The Bay Area Outlook: Signs of Growing Pains?

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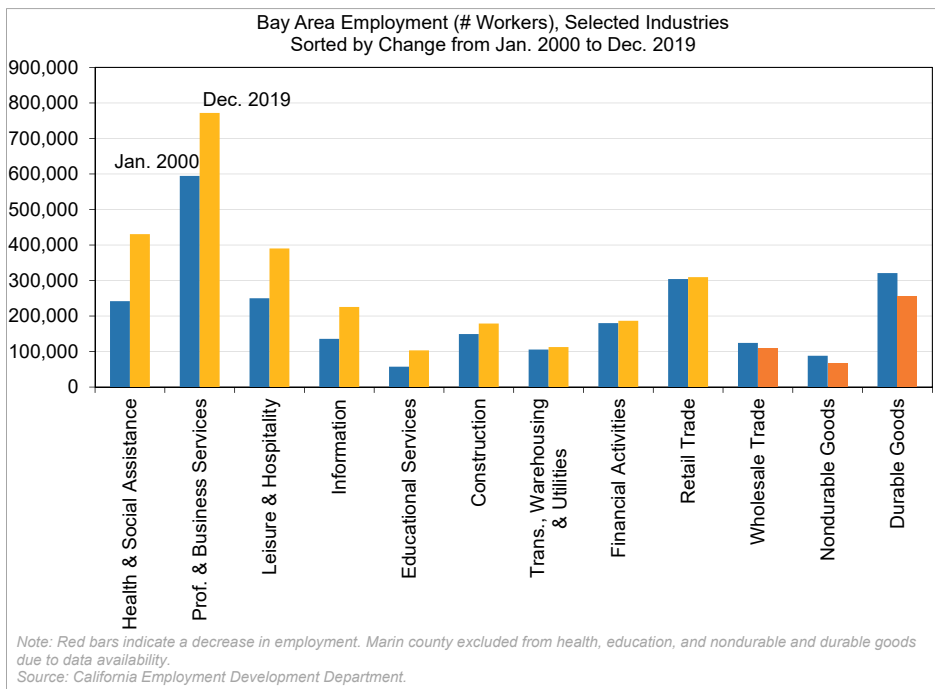March 2020

Summary

- The San Francisco Bay Area is without question a driver of growth in California.

- With that growth comes congestion and potential strain on local resources and infrastructure.

- Transportation: commute times have increased, likely reflecting both more traffic and longer commutes (in terms of distance traveled).

- Infrastructure: traffic on Bay Area bridges is up, transit systems are close to capacity during peak commute times, and a substantial fraction of public transportation assets are not 'in a good state of repair.'

- Homelessness: homelessness is not just a social issue, but potentially an economic one. There is some evidence that economic activity interacts with the prevalence of homelessness.

- Taking these metrics into consideration, is there evidence that Bay Area residents are responding by leaving en masse? The answer depends on how you look at the data.

- Bay Area outlook: while the metrics reviewed here show signs of capacity constraints, and while the coronavirus may affect economic activity in the Bay Area, and in the rest of the state, we project that the Bay Area will continue to experience growth in employment and personal income above that seen in the state overall.

The Bay Area generates a substantial amount of California's total economic activity.[1] The Bay Area alone employs about 20% of California's workers, generates about 30% of the state's GDP, and contributes about 20% of all taxable transactions in California.[2] This economic activity is the starting point for this report – the preamble of the story. As the Bay Area has grown and changed during the past two decades, the sectors experiencing the most (and least) growth are probably unsurprising: health services, professional and business services (which includes the sub-category 'computer systems design and related services'), leisure and hospitality, and information top the list, with manufacturing (both of durables and non-durables) and wholesale trade rounding out the bottom (Figure 1). The data in the figure are consistent with the view of the Bay Area as a technology center, and are also consistent with the idea that firms using similar (new) technologies and ideas benefit from clustering together. As the cluster grows, it attracts supporting industries and demands resources (such as labor, land, and capital), and this growth may increase congestion, which will tend to drive up prices of scarce resources. At some point, the costs of congestion relative to the benefits of proximity will become relevant in firm (and individual) location decisions. This is the part of the story that is examined here: the cost side of growth. This Bay Area Outlook will examine some indicators of congestion with the goal of quantifying the growing pains that many long-time Bay Area residents lament. Though this review cannot determine whether or not congestion costs now exceed the benefits of clustering, understanding

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1. Unless otherwise noted, the "Bay Area" refers to these six counties: Alameda, Contra Costa, Marin, San Francisco, San Mateo, and Santa Clara.
2. Employment and GDP data are from the BEA in 2018. Taxable sales are from the Department of Tax and Fee Administration from 2019 Q3.

Figure 1   Employment, Selected Industries, Jan. 2000 and Dec. 2019

Note: Red bars indicate a decrease in employment. Marin county excluded from health, education, and nondurable and durable goods due to data availability.
Source: California Employment Development Department.

resource and infrastructure constraints contributes to a balanced assessment of the Bay Area's economic potential.

