

How to Make Electric Cars Competitive

By Jan-Petter Janssen

If cars had been running on electricity rather than on conventional fuel, society would benefit. Unfortunately, as long as the individual prefers the old technology, a bad circle of research on better gasoline engines, which leads to more demand, which leads to more research etc, will continue to take place. I will present some thoughts on how to overcome this problem.

Cars' Effect on Society

The pros and cons for society from using cars can be systematized into five points:

1. Consumer / producer surplus
2. The effect of one's mobility on others' welfare
3. The local / global pollution
4. The impact of one's use of roads on others' use of the same roads
5. The cost of building and maintaining roads

Point 1 is from traditional economics, and any government effort will disturb the efficient market outcome. Hence will any taxes lead to a dead weight loss and be negative.

Point 2 is simply that when persons or goods move from A to B, other people might benefit from this as well.

Point 3 is the negative impact from noise and exhaust plus the claimed contribution to global warming.

Point 4 is that a road can only handle a given amount of cars before it gets clogged. The effect of a car is about zero until a certain point before it gets clearly negative.

Point 5 is a cost and hence by nature negative.

It is obvious that the net effect of these effects is positive. Imagine a car free society. It would be a disaster for our welfare (point 2 in particular.) On the marginal however, a conclusion would require a much more rigid analysis.

I will not go into depth on this point, but just mention the differences on how governments deal with this. In Norway a liter of gasoline is taxed about US\$1.5, which implies a pumping price around \$2.5 (close to ten dollars per gallon.) Venezuela and some Arabic oil producing countries subsidize gasoline. A government should try to get the sum of these effects to be zero at the marginal. How to do this is not within wisdom, and from the highly diverse policies around, I reckon gasoline taxes are more or less randomly set with some other political goal in mind.

[A suggestion on

<http://developingtrader.com/070812.php>]

Thankfully, the electricity versus gasoline debate is considerably easier. The engine is just a technical issue, so for the consumer, price is the only concern. Point 3, pollution, will drastically reduce with electricity, while point 2, 4 and 5 will remain unchanged.

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The Consumers

The statement that electricity versus gasoline is just a price issue may require some modification. The el cars are technically inferior, and consumers would thus require these cars to be cheaper with some individual premium. However, for families with two (or more) cars, I will assume that an electric car of today's technology would be about as good for the second car.

All consumers (or the very big majority at lest) chooses the car with the lowest total cost of purchasing a car, plus the present value of associated costs, minus the expected sales price. The gasoline cars are considerably cheaper to buy at moment, which overweighs the fact that el cars are cheaper to use.

My suggestion to the government is to offer a hand, in order to help Smith's invisible one to overcome a temporary problem.

The Producers

A firm will only produce as long as the cost of one more unit is no larger than the price it sells for. Furthermore is it equally crucial that, in the time of deciding to produce or not, that also the average cost is no larger than the price.

I think it's the average cost constraint which holds back the electric car. With the tremendous research and development costs and the risk associated with the unknown result it is no wonder that car manufacturers choose to evolve the existing technology rather than trying to revolutionize the existing one.

The Necessary Help

From the last two sections it is clear that:

1. Almost all cars run on conventional fuel
2. If the price of a car is at least both the average and the marginal cost, it will be produced.

I will further state that:

3. If the price is at least marginal cost and marginal cost is above average cost, a positive profit will be made.

Point 3 implies that a boom in research will be made, which will make the electric car technology (and most likely batteries in particular) become cheaper. Perhaps it will become even cheaper than gasoline.

Point 1 leaves the government with a potentially very effective opportunity. If gas is taxed and this cash flow is used to subsidize el cars, than a low tax per usage of gas will imply a high subsidy for each el car user.

If the subsidies are sufficient to make the suggestion in **point 2** to come true, a positive circle of research will come through. This will give birth to a new market, which hopefully soon will be competitive with gasoline.

The Government's Role

The government should work as an auctioneer. It's objective is to get as many electrical cars on the road as possible. This could be done, for instance, by letting car producers setting how many cars they can sell, and to what price. Similarly, consumers will set up orders on electrical cars. Then, say once a month, the government fills the orders which maximize the

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number of cars sold by subsidizing the area between the producers' offer prices and the consumers' bids. I.e. the closest spreads will be filled, and as many orders will go through as possible within the subsidy budget.

Further Remarks

As a Norwegian I find it ridiculous that our government subsidizes research on an electric car, and all that is come up with is the mediocre Think City. It appeals only to environmental geeks, while the promising Tesla is carbon cool! The model above would not favor any specific car, but only alter the market negatively in the short run in order to bet on a future favorable market outcome.

I believe though, that this model would have been much more useful some decades ago (and if implemented we would drive on battery now.) Today, with the oil price well above \$100, the increased research comes by itself so no need to implement it.

More generally, I hypothesize that if we have two technologies; A and B, with these characteristics:

- A is preferred to B socially
- B is preferred to A individually
 - -> B has (almost) the entire market
 - -> All research is on improving B
- Tax on B, which subsidizes A such that $P_A \geq mc(q) + s > ac(q) + s$ (the price received by manufacturer on A is at least the production cost of the last unit, which is higher than the average cost, after subsidies taken into account) is the most desirable policy in order to redirect research into the socially preferable technology.