Literature Search 618: Enhancing Managed Lane Equity Analysis

Tuesday, June 9, 2020

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Resources searched: TRID, Pooledfund.org

Summary: Results are compiled from the databases named above. Links are provided for full-text, if applicable, or to the full record citation. I completed my searches using the following terminology: managed lanes, equity, environmental justice, MnPASS.

Most Relevant Results

TRID

Revenue, Finance, Pricing, and Economics

Abstract. This issue contains fifteen papers concerned with revenue, finance, pricing, and economics. Specific topics addressed in this issue include the following: matching funding, mobility, and spatial equity objectives in a networkwide road pricing model; public’s acceptability of road-pricing schemes; variable congestion charges in a city center; optimal dynamic tolls for managed lanes; cost savings through effective management of infrastructure in the public right-of-way; nonwork trips associated with transit-oriented development; and computable general equilibrium modeling of a transport network. Additional topics addressed in this issue include: the relationship between agglomeration and productivity; value of travel time and reliability; welfare effects of giving commuters priority at ports; high-speed rail and manufacturing agglomeration; origin revenue sources for infrastructure funding; economic effects of automated vehicles; economic efficiency of project delivery options; and spatial distribution of manufacturing employment. Record URL: http://www.trb.org/Main/Blurbs/176657.aspx
Publication Date: 2017-00-00

Managed Lanes in Texas: A Review of the Application of Congestion Pricing

Wood, Nick; Baker, Trey; Moran, Maarit; Pritchard, Gavin; Lomax, Tim; Steadman, Max; Glover, Brianne; Dell, Brian

Abstract. This report examines congestion pricing as it is applied on managed lanes facilities within Texas as well as the rest of the United States. It presents: A general discussion of the state of the practice in congestion pricing and managed lanes; An overview of challenges facing the implementation of pricing; and A description of how the concept has been implemented and evolved in Texas. This report features five case studies of congestion pricing on managed lanes, two of which are in Texas, with a focus on how those systems were developed, how they are structured from a pricing perspective, and how public acceptance has been addressed.
Publication Date: 2016-09-00

Travel Behavior 2013, Volume 1

Abstract. This issue contains 19 papers concerned with travel behavior. Specific topics addressed include: bicycle commuting; geoimputation accuracy; travel time frontiers; elderly transport mobility and subjective well-being; willingness to pay for managed-lane systems; predicted sequences of activity travel episodes; time dynamics in activity
travel behavior models; allocation of intrahousehold motorized vehicles; willingness to pay for leisure; fuel use and optimality of assignments in multivehicle households; and equity effects of congestion charges. Other topics discussed include: activity-travel patterns and subjective well-being; willingness to change to nonmotorized travel modes; the activity travel scheduling process; individual mobility attributes and modality style; a joint model of household automobile ownership and residential location choice; teenagers’ mode choice behavior; residential location, work location, vehicle ownership and commute tour characteristics; and symmetry of transit trips in time and space. 

Record URL: http://www.trb.org/Main/Blurbs/170271.aspx

Publication Date: 2013-00-00

Finance, Pricing, Economics, and Equity Issues

Abstract. This issue contains 21 papers concerned with transportation finance, pricing, economics, and equity issues. Specific topics discussed include the following: a marginal-cost vehicle mileage fee; equity of fees for vehicle miles traveled; relationship between vehicle miles traveled and economic activity; role of context in equity effects of congestion pricing; impact fees effects on urban form and congestion; willingness to pay for high-occupancy toll lanes; traveler pay for managed-lane travel; managed arterials; impact of peak and off-peak tolls on equity effects of congestion pricing; impact fees effects on urban form and congestion; willingness to pay for high-occupancy toll lanes; traveler pay for managed-lane travel; managed arterials; impact of peak and off-peak tolls on corridor traffic; risk allocation in toll highway concessions; valuing public-sector revenue risk exposure in transportation public-private partnerships; risk measurement for pay-as-you-drive automobile insurance; benefit-cost analysis of information technology tools for program management; generating revenue to fund public-private partnerships for urban freeway reconstruction; local initiative, decentralized control, and independent financing of the Chicago Skyway; nonpublic funding options for interstate safety rest areas; price adjustments in unit-cost construction contracts; models to assess impact of infrastructure investment; relationship of transportation access and connectivity to local economic outcomes; road investments effects on economic output and induced travel demand; and impact of regulation and network topology on effectiveness of roadway privatization.

Publication Date: 2012-00-00

Lari, Adeel; Aultman, Sara. Study of Public Acceptance of Tolling with New Capacity and Credits: Concepts of FAST Miles and FEE Lanes. University of Minnesota, Twin Cities; Minnesota Department of Transportation; Federal Highway Administration, 2010, 57p

https://trid.trb.org/view/927665

Abstract: Conversion of high-occupancy vehicle (HOV) lanes to high-occupancy toll (HOT) lanes has become a relatively common managed lanes technique now employed in cities across the U.S. HOT lanes are created by developing a pricing system for existing HOV lanes that allow single occupancy vehicles to gain access to HOV lanes by paying a fee. Conversion of existing general purpose lanes to toll lanes or HOT lane operations, however, has not yet won public support as the perception persists that these “free” lanes have already been paid for and such conversions are a take-away. Focus groups were held in Minnesota to understand what policies, conditions, designs and operational characteristics could be considered that may satisfy concerns about general purpose lane adaptations to optional toll lanes or Flexible and Efficient Express (FEE) lanes. FEE lanes envision all users, except transit, paying a toll during peak-periods, with the lane reverting back to “free” operation outside of the peaks. Three configurations of FEE lanes were presented and a toll credit system was offered as a means to compensate users who may view the conversion as a take-away. Participants liked what they have already seen work, which is one priced lane on I-394 MnPASS, but were also concerned about user safety and equity. The credit system, which attempts to address user equity, was a source of confusion for many focus group participants. Although some participants seemed to like the idea of getting the credits to use FEE lanes, there were numerous concerns about logistics of credit management and distribution. These findings highlight the need for increased education and marketing about road pricing options which can assist in building support for a variety of pricing options, such as FEE lanes.

Abstract: Conversion of high-occupancy vehicle (HOV) lanes to high-occupancy toll (HOT) lanes has become a relatively common managed lanes technique now employed in cities across the U.S. However, conversion of existing general purpose lanes to toll lanes or HOT lane operations has not yet won public support as the perception persists that these “free” lanes have already been paid for and such conversions are a take-away. Focus groups were held to understand what policies, conditions, designs and operational characteristics could be considered that may satisfy concerns about general purpose lane adaptations to optional toll lanes or FEE Lanes. FEE Lanes envision all users, except transit, paying a toll during peak-periods, with the lane reverting back to “free” operation outside of the peaks. Three configurations of FEE lanes were presented and a toll credit system was offered as a means to compensate users who may view the conversion as a take-away. Participants liked what they have already seen work, which is one priced lane on I-394 MnPASS, but were also concerned about user safety and equity. The credit system, which attempts to address user equity, was a source of confusion for many focus group participants. Although some participants seemed to like the idea of getting the credits to use in FEE lanes, there were numerous concerns about logistics of credit management and distribution. These findings highlight the need for increased education and marketing about road pricing options which can assist in building support for a variety of pricing options, such as FEE lanes.

**Least Relevant Results**

TRID

The effectiveness of managed lane strategies for the near-term deployment of cooperative adaptive cruise control
Zhong, Zijia; Lee, Joyoung

Abstract. Traffic simulation is a cost-effective way to test the deployment of Cooperative Adaptive Cruise Control (CACC) vehicles in a large-scale transportation network. By using a previously developed microscopic simulation testbed, this paper examines the impacts of four managed lane strategies for the near-term deployment of CACC vehicles under mixed traffic conditions. Network-wide performance measures are investigated from the perspectives of mobility, safety, equity, and environmental impacts. In addition, the platoon formation performance of CACC vehicles is evaluated with platoon-orientated measures, such as the percentage of platooned CACC vehicles, average platoon depth, and vehicle-hour-platooned that is proposed in this paper under the imperfect dedicated short range communications (DSRC) environment. Moreover, managed lane score matrices are developed to incorporate heterogeneous categories of performance measures, aiming to provide a more comprehensive picture for stakeholders. The results show that mixing CACC traffic along with non-CACC traffic across all travel lanes is an acceptable option when the market penetration (MP) is lower than 30% for roadways where a managed lane is absent. Providing CACC with priority access to an existing managed lane, if available, is also a good strategy for improving the overall traffic performance when the MP is lower than 40%. When the MP reaches above 40%, a dedicated lane for CACC vehicles is recommended, as it provides greater opportunity for CACC vehicles to form platoons. The facilitation of homogeneous CACC traffic flow could make further improvements possible in the future.

Record URL: [https://doi.org/10.1016/j.tra.2019.08.015](https://doi.org/10.1016/j.tra.2019.08.015)


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Publication Date: 2019-11-00
Cirillo, Cinzia; Vicente, Javier Bas. Evaluating Equity Issues for Managed Lanes: Methods for Analysis and Empirical Results. University of Maryland, College Park; Urban Mobility & Equity Center; Office of the Assistant Secretary for Research and Technology, 2019, 30p

https://trid.trb.org/view/1604506

Abstract: Transportation planning decisions can have significant and diverse equity impacts (Litman, 2002). In particular, congestion and road pricing have raised equity concerns. Notably, the toll imposed on Managed Lanes on US highways affects drivers’ income. This is especially true for low-earning individuals, who devote a large portion of their available budget to transportation. Therefore, any policy or project assessment should take into consideration the so-called Income Effect. This concept refers to the fact that the impact of a change in driving cost—for instance, a toll increase—is not constant for all individuals but depends on their own income level. Unfortunately, the two measures most commonly used in project evaluation practice, Rule of a Half (RoH) and Log-sum (LS), rely on the assumption of absence of Income Effect. Since microeconomic theory does not support these grounds, not to account for income effect in policy evaluation may produce inaccurate results. Applying a policy for which the economic impact is not well-assessed may lead to severe equity issues. This project proposes a methodology that accounts for income effect in the appraisal of Managed Lanes and calculates the errors due to the use of approximated methods. In particular, the analysis is based on three pillars: i) the use of real data, ii) the use of more realistic assumptions about drivers’ behavior, considering different income levels and correlations between the alternatives, and iii) comparison of the LS and RoH and LS to the Compensating Variation (CV), the true benefit measure derived from microeconomic theory. These improvements provide a refined tool for the appraisal of the social, economic and equity aspects of transportation policy in the context of Managed Lanes. The tool will benefit private entities involved in road pricing projects, and transportation public agencies in need of ameliorating their evaluation of equity issues.


https://trid.trb.org/view/1512308

Description: A significant component to recent roadway investment in congested U.S. cities has been price-managed lanes (e.g. high-occupancy vehicle [HOV] conversions, express toll lanes, variable priced lanes, and high-occupancy toll [HOT] lanes). These facilities represent assets with “tolling choice,” which are assets with an adjacent free alternative route, and are separate and distinct from general toll facilities. General toll facilities typically are operated separately from managed lanes, but their policies and practices may influence the implementation of priced managed lanes. In the past decade, over $10 billion in public and private investments have been made in such facilities. However, a number of locations have experienced rising public and political concern that may jeopardize both planned and operational projects. New projects include I-77 Charlotte, I-66 Virginia, I-405 Seattle, I-35 Austin, I-635 Dallas, I-30 Ft. Worth, I-275 Tampa and others. Tolling affects traffic demand and route and mode selection. These facilities may generate revenue to support capital and operational costs. Techniques to manage toll rates, promote benefits to users including carpoolers and transit, address equity and balance competing goals have been challenging for agencies to implement and for the public and policy makers to understand. Challenges may include a lack of consistent performance metrics among transportation agencies and this may play a role in undermining public support. For example, the impacts to carpoolers on HOT lanes following conversion from HOV-only use is not fully understood. Levels of demand on severely congested corridors may be so large that the toll needed to manage demand may be unsustainable, and the goal of operational management may be forsaken when policymakers limit toll rates and users fail to see benefits. Additionally, pricing strategies, equity issues and operational knowledge gaps create barriers to implementation and post-implementation problems. Worse, public controversy about
tolling in any form may be preventing new projects from proceeding. The role that media and social media play in public perception of pricing projects is not well understood.

The objective of this synthesis is to identify challenges transportation agencies are confronted with related to system management issues, local experience, and messaging consistency. The synthesis will document strategies and tactics employed, lessons learned, and key success factors.

This synthesis will compile available information from project sponsors and operators for the 30 plus price-managed lane facilities. The surveyed agencies will include public private partnerships (PPP), publicly operated, and new capacity, and converted facilities. Information to be gathered will include but not be limited to: Stated and achieved project goals; Performance metrics and operational standards; Issues and strategies to address concerns (e.g. regional network traffic diversion, transit integration, mode choice, time shifting of trips, social justice and geographic equity issues, price management controls, legislative action, enforcement); Agency understanding of political and social roadblocks to implementation; and The differing roles in communicating “tolling choice” by the media and local, state and federal stakeholders.

Information will be gathered through an international literature review and a survey of U.S. transportation agencies with active, proposed or previously proposed price-managed lanes. For locations involving operational and terminated projects, at least six case examples will be developed from interviews with state DOTS and local/regional agencies that outline steps taken to address the tolling issues and enforcement policies raised and effectiveness of such actions.

Lou, Yingyan; Vadlamani, Satish. The Potential of Employing Connected Vehicle Technologies for Demand Management of Managed Lane Facilities. National Transportation Center @ Maryland; Office of the Assistant Secretary for Research and Technology, 2017, 32p
https://trid.trb.org/view/1505093

Abstract: This research explores the potential of employing Connected Vehicle (CV) technologies for demand management of managed lane (ML) facilities. More specifically, the authors envision CV technologies being adopted to 1) produce rich real-time traffic information, such as travel time variability and reliability as well as pricing variability (if applicable); and 2) disseminate such information to approaching travelers. Such information would likely affect travelers’ propensity of choosing MLs and thus the usage rate and the traffic conditions of the MLs and the general-purpose lanes (GPLs). As the market availability of connected and autonomous vehicles (CAVs) is prognosticated by 2020, the potential impact of CAV technologies on effective demand management is worth investigating. Priced Managed Lane (ML) facilities have been advocated to effectively mitigate traffic congestion and their number has increased from 14 to 24 in the past five years alone (4, 5). MLs include high-occupancy vehicle (HOV) and high-occupancy toll (HOT) lanes, which are dedicated and restricted lanes that operate in a relatively closed and controlled environment. Despite the prevalence of MLs in the US, there are no rapid HOV to HOT conversions due to public opposition, double taxation and equity concerns (6–8). It is possible that sometimes travelers may not receive expected benefits from MLs due to uncertainties in traffic such as a traffic accident that is not reflected by the time display. In view of this, the authors argue that innovative pricing strategies could be explored to boost public acceptance of priced MLs and at the same time help achieve their design objective. They propose an alternative pricing strategy via an option of Travel Time Refund (TTR). When choosing to pay for MLs, users are provided an opportunity to purchase an additional TTR, which ensures them a certain amount of travel time savings. The cost of TTR is always less than the actual toll. If users did not experience the “insured” travel time savings due to unforeseen circumstances, they would be refunded the toll amount but not the additional cost of TTR. This study provides a discussion of the implementation issues of TTR and the potential of using CVs to help achieve the vision. The authors envision CVs to enhance existing information provision capabilities by providing richer real-time information. The feasibility of utilizing existing road infrastructure, i.e. traffic signs, toll transponders, tollbooths etc. to accommodate the new pricing technology is also considered.
Environmental Justice and Tolling: A Review of Tolling and Potential Impacts to Environmental Justice Populations.  
Federal Highway Administration, 2016, 4p  
https://trid.trb.org/view/1441067
Abstract: Increasingly, tolling has become an integral part of transportation infrastructure as cities and States respond to urban mobility challenges and face decreased funding for transportation projects. Toll revenues are often essential to pay the capital cost of the toll facility, as well as its operations and maintenance. Expanded use of tolling has also been promoted during the last several Federal-aid Highway Program authorization periods. Environmental Justice (EJ) populations can be affected by tolling, but the impacts vary widely by context and type of project (i.e., full facility tolling or partial facility tolling; a.k.a., “managed lanes”). This fact sheet describes different planning-level tolling scenarios and their potential impacts on EJ populations as well as a project-level evaluation of tolling projects and questions that should be answered to understand the socioeconomic impact of tolls.

