**The Search for An Efficient and Clean America: Traffic Congestion and Carpooling**

The rapid growth of urban areas and economic prosperity in the United States following World War II brought newfound investments into infrastructure across the country, including massive expansions of roadways. The rapid development also ushered in a wave of expansion outward in the form of sprawling suburbs, and the commuters, congestion, and traffic that come with them. Fast forward to 2018, where daily commutes to work in these urban areas feature exciting new concepts such as bike-sharing, scooter-sharing, and most importantly, Uber and Lyft vehicles available to pick you up at the touch of a fingertip. In contrast to these new transportation options, Americans have lost trust in their once heralded subway and bus systems due to a lack of reliability as the nation’s infrastructure ages, desperate for upgrades. Despite the influx of bikes and scooters, an overwhelming number, 76.3 percent, of Americans use cars to commute to work (U.S. News and World Report). However, only nine percent of commuters choose to carpool, and that number has been steadily declining for decades. When the U.S. Census Bureau started collecting commuting data back in 1980, the average commute was 21.7 minutes. In 2015, it was 26 minutes. As commuting lengths continue to rise, the U.S. government is struggling to implement innovative and economically efficient ways to incentivize carpooling and reduce roadway congestion.

America’s love affair for cars has a long history and is now stronger than ever. The number of Americans with access to three or more cars rose by 2.5 percent over the last decade (Brookings, 2015). Cars offer people privacy, especially when compared to the subway or a bus. Being able to control the temperature, noise, and shamelessly eat breakfast or finish getting dressed on the drive to work are little factors that make big impacts on commuters’ decisions. In addition, owning certain types of cars are often seen as status symbols. Americans however, have been slow to accept the drawbacks of high car ownership rates, and their negative impact on the global climate, commuting times, and economic productivity. An INRIX study found that in 2017, congestion on US roads cost $305 billion in lost productivity of workers sitting in traffic and the increased cost of transporting goods through heavily congested areas.

Uber and Lyft are almost certainly going to be a large part of future American workers’ commute to work. However, they also are going to continue to be a large piece of the problem as to why roads around U.S. cities are constantly congested. Solutions to these congestion problems, is the main task at hand for many district legislators. While Americans have yet to see the benefits of congestion pricing schemes in big cities, several European countries have enacted congestion pricing plans. In fact, London’s congestion charge system has been in place since 2003, and today the number of vehicles driving into Central London are a quarter lower than they were in 2008 (CityLab, 2018). Stockholm has also experienced benefits from a similarly structured congestion pricing scheme. The idea of a congestion pricing mechanism is something that has repeatedly resurfaced for decades in the U.S., yet it has struggled to become implemented into law. In January of 2018, New York Governor Andrew Cuomo introduced outlines of a congestion pricing plan in Manhattan, where it has been estimated that a third or more of cabs, Ubers, and Lyfts are empty at any given point. Cuomo’s plan however, failed to be put into law. Empty ride-hailing vehicles worsen congestion and release emissions into the atmosphere without any benefit or economic gain in return. According to the Center for Environmental Research and Technology at UC-Riverside, Greenhouse gas emissions are at their worst in stop-and-go traffic of cities, as cars spend time emitting carbon while sitting idly. Delivery services also face higher labor costs as trucks and suppliers sit in traffic for longer periods of time.

Morgan Klaeser, an undergraduate Economics student at UW-Madison, quantified the factors that influence travelers’ decisions to carpool to work in her research paper, “Carpooling Behavior in Congested Areas.” Klaeser decided to take a look at many factors that influence people’s commuting decisions, including income, age, gas prices, congestion costs, and social capital. The main focus of her analysis is to provide data that can help government officials make effective decisions when deciding between economic returns and efficiency. For her data, Klaeser used the Integrated Public Use Microdata Series (IPUMS-USA) database, and the American Community Survey (ACS) from 2000 to 2012. While there are many options for governing bodies to help reduce congestion, such as improving subway systems, Klaeser seeks to determine an explicit response for people’s decisions between only driving to work alone and carpooling. This is because commuters across different metropolitan areas considered in this research simply do not all face the same initial choice set of transportation modes.

