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Finding the density sweet spot for transit

Report shows new numbers

Wendee Holtcamp, Apr 28, 11.

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One of the longstanding questions in planning new rail transit projects is how to get the most “bang for the buck” in terms of investment costs and urban density in the area served. Sometimes densely developed areas are difficult and expensive add rail to, but if an area served by rail is not dense enough, the transit system will not have enough riders to make it worthwhile. University of California, Berkeley graduate student Erick Guerra and professor of City & Regional Planning Robert Cervero tackled the question, and they summarized their findings in the recent University of California Transportation Center report [Cost of a Ride: The Effects of Densities on Fixed-Guideway Transit Ridership and Capital Costs](#) published in August 2010.

The researchers looked at 59 capital transit investment projects – including 33 light rail, 23 heavy rail, and four bus rapid transit – in 19 metropolitan areas in the United States (Houston was not in the mix). The ultimate question they were trying to answer was how many jobs or people in an area made rail worth the investment?

They calculated a density that would allow a project to perform well, and also a bare minimum. According to the report: “[A]n average light rail system in an average city requires approximately 56 jobs and persons per gross acre in order to achieve a strong cost-per-rider performance with an average capital cost of \$50 million per mile.” They found the bare-minimum threshold for rail investment was 27 jobs and persons per acre for heavy rail

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systems and 14 for light rail. "Below these levels," they conclude, "the average transit investment is unlikely to approach the ridership levels needed to justify the capital costs." However, when other desirable features are present, such as plentiful parking, good transit service within a city or low capital costs, some corridors performed well and had a low cost-per-rider despite low urban densities. They also found that heavy rail had a ridership bonus over other types of rail, although their construction costs are also the highest.

How did the rail projects they analyzed measure up? The majority of the 768 transit stations in the 59 corridors studied had fewer than 19 jobs and persons per acre within a half mile of stations, and most transit-station areas in the study fell significantly short of the optimal density they calculated that would give a project the best "bang for the buck."

They found that a 10% increase in population density (people and jobs) corresponded with a 2.66% increase in ridership. Likewise, the 10% population density increase resulted in a 2.6% increase in costs, which is consistent with past studies. The researchers separated out the density of job opportunities and the density of dwellings, both of which improved the cost-effectiveness of a transit system but not equally. A 10% increase in population density per acre corresponded to a 3.2% decrease in cost-per-rider, whereas a 10% increase in jobs per acre corresponded to a 1.5% decrease in cost-per-rider.

The researchers conclude that any density threshold, including their own, should be used with caution and skepticism, since cost-effectiveness can vary widely among cities for reasons such as local parking availability and construction costs.

"Although they share similarities, each transit system and project is unique with its own set of extenuating circumstances and particularities. Furthermore, each system has observable, as well as unobservable, variations that influence ridership. There is no one or even dozen hard and fast density thresholds that can be applied across all projects."

The authors plan to next address how other variables affect ridership, such as train frequency, bus connections, and relative costs of automobiles in a given city.

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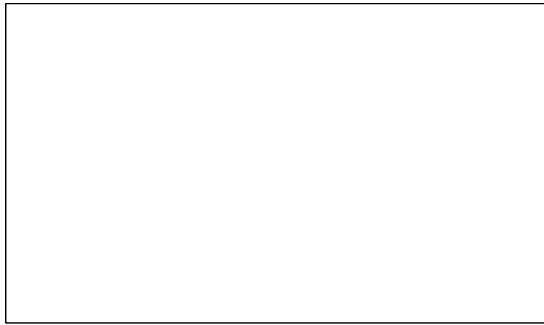
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