DRISI
Caltrans Division of Research, Innovation and System Information

Research Results

Not So Fast: A Study of Traffic Delays, Access, and Economic Activity in the San Francisco Bay Area

The research measured how congestion affects economic performance of key industries in the San Francisco Bay Area.

Planning, Policy and Programming

OCTOBER 2016

Project Title:
Accessibility and Economic Development: How the Transportation Network Affects the Economic Performance of Regions

Task Number: 2798

Start Date: March 1, 2015

Completion Date: March 31, 2016

Task Manager:
Mohamed AlKadri,
Ph.D., PE Branch Chief,
mohamed.alkadri@dot.ca.gov

WHAT WAS THE NEED?

The research objective was to answer few basic questions:

- Does traffic congestion "really" affect business locations and travel choices? If so, how?
- How is access to major industries related to traffic congestion?
- How does traffic congestion affect economic performance of businesses?

WHAT WAS OUR GOAL?

Our goal was to understand how traffic congestion affects economic performance of businesses. Getting answers to the above questions will help businesses understand the effect of location and access on their economic performance, particularly, new start-ups trying to decide where to locate. It will help economists and urban planners understand the factors affecting the economic viability and livability of their regions. And finally it will also help transportation practitioners and planners better understand traffic demand so they can better manage it and provide adequate supply (i.e., roadway infrastructure and capacity and transportation services).

WHAT DID WE DO?

The research measured how traffic congestion affects economic performance in the Bay Area. It focused on five basic industries: ***Advertising, entertainment*** (e.g., Pixar in Emeryville and Skywalker Ranch in Marin County) ***IT*** (i.e., Silicone Valley and businesses such as Apple, Facebook, Google, and Intel), ***securities***, and ***commodities*** industries. The research also looked at the ***grocery*** industry –as a non-basic industry.

Caltrans

DRISI provides solutions and knowledge that improves California's transportation system

The statistical analysis focused on the effects of traffic congestion. That is, other factors affecting start-up business location and economic performance, such as the cost of housing, were taken into account by the multivariate statistical models so that the observed effects are only attributed to traffic congestion.

Research data (such as traffic, travel time, demographics, employment, and economic activities) were drawn from three primary sources: 1) The National Establishment Time Series (NETS) proprietary micro dataset released by Walls and Associates, 2) Transportation network travel time data developed by the San Francisco Bay Area Metropolitan Transportation Commission (MTC), and 3) Socio-demographic data from the U.S. Census Bureau's American Community Survey (ACS).

WHAT WAS THE OUTCOME?

The most fundamental finding in this research was the following postulate: "Proximity to jobs in the San Francisco Bay Area, regardless of congestion levels, contributes far more to employment access than do variations in traffic delays." The research found that, on average, more jobs can be reached in a given amount of (travel) time through congested streets of San Francisco than on fast moving freeways and boulevards in the fringes of the Bay Area.

Figure 1 shows the relationship between proximity to jobs and job accessibility and local area traffic speeds and job accessibility (right) in the San Francisco Bay Area. The figure's comparison shows that job density is directly proportional to job access (shorter distances) and inversely proportional to average travel speed.

Figure 2 shows the effects of combining both proximity and speed on accessibility. The results of the multi-factorial analysis shows that proximity has much greater effect on overall job accessibility than faster travel speeds.

Figure 3 shows the overall employment density (all jobs) in the San Francisco Bay Area.

Figure 4 shows the speed, employment, proximity and employment accessibility plotted against each other.

In other words, access is the key. Traffic delays and traffic congestion do not influence new businesses and employment opportunities nearly as much as access to other business activities and services. San Francisco Bay Area residents and businesses (especially new residents and businesses) are willing to pay more for real estate, endure more congestion, tolerate more traffic delays so that they have "access" to what they want to do: Business and employment. In addition, new startups seem to locate close to other businesses that they depend on or trade with. This phenomenon is known as "agglomerations" of alike, similar, interdependent businesses and industries. Interdependence comes in form of supply and demand of inter-business goods and services. The agglomeration also creates greater masses of labor, workforce, and customers.

