

TRANSPORTATION AND PUBLIC UTILITIES GROUP SESSIONS AND EVENTS – ASSA 2021

Below is a summary of the planned events and sessions for the TPUG group at this year's ASSA meetings, and below that is a summary by session of papers, authors, session chairs.

TPUG Business Meeting

Reception Sunday, Jan. 3, 2021 6:00 PM - 7:00 PM (EST)

**Session 1: Automobile Markets, External Effects and Policy (R4, L9)
Monday, Jan. 4, 2021 12:15 PM - 2:15 PM (EST)**

**Session 2: Airports and Airline Markets (R4, L9)
Monday, Jan. 4, 2021 3:45 PM - 5:45 PM (EST)**

**SESSION 3: Public Utilities 1 (L9, L5)
Tuesday, Jan. 5, 2021 12:15 PM - 2:15 PM (EST)**

**Session 4: Public Utilities2 (L9, L5)
Tuesday, Jan. 5, 2021 3:45 PM - 5:45 PM (EST)**

Session 1: Automobile Markets, External Effects and Policy (R4, L9)
Monday, Jan. 4, 2021 12:15 PM - 2:15 PM (EST)

Session Chair: Jonathan E. Hughes, University of Colorado

Title: Regulating Untaxable Externalities: Evidence from Vehicle Air Pollution

Authors: Mark R. Jacobsen*, University of California-San Diego
James M. Sallee, University of California-Berkeley
James S. Shapiro, University of California-Berkeley
Arthur A. van Benthem, University of Pennsylvania

Abstract:

What is a feasible and efficient policy to regulate air pollution from vehicles? Theoretically, optimal policy would apply a Pigouvian tax on emissions. Such a tax is technologically infeasible, and most countries instead rely heavily on exhaust standards for new vehicles that limit air pollution emissions per mile. These standards regulate air pollutants like nitrogen oxides and have very different properties than fuel economy regulations. This paper carefully assesses these standards' effectiveness and efficiency. We show that the emissions rate of new vehicles in the US has fallen by more than 99 percent since exhaust standards began in 1967. Used vehicles have had comparable declines. We show that exhaust standards have caused much of this decline. Yet exhaust standards are not cost-effective in part because they give no incentive to scrap old vehicles, which account for a large share of total emissions. To study counterfactual policies, we develop analytical and quantitative models of the new and used vehicle fleets. We study the effects of making registration fees increase with a vehicle type's emissions. We also compare these policies to current actual registration fees, which (perversely) decrease with a vehicle's emissions.

Title: Can Behavioral Interventions Be Too Salient? Evidence from Traffic Safety Messages

Authors: Jonathan D. Hall*, University of Toronto
Joshua Madsen, University of Minnesota

Abstract:

Behavioral interventions are a popular tool for encouraging socially desirable behavior and are expressly designed to seize people's attention. However, little consideration has been given to the costs of seizing attention. We estimate these costs in the context of an increasingly common highway traffic safety campaign that displays roadside fatality counts on highway dynamic message signs (DMSs). We exploit detailed data on DMS and crash locations, DMS logs, and a unique setting in Texas where fatality messages are shown only during one week each month. We find that this behavioral intervention significantly increases the number of traffic crashes. The increase in crashes is immediate, dissipates over longer distances, and increases with the displayed fatality count. Crashes increase statewide during treated weeks, inconsistent with any benefits. Our results show that behavioral interventions, designed to be salient, can crowd out more important considerations, causing interventions to backfire with costly consequences.

