In recent years, with increased economic globalization, growing e-commerce and internet based shopping freight movement patterns are undergoing a transformative change. The shipment size distribution is moving towards a higher share of smaller size shipments affecting transportation mode and vehicle type requirements. In addition, freight transportation mode is closely affected by the destination location (and its attributes). In our dissertation, we contribute to freight research by developing a comprehensive framework to examine the how, where and how much freight flows in US. Specifically, we study the following dimensions of freight flow: (1) transportation mode, (2) mode and shipment weight choice and (3) mode and destination choice. For analyzing mode choice, an advanced discrete freight mode choice model—a hybrid utility-regret based model system has been estimated while accommodating for shipper level unobserved heterogeneity. To demonstrate the applicability of the proposed model system, detailed policy analyses examining the implementation of vehicle fleet automation and rerouting of freight movements away from a region were considered. While shipment weight could be considered as an explanatory variable in modeling mode choice (or vice versa), it is more likely that the decision of mode and shipment choice is a simultaneous process. This joint decision is investigated both simultaneously employing a closed form copula structure and sequentially employing latent segmentation based sequence model. For destination choice, we investigated the connection between shipping mode and destination choice of shipment in a latent segmentation based sequential form. The analysis for the dissertation is conducted using 2012 Commodity Flow Survey (CFS) data.

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The public is welcome to attend.