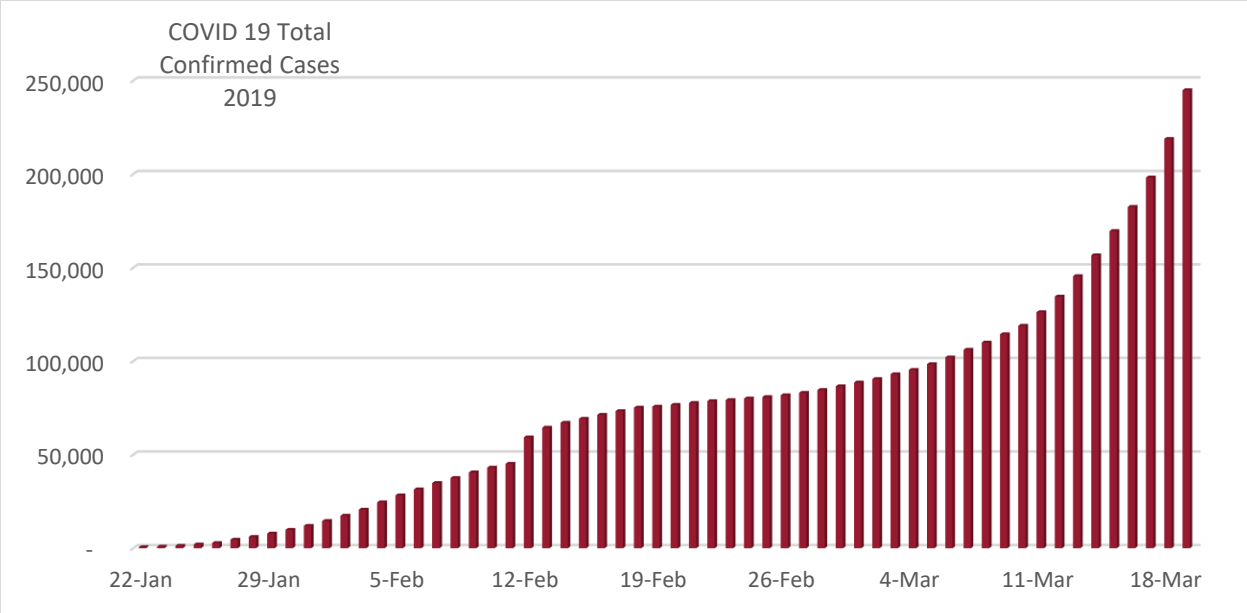


Given the information we presented here, we want to leave you with a picture of the future.

I will present you with two forecasts: one more optimistic one, which I will consider the baseline forecast, and a more pessimistic one, which will become more likely if two conditions regarding the future development of the spread of the CONVID-19 virus will not be met.

