Task 10 – Short-Term Model Enhancements

Transit Related Enhancements

presented to

TPB Travel Forecasting Subcommittee

presented by

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Acknowledgments

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Task 10
Transit Related Enhancements

- Review representation of complex transit fare systems
- Discussion of how fare subsidy programs can be captured in the model
- Discussion of bus speeds
- Discussion of the statistical estimation of mode choice logit model parameters

Transit Fare

- It was common that fares were represented explicitly in terms of transit provider/operator and mode combinations
- TPB's representation of distance-based Metrorail fares is consistent with the state of practice
- Fares usually were represented in terms of cash fare, but some MPOs account for the discounts available to certain groups (e.g., students, seniors) or due to pass usage (e.g., monthly or weekly passes). In these cases, the fares were usually weighted averages based on revenue composition of different types of users

Transit Fare Subsidy

- No large MPO has consideration of transit fare subsidies built into their travel demand model, though a few incorporate fare-free zones
- TPB is ahead of its peers in terms of considering transit subsidies in regional travel demand models
- Transit fare subsidy has become increasingly popular and prevalent in metropolitan Washington area, and its accurate representation as part of travel costs is important for the regional model

Transit Fare Subsidy (continued)

- Several issues appear to complicate the consideration of incorporating the currently proposed transit subsidy approach in the regional model
  - » Application of fare subsidies in the Metrorail trips only may potentially bias estimation of trips in other transit modes such as bus and commuter trips
  - » Employers provide varying subsidy levels for transit
  - » It is not easy to implement a similar method for bus-related trips
  - » Station-based subsidies of work trip attractions are tied to the employers close to individual stations, which may change locations in the future
  - » Transit fare subsidies should also be considered in the context of other travel subsidies such as parking subsidies

Transit Fare Subsidy (continued)

- Consideration of other methods of incorporating the fare subsidy which could be applied to all transit modes is encouraged
  - » Use recent travel surveys to look at fare subsidy presence in other transit modes
  - » Explore the relationship between fare subsidy presence and the type of employment in the attraction TAZ
  - » Explore more general distributions of fare subsidies on a geographic basis (e.g., district-to-district or county-to-county) which might be more stable over the planning horizon

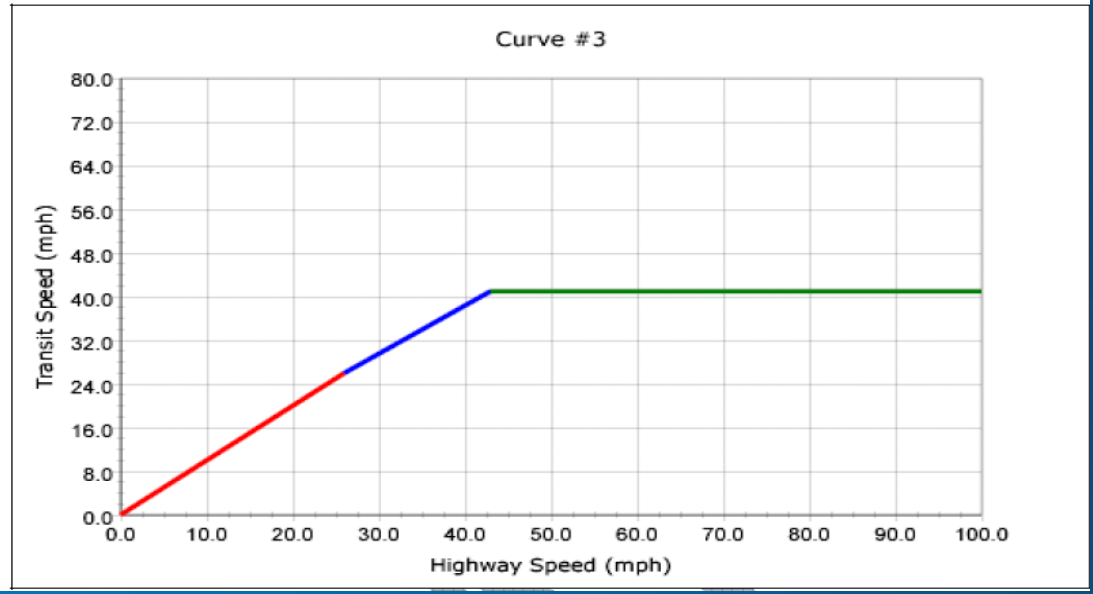
Bus Speed/Travel Time

- It is a state of practice to estimate travel time of transit modes operating in mixed traffic as a function of congested highway time

- Methods
  - » Bus speed curves
  - » Regression model
  - » Highway time/speed with bus delay

Bus Speed/Travel Time

- Bus Speed Curves
  - » Relate bus speed with auto speed on highways, generally by facility types, area types, and perhaps sub-modes
  - » are piecewise linear and are defined by three points
  - » implicit incorporation of stop density, dwell time, and acceleration and deceleration



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Bus Speed/Travel Time

- Regression Models
  - » Bus speed = a (congested highway speed) + b
  - » a and b parameter values may change by area types and facility types
  - » Easy to estimate and calibrate parameters
  - » Usually, scheduled bus run time and modeled highway speed are used for estimation
  - » Depend on accuracy of speed data for bus and highway
  - » Do not represent delay explicitly

Bus Speed/Travel Time

- Highway time/speed with bus delay
  - » Bus speed = congested highway speed + bus delay
  - » Bus delay is a function of the number of stops
  - » Bus delay can vary by modes, time-of-day, area type, etc
  - » Can explicitly include dwell time, acceleration/deceleration time
  - » Do not reflect explicitly the impact of transit demand

Mode Choice Model Development

- Three major approaches
  - » "Estimation" approach
  - » "Assertion" approach
  - » Hybrid approach
  - » Out of the 25 regional models reviewed, approximately half "estimation", the remaining half either the "assertion" approach or hybrid approach

Mode Choice Model Development

- FTA requirements
  - » Requires **compelling evidence** if mode choice coefficients are outside a certain range
    - -0.03<In-Vehicle Time Coefficients C(ivt)<-0.02
    - 2.0<C(ovt)/C(ivt)<3.0 where C(ovt)= Out-of-Vehicle Time Coefficients.
  - » Requires **compelling evidence** if mode-specific IVTT coefficients (Civt) are used instead of "generic" IVTT coefficients for all modes.
  - » Requires **compelling evidence** if the relative magnitude of mode-specific IVTT coefficients does not follow appropriate relationships:
    - C(ivt) (transit) less negative than C(ivt) (auto)
    - C(ivt) (commuter rail) less negative than C(ivt) (transit)

Conclusions

- TPB may wish to consider the following options for short-term enhancements of the regional travel demand mode
  - » An explicit representation of transit fares by provider and mode
  - » Consider fare subsidies in all modes, by employment types and subareas
  - » Establish an explicit relationship between bus speed and highway speed, along with bus delay
  - » Take estimation approach to mode choice model development first, then hybrid approach if necessary