Transit Gap Methods

The AllTransit™ website has a tool called the AllTransit Gap Finder which identifies areas where the transit service is less than typical for similar areas in the U.S. A Transit Service Gap refers to a neighborhood (for the purposes of this analysis a neighborhood is defined as a Census Block Group) where there is a larger average market for transit than the service provided. A benchmark is needed to define the average transit market; this is accomplished by fitting current transit service to a set of parameters that are associated with transit demand, giving an estimate of the average service for such a neighborhood across the U.S. This transit market is then compared locally to the transit service available and the "Transit Gap" is the mismatch in the local transit market and the local transit service.

Why not Transit Deserts?

Often areas where there is a lack of transit are labeled as "Transit Deserts" as an analogy to "Food Deserts"; usually described as intercity neighborhoods that lack access to healthy food. However, transit is intrinsically different than food. A given location could have no transit and that might be okay, for example a rural area where the population is so dispersed that running a transit service would not make sense. On the other hand a place with a lot of transit service may not be enough for the market demand, given the people, jobs and amenities in that location. Therefore, AllTransit™ has decided to focus on what is the average service provided in neighborhoods and narrow in on areas where there is a **gap** between that **market**, and the actual **transit service** that is being provided.

A Consistent Measure of Transit Service

The AllTransit™ Performance Score is a ranking of the AllTransit Performance Index (API[1]) in order to compare all the Census Block Groups in the country on an equal basis. For a more detailed description of how this is calculated see AllTransit methods. The API, which uses the weighted sum of three transit metrics: Transit Connectivity Index, the Jobs in the 30-minute Transit Access Shed and the Level of Service, in such a way that is driven by the fraction of people in a neighborhood that use transit for their daily commute. It addresses three questions:

1. How much is the transit in a neighborhood used?
2. Can neighborhood residents find a bus stop or train station and how long do they have to wait for a ride?
3. Can neighborhood residents get to jobs and other economic activity using this transit system?

Transit Market

The API, as a measure of transit quality of service, is used to benchmark transit service across the US. The measure of the local transit market is developed off this service measure but is based on factors that drive transit demand. The categories of what drives transit demand are demographics,

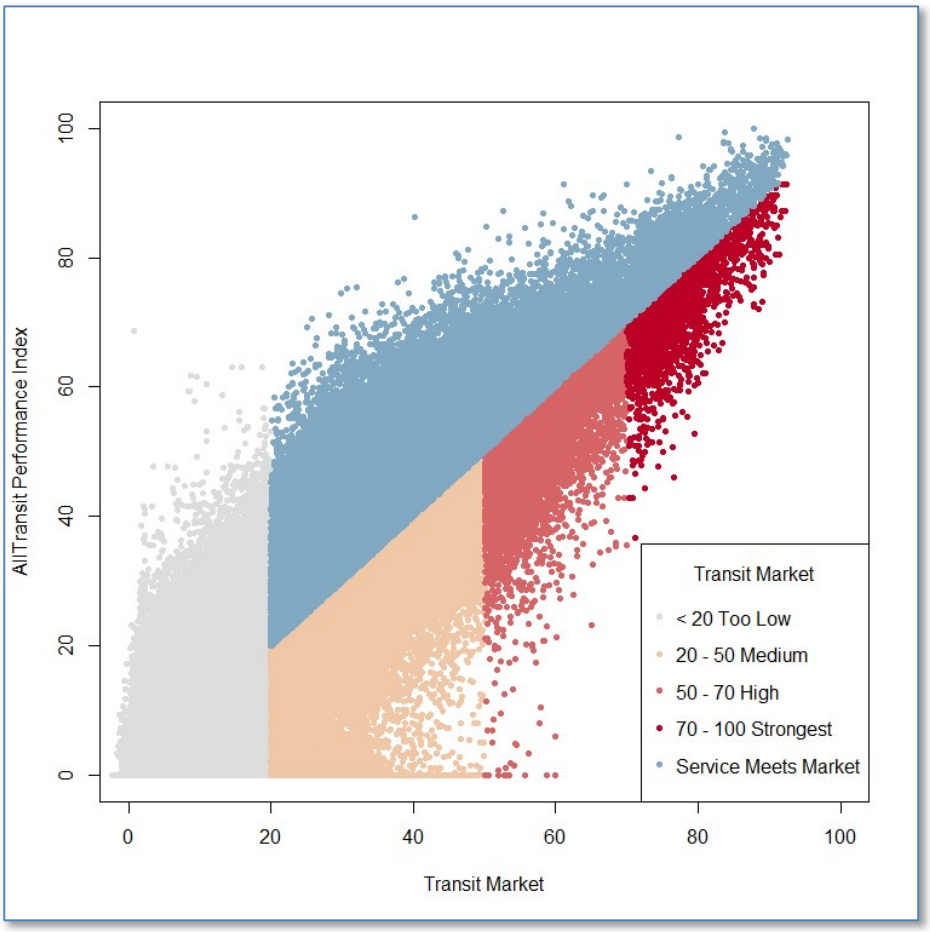
[1] This index is described in the AllTransit methods document (https://alltransit.cnt.org/methods/AllTransit-Methods.pdf) on pages 6-8 and is referred to as the "intermediate index."

