

TRANSPORTATION AND PUBLIC UTILITIES GROUP SESSIONS AND EVENTS – ASSA 2020

Below is a summary of the 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 and Cocktail Reception
Friday, Jan. 3, 2020 6:00 PM - 8:00 PM (PST)
Manchester Grand Hyatt San Diego, Cortez Hill B

Session 1: Transportation Competition and Externalities
Friday, Jan. 3, 2020 10:15 AM - 12:15 PM (PST)
Manchester Grand Hyatt San Diego, Gaslamp C

Session 2: Safety and the Social Costs of Transportation
Friday, Jan. 3, 2020 12:30 PM - 2:15 PM (PST)
Manchester Grand Hyatt San Diego, Gaslamp D

SESSION 3: Welfare, Pricing, and Market Power in Utility Markets
Saturday, Jan. 4, 2020 10:15 AM - 12:15 PM (PST)
Manchester Grand Hyatt San Diego, Gaslamp C

Session 4: Electricity Markets
Saturday, Jan. 4, 2020 2:30 PM - 4:30 PM (PST)
Manchester Grand Hyatt San Diego, Gaslamp C

Session 1: **Transportation Competition and Externalities**
Friday, Jan. 3, 2020 10:15 AM - 12:15 PM (PST)
Manchester Grand Hyatt San Diego, Gaslamp C

Session Chair: T. Edward Yu, University of Tennessee, tyu1@utk.edu

Title: Perception vs. Reality: The noise complaint effect on home values

Authors: Jeffrey Cohen, University of Connecticut (jeffrey.cohen@business.uconn.edu)
Felix Friedt*, Macalester College (ffriedt@macalester.edu)

Abstract: Aircraft noise pollution adversely affects physical and mental health. Previous research quantifies these problematic health effects through the losses that are capitalized into home values. Much of this research relies heavily on federally regulated noise contour plots - which do not depend on actual noise events - to identify the house price discounts. We break new ground on this subject by investigating whether actual residential noise complaints more accurately measure the aircraft noise pollution and housing price impacts experienced by residents near Minneapolis-Saint Paul International Airport. As federal aviation policies and noise abatement initiatives are based on noise contour plots, the potential disconnect between these mathematical models and actual human experience could have considerable policy implications.

Title: Bike sharing and house list prices: Evidence from micro-level data in Shanghai

Authors: Zhengyi Zhou*, Shanghai University of Finance and Economics,
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Abstract: This paper studies the impact of bike sharing on house list prices. We combine the unique order-level records from a major sharing bike company with our micro-level house listing data. To mitigate endogeneity concern, we use point-of-interest (POI) data from Baidu Map to construct an instrument for our key variable. It is found that sharing bikes negatively affect local house prices, perhaps because of their misuse of public space. However, such negative effect can be offset by the positive effect caused by easier access to subway stations, especially the stations that are non-overlapping with shopping malls. In downtown (suburb), the positive effect (negative effect) dominates. For an average house listed three months after the launch of sharing bikes, the sharing bike premium is 1.5%. In contrast, sharing bikes do not generate significant value by serving as a complement to the bus system.

Title: The Determinants of Railroad Pricing: Elasticity of Demand for Transportation versus the Profitability of Using the Service

Authors: Kenneth D. Boyer, Michigan State University, boyerkd@msu.edu
Wesley W. Wilson*, University of Oregon, wwilson@uoregon.edu

Abstract: Railroad pricing is generally understood to be based on cost and demand considerations. This paper investigates the pricing of railroad service for transportation of a homogeneous commodity. The uniform nature of the commodity allows us to identify the source of the demand elasticity for the movement that is priced and also allows us to get an indication of the profitability to the shipper of moving the commodity. Using data from the Bakken crude oil boom of 2010-2016, we find that that the profitability to the shipper of moving the commodity is a far more important element determining railroad pricing than are factors that relate to the elasticity of demand for making the haul. We infer that Ramsey Pricing, which emphasizes the elasticity of demand for the movement as a pricing element, plays only a secondary role in railroad pricing. The profit to the shipper of using the service is a more important element.

