

INTRODUCTION

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As you all know, our automobile industry has seen a larger and larger share of the passenger car market move to foreign manufacturers as Americans, albeit somewhat reluctantly at first, have opted for smaller, more fuel efficient cars. The Detroit automakers belatedly are making serious efforts to regain at least a portion of the market that they have lost. Now while the move to smaller cars was almost necessitated by fuel considerations, it brings with it many problems and issues for which we are not adequately prepared. Vehicles in the 2000-pound range have become common, and even smaller vehicles are emerging weighing 1500, 1000, and even below 1000 pounds. It appears that there's a very real possibility that these vehicles will increase significantly in number, and if this does occur, we're going to need to cope with a wide range of considerations that have not been addressed. First, how feasible is such a vehicle? Several years ago I had the opportunity to collaborate with several professors in the School of Engineering at North Carolina State University in Raleigh. One of them had a replica of a 1903 Oldsmobile that had been manufactured in the early 1960's. The gas tank held only one gallon, but the car obtained around 100 miles to the gallon. It had a top speed of around 25 miles per hour, and it could carry two occupants plus a couple of bags of groceries. The professor drove this vehicle between home and campus and his consulting firm for a number of years until he placed it in the lobby of his firm. He used it mainly on roads with posted speed limits no higher than 35 miles per hour. How many of our trips include only one occupant, or at the most two? How many are for short distances near home? How many could be accomplished on roads with low posted speeds? If the technology used in a 1903 Oldsmobile could produce such a machine, how much more could we accomplish today? Clearly the questions and problems are many. What would it cost to manufacture, maintain and operate such vehicles? Is there sufficient use for them? If they could not serve as the primary family car, could they meet the need for a second vehicle? Is there any market for such a car? How would our roads and highways accommodate them? What are the implica-

tions for pavement maintenance? On the one hand, such a car would not create a great deal of wear and tear, but on the other hand, it may be much more vulnerable to pavement imperfections. A pothole could have much more devastating effects, and hence such a car may require higher pavement maintenance standards. Parking facilities would need to be modified further, just as many have already been modified to accommodate compact cars.

Perhaps the most important issue is that low speed lightweight vehicles pose serious safety problems. Such cars might not be able to meet federal safety standards. I do understand, and I'm sure there are people here who know more about this than I, that in Japan they make a distinction between their very lightweight automobiles and heavier ones, and allow somewhat different safety standards for the lighter ones. In this country, we do not apply the same safety standards to motorcycles that apply to cars. If a very small vehicle were viewed as an alternative to a motorcycle or a moped, would it then appear less hazardous? How much could we offset some of the safety problems through more innovative traffic engineering and enhanced visibility? Clearly, we cannot build new facilities for such cars, but could we designate or dedicate certain existing routes for these vehicles, or existing lanes, and exclude heavier vehicles from these routes, just as we now limit heavy trucks to certain routes or lanes? On a dedicated route, the smaller car would allow ample space for bicycle paths and mopeds as well.

However, there would still be the problem of getting the small vehicles to and from these special routes and getting them through intersections. How much could we achieve through enhanced visibility? There's ample evidence that increasing the conspicuity of motorcycles and motorcyclists through lights-on laws and reflectorized materials leads to marked reductions in daylight multi-vehicle crashes. Likewise, the use of high mounted, central brake lights on the rear of passenger cars significantly reduces rear end collisions. To what extent could we apply such principles to these small vehicles? Henry Ford once said, "You can have a Model T in any color you want

so long as it's black." Could we say, you can have one of these small cars in any color you want so long as it's reflective and fluorescent?

I realize these ideas are unorthodox, and any kind of regulation is in ill repute today. Yet there is an urgent need to think some new and different thoughts and develop strategies that are relatively inexpensive. The forum we're conducting today is bringing together some of the top experts in this field. While we will not cover all the issues, we will make a healthy start on what is an important emerging issue in highway transportation. The Transportation Research Board has the potential to bring to bear the range of expertise needed to address this issue. We hope to identify some of the problems and the corresponding research needs, so that perhaps we can be better prepared to cope with the coming changes.