Transportation

One measure of congestion is transportation congestion. With employment growth comes more people commuting on roads and transit systems. Whether by time or mode of transportation, commutes have been getting longer. Figure 2 shows that commute driving times have increased for residents of all Bay Area counties. This pattern could reflect either longer commute times over the same distance, longer commute distances, or both. The data suggest that this increase is not solely the result of commuting over longer distances. From 2006 to 2019, travel times along the same corridor of 101, particularly in the reverse-commute direction (southbound in the morning and northbound in the after-

noon), have increased from an average of about 35 minutes to about 40 minutes (Figure 3). The increase for carpoolers is even more stark in the reverse-commute direction: from about 31 minutes to about 40 minutes on average, essentially eliminating the carpool time advantage along this corridor.

Still, some of the overall increase seen in Figure 2 is likely attributable to individuals living further from where they work, as demonstrated by changes in commute patterns. While the fraction of Bay Area residents who both live and work in San Francisco county has stayed relatively stable over time, the fraction commuting to San Francisco county from Alameda county, Santa Clara county, and (more recently) San Mateo and Contra Costa counties, has increased (Figure 4). These statistics are consistent with an increase in commute distance.
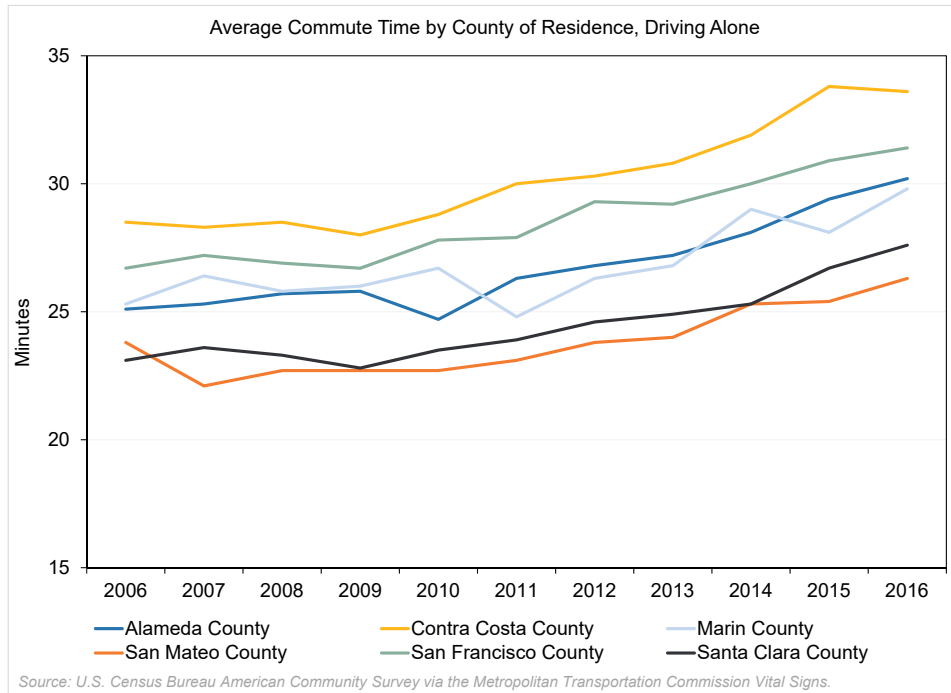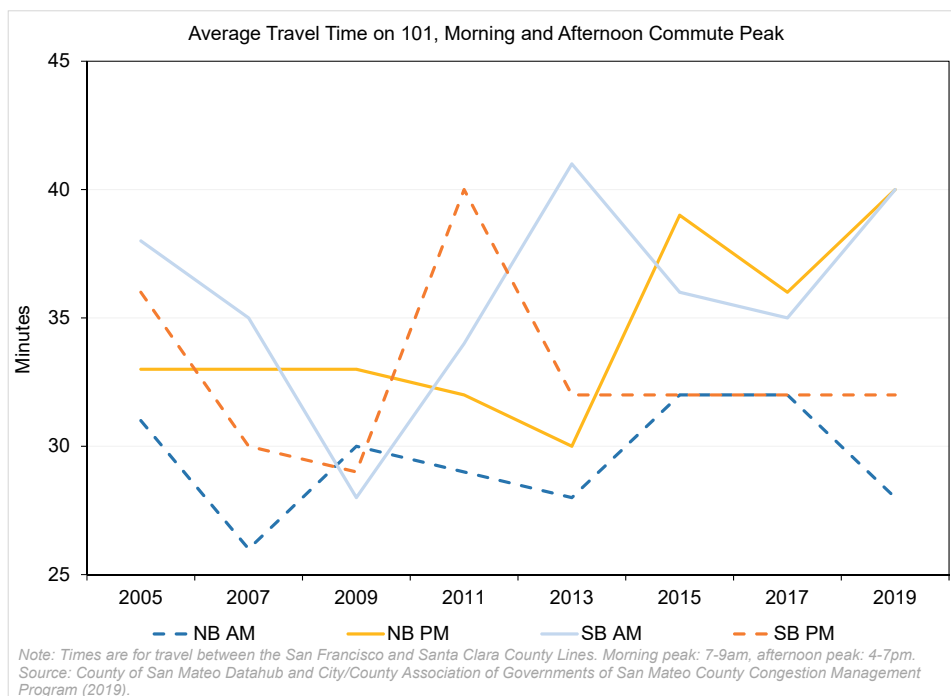
Figure 2   Commute TIme

Average Commute Time by County of Residence, Driving Alone

Alameda County   Contra Costa County   Marin County
San Mateo County   San Francisco County   Santa Clara County

Source: U.S. Census Bureau American Community Survey via the Metropolitan Transportation Commission Vital Signs.