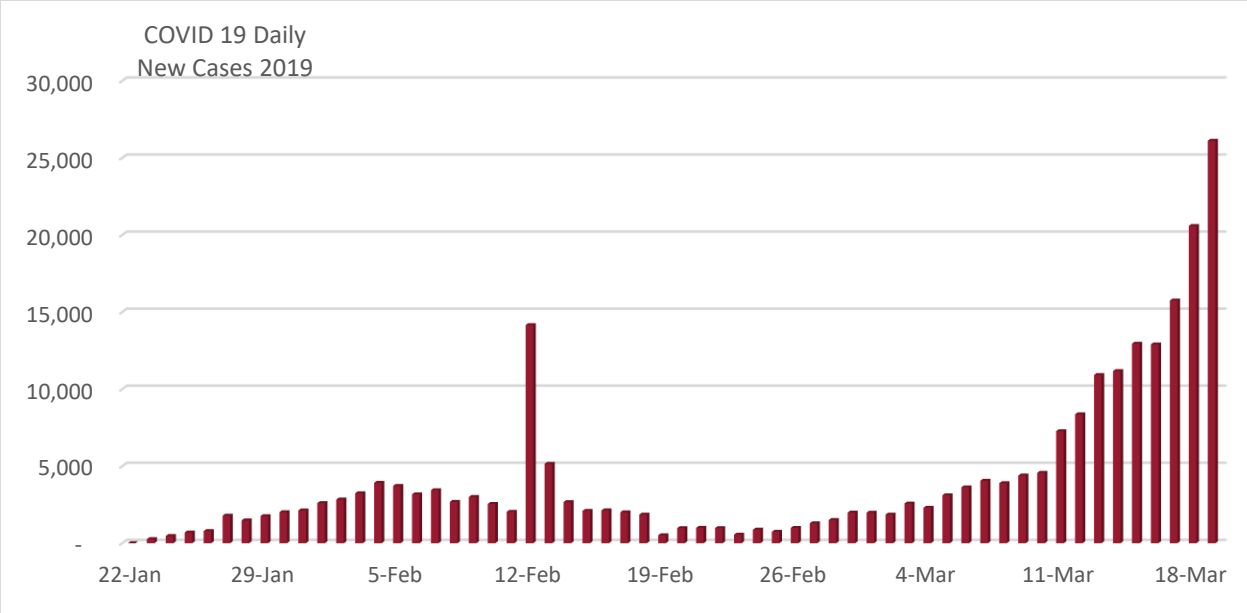
- **Optimistic Scenario**: there will be a decline in new infections in the world by the first week of April and we will have the virus 'under control' by the first week of June. Congress will pass a $1.5 trillion stimulus package next week, and will augment this with a further $1.5 trillion stabilization package over the following months (close to 15% of current GDP for the total package). Existing medication will be adapted to mitigate the more serious effects of the pandemic. A vaccine can be developed within 12 months.

Here is what the most recently available numbers from Johns Hopkins University look like.



The latest available data does not show a decrease in the total number of confirmed cases. This is of concern, since countries such as Italy, Spain, Germany, and South Korea have put drastic measures into place earlier. Perhaps the graph becomes more meaningful if we combine it with a calculation of how long it takes to double the number of infections in a given country. For Italy, France, Germany, Britain, and Spain, that number is currently between every second and third day. Assuming conservatively for California that the number is four, infections in California will increase from the 1,241 cases most recently observed, to 20,000,000 by May 16; in the Inland Empire, we will have 2,400,000 by May 24. In that case, 50% of Californian's would be infected. Mortality rates are hard to determine since there seems to be a large number of Californian's infected but not measured due to unavailable testing kits. Assuming a 1% mortality rate, this would result in 200,000 deaths in the state of California.

Our final graph displays the total new cases per day. The earlier data basically is specific to China, including the spike which was due to the Chinese authorities using a different testing procedure to identify the number of infections. According to official Chinese government sources, there are currently no new cases of COVID-19 infections in China other than those from Chinese citizens returning from countries outside of China.



We want to give you a simple litmus test to check whether or not the more optimistic scenario holds, and it concerns a local event. Matters will look optimistic if the Coachella Festival will take place as currently planned in October (and that includes Stagecoach as well). This has little to do with the multiplier effect that the event generates, although at $400 million it is significant for the Coachella Valley and especially for the City of Indio. Instead we see it as a signal that it will be safe for large numbers of people (225,000 for each weekend) to gather again. If this bell weather signal holds, then other events throughout the nation will also resume (note that he 2020 Olympics in Tokyo, Japan, were just postponed).

Forecast

Under the optimistic scenario, we see a large decline in real GDP for the second quarter of 2020 (2020:Q2), which will set a new record when compared to previous recessions and will be close to minus ten percent (-10%). While the decline in real GDP will not be as severe during the third quarter of 2020 (2020:Q3), it will continue to be negative due to consumers only returning slowly to increase their expenditures on leisure and hospitality (outside dining, vacations) (minus -3.5%). Unemployment rates will increase dramatically. For the nation, the unemployment rate will climb from the 3.5% observed in February rapidly to 6.5% in June 2020. It will peak at 7.5% in September 2020, before starting to decline slowly during the last quarter of the year. The Inland Empire will be more severely affected both in terms of output lost and employment. Unemployment rates for the Inland Empire will be in the double digits.

