

COLUMBIA UNIVERSITY
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Subject: Request for Unmasked Carload Waybill Sample

Dr. Brennan:

We are writing to request access to the unmasked confidential Carload Waybill Sample from 1984–2021. This data will support an academic research plan related to rail operators' responses to slow orders and the resulting effects of these responses on railway safety. To answer these questions, we require data on train origins, destinations, freight revenue, and characteristics, information recorded in the unmasked Carload Waybill Sample but not in its public alternative. The research will be conducted by Xinming Du and Andrew Wilson, PhD candidates in the Sustainable Development program at Columbia University.

Research question:

In this study, we aim to explore how freight train operations change in response to environmental conditions, in particular, whether temperature fluctuations that may lead to slow orders can induce behavioral responses including modifications in train length, speed, weight, and related characteristics. We hypothesize that some of these behavioral responses may have implications for rail safety, though are unsure about the sign and magnitude of these consequences. To our knowledge, we would be the first to explore these questions with actual train operations data.

At its core, our study proposes to explore the influence of weather on rail operations. This requires that we know the weather conditions that trains are exposed to along their route, information we plan to estimate from the origin and destination available in this data. We are interested in weather conditions because thermal expansion and contraction are key considerations in rail design and construction. Rail operators and the trains they operate may also exhibit vulnerability to temperature changes. Using detailed weather and railway accident data, we plan to estimate empirically whether both heat and cold lead to more railway malfunctions, as well as the implications of these malfunctions for rail safety. In a changing climate, adapting to new temperature regimes may require additional investment in rail infrastructure, though such investments have social returns above private returns, which provides a rationale for public support.

Though physical adaptations—including CWR, rail monitoring, and rail retrofits—may increase safety in response to a changing climate, they are slow and expensive. In the short run, behavioral responses on the part of track and rolling stock operators will dominate. In response to slow orders, one such form of adaptation, rail operators may change train characteristics,

including train length, speed, and weight. These responses may have consequences for safety over and above the effects of temperature alone. While aggregated data shows the number of rail accidents per day has declined since the 1980s, trains have also gotten longer. We hope to be able to speak to the tradeoffs inherent in these questions.

In addition, we plan to model the tradeoff between safety and delay. On one hand, train operators care about safety, and accidents are costly for both private operators and society. On the other hand, driving in a cautious manner and at a slow speed leads to delays and results in a loss of economic revenue. We will use the freight revenue in the unmasked dataset to calibrate our model.

Results and confidentiality:

While these data will be used in their unmasked form for our main analysis, all analytical products will report only aggregate values at a scope sufficient to ensure confidentiality; we will not report any individual-level data. We understand and will comply with all confidentiality regulations related to the use of this data (e.g., those contained in 49 CFR § 1244.9) and will share research products with the Office of Economics for compliance review prior to release. The data will only be used for academic research conducted by Xinming Du and Andrew Wilson. The final output will be an academic paper in an economics journal.

Researchers' qualifications:

Xinming Du is a final-year PhD candidate in Sustainable Development at Columbia University. Her research fields include environmental economics, applied microeconomics, and digital economy. Her papers have been published in the Economics Letters, AEA Papers and Proceedings, Nature Climate Change, and other leading journals in environmental economics. During her PhD, she did consultancy at the World Bank and the International Monetary Fund.

Andrew Wilson is a fifth-year PhD candidate in Sustainable Development at Columbia University. His research explores the impact of air pollution and temperature exposure on human health, how people respond to information about climate risks, and the value of weather and climate forecasting improvements.

Thank you for your consideration of this request.

Sincerely,
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