



Federal Spending on Rural Infrastructure: A Worthwhile Investment?

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Between 2002 and 2006 the federal government spent \$3.3 billion on rural water treatment and wastewater disposal infrastructure, mainly in relatively remote communities with populations less than 20,000. Authorized through Title VI of the 2002 Farm Bill – the "Rural Development title" – more than 93% of this money took the form of grants (the balance was distributed as loan subsidies). The 2002 Farm Bill also authorized large federal investment in rural telecommunications capacity; since 2004 over \$1 billion in loans (at subsidized rates) have been extended to telecommunications providers, primarily for broadband deployment.

In the run-up to passage of a 2007 Farm Bill considerable debate surrounds the costs and benefits of various elements of that legislation, including investments aimed at promoting rural development. This issue of the *NC State Economist* examines the extent to which federal infrastructure investments in small rural communities promote sustained positive changes in the magnitude and composition of local economic activity. The discussion focuses on the two types of federal infrastructure investments that have received the most discussion in the context of the upcoming Farm Bill – water treatment infrastructure and telecommunications infrastructure.

Water Treatment Infrastructure

The importance to different businesses of the availability and cost of water and sewer services is highly variable. Some types of industrial processes are more dependent on adequate supplies of water than others, and the lack of a local water system in a given rural community may well preclude location of firms that utilize those processes intensively. What

little research has been conducted on the economic impacts of rural water and sewer systems suggests that the net benefits tend to be much more modest in rural communities than in more densely populated urban communities. This is fundamentally due to the substantial economies of scale and density in plant construction and deployment of water and sewer lines.

Evidence linking the availability of water treatment infrastructure in rural communities to those communities' ability to attract new businesses is weak. While some research connects some firms' location decisions to the availability and quality of local water supplies, most analysts of firm location find that other factors – particularly the quality and size of the local labor force, the existing road network, and the nature of the local telecommunications infrastructure – are much more important. Moreover, the higher unit costs of water treatment in (smaller) rural systems generally translate to higher prices for water customers; this in turn tends to lower a community's attractiveness to new firms considering relocation.

For many rural communities, changes in residential development patterns may well be the most profound impact brought about by augmentation of local water treatment capacity. This is especially the case for rural communities located in reasonably close proximity to urban areas, where deployment of water infrastructure facilitates exurbanization trends currently observed at the urban-rural fringe. In terms of local economic development, local businesses – particularly those in construction, retail, and service sectors –

generally will be affected positively by increases in demands for their goods and services arising from population growth. On the other hand, residential development associated with exurbanization often leads to substantial fiscal pressures on local governments (and taxpayers) as they pay for the increased level of public services associated with residential development.

Unfunded Mandates

Stringent federal treatment standards for treating drinking water and wastewater effluent, coupled with an ever greater share of fiscal, regulatory, and enforcement responsibilities being shifted from the federal government to state and local governments, represent an important set of unfunded federal mandates facing local communities. Federal funds channeled to rural communities for drinking water and wastewater treatment would thus appear to represent a counter-balancing cushion to the costs of unfunded federal mandates. Just how large that cushion is would of course vary widely across communities, system types, and the extent to which federal requirements raise costs above what the community would have incurred absent those mandates.

However, there are several reasons why federal aid to water infrastructure investment might represent an undesirable use of public resources. First, there is evidence that greater local cost shares in construction of water treatment facilities leads to more economical choices – simpler treatment technologies, more careful oversight of project costs, and shorter construction periods. Second, when water treatment is funded locally, communities have considerably stronger incentives to promote water conservation in order to delay the installation of additional treatment capacity. Third, in many circumstances *fiscal substitution* effects will prevail: federal funds may simply displace resources that local governments would have spent to achieve some socially desirable outcome – like safe drinking water or suitably treated wastewater discharges – even in the absence of federal man-

dates. Finally, to the extent that the public goods created by federal investment in rural communities' water treatment capacity are consumed locally, one can reasonably question the fairness of those services being subsidized by other taxpayers. A number of studies indicate substantial local willingness to pay for water quality improvements. Hence, in addition to being more equitable, local financing of water treatment infrastructure will be feasible in many cases as well.

Benefits versus Costs

Two factors are important in determining whether and when federal investments in water treatment infrastructure are likely to pass a reasonable benefit/cost test. First, the ability of such investments to provide a strong "pump priming" stimulus to local economies is often limited. This means that assessing net benefits will depend heavily on environmental services and associated amenities provided by water treatment. But even if the net benefits of those environmental services outweigh the costs associated with their provision, it remains highly debatable whether federal underwriting of those investments is sound public policy. Evidence of fiscal substitution effects and local willingness to pay for improved water quality, coupled with the fact that the public goods generated by those investments are generally consumed locally, call into the question the advisability of federal funding for these investments on both efficiency and equity grounds.