Figure 2   Commute Distance (Constant Distance)

Average Travel Time on 101, Morning and Afternoon Commute Peak

NB AM   NB PM   SB AM   SB PM

Note: Times are for travel between the San Francisco and Santa Clara County Lines. Morning peak: 7-9am, afternoon peak: 4-7pm.
Source: County of San Mateo Datahub and City/County Association of Governments of San Mateo County Congestion Management Program (2019).

Figure 4   Commute Flows into San Francisco County

County to County Commute Flows:
Percent of Bay Area Workers Commuting to San Francisco From ...

Source: American Community Survey (5-year estimates) and U.S. Census Bureau.
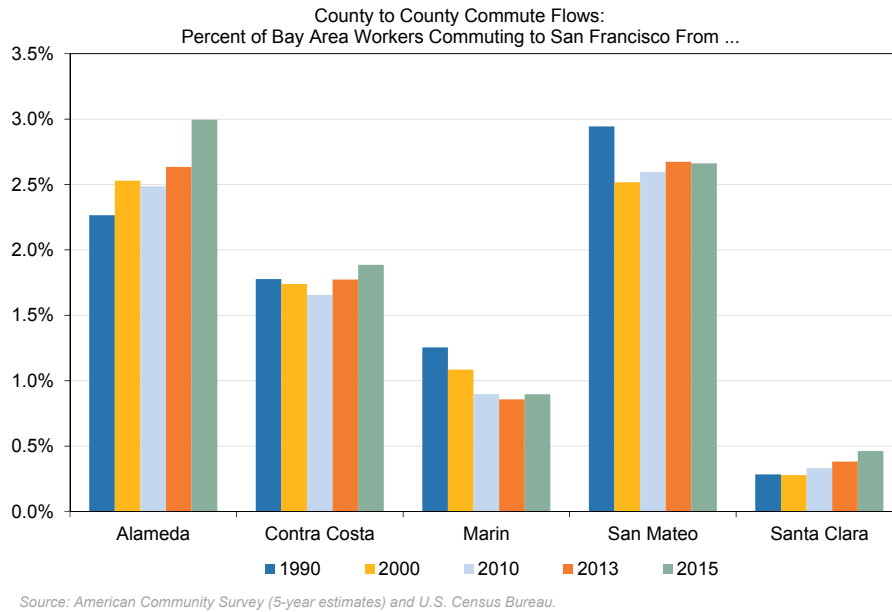
Figure 5   Public Transit Commute Times

Average Commute Time by County of Residence, Public Transit

Source: U.S. Census Bureau American Community Surveyvia the Metropolitan Transportation Commission Vital Signs.
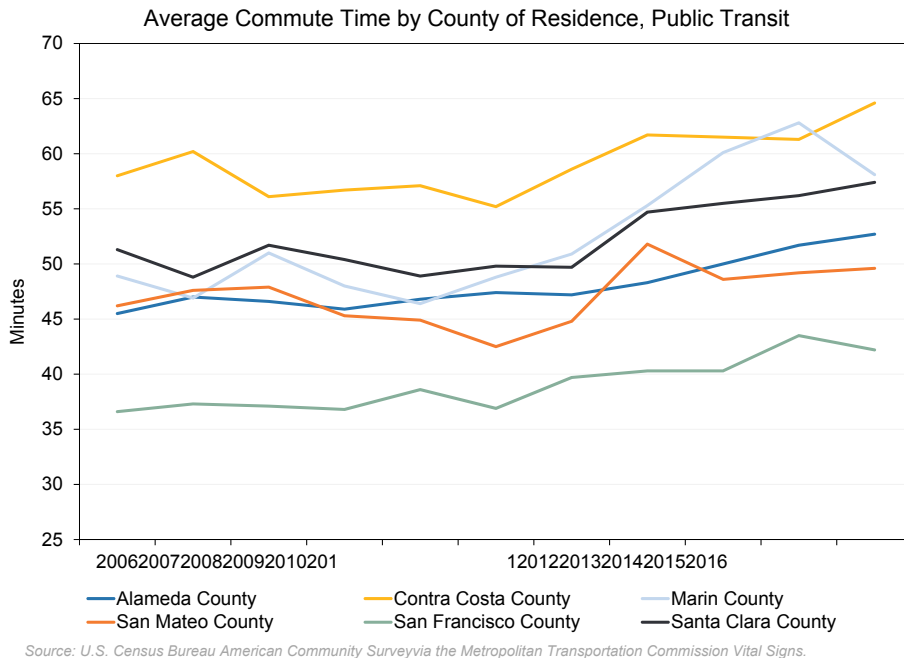
As with driving commutes, public transportation commutes now take longer than they used to. Between 2006 and 2016, these commutes have become, on average, about 6.5 minutes (about 13.5%) longer in each direction (Figure 5). Since trains and busses run on set schedules, this increase is most likely driven by workers living further from their place of work, though road congestion (for busses) and longer boarding/ disembarking times (for trains and light rail) could contribute as well.
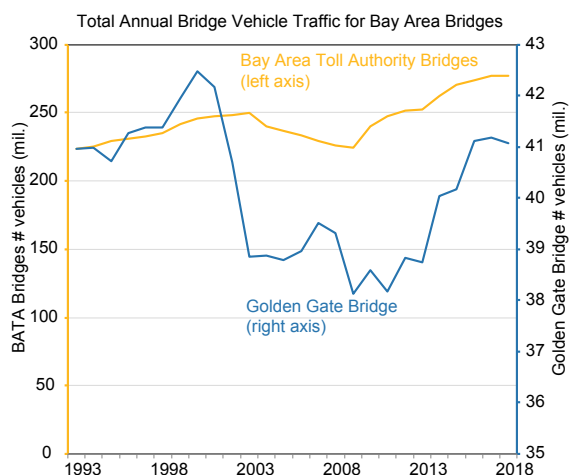
Infrastructure