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

Authors: Hanming Fang,* University of Pennsylvania, hanming.fang@econ.upenn.edu
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Abstract: This paper analyzes the effects of high-speed rail competition on airlines' quality by utilizing a unique dataset containing all flights departing from Beijing to 113 domestic destinations in China from Jan 2009 to Dec 2012. To establish a causal interpretation of competition and productivity, we employ a difference-in-differences approach with the entry of HSR serving as a plausibly exogenous shock that brings competition for the airline industry. We document two main findings in this paper. First, the entry of the HSR introduces competition to the airline industry, facilitating improvements in the productivity or on-time performance of affected flights. Second, the decrease in departure delay is identified as the source of the increase in productivity.

Discussants:

Zhengyi Zhou*, Shanghai University of Finance and Economics, zhou.zhengyi@mail.sufe.edu.cn
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Charles P. Mason, University of Wyoming, Bambuzlr@uwyo.edu
Anming Zhang, University of British Columbia, anming.zhang@sauder.ubc.ca

Session 2: Safety and the Social Costs of Transportation
Friday, Jan. 3, 2020 12:30 PM - 2:15 PM (PST)
Manchester Grand Hyatt San Diego, Gaslamp D

Session Chair: Bijan Vasigh, Embry Riddle Aeronautical University, Bijan.Vasigh@erau.edu

Title: "Analyzing the Risk of Transporting Crude Oil by Rail

Author: Charles P. Mason, University of Wyoming, Bambuzlr@uwyo.edu

Abstract: The domestic crude oil industry was witnessed a remarkable expansion over the past ten years. Much of the new production occurs in regions not well serviced by existing oil pipelines, and so firms have increasingly turned to rail as a mode of transport. In turn, this has led to concerns related to safety. In response to these safety concerns, the US Department of Transportation (DOT) adopted a new rule governing rail shipments of oil. These observations point to the importance of understanding the risks associated with rail shipments.

In this paper I provide a careful empirical assessment of the risks associated with shipping a given amount of crude by rail. Using data from the department of Transportation, I construct an empirical model that links rail incidents to the quantity of oil shipped by rail. This data includes monthly observations on the number of carloads of crude oil shipped between January 1, 2009 and December 31, 2014, as well as information on safety incidents associated with these shipments. I find a statistically important link between the number of cars containing crude oil shipped by rail in a given month and the distribution of incidents; in particular, increases in shipments are associated with a rightward-shift in the distribution. I find similar effects relating shipments to the volume of oil spilled as well as the dollar damages from spills. These effects are noticeably more important in states where recent increases in oil production – mainly associated with the deployment of unconventional techniques – has been most pronounced.

Title: The Marijuana Effect on Motor Vehicle Crashes

Authors: Richard Fowles*, University of Utah, Salt Lake City, Utah 84112, richard.fowles@utah.edu
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Abstract We are just beginning to be able to detect the policy implications of changes in marijuana laws and consumption across the US on motor vehicle related fatalities. This study examines the effect of marijuana use on motor vehicle related fatalities using a balanced panel of data across all states and Washington, D.C. for the period 2010 to 2016 using Bayesian sturdy statistics, i.e., s-values. It addresses the possible interaction between marijuana consumption and alcohol consumption along with the legal environment across states and time.

Title: Assessment of possible global regulatory measures to reduce greenhouse gas emissions from international shipping

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Abstract: During the last several years, there has been a significant increase in global merchandise trade and it is expected to grow especially between more distant countries. Subsequently, growing trade is likely to stipulate the use of international maritime transport, since roughly ninety percent of the world trade is carried via sea transport. International transportation is one of the substantial sources of global emissions, producing about 14% of global Greenhouse Gas Emissions (GHG), and growing trade is expected to further increase the share of transport emissions and contribute to climate change.

