The Incidence of Highway Benefits

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IMPACT OF HIGHWAYS ON NATIONAL PRODUCT AND EXPENDITURE ACCOUNTS

• THE ECONOMIC impact of highway improvements on the national product and expenditure accounts, that is, the nation's economic balance sheet, will be analyzed in terms of full employment. (The treatment for a condition of unemployment would necessarily be modified to the extent that highway expenditures put otherwise idle resources to work. In the circumstances deficit financing would tend to close a deflationary gap; on the other hand, pay-as-you-go financing might well reduce consumption in other areas resulting in unemployment that would affect employment generated by highway expenditure. Benefit-cost analysis in an unemployment situation may require substantial modification either by discounting costs or enhancing benefits, the full implications of which we cannot explore here. It is pertinent to note, however, that the choice between alternative projects may still appropriately be influenced by conventional benefit-cost comparisons when employment stimulating effects are equal.) The first effect of an expenditure for highway improvement is a transfer of resources from other activities to highways. To avoid inflation, there must be a reduction in expenditure for other consumption or investment purposes. Taxation is usually the most effective means of bringing about a non-inflationary shift of expenditures.

The economic justification of the taxation necessary to finance the highway improvement lies in the benefits which it provides. (A pay-as-you-go financing program at a time of great activity in highway building is likely to draw more from the economy than the highway improvements provide in the way of benefits during a given time period. In other words, highway expenditures will exceed highway benefits during the period, even though the latter exceeds highway costs spread appropriately in time.) Presumably, the highway improvement is intended to reduce the total costs of highway transport (or improve the quality which also can be stated, for simplcity but rather clumsily, as a reduction in cost). This saving in user cost may be regarded as the "private" benefit of the highway improvement. But unless it exceeds the public costs incurred in providing the highway there is no net gain for the economy. Moreover, there would be no net gain for users if the highway costs were assessed against them through user taxes; the benefit is offset by the taxes. If, however, some portion of the cost is assessed against general taxpayers, then users as such may experience a net gain. But this gain represents nothing more than a subsidy of highway users by the general taxpayers, which, of course, involves a redistribution of income, the incidence of which is dependent on the nature of the general taxes used. The fact remains that unless total highway transport costs (including the subsidy, if any) are reduced by the improvement there is no net gain to the economy.

Actually, of course, we expect highway improvements to provide benefits to users considerably in excess of their costs — that is to say, we anticipate a surplus. It is the disposition of this surplus that causes so much difficulty in understanding of highway economics. Suppose that it were public policy to recover the surplus, as well as the highway cost, from highway users. Motorists would enjoy no net gain but neither would they experience loss. The immediate economic effect of the highway improvement would simply be the reallocation of resources resulting from the shift from other economic activity to highway construction. But government would be left in possession of the surplus, and its disposition would effect a redistribution of income. For example, general taxes of one kind or another might be cut or additional public services might be provided.

The conventional approach to highway finance, in the United States at least, has been

to recover no more than the costs of highway improvement through taxation. (Certain selective taxes are collected from highway users which are not used for highway purposes and in a few states there is diversion to non-highway purposes of portions of taxes that are clearly of the use-tax variety. It seems that these practices were established as a matter of expediency and their justification, however flimsy, is to be found in general fiscal policy; certainly they were not reasoned out in terms of highway finance policy and established to recover surplus highway benefits.) We do not seek to capture for public use the full amount of benefits provided by highway use. Thus, the surplus of benefit over cost remains with the private sector of the economy.

The benefits of highway improvement, including that portion which offsets costs, as well as the surplus over costs are experienced in the first instance through use of the facility. We are led, therefore, to look to the impact of the improvement on the highway users.

A sizable portion of total highway transportation is used in the production of goods and services. Thus, it enters directly into the product accounts of the nation. A reduction in the costs of highway transportation means a reduction in the costs of production. In the interests of brevity and simplicity, we shall assume that competitive forces bring about a reduction in prices of goods and services, the production of which involved highway transportation. As a result, less disposable income is required for the purchase of a given volume of goods and services. The savings will be available for consumption of other goods and services (including more highway transportation) or for personal saving and subsequent investment. The additional production to satisfy the demand for more goods and services will have been made possible by the release of resources previously used for highway transportation (that is to say, by the excess of highway benefits over highway costs).

That part of highway transportation used for personal (non-business) affairs will also be benefited by the highway improvement. Some part of the benefit will be reflected in lower money costs of personal highway transportation. Examples would be lower vehicle operating costs or lower accident costs. Reduction in these money items will result in the release of disposable income which will then be available for the purchase of other goods and services (which again might include more highway transportation).

However, a considerable part of the estimated benefit of highway improvement will not release income nor provide for added production. For example, time savings or added comfort and convenience for commuters or shoppers or vacationers which are sometimes quantified for highway benefit analysis, will not enter into the nation's product and expenditure accounts. This is not to say that these intangibles do not have economic value; the economic justification lies in the better quality of highway service for which we may be perfectly willing to spend more. However, the point to note is that spending for a given volume of highway transportation service may actually increase even though the benefit-cost ratio for highway improvement is favorable. We should realize that we are using more resources for highway transportation rather than less which is the usual assumption of the "good roads don't cost – they pay" line of argument. With accelerating efforts to meet the urban commuting problem with highway transportation, this fact is likely to assume ever-increasing importance in highway policy decisions; for personal time-savings as well as riding comfort and convenience are the major elements of highway benefit for peak hour commuting.

Whether we are concerned with reduced costs or improved quality (or some of each) it is my thesis that the benefits of highway improvement can be realized only as they are generated by highway use. This is not to say that there are no sequential effects. As a matter of fact, we are dealing with the reverse of the economic problem that involves impact, shifting, incidence, and effects of various taxes. When government collects a particular tax, for example a gasoline tax, it is collected but once. Yet how often is it claimed that both the oil company and its customers pay the tax? Not infrequently the argument is carried further: It may be suggested on the one hand, that the tax is shifted backward to owners of oil-producing lands, or on the other, that it is shifted forward from the oil companies to the truckers and finally to the consumers of goods hauled by truck. Most economists would agree that any one of these things or perhaps a little of each, might happen in given circumstances. But I doubt that anyone would say that the tax burden is four times as much as the tax imposition simply because some part of the tax incidence may rest with the highway user, some with the oil company, some with the land owner, and some with the consumer of goods hauled by highway.

