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I-73: Weighing the Costs

An examination of highway economic analysis and its application to the I-73 project

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1. ABSTRACT:

The proposed I-73 project, a new terrain interstate highway to be built through Southwestern Virginia, leaves local residents with a number of pressing questions. Residents are concerned about the way that such a large road could transform their region, and have a right to know about the potential impact of I-73 on the economy and quality of life of the Roanoke Valley and surrounding areas.

This report presents the information that is currently available on trends in highway economics across the nation. The steps that are used to calculate the economic potential of a highway project are outlined and examined in detail. This study of highway economics prompts the following question: Has enough economic analysis of the I-73 project been performed to ensure area leaders that it is a viable investment? The answer appears to be no. Due to a nationwide trend of plummeting highway profitablity, this report calls for a thorough benefit-cost analysis of the I-73 project before the region comes to any decision on the issue.

2. SOURCES:

The information on the highway economics of the past forty years came from three primary sources. The first was a review of infrastructure spending by the Congressional Budget Office (CBO), which sought to track the efficacy of various forms of infrastructure investment. The second source was an internal review of the Federal Highway Administration (FHWA) entitled "Contribution of Highway Capital to Output and Productivity Growth in the US Economy and Industries" performed by a New York University economist. Both of these studies were published in 1998. The third primary source was a review essay on infrastructure investment published in the Journal of Economic Literature by economist Edward Gramlich, who is now a member of the Federal Reserve Board.

Additional sources include a reanalysis of a benefit-cost study performed by Indiana Department of Transportation on a proposed highway project. Information on employment figures came from a 1999 report entitled "Highway Capital and Economic

Productivity" published by the Surface Transportation Policy Project. The Draft Environmental Impact Statement (DEIS) recently released by VDOT was briefly examined, along with other VDOT statements. Finally, the economic analysis of I-73 commissioned by the City of Roanoke and performed by the Economic Development Research Group, was a source of limited economic information available specifically on the I-73 project. This analysis, entitled "Economic Impact of I-73 Alignments on the city of Roanoke" will be herein referred to as the EIR. For further information on sources and citations, please see the footnotes and works cited page.

