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POLICY BRIEF

Infrastructure: How to Define It and Why the Definition Matters

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Soon after he took office, President Joe Biden proposed the American Jobs Plan, which would revamp America's infrastructure, with the ultimate goal of fostering economic growth. In its current form, the proposal includes spending on items such as childcare and workforce development, which are not widely considered to be infrastructure. The subsequent debate about what constitutes infrastructure demonstrates the need for a common definition of infrastructure when discussing government policy proposals and when thinking about how an economy grows and prospers.

In past government budget policy discussions, the term "infrastructure" has been used to describe spending that mostly pertains to transportation, particularly roads and highways. It has also been used to refer to spending on water projects, environmental improvements, energy, broadband, public lands, and public housing. Critics are correct in noting that some of the spending proposed as part of the American Job's Plan, such as spending for home care workers, should not be considered infrastructure. But the plan also includes some things that many people might not consider to be infrastructure that they should, such as communications networks and the electricity grid.

After discussing the role and importance of infrastructure, this policy brief explores alternative definitions of infrastructure, noting how they differ and what they share in common. Then it considers how using a nontraditional definition can lead to unnecessary expansion of the federal government's role. Following that, it summarizes some important principles about infrastructure policy, emphasizing the advantages of private ownership and of relying on user fees to fund infrastructure.

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WHY CARE ABOUT INFRASTRUCTURE

According to Efosa Ojomo, "well-maintained infrastructure is perhaps the most striking and observable difference between impoverished nations and prosperous ones."[1] Infrastructure and its quality affect where "people, activities and businesses are located," which affects "economic growth, land use and quality of life."[2]

In the economic development literature, several studies show that investment in infrastructure contributes to economic growth, though some studies show that public infrastructure investment crowds out investment in private capital.[3] Whether and how much infrastructure investment enhances economic growth may depend on who owns the infrastructure and on incentives that determine the timing, location, and kind of investment that occurs.

Rather than seeing infrastructure investment as a way to spur economic growth in a country or region, it may be more helpful to see infrastructure as an investment that enhances growth that is already occurring.[4] If an area is growing and has healthy institutions, infrastructure investment will tend to accompany economic growth. But it is not necessarily the case that investing in infrastructure will lead to more growth in an area that is otherwise stagnant.

DEFINING INFRASTRUCTURE

Infrastructure should be defined according to the role that it plays in the economy. Investopedia defines infrastructure as "the general term for basic physical systems of a business region, or nation." They emphasize that infrastructure systems "tend to be capital intensive and high cost investments, and are vital to a country's economic development and prosperity."[5]

Almost everyone would agree that transportation facilities and facilities to manage water and wastewater are infrastructure. Fewer agree on a broader definition than that. In a survey asking pension fund managers how they would define infrastructure, many respondents did not include housing or recreational facilities, and some did not include environmental-related facilities or public safety–related facilities.[6] Although some consider communications systems or networks and energy facilities to be infrastructure, many do not, perhaps because those are largely privately provided.

Survey responses are likely made on the basis of historical and cultural considerations, so projects that people view as public works are more likely to be considered infrastructure than facilities that are provided by private firms in the market.[7] Popular definitions that limit infrastructure to public works are too narrow. Facilities that some governments provide as public works are privately provided in other jurisdictions.

Larry Beeferman and Allan Wain provide a good, short definition that focuses on the role that infrastructure plays:

> Facilities, structure, equipment, or similar physical assets—and the enterprises that employ them—that are vitally important, if not absolutely essential, to people having the capabilities to thrive as individuals and participants in social, economic, political, civic or communal, household or familial, and other roles in ways critical to their own well-being and that of their society, and the material and other conditions which enable them to exercise those capabilities to the fullest.[8]

A longer definition from the same source adds details about what people must be able to do to thrive and participate in daily life. That definition includes traveling, communicating, transporting goods, running businesses, engaging in social activities, accessing potable water, nourishing food, shelter and healthcare, enjoying and being kept safe from the physical environment, accessing education and training, accessing means of protection from violence and theft, and accessing sources of energy.[9]

The aforementioned definition implicitly includes specific systems related to transportation and communications and facilities related to water, waste control, health, and energy. These systems give people access to necessities. The necessities themselves, such as food, water, social activity, and shelter, are not generally considered to be infrastructure.

INFRASTRUCTURE POLICY IN AMERICAN HISTORY

Congressional hearings about public infrastructure and the amount government spends to repair and replace it date back at least to the 1980s. A 1986 hearing about urban infrastructure and economic development in American cities mentions bridges, roads and streets, public libraries, public schools, colleges and universities, dams, courthouses, parks, municipal airports, ports, water systems, wastewater treatment, and jails as public works projects that constitute a major part of America's national wealth.[10]

The US government has been involved in funding and promoting transportation infrastructure from the beginning of the republic. The first federally funded infrastructure project was the Cape Henry Lighthouse, built in 1789 at Virginia Beach, Virginia.[11]

The American Recovery and Reinvestment Act of 2009 had a major infrastructure component. In 2015, Congress passed and President Barack Obama signed a $305 billion transportation infrastructure bill.[12] Since that time, other infrastructure bills have been proposed, but no major infrastructure legislation was passed during the Trump administration.

POLICY ISSUES CONCERNING INFRASTRUCTURE

How people define infrastructure has implications for government policy. The American Jobs Plan proposes to "Solidify the infrastructure of our care economy by creating jobs and raising wages and benefits for essential home care workers."[13] By promoting more tax funding of childcare and by calling childcare infrastructure, the administration is implicitly claiming that childcare is part of the government's responsibilities.