Yet, we are precisely in danger of doing this kind of multiple counting when we start to add up the benefits of highway improvement by looking alternately to the highway user, to the land owner, to the consumer, and so on until finally we come to the happy conclusion that everybody benefits from highway improvements. The danger is particularly acute because the highway benefit problem is so often attacked in parts. Thus, one group studies land values, another user costs, and a third freight rates. And, of course, each may find that highway improvements have resulted in benefits — in the one case to land owners, in the second to highway users, and in the third to consumers.

Therefore, I would emphasize again that the benefits of highway improvements can be realized only through highway use, which is simply another way of saying that highway users are the initial beneficiaries of reductions in costs or improvements in quality. In tax parlance, we would say that users bear the impact. But just as taxes may be shifted, so may benefits; and just as taxes have sequential effects, so do benefits.

In the case of highway improvements we may expect that one of the sequential effects will be an increase in highway usage. Certainly there will be some elasticity in the demand for personal highway service just as there is elasticity in demand for all economic goods and services. Moreover, with lower costs we may expect some transfer of commercial traffic to highways from other modes of transportation. All of this is simply to say that the new cost (and/or quality) conditions create a disequilibrium to which the economy will react until a new equilibrium is reached. The new equilibrium will involve a higher volume of highway usage, but not necessarily will the whole of the highway benefit be channeled into more highway usage. For example, in the case of personal transportation, the return to the consumer from each additional unit of highway service diminishes, and at some point the marginal return from an additional unit of highway services. The more inelastic the demand for highway service the less impact the benefit of highway improvement will have on use; and the greater will be the saving that may be channeled into other consumption or investment.

Now, if the costs of highway improvements are assessed directly against users only the surplus (that is, the excess of benefits over costs) will be available for dispersion through the economy in some manner. At the same time, the cost assessment against users will reduce the impact of the improvement on highway use, for the simple reason that the net benefit (cost reduction) is less. To state the matter the other way, if costs of highway improvements are defrayed by general taxation, or by deficit financing, neither of which impinges directly on highway use, the benefits to users will appear to be that much greater and there will be an additional stimulus to highway use. On the other hand, withdrawal of resources through general taxation (or deficit financing) will tend to reduce other consumption and investment. In essence, user financing of highway improvements tends to offset the stimulus for additional use while general taxation tends to enhance it. The question of public policy then, is whether there is sound reason for promotion of highway use through general subsidy which will probably involve income redistribution and, of course, can be provided only at the expense of production and consumption of other goods and services. Without going into detail, I believe there is a strong presumption in the negative.

It is a relatively simple matter to assess highway costs directly against users and permit the surplus (the excess of benefits over costs) to fall where it may. It is quite another matter to attempt to trace the benefits and lay taxes at their final resting places. The particular conditions surrounding each individual highway improvement will affect the shifting and incidence of benefits. The variables involved include such things as characteristics of the traffic using the facility, the nature of existing and potential land uses in the neighborhood, and availability, quality, and costs of alternative modes of transport.

Actually, if public policy decrees that only highway costs be recovered there is not

much point in looking beyond the highway user; by user taxation we initially reduce the amount of benefit that might be shifted or capitalized and thereby reach the ultimate beneficiary. For example, we might consider the alternative of taxing truckers or the consumers of goods hauled by truck. The result may well be the same. In the one case the trucker passes the cost on to the consumer; in the other, the truck rates are lower since no tax is included, but the consumer pays the tax. The practical difference is that the truckers can be identified, and they can undertake the problem of spreading the cost among users of their services; whereas it would be virtually impossible for government to identify in any meaningful way the consumers who enjoy highway benefits through consumption of goods hauled by truck, and to lay taxes on them in proportion to such benefits.

Consumers may enjoy net benefits even though they bear highway costs through direct or shifted taxes, simply by reason of the excess of benefits of highway improvement over highway costs. But this simply means that one of the main objectives of all economic activity has been achieved - increased productivity and consumption. In this context, a highway improvement may be treated as any other improvement in technology which reduces costs or improves quality of goods and services. Admittedly, there may be windfall gains as we move toward a new equilibrium, but the treatment of such windfalls is a matter of general policy involving social and economic considerations that extend far beyond questions of highway policy and practice. Decisions in this sphere appropriately should apply across the board, and, to the extent that they are effected through fiscal policy, general taxation for general puposes is appropriate. Capital gains taxation, for example, might recover some of the excess benefits of highway improvements that find their way into certain land values; but there are innumerable other causes of windfall gains all of which might be treated uniformly by capital gains taxation. Instead of attempting to trace the specific cause of each capital gain, we can look simply to the result for tax purposes.

IMPACT OF HIGHWAY IMPROVEMENTS ON LAND VALUES

The impact of highway improvements on land uses and values seems to cause most concern as well as confusion among many students of highway affairs.

One of the claims often advanced by highway protagonists is that highway improvements enhance land values. If this were true as a general propositon it might well be used as an argument against rather than for highway improvements. Actually, transportation improvements do not affect fertility or productivity values but only site or accessibility values which in themselves are functions of pre-existing transportation conditions. Thus, if highway improvements could be supplied ubiquitously the tendency would be toward reduction rather than increase in aggregate land values. For reduction in transport costs tends to reduce accessibility values of previously favored locations and to increase values of those previously less favored. Moreover, with reduction in transport costs the supply of usable land for particular purposes is increased. With "magic carpet" transportation, site or accessibility values would disappear entirely.

Although any hint of reduction in land values seems to spell economic tragedy in the minds of many, Belloc has pointed out as one of the "blunders of the science of economics" the idea that destruction of site values "is in some way an expenditure of real wealth." The fact is that such values are artificial, representing neither wealth nor production potential. However, those finding comfort in high and ever-increasing land values may be consoled by the fact that any tendency toward reduction in land values as a result of transport improvements may be offset (perhaps more than offset) by increases in the demand for land which may also result from the transport improvement. Thus, some part of the previously described addition to disposable income resulting from highway improvements may be used for purchase or rental of land in lieu of other goods and services. Beyond this, since magic carpet transportation is not possible, lower highway transportation costs along with added comfort and convenience may so affect consumer preference that additional income (more than is provided by the highway improvement) is devoted to acquisition or rental of land. For example, dwellers on small city lots may move to suburbia. Here of course, there is a shift in demand which would tend to reduce values of the city lots while increasing suburban values.

