

Date: December 2021
To: TJ Nee, Stateline Area Transportation Study
From: Jim Meyer & Chris Brewer, AECOM Technical Services, Inc. (AECOM)
Re: Rock County Commuter Jobs / Univariate Regression Analysis

Introduction

Building upon the *SLATS Passenger Rail Study*, completed February 2021, AECOM was asked to more explicitly evaluate the economic connections between employment by place of residence in context with access to commuter rail service into major employment centers. The goal of the analysis was to frame in conceptual terms how the availability of commuter rail service adds to economic diversification, with a greater share of jobs in professional services categories. The focus of this analysis was on exploring potential future commuter rail service access between Rock, County, WI and downtown Chicago.

In conceptual terms the analysis relies on these basic precepts:

- That nationally, there is a positive relationship between commuter rail usage and employment in professional services sectors.
- That post-COVID there appears to be an emerging segment of hybrid workers who will accept longer rail commute times to access job centers if it results in an enhanced quality of life, such as living in suburban / rural edge housing locations.

While the analysis relies on pre-COVID data, our insights from current work across the Chicago region being completed for CMAP reinforces the following elements about COVID's impact on worker commuting:

- Lockdowns forced companies into a dramatic experiment with remote work, and office utilization rapidly plunged below 30% across central business districts. Moving into 2021, while office space utilization started to improve, cities that are more reliant on transit are seeing slower recovery. COVID specifically impacted office markets that are served by transit, in large part due to commuters wanting to avoid riding a crowded train.
- Office markets have been impacted by COVID, as vacancies accelerated into 2021, with major markets seeing vacancy rates more than 20% according to Jones Lang LaSalle (JLL). Office space utilization remains very low (under 30%) as return-to-work strategies have been delayed by onset of new COVID variants; office markets in general do not yet appear to be fully pricing in low utilization.
- In 2020, while high-cost markets (New York City and San Francisco in particular) initially dealt with significant worker out-migration, trends for 2021 point to recovery. Research by Brookings leveraging US Postal Service data argues that the vast majority of worker moves out of core cities were in fact shorter in distance, within a region rather than region to region.
- Industry research points toward expectations for growth of a hybrid model for post-COVID office work. Studies undertaken by the National Bureau of Economic Research on "Why Working from Home Will Stick" highlights the following points. First, Pre-COVID, workers generally spent about 5% of full workdays at home. Beginning in the Spring of 2020, the percentage of workdays spent at home initially accelerated beyond 60%, before falling into a steady 40%-55% range. Expectations point to a post-COVID hybrid world where about 20% of workdays are spent at home, with most workers opting for 2-3 days a week in the office.
- AECOM research also reinforces the impact of pre-COVID trends and broader realities. For example, while companies have encouraged "work from home" as a tactical response to health concerns, insight suggests that inevitable strategic pressures to remain competitive argue that "work

from home” policies will be evaluated in context with business decisions regarding employee pay levels as well as decisions to automate, offshore, or outsource positions. Well before COVID, jobs in regional headquarters operations (finance and accounting in particular) were more likely to be “work from home,” outsourced or sent offshore.

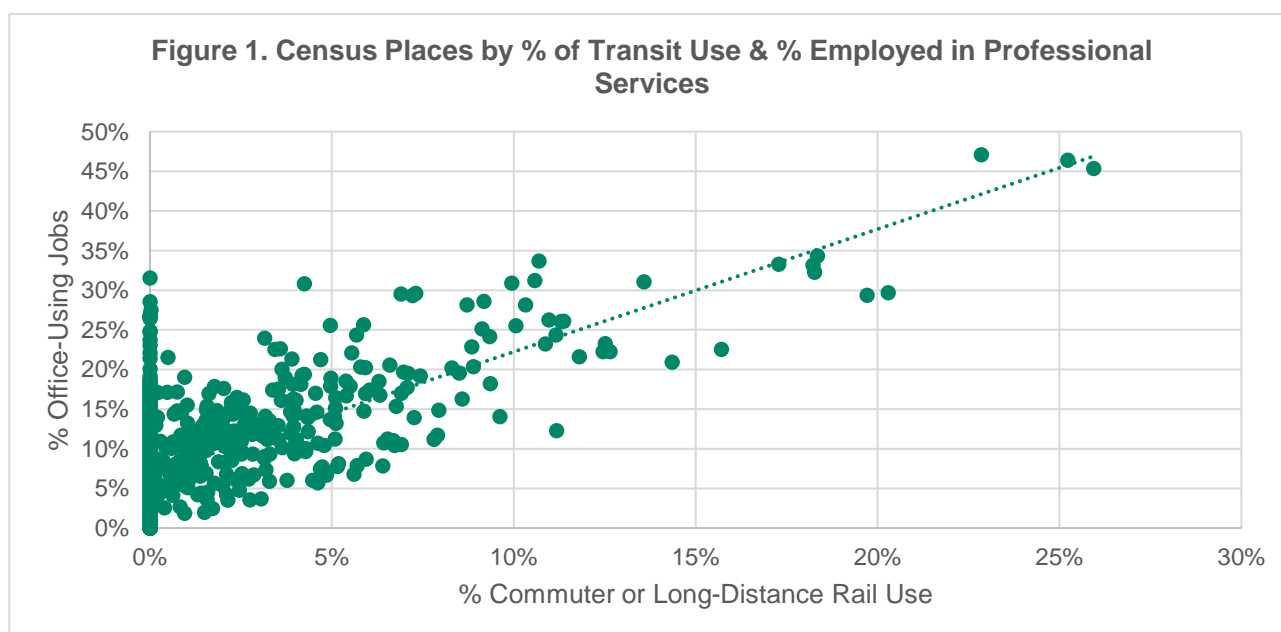
- AECOM research also suggests that pre-existing differences in mobility, population density, housing prices, and cost of living that were playing out across US metropolitan areas before COVID will also have direct bearing on employee motivation to “work from home.”