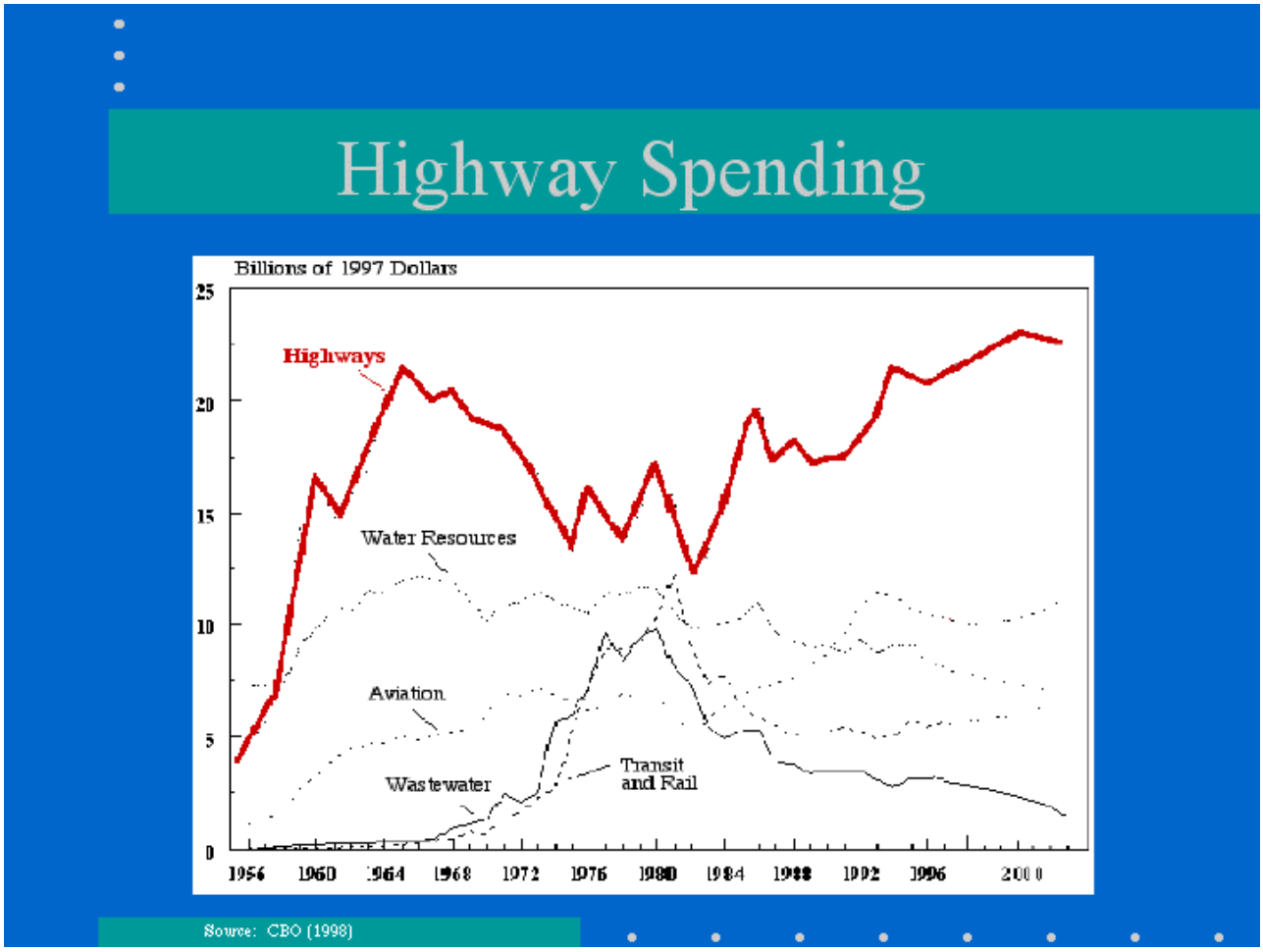
3. HIGHWAY INVESTMENT AND ECONOMIC POTENTIAL 1960-2000:

This nation spends a great deal of money on our interstate highways. A number of economists, government offices, and concerned citizens have begun to scrutinize whether this money is being well spent. Using various statistical tools, analysts can determine how highway profitability is changing and what types of highway investment will spark the greatest economic development in the present and future.

3.1 Highway Spending

As it was originally designed, the Interstate Highway System (IHS) was scheduled to be near completion thirty years ago. However, real highway spending is currently increasing. In Figure 3.1.1, it is clear that highway investment initially dropped after the 1965 peak. Normally one would expect this trend to continue until the spending flat-lined at a maintenance level. In the early 1980s, however, spending increased sharply, and this alarming trend has continued through the year 2000. Notice, also, that this trend is not echoed in the other sectors of infrastructure but is instead limited to highways alone.