Not only is it impossible to have unchanneled, "magic carpet" transportation, but it is not even practical to improve transport channels ubiquitously. A highway improvoment, for example, must be made at a specific place and at a specific time. Immediately it disturbs a previously existing theoretical equilibrium. The improvement raises the comparative accessibility values of sites within its zone of influence. It exerts a gravitational pull which channels demand for land in that direction by drawing it away from other areas. A kind of chain reaction is set in motion; the highway improvement attracts a factory; the factory attracts employees who seek homesites; the resulting population growth attracts retail stores, service industries, etc. Competition for sites begins to increase land values and availability begins to decline until a new equilibrium is reached. Simultaneous and uniform improvements in two directions would have a less dramatic impact on land values because the supply of sites of equivalent accessibility values would be doubled. Similarly, a second improvement (b) closely following a first (a) would probably show a less dramatic increase in land values than the first. And, finally, if equilibrium had been reached after a first improvement (a), a second improvement (b) might show that land values increased in the vicinity of the second improvement while they remained stable or even declined in the vicinity of the first. Are we to say then that highways benefit (b) lands but do not benefit (a) lands? Here, the danger of excessive reliance on before-and-after studies becomes all too clear.

Unfortunately, neither highway-user taxation nor any practical kind of general taxation can cope effectively and equitably with the shifting of land values resulting from highway improvements channeled in time and space. Tolls on each highway improvement would be theoretically ideal, but of course, impractical. Even in this case land values could rise along the toll facility because no more than highway costs are recovered by the toll authority.

Highway-user taxation in practice is uniform in the taxing jurisdiction and applies to usage of all roads and streets and not simply to those being improved in a given period. Thus, a certain insult is added to injury when the users of unimproved road AC are taxed to meet a portion of the costs of improvement of road AB. Beyondthis, the attraction of lands along AB is greater than it would otherwise be, because AB users are not paying the full cost of the improvement. The justification of this method of finance must rest in the notion that we are financing highway systems and that ultimately the equities will balance out reasonably well. It is especially important to note that the dilemma is not solved by abandoning user charges in favor of some kind of general tax. A general property tax to defray the cost of the highway improvement, for example, would apply to AC lands as well as to AB lands with the result that the comparative benefit to AB would be enhanced as much by property taxation as by user taxation.

SOME IMPLICATIONS OF BENEFIT ANALYSIS

There is an obvious preoccupation with problems of highway finance in my treatment of the incidence of highway benefits. Even so, the analysis may contain some hints of economic impact that have pertinence for highway programming, location, and design. Thus, it has been asserted that highway improvements by reducing cost or improving quality, or both, will tend to increase volumes of highway use; but that the increase is likely to be less when highway use taxation defrays the highway cost than when it is met by general taxes (or deficit financing).

More importantly, it has been argued that the very fact that highway investment must be made at particular places and at particular times will have a profound effect on land use and land values. While we have questioned the relevance of this finding insofar as practical fiscal policy is concerned, we believe it has pertinence in highway planning and design.

The fact is generally highway improvements are provided in areas where development has already taken place or is about to take place. To an extent, then, the highway improvement is an effect of the economic development rather than a cause. But it is not to be overlooked that the highway improvement will accelerate the forces for development by exerting a gravitational pull and setting in motion something of a chain reaction. Unless this impact which will be manifested in increased highway travel is anticipated there is danger that the highway improvement will be underdesigned. This suggests the need for continuing research in traffic generating forces.

The fact that the highway can and does influence land uses and values also has grave implications for comprehensive regional and city planning. Here is one of the basic causes of conflicts that sometimes arise between the planner and the engineer. The former would like to plan land uses and build transportation facilities accordingly; the latter often builds highways in the absence of comprehensive general plans and, in so doing, materially influences the shape of the community. Unfortunately, in many cases there is no well settled policy as to whether the transportation system should be built and other plans modified accordingly, or whether a comprehensive general plan should control decisions on transportation facilities.

It has been observed that highway engineers generally will respect comprehensive plans that are reasonably definitive and have official sanction. It must be noted, however, that in an economy in which private economic decisions are relatively unfettered, the limits of land use control, even by comprehensive planning, are comparatively narrow. Thus the impact of putting a highway improvement in place in conformity with an over-all plan may be more profound than the planner had anticipated, with the result that the plan itself must be modified in light of the accomplished fact and its sequential effects.

Some of the recent experiences in California demonstrate rather clearly that there will be occasions of real and direct conflict between users interested in better highway service, on the one hand, and a particular community's objectives and values, on the other. These values, including, among other things, esthetics and amenities of living, may in some circumstances be adversely affected by highway improvements of greatest benefit to highway users (or to others when shifted).

California law requires that the state highway commission give consideration to expressions of community value brought before it by local agencies of governments in making its final determination on specific freeway locations. We have become convinced that these community values can be determined in the present state of the art only by the community itself and that they may best be expressed through an officially adopted comprehensive local plan which has been exposed to the debate of the political forum. Any substantial modification of such an expression of community values by state or federal interests should be made only when necessary to resolve conflict between two or more local plans or where there is clear violation of overriding state and national interests. The latter determination as well as the finding of intangible community values, involves value judgments that no amount of highway benefit chasing will resolve completely.

Discussion

Rothrock. - Zettel talked about windfall benefits of property.

Assuming that the entire cost of the highway is recovered by taxation upon the user and that it is true that there is some surplus which may fall upon property as a windfall to the owner, some economist has said that these windfalls should not be taxed to get funds with which to build additional facilities, but should be taxed or recovered for what he called the collective good.

I would like to have an opinion on that statement.

Zettel. -I think that theoretically there is a surplus of benefits over costs, which will be distributed throughout the economy in some manner. Some of it may go to consumers or because of the particuler circumstances it may well be capitalized in the values of land. I assume that when we have paid for the highway with highway user taxes only the surplus is shifted.

If we are to attack this windfall profit, we can do it through some sort of capital gains taxation, if we wish. It occurs to me there are many cases of windfalls through both the public and private activity and we need a general policy on this kind of gain.