- **More Pessimistic Scenario**: the two conditions regarding the spread of the virus are not met, in which case we believe that the recession will last for the remainder of the year, even

if Congress approves a stabilization package of $3 trillion total. The vaccine takes 18 months to develop and the existing drugs cannot be used to lower the serious effects of the pandemic.

Under this scenario, the recession will become more severe with no recovery in the fourth quarter of the year and perhaps even early next year. A particularly negative situation will develop, as analyzed by several models at Imperial College/University of London, whereby a second wave of infections starts in October 2020 and does not end until December 2020. This scenario is based on the idea that the current policy of social distancing and closing schools and institutions of higher learning will result in lower infections in the near future, but also in fewer individuals becoming immune to the CONVID-19 virus. As schools and universities re-open, the virus will spread again since a large number of people were not previously infected.

Again, we hope that this more pessimistic scenario will not become a reality. We will continue to monitor both medical and economic data and present it to you as soon as it becomes available, by posting it on the website. In the meantime, I hope that social distancing will have its desired effect and that we can all look back at this episode as a once in our lifetime event.

By comparison, the Wall Street Journal published a range of forecasts based on a survey of 34 professional economists (these are the folks at Goldman Sachs, JP Morgan, Barclays, etc.). The newspaper classified the *median* forecasts into the categories "Pessimistic," "Baseline," and "Optimistic." The Journal did not specify what assumptions the different scenarios were based on. Note that our "Optimistic Scenario" is more in line with the "Pessimistic" outcome listed in the tables below, although it is rosier than Secretary of the Treasury Steve Mnuchin's prediction of a 20% national unemployment rate. Maybe Mnuchin used that number simply to scare Congress into action?

Real GDP Growth Forecast, U.S., 2020:Q2-2020:Q4, in Percent			
Date	Pessimistic	Baseline	Optimistic
2020:Q2	-10.0	-7.0	-4.0
2020:Q3	-3.8	0.0	1.7
2020:Q4	-0.5	2.6	3.1

Unemployment Rate, U.S., 2020:Q2-2020:Q4, in Percent			
Date	Pessimistic	Baseline	Optimistic
2020:Q2	6.3	5.3	4.5
2020:Q3	7.0	5.1	4.5
2020:Q4	7.4	5.5	4.5

I want to leave you with a useful link to a simulation published by the Washington Post, which shows the effect of successful "social distancing" compared to other less restrictive outcomes. I strongly feel that this link is truly instructive and hope that our society will adopt the right pass in the future (https://www.washingtonpost.com/graphics/2020/world/corona-simulator/).

We have said little so far about how the pain will be shared. There will be some sectors (Health) that will benefit from the outbreak, while others (especially Leisure and Hospitality) that will receive the brunt of the blows.

John Husing will chime in on the forecast of the effect on sectoral outcomes in our next report, and we will keep it therefore short here by focusing on the sectors most impacted in the Inland Empire.

- *Health and Education*: while schools have shut down, teachers and staff will continue to receive their income. There is even a plan out there to help substitute teachers. The education sector therefore will not be much affected in terms of spending power generated within. Health will benefit as hospital beds will be used to capacity. The sector is more concerned with excess demand at this point than not having enough work. Interestingly enough, it is the Health and Education sector that has made up for the employment losses in manufacturing and construction during and past the Great Recession.
- *Warehouse and Transportation, Whole Sale*: the logistics sector is going to experience a large negative shock from the loss of imports. 40% of all U.S. imports come through the ports of Los Angeles and Long Beach. There has been a drop in incoming containers by 20% simply as a result of the supply-chain problems experienced in China (there have been over 50 fewer container ships arriving in Southern California so far). Add to that the lower demand of imports from U.S. customers because of the economic contraction, and you are looking at a significant decline in employment in this sector. There is a bright sign: Amazon just announced that it will hire 100,000 additional workers as a result of increased internet orders. Certain firms within the industry, such as UPS and FedEx, will do particularly well. Ontario airport is affected in a significant way through the reduction in flights.
- *Retail Sales*: there are certain firms, such as grocery stores, within this sector that are currently benefitting from the hoarding behavior of households. The great majority of retail outlets, especially department stores and malls in general, are hurting significantly. Also note that consumers are now overstocked, assuming that there will be no shortages of goods in the medium to long run. As a result, there will be fewer trips to the grocery store in the near future (100 rolls of toilet paper can last for a long time).

