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

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Abstract

The text of your abstract. 200 or fewer words.

Keywords: 3 to 6 keywords, that do not appear in the title

*true

1 Agenda

1. Quantifying Truck Parking Shortage.
2. Do local economies respond to the need for truck parking or is it hindered?
3. Does land regulation limit truck parking creation?

2 Introduction

The United States hosts 90,056 local governments, each imposing unique zoning restrictions that shape land use. Among the pressing concerns influenced by these regulations is the growing shortage of truck parking (American-Trucking-Association 2023). Inadequate truck parking has led to dangerous or illegal practices, such as parking on highway shoulders or in unauthorized areas, which heightens traffic accident risks and imposes economic costs like increased fuel consumption, delivery delays, and inflated goods prices (USDOT 2015).

Despite the significant implications, there is limited empirical research quantifying the relationship between truck parking demand and the regulatory environment influencing its availability. Zoning regulations, in particular, often play a more decisive role in truck parking accessibility than geographic or transportation network factors (Shertzer et al. 2018). This study seeks to bridge this gap by leveraging traffic accident data as a proxy for truck parking demand and analyzing how land-use regulations impact parking availability.

Specifically, this research aims to test two hypotheses:

1. If restrictive local zoning laws drive truck parking shortages, regions with high truck parking-related accidents should exhibit minimal correlation with increased truck stop capacity.

2. Parking accidents involving trucks can serve as a quantitative proxy for truck stop demand, enabling the evaluation of truck stop shortages across regions.

this study employs an event study design, categorizing zoning regimes into four types—Traditional, Exclusion, Reform, and Wild Wild Texas—based on (Puentes et al. 2006) (See Appendix B) . We hypothesize that restrictive zoning regimes (Traditional and Exclusion) are less responsive to truck parking demand compared to flexible regimes (Reform and Wild Wild Texas), resulting in lower truck parking capacity despite evident needs.

3 Background

Existing studies on zoning provide valuable context but are limited in scope. Research often focuses on single municipalities (Shertzer et al. 2016, Glaeser & Ward 2009) or international contexts (Anagol et al. 2021). Furthermore, most literature emphasizes residential zoning (Lens & Monkkonen 2016, Huang & Tang 2012)or office space (Cheshire & Hilber 2008), leaving industrial zoning and its implications for truck parking largely unexplored.

Initially designed to balance public welfare and economic development, zoning regulations have evolved, sometimes adapting to market forces or catering to local stakeholder interests, such as middle-class homeowners (Fischel 2024). While zoning has the potential to enhance economic productivity, it can also introduce inefficiencies, particularly in industrial applications (Mcdonald & Mcmillen 2012). Fragmented zoning governance often discourages communities from accommodating truck parking, despite its regional benefits, due to localized decision-making dynamics. Furthermore, it is unclear whether the current state of land regulation optimizes welfare (Osman 2020). This paper aims to address this gap within the context of truck parking shortages these challenges,.

This research contributes to the broader discourse on zoning's economic impact, extending the analysis to the critical issue of truck parking infrastructure. By examining the interplay between zoning classifications, parking-related accidents, and truck stop capacity, this study offers insights for policymakers aiming to mitigate the externalities of inadequate truck parking through thoughtful zoning reforms.

4 Data

Our data is (1990-Present) FMCA (Federal Motor Carrier Safety Administration) Crash file from USDOT (Department of Transportation) (Appendix A). We can see type of vehicle (ex. trucks), nature of the crash (ex. Crashed involving a "parked" vehicle), fatalities, injuries, number of vehicles involved, etc. We will aslo use WLIURA dataset by Gyourko et al. (2008) and classificaions by Puentes et al. (2006) .