The research noted that not all industries are alike when it comes to co-locating. Some industries tend to co-locate more than others. For example, the entertainment industry co-locates the most (primarily in the city of San Francisco). The IT industry is less concentrated but mainly clustered in the South Bay's Silicone Valley. On the other end, the grocery industry is scattered along residential clusters across the Bay Area.

The second significant finding of this research is that "access" is greatest where there is congestion. This sounds illogical, but it can be explained. Heavily populated areas, dense urban centers, and high-rise buildings mean much "shorter" travel to get to destination. Conversely, low-density suburban areas require much longer travel to get to destination, and thus less access. According to this research, this conclusion is true even when travel time, distance, and emissions are factored in.

The above two findings do not mean that congestion is good! The facts are simply that dense urban neighborhoods "cope" with congestion by means other than increasing capacity, such as using alternative modes (transit, bikes, and walking) and allowing dense, mixed use development.

These research findings have another implication: Shifting the focus from "mobility" to "access." This makes sense logically because mobility is means to access and not an objective by itself. The authors noted that "In the Bay Area and LA, in other words, it's location, location, location, and not faster, faster, faster."

So the main conclusion of this research is that, in metropolitan areas, geographic "proximity" increases "access" much more than transportation mobility. Good proximity is typically characterized by short distances. Good mobility is typically characterized by fast speeds.

Another observation is that congestion is a side effect of success, not a cause or symptom of failure. Nonetheless, it does not mean that congestion is good or that we should not bother to try to mitigate it. In this research, it was observed that, within a given area, holding all other variables constant, access was "greatest" when delays were the "least."

Finally, the researches did not find any evidence that chronic traffic congestion is actually driving businesses out to less congested parts of the Bay Area.

Do the results address the Caltrans need?

This research was a University of California Transportation Center (UCTC) research project. The research was funded by the University of California Center on Economic Competitiveness in Transportation. As such, the research was aligned with the research goals and the research agenda of the UCTC, not Caltrans.

Nonetheless, the findings of this research can be highly informative to Caltrans. One of Caltrans goals is to promote the "***Sustainability, Livability and Economy***" * in the State of California.

* "Make long-lasting, smart mobility decisions that improve the environment, support a vibrant economy, and build communities, not sprawl."

WHAT IS THE BENEFIT?

The research findings are significant for urban planners and transportation professionals. The implications of the first findings (or, say, "theory") are far reaching. For example, this theory creates doubt regarding the notion that urban congestion causes suburban sprawl. It contradicts the idea that congestions chases away business and stifles economic productivity. It also questions the notion that reducing supply or increasing congestion pricing would reduce demand, and thus reduce congestion because people will continue to gravitate to business hubs and employment centers regardless of congestion or congestion pricing.

This research provides planners and decision makers with new information about the effects of traffic congestion on business performance. It sheds new light on the relationship between access and economic activities and access and congestion. Urban and land use planners can apply access-focused development impact analysis in order to ensure and bring in the economic and social benefits of agglomeration –which is why cities exist in the first place. They should evaluate selective road capacity improvements (i.e., increase capacity to increase access, not necessarily increase mobility) and evaluate parking and congestion pricing strategies to manage demand (and supply) in light of the above findings and conclusions.

LEARN MORE

The project's final report is titled "Not So Fast: A Study of Traffic Delays, Access, and Economic Activity in the San Francisco Bay Area." It can be found on DRISI's Website. It can also be requested from the project manager, Dr. Mohamed AlKadri by contacting him at: mohamed_alkadri@dot.ca.gov