Analytical Approach

Research efforts began with analysis of all Census places (i.e., cities, towns, villages, and Census Designated Places – CDPs) in Illinois to determine if the presence of commuter / long distance rail transportation (referred to as rail in this document) influenced office-using employment. To conduct the analysis, AECOM collected U.S. Census American Community Survey (ACS) 5-year average estimates from 2015 – 2019 for 1,364 Census places in Illinois, excluding Chicago. Counts of workers that live in each place by industry (e.g., finance, agriculture) and mode of transportation to work (e.g., commuter / long distance rail) were collected.

After Census data was collected, AECOM conducted simple, bivariate statistical modelling to identify the association between rail use and office-using employment, and model office-using employment as a function of rail use. AECOM then used a GIS layer of Metra Stations and intersected it to the GIS layer of Illinois places, to create a cluster (a grouping in GIS which overlays employment with stations) within the universe of places with a Metra station. The purpose of this cluster was to gauge how rail service quality was associated to rail use and office employment.

Figure 1 depicts the U.S. Census data collected for this effort plotted on an X/Y plot, where the x-axis shows the percent of workers that use rail transportation, and the y-axis shows the percent of jobs that are in an office using industry. Office using jobs are defined in this graph as jobs in the finance, insurance, real estate, professional services, or management industries. Each point on the graph represents a U.S. Census place, the dotted line represents the line of best fit for the data:

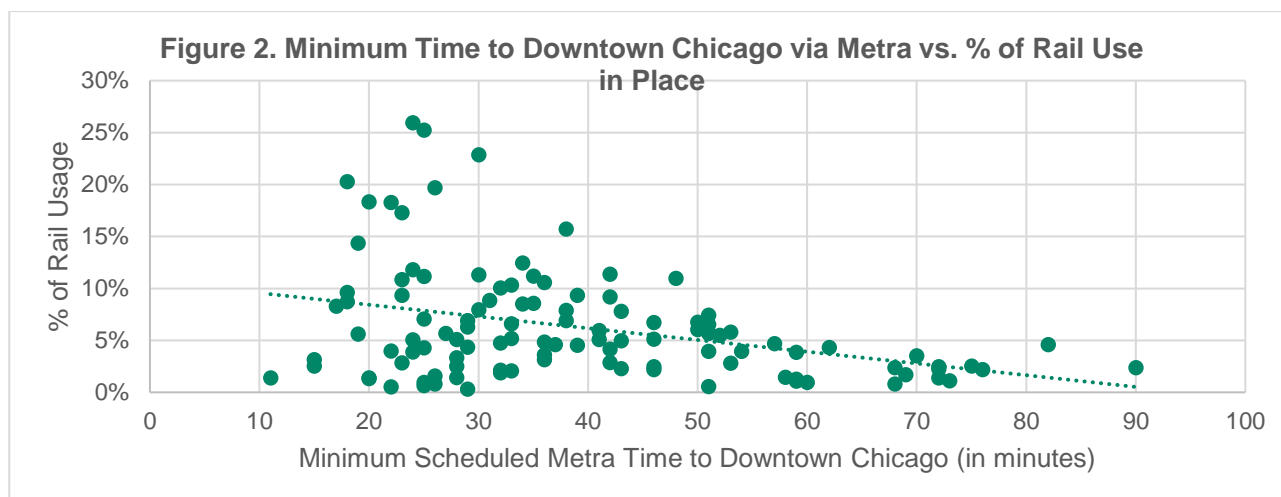


For all places in Illinois, without clustering, there is a correlation coefficient of 0.65 between proportion of office using jobs and proportion of workers that use rail as their primary means of transportation. Based on this correlation, there is a moderate positive association between use of rail in a city and the share of workers that work in office jobs. Based on the two-way relationship between the variables, the regression equation for the line of best fit is:

$$\% \text{ Office-Using Employment} = (1.5475 * \% \text{ Rail Use}) + 0.0676$$

The r-squared from the univariate regression model is 0.42, or in other words 42% of the variation in the share of office jobs in cities can be attributed to the presence of commuter rail. Although this r-squared is not particularly strong (i.e. >0.5), the point is simply that the chart reinforces a generally positive relationship between office using jobs and reliance on commuter rail service.