This issue has drawn more attention as the negative impacts of the GHG emissions become more serious and significant. The International Maritime Organization, a UN body, has adopted a Greenhouse Gas Strategy that sets the ambition to reduce GHG emissions by at least 50% in 2050 and phase them out altogether as soon as possible in this century.

In this paper we analyze which policy measures are able to achieve significant maritime transport emission reductions and then we develop assessment criteria for evaluation of the relative merits of the different mid- and long-term policy measures. We also develop a methodology based on the energy-environmental version of the Global Trade Analysis Project (GTAP-E) with transport mode substitution that enables an appropriate representation of the dynamics and responses of both the shipping system and global/national economies. Using our proposed analysis methodology in a number of case studies in order to produce outputs for small island states, developing and least developed countries, we illustrate the methodology and its capabilities, as well as produce evidence about how specific policy measures may have impacts on specific nations' economic development and security.

Title: Reducing Sulphur Emissions: A Maritime Supply Chain Perspective

Authors: Laingo M. Randrianarisoa, University of British Columbia, laingo.randrianarisoa@sauder.ubc.ca
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Abstract: The approach chosen by International Maritime Organization to reduce emissions from high Sulphur content fuel is to set a quantity target for an allowable amount of emission

0.5m/m by 2020. It is often argued that if the shipping sector generates a certain level of emissions, it is held responsible for reducing its emissions by some fraction of the amount. This approach, however, ignores that not only can be shipping economically inefficient in reducing emissions and other sectors may be much more efficient, but also shipping represents only one component of the supply chain in moving goods from origin to destination. This paper provides a new perspective for reducing emissions which focuses on improvements in supply chain upstream and/or downstream from the shipping activity. The empirical strategy consists of evaluating the impact of maritime connectivity and performance of logistics in supply chain, first on trade (exports and imports of goods), then on the number of vessels for bulk, container and general cargo. The UNCTAD liner shipping (bilateral) connectivity indices (LSCI) and World Bank logistics performance index (LPI) are used to capture the quality of institutions and logistics performance. We find evidence that improvements in supply chain can potentially increase both exports and imports of goods, by lowering the costs of trade. The growth in trade, in turn, can be accommodated by increase in size of vessels rather than increase in the number of vessels. These findings have important policy implications, as large vessels display higher fuel efficiency, resulting in lower emissions per unit of output.

Discussants:

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SESSION 3: Welfare, Pricing, and Market Power in Utility Markets
Saturday, Jan. 4, 2020 10:15 AM - 12:15 PM (PST)
Manchester Grand Hyatt San Diego, Gaslamp C

Session Chair: Frank Wolak, Stanford University

Title: Water Tariff Setting and its Welfare Implications: Evidence from Chinese Cities

Authors:

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Abstract: We develop a framework to analyze urban water tariff setting and its welfare implications and apply it to a panel of Chinese cities in the 2000s. First, we find that peer cities' water tariff levels have a significant influence on a city's choice of tariffs. We use the peer cities' average tariff as an instrumental variable to estimate water demand functions, which yields elasticity estimates around -0.41 for both residential and industrial sectors. Second, estimation of cost functions reveals the supply of urban water services to be characterized by strong economies of scale with the majority of sample city-years on the downward sloping segment of marginal cost curves. More than half of the sample have residential water tariffs higher than the corresponding marginal costs while the share increases to 71% for industrial sector. The deadweight loss calculated under first-best pricing suggests moderate welfare loss due to prices deviating from the equilibrium. Finally, we show that taking into account non-revenue water losses justifies an efficient price higher than the equilibrium price.