Klaeser created a discrete choice logit model to understand the roles of each factor. Created by renowned Econometrician Daniel McFadden and his test on the BART subway system in San Francisco, discrete choice modeling has been one of the most pivotal steps forward in urban travel demand measurement since 1974. Discrete modeling observes the behavior or preferences of individual people and draws conclusions by aggregating across groups. In Klaeser’s own discrete choice model, she uses the coefficients to determine the effect of her dependent variables (income, age, gas prices, etc.) on the probability or extent to which a given individual is going to choose carpooling over driving by themselves.

Klaeser’s results were consistent with most theory about consumers and income, in that individuals value privacy and status as income increases, and once they are able to afford privacy and gas, these individuals choose to commute on their own. In other words, carpooling and bus rides are viewed as inferior goods. Once an individual can afford to purchase the privacy of their own vehicle, they tend to do so. Klaeser’s data finds that as mean income increases by $1000 increments each year, the probability an individual chooses to carpool instead of making the same trip to work in a private vehicle decreases by 0.09 percent. In contrast, her results also show that as the costs of commuting in congested areas increase, people seek to exploit economies of scale by carpooling. For a one-dollar increase in cost per commuter, the marginal effect on demand for carpooling increases by 0.019 percent. In addition, she found that as the real price of gasoline increases by a dollar, an individual is eight percent more likely to carpool. Relative to the significance of a full dollar increase in gas prices, the corresponding eight percent increase carpooling is quite small.

Another factor that directly relates to commuting behaviors is age. Age signifies a lot more than just the number itself. As age increases, people are more likely to get married and start families, and thus more likely to move outside city limits into neighboring suburbs. Klaeser found that for every one-year increase in an individual’s age, the probability of carpooling decreases by 0.17 percent.

Klaeser also decided to look into how racial makeup of geographic neighborhoods impact an individual’s propensity to carpool. Her results actually contradicted a previous report conducted by Kerwin Charles and Patrick Kline in 2002. Charles and Kline found that racial makeup in neighborhoods is the strongest determining factor for whether or not an individual decides to carpool. They concluded that if an individual lives in a neighborhood with many people of the same race, they are more likely to make connections with the people living around them, and thus more likely to carpool. Klaeser however, found the opposite. Her data suggests that a one-percent increase in the percent of people of the same race as the commuter that take the same route to work correspond to a 4.2 percent decrease in the probability of an individual carpooling. This contrast in conclusions is significant, and Klaeser admits that her contradicting results call for further analysis. When grouped solely by race, Klaeser found that Blacks, Hispanics, Asians, and people of Native American descent are all up to six percent more likely to carpool than Whites.

Klaeser’s extensive research and model take a pivotal step in trying to understand the factors that impact an individual’s decision to carpool. Given her somewhat limited resources as an undergraduate student, Klaeser said she would love to conduct more expansive research on the issue if more funds, resources, and time were possible. Klaeser states in the final section of her paper that the next step for research on carpooling incentives would be attempting to quantify the effect of presence of High Occupancy Vehicle (HOV) lanes on commuting paths.

America’s aging infrastructure and congestion problems will likely become increasingly political over time as they are some of the single most important factors when considering the future of American cities, their economies, and climate change. If local, regional, and national government systems in the U.S. continue to ignore the congestion issues and research like Klaeser’s on American roadways, people will look to the tech industry and ride-sharing companies like Uber and Lyft for solutions. These companies have already toyed with fleets of autonomous vehicles that cycle around cities picking up and dropping off passengers. These cars would be able to communicate with one another via signals and choose efficient routes that reduce commuting times and energy wasted. However, just like carpooling, people would need to be willing to share those vehicles. For the time being, Americans are going to have to try to escape traffic via one of the many electric scooters that have flooded city sidewalks.