PROJECT TITLE: LIGHT TRUCKS AND HIGHWAY FATALITIES: THE ROLE OF NETWORK EFFECTS

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Light trucks, such as sport utility vehicles (SUVs) and pickups, impose greater risks of injury and death on other motorists than do cars, while at the same time providing their occupants with increased protection against these risks relative to cars. In theory, these characteristics could combine to create a network effect: the more people who drive light trucks, the greater the propensity of a consumer to choose a light truck relative to a car (that is, as a means of protection against other light trucks on the road). Previous research has measured the adverse effects of light trucks on the safety of other motorists (i.e., the negative externality), and a couple of studies have identified the possibility of light-truck-induced vehicle choice effects. None have attempted to develop a standard metric for light trucks' impacts on vehicle choice across varying market conditions.

This study combined data on fatal accidents from the National Highway Traffic Safety Administration with data on vehicle choices from the U.S. Consumer Expenditure Survey to estimate an external cost elasticity of demand, the effect of a one-percent increase in the magnitude of the light-truck externality on the propensity of consumers to choose a light-truck over a car.

The elasticity estimates accounted for variations in demand for light trucks across states, across regions, and over time. They also accounted for variables affecting households' vehicle choices other than the risk posed by light trucks on the road. These included economic-cultural characteristics by state by year, topology and road condition variables, and characteristics of the household or individual respondent.

The study found, in most cases, a positive elasticity, suggesting that a greater number of light trucks on the road increases the consumer's propensity to choose a light truck. However, in states and years with unusually low demand for light trucks, the elasticity turned negative. This is consistent with earlier theory.

The largely positive external cost elasticity of demand for light trucks implies that previous estimates of the effects of policies to change the vehicle mix (i.e., cars versus light trucks) might be understated, to the extent that they do not take network effects into account. The life-saving effect associated with such policies, due to improved highway safety, is likely greater than previously believed.

The elasticity provides a standard way of measure the effects on consumer choice that arise from product-induced externalities that may be applied outside the motor vehicle context. Applications of the approach to other industries would be desirable. Future analyses of the motor vehicle market should employ a statistical instrument to create a "natural experiment," by which the effect of exogenous changes in highway safety on vehicle choice could be observed.

Table 3. External Cost Elasticities of Demand			
No demand interaction term	0.906	0.896	1.048
Region-year-based demand interaction term			
At mean	0.568	0.577	0.883
One standard deviation above mean	0.780	0.792	1.106
One standard deviation below mean	0.356	0.362	0.660
State-year-based demand interaction term			
At mean	0.295	0.303	0.304
One standard deviation above mean	0.612	0.623	0.619
One standard deviation below mean	-0.023	-0.017	-0.010
Time trend	Yes	No	No
Year indicators	No	Yes	No
Region-specific linear time trend	No	No	Yes

Notes: Estimates show the percent increase in sales of light trucks associated with a one-percent increase in the external cost imposed by light trucks on cars.