Commute times give a sense of how long workers spend getting to and from work, but do not directly show how many people use regional transportation infrastructure. Observing an increase in the use of roads, bridges, and public transportation systems has a substantial positive side, as more use is a consequence of more economic activity: more workers commuting to their jobs and more goods being delivered and purchased. The downside is that traffic may be stressing infrastructure and resulting in time lost to commuting. One metric of infrastructure use is bridge crossing. Figure 6 shows that traffic across all Bay Area bridges has risen from about 278 million vehicles per year in 2010 to about 318 million vehicles per year, about a 14% increase in just under ten years. Still, Golden Gate Bridge traffic is still substantially below the peak in 2000. (This increase in bridge traffic is also consistent with individuals living further from where they work because having to cross a bridge increases commute distance.)

Public transportation use is also rising. Looking more closely at two systems, BART and Caltrain, gives a better understanding of how expanded use translates to system capacity. Figure 7 and Figure 8 show average weekday ridership for
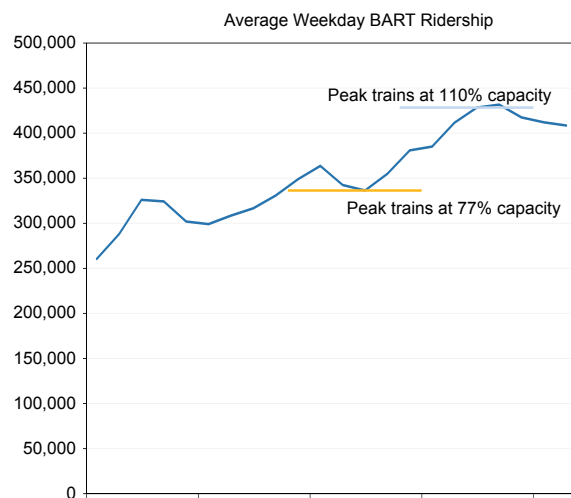
these two transit systems since the 1990s. Both have seen substantial growth over time, but more important for the discussion here is that both systems are close to capacity during peak commute times. In 2015, BART trains during

Figure 7   BART Ridership and Capacity

Note: Capacity listed is for the peak hour during the morning commute and the peak direction (into San Francisco).
Source: Bart.gov and the Metropolitan Transportation Commission.

Figure 6   Bay Area Bridge Crossing

Note: Total bridge traffic is approximated as two times toll-paying traffic. (Tolls are only paid in one direction.) BATA bridges: the Antioch Bridge, the Benicia-Martinez Bridge, the Carquinez Bridge, the Dumbarton Bridge, the Richmond-San Rafael Bridge, the San Francisco-Oakland Bay Bridge, and the San Mateo-Hayward Bridge.
Source: Metropolitan Transportation Commission and GoldenGate.org.

Figure 8   Caltrain Ridership and Capacity
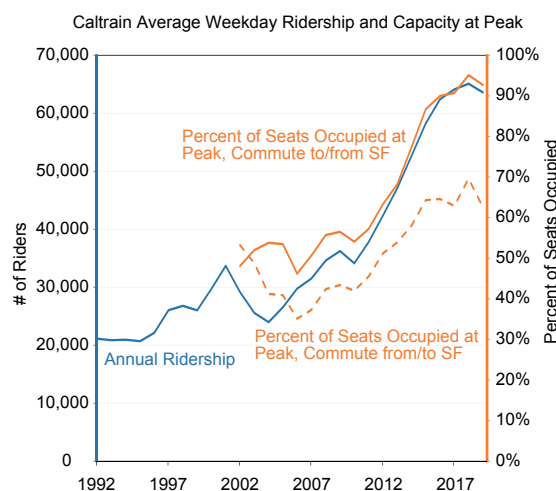
Source: Caltrain Annual Passenger Counts (http://www.caltrain.com/about/statsandreports/Ridership.html), various years. 1992 - 2016 data are average weekday ridership counts, 2017 - end data are average mid-weekday ridership counts.

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3. *Measured from the trough during the 2007 – 2009 recession to the most recent year of data, the increase in vehicles per year is over 20%, but carpools were not charged tolls until the 2010-2011 fiscal year for Bay Area Toll Authority bridges (and are thus not included in vehicle counts), so some of the 20% reflects carpool traffic being added to vehicle counts.*

Figure 9   State of Transportation Infrastructure

Percent of Revenue Vehicles "Not in a Good State of Repair" (2017)
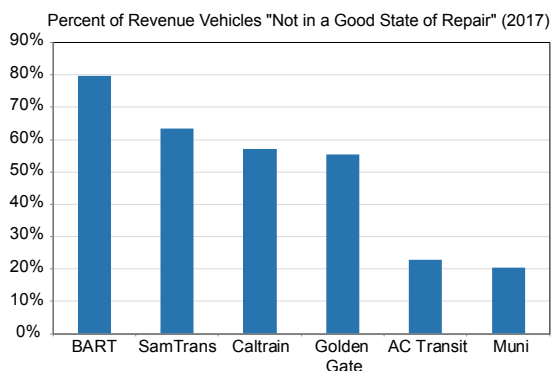
Note: "State of repair" is defined by the Federal Transit Administration. The Metropolitan Transportation Commission uses the concept of usable life to classify the state of repair for revenue vehicles. "Revenue vehicles" are vehicles used to transport customers.
Source: Metropolitan Transportation Commission (2017).