5 Strategy

With no truck parking available trucks illegally park causing observed accidents such that areas increase truck parking availabilit

No Truck Parking → Trucks will illegally park → **Accidents Occur** (observed)→Truck Parking Demand increases → **Truck Parking Capacity Increase** (observation)

5.1 Event Study Model

The equation to estimate the effect of the Truck Parking Accident (TPA) on the creation of truck stops is specified as follows:

$$Y_{tj} = \sum_{i=-6}^{6} \beta_i \text{TPA}_{i,j} + \gamma X_{tj} + \epsilon_{tj}$$

Where:

- Y_{tj} is the change in truck stop capacity in year t for category j.
- β_i are the coefficients for the event dummies ($\text{TPA}_{i,j}$), where i represents the relative year to the Truck Parking Accident ($i = -6, -5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5, 6$).
- $\text{TPA}_{i,j}$ is the event dummy indicating the presence of a Truck Parking Accident in relative year i for category j. Specifically, when $i = 0$, this corresponds to the year in which the Truck Parking Accident occurs.
- γ represents the coefficients for the control variables (X_{tj}).
- X_{tj} are the control variables in year t for category j.
- ϵ_{tj} is the error term for year t and category j.
- j indicates a specific category used to isolate subsets of the data.

To analyze the impact of the Truck Parking Accident across different zoning categories, I will estimate to each corresponding category:

1. **Traditional**: This category evaluates the effects in conventional settings with typical zoning regulations.

2. **Exclusion**: This category examines the impacts in areas where truck stops are limited or restricted by zoning laws.

3. **Reform**: This category focuses on regions undergoing policy or structural reforms related to truck parking.

4. **Wild Wild Texas**: This category investigates the unique circumstances and effects

in Texas, a state known for its distinctive truck parking challenges.

By analyzing these four categories, I aim to uncover how the Truck Parking Accident influences the creation of truck stops across diverse environments and regulatory frameworks.

5.2 Difference-in-Differences (DiD) model

Furthermore, using the WLRUI index data and a DiD design, I will compare locations with a high restriction index to those with a low restriction index, controlling for truck parking categories. The model specification is as follows:

$$Y_{it} = \sum_{t=-6}^{6} \theta_t HR_{it} + \sum_{t=-6}^{6} \phi_t Post_{it} + \sum_{t=-6}^{6} \psi_t (HR_{it} \times Post_{it}) + \gamma X_{it} + \epsilon_{it}$$

Where

- Y_{it} is the chaneg in truck parking capacity for category i at time t.
- HR_{it} is the high restriction index indicator for category i at time t.
- $Post_{it}$ is the indicator for the post-TPA period for category i at time t.
- $HR_{it} \times Post_{it}$ is the interaction term that captures the treatment effect of being in a high restriction area after the truck parking accident.
- θ_t represents unique coefficients for the high restriction index across time periods t.
- ϕ_t represents unique coefficients for the post-TPA period across time periods t.
- ψ_t represents unique coefficients for the interaction term across time periods t.
- X_{it} is a vector of control variables for category i at time t.
- ϵ_{it} is the error term.

5.3 Regression

Independent: Fatalities/Injuries/Vehicles-Involved

Dependent: Number of Additional Truck Stop Capacity following a 90% z score Fatalities/Injuries/Vehicles-Involved

Control: Location

5.4 DID:

Treatment: Fatalities/Injuries/Vehicles-Involved >= Z score=90%

Control: Fatalities/Injuries/Vehicles-Involved < Z score=90%

Independent: Fatalities/Injuries/Vehicles-Involved

Dependent: Truck Stop Capacity

6 Limitations:

Data only indicates any accidents involving any parked vehicle. The parked vehicle in question need not be a truck. The parked vehicle may also be a legally parked truck.

7 Robustness:

we know this works because truck stop creation is relaetively stable

Buses are a category of large vehicle that may be attributed to trucks. We would need to investigate the same study with/without Buses in the dataset. We can also use other land regulation index that would potentially be the same.