Victoria Transport Policy Institute, 2015, 21p  
https://trid.trb.org/view/1367530
Abstract: This report describes a framework for determining when bus lanes are warranted based on economic efficiency, social equity and strategic planning objectives. Bus lanes increased urban transport system efficiency and equity by favoring higher value trips and more space-efficient modes over lower-value trips and space-intensive modes. Bus lanes can carry more passengers than general traffic lanes, and so increase total capacity (people per traffic lane), increase transit system operating efficiency, directly benefit bus passengers, cause travellers to shift from automobile to transit which reduces various transportation problems, and support more transit-oriented development. This paper examines how these impacts are considered in conventional planning, describes examples of bus lane planning and evaluation, and discusses ways to optimize their implementation. Much of this analysis also applies to other transit improvements, such as increased service frequency, and other managed lane types such as High Occupancy Vehicle (HOV) and High Occupant Toll (HOT) lanes. This paper should be of interest to policy analysts, transport planners and engineers, and transit advocates.

Active Traffic Management for Facilitating Traffic Operations in Metropolitan Freeway Network: A Comprehensive Review and Comparative Analysis  
Aung, Lily; Zhang, Guohui; Walton, C Michael
Abstract. Active traffic management consists of a series of integrated congestion management strategies including speed harmonization, queue warning, hard shoulder running, dynamic rerouting, travel time signs, ramp meter control, managed lanes, etc. This study aims to provide a comprehensive review and comparative analysis on various active traffic management strategies and their application. The detailed analyses of the key technologies are provided, and the system benefit, safety, and equity concerns are addressed in this paper. The findings of this study indicate active traffic management systems demonstrate the great potential for freeway congestion mitigation and safety enhancement.
Publication Date: 2011-00-00

Loudon, William R; Synn, Jienki; Miller, Harlan. Consideration of Congestion Pricing and Managed Lanes in Metropolitan Transportation Planning.  
Transportation Research Record: Journal of the Transportation Research Board, Issue 2187, 2010, pp 60-67  
https://trid.trb.org/view/910757
Abstract: Under FHWA sponsorship, DKS Associates conducted a national scan of how agencies in major metropolitan areas are developing plans for congestion pricing, managed lanes, or both. Staff members from the metropolitan planning organization (MPO) and the state department of transportation (DOT) in 10 metropolitan areas were surveyed to find out how they are including consideration of congestion pricing, managed lanes, or both in their metropolitan
planning processes and the development of long-range transportation plans for the region. In addition, the study team identified projects already in operation in each region, those already in the long-range plan, and those being considered. The study results reported in this paper focused on how the MPOs, state DOTs, and other key agencies interact, contribute, and cooperate in considering congestion pricing or managed lanes. The study also produced information on methods used to evaluate these strategies, including modeling tools used, performance measures used, and how network effects, diversion of trips, and equity effects are taken into account. The study identified how federal grants were used to fund studies and projects in the early stages of consideration of congestion pricing or managed lanes in the 10 regions. Public and stakeholder involvement methods used by the MPOs and state DOTs to advance projects were also identified.