IMAGES

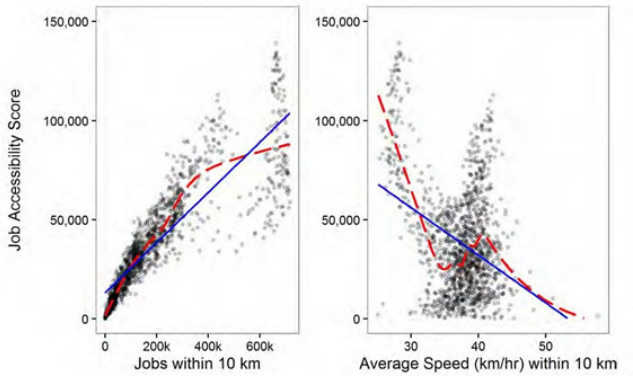

Image 1: The relationship between proximity to jobs and job accessibility (left) and local area traffic speeds and job accessibility (right) in the San Francisco Bay Area.

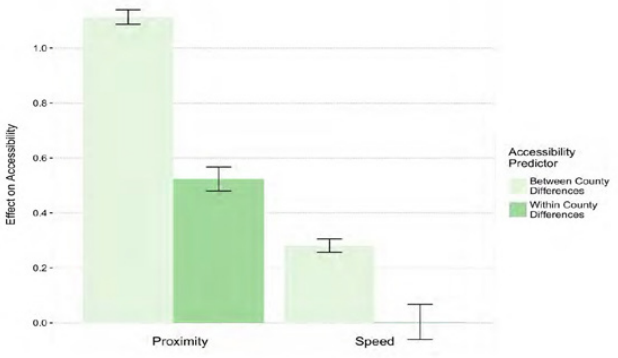

Image 2: The relative effects of differences in proximity and speed on overall job accessibility in the San Francisco Bay Area.

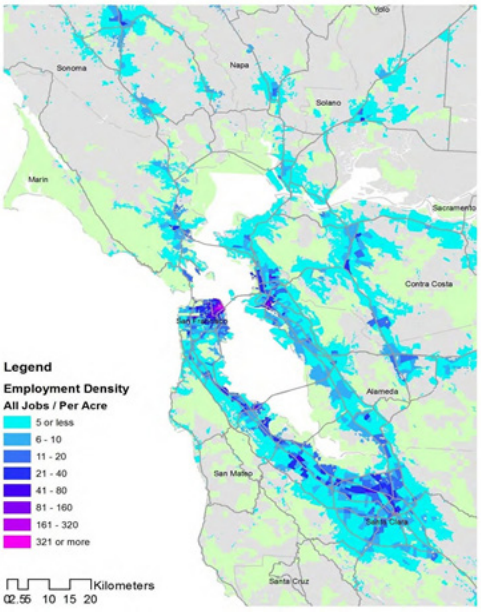

Image 3: Employment density in the San Francisco Bay Area. (Jobs in all sectors, per acre (2009 data))

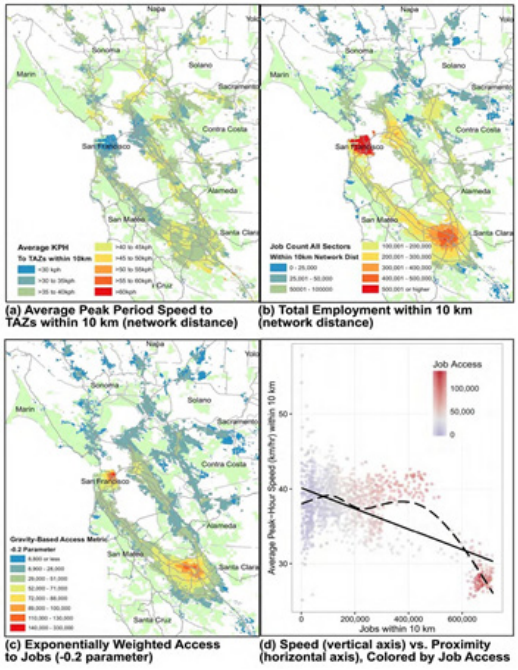

Image 4: Speed, employment, proximity and employment accessibility plotted against each other, cartographically and by color-coded scatter plot.