8 Robustness

Some concerns may arise from the time variation of zoning classifications. We may ssafely exclusde this concern given that zoning regimes or classificaitons are relatively stable across municipalities (McLaughlin 2012).

9 Improvements:

Limitations can be addressed by looking at other datasets, found in "To do"

There are other datasets found in NHTSA or FARS Analytical Users Manual, 1975-2022. That contain data that could potentially be more relevant that addresses any limitations in our design.

10 Remarks

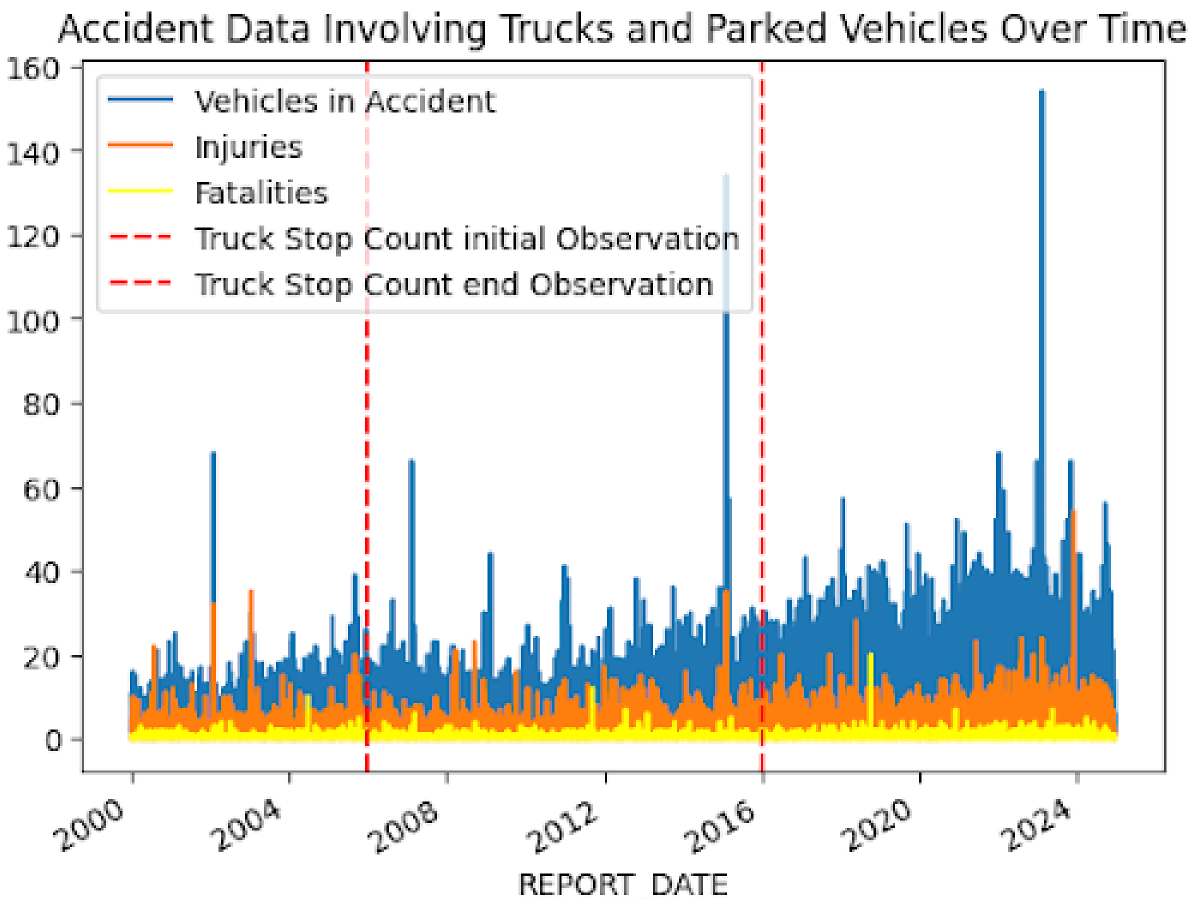
on housing restrictiveness vs industiral zoning. While it is true most research that deals with zonign restrictiveness tackle in it housnig eprspective. There is no reason to suggest that housnig restriveness index can ntot be used for for studying industrial restrivness.