Figure 3.1.1

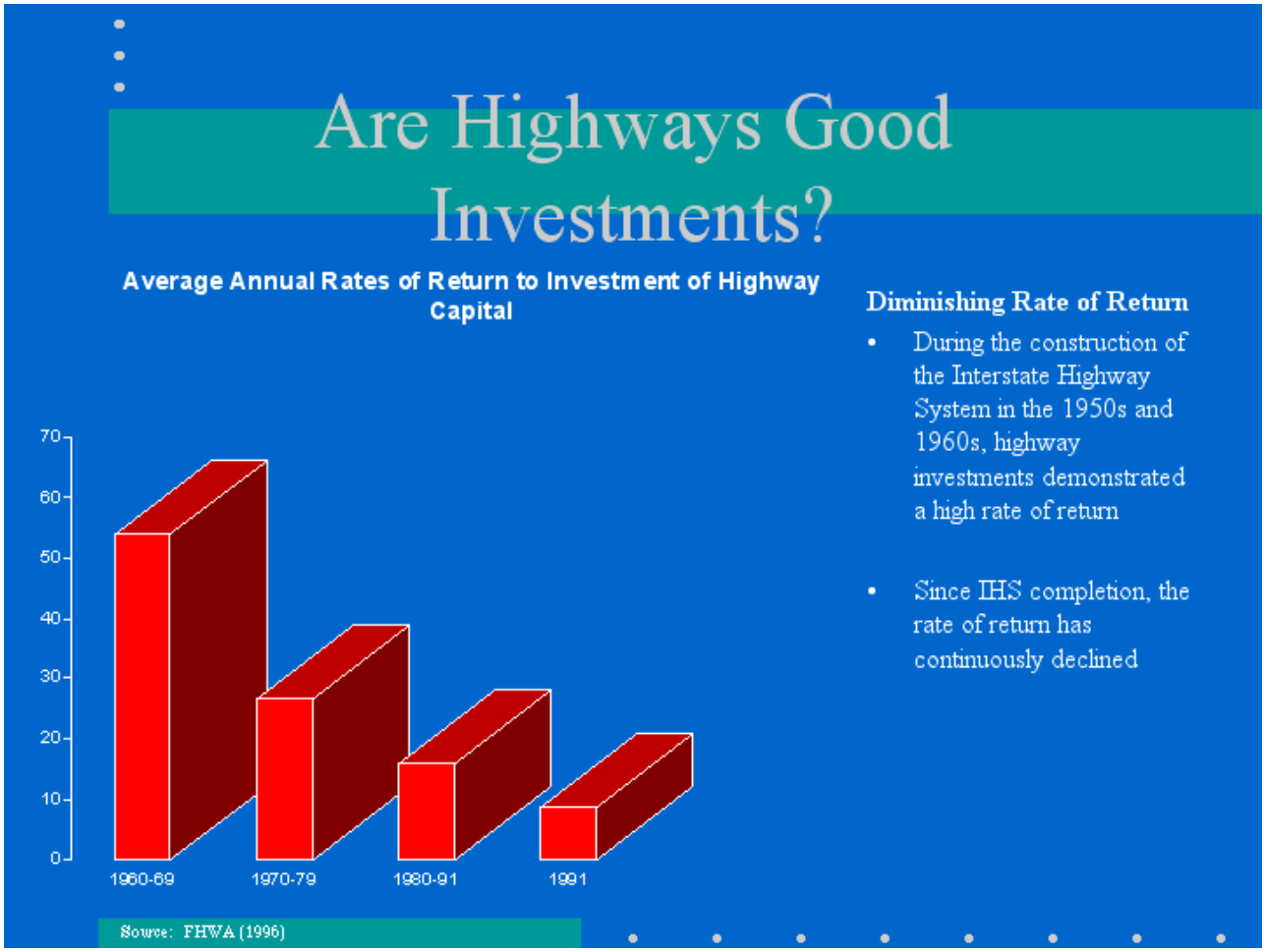


3.2 The Viability of Highway Investment

With the knowledge of the increasing resources that the nation devotes to highway spending, it is unsettling to discover that new highways no longer necessarily result in economic development in the regions where they are built. In fact, the amount of economic development brought by highways has decreased so sharply over the last thirty years that most investments in new highway construction cannot break even.

Figure 3.2.1 demonstrates this fact using an economic tool called an internal rate of return. A rate of return equates the present value of benefits with the present value of cost, including "opportunity cost" or gains which are forgone by not putting invested funds to their most attractive use. For example, if the rate of return for a particular project were 14%, then for every dollar invested in that project, $1.14 in benefits would result.

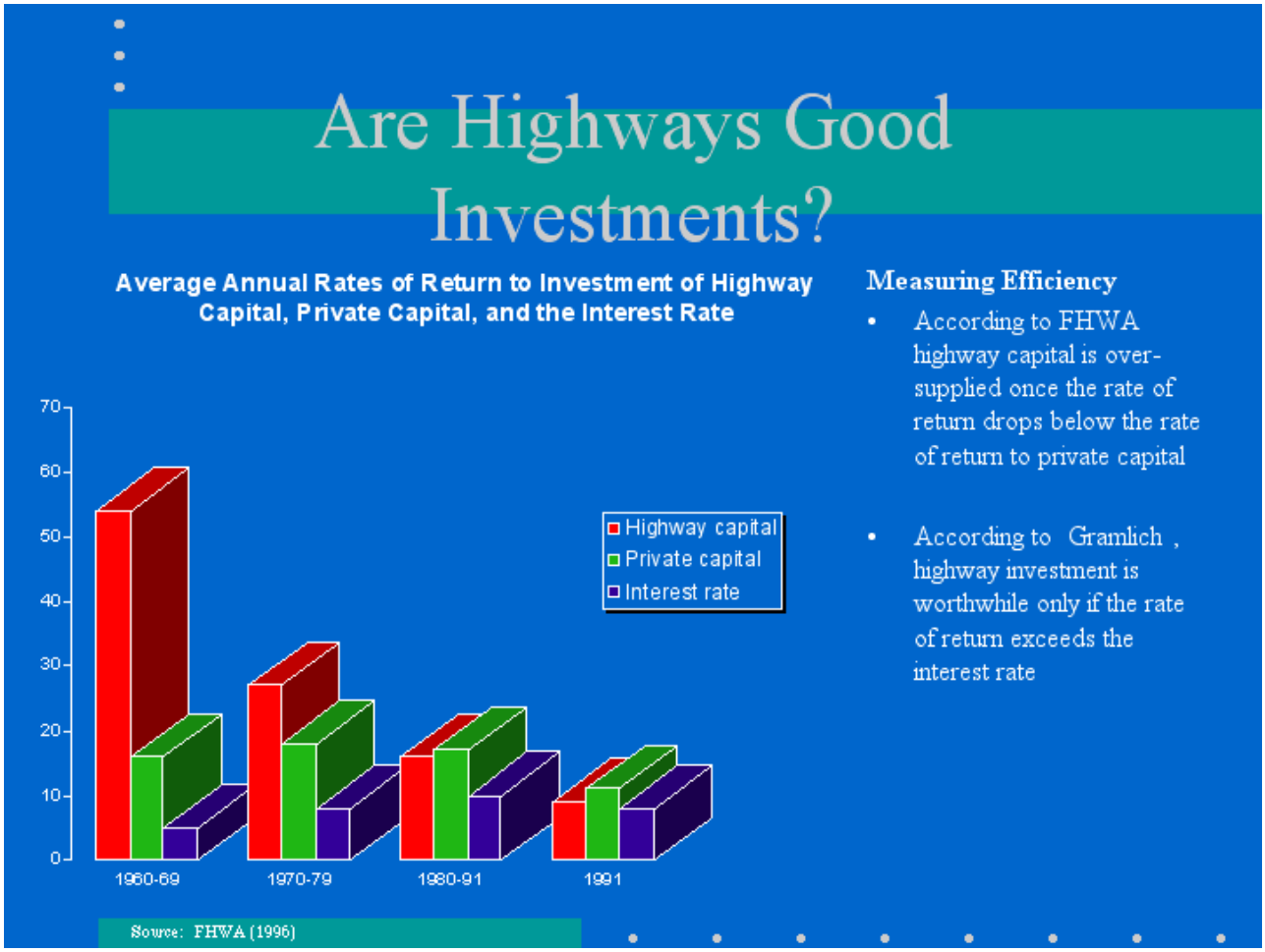
Figure 3. 2.1



It is clear from Figure 3.2.1 that highway investments demonstrated a high rate of return in the 1950s and 1960s, during the first decades of the IHS. Since the completion of the IHS, however, the rate of return has precipitously and continuously declined.

It is not only important to know that the rate has declined, but also to know if the rate of return is efficient. That is, is enough economic development resulting from highway construction to justify the investment at all? There are two ways to measure the efficiency of highway capital. The first, used by the FHWA, stipulates that highway capital is oversupplied once the rate of return to highway capital drops below the rate of return to private capital. A second method, advocated by Edward Gramlich, is that highway investment is worthwhile only as long as the rate of return to highway capital exceeds the long-term interest rate. Figure 3.2.2 compares the falling rate of return to highway capital from Figure 3.2.1 (the red series) with the rate of return to public capital (the blue series) and long-term interest rate (the green series).

Figure 3. 2.2



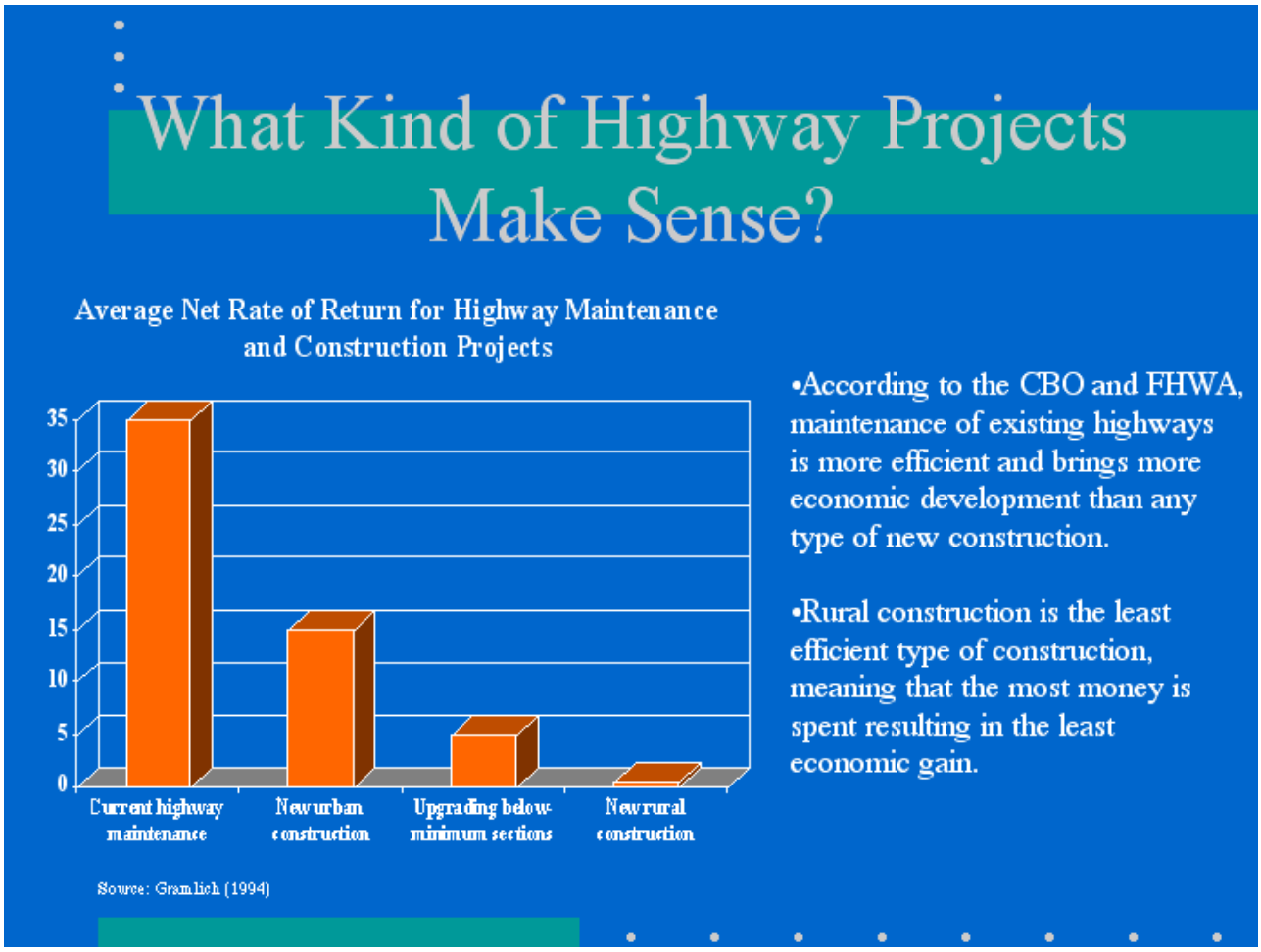
As is shown above, there is a comfortable margin between the rate of return to highway capital and to private capital through the 1960s and 1970s. In the 1980s, however, the rate of return to highway capital drops below the rate of return to private capital, indicating that highway capital is generally oversupplied according to the FHWA. This trend continues through 1991. Using Gramlich's method, there is again a significant margin between the rate of return to highway capital and the long-term interest rate even in the 1980s, indicating that on average, some economic development is resulting from highway construction. By the 1990s, however, the rate of return to highway capital and the long-term interest rate have converged, demonstrating that continued investment in highway infrastructure may no longer be worthwhile.

3.3 The Economic Potential of Highway Maintenance Versus Highway Construction

Relying on data from the CBO, it is clear that highway maintenance is more efficient that new highway construction. This means that dollar for dollar, investment in maintenance projects such as road resurfacing or widening contribute more to economic growth than new construction. This fact is clearly demonstrated by Figure 3.3.1, which

compares the 1994 rate of return of four types of highway projects: maintenance of existing roadways, new urban construction, upgrading of below minimum sections, and new rural construction.

Figure 3.3.1



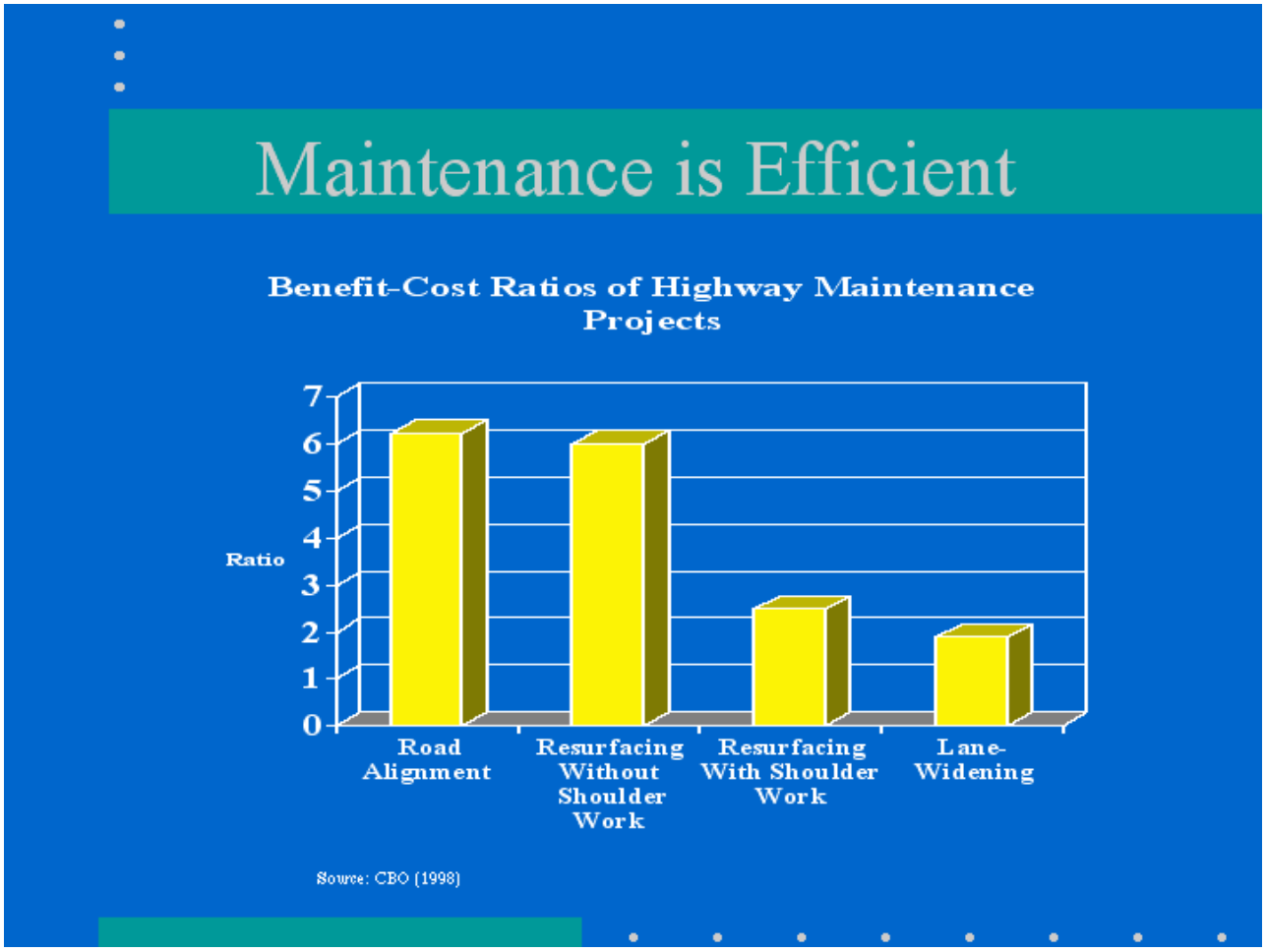
While maintenance of existing highway infrastructure nets a very high 35% rate of return, urban construction produces less that half that. Upgrading below minimum sections of highway is still lower, and lowest of all is new rural construction, whose rate of return is listed as negligible and could possibly be negative (Note that I-73 is a rural highway project, not an urban one, since the vast majority of its length runs through rural areas). According to both the CBO and the FHWA, maintenance of existing highways is more efficient and brings more economic development than any form of new construction. In addition, rural construction is the least efficient type of construction, meaning that the most money is spent resulting in the least economic gain, and possibly even economic loss.

Another analytic tool, the benefit-cost ratio, allows further examination of the efficiency of maintenance in Figure 3.3.2. A benefit-cost ratio is the present value of all

discounted current and future benefits of a project divided by the discounted sum of all its costs. A ratio of 1 means that the project will break even, and if the benefit-cost ratio for a given project is 2, then for every dollar invested in the project, $2.00 in benefits will result. This ratio frequently takes into account social costs and benefits. These are effects of a project that do not have obvious quantities, but can be quantified through the methodology of this type of analysis. For instance, increased air pollution would be a social cost, and increased land for parks would be a social benefit. Each would be quantified and included in a benefit-cost analysis.

Figure 3.3.2 gives the benefit-cost ratios of four types of maintenance: road alignment, resurfacing without shoulder work, resurfacing with shoulder work, and lane-widening. All of these maintenance projects exhibit acceptable, and some very advantageous, benefit-cost ratios.

Figure 3.3.2



A final economic comparison of highway maintenance and new highway construction indicates that maintenance can employ up to 40% more individuals than a highway construction project (Dittmar, 1999).

3.4 Summary

The information given above indicates that on average, new rural highway construction is inefficient, demonstrating little to no potential for economic development. A project of this type may even be built at a loss. It is efficient, however, to invest in maintenance of existing highway infrastructure, and this type of investment provides greater potential for economic benefit to an area.

4. IS THERE BENEFIT-COST DATA FOR THE I-73 PROJECT?

Given the overall inefficiency of new rural construction and the drop in economic benefit brought by highway investment nationwide, it is essential to examine whether I-73's potential to bring economic development is not also outweighed by its costs. Unfortunately, there is no up-to-date and thorough benefit-cost analysis or rate of return calculated for the various possible routes of I-73. In fact, much of the basic information necessary to do a benefit-cost calculation is not available. The following is an examination of the parameters for the benefit-cost analysis. Neither VDOT nor the EIR has designated monetary figures for the simplest benefits and costs, much less the complex social and indirect elements.