Title: Tradable Performance Standard as a Hybrid Regulatory-Market Policy Instrument: Case Studies in Transport

Authors: Sonia Yeh, Chalmers University of Technology
Dallas Burtraw*, Resources of the Future
David Greene, University of Tennessee
Thomas Sterner, Gothenburg University

Abstract: Tradable performance standards are technology requirements or emissions intensity standards that can be averaged or traded across facilities. Like pollution pricing (emissions taxes, fees, or tradable permits), they influence technology choice by increasing the relative costs of technology with undesirable performance characteristics; unlike pollution pricing, they do not fully internalize the costs of emissions. Tradable performance standards make both undesirable and desirable technologies cheaper than would pollution pricing by providing a production incentive that reduces downstream product prices and the incentive for consumers to substitute away from the product, thus raising the total cost of emissions reductions compared to pollution pricing. However, they provide incentives for upstream innovation and technology transformation that are greater per dollar change in product prices than carbon pricing, and are generally additive to those from pricing so the policies can thus be combined without sacrificing the efficiency properties achieved by pricing. This paper surveys performance standards in the U.S. transportation sector, including greenhouse gas emissions (GHG) and Corporate Average Fuel Economy (CAFE) performance standards for light-duty vehicles (passenger cars and trucks), Zero Emission Vehicle (ZEV) programs that incentivize battery electric and hydrogen vehicles, and the Renewable Fuel Standard (RFS) and Low Carbon Fuel Standard (LCFS) for transport fuels. We discuss the aims, designs and empirical results of these programs, and the interactive effects of policies within a multi-policy strategy to accelerate long-term, large-scale energy transitions.

Title: Competition and Quality Gains: New Evidence from the High-Speed Rails and Airlines

Authors: Jeffrey P. Cohen*, University of Connecticut
Sandra Schaffner, RWI-Leibniz Institute for Economic Research

Abstract: How does a new highway in Germany impact residential real estate prices – both owner-occupied and rental properties? Construction of the A38 highway was completed in 2009 and expanded by additional interchanges at several points in time, through 2013. The highway connects the east and west of Germany. This dramatically alleviated congestion on nearby roads as well as enhanced connectivity for residents in the mainly rural areas. We consider a hedonic house price model with a quasi-difference-in-differences specification, to test the hypothesis that there are positive price effects on German real estate resulting from the highway completion and the associated relief of nearby road congestion. We control for potential negative effects due to additional noise and pollution, using direct distance (as the crow flies) to the nearest point on the highway. We use a German dataset on rental and owner-occupied real estate prices, for properties listed for sale and rent throughout Germany in the years 2007-2017. The treatment effects for houses and for apartments for rent are positive and significant, which implies that shorter distance to the highway leads to higher prices after the opening of the major highway (A38). The magnitudes of these treatment effects are larger for houses than for apartments. These results imply that the market capitalizes the new highway more strongly for sale properties than for rentals, perhaps because ownership implies a longer term commitment to staying in a property than renting. In other words,

the present discounted value of the expected highway benefits over a relatively long time horizon are reflected quite strongly in owner occupied properties. For the changes in 2008 and 2009 we do not observe any significant effects of noise and pollution on prices while there are negative effects in 2012 and 2013. It appears likely that these disamenities became more prevalent.

Discussants:

Boyoung Seo, Indiana University
Mark R. Jacobsen, University of California – San Diego
Jeffrey P. Cohen, University of Connecticut
Ian Lange, Colorado School of Mines

Session 2: Airports and Airline Markets
Monday, Jan. 4, 2021 3:45 PM - 5:45 PM (EST)

Session Chair: Richard Fowles, University of Utah

Title: Airline Mitigation of Propagated Delays via Schedule Buffers: Theory and Empirics

Author: Jan K. Brueckner*, University of California – Irvine
Achim I. Czerny, Hong Kong Polytechnic University
Alberto A. Gaggero, University of Pavia

Abstract: This paper presents an extensive theoretical and empirical analysis of the choice of schedule buffers by airlines. With airline delays a continuing problem around the world, such an undertaking is valuable, and its lessons extend to other passenger transportation sectors. One useful lesson from the theoretical analysis of a two-flight model is that the mitigation of delay propagation is done entirely by the ground buffer and the second flight's buffer. The first flight's buffer plays no role because the ground buffer is a perfect, while nondistorting, substitute. In addition, the apportionment of mitigation responsibility between the ground buffer and the flight buffer of flight two is shown to depend on the relationship between the costs of ground- and flight-buffer time. The empirical results show the connection between buffer magnitudes and a host of explanatory variables, including the variability of flight times, which simulations of the model identify as an important determining factor.