employment, commerce and urban form[2]. AllTransit examines the relationships between these local characteristics and how well they are served to develop a weighted sum of these variables to estimate the market in a given neighborhood.

Finding the Transit Market or Benchmark

Rather than try and find the weighting for the market demand inputs to estimate demand (since we have no way of knowing actual demand for transit) AllTransit has focused on how much service is provided to every neighborhood, and has developed weighting for each transit market input so as to estimate the average service provided relative to the combination of demand inputs. While this assumes that the transit providers do their best to provide service that matches demand, we know that the match is not perfect for every neighborhood, and this is why AllTransit set about to find the underserved neighborhoods.

Figure 1: AllTransit Performance Index vs. Transit Market, Each Dot represents all Neighborhood (Census Block Group) in the US - Yellow to Red Showing The Market in Underserved Neighborhoods



[2] For a complete breakdown of the variable used see "Transit Gap Technical Documentation" document: https://alltransit.cnt.org/methods/Transit%20Service%20Gap%20Technical%20Documentation.pdf

Each dot in Figure 1 above represents one of the 217,182 Census Block Groups in the US, its color represents one of three things – grey means the transit market is low enough not to worry about the service, blue means that the service meets the market, and the three shades, tan, orange and red, indicate a gap in those neighborhoods and the shading itself represents their calculated markets.

Is the Benchmark "Good Enough?"

The underserved neighborhoods are those that have transit service that is below average for all neighborhoods with the same mix of demographics, employment, commerce and urban form. So, while this gap is between current and average it begs the question is it good enough, and AllTransit has to concede that we do not know the answer to this, but rather the gap points out where transit is too low relative to similar neighborhoods, in other words is the transit service in an underserved community is not on an even playing field with the rest of the US.

Picking out the Underserved Households

The AllTransit™ Gap Finder tool allows the user to pick a location, such as a city, county or region. The tool then pulls the data on the API and the market benchmark and compares them for every neighborhood inside the area, and finds the neighborhoods that are underserved. It then uses the number of households within the underserved neighborhoods, and compared to the number of households in the total area to calculate the percent of underserved households.

Estimating how to close the Gap

In order to show how to close the gap in the underserved neighborhoods, AllTransit uses one simple fix – raise the frequency of service in those neighborhoods, so the API will match the market benchmark. One could in principle do other things to increase the API, such as increase ground speed of the service, or increase local employment, to increase the number of jobs within 30-minute commute, or reposition the transit stations/stops to increase the TCI, and although these things may be the way to actualize change in a neighborhood, they are difficult to calculate for our tool.

By increasing the frequency of service in a neighborhood the API increases. The value of API is proportional to the frequency of every transit service within a ½ mile of the block groups; on average raising the overall frequency of service will raise the TCI. The AllTransit tool calculates the amount needed to on average raise the average service value to equal the average value of the market for all the underserved neighborhoods. A lot of averages here, and that works for this calculation, but how that is implemented is beyond the scope of this tool, but the general trend speaks to how much more transit should be advocated for in a given location.