Nonlinear pricing is an unfamiliar term for a familiar idea. Linear pricing charges all consumers the same price for the same quantity of goods or services; in nonlinear schemes, the price varies, depending, for example, on quantity purchased or a consumer's ability to pay. In Florida, transportation infrastructure is supported largely through gas taxes, but as cars have become more efficient or use nongas fuels, revenues from gas taxes have continued to decrease. An alternative to the gas tax is the mileage fee, which charges the driver according to vehicles miles traveled (VMT). The question is what pricing scheme best balances revenue needs with other considerations, such as socioeconomic equity.

University of Florida researchers tackled the problem of optimal pricing in its most general form. Others had based solutions on total miles or simplified networks, but the generalized road network used in this project offers the most broadly applicable and potentially accurate approach, allowing pricing schemes to be optimized for desired criteria. In this report, the criterion was travel demand, that is, equilibrium travel times less than the time drivers were willing to travel — a time-savings for drivers.

As a basis for project analyses, the 2009 National Household Travel Survey provided data for 13,086 Florida households. The survey includes many characteristics of households, travelers, trips taken, etc. For comparison purposes, gas tax rates were converted to an equivalent price per mile, or mileage fee.

Researchers analyzed the socioeconomic impacts of one-part and two-VMT mileage fees. One-part mileage fees, which charge all drivers the same fee, are often referred to as flat mileage fees. For one-part pricing using 1.61, 2.8, and 4.1 cents per mile, analyses revealed that socioeconomic impacts became increasing regressive with higher mileage tax rates. Two-VMT pricing, which charges one rate up to a certain mileage and an increase
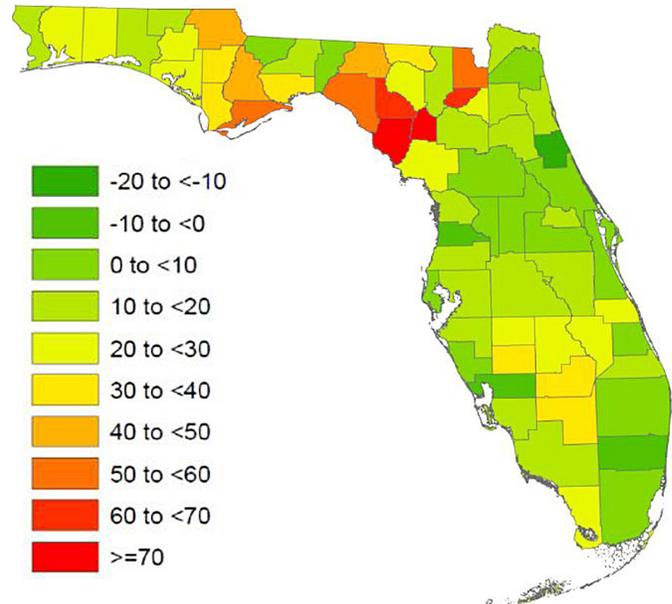
This map shows how the impact of flat mileage fees on consumer economic advantage varies from county to county, with bright red representing the highest advantage.

rate above that level, has the potential to reduce the regressive nature of the flat rates. Three two-VMT pricing schemes were analyzed, all of which were less regressive than flat fees.

Study models were also implemented on networks: an abstract, rectangular network and a commonly used geographic network based on Hull, Quebec. In addition to one- and two-VMT schemes, a two-part pricing scheme, charging drivers a flat access fee and then a VMT increment, was also analyzed. The two-part pricing scheme offered the best social benefits on both networks; however, the three pricing schemes ranked differently, indicating that performance of pricing schemes depended on the topology of the network.

The models created in this project will allow the equitable and revenue-effective design of future, mileage-based transportation pricing schemes.