Second, economies of scale in plant construction and economies of density in the installation of water lines mean that benefits are more likely to outweigh costs in areas in which the level and density of populations served are highest. For this reason, investments in water treatment infrastructure in rural communities located within the commutershed of expanding urban labor markets are likely to yield the highest net returns. On the other hand, the probability of costs outweighing benefits for any particular project will be greatest in the most remote and least populous communities – precisely the kinds of communities that Rural Development title programs are designed to serve.

Telecommunications Infrastructure

Properly implemented telecommunications capacity reduces the cost of physical distance to consumers and to businesses in the communities served. Hence, telecommunications investments in rural areas can yield substantial positive impacts on the productivity and profitability of existing firms, as well as on the location decisions of potential new firms. And rural consumers stand to benefit from the broader array of goods and services choices available to them in an electronic marketplace.

In striking contrast to the situation that existed at the end of the 20th Century, rural communities and rural dwellers are now connected to the internet to nearly the same degree as their urban counterparts. Where a rural-urban digital divide persists, however, is in access to high-speed data transmission through broadband connectivity. Despite some narrowing of this gap over the past few years, access to broadband continues to lag in rural areas – especially in sparsely populated rural areas and remote communities located far from urban centers.

The benefits of broadband over dial-up connectivity are well-chronicled. By reducing the effective cost of distance, the high-speed data transmission enabled by broadband has significant potential for easing key constraints on economic performance of businesses in rural places – small markets, high transport costs, and physical isolation. E-commerce, healthcare and education are areas in which broadband offers significant potential benefits to rural residents.

Ironically, precisely the same physical remoteness and low population densities that make broadband particularly desirable in rural areas also renders its deployment expensive. All broadband technologies require very large up-front financial outlays by service providers that must be spread across their customer base. For this reason, rural small businesses generally pay more for high-speed internet access than do their urban counterparts. Moreover, demand side constraints have proven to be important factors limiting

deployment of broadband in rural areas, as broadband carriers generally require a minimum number of customers before they will offer service in an area. This means that broadband deployment generally will *follow* economic development, rather than cause it to happen.

Benefits versus Costs

The rates of return on broadband deployment are inversely related to the density and remoteness of populations served. This limits the effective rate of return on telecommunications investments made under the auspices of the Rural Development title, because those investments are specifically targeted to more remote and less populated areas.

Broadband availability appears likely to expand more rapidly into rural communities located nearer to urban areas than into more remote locations. The lion's share of the narrowing of rural-urban gaps in access to high-speed data transmission that has taken place in recent years is accounted for by deployment of DSL and cable service in rural communities located near urban centers. Correspondingly, the costs of bringing broadband to particularly remote areas may greatly exceed the benefits that universal service would bring.

On the other hand, there is substantial historical precedent for federal investments in communications infrastructure that provide close to universal access to a dominant mode of communication in society (such as mail service or telephone service). Presumably, such investments reflected an assessment by policymakers that the social benefits created by deployment of those services were sufficiently large to outweigh the relatively steep costs of their providing those infrastructure services to remote consumers. The desirability of continued or expanded federal funding of programs promoting broadband deployment into remote rural areas depends on the extent to which a comparable assessment of these social benefits exists today.

Conclusion

Net payoffs to investments in both water treatment and telecommunications infrastructure are related the size and density of the population served. This represents a formidable barrier to those sorts of investments passing a reasonable cost/benefit test in the remote and less-populated areas targeted by federal programs under the Rural Development title of the Farm Bill. Importantly, available evidence suggests that neither type of investment appears to offer much in the way of a "pump priming" stimulus to local economic activity.

With respect to water treatment investments, it further appears difficult to justify federal involvement on grounds that such investments counter the unfunded mandates attributable to stringent federal treatment standards for both drinking water and wastewater effluent. In short, federal underwriting of those investments appears to be unsound public policy.

On the other hand, federal funding of broadband deployment into remote rural areas may be justified on the grounds that access to up-to-date telecommunications capability is an inherent "citizenship right" that should be afforded to all. However, this justification requires an assessment that the social benefits associated with universal (or at least, near-universal) provision of high-speed internet access to remotely located citizens outweighs its high costs.

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