TRAPPED IN THE FORECAST: AN ECONOMIC FIELD OF DREAMS

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Having participated in much of the rail passenger forecasting during the creation of Amtrak, the analysis of nationwide high speed rail proposals, and the inception and development of the Northeast Corridor Project, I feel reasonably qualified to inject a note of caution into high speed rail (HSR) demand forecasting in the US. To paraphrase Winston Churchill, as for HSR demand forecasting, seldom in the field of economic endeavor has so much been projected for so many based on so little. As we look at future ridership and revenue forecasts (I won't address operating and capital cost estimates which raise a whole different set of problems), some ideas need to be kept in mind.

EUROPE AND JAPAN ARE NOT GOOD COMPARISONS. Nearly every HSR proponent asserts "they have HSR in Europe and Japan, so we should have it here." Another variant is the "we can't let them get ahead of us in a vital technology" argument. On one level, these are merely superficial, false analogies because Europe and Japan are quite different from the US: population is much denser, distances are shorter, gasoline prices are three times as high, the rate of automobile ownership is lower, and airline tickets are twice as expensive, to name a few. The outright comparison is just wrong. The technology argument misses the point: the Europeans are far behind the US in heavy duty rail freight technology, but they feel no need to adopt US freight technology. The needs are different, why should not the technology be different also? Finally, the argument assumes that rail passenger service is "successful" in Europe and Japan, a point which is open to question. There is little doubt that the TGV from Paris to Lyon is "profitable," and the same is probably true of the Shinkansen from Tokyo to Osaka. It is not so clear that any of the other HSR lines are actually earning a level of return which economists would usually demand. What <u>is</u> clear is that the European railroads overall need massive amounts of support each year and that their governments are increasingly restive about paying. Nor has the private sector done any purely HSR investing in any country. <u>Some</u> HSR may well be justified <u>somewhere</u>, potentially even the US, but not all has been productive everywhere.

CHANGE IS SLOW AND THE RATE IS UNPREDICTABLE. Whatever else demand models might say, they rarely address the vital issue of how, and how fast, we get from here to there. Even when confronted with desirable choices, people rarely change behavior rapidly -- because they have already bought their car, they don't want to change houses, they don't read the advertisements, etc. When the project consists of large (typically underestimated) investments up front, any delay in the benefits, even if they do eventually reach the predicted levels, is fatal to achieving the target rate of return.

SEX APPEAL IS SOMETIMES MAINLY IN THE EYE OF THE FORECASTER. Demand modeling often trips badly on the issue of "image." No matter what their actual attributes, services which are perceived as "modern" often enjoy demand beyond what experience would indicate -- and vice versa for services which are not seen as a la mode. In demand forecasting, there is a tendency to assume that the potential passenger will have the same favorable view of rail as does the forecaster or promoter ... and sometimes it doesn't work out that way.

REALITY HAS A WAY OF SUPERSEDING THE MODELS. Modelers, especially demand modelers, eventually come to believe that, if there is a difference between reality and their model, then reality (not the model) is off the mark. Several important examples of this phenomenon have cause real problems:

> **Nature, unfortunately, is non-linear, while models often aren't.** Since multi-variate, linear regressions are the predominant method we have of assembling data into model form, we tend to use them as "the best available." This is not too bad when we stay within the limits of the data available -- but HSR forecasts are almost definitionally outside the regression limits because we are looking at a service which has never existed before, at least in most of the US. The attached figure shows the typical result: extrapolation of regression coefficients far outside the actual experience is asking for trouble.

We sometimes focus on the wrong things. Demand forecasting in the Northeast Corridor spent a great deal of time and money analyzing potential responses to various modal factors, particularly comparative trip time, cost and frequency. Unfortunately, the factors which <u>really</u> determined the outcome were total population and income trends, and these did not receive anywhere near the same attention (and were over-optimistic).

Howard Hughes is dead. Models inherently make estimates of the price elasticity of demand. As with the directly modal issues, these may only be valid within the range of current experience. Northeast Corridor demand modeling suggested that at least <u>some</u> demand existed even at extremely high prices, leading to the well known "Howard Hughes" effect (raise the prices until only Howard Hughes is riding). Another variant of this issue is the "red train/blue train" problem, where any new mode attracts some new demand: red trains, travelling one mile per hour faster than the existing blue trains, will attract at least some new demand (mathematically, if not physically).

Beware of induced demand. Logically, if an entirely new option is available, there will be at least <u>some</u> demand which is entirely new ad would only exist with the new mode. While logical, common sense (unlike some models) suggests not much, if all else is held equal. Very clearly, models which predict significant levels of induced demand must bear the burden of proof.

SO WHAT? It is easy to look at a problem as complex as demand forecasting and say what not to do. Is there any formula for what we <u>should</u> do? Yes -- "KISS and don't make up." Keep It Simple, Stupid (KISS) is a principle which deserves to be engraved on all demand forecasts: when it can't be explained with a pencil and (preferably linear) graph paper, it deserves real caution. Make sure to focus on the important factors: if the important variables are GNP and population, then don't spend too much time modeling precise modal characteristics, and keep in mind that GNP and population forecasts have occasionally been wrong. Use a "giggle" test and compare the model forecasts with current experience: if annual rail ridership in a market today is 800,000 passengers, and if air service carries no more than 1 million, then an HSR forecast of 36 million deserves some skepticism. Maybe most important, until you hear US politicians advocate an additional $2 per gallon tax on gasoline (which would still leave gasoline cheaper in the US than in Europe and Japan), without spending the extra revenue on more and better highways, don't plan on getting people out of their autos, even if the model says we can.

WHY IS DEMAND FORECASTING SO HARD? It isn't; the problem is that we are using forecasts to answer the wrong question. We keep asking whether HSR can compete with highly available and relatively cheap automobile and air options. And we don't make autos and air pay for their pollution, noise and land use impacts. Any model which predicts high demand for rail under these circumstances <u>ought</u> to be suspicious. The real question is whether cheap gasoline, airport noise, and free landing slots at major airports ought to be public policy. We <u>could</u> model what would be the result for HSR if these policies change -- as a former Federal Railroad Administrator said (under a somewhat different context, to be sure) we ought to bite the Bullet before trying to build it.

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