Title: Network Propagation and Air Traffic Congestion Policies

Authors: Tom C. Lam, Clemson University
Christy Y. Zhou*, Clemson University

Abstract Air traffic congestion is very costly to airline companies and passengers. Lack of incentive to internalize congestion cost on their rivals, airlines would impose heavy welfare cost on rival companies and their passengers. Quantifying congestion effect is therefore important for designing policies to improve welfare and market efficiency. In this paper, we quantify the marginal congestion effects by estimating the direct effect of having more flights on other contemporaneous flights and by simulating how this direct

effect propagates via air traffic network. We find the direct congestion effect is sizable - one additional flight waiting on the runway would lead to additional 0.5 minute of departure delay, 1 minute of taxi time, and 1.5 minutes of arrival delay. The indirect propagated effects can be a few hundred times larger than the direct effect during peak hours at the large airports. In addition, we find a large share of congestion at hub airports are internalized by hub airlines. Imposing a heterogeneous congestion fees may incentivize airlines to shift their schedules. However, the overall congestion effect is so heterogeneous that even imposing a congestion fee with micro-targeting will only pick up a small proportion of the variation.

Title: Operational and Competitive Effects of a Major External Supply-Side Shock: Case of Boeing 737 MAX Grounding

Authors: Volodymyr Bilotkach*, Singapore Institute of Technology
Paulos A. Lakew, Unison Consulting
Nicholas Rupp, East Carolina University

Abstract: In this study, we use Official Airline Guide's Database (OAG) on schedules published by US carriers for March-July 2019 to investigate the operational and competitive effects of 737 MAX grounding on the US domestic airline market. Preliminary findings suggest the following: (1) MAX grounding has sizably reduced traffic at US airports, especially at large and medium size airport hubs. (2) At the same time, the 737 MAX grounding had little to no impact on the number of nonstop destinations served from the US airports. (3) Airlines tend to replace 737 MAX with aircraft with similar yet smaller capacity aircraft. Consequently, airlines which have replaced 737 MAX aircraft are experiencing higher load factors compared to airlines which are not operating 737 MAX aircraft. (4) Post grounding, large and medium hub airports disproportionately lost the most scheduled capacity while small hubs gained more service than previously scheduled. (5) We find evidence pointing to the expected competitive response by the airlines not operating 737 MAX aircraft. Collectively, these carriers increased their scheduled departures by as much as 2%, while increasing their seat capacity by 0.5%. We will further conduct reduced form difference-in-differences type analysis and evaluate the factors that drive the airlines' choices of operational and competitive responses to this external 737 MAX shock.

Title: Effects of Airline Entry on High-Speed Rail

Authors: Changmin Jiang*, University of Manitoba
Chunan Wang, Beihang University
Anming Zhang*, University of British Columbia

Abstract: This paper investigates how an incumbent HSR responds to the entry of an airline with service frequency, number of stops, and train size as strategic decision variables. We obtain the following main results. First, the entry of airline reduces frequencies of all HSR service in an OD market, but the frequency of HSR service with a smaller number of stops decreases more. Second, the airline entry reduces the train size of HSR service with a large number of stops. However, such entry does not significantly affect the train size of HSR service with a small number of stops. Third, except for a limited number of extreme cases, the airline entry always improves social welfare. Nevertheless, the

distribution of such welfare gain among passengers in different markets is quite uneven. In addition, factors that are conducive to the increase in consumer surplus after the airline entry include a small weight that the HSR operator puts on welfare, a small passenger differentiation between transport modes, and a large size of long-haul market are. Finally, the extension analysis shows that an alternative pricing strategy of HSR where the HSR ticket prices depend completely on the distance of trips may be welfare-improving in some circumstances. Besides, policy implications for the development of regional economies are provided.