ECONOMIC CONSIDERATIONS

Dr. Charles Lave, Professor of Economics
University of California

PAT WALLER: Our speaker is Dr. Charles Lave, who is Chairman of the Economics Department at the University of California in Irvine. He's currently on sabbatical at MIT with the Future of the Automobile Research Program. I first came across his work when he edited an issue of "Transportation Research". He's done a great deal of work in the state of the art on models of demand for automobiles. As I recall, I believe that issue was entitled, "Economic Implications of Automobile Choice", and that immediately caught my eye. I thought, "Oh, here's somebody who is really doing something interesting," and it was just this morning that I had the opportunity to meet him in person. I am delighted to have the chance now to hear what he has to say on the question of economic considerations.

DR. CHARLES LAVE: Rather than an abstract discussion of economic considerations, I will focus on a specific mini-car that was recently introduced in Japan. It's not available here yet; and, as you will see, that's fortunate for us. The car is the Honda "City Car," and I want to organize my talk around the theme: if that car were here, what kind of market share would it get? In essence, what I'm doing is market analysis. I think market analysis is probably a good thing to do at this time of the morning. It's certainly more fun than economics or engineering. God knows, it pays better.

Anyway, let's talk about the Honda City Car. The following quotes are from "Automotive News," which is published in Detroit, and is at least somewhat biased toward American cars. Thus the positive comments of their writer are quite significant. The review of the Honda City Car, on December 7, said: "It's styled with plenty of character, has lots of room inside, really lively performance, and it cruises quietly at 70 miles per hour." So we're not going to need bicycle lanes for this car. "It has very good handling, holds four people with reasonable comfort, has sporty looks, and goes 0 to 60 mph in 12 seconds," which is very fast by the standards of U.S. cars. On the Japanese city cycle it gets 45 miles per gallon, and on the highway at 37 miles per hour, it gets 68 miles per gallon. Clearly, this particular mini-car is not going to require much sacrifice of looks, performance, or comfort. And now for the really bad news -- and I've checked this with two

different sources--it seems that the car could be sold in the United States for a mere \$3,500.

Now remember, this is not a dream car. It's a production vehicle, and it's selling extremely well in Japan. Suppose it were available here at something like that price. What market share might it achieve? In particular, since the U.S. cannot produce a similar car at that price, I want to see how much of the auto market would remain for American manufacturers. What would we have left? In the context of talking about sharing, it's worthwhile to remember a remark that Will Rogers once made about marital relations and reciprocal behavior. "Never forget that one good turn, gets all the blanket."

Is Honda going to get all the blanket with this particular car? Let's try a number of alternative forecasting approaches to see what happens. The first task is to set some kind of upper boundary on market share. One characteristic of this car, after all, is its small size. Can we say anything about the possible upper boundary on the market share of small cars? We know, looking at sensitivity to size, that consumers like to have at least one automobile capable of carrying the entire family together. Regardless of the number of special purpose vehicles they may have--a pickup to go hunting and shoot at each other, a tiny little car to transport themselves to work, and so on--they like to have one car which is suitable for the whole family. What does this imply in terms of the market share available to small cars? A few years ago Phil Patterson, sitting in the audience, coughed up a few thousand dollars to support two Irvine anthropologists, Gladwin and Murtaugh, in a study of auto purchase behavior. So instead of doing field work in South America or Africa, they chose to study the fierce tribe of Southern California auto buyers.

These anthropologists began with detailed interviews, and tried to figure out how it was that people chose automobiles: how did they decide what size car to buy? The end result was a series of decision-tree models. They're nice; anyone can look at the models and follow what's going on; you don't have to be a statistician. They show the process by which people progressively narrow down to pick a given car size. Then, last year, the model was applied to known U.S. demographics to produce market share projections, for 1990, of the share of large family cars. What they found is that, essentially irrespective of fuel prices and all kinds of other factors, 30 percent of the market is going to be these large cars in 1990. Well, in one respect that's good news for American manufacturers. It means they can sell to at least 30 percent of the market. But, on the other hand, that other 70 percent is all a potential Japanese share (which is a pretty big piece of the "blanket").

Somebody in the audience mentioned the importance of demographic trends, so let's also look at market shares from a demographic point of view. A few years back, Joan Bradley and I did a model of imported car shares: a simple multiple regression model, not terribly difficult to make sense of. We used both state-average data and household data, and modeled the demographic factors which influence people's willingness to buy imported cars and small cars. Three demographic factors emerged as overwhelmingly important in that decision. The first was family education levels. The second was whether or not it was a multiple-car household, and the third was the age of the head of the household. The education level variable was far and away the