Title: Welfare Analysis of Equilibria With and Without Early Termination Fees in the U.S. Wireless Industry

Authors: Joseph Cullen (Amazon)
Nicolas Schutz (University of Mannheim)
*Alex Shcherbakov (Bank of Canada), AShcherbakov@bank-banque-canada.ca

Abstract: In this paper we study the welfare implications of early termination fees in the U.S. wireless industry. We use a theoretical model to illustrate that the endogenous choice of consumer switching costs by service providers does not necessarily raise firms' profits. Instead, firms may be better off in an equilibrium without early termination fees. We show that equilibria with and without early termination fees may coexist and that firms may be locked into an unfavorable one due to a coordination problem. By contrast, consumer welfare is higher in a switching costs equilibrium. We further investigate the welfare implications of alternative equilibria using a dynamic model of consumer behavior in an industry

with durable products and switching costs. Our counterfactual simulations provide empirical evidence for the impact of consumer switching costs on equilibrium prices and social welfare.

Title: Market power and incentive-based capacity payment mechanisms

Authors: *Shaun D. McRae, ATAM, shaun.mcrae@itam.mx
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Abstract: Capacity markets provide guaranteed payments to electricity generation unit owners for having the “firm capacity” to produce electricity. Historically, these markets are plagued by the weak incentives they provide for plants to be available during high-demand hours. The reliability payment mechanism in the Colombian electricity market provides market-based incentives for plants to produce during periods of system scarcity. This market has served as a model for the design of capacity markets in a number of jurisdictions in North America and Europe. We demonstrate severe shortcomings of this mechanism. By adjusting their price and quantity offers, generators with the ability to exercise unilateral market power can choose whether or not a scarcity condition exists. We find that this mechanism can make it privately profitable for a firm to withhold output and create a scarcity condition. We illustrate this problem using hourly data from the first ten years of operation of the reliability payment mechanism in Colombia. The mechanism not only fails to minimize the cost of meeting electricity demand but also creates perverse incentives for electricity generators that could reduce the reliability of electricity supply. We quantify the cost of the perverse incentives caused by this capacity payment mechanism by computing a counterfactual dynamic oligopoly equilibrium for the 2015–16 El Niño event in Colombia.

Title: Hydro power. Market Might

Authors: *Grant McDermott, University of Oregon, grantmcd@uoregon.edu

Abstract: A central tenet of economic theory is that market power induces deadweight loss. This claim rests on an assumption that is difficult to verify empirically. Namely, dominant firms produce less than the social optimum. I provide evidence of such restrictive behaviour using a rich dataset of Norwegian hydropower firms. The research design exploits exogenous variation in the formation of localized electricity markets. Power plants are assigned to distinct sub-markets as the result of binding transmission constraints. This manifests as a shock to the market power that parent firms command in each sub-market. Further, the ubiquity of hydropower generation in Norway avoids empirical complications associated with marginal cost estimation and endogenous variation in the supply mix. This allows me to identify the causal impact of market power on firm behaviour without imposing strong structural assumptions on the data. I show that a one percent increase in market power causes firms to withhold production by as much as a 0.3 percent. My results suggest that even seemingly competitive markets are susceptible to manipulation and welfare losses.

Discussants:

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Ed Rubin, University of Oregon, Ed Rubin <edwardr@uoregon.edu>
Frank Wolak, Stanford University, Frank A Wolak <wolak@stanford.edu>

Session 4: Electricity Market
Saturday, Jan. 4, 2020 2:30 PM - 4:30 PM (PST)
Manchester Grand Hyatt San Diego, Gaslamp C

Session Chair: Meredith Fowlie, University of California Berkeley, fowlie@berkeley.edu

Title: As coal declines, what rises? Co-benefits and strategic responses to coal-plant closures

Authors: Meredith Fowlie (UC Berkeley), fowlie@berkeley.edu
*Edward Rubin (University of Oregon), edwardr@uoregon.edu
Catherine Wright (UC Berkeley), cwright@berkeley.edu

Abstract: A growing literature has established a link between particulate matter exposure and adverse health outcomes. For practical reasons, this literature largely focuses on short-term outcomes—though many expect longer-term outcomes to matter greatly. In this paper, we apply a quasi-experimental approach to estimate the causal impact of power plant emissions on longer-run health outcomes. Our approach leverages two important developments that have unfolded over the past decade: (1) discrete and sustained reduction in coal plant emissions across the country and (2) spatially continuous, satellite-based estimates of pollution concentrations. We also explore the potential for strategic "rebound" effects following coal-plant closures.