Discussants:

Changmin Jiang, University of Manitoba
Volodymyr Bilotkach, Singapore Institute of Technology
Tom C. Lam, Clemson University
Achim I. Czerny, Hong Kong Polytechnic University

SESSION 3: Public Utilities 1 (L9, L5) **Tuesday, Jan. 5, 2020 12:15 PM - 2:15 PM (EST)**

Session Chair: Frank Wolak, Stanford University

Title: Transmission Constraints and Electricity Trade in India

Authors: Fiona Burlig, University of Chicago
Akshaya Jha*, Carnegie Mellon University
Louis Preonas, University of Maryland

Abstract: This paper studies the influence of transmission infrastructure on electricity market outcomes in a developing country context. Both economic theory and evidence based on ex-ante structural simulations ((Ryan (2017))) suggest that increasing electricity transmission capacity should (i) decrease price dispersion between previously separated regions and (ii) reduce the overall cost of generation, by shifting production to lower-cost plants. We assemble a novel dataset on daily transmission capacities between regions of India's power grid, in order to generate ex-post empirical tests of these hypotheses. For the 5 percent of Indian electricity sold on a wholesale power market, we find that a 300 MW increase in transmission capacity leads to a 15 percent reduction in interregional prices wedges. However, for the remaining 95 percent of Indian electricity sold on bilateral contracts, we find that changes in transmission capacity have no detectable effect on either the quantity or the average variable cost of generation. These results suggest that given India's current institutions and generating resources, the short-run economic benefits of incremental investments in transmission infrastructure are likely to be small.

Title: What is Price Discovery Achieving in the New Zealand Electricity Market?

Authors: Stefan Bergheimer, Max Planck Institute

Estelle Cantillon, Univeristy of Brussels
Mar Reguant*, Northwestern University

Abstract: Wholesale electricity markets solve a complex allocation problem: electricity is not storable, demand is uncertain, and production involves dynamic cost considerations and indivisibilities. The New Zealand wholesale electricity market attempts to solve this complex allocation problem by using a price and quantity discovery mechanism that ends one hour before dispatch. We document behavior during price discovery consistent with the intended goal of promoting dynamic allocative efficiency but also find that prices typically increase along the process. We build a model of dynamic pricing by hydro generators that identifies how information generated during price discovery can both increase allocative efficiency and market power. The model is used to disentangle the effect of information on market power and efficiency.

Title: Simplified Electricity Market Models with Significant Intermittent Renewable Capacity: Evidence from Italy

Authors: Christoph Graf*, Stanford University
Federico Quaglia, TERNA Rete Italia S.p.A.
Frank A. Wolak, Stanford University

Abstract: Using hourly offer curves from the Italian day-ahead market and the real-time re-dispatch market for the period January 1, 2017 to December 31, 2018, we show how thermal generation unit owners are able to profit from differences between a simplified day-ahead market design that ignores system security constraints as well as generation unit operating constraints, and real-time system operation where these constraints must be respected. We find that thermal generation unit owners increase or decrease their day-ahead offer prices depending on the probability that their final output will be increased or decreased relative to their day-ahead schedules because of real-time operating constraints. First, we estimate generation unit-level models of the probability of each of these outcomes conditional on forecast demand and renewable production in Italy and neighboring countries. Our most conservative estimate of the impact of a change in the probability a unit owner will have its day-ahead schedule increased in the real-time re-dispatch market implies a day-ahead offer price increase of 5 EUR/MWh if this probability changes by 0.1. If the probability of a day-ahead schedule decrease rises by 0.1 the unit owner's offer price is predicted to be 6 EUR/MWh less. Over our sample period, we find that the economic re-dispatch cost averaged approximately 15% of the total cost of energy consumption valued at the day-ahead price.

Title: Shades of Integration: The Restructuring of the United States Electricity Markets

Authors: Alexander MacKay, Harvard University
Ignacia Mercadal, Columbia University

Abstract: We use a detailed dataset on electricity transactions to investigate changes in market structure following the deregulation of the electricity sector, as well as the consequences for prices. We show that deregulation was effectively delayed by intermediate degrees of vertical integration, such as long-term contracts and common ownership. To account for these mechanisms, we look at the impact of effective

deregulation: the portion of a market served by companies not related to the incumbent utility. We find that effective deregulation occurs several years after the initial vertical separation of incumbent utilities, and, when it occurs, prices increase. Deregulation can have this effect when firms have market power: the increase in prices from upstream markups and double marginalization may outweigh the cost reductions from allocative efficiencies. We consider alternative explanations and discuss why it is unlikely that they resulted in the observed correlation between prices and retail competition.

