Trucking, Supply Chain, Accident, Fragility, Perishability

An H.H. Franklin Bridge-Fund Award Proposal for Summer 2005
(Based on a proposal submitted to the National Science Foundation)
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Project summary. The goal of this project is to develop theoretical models of U.S. motor carrier (trucking firm) speed and accident behavior and to structurally estimate these models using firm-level U.S. Department of Transportation (DOT) safety data. Preliminary research, using the DOT Motor Carrier Safety Status Measurement System database of firm-level safety performance (SafeStat), indicates that motor carrier safety and accident behavior are highly correlated with the nature of the commodity transported (e.g. Chemicals, Building Materials, Livestock, or Passengers). Different commodities are characterized by different features that create differing incentives for driver safety behavior. To date, preliminary research indicates that commodity *perishability* and *fragility* characteristics may create competing incentives for driving speeds. For instance, Fresh Produce is highly perishable and needs to be delivered to market expeditiously, while its fragility (potential loss due to an accident) may be relatively low. Passengers on a bus are somewhat perishable (in the sense that they do not want to be late), but they are highly fragile, since the potential loss of human life in a fatal accident is very high. These competing incentives imply a *supply curve for speed* that varies across the different commodities transported. Insofar as accident rates are positively correlated with speed, transporters of different commodities should (on average) exhibit different accident rates and safety performances.

The objectives of this project are: 1) to develop theoretical models of short-run motor carrier driving behavior by commodity, where potential choice variables are things like driving speed, driving aggression, and accident insurance; 2) to expand the Safestat database (based on the raw data in the Motor Carrier Information Management System), creating a richer database capable of identifying estimation of the theoretical models; and 3) to structurally estimate the theoretical models and conduct statistical inference on model parameters. Currently, the Safestat database can only support a simple model of motor carrier speed and accident behavior, where the choice variable of the objective function (short-run transportation cost) is driving speed. This model is detailed in this proposal. Expanding Safestat will enable specification and estimation of more robust models, which may include additional choice variables, such as accident insurance.

There are currently no behavioral models which are specific to the motor carrier industry and which incorporate commodity characteristics as an incentive for speed and accident performance. By applying structural estimation strategies to behavioral models, this project will directly advance the fields of transportation research, transportation economics, and highway safety and management in theoretically rigorous ways. The proposed research will add to our knowledge of transportation costs which are important to the fields of supply chain management, urban and regional economics, agglomeration

economics, international economics, and supply chain management. It will also add to our understanding of the incentives for speeding, risk, and accidents, which have profound public externalities on our nation's highways. Also, the results of this research may have implications for policy and enforcement of highway safety laws.