After establishing the relationship between office-using employment, AECOM clustered Illinois places based on the existence of one or more Metra stations. Only places / cities that had a Metra station located within city boundaries were clustered. In total, 111 places with a Metra station were added to the cluster. The Metra place cluster was used to assess the relationship between service quality (represented by the fastest scheduled service to Chicago, in minutes) and rail usage. **Figure 2** depicts the percent of commuters using rail (y-axis) by place as a function of minimum travel time¹ into downtown (x-axis):



The analysis found a correlation coefficient of -0.36, or a moderate negative association. In other words, as the time it takes to arrive downtown decreases, rail usage increases. The regression equation for this relationship is given as:

$$\text{Rail Usage \%} = (-0.0011 * \text{minutes to downtown}) + 0.1069$$

The r-squared value for this regression is 0.12, indicating that 12% of the variation in rail usage can be explained by the travel time to downtown based on the univariate model. In this context, the lower r-squared value is less important than the aggregate distribution based on travel time, which shows a gradual decrease based on travel distance, which is intuitive and logical. As the distribution is wider, the r-squared value is lower.

Analysis Outcomes

AECOM applied the linear relationships from both analyses to estimate the impact that commuter rail access could have on Rock County, WI, using three scenarios for minimum commuting times to downtown Chicago from Rock County at 60-minutes, 75-minutes, and 90-minutes (see **Table 1**). Based on the relationship identified between travel time to downtown and train usage, the 90-minute minimum time would yield less

¹ Minimum travel time was used as it was felt to be a better predictor of commute time.

train use than the 60-minute minimum time. When the minimum time to downtown is converted into train usage, the potential impact to Rock County employment can be observed.²

Table 1. Rock County Employment Impact from Transit Adoption

Scenario	Total Jobs	Office Jobs	% Office	Implied New Jobs Above Baseline
2019 ACS Actual Value	79,931	4,860	6.10%	0
90-Minute Minimum Train Ride	79,931	6,381	8.00%	1,521
75-Minute Minimum Train Ride	79,931	8,421	10.50%	3,561
60-Minute Minimum Train Ride	79,931	10,462	13.10%	5,602

The analysis suggests that if Rock County had access to commuter rail, with between 60-minute and 90-minute minimum commute time to downtown Chicago, it would have between 1,500 and 5,600 more office using residents who commute than it currently does, based on the univariate regression models completed for this analysis. It is important to acknowledge that under current operating conditions, it would be impossible to achieve a 90-minute rail commute between Rock County, WI and downtown Chicago. However, future technology investments and rail infrastructure improvements (double tracking the route and the use of express trains with limited stops), albeit expensive, could potentially in the future accommodate a 90-minute, or less, trip. It should be further noted that this analysis does not consider the infrastructure costs or feasibility of implementing the previously mentioned improvements, or other potential improvements that might be needed. It is simply provided to demonstrate that there are alternatives that could reduce the travel time. As an example, current Metra service between Chicago and Milwaukee operates under 90-minutes and is about that same distance of a Chicago to Rock County connection.

Again, the analysis relies on pre-COVID trends regarding employment by place of residence and peak hour commuting times. As COVID has shifted a larger share of office jobs into remote work over the last 20 months, there are expectations that suburban and rural locales with commuter rail service are better positioned to attract remote workers, as office work pivots toward a hybrid return to work model (3-4 days in the office as opposed to 4-5 days in the office).

Conclusion and Next Steps

This analysis focused on evaluating, in conceptual terms, how the availability of commuter rail service adds to economic diversification, with a greater share of jobs in professional services categories. The primary focus of this analysis was on exploring potential future commuter rail service access between Rock, County, WI and downtown Chicago.

The results indicate that if Rock County, WI had access to commuter rail, with between 60-minute and 90-minute minimum commute time to downtown Chicago, it would have between 1,500 and 5,600 more office using residents who commute than it currently does. It is acknowledged that significant rail infrastructure investments would be needed to achieve these travel times; however, it is not impossible.

Perhaps more importantly, the results of this analysis begin to provide potential insight regarding implications for new commuter jobs based on peak hour travel time for commuter rail service that could potentially operate between Rockford, IL and Madison, WI. The *SLATS Passenger Rail Study* found that a Rockford to Madison rail alignment would have approximately the same daily ridership as a Chicago to Madison (through

² It should be noted that AECOM, as part of another rail commuting study being conducted in 2022, is collecting additional data for longer rail commute times. It is possible that this new data could be used to update this analysis in the future.

Rock County) alignment. While further research would be needed to confirm assumptions for travel time and frequency of service between Rockford and Madison, **Figure 2** provides a framework to analyse potential future rail alignments within the region.

In conclusion, when an opportunity presents itself, it is recommended that SLATS further evaluate the Rockford to Madison service concept to analyze the potential impact on office job creation in the region. It is also recommended that SLATS revisit the projected daily rail ridership projections from the *SLATS Passenger Rail Study* once this additional analysis is completed, and when the 2020 US Census data becomes available.