If we put the tax on capital gains into the highways, then the windfall would simply

be that much greater. I suggested, why not tax the highway user in the first instance, so the windfall gain would be less than it would otherwise be.

It is not policy in the United States to recover through highway taxation more than the cost of the highway (using the term "costs" loosely). If we want to prevent windfalls, perhaps we could just tax the whole benefit away from the highway user. There would still be these shifts in values because of the fact that transportation has to be channeled, but the charges have to be uniform. If we could tie our financing down to a specific highway and the specific lands affected by that highway, as by a toll system, excess benefits might be recaptured and no windfalls would result.

Rothrock. — Is it possible, or is the theory tenable, that all benefits or increases — surpluses — which are created by the construction of the new highway system are not already measured in the decrease in costs of transportation of goods and people?

Zettel. — I think that the benefits accrue from the use of the highways and only in that manner. They are then distributed into the economy, depending on different circumstances with respect to different market conditions, different conditions of land use along particular highways, etc. But, of course, society in one manner or another is going to enjoy these benefits.

Rockrock. - I would call that a gradual growth of income due to the continual and increasing expansion of the transportation system, as a whole.

Zettel. — Initially, we have assumed an equilibrium situation and I have tried to leave out the growth factor in this analysis entirely. Theoretically even if there were no growth in the economy the surplus of benefits would be transmitted through the economy, given a stable economy. Of course, it is very highly complicated when you bring in new conditions, including the growth.

This is what makes suggestions about highway-caused land values seem a little unrealistic to the practical person because he sees population increasing and land values going up for that reason, rather than the reasons I was trying to express.

Levin. -I could follow your rationalization of the truck and goods concept where you tax the trucker and he passes it on. There you do not have any inequities.

When the Interstate System is completed, we will have perhaps 15,000 interchanges. These will be favored areas for land value increments, shopping centers, etc.

Assuming the scale and magnitude of present user taxes are what they are now, would you say that you would increase present user taxes in order to account for these changes and increments that are going to take place at 15,000 interchanges? How are you going to rationalize getting from the user to the persons that are getting the actual benefits?

Zettel. — Unless we change our entire concept of highway finance and attempt to recover all of the benefits I woud not do it. The user has enjoyed the benefits. He has paid enough in taxes to meet the cost. Assume that there is a surplus. This is what we are all hopefully doing — improving our transportation system by this highway program. This surplus, if we call it that, may get transmitted to consumers. It may in certain circumstances rest with the users, and it may in some circumstances cause shiftings in land values. I would not tax users — we accept the shiftings. At least, we accept the possibility of such shiftings. Therefore, I would simply ignore it. Certain property owners may have benefited; there is a windfall gain here. Certain other property owners — this is more diffused so it is not so dramatic — have been disadvantaged. We have not become sophisticated enough to tax the benefits from those whose properties have benefited in order to compensate those properties that have been disadvantaged. This would be an entirely different policy which would have little to do with highway finance. It would be simply a matter of taking care of inequities or what might be called compensable disbenefits.

Levin. — Increasingly, the highway funds are being called upon to pay for larger and ever larger areas of disbenefit, so to speak. Capital gains or windfalls of land value are at present captured through the capital gains tax and increased retail trade through the income-tax mechanism, both of which now find their way to the general funds of the state and Federal government. Would you condone a use of the portion of these funds for highways, on the theory that this is somewhat highway oriented, or highway actuated or stimulated?

Zettel. — Yes, but I would also condone the use of such taxes for general purposes. The gains are similar to many others that take place as the economy changes or technology improves. When the railroads locate in a certain place, they have a tendency to shift land values. These are dramatic changes, probably much more than highways will cause because of the greater ubiquity of highways.

I think Heer's study indicated that the railroads caused a much greater change than is likely to happen from highways.

But I think that is part of the way our economy operates. It so happens that the public agency is making the investment in highways which causes these changes; but when the gas or electric company puts a power line in a certain direction frequently there are increments in land value. If we want to attack them we can do so through the general tax structure.

I would like to cite the case of a huge shopping center near where I live. All of the properties around there are being improved. Some are being developed into gas stations, and other facilities. Property values have increased a great deal. Now, this was private investment which affected the values for at least a block around the shopping center.

Through capital gains taxation and income taxation, as well as direct property taxation, we recapture some of the gain for general tax purposes. But there are so many causes of capital gains that I think we need only to look at the effect and go after that rather than to try to trace back to the cause; in other words, tax the effect rather than the cause.

St. Clair. — What is the relevance to this situation of the age-old custom of benefit assessments, whereby the government actually does assess individual property or strips of property for the benefits caused by highway improvements or other types of improvement?

Zettel. — These assertions do not lead me to the conclusion that all highway costs have to be borne entirely by highway users in all circumstances. One of my qualifications is that there may be a genuine governmental overlay. For example, in order to get children to a school a highway might be improved which would not be provided in response to the demand of highway users; then perhaps the cost should be charged against the school budget as a matter of public policy.

The other qualification is that in the case of lightly traveled roads and streets the realities of the highway financing tax systems are such that on grounds of equity we can improve highway financing programs by assessing the charges against the property owners for land service roads. But I am not trying to track benefits. I am not saying that the benefits accrue to property owners rather than to users.

I still insist that it is as a user that I am enjoying the road. But as a practical matter of taxation, it is easier to get at me as a property owner than it is as a highway user.

If you could put a toll gate on this land-use road, I would be perfectly satisfied that that was the proper way to defray the cost because I am using the road. But without the toll gates you can get at me best by getting at me as a property owner.

Particularly is this true for new residential roads and streets. It seems appropriate to bring these roads and streets into the highway system with direct assessments. In other words you join the system bringing your road with you.

<u>Cherniack.</u> – I would like to add to the comment on one part of Mr. Zettel's paper. Let us assume an improvement in a highway produces a surplus and that the surplus is divided among the different beneficiaries, one of whom is a passenger car user. Now, the passenger car user chooses to utilize his benefit in this way:

He now lives 10 miles from his plant or CBD and he chooses to move out 20 miles because his rent will be cheaper. After moving, he is the same time away from his plant, maybe three-quarters of an hour, as before, but now living 20 miles away. Where before he had 20 miles a day to drive to and from work, he now has 40 miles, so he is contributing twice as many vehicle miles. That is the way he cooses to collect his benefit.

Of course, he has a number of companions who react in a similar manner. That is one of the reasons why we have traffic generation because we collect these vehicular miles. In the first instance, there is a 10-miradius and an area within that circle. Now there is a 20-mi radius and an area four times as great as that of the previous circle. That creates quite a problem. The new traffic begins to absorb the capacity of the new freeway.

In addition, the man that goes out to the suburbs now lives in a sparsely settled area and really needs a car, perhaps two cars. Even though he may not be able to afford them, he has two cars now.

Our studies show that the more sparsely settled the area the more cars there are per person or per family. The more cars there are, the more trips they will generate. So from both standpoints, the fact that there are longer trips and more cars, there are both more vehicle miles and more mass to demand vehicle miles.

There is now a chain reaction that perpetuates the need for highways. Where do we go from here?

Zettel. -I guess we continue to build more highways. This is precisely what is happening. I suggest again that I think the system of taxation has some connection with the extent of this kind of impact. That is to say, if you were to provide the highway without assessing any part of the cost against the user, this chain reaction could be even greater than it is. Perhaps the user would move 22 miles instead of 20 miles if he didn't have to pay additional taxes in order to pay for the cost of the highway improvement. Thus, the results would be a little different under alternative methods of financing. The method that would deal most directly with the problem would be to defray the highway cost with direct taxes on users so that their benefits would not be as great as they otherwise would be. The chain reaction would be less than if costs were met by deficit financing or through the income tax structure or something else which would not have a direct impact on highway usage.

<u>Cherniack.</u> – I omitted a third point which makes the reaction even greater. That is that a heavy truck, a tractor-trailer combination, puts a heavier impact on the structure of the highway than a delivery wagon, so we try to recover the cost by increments in some way. But when we are through we have a residual that falls upon the passenger car.

But passenger car journeys to and from work create sharp peaks on the highway and absorb the geometrical capacity of the highway — and the geometrical capacity is perhaps far more costly than the structure. In other words, you can add a few inches to the thickness of concrete at less cost than is required to add a lane to provide two lanes in each direction, to absorb these sharp peaks. What do we do about it and how do we stop this chain reaction again?

Zettel. - I don't know the answer, of course. I think I would have to agree that you have put your finger on perhaps one of the critical problems in the building of modern highway facilities, including the Interstate System, because as far as I can see "Interstate System" is something of a misnomer. What we are building in California and calling Interstate highways are routes for commuters. We could take all the interstate traffic into downtown Los Angeles on a two-lane highway but we are putting 8- and 10lane roads paralleling other freeways to serve the commuter.

On this peak hour problem, the sophisticated approach would be to find some way of pricing that peak hour movement. The prices should obviously be higher. It is a perennial problem that we have in all mass transit. The fare should be higher when you are standing and holding on to a strap than when the lady passenger travels downtown for shopping in comfort at an off-peak hour. If we had a way of assessing the added cost we should do so.

But getting away from user taxation seems to be only to aggravate the situation. The

problem is to get more sophistication into our user charge systems. Toll systems would help.

Lindman. — Several years ago I heard that the Public Works Administrator had said at a Bureau of Roads Session for Foreign Engineers, "You have been listening to all these engineers and their theoretical points and that sort of thing. Actually, we politicians make the major highway decisions in this country."

I think this points up that we have a bit of a conflict going on between the engineers and the politicians. The engineers are not exactly hopeless in this fight because they have some very powerful allies, but we still have the fact that we have major decisions made by the politicians. In fact, I had one economic colleague say that the decision to build a highway is a political decision, not an economic decision. Well, that annoyed me a bit, but the more I think of it, the more I believe he is right. I think that as I look at the Interstate System today I find the system to be entirely different from what we would have had if we had had a toll road system. That would have been an economic system.

But the Interstate System has many routes on it that I suspect can not be justified in terms of benefit-cost ratios. If they are to be justified, it is necessary to do an awful lot of stretching. If extra costs were added, such as Professor Grant suggested, I think there would be even more difficulty justifying some projects.

So my point is this, that fundamentally our highways are politically determined and I think we can only charge the users for that portion of the cost which the users cause and which benefits them. We have to expect that there is going to be a sizable residue of costs left over that are political, military and all that sort of thing.

Adkins. - I would suggest that the politician finds himself with pressures that have arisen from economic sources and that he is certainly a decision maker, but I believe that it is not as purely a political decision as your point would make it.

Winfrey. -I was pleased that the desirability of looking farther than the immediate foreground around a highway improvement has been mentioned.

Levin brought out that in considering the effect upon business and on land values it is desirable to go farther and take in a whole area. That is along the line that I suggested when I said that we need to look for offsetting types of consequences.

I think the engineer, or the engineer and economist in each field, is entirely too prone to look for benefits of a positive character. He does not search very far to find adverse conditions. It is as essential to look for those as it is to look for the close at hand benefits.

As an illustration I would like to refer back to private enterprise. A person in competitive business is not concerned about the good health of competitors. He brings out a new product or he brings out a new pricing system or changes his organization in order to make a profit within his concern. He is not concerned about others, and even beyond that he may not be concerned about the health of the nation particularly. He may even do things which are adverse to the national government, and the people as a whole, because it makes him individually a profit.

Now, as we follow this trend in transportation and building highways, I wonder if we are not getting to the point where we are willing to make highway decisions without regard to the consequences in other areas of government or in other areas of transportation. It seems to me, if we are going to do our job properly that we must look afield to see what the ultimate consequences are in all aspects and not look just solely to the highway field.

Theoretically, I have made an analysis of a proposed highway location some 20 miles in length and because of the particular circumstances involved I came up with a zero net change in motor vehicle operating cost. I also came up with a zero net change in the time values, time consumptions. But I do find that comfort, strain and convenience and the like give me the equivalent of 3 cents a mile or 2 cents a mile in benefit. I have also interviewed the people in the area and they say, we will gladly pay for it.

Therefore, as the Highway Administrator I elect to build that road on the basis that my economic study, if we can call it economic, indicates comfort and conveneince,

relief from mental strain, etc., are so highly beneficial that its construction is justified on that ground alone.

Now, then, what happens to the national economy when we build highways on that basis?

<u>Hennes.</u> — I think this question goes back to the basic assumption that I think everyone accepted, that we build roads to reduce the cost of transportation. I think that this axiom can be defended or attacked depending upon the way in which you want to set up the problem.

If we use the terms that people use in ordinary conversation it is not true that we build roads to reduce the cost of transportation. We build them in large part because people want to have roads, to drive on and to consume.

If we want to solve economic problems we have to find numbers to measure this desire for the people to use their wealth in that particular fashion; and so we go to Mr. Cherniack's cost of impedance, or we express this desire to avoid undesirable characteristics of travel by putting a dollar value on the avoidance of discomfort. So I think it is perfectly all right for me to spend my money on chocolate bars, or bourbon or highways if I choose to do so, rather than to produce goods which produce other goods.

<u>Winfrey.</u> — I didn't make my question clear. What happens to the economic system of the country if we build the highway on that basis? We have no net monetary benefit from it so we have to adjust the internal economy some way to get the money to pay for the highway. What readjustments do we go through in order to pay for the highway that we build on that basis?

Zettel. - I think that what you are suggesting (given an equilibrium situation at full employment) is that consumer preference has changed. They decide simply to buy a better road for which they are willing to pay. They are getting better quality. As standards of living rise we may insist on better highway quality. The circumstances are similar to what I tried to suggest with respect to time savings. We are measuring a lot of time saved that the people may be willing to pay for, but in order to pay to save that time they take part of their product, part of their income and buy more time and buy less of something else, or save less, if that is the case. Perhaps it comes out of savings which could reduce investment or it might come out of other consumption. One can't tell. Any kind of improvement in product which raises the price creates the same kind of reaction - for example, when people decide to move up from Fords to Cadillacs.

Winfrey. — I have no objection to building highways on that basis. I like comfort myself and am willing to pay for it. But I want to bring out the point that there is a shift internally in the economic system. It is hard to trace it to its ultimate consequences, but we each settle it in our own individual way. Nevertheless, there is an adjustment, and there are the ultimate consequences that are involved even though we can not trace them positively.

Grant. -I have a comment that I would like to make that relates to the major theme of this conference, which is decision-making on highway programming, location, and design. The point is that you have to be very careful about not counting the same thing twice.

It is easy, if you are minded to get some good benefits for your project and make it look good, to count the motorists' savings also in the land values increases. There is a classic case of this that has been quoted many times. It has to do with flood control in the Connecticut River Valley.

There was a big flood in the Connecticut River in the mid-1930's, the first such flood for some 60 years. Nobody was around who remembered that the Connecticut River could flood. And the effect of this flood was to depress greatly the value of land in the flood basin of the Connecticut River.

The Army Engineers conceived a project for relief of floods in the river valley and in figuring the benefits on this they figured the reduction of flood damages. Then they looked at the current land values and the land values before anybody thought there would be any floods. They said these will be restored and thus they were counting the same thing twice.

These were not imperfect measures of the favorable consequences of flood control. This was the same thing being counted twice. This is extremely easy to do when you look at non-user consequences.

Now, I don't disagree with anyone who has been talking about the importance of evaluating non-user consequences to the extent that this could be done. I want to say when you do this there are conceptual problems that have to be solved and it is easy to double count.

Levin. — The way we are now handling user benefits through the benefit-cost ratio, is that we ascertain as scientifically as we know exactly what the fuel savings are, the time savings, savings in accident costs, etc. In terms of this formulation, do you think that we are double counting when we seek to take account of land increments as they occur?

Grant. - I think the only answer is a sort of weasel word and it says you may be. It depends.

Levin. — How can we avoid theoretically this double counting business?

Grant. — I would like to pass this on to some of the professional economists like $\overline{Pendleton}$ and Zettel.

Adkins. — I would like to emphasize the seriousness of the approach. The non-user benefit studies have been conducted in isolated areas and perhaps the benefits may be entirely transferred and transitional. Perhaps user groups who have borne the major portion of the cost, if not all of it, in many of our systems will look to these measured benefits and say "you have been overcharging us." The non-user groups who seem to find a finger pointed at them will say, "yes, but these studies have been made in isolated places, on small segments of road, and benefits may be transitional." I think a very serious contention may arise, and probably has already arisen, on this very point.

Lang. — Perhaps this problem can become a little clearer if we are willing to accept Zettel's thesis from a standpoint strictly of land impact.

On the economy, the only measure of benefit is the savings in user cost. If you are not willing to accept that, then the rest of what I say will not make too much sense. But I accept it without any question. Suppose you accept that as covering the economic side, including land impact. Then realize that, in addition to being an instrument of economic policy, highway improvement is an instrument of social policy. It can be used to implement social changes which the body politic considers desirable. Expenditures above and beyond what will be justified on the basis of user cost savings, which is, strictly speaking, the only economic benefit, may be judged on the basis of whether or not the social change produced by the construction of highways is what we want and whether it gives us enough of what we want. Perhaps in this framework the whole problem will become a little clearer.

This is substantially what Winfrey was trying to get at in pointing out that in fact you have many highways which do not show any user benefits, yet they are considered desirable because they implement social change. They permit the development of a different land-use pattern which the community feels is desirable and is willing to pay for. The additional expenditure that is made strictly to implement the social change then should be judged as to whether or not this social change is one which you want and is adequate.

<u>Burch.</u> — That is substantially the line that I wanted to mention. It seems to me that the public wants highways not because they are economically justified or because they are self-paying. The people simply want them as a manifestation of their desire for a higher standard of living, even as they want a 4,000-lb automobile to drive a mile to get a spool of thread. There isn't anything economic about that. But they simply want to do it.

If in the process there is some waste, either in the use of the big car or in the

excessive expenditure for the highway of the type which you say is not paying, it has not concerned the people in general. For a great many years we have been riding an upward curve of standard of living, and no one has been concerned.

I think the people do not look at highways as an end product or as something which creates wealth, but as something which is desirable and often necessary as a tool for the creation of wealth, or for social values. Highways are a means to an end in the eyes of the body politic rather than an end within themselves.

<u>Pendleton.</u> – I am in complete agreement with Levin that we badly need an overhauling of our terminology on benefits. For instance, we practically always classify land value changes as non-user benefits. Now, I will go along with Zettel and say that they probably are a reflection of the surplus of user benefits above what the user has to pay for the use of the facility.