11 Appendix

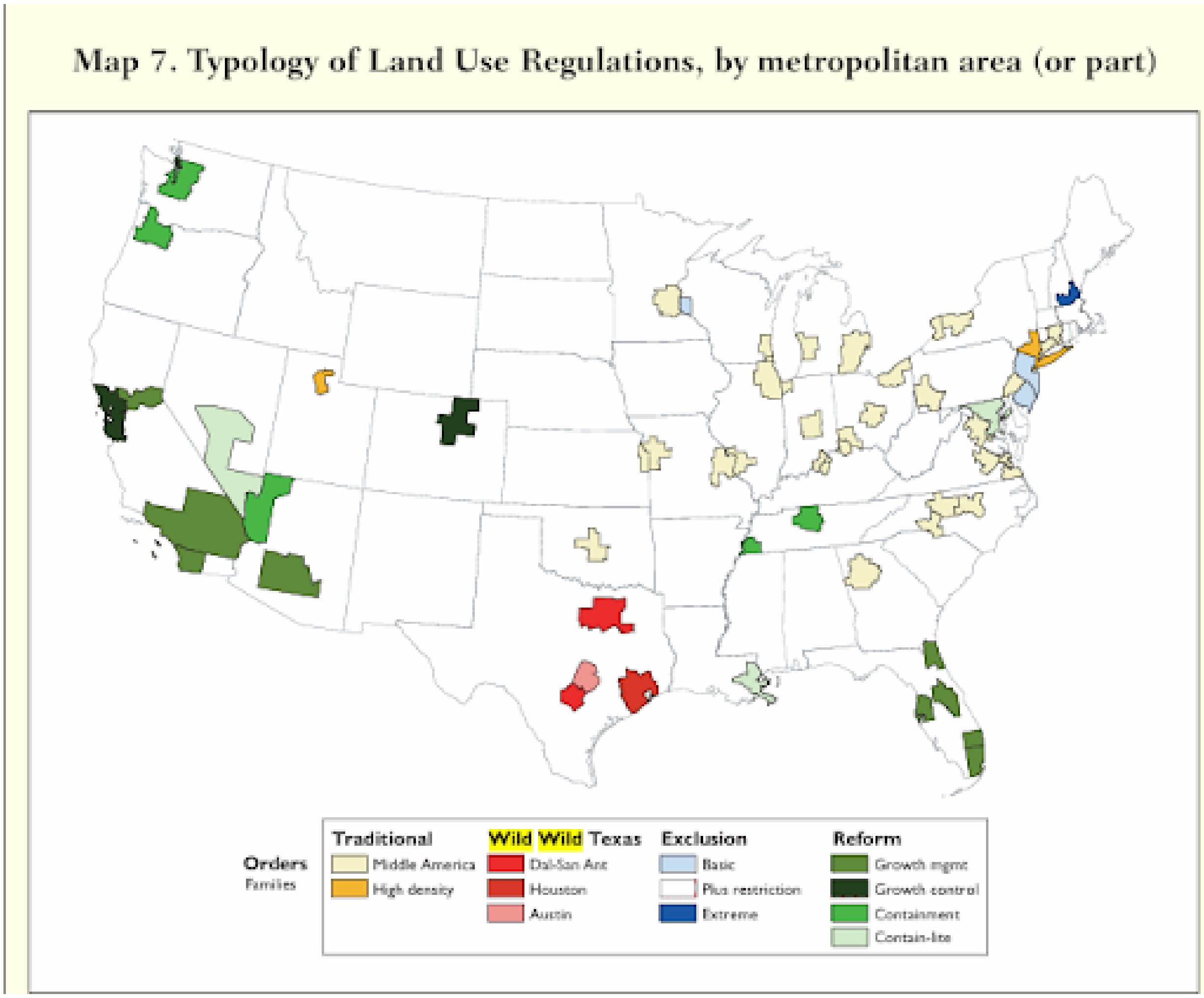
11.1 A. Visualization of dataset.