4.1 The Steps to a Benefit Cost Analysis

According to Dr. Neal Johnson of the School of Public and Environmental Affairs at Indiana University, there are four steps to calculating a benefit-cost ratio for a project. The first is to identify the benefits and costs: direct, indirect, social. The analyst must not be limited to those that are easily quantifiable. The second step is to assign, through economic equations, monetary values to each benefit and cost. The third step is to discount those benefits and costs that accrue over time, and then the analyst may calculate the benefit-cost ratio. Sections 2-4 identify the benefits and costs of the I-73 project and examine for which of these a monetary value has been calculated.

4.2 Identifying the Benefits and Costs

Benefits are broken into three categories. "User benefits" are the direct benefits to those individuals traveling on the new highway such as reduced travel time and improved safety. "Tourism benefits" are the benefits to an area through increased tourism brought by the highway, main. "Productivity gains" is the largest category of benefits, and include decreased cost of goods production and business attraction and expansion.

Costs are also of three types: project development, project maintenance, and environmental impact. Many of these costs are incurred before, during, and long after

construction, so estimating the cost effectiveness of a project over the long term is essential.

4.3 What monetary values are so far assigned to these benefits and costs?

Benefits

Under the category of user benefits, both VDOT's Draft Environmental Impact Statement (DEIS) and the EIR estimate what the reduced travel times might be from and to various points on the I-73 route, but neither estimate what savings that might bring to travelers. Improved safety is listed in the Purpose and Need statement of the DEIS and accident reduction is a theme throughout the report, however this benefit has not been quantified either. Furthermore, no estimates have been made in the changes in vehicle operating costs if I-73 is constructed.

In terms of tourism benefits, the EIR has estimated a possible annual $40-60 million in additional hotel and lodging revenues and $2-3 million in additional restaurant and hotel tax revenues. No estimates have been made of the travel cost savings as a result of the highway.

Under the final benefit category of productivity gains, the decreased cost of producing goods and services has not been estimated. Both VDOT and EIR have addressed the possibility of business attraction and expansion through job availability and have produced a range of different estimates for job increases from the hundreds into the thousands.

Costs

VDOT has allocated a total of $15 million dollars for past and future planning and design of the I-73 project. Construction itself is estimated to cost $1.12-1.37 billion. The cost of long-term maintenance of this highway was not given.

While the DEIS did address the environmental issues of air and water pollution, it did not estimate the costs of these impacts to the community. The effect of increased traffic congestion was also not measured in terms of additional cost.

Finally the EIR mentioned but did not quantify costs such as increased city investment in roads and public transit, and lost revenues from any possible decrease in downtown access. The DEIS did estimate that annual tax revenues lost from displaced business could be in the millions of dollars for some I-73 routes.

4.4 Incomplete Information

Out of the fifteen sample benefits and costs identified above, only four monetary figures were available for a benefit-cost ratio. Even those that are given may be outdated and are difficult to compare in some cases. A benefit-cost analysis of I-73 could not yet

be performed, because much of the supporting information and quantification is not available.

4.5 Conclusions

Because of the precipitous drop in the efficiency of highway investment and the risk associated with investment in highway construction over highway maintenance, it is essential to scrutinize the economic potential of any new rural highway project. It seems, however, that the economic information is not yet available to allow area citizens and leaders to make an informed decision about the costs and benefits of I-73 and its alternatives. While the DEIS was not required to make such an analysis, the regulations concerning the implementation of the National Environmental Policy Act of 1969 suggest that it be incorporated if it is relevant to the decision-making process. Many were hoping that the DEIS would contain a benefit-cost analysis, and now feel a lack of economic and comparative environmental information to allow them to choose the best option for the Roanoke area.

5. RECOMMENDATIONS:

This report recommends that several impartial benefit-costs analyses be completed for the routes and alternatives of the I-73 project which incorporate direct, indirect, and social costs and benefits in a quantitative manner. Furthermore, in light of the information contained in this report, the benefit-cost analyses must allow for comparison between the economic advantages of I-73 construction and maintenance of existing highway infrastructure.

Works Cited

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