Impacts to Traffic Safety and Mobility of Changes in Speed Limits for Indiana Freeways

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1. Background and Justification

Concern about the severe impact of trucks during collisions with other vehicles led to implementation of Differential Speed Limits (DSL) on Indiana rural freeways. Some experts doubt that this solution is indeed beneficial to safety.

There is a recent trend in neighboring states to replace the differential speed limits with a uniform speed limit (Ohio) or to increase the speed limit in rural freeways (Wisconsin).

The question to be addressed in this study is: Should Indiana follow other states and revert to a single speed limit on its freeways or not?

2. Research Objectives

- Determine if the differential speed limits on rural freeways indeed increase the difference between the truck and non-truck speeds.
- Estimate the safety and mobility effect of removing the differential speed limits on rural freeways.
- Estimate the safety and mobility effect of raising the speed limits on urban freeways from 55 mph to 60 or 65 mph.

3. Literature Review

MOBILITY EFFECTS

- Increase in the speed limit increases the average speed and the speed of drivers who violated the old speed limit.
- Drivers tend to "go with the flow" rather than to follow the posted speed limit.
- Change in the average speed is lower than the change in the posted speed limit.
- Some research found no difference in speed distribution under uniform and differential speed limits.
- The difference between average speeds of trucks and non-trucks is greater than the posted speed difference.
- Speed limits for trucks reduce the average speed of trucks regardless of the speed limit.
- 21% of surveyed Indiana drivers believe that driving 5 mph over posted speed limit is safe, 44% said 10 mph, and 35% said 20 mph.

SAFETY EFFECTS

- Speed plays a significant role in crash risk and severity.
- Speed above or below the average speed of the flow increases the risk of crash.
- Increases in speed limits are related to increase in fatality rates.
- Higher truck speed limits are associated with the increase in fatality rate.
- The 2008 Indiana study did not confirm a significant increase in severity of accidents on interstates after the increase in the speed limit.
- Differential speed limits have two opposite effects: they slow trucks down but they increase the speed variation.
- Although differential speed limits may increase rear-end crashes, they may also reduce other types of crashes.
- Joint application of differential speed limits and truck lane restrictions is beneficial.
- Differential speed limits used around ramp intersections increase unsafe interactions between trucks and non-trucks.
- Some study results are inconclusive or contradictory.

4. Data

1. Traffic: hourly counts, speeds by vehicle type, and vehicle classification from permanent and short-term stations in Indiana, Illinois, Ohio, Michigan, Kentucky, and Wisconsin.
2. Roadway characteristics: number of lanes, lane width, shoulder width, median width, grade, terrain type, speed limit, etc. from Highway Performance Monitoring System.
3. Crashes frequency and crash severity taking into account type of vehicle involved in crashes and crash type from states crash records

5. Future Work

- Perform data analysis and estimate the speed and crash models for Midwest interstates based on the collected data and information.
- Estimate the state-wide mobility and safety effects of hypothetical speed limit changes on Indiana interstates.

6. References

2. Eslak, R. (2013). A reparametrization of the Power Model of the relationship between the speed of traffic and the number of accidents and accident victims. Accident Analysis & Prevention, 55(6), 251-257.

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