

Financing Infrastructure in Rural America

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AN INTRODUCTION TO THE SYMPOSIUM INFRASTRUCTURE AND RURAL ECONOMIC DEVELOPMENT

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Does America's infrastructure receive a passing grade? The National Council on Public Works Improvement in a recent study¹ graded America's infrastructure. Their grade on an academic scale was a scant C - which is barely adequate to support current demands. Specific services such as highways were graded a C+, solid waste a C- and hazardous waste a D. The study concluded: "After two years of study, the National Council on Public Works Improvement has found convincing evidence that the quality of America's infrastructure is barely adequate to fulfill current requirements, and insufficient to meet the demands of future economic growth and development."

The problem in many rural areas and particularly in the South is compounded by the poor economic conditions and the inability of the local and state economy to support additional infrastructure investment. In addition to the poor economic conditions in many rural areas, the burden of financing infrastructure has shifted to local areas. Since 1977, local government outlays have continued to rise, while state and federal government outlays have fallen.² The result has been an increasing shift in responsibility away from the state and federal level toward the local level. Local governments now provide half of the money spent on public works. This is up from 38 percent 20 years ago.²

The deterioration of the rural infrastructure and the struggle to finance rural infrastructures are the reasons this issue is so critical. Without adequate infrastructure, rural areas may find it difficult to have economic development and growth. On the other hand, without economic development and growth, it may be difficult to finance infrastructures. The problems of inadequate infrastructures and financing infrastructures are severe enough that the Cooperative Extension Service and the Southern Rural Development Center have taken steps

to address the issue. The Cooperative Extension Service has identified it³ as a critical issue and directed its personnel to assist rural areas with the problem. The Southern Rural Development Center in 1988 created four task forces to address the most critical issues in the South. One task force was infrastructure issues. The task force organized a symposium at the Southern Agricultural Economics Association Meeting in Nashville in February 1989. One useful output of that symposium was an outstanding paper presented by Clemson University Alumni Professor Dr. James Hite. The task force felt the paper was extremely well done and should be printed and shared with professionals and practitioners.

Selected References

1. National Council on Public Works Development, *Fragile Foundations: A Report on America's Public Works*, Final Report to the President and Congress, February 1988.
2. National League of Cities, *Financing Infrastructure Innovations at the Local Level*, December 1987.
3. Cooperative Extension Service, *Revitalizing Rural America*, Developed by Revitalizing Rural America Priority Initiatives Task Force, 1987.

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FINANCING INFRASTRUCTURE IN RURAL AMERICA

James Hite

Introduction

Infrastructure, as the term is generally used by economists, refers to social capital. It can pertain either to the permanent physical installations and facilities supporting socioeconomic activities in a community, region, or nation, or to human capital in the form of intellectual concepts, theories, skills, and organization or institutional entities (see Fox). For purposes of our discussion here, we are concerned primarily with physical infrastructure — the roads, streets and bridges, airports and railroads associated with the transportation system, electric and natural gas utility systems, water supply systems, wastewater treatment and waste disposal facilities, hospitals, and related assets.

My charge in this paper is to consider problems in financing needed investments in such infrastructure in America's rural communities. In undertaking to meet that charge, I first will review some recent attempts to assess infrastructure needs in the United States. I will then explore some particular problems of financing infrastructure that are unique to rural communities. Finally, I will examine some general principles of public finance as they may pertain to the problems of infrastructure financing in rural communities to determine what can be deduced regarding appropriate public policies and programs to address rural infrastructure needs.

Assessing Infrastructure Needs

Interest in the state of America's infrastructure surfaced in the early 1980s with the publication of a book by Choate pointing with alarm to deterioration of the public works that undergird the entire socioeconomic system. Choate's book excited journalistic interest in the subject and articles appeared in *Newsweek* (August 2, 1982) and the *National Journal* (June 12, 1982) detailing both the nature of the problem and the lack of hard

information regarding needed investments in maintenance of existing infrastructure and expansion to serve growing populations. The University of Colorado at Denver contracted with the Joint Congressional Economic Committee to undertake a state-by-state assessment of infrastructure needs and resources, an effort that resulted in several detailed state reports (Hite, et al.; Lake; Ohi; University of Oregon) attempting to document situations existing in various parts of the United States. The Public Works Improvement Act of 1984 (P.L. 98-501) established a National Council on Public Works Improvement which issued a report to the President and the Congress in February 1989.

The methods employed in all these studies are open to serious question with regard to scientific credibility. Routine, on-going assessments of infrastructure needs take place in only a few states. Indeed, in many states and localities, there exists no reliable, up-to-date inventory of assets that constitute various types of physical infrastructure. Regular, methodical examination of the condition of infrastructure is often lacking. Without such examination, estimates of required expenditures to maintain existing infrastructure and expand facilities to meet growth needs are hardly more than educated guesses.

Objective evidence is available, however, to show that investments in new infrastructure assets in the United States have been declining in real terms since 1972. Similarly, there is objective evidence that expenditures on operations and maintenance have grown rapidly since the 1960s (National Council on Public Works, p. 7, hereafter cited as "Council"). The percentage of the GNP devoted to infrastructure creation, maintenance, and operation has declined for a quarter of a century, as has the percentage of combined federal, state, and local government expenditures devoted to infrastructure (Council, p. 8). Taken together, these pieces of objective evidence are not sufficient to conclude that the nation is underinvesting in infrastructure since it is possible that there was a surplus of infrastructure available

nationally in the 1960s. Yet the rapid increase in operations and maintenance expenditures considered in context with the decline in outlays for new facilities suggest that new infrastructure investment is not keeping pace with general growth, and that existing infrastructure is becoming worn out or obsolete, necessitating increasingly large outlays just to keep it in service.

There is also considerable anecdotal evidence of obsolescence in infrastructure that cannot be ignored. It is common knowledge that many of the nation's airports are congested both with regard to passengers and planes. The nation's interstate highway system is now, in many places, heavily congested. There are frequent news reports dealing with unsafe bridges and inadequate facilities for disposal of solid and hazardous wastes. A recent South Carolina study documents serious problems in that state's rural water supply infrastructure (Thurmond Institute). Hence, even in the absence of a comprehensive, systematic, scientifically-credible survey of the status of the nation's infrastructure, the preponderance of evidence seems to point to a serious and growing problem that threatens to limit economic opportunities in almost every American community, rural and urban.

Special Problems in Rural Communities

No contention is put forward here that the infrastructure problem is more severe in rural than urban America. Undoubtedly, the congestion that is associated with large urban centers gives rise to needs for immense investments in infrastructure. Yet the nature of the infrastructure problems in rural and urban communities is different, both with regard to type of infrastructure needs and the per-capita costs of meeting those needs. Moreover, rural communities often lack sufficient economic bases to support the large financial outlays required to meet infrastructure needs.

It is an interesting and (so far as I can determine) an open question in economic theory whether there are necessary reasons why per-capita income, generally, in rural areas must be lower than in urban areas over the long term. Within the context of a Thunen spatial model, however, it is clear that rural areas, by virtue of their remoteness from markets, face certain economic disadvantages that result in lower aggregate income. While fortunate circumstances regarding natural resource endowments may offset these disadvantages in some instances, it seems likely that most rural communities are destined to have fewer financial assets to invest in infrastructure than urban communities. At the extreme, certain remote communities situated geographically beyond the extensive margin of market activities may be forced into subsistence economies

wherein infrastructure can be developed and maintained only by wealth transfers from the urban areas or by a kind of taxation in kind (see Hite and Henry).

If rural communities may have less resources with which to construct, maintain, and operate infrastructure, that disadvantage is partially offset by having less need for certain types of infrastructure than congested urban communities. Sparsely populated areas, for example, may be served adequately by septic tanks and private water systems and not require the expensive sewer collection and treatment facilities or the water supply distribution systems that are public health necessities in more densely populated places. The density of streets and roads per square mile in rural areas need not approach that required in urban communities, nor is it necessary that these streets and roads be constructed to accommodate the heavy traffic flows common to urban places.

In counterpose, it should be noted that sparse population can increase the unit costs of both constructing and operating certain types of infrastructure. Rural highway costs per vehicle served may be higher than those for urban areas. Providing water supply services to rural residents generally requires larger investments per person served and per unit of water delivered because of: a) the necessity of laying and maintaining a relatively greater number of miles of line per household served than in densely settled areas, and b) there are substantial economies of scale in water harvesting, treatment and storage (See Carriker and Dillman). The objective evidence seems to be clear that the cost of providing many of the local government services associated with infrastructure are inversely related to the density of population (Meadows).

The bottom line is that even if rural economies are prosperous, the overhead costs of supporting needed infrastructure are likely to strain rural communities. If the terms of trade for rural products, be they agricultural commodities or other raw materials, are favorable, rural communities operating within the commercial economy may be able to summon adequate resources to meet infrastructure needs. But if the terms of trade turn against rural products, as seems to have been the case in the 1980s, the financial burden of meeting these infrastructure needs may be too great to be borne unless that burden is shared across the entire national or state economy.

Infrastructure Costs and Principles of Public Finance

There is a well-developed body of literature in public finance that goes back to Adam Smith's canons of taxation (and even to pre-Smithite economic thinkers). Two

principles drawn from that literature seem relevant to the question of financing rural infrastructure within the context of the discussion above regarding the peculiar financing problems arising out of the spatial aspects of rural economies: a) the ability-to-pay principle, and b) the benefit principle.

We need not attempt to settle here whether rural communities inherently have less ability to pay for necessary and appropriate infrastructure than urban communities. The evidence seems clear that in the situation now prevailing in the United States there is: a) a need to expand investment in infrastructure, both in rural and urban communities, and b) that for reasons which may or may not be transient, rural economies have not prospered in recent years with general prosperity across the entire American economy. In concrete and pragmatic terms, rural American communities are less able to pay for infrastructure now, and for the foreseeable future, than are all American communities taken together (despite the existence of some economically depressed urban communities). On the basis of the ability-to-pay principle, a case can be made for policies and programs that would transfer income to rural communities to underwrite needed infrastructure investments. That is, the country as a whole has greater relative ability to pay for infrastructure than does rural America.

The case is perhaps less unequivocal regarding application of the benefit principle. The benefit principle holds that the costs of providing public benefits ought to be apportioned among the various segments of society in reasonable (if approximate) proportion to the benefits received. But determining who benefits and how much they benefit from various types of infrastructure is not a simple matter in a complex economy with all its intersectoral and interregional relationships.

The difficulty of ascertaining benefits suggests that if the benefit principle is adopted as the basis for financing rural infrastructure, that infrastructure should be financed in large part by user charges. In some cases user charges can be applied rather straightforwardly in furtherance of the benefit principle. It is probable that the bulk of the benefits from a water supply system providing adequate safe water are realized by those who are customers of the system, and, hence, user charges are arguably appropriate application of the benefit principle in water supply infrastructure.

Yet only in some cases can user charges be passed on to those who received indirect benefits. Consider the case of using tolls to finance rural roads in an agricultural area. The structure of agricultural markets and the generally inelastic nature of the demand for agricultural products might result in increases in supply and reductions in commodity prices that benefited consumers but actually left some farmers worse off finan-

cially, not only to the extent of the tolls but also because of lower farm-level prices. User charges also can present some equity problems with regard to denying access to important infrastructure services to the poor because of inability to pay the user charges. A case in point is the effect of water user charges on access to potable water by poor families.

These two public finance principles—ability-to-pay and benefit—are not the only relevant principles worth considering. Selection between them requires some attention to practical considerations embodied in the canons of taxation proposed by Adam Smith. Among Smith's canons are three that seem especially worthy of comment here. These three canons hold that a tax (in this case, we can also consider a user charge) should be efficient, convenient, and adequate. That is, it must not be unreasonably costly to collect the tax or user charge when considered with regard to the amount of revenue obtained. A toll on an infrequently used rural road would almost certainly cost a great deal to collect relative to gross revenues realized, and hence, financing rural roads by user charges (at least, by tolls—motor fuel taxes are another matter touched upon below) might be rejected on efficiency grounds. The time, place, and manner of payment of the tax or user charge should be convenient, which again would represent a problem with user charges for many rural roads and bridges. The tax or user charge must also generate sufficient revenue to fund adequately the need. Doing so with user charges on rural water systems is apt to require, in some cases, charges that are so high as to be not just an inconvenience, but a genuine financial hardship on rural families. Our recent work in South Carolina indicates that rural water supply systems in the state can fully recover all fixed and variable costs only if charges are raised to levels that will cause monthly water bills in many communities to be in the \$60-100 per month range (Thurmond Institute).

Implications for Policies and Programs

So where does all this leave us with regard to policies and programs for financing infrastructure in rural communities?

Clearly, it leaves us with a great deal of room for argument amongst ourselves as economists and rural development specialists, and within the body politic generally. Just as there is no perfect tax, there appears to be no perfect way to finance the infrastructure needs of rural communities. Both practical considerations and fairness may suggest financing infrastructure with a hybrid scheme embodying some aspects of both the ability-to-pay and the benefit principles.

A strong argument can be made that in all cases

where a user fee can be utilized without doing too much violence to Smith's canons, it should be used. User fees have the great advantage of promoting efficiency in infrastructure investment. Had many rural communities been made to understand that they would be expected to generate sufficient revenues from user fees to finance their water supply systems, those systems would have been designed in different ways, or else not built at all. The opportunity to receive federal (and/or state) grants and subsidies for rural water systems has resulted in a great many inefficient systems being constructed that may now have to be abandoned or reorganized drastically as federal subsidies are withdrawn.

Yet it seems likely that user fees are not a practical way to finance some types of needed rural infrastructure. The case of secondary rural roads and streets serving mostly local traffic is perhaps an example of a type of infrastructure than cannot practically be financed with user fees. Moreover, the impact of user fees on the poor in denying access to vital services must be a matter of concern. So, too, must be the existence of certain externalities, as in the case of the indirect benefits from education made possible by improved school buildings and by school bus transportation, or from improved public health made possible by investments in water supply and waste disposal infrastructure.

It seems likely that some types of infrastructure must be financed from tax revenues, and perhaps that a portion of the costs of all types of infrastructure will need to be financed from this source. The question is whether we have the imagination to create financing schemes that meet the needs to move away from direct user charges while still retaining most of the advantages of user charges.

One example of such a financing scheme might be developed out of the idea for "water stamps" put forth by Holley Ulbrich and myself in a recent paper published in *Land Economics*. The water stamps idea grew out of our concern that direct subsidies to water supply systems were inefficient not only in the sense that they introduce inefficiencies into water systems design and operations, but also in that they subsidize affluent customers of those systems more than low-income customers because the amount of subsidy is proportional to the quantity of water used. We calculated that direct subsidies to low-income households in the form of water stamps that, like food stamps, could be used to pay for a base water allowance would save tax monies while still assuring that no one was deprived of water because of inability to pay. Our estimate of the total annual cost of the water stamp program in South Carolina is on the order of \$22 million.

Given that current daily water use in the state is on the order of seven billion gallons, a tax on water with-

drawals of less than one cent per thousand gallons would be sufficient to fund the water stamp program, if administrative costs were carefully controlled. Such a tax would amount to an increase of about six cents per month on the water bill of the average South Carolina family.

In a sense, this water user's tax would be analogous to the motor fuel tax, which is sometimes classified as a user fee (an argument can be made that the motor fuel tax is not precisely a user fee because it is not directly proportional to road use). Like the motor fuel tax, such a water user's tax would provide a cross-subsidy within the state economy but would introduce only minimum efficiency distortions. It might be possible with a focused imagination to devise similar cross-subsidy schemes that would combine the ability-to-pay and benefit principles in providing financial support for other types of rural infrastructure.

Summary and Conclusions

Although the objective evidence is perhaps less than is needed for a scientifically rigorous conclusion, the evidence strongly suggests that: a) there is an underinvestment in new infrastructure in the American economy as a whole; and b) rural communities face special problems in financing necessary and appropriate infrastructure from their own resources. These special problems apply both to maintenance and replacement of existing infrastructure and provision of new infrastructure.

The ability-to-pay principle would suggest that policies and programs transferring resources from urban to rural America for infrastructure financing are appropriate. Even if such transfers were politically feasible, however, they can introduce inefficiencies into the design of rural infrastructure. The benefit principle suggests that user charges should be used in so far as practical to finance infrastructure, and adoption of the benefit principle as the basic philosophical premise regarding infrastructure finance will serve the cause of efficiency. Yet user charges are not perfect in their ability to capture payments from all who benefit directly or indirectly from rural infrastructure. User charges can also deprive some rural residents of vital services because of lack of ability-to-pay.

All things taken into consideration, it seems advisable to hybridize the ability-to-pay and benefit principles in devising schemes to finance rural infrastructure. User charges, combined with cross-subsidies bridging income classes and urban-rural communities can possibly achieve most of the desirable features of the benefit principle while alleviating the more distressing effects of user fees on low-income families and communities.

As a matter of judgment, it appears the initiative for devising such hybrid schemes must be seized by the states. Federal preoccupations with budget deficits will probably preclude any major initiatives regarding rural infrastructures from coming out of Washington. On the other hand, many small rural communities cannot muster the resources to finance needed infrastructure on their own. The states, encompassing within their jurisdictions both urban and rural communities, have the potential to muster such financial resources, and it is in the arena of the state governments that the rural infrastructure problem will need to be addressed.

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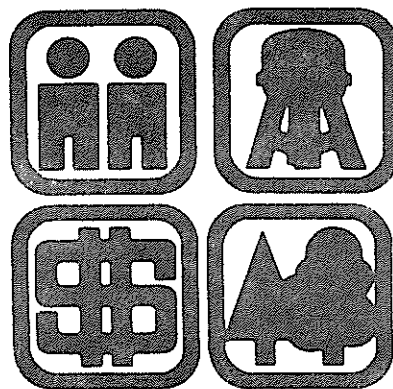
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