Zoning: A Barrier or Solution to Truck Parking Infrastructure Shortages?

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Abstract

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1 Institutional Setting

The Federal Motor Carrier Safety Administration (FMCSA), maintains a comprehensive database known as the Crash File. This dataset records all reported motor vehicle crashes in the United States, providing detailed insights into the nature and conditions of each accident. Key attributes include the type of vehicle involved (e.g., trucks, motorcycles, or buses), the circumstances of the crash (e.g., involving a parked vehicle), the number of vehicles involved, any fatalities or injuries, and relevant weather conditions, and observations. Our data is (1990-Present) FMCA Crash file from USDOT (Appendix A).

Our dataset spans from 1990 to the present, with a focus on records from 1993 to 2016. A unique feature of this dataset is its ability to distinguish trucks as a specific variable, allowing for a granular analysis of truck-involved collisions. Furthermore, it offers detailed information on accident circumstances, such as whether a truck was illegally parked, a distinction not commonly found in other datasets.

We also incorporate a digitized data set tracking truck stop creation from 2006 to 2016. This data set enables us to analyze the impact of new truck stops on accident patterns at the county level. Notably, this period lacks significant policy reforms or major events that could confound our analysis.

Additionally, we utilize the Wharton Land Use Regulation Index (WLIURA) dataset by Gyourko et al. (2008), which measures the zoning restrictiveness of various locations. This dataset allows us to examine the influence of local zoning laws on crash patterns. We further refine our analysis by incorporating zoning classifications from Puentes et al. (2006), which categorize land use regulations into four distinct zoning types. These classifications serve as control variables in our study.

2 Event Study Model

The change in the number of truck stops from 2006 to 2016 is modeled as:

$$\Delta\text{NumTruckStop}_{t=[2006-2016]} = \sum_{i=1993}^{2006} \beta_{t=i}\text{Accident}_{t=i} \cdot \text{Severity}_{t=i} + \gamma_t X_t + \epsilon_t$$

where year t represents time i, $\Delta\text{NumTruckStop}_t$ denotes the change in truck stops, Accident_i is an event dummy indicating the presence of an accident, and Severity_i represents associated fatalities, injuries, or vehicle involvement. X_t consists of control variables, including zoning categories: Traditional (zoning unchanging), Exclusion (zoning difficult), Reform (zoning friendly), and Wild Wild Texas (no zoning). Finally, ϵ_t represents the error term for year t. We also add 2 dummy controls for counties with high and low zoning restriction. More possible controls would include,region, county budget, county weather patterns and population.

The identification assumption is that in the absence of designated truck parking, trucks will resort to illegal parking, leading to observable accidents. In response, counties, driven by public safety concerns and the goal of reducing accidents, are incentive to increase truck parking availability. This, in turn, results in the creation of additional truck stops. The causal mechanism can be summarized as follows:

Insufficient Truck Parking → Illegal Truck Parking → Observed Accidents → Increased Demand for Truck Parking → Observed Increase in Truck Parking Capacity.

We can test this assumption by observing the coefficients surrounding, each zoning category and high/low restriction coefficient. We expect to see Traditional (zoning unchanging) with a insignificant coefficient, Exclusion (zoning difficult) with a negative coefficient, Reform (zoning friendly) with a positive coefficient, and Wild Wild Texas (no zoning) with a positive

coefficient. High restriction places will have

Potential sources of bias would be overestimation of accidents. It is really difficult for a truck to legally park anywhere. It could be well the case that the truck did every reasonable measure to park properly but would still get into a accident. This would overestimate accidents and underestimate our coefficient. Another source of bias would be underestimation of severity of accidents. Counties have a incentive to maintain a safe public image, which would include minimizing severity of accidents, underestimating our coefficient estimate. Furthermore, zoning classifications literature, support the idea that time variation of counties overtime follow their zoning categories. For example, Exclusion (zoning difficult) would become more difficult over time and vice versa(McLaughlin 2012). This would overestimate our coefficient estimates as t increases.

We will cluster standard error by region. This is because different regions have vastly different accident and trucking profiles. Some regions for example may have a bigger trucking culture than another. Regional weather may also contribute to the accident profile of regions and the ease of truck stop construction.

References

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