Housing Market,

Robert Kleinhenz

As with many other parts of the economy, “real-time” immediate indicators of the housing market are hard to come by. Most housing market statistics are reported monthly or quarterly. Based on numbers released by the California Association of Realtors on Friday, March 20, home sales and prices during the month of February rose in the IE both month-over-month and year-over-year. These closed-escrow sales figures are based on transactions that were initiated in January or even late December. Similarly, figures on closed sales in March will be based on transactions that opened escrow 30 to 60 days prior, so the full impact of COVID-19 on closed sales will likely register in April.

That said, anecdotal information points to concerns on the part of would-be buyers, with respect to both their financial outlook and the broader direction of the market. Meanwhile, agents must explore new ways to conduct open houses by means of virtual tours, possibly video conferences with clients, and other approaches. People are ingenious and good ideas often catch on quickly.

For a housing market that has never truly shifted out of second gear over the course of the longest economic expansion on record, this is yet another case of bad timing. The combination of income growth, low mortgage rates, and demographics had the potential to lift this year’s sales past last year’s subpar performance. That scenario is now in jeopardy, as buyers, sellers, agents, and brokers figure out how to move forward. Again, timing is very important: If ‘Safer-at-Home’ policies are lifted before mid-year and if IE residents can promptly return to work, market activity may still respond to low mortgage rates. Stay tuned!

Industry Survey, Taking the Pulse of IE Businesses

Babara Sirotnik

One month ago, the stock market was at an all-time high, the local economy was humming along, and the coronavirus was a news item that mainly pertained to China, not the U.S. Now COVID-19 is a worldwide epidemic that has affected every state in the U.S. and every sector of the economy. Businesses and government agencies are having to reinvent the way they do things as more and more shutdowns are announced.

Economic/business data exist that describe the state of the economy, but those data are old (having been gathered before the crisis hit) and do not necessarily focus on the Inland Empire in particular. That’s why the Inland Empire Economic Partnership is planning to conduct a brief industry survey.

The Inland Empire Economic Partnership, working with regional economists and researchers from Cal State San Bernardino, the University of Redlands, Claremont McKenna, and others, would like to know the current state and challenges of the Inland Empire business community. This

information will be used to drive policy decisions at the Federal, State, and local levels that will support our region's business community throughout the course of this crisis.

The 5-minute online survey includes questions such as:

- Top 3 concerns which are affecting your business because of COVID-19
- Length of time your business can survive based on current cash flow and reserves without government support
- Changes being implemented to accommodate staff and customers
- Need for information about ways organizations can better cope with the pandemic
- Estimates of percent of revenue which may be lost due to the effects of coronavirus
- Plans for employee lay-offs and/or company shut-downs

Please contribute to the effort to take the pulse of Inland Empire businesses. You can access the survey on IEEP's web site (http://ieep.com/) or in an e-mail you will soon be receiving. We would appreciate it if you could respond by **March 30, 2020** at the latest.

Consumer Sentiment, Labor Market,

Cameron Shelton

Predicting Consumer Behavior

We've all heard the statistic that spending decisions made by households constitutes 70% of the economy. As a result of precautions against Covid-19, households are in lockdown, reducing their ability to spend on many goods and services. At the same time, households will be responding to two unusual events: layoffs and the associated loss of wages and a potential rebate check from the government stimulus. While the lockdown is novel, past studies of consumer behavior can give us some guidance as to how household spending will respond to layoffs and rebates.

Layoffs

Unemployment claims in CA jumped from an average of roughly 50,000/week over the past few years to 190,000 for the second week of March. We don't know whether the pace of layoffs will accelerate or not. And indeed, this will depend to some extent on how consumer spending holds up. But we do know something about how losing a job affects household spending over the first few months.