I would go further and say the main purpose in studying land values may well be to get a better measure of user benefits. In other words, as user gains, which are not charged for, become capitalized into land values I think we have here a key source of data for what nonmeasurable comfort and convenience are worth to the people who enjoy them. The thing is, you don't pay the highway department for them. You pay the land owner for them. If we could find out enough about these land values, I think we might go a long way toward solving this question of how much the more elusive benefits are worth.

The two sources of information which seem most plausible to me are the toll road experiences and land-value impact data, which, if they are collected and handled in the right way, should lead to very valuable insights into various other benefits.

I have one more comment for Mr. Adkins on this general question of handling landvalue data. I was called upon about eight months ago to review his land-value study of the Dallas Expressway. It occurred to me at that time that when you choose a control area with which you are going to compare the land-value increments along a new highway you run a very great risk. The closer the control area is in characteristics to the highway area the more likely the control area is to experience a negative effect on land values. Thus, when you make the comparison of highway area values with control area values you are really exaggerating considerably the road influence. What in effect happens is that the highway drains off some of the value which would have accrued to the control area in the absence of the highway.

This is just a methodological question. I have no answer to it but I think it ought to be recognized because it is another consideration which may lead to less spectacular discoveries of land value increases along new highways.

Adkins. — I think there is no doubt that some of the laboratory conditions we assume in economic impact research are not so good. But upon occasion we are forced to plunge into the problem rather than back and hedge. I appreciate your comment, and certainly it contains elements of truth.

McKain. -I believe that in the awarding of defense contracts the government tries to single out labor surplus areas, which is not an economic thing to do, strictly speaking.

In considering the net effect of a highway modification I think it is important to go back to the original objective. For example, a certain region may benefit and its land values may go up even though the land value in another area may go down. But if the objective of that program was to improve the economy of the area, it is a very important thing to evaluate the influence. The justification for some of these so-called narrow studies can be based on this ground. When we talk about the consequences to whomsoever they accrue, we should not have too broad a base when we talk about the whomsoever. We should think of the consequences that the original legislation or plan was intended to effect.

Hoch. — Mr. Cherniack points out that demand in the long run will probably be a lot more elastic than in the short run, demand for highway services in particular.

This undoubtedly will imply that benefit-cost ratios, which are developed for the short run essentially will change. Now, I am not sure in which direction they will change. One hunch is that with increased demand you will probably need more capacity. That is why highway engineers often understate future needs.

Rothrock. — Changes in land values either are a derivative of the change in costs of transportation, or they are transferred from a similar place. I think that is a double count.

If that is true -I think that double counting, counting these values that you are willing to pay for, or this money you are willing to pay for convenience, is all right, if you can quantify. But when you quantify some of these increased values of land, commercial, residential, increased business, some of those things can be shown to be double counting if you take full account of the differences in the cost of transportation as well.

Gardner. - Mr. Levin says, "In one or two instances an entirely new approach is being taken."

Inasmuch as we in Pennsylvania have such a study going on and we haven't reached the point of no return, I wonder if you could enlarge on that for me, the particular point you have in mind?

Levin. — The general reference was to some of the studies going on in Prof. Hennes' bailiwick where he has some economic geographers who are focusing on spatial interrelationships between economic and commercial activities and highways. Dr. Garrison, for example, has developed, quite appropriately, the concept that in a given cross-section of time there is an observed relationship between transportation facilities and the arrangement or organization of commercial enterprise.

Commercial enterprise will gather around existing facilities in a certain way and you can document this pattern. Then you do something to your transportation plant, resurface the road or do anything, divide the highway, and over a longer period of time this has some effect geographically and functionally on the regrouping.

There is some kind of regrouping of commercial enterprise, or of land uses generally, resulting from improvements and accessibility and other transportation characteristics.

Garrison is seeking ultimately to document a theoretical approach with some empirical data to develop some generalized relationships between transportation changes and the regrouping of commercial enterprises and other land uses.

I think it is a hopeful and refreshing approach to this problem.

Hennes. - I would like to refer to the discussion on double counting benefits.

This danger actually does exist, of course, if land values go up in response to reductions in vehicle operating cost; but of course I think we may also assume that many times land values go up not because of reduction in vehicle operating cost but because the road improvement makes driving more pleasant and convenient. That is, suburbanites may move to some particular suburb and buy a Cadillac. We may assume they didn't move in order to achieve reductions in vehicular operating cost, but in order to achieve additional ease in getting to work.

In such a case we don't have double counting unless we actually did place some money value on these amenities and included them with vehicular benefits. If benefit-cost ratios don't include these amenity values, then increases in land value that are the result of these amenity values do not represent any double counting.

The possibility of double counting is present not only in the transfer of user to nonuser benefits, but also in the independent appraisals of different proposed additions to a road system.

Seattle, for example, is a city which is bounded on one side by Puget Sound, and on the other side by Lake Washington. Three major public improvements in transportation had been advocated in recent years, each involving user and non-user benefits.

One proposal is for a bridge to cross Puget Sound. This was subjected to a study. The bridge would produce a new bedroom area for Seattle.

Another study dealt with the north-south freeway. This would introduce a bedroom area for Seattle to the north. It would produce a certain amount of traffic. The third proposal is an entrance to the city from the east, with another bridge across Lake Washington. This would introduce a new residential area.

Each porposal is considered separately. If all three were built simultaneously there would not be this much increase in the population of the city. Both the non-users'

benefits would have been exaggerated by this separate counting and also the actual traffic that is used to justify this project.

I want to read from an article from Garrison's (et al.) book, "Studies of Highway Development and Change" (Univ. of Washington Press, 1959).

"In discussions with both lay and technical groups, the author has often encountered the argument that attention to nonvehicular benefits is, at best, specious double counting of benefits. It is argued that nonvehicular benefits (observed, for example, as increases in property values) should not be brought into benefit calculations along with materials on travel time savings, lower cost of vehicular operation, and other items related to vehicles. It is observed that nonvehicular benefits are actually anticipated savings in time, vehicular operating cost, etc., and these savings are already counted when vehicular benefits are computed. This observation certainly contains elements of truth. It is the assertion from this that is faulty — that no attention should be given to nonvehicular benefits.