Title: Machine Learning the Equilibrium Impacts of Nuclear Shutdowns in Germany: Prices, Profits, Pollution, and Politics

Authors: Stephen Jarvis, University of California – Berkeley, jarviss@berkeley.edu
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Akshaya Jha, Carnegie Mellon University, akshayaj@andrew.cmu.edu

Abstract: Many countries have phased out nuclear electricity production in response to changes in the perceived risk of nuclear accidents. This paper examines the impact of the shutdown of roughly half of the nuclear production capacity in Germany after the Fukushima accident in 2011. We use hourly data on power plant operations and a novel machine learning framework to estimate how plants would have operated differently if the phase-out had not happened. We find that the lost nuclear electricity production due to phase-out is replaced primarily by coal-fired production and net electricity imports. This shift away from nuclear also increased both electricity prices and the average operating cost of German electricity production. Combined, we estimate that the cost of the nuclear phase-out is roughly 7 billion dollars per year; roughly half of these costs are due to increased levels of local pollution which impose significant health burdens. We explore two potential explanations for why the nuclear phase-out occurred despite its substantial costs: (1) political economy considerations tied to phase-out-induced increases in firm profits and (2) the perceived external costs associated with nuclear production.

Title: SOLAR IMPACTS: DOES DISTRIBUTED PRODUCTION AFFECT CONSUMPTION CHOICES?

Authors: Mark A. Jamison, University of Florida, mark.jamison@warrington.ufl.edu
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Abstract: As the role of electricity consumers changes with increased deployment of distributed generation, primarily through the installation of rooftop solar photovoltaic (PV) panels, the impact of this change on the electricity system as a whole - in the way that utilities deploy their own technologies, utility finance, and the environment – has implications for the future of electricity service. The analytical work to date on these alternatives assumes that electricity generation from these distributed sources displaces existing generation, usually from centralized sources – on a one to one basis. Utilizing a customer-specific data set, we specifically examine whether households change their consumption behavior after they install PV panels on their roofs. We find that consumers that install these panels increase their aggregate electricity consumption by 8-14%. This additional consumption has implications for the stability, the financial sustainability and the carbon footprint of our transforming electricity grid.

Title: Rooftop Solar Penetration and the Spillovers to Gas-fired Generator Efficiency in Western Australia

Authors: Gordon Leslie (Monash University, gordon.leslie@monash.edu)
Akshaya Jha (Carnegie Mellon University, akshayaj@andrew.cmu.edu)

Abstract:

The rapid growth in electricity production from solar resources has decreased the production by thermal (fossil fuel) generators. However, there is some concern regarding the “intermittency cost” of renewable generation: thermal generators are often required to take costly actions to start up or ramp production quickly in response to falling solar production when daylight ends or clouds form. This paper examines how the rapid growth in rooftop solar installations in Western Australia impacted the operation of gas-fired power plants in Western Australia. Corresponding to a 5-fold increase in rooftop solar from 2013-2018, we find that the aggregate market-wide heat rate (GJ of thermal energy divided by MWh of electricity production) increased by 5%. This fall in fleet efficiency is due to base load generation with high start-up costs and low marginal costs drastically decreasing production. Our results suggest that markets will transition toward more flexible thermal technologies as solar penetration increases; this in turn increases the importance of incorporating market mechanisms for assigning the costs of balancing supply and demand at every instant.

Discussants:

1. Akshaya Jha, Carnegie Mellon University, akshayaj@andrew.cmu.edu
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