In a study published last year, Peter Ganong and Pascal Noel of the University of Chicago found that spending by households whose primary earner filed for unemployment dropped 6% at the start of unemployment, continues to drop by an additional 1% for each month on unemployment insurance, and then drops by 12% at the exhaustion of unemployment benefits. One reason this is likely to be a good guide to consumer spending is because it reflects what savings households have

and how willing they are to adjust their spending habits in the face of loss of income for a period of a few months. One difference between the current situation and past unemployment is that newly unemployed workers are not likely to find another job until the end of the lockdown. On the other hand, they may reasonably expect to get their old job back when the lockdown ends. Thus we can reasonably estimate that consumers who lose a job will reduce spending between 6 and 10% in the coming months.

Stimulus checks

The Federal government is currently debating whether to mail stimulus checks of $1200 to American households. This would be the second time this century such checks went out. In 2001, as part of the Economic Growth and Tax Relief Reconociliation Act, the Bush administration mailed stimulus checks of $300 or $600 to households. Because the timing was randomized—some households received the checks weeks ahead of other households—economists David Johnson , Jonathan Parker, and Nicholas Souleles were able to estimate how household spending responded to (i) the news that the check would be coming and (ii) the actual receipt of the check. They found that households, on average, spent 72% of the rebate checks within three months: 11% on food and the rest on non-durable goods including clothing, personal care, health, and entertainment. Unsurprisingly, the additional spending was concentrated mostly among households who had low cash and savings. Given the difficulty of shopping for certain types of items under lockdown, the composition of spending will almost certainly differ from what it was in 2001.

Putting it together

As of the most recent census data from 2017, average California household income is $72,000. The American personal savings rate is about 7.5%, implying that Californian households spend about $5500/month. A drop of 10% due to job loss is $550 per household. If we estimate 150,000 additional lost jobs per week times 4 weeks times $550/household, that would imply a spending decline of $330 million by California households over the next month due to job loss. That's a little less than 0.1% of California GDP. In other words, most of the economic effect of the virus is not coming from workers who lost their jobs ceasing to spend, but from the rest of the economy failing to spend because we are stuck at home.

According to the census, there are roughly 11.5 million households in California. If each receives a $1200 check from the Federal government, and if checks are spent in 2020 the way they were in 2001, then this would amount to $10 billion in additional spending by Californians over the next 3 months. That's clearly far more than enough to cover the lost spending by households who are newly unemployed.

The main question is, will households spend these extra dollars while stuck at home? In 2001, the checks were spent on eating out at restaurants, entertainment such as concerts and sporting events, clothing, and healthcare. What could rebates be spent on in 2020 under lockdown? The stimulus checks will presumably help keep those whose industries are hardest hit from going without food. For that alone, they are worthy. But whether those checks will lead to additional spending by the vast majority of household who haven't lost their jobs remains to be seen.

Use of Technology/Internet in Current Crisis

Johannes Moenius

The most important means to mitigate the effects of staying home during the crisis is technology. Telecommuting, video-calls and conferencing, online shopping, and online entertainment have rapidly replaced traditional modes of work, social contacts, shopping, and entertainment. Several countries have used robots to interact with potentially infected patients to minimize exposure for critical human resources in healthcare: doctors and nurses. It is hard to overemphasize the role that technology plays in right now in our daily lives. But what are the long-term consequences of this shift?

Three questions take center stage in this context:

- How much can technology substitute for current forms of work, social contacts, shopping, and entertainment?
- How much of the current substitutes will continue after the corona virus threat has passed? In other words, after forced discovery of alternatives, will those substitutes be reversed in full, and if not, to what extent?
- How much will employers try to reduce their dependency on human labor in order to immunize their supply chain against pandemics by accelerating their automation efforts?

We will discuss these three questions in updates to this post in the weeks ahead, complemented by updates on what we know how technology deepens its roots in the daily lives during the lock-down.