"The element of truth in the statement above is a result of faulty estimations. When properly estimated...counting of vehicular and nonvehicular benefits does not lead to double counting.

"It is true that improper counting of benefits of vehicular and nonvehicular types may lead to double counting, and thus an overstatement of highway benefits. It is false to say that counting benefits of non-vehicular and vehicular types necessarily leads to double counting.

"The difference between the two previous statements may well be that between an adequate and efficient highway system developed in terms of its total benefits to the economy, and an incorrect system developed in terms of a partial evaluation or an over-evaluation of benefits."

Rothrock. -I agree with him. He also agrees that there is some double counting.

Hennes. — Double counting is most apt to occur in analyzing individual improvements, rather than system improvement.

Rothrock. — Where a man has had the value of his land changed because it is converted from a swamp to good land because of construction of a highway, his benefit is the same as if the state had built a dam to accomplish the same purpose. That is a benefit presumably which is not double counted.

Now, as far as these other benefits are concerned, the things that you talked about - the comfort and convenience factor - a man pays a higher price for the land because its adjacence to the highway gives him comfort and convenience. He pays for that because of his use of the highway. And the traffic on the highway accounts for that if it is quantified.

Hennes. - Yes, if it is quantified, but it isn't, yet.

Rothrock. -I was inclined to think that the whole thing could be measured only in the benefits to transportation but I agree with the Garrison statement.

<u>Campbell.</u> — Mr. Newcomb began to explain a concept of his about the economic purpose of highways and their effect. I would like to hear him further on this concept.

<u>Newcomb.</u> – I come at this from an entirely different standpoint than most of the rest of you. I was in the Council of Economic Advisors where the problem was economic growth and what the highway does for the economic growth of the country.

Now, that is a little bit different from asking what it costs to build a road, and what the highway user gets out of it. I think, as a matter of fact, economic growth is just as important a concept.

A couple of years ago, I said in the Engineering News-Record that we needed to spend a lot more on highways than we were spending, from the standpoint of economic growth. I got back very strong letters from engineers asking if I didn't know that railroads were more efficient than highways for moving goods and that we should spend the money on them.

As an economist, I came to the conclusion that businessmen make decisions on the

basis of what is most profitable for them and they were using highways rather than rails because it was more efficient.

So I went to a steel company and asked why they had shifted their movement of steel from rails to highways. They said, "when we shipped by rail to Youngstown Stove, we had to stock up a full day's supply of steel on the cars that they gave us. Then the locomotive would come along some time in the evening and shuttle them off to a yard. Maybe they got on the right tracks that night and maybe they didn't. If they didn't, they stayed there all day and the next night another locomotive came along and hauled them over to Warren and then they got shuttled over to Youngstown Stove. That meant a lot of inventory, uncertainty and costs.

"Now, we just have one trailer back against the door and load three rolls of sheet. When we have loaded the three rolls, a tractor comes along and three hours later the delivery is made to Youngstown Stove. And if the tractor breaks down, we get another one in an hour or so."

This was an entirely different problem from the cost to move a ton over a mile of road. It was the total problem, the inventory accumulation, the handling, the accounting, the cost of the finished stove. The finished stove in Youngstown was cheaper because of the greater highway efficiency, so Youngstown could compete more effectively.

We looked at highways from the point of view of what they do to the economy. The economy grows because the productivity of man-hours goes up and it has been going up 3 percent a year. The increase in man productivity is cut a little bit in the production of man-hours per year, because of the reduction in hours of labor; but the net result of increases in productivity per man-hour, increases in labor supply, and decreases in number of man-hours per man is something like 4 percent a year.

This is what the highway is for. The highway should be a device for increasing the productivity of the belt lines.

But if men who meet in places like this can consider the highway not just as something that involves costs of 2 cents or 10 cents a ton-mile, but as something that affects the cost of the stove that comes out, I think our problems may be somewhat different from what they have appeared to be as we have discussed them.

For instance, the question was raised about the low density of traffic. It has been implied that the farm road is inefficient — that it doesn't earn its own way. Well, the bolls of cotton in the field are almost worthless; they do not have any value unless and until we get them to a gin that can put them into a bale and make them usable, and until we can move them from there to a mill that weaves them.

Counting the tons of cotton that go over this little road before they get to the main system may suggest that the road isn't earning its way at all. But it it were not for that little road, we wouldn't have any clothes on our backs. So somehow or other we should look at the road as a link in a chain which makes the total system work. Our pricing system isn't such that we price each link in such a fashion to make that link appear to pay for its own way. But if we look at this from the standpoint of economy, I think that even the farm road is essential to the growth and prosperity of the country as a whole. So our problem, it seems to me, is determining what a growing economy needs.

I would take exception very vigorously to Zettel's efforts to discuss the problem assuming a stable economy. Growth is the essence of our economy and has to be put into our formula before we talk of anything. We have to think in terms of growth.

If we think of how the highway enables the economy to grow, we can explain many things, that from the standpoint of stable equilibrium, and each cost matching each price, doesn't seem to make sense. So I would like to emphasize that this group is working in an essential part of a system which is growing vigorously. The highway should be studied as a part of a growing system, not as a piece of mechanism operating by itself.

Levin. - Let's forget taxes. Suppose you wanted to join with two alternatives, A and B, two cities. Let's say they cost the same thing from the standpoint of construction and maintenance and right-of-way maintenance and you computed user benefit-cost ratios and obtained equivalent ratios.

Let's say that one of these alternatives has a terrific industrial potential, it will open up a great industrial area. The other one is negative from this point of view. Do you think it legitimate to explore the industrial potential and that this should bear on which of these two routes you should settle on?

Zettel. - The answer is, yes, of course.

Levin. — In other words, you are not discounting entirely the use of non-vehicular benefits?

Zettel. — The last sections of my paper pointed out that we should consider the economic, and somebody pointed to the sociological. I used the terminology "community values," because we have some serious conflicts coming up in my state.

We actually, in certain circumstances, have conflict between what would be an economic analysis from the point of view of users, and what the community might like to be like, and the example you used would be a consideration when other things are equal. There may actually be a conflict. One of these may be better from the point of view of the users than the other. This is a judgment that has to be established by the community.

This is the one other thing I would insist on, that this sort of thing is a community judgment and not a Washington judgment, for example.