the peak morning commute into San Francisco were, on average, at 110% capacity. Though average ridership has declined some since the peak in 2016, peak trains are still likely at or close to capacity. Caltrain trains during peak commute hours are also operating close to capacity (over 90%), particularly in the traditional commute direction (northbound in the morning, southbound in the afternoon).

At the same time as more people are riding these systems, transportation infrastructure is deteriorating. Figure 9 shows the fraction of revenue vehicles (i.e. vehicles used to transport customers) for several transit systems that were "not in a good state of repair" as of 2017 (non-revenue vehicles are in even worse shape).[4] For BART, Caltrain, SamTrans, and Golden Gate Transit, over 50% of revenue vehicles were in bad shape. This could be an indication that large, costly, capital investments will be needed in the future. In the interim, the state of transit infrastructure may place limits on the systems' ability to accommodate employment and population growth.

Data on commute times, commute patterns, and transportation infrastructure provide evidence that capacity constraints and the costs of the Bay Area's growth warrant careful consideration when assessing the potential for growth going forward.

Homelessness

From state politicians to California residents, individuals identify homelessness as a major issue for the state. Putting aside whether or the extent to which there is a causal relationship between economic growth and homelessness, homelessness is certainly an issue that businesses and residents have to consider. Rather than focusing on the social and political debate, this section investigates the relationship between economic activity and homelessness.

Two recent examples of how homelessness may affect economic activity come from news about conventions. In 2018 and again late last year, two large conventions announced that they would be moving their events elsewhere (Oracle starting in 2020 and a large medical association after 2023) citing costs (e.g. hotel accommodations) and street conditions. While general tourism may fill the void left by cancelled conferences (though the extent to which is hard to say), these cancellations indicate that for at least some conference organizers, San Francisco's costs now tip the scale against the city's favor.

Figure 10   Calls Requesting Encampment Cleanup, San Francisco

**San Francisco 311 Calls for 'Encampment Cleanup'
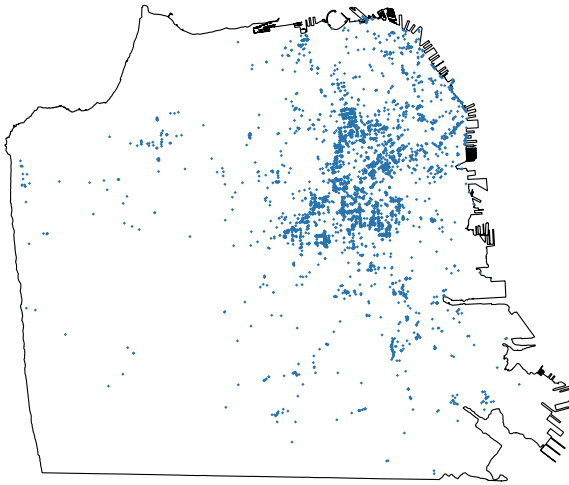(Monthly Total # of Calls)**
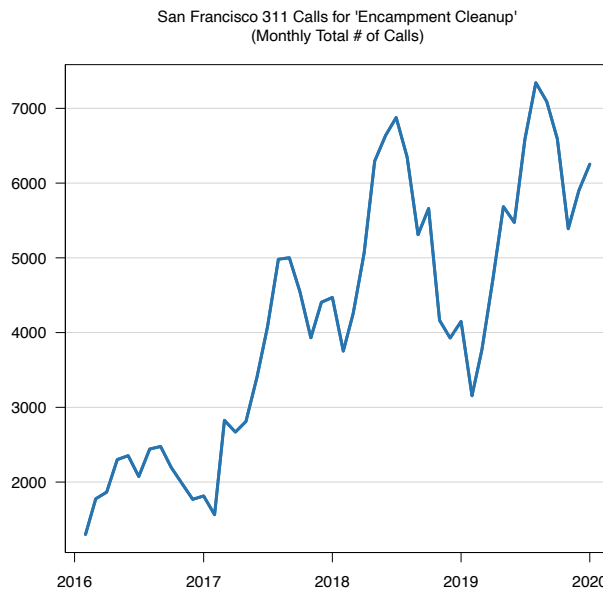
Note: 'Encampment Cleanup' is one of the detailed categories that can be assigned to each 311 call.
Source: San Francisco 311 and authors' calculations.

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4. "State of repair" is defined by the Federal Transit Administration (FTA, National Transit Database Glossary). The Metropolitan Transportation Commission uses the concept of usable life to classify the state of repair for revenue vehicles (MTC, Regional Transit Capital Inventory).

Figure 11   Homeless Encampment Reports

**San Francisco 311 Calls for 'Encampment Cleanup'
Jun 2019**

*Note: Each point is one call. 'Encampment Cleanup' is one of the detailed
categories that can be assigned to each 311 call.
Source: San Francisco 311 and authors' calculations.*

To move beyond these two specific examples, we investigate the spatial distributions of homelessness and economic activity at a fixed point in time and then use panel regression models to study the relationship over time.

To capture high-frequency geographic information about homelessness, we use a database of San Francisco's 311 calls. Each call is given a category, one of which is "encampment cleanup" (Figure 10). Though calls about encampment cleanups are certainly not a perfect measure of homelessness, these data have the advantages of being high-frequency (down to the hour) and geographic (the data contain latitude and longitude coordinates). For economic activity, we use daily data on business formation and destruction (location openings and closings) and on building investment (building permits), all of which also include latitude and longitude coordinates.

Figure 11 maps the location of all encampments that were requested to be cleaned up in June of 2019. (Maps for other months look similar.) Using some simple spatial statistics, one finds, perhaps unsurprisingly, that encampments are not distributed randomly (in a statistical sense) around the city. Instead, they cluster together.[7] Moreover, spatial statistical techniques that compare how two sets of points spatially interact show that construction activity (as measured by building permits pulled) and encampments tend to cluster together (more so than one would expect if both were distributed randomly around the city). These results are simple (spatial) correlations and should not be interpreted causally.

Another way to look at the issue is to compare economic activity (counts of building permits, business formation, and business closure) to counts of encampment calls over time within zip codes using panel data models. Simple correlations show strong positive relationships between all three measures of business activity and the number of encampment calls. This is not surprising: in the cross-section, zip codes that have more business and construction activity likely have more people, and areas with more people likely have more encampment calls (either because there are more people around to report encampments or because encampments may be more likely to pop up where the density of people and businesses, who might offer support to the homeless, is higher). To control for the fact that different zip codes may have different underlying tendencies to have (or have reports of) encampments and for trends in encampment calls over time, we run regressions that use variation in encampment calls and business activity within each zip code over time using fixed effects for zip code and date.

business openings = **33.8** + 0.003 * # encampment calls + zip code fixed effects + year-month fixed effects [N = 2,399; adjusted R2 = 0.798]
business closings = -4.1 + **0.036 *** # encampment calls + zip code fixed effects + year-month fixed effects [N = 2,244; adjusted R2 = 0.809]
building permits = **86.8 - 0.011 *** # encampment calls + zip code fixed effects + year-month fixed effects [N = 1,764; adjusted R2 = 0.901]

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5. 311 is the "primary customer service center for the City of San Francisco" (sf311.org). Individuals can call with any question or request.
6. Unfortunately, the data on business openings and closings are missing latitude and longitude coordinates for recent years, so this measure cannot be used in the spatial analysis.
7. One slight issue with the statistical tests is that because encampments technically cannot exist in every location (e.g. they cannot be located in the middle of a building), not all of the test's assumptions are perfectly met.

These regressions show that more encampment calls in a zip code are associated with statistically significantly fewer building permits pulled and more business closures (bold values are statistically significant at the 5% level). While these results are consistent with the notion that encampments deter economic activity, they by no means guarantee causality. A third variable that changes within a zip code over time, like gentrification, could result in both more building permits and fewer encampments. Whether or not these relationships are causal, what is not in dispute is that homelessness in the city has been increasing over time. Data from 311 calls on encampments confirm the patterns seen in the Department of Housing and Urban Development's point in time counts of homelessness. Understanding the causal link between homelessness and economic activity and the magnitude of any effects will become increasingly valuable if this issue persists.

Migration

High costs of living and the metrics discussed above are symptoms of congestion – more people trying to crowd into the same space.[8] Given that there does seem to be evidence for increasing congestion in the Bay Area, is there evidence that individuals are responding by changing their location decisions and are leaving the Bay Area? The answer depends on how you look at the data.

IRS data from 2012 to 2018 (the latest available tax year) show that the number of people leaving the Bay Area for other counties in California outside of the Bay Area increased from about 80,000 in 2012 to over 100,000 by 2018 (Figure 12).[9] Someone wanting to tell a story about migration out of the Bay Area might use these statistics.[10] These numbers overstate the net outcome of migration. The

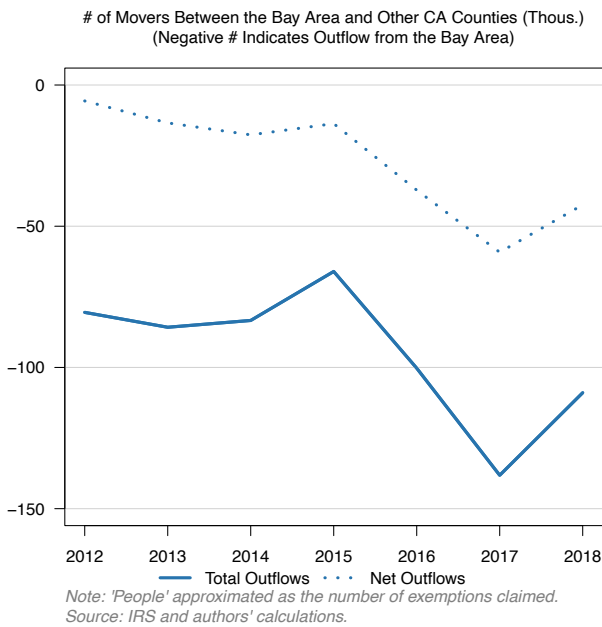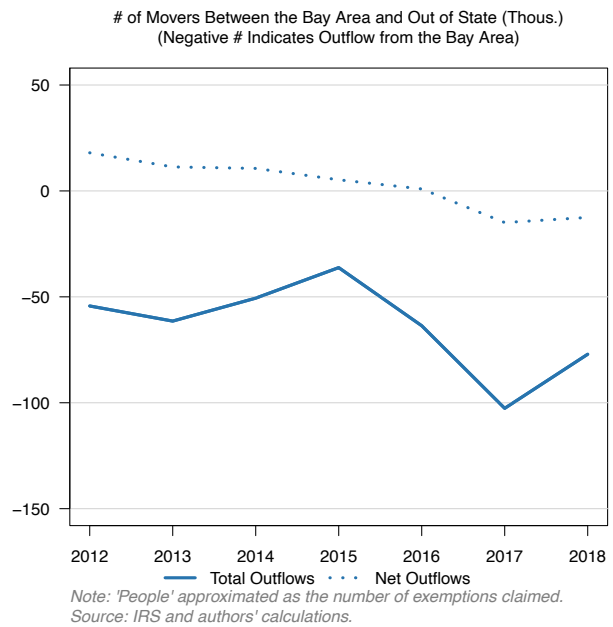Figure 12   Migration Between Bay Area and non-Bay Area Counties in CA

# of Movers Between the Bay Area and Other CA Counties (Thous.)
(Negative # Indicates Outflow from the Bay Area)

Note: 'People' approximated as the number of exemptions claimed.
Source: IRS and authors' calculations.

Figure 13   Migration Between the Bay Area and Other States (Not CA)

# of Movers Between the Bay Area and Out of State (Thous.)
(Negative # Indicates Outflow from the Bay Area)

Note: 'People' approximated as the number of exemptions claimed.
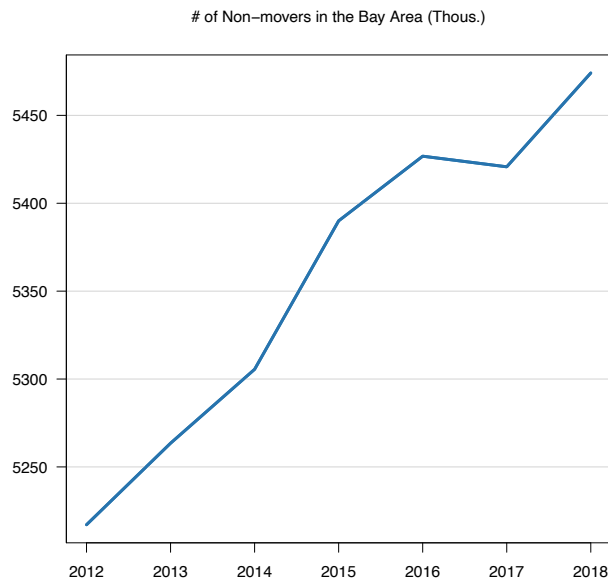*Source: IRS and authors' calculations.*

8. The jury is still out on the causal relationship between home prices and homelessness, but at least in the cross-section, the correlation seems to be strong (Evans, Philips, and Ruffini 2019).
9. Because the data are from tax returns, 'people' are approximated by the number of exemptions claimed in tax filings. In addition, the figures present-ed only include counts of flows with known origin and destination counties. County origin-destination pairs with fewer than ten filers are aggregated and reported in 'other flows,' and thus cannot be used here.
10. Note the jump in out-migration between 2015 and 2017. The IRS data show a notable increase in migration all across the county between these years, so the seemingly large change is not specific to the Bay Area. Other estimates of migration, such those from the Current Population Survey, do not indicate a large increase between 2015 and 2017, so the pattern in the IRS data may reflect changes in data matching or methodology.

Figure 14   Bay Area Stayers

# of Non–movers in the Bay Area (Thous.)

Note: 'People' approximated as the number of exemptions claimed.
Source: IRS and authors' calculations.

of individuals moving in accordance with the value of their labor, then from an economic perspective, this is not necessarily bad. If, on the other hand, market imperfections are distorting prices (of homes, for example) or wages, then the economic argument in favor of migration loses validity. The analysis here cannot be used to determine which is the case. Figure 12. Migration Between Bay Area and non-Bay Area Counties in CA

To tie the migration figures back to the core question about location costs and benefits, flows out of the Bay Area (on net) are consistent with more people determining that the balance of costs and benefits no longer favor the Bay Area; however, the IRS migration data do not account for international migration, which likely has a net positive effect on the Bay Area's population. Though net migration out of the Bay Area to other California counties is not new (see Figure 12), a continuation of the congestion trends reviewed above could erode the benefits of proximity and clustering long enjoyed by Bay Area firms and residents.

The Bay Area Outlook

In the near future, though, pessimism about congestion does not dominate the outlook. The major uncertainty in the outlook is the coronavirus. Here, uncertainty is the key word. At the time of this writing, there is not enough information and there are not enough economic data to make a definitive claim about how the virus will affect the Bay Area. On one hand, tourism may suffer and affect, among others, the leisure and hospitality industry, which is a sizable industry in the Bay Area (Figure 1).[11] On the other hand, The Bay Area's concentration of technology firms and professional industries may provide insulation from any economic effects of the virus if workers are able to work remotely with relative ease. In addition, if more people in the general population stay home and avoid travel, firms that provide web-based services may see demand for their services increase.