Discussants:

TBA

Session 4: Public Utilities2 (L9, L5)

Tuesday, Jan. 5, 2020 3:45 PM - 5:45 PM (EST)

Session Chair: Doug Jones, Ohio State University

Title: What are the Carbon Emissions from Electrification?

Authors: Stephen Holland, University of North Carolina - Greensboro
Matt Kotchen, Yale University
Erin Mansur*, Dartmouth College
Andrew Yates, University of North Carolina – Chapel Hill

Abstract: Power plants in the United States burn about half the amount of coal that it did just a decade ago. We examine how this has changed the relationship between electricity consumption and carbon dioxide emissions. While aggregate emissions have fallen, we examine how emissions changed on the margin, as this is the metric that is relevant for analyzing policies that effect grid level consumption of energy, including electric vehicles and rooftop solar investments. We find that while total CO2 emissions fell by 20% from 2010 to 2019, the marginal emissions have remained constant within a region of the country (an interconnection). To examine why this has occurred, we look at the change in the percent of the time that coal is on the margin. We find that in some hours, like in the middle of the night, coal is now less likely to be on the margin. Natural gas plants are more likely to produce at this time of day. In contrast, in the middle of the day, the opposite occurs. This is consistent with low natural gas prices enabling cheap, combined cycle natural gas plants to move up the merit order and to be called on to operate before coal plants. Gas plants have become baseload and coal units are now shoulder units that follow load.

Title: Effects of Mandatory Energy Efficiency Disclosure in Housing Markets

Authors: Erica Myers, University of Illinois-Urbana-Champaign
Steven L. Puller*, Texas A&M University
Jeremy West, University of California-Santa Cruz

Abstract: Mandatory disclosure policies are increasingly prevalent despite sparse evidence that they

improve market outcomes. We study the effects of requiring home sellers to provide buyers with certified audits of residential energy efficiency. Using similar nearby homes as a comparison group, we find this requirement increases price capitalization of energy efficiency and encourages energy-saving residential investments. We present additional evidence characterizing the market failure as symmetrically incomplete information, which is ameliorated by government intervention. More generally, we formalize and provide empirical support for seller ignorance as a motivation for disclosure policies in markets with bilaterally incomplete information about quality.

Title: Retail Pricing in Colombia to Support the Efficient Deployment of Distributed Generation and Electric Vehicles

Authors: Shaun D. McRae*, Autonomous Technological Institute of Mexico
Frank A. Wolak, Stanford University

Abstract: Electricity tariff reforms will be an essential part of the clean energy transition. Existing tariffs rely on average cost pricing and often set a price per unit that exceeds marginal cost. The higher price encourages over-adoption of residential solar panels and under-adoption of electric alternatives to fossil fuels. However, an efficient tariff based on fixed charges and marginal cost pricing may harm low-income households. We propose an alternative methodology for setting fixed charges based on the predicted willingness-to-pay of each household. Using household data from Colombia, we show the fiscal burden and economic inefficiency of the existing tariffs. We then show how our new tariff methodology could improve economic efficiency and create incentives for the adoption of clean energy technologies, while still leaving low-income households better off.

Title: Electricity Market Restructuring and Retail Rates

Authors: Kenneth Rose*, DePaul University
Brittany Taruffelli, Louisiana State University
Gregory B. Upton Jr., Louisiana State University

Abstract: State-regulated investor-owned utilities serve over 70 percent of electricity to final end-use retail consumers in the U.S. Prior to the 1990s, all states used a “cost of service (COS)” regulation regime in which investor-owned utilities were allowed to recover prudently incurred costs plus a rate of return on capital expenditures. From 1996-2000, some states passed electricity market “restructuring” that, over time, vertically de-integrated utilities and allowed customers to purchase power from third party providers. This is commonly referred to as “retail choice.” This empirical research examines the effect on electricity prices to final consumers. We find evidence that rates increased in restructured states relative to plausible counterfactual synthetic controls.

Discussants: