TRANSPORTATION AND PUBLIC UTILITIES GROUP

SESSIONS AT 2023 WESTERN ECONOMICS ASSOCIATION INTERNATIONAL - ANNUAL MEETINGS

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San Diego

Corresponding / presenting author in **bold**.

TPUG Session 1: Transportation and Public Utilities

Chair: Shengnan Fang, Linn-Benton Community College

1. Are Transit Fares Regressive? The Use of Weekly and Monthly Passes in New York City
   Meiping Sun, Fordham University
   Jing Wang, Columbia University

   Abstract: Exploiting details of transit card data during the period 2013-2015, we provide evidence that a large number of commuters on the New York City public transit system purchase a weekly (7-day) unlimited-ride transit pass every week and continue this purchase pattern for more than 11 months. As a monthly (30-day) pass costs roughly the same as three and a half weekly passes, these commuters spend more money on transit fares with repeat weekly passes than they would have with monthly passes while receiving the same level and quality of transit services. These repeated weekly pass commuters predominately live in low-income neighborhoods, which may proxy for liquidity constraints. Low-income commuters may be unable to spend a large amount at one time for a monthly fare, opting instead to buy weekly fares that are cheaper in the short-term but much costlier in the long-term. Alternative mechanisms such as time inconsistency and job instability alone are unlikely to explain the observed behavior of recurring weekly pass commuters. These commuters would benefit significantly from a monthly fare cap, in which a rider can ride free for the rest of the month after reaching the equivalent monthly pass fare using the same transit card in a calendar month.

2. On-time Performance and Quality Disclosure Programs: Evidence from a Regression Discontinuity Design for Airline Arriving Time
   Shengnan Fang, Linn-Benton Community College

   Abstract: This paper studies the impact of a disclosure program for airline on-time performance, which ranks the airlines monthly regarding to the percentage of the flights arriving less than 15 minutes late. Based on the mandated disclosure program airline on-time performance, this paper uses the fraction of airline flights arriving time slightly less and slightly more than 15 minutes as the treatment and control groups, respectively, to implement a regression discontinuity design. We find that firms in this industry are heterogeneous in how they respond to the disclosure program. Our findings are robust to parametric and nonparametric estimates and different model specifications.

3. Modeling the Demand for Electric Vehicles and the Supply of Charging Stations in the United States
   David H. Austin, Congressional Budget Office

Abstract: This paper presents a simulation model of the markets for light-duty electric vehicles (EVs) and the associated public charging infrastructure, as well as the network interactions between them. It illustrates the model's attributes by simulating the effects of federal subsidies for public electric vehicle charging stations and of an extension of tax credits for electric vehicles. I project that by the early 2030s the charger subsidies, which were signed into law in 2021 as part of the Infrastructure Investment and Jobs Act, will have increased the size of the charger network enough to meet the demand for charging through the middle of that decade. That includes the additional demand that the expansion itself will induce: I project that through 2030, sales of EVs will rise more than 20 percent more rapidly with the expanded charger network than they would have otherwise. Including the additional effect of the EV tax credits that were signed into law as part of the 2022 reconciliation act, as well as recent changes in federal policy and past growth in EV sales, I project that EVs will constitute between 29 percent and 66 percent of new, light-duty vehicle sales by 2032, compared with about 6.5 percent in 2022. After all of the subsidy funding from the Infrastructure Investment and Jobs Act has been distributed and the available EV tax credits claimed, EV charger networks and the EV fleet will remain somewhat larger than they would have been in the absence of those policies.

4. Regulator Preference and Underinvestment in Water Infrastructure
   Chunyu Guo

   Abstract: Public water systems in the U.S. are facing a significant challenge due to underinvestment in water infrastructure, resulting in large water leakage and potential public health crises. Being a natural monopoly, the investment decisions made by local water regulators are based on the tradeoff between profit earned from water customers and residents' satisfaction. Failure to provide high-quality water or charging high prices can directly lead to negative electoral consequences in the next term. However, the managers' preferences regarding this tradeoff can deviate their investment decision from the profit-optimal level. This paper aims to explore the reasons for underinvestment by developing a dynamic framework to specify and estimate the local manager's preference for water utility investment. I recover the intertemporal consequences of water infrastructure investment decisions, recognizing water price adjustments and changes in water quality. I find that the municipal regulator assigns less weight to consumer surplus over profit, leading to a reduction in investment in water infrastructure. My findings show that underinvestment in water treatment and distribution infrastructure, aimed at improving drinking water quality and reducing water leakage, is a result of this preference. I use the estimated model to quantify the welfare improvement resulting from the manager's preference in inducing higher investment. The counterfactual analysis results indicate that programs such as subsidizing the water utility and technological advancements on improving infrastructure quality can help improve the investment level and social welfare.

5. Customer Switching, Firm Entry and Regulatory Policy: Evidence from the Electric Utility Industry
   Robert Press, Georgetown University
   John W. Mayo, Georgetown University
   Jeffrey T. Macher, Georgetown University

   Abstract: More than twenty years have passed since some states acted to restructure intra-state electricity markets, opening these former monopoly markets to competition. A number of studies have subsequently examined such restructurings, yet two key characteristics of the extant research create the opportunity to provide fresh insights into the evolution of these markets. First,

research to date almost exclusively focuses on how restructuring affects electricity costs and prices. At a more primitive level, however, any economic impact of restructuring is driven by the willingness of new suppliers to enter formerly monopoly markets and by the propensity of consumers to switch away from their historical monopoly provider. Second, existing research largely focuses on restructuring as a discrete phenomenon: it either happened or did not happen. The restructuring of intra-state electricity markets was, however, considerably more nuanced both in initial legislative design and in regulatory implementation, than implied by the prevailing discrete categorization. In this paper, we examine both the role played by these more basic drivers of restructuring outcomes and delve into the potential for variations in state-level legislative design and ex post implementation to profoundly affect the evolution of restructured electricity markets. Our empirical analysis provides considerable support for not only the crucial interplay between consumer switching and entry, but also the key role that legislative and regulatory market design mechanisms have had on the evolution of electricity market structure.

TPUG Session 2: ISSUES IN ENERGY

Chair: Nam Foo, Edith Cowan University

1. Assessing the Impact of Green R&D on Green Growth in OECD Countries: A Panel VECM Analysis
   Ashraf Galal Eid, Qatar University

Abstract: Many countries are paying great attention to green economic growth as a major pillar of their long-term sustainable development plans. In 2009, the OECD countries announced the Declaration on Green Growth, which emphasized the implementation of green growth strategies as a part of OECD countries' response to the 2008 financial crisis. These strategies include enhancing the investment in environmentally related R&D technologies, which is essential in the construction of sustainable low-carbon economies. This paper aims to assess the impact of four types of green R&D: renewable energy R&D, nuclear energy R&D, energy efficiency R&D, and fossil fuels R&D on two green growth indicators, CO2 productivity and energy productivity, in 18 high-income OECD countries during the period 1980-2021. The study implements the Panel Vector Error Correction Model (VECM) to examine the long-run and short-run causality among the model variables. The panel VECM results show a long-run relationship between green R&D variables, energy intensity, CO2 productivity, and energy productivity. We also find a positive and significant short-run impact of fossil fuels, renewable energy R&D, and energy efficiency R&D on both green growth indicators. However, the impact of nuclear energy R&D is found to be insignificant. Moreover, the model results show that renewable energy R&D has the highest positive impact on green growth indicators followed by energy efficiency R&D and fossil fuels R&D. In addition, we find a negative and significant impact of energy intensity on CO2 productivity and energy productivity. Finally, the study implements Bai and Perron (2003) and Ditzen et. al. (2021) test for multiple structural breaks in panel data. The test results suggest the existence of multiple structural breaks in 2009 and 2015, which indicates the sensitivity of energy R&D variables to the 2008 global financial crisis and oil price fluctuations (specifically, the fall in oil prices that occurred from mid-2014 to early 2015).

2. Energy Poverty and the Impact of Wellbeing in ASEAN Under China's Foreign Aid Motives.
   Nam Foo, Edith Cowan University

   Abstract: Energy is one of the primary elements in human daily life. It is important, because it is used for cooking, lighting, and other business activities. However, it does not matter that energy poverty is connected to the electrical grid, and this topic remains focused on insufficient energy consumption. In many ways, this is due to the unaffordability of and inaccessibility to clean energy to support our daily essential needs, which may cause the deprivation of a household and affect its social wellbeing. This study investigates the incidence of energy poverty in China's foreign aid countries. Our paper uses the latest panel data of selected countries in the Association of Southeast Asian Nations (ASEAN) from 2000–2019 to investigate the impact of energy poverty on energy consumption, education, and the per capita income of households. The selected five nations are Cambodia, Lao People's Democratic Republic (PDR), Indonesia, Myanmar, and the Philippines. Our empirical outcomes provide support for economic and social wellbeing policymakers in their decision-making. Our results indicate that the impact of energy poverty on these households' wellbeing is significant. Energy poverty household members in these countries that receive foreign aid from China have a higher probability of suffering high energy costs, having a significant dropout rate from schools, and having the least number of opportunities to improve their income. Our findings reveal a signifinicant impact of the Chinese foreign aid program, which helps reduce energy poverty in this region. We suggest that Chinese and ASEAN governments urgently need to implement effective policy measures that focus on the provision of clean and affordable energy to low-income households in these poor ASEAN states.

3. Asymmetric Gasoline and Diesel Price Responses.
   Najmeh Kamyabi, California State University, Bakersfield

   Abstract: Movements of gasoline and crude oil prices have been the focus of many studies in the last few decades. Using weekly crude oil, retail gasoline prices, and diesel prices during the period from January 2000 to December 2022, we examine the hypothesis of asymmetric pricing for both the gasoline and diesel market for nine states. We apply an error correction model under structural breaks to examine the hypothesis of asymmetric pricing of gasoline and diesel in responding to crude oil price changes using weekly data from 2000 to 2022. The result confirms the asymmetric movement in the gasoline and diesel market in all states. However, the speed of adjustment is different across states.

Discussants: Hamdi Bennasr, Qatar University; Ashraf Galal Eid, Qatar University; Nam Foo, Edith Cowan University; Najmeh Kamyabi, California State University, Bakersfield

TPUG Session 3: Topics in Transportation
Chair: Ulmaskhon Kalandarova, Colorado State University, Fort Collins

1. Evaluating and Decomposing Performance of Urban Metro Transportation System from the Multiple Dimensions
   Chao-Chung Kang, Providence University, Taiwan

   Abstract: Most studies in the transport literature have focused on analyzing the efficiency or productivity changes of metro transits. However, in practice, besides the productivity or efficiency measurements of the MRT (mass rapid transit) system, the operator also pursues the performance in sustainable financial effectiveness, safety, service quality, or marketability. As indicated in the literature, many studies often overlook the goals mentioned above when measuring the performance of metro transits. Thus, the performance evaluation from the one-dimensional perspective does not provide operators insight or useful information for making improvements in resource allocation. This study, therefore, proposes a triangular pyramid performance evaluation concept based on the multi-dimensional perspectives, and also presents a sequential network performance assessment model to evaluate overall effectiveness. The overall effectiveness is also decomposed into efficiency and effectiveness for production, service, and marketability stages for urban metro transits.
   This study conducts a case study consisting of the Taipei and Kaohsiung MRT transits with the input-output data from 2009 to 2018. The Supper Slack-based Measure (Supper-SBM) is applied to evaluate financial efficiency from the one-dimension perspective. The network SBM (NSBM) model which was proposed by Tone and Tsutsui (2009) is also applied to measure the overall effectiveness and decomposes overall effectiveness into production efficiency, service effectiveness, and marketability effectiveness simultaneously.
   Result of the Rank-Sum-Test (Wilcoxon-Mann-Whitney) shows a significant difference in ranking distribution of financial efficiency between the traditional SBM and Supper-SBM model. In addition, the Kruskal-Wallis Test also displays the difference in ranking distribution of marketability effectiveness (MSE) among two-stage network, three-stage network, and four-stage network SBM models. The results of the case study demonstrate that the overall effectiveness (OE) of the four-stage network DEA model can be decomposed into managerial efficiency (ME), production efficiency (PE), service effectiveness (SE), and marketability effectiveness (MSE) of the metro transit system simultaneously. The empirical analysis displays that the triangular pyramid framework and sequence network model can provide managers with insight management implications from the multi-dimensional perspectives.

2. Effects of Using the Sustainable Aviation Fuels in the U.S. Air Transportation: Case Study of California
   Ulmaskhon Kalandarova, Colorado State University, Fort Collins
   Anita Alves Pena, Colorado State University, Fort Collins
   Stephan Weiler, Colorado State University, Fort Collins

   Abstract: Low-carbon sustainable aviation fuel (SAF) made from renewable biomass and waste resources have the potential to deliver the performance of petroleum-based jet fuel but with a fraction of its carbon footprint, giving airlines solid footing for decoupling greenhouse gas (GHG) emissions from flight (U.S. Department of Energy, 2020). SAFs lower carbon intensity makes it an important solution for reducing aviation greenhouse gas emissions (U.S. EPA).

The Renewable Fuel Standard (RFS) program was created in 2005 under the Energy Policy Act (EPAct). The RFS program is a national policy that requires a certain volume of renewable fuel to replace or reduce the quantity of petroleum-based transportation fuel, heating oil or jet fuel (U.S. EPA). The California Air Resources Board amended the Low Carbon Fuel Standard to include aviation fuels in 2018, specifically to include alternative jet fuel as an "opt-in" pathway within the program. With the 2018 update, conventional fossil jet fuel still does not generate deficits for obligated parties such as oil importers and refiners; however, alternative jet fuel is eligible to generate Low Carbon Fuel Standard credits based on their life cycle carbon intensity and proportionally to their greenhouse gas emission reduction. Credit holders can use them to offset deficits generated by gasoline and diesel within the program.

Since it is a novel trend in aviation (started in 2018 in California), there is still a lack of literature showing the economic effect of adoption of SAFs into aviation market. The purpose of this paper is to analyze the effect of policy adoption of SAFs into aviation industry in the USA and analyze the aviation outcomes (proxied by number of seats supplied at the airline-route level transportation, frequency of flights/routes). We will focus our analysis first in California, since according to US EPA, the SAF fuel is used primarily in California due to the LCFS (2018).

A range of different methods to analyze those questions will be used: time series, panel regressions, synthetic control method, etc. California-specific US EPA, FAA data on SAF production/consumption, air flights related data and other data will be used in the analysis.

3. Transit Infrastructure, Couples' Commuting Choices, and Gender Inequality
Daniel Velasquez, University of Michigan, Ann Arbor

Abstract: I study how urban transit infrastructure affects labor supply and gender inequality in the presence of married households. In such households, labor and commuting decisions are made jointly. When one spouse earns a higher wage, the household may sacrifice a portion of the other spouse's earnings to reduce commuting costs. Therefore, improving commute times can affect one partner's commuting by impacting their prospects (direct channel) and their spouse's (indirect channel). I set up a general equilibrium model featuring single and married households and use it to study new transit infrastructure in Lima, Peru. In the counterfactual analysis, areas that experienced the largest reductions in commuting times, the gender gap in real earnings among married households decreased by 12 percent. However, the gap remained unchanged among single households. The gap decreased through the direct channel but increased through the indirect channel.

4. Precision Scheduled Railroading, Demurrage, and Freight Railroad Shipper Adjustments
Elvis Ndembe, Prairie View A&M University

Abstract: This study examines the likely linkage between precision scheduled railroading PSR and escalating demurrage using Class I freight railroad traffic and financial data between 2002 and 2021. Our empirical analysis shows that PSR and associated operational changes has led to higher demurrage. PSR implementation is associated with a 77 percent increase in real total demurrage per car mile in the short and medium term. Interestingly, shippers have not adapted to PSR related changes to mitigate the increasing burden of delay charges. This lack of adjustment can help explain the significantly high impact of PSR on the level of demurrage levied to shippers. Results also suggest that Class I freight railroad demurrage and operational policies have differential effects on real total demurrage per car mile compared to the base railroad when

controlling for PSR. There was no statistically significant difference in delay charges for traffic generated by privately owned freight cars compared to railroad owned freight cars. Although we do not attribute escalating demurrage entirely on PSR, overall, these results support the idea that PSR adoption has contributed to the higher-than-normal charges levied on rail shippers for freight car loading and unloading related delays albeit in the short and medium terms.

Discussants: Daniel Velasquez, University of Michigan, Ann Arbor; Chao-Chung Kang, Providence University, Taiwan; Elvis Ndembe, Prairie View A&M University; Ulmaskhon Kalandarova, Colorado State University, Fort Collins