Given this uncertainty, the Bay Area outlook generally follows that of the state.[12] We project that payroll employment growth, following a strong year in 2019, will hover close to 1% for the next two years as current low unemployment

dashed line in Figure 12 shows that net migration between the Bay Area and other counties in California is much smaller. While migration is still outward on net, there are only about 50,000 net out-migrants in 2018 as opposed to over 100,000. Figure 13 shows analogous series for migration between the Bay Area and the rest of the US (excluding California). Even these statistics do not paint an accurate picture of Bay Area migration or population change because they do not account for either 1) international immigration, or 2) natural population increase. Looking instead at the number of people who live in the Bay Area and remain there through the next year (Figure 14), the Bay Area population is growing, not declining.

This discussion aims to demonstrate the importance of understanding exactly what question is being asked and how that question is being answered. Moreover, migration is not inherently bad. The efficient use of resources across space (in an economic sense) relies on unrestricted mobility of labor (i.e. people). If Bay Area migration is the outcome

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11. Looking to the past may provide some context. There was a sizable, though short-lived, drop in international passenger arrivals at SFO during the SARS outbreak. Still, patterns of employment in leisure and hospitality and tourism metrics like hotel occupancy rates in San Francisco did not dip notably; however, the current consensus view seems to indicate that supply chain disruptions from the coronavirus will be more severe than the disruptions induced by SARS. (For SFO arrivals, see the California Forecast slides from last quarter, for example. Employment data are from the Employment Development Department, and hotel occupancy rates for San Francisco are from sfgov.org.)
12. Here, the "Bay Area" includes Alameda county, Contra Costa county, Marin county, San Francisco county, San Mateo county, Santa Clara county, and San Benito county because of how available data are aggregated.

rates (below 2.5% for the Bay Area) may make finding new workers difficult. Real personal income growth will slow this year, though not as much as in the state overall. Asset market reactions to the coronavirus could have a negative effect on IPO activity and incomes. Still, the Bay Area typically experiences higher income growth than does the state because high costs of living (which characterize the Bay Area) tend to favor in-migration of workers with a high marginal product (and thus a high income) and out-migration of low marginal product workers. After a dip, we project that real personal income growth will pick back up in 2021 as uncertainty over the coronavirus (hopefully) passes.

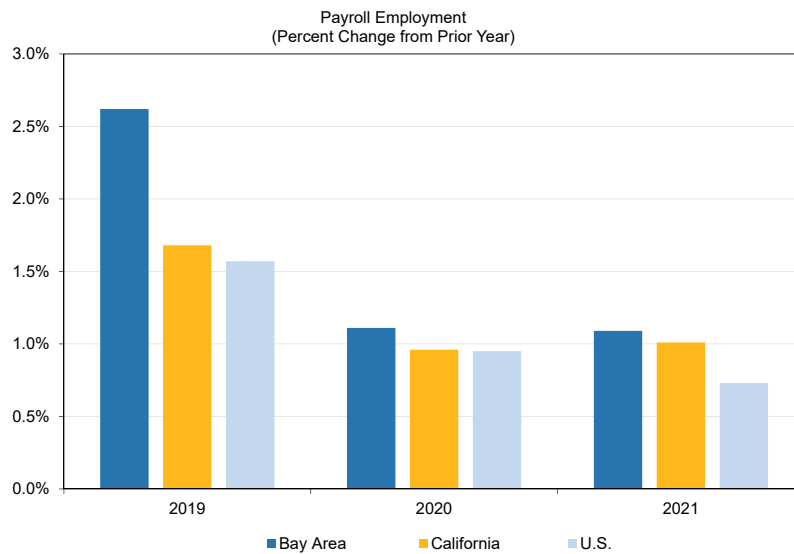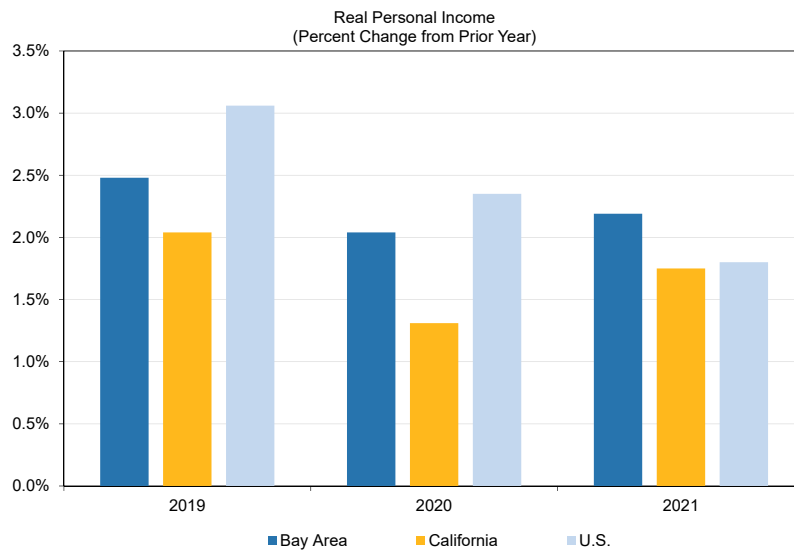Figure 15   Bay Area Outlook: Payroll Employment

Payroll Employment
(Percent Change from Prior Year)

Figure 16   Bay Area Outlook: Real Personal Income

Real Personal Income
(Percent Change from Prior Year)

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