(Present Truck stop parking observatios also available Truck Stop Parking | Geospatial at the Bureau of Transportation Statistics)

[Co (2024)]


Accident Data Involving Trucks and Parked Vehicles Over Time
Vehicles in Accident
Injuries
Fatalities
Truck Stop Count initial Observation
Truck Stop Count end Observation
160
140
120
100
80
60
40
20
0
2000
2004
2008
2012
2016
2020
2024
REPORT_DATE

11.2 B. Map of Zoning Categories



References

American-Trucking-Association (2023), 'National Truck Parking Shortage: A Growing Safety Concern for All Motorists', https://www.trucking.org/news-insights/national-truck-parking-shortage-growing-safety-concern-all-motorists.

Anagol, S., Ferreira, F. V. & Rexer, J. (2021), 'Estimating the Economic Value of Zoning Reform'.

Cheshire, P. C. & Hilber, C. A. L. (2008), 'Office Space Supply Restrictions in Britain: The

Political Economy of Market Revenge', *The Economic Journal* **118**(529), F185–F221.

Co, W. (2024), 'WilliamClintC/Research-Proposal-Trucks'.

Fischel, W. A. (2024), 'An Economic History of Zoning and a Cure for Its Exclusionary Effects', *ResearchGate* .

Glaeser, E. L. & Ward, B. A. (2009), 'The causes and consequences of land use regulation: Evidence from Greater Boston', *Journal of Urban Economics* **65**(3), 265–278.

Gyourko, J., Saiz, A. & Summers, A. (2008), 'A New Measure of the Local Regulatory Environment for Housing Markets: The Wharton Residential Land Use Regulatory Index', *Urban Studies* **45**(3), 693–729.

Huang, H. & Tang, Y. (2012), 'Residential land use regulation and the US housing price cycle between 2000 and 2009', *Journal of Urban Economics* **71**(1), 93–99.

Lens, M. C. & Monkkonen, P. (2016), 'Do Strict Land Use Regulations Make Metropolitan Areas More Segregated by Income?', *Journal of the American Planning Association. American Planning Association* **82**(1), 6–21.

Mcdonald, J. F. & Mcmillen, D. P. (2012), '(PDF) The economics of zoning', https://www.researchgate.net/publication/281736262_The_economics_of_zoning.

McLaughlin, R. B. (2012), 'Land use regulation: Where have we been, where are we going?', *Cities* **29**, S50–S55.

Osman, T. (2020), 'Restrictive Land Use Regulations and Economic Performance', *International Regional Science Review* **43**(4), 291–315.

Puentes, R., Martin, J. & Pendall, R. (2006), 'From Traditional to Reformed: A Review of the Land Use Regulations in the Nation's 50 largest Metropolitan Areas', https://www.brookings.edu/articles/from-traditional-to-reformed-a-review-of-the-land-use-regulations-in-the-nations-50-largest-metropolitan-areas/.

Shertzer, A., Twinam, T. & Walsh, R. P. (2016), 'Race, Ethnicity, and Discriminatory Zoning', *American Economic Journal: Applied Economics* **8**(3), 217–246.

Shertzer, A., Twinam, T. & Walsh, R. P. (2018), 'Zoning and the economic geography of cities', *Journal of Urban Economics* **105**, 20–39.

USDOT (2015), 'Jason's Law Truck Parking Survey Results and Comparative Analysis - FHWA Freight Management and Operations', https://ops.fhwa.dot.gov/Freight/infrastructure/truck_parking/jasons_law/truckparkingsurvey/index