But many believe that childcare is properly the responsibility of parents, not the government. That is, parents may choose to purchase childcare services outside the home, and parents should bear the cost of that choice. For instance, economist Ryan Bourne argues that a combination of "family, civil society, and markets" is capable of providing "everything from parental or extended family care all the way to 'round the clock' day care."[14]

Although the government has subsidized childcare for low-income workers and home care for elderly individuals in the past, doing so was not portrayed as infrastructure spending. Those programs were acknowledged to be government transfer programs like food stamps or Medicaid. Maintaining the distinction between spending on transfer programs and spending on infrastructure makes it possible to better frame discussions about budget priorities.

A narrower definition of infrastructure is also more consistent with the committee structure of Congress. The House of Representatives has its Committee on Transportation and Infrastructure, which was previously the Committee on Transportation and Public Works before being renamed in 1995.[15] Recently, Representative Peter DeFazio, chair of that committee, proposed a $547 billion bill that focuses on some of the infrastructure components from the American Jobs Plan, and it would fund investment in highways, public transit, and passenger and freight rail.[16]

Ownership and Funding of Infrastructure

Because infrastructure industries have high fixed costs and low marginal costs and because market competition can lead to costly duplication of infrastructure, it makes sense for infrastructure to be provided by monopolies. Moreover, government ownership might result in lower costs than ownership by private monopolists. But private ownership has its own advantages. And government regulation of private firms, as is used in the electric utility industry, can still keep prices affordable.

Some people argue that infrastructure should be funded through taxes because it is a public good. Economists consider something a public good if it is costly to exclude those who do not pay for it from using it and if the cost of serving additional users, once the good is provided, is zero or close to zero. But with most kinds of infrastructure, the cost of excluding those who do not pay is quite low. In some cases where it may previously have been costly to exclude nonpaying users, such

as with roads and streets, technology has reduced this cost. And most kinds of infrastructure are subject to congestion, so accommodating additional users is costly.

Because infrastructure generally cannot be classified as a public good, it is possible and desirable to fund it with user fees. User fees are a better way to pay for infrastructure than taxes for three reasons:[17] (a) whereas taxes distort behavior—because people do less of whatever activity is taxed—user fees do not; (b) user fees "send correct signals to consumers about the true costs of the services";[18] and (c) user fees allow political decision makers, including voters, to better assess the performance of service managers, and the resulting "accountability allows for better and more targeted maintenance and many other benefits."[19]

How infrastructure is funded depends partly on who owns it. Government owns many kinds of infrastructure, particularly infrastructure for transportation, water and wastewater, public safety, conservation, and education (see table 1). Most infrastructure is owned by state and local governments, but a substantial share is privately owned (see figure 1). The federal government provides substantial subsidies to highways and public transportation, which are owned primarily by state governments.

Although much of the infrastructure that is government owned could be privately provided, there are a variety of reasons why governments fund a substantial portion of certain categories of infrastructure.

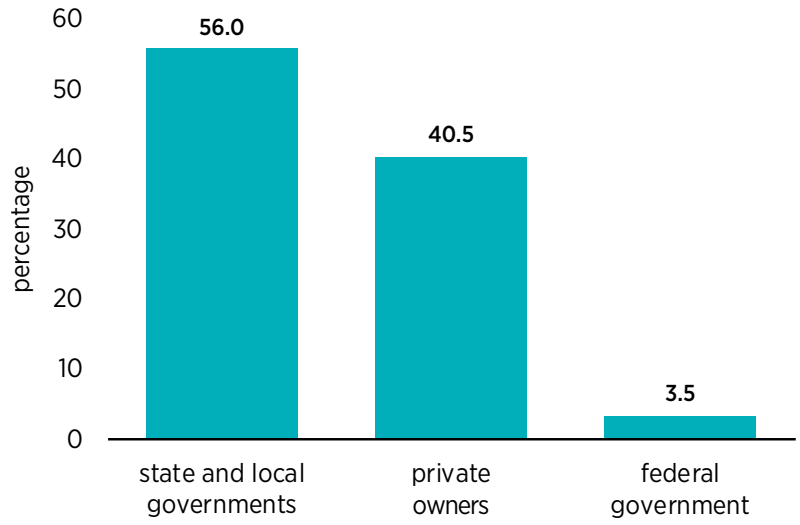
Government has traditionally provided roads and highways because limiting access to paying users has been costly and because the transactions costs of charging directly for use have historically been high. Public transportation could be privately owned and funded, but most transit systems

Table 1. Percentage of Infrastructure Owned by the Federal Government, State and Local Governments, and Private Individuals in 2017

TYPE OF INFRASTRUCTURE	FEDERAL	STATE AND LOCAL	PRIVATE
Water supply	0.0	90.8	9.2
Sewer and waste	0.0	93.4	6.6
Conservation and development	61.9	30.7	7.4
Power	0.6	11.9	87.5
Transportation	1.4	88.8	9.8
Health	3.7	13.4	82.8
Education	1.5	80.4	18.1
Public safety	24.2	67.7	8.0
Digital	0.0	0.0	100.0

Source: Jennifer Bennett et al., "Measuring Infrastructure in the Bureau of Economic Analysis National Economic Accounts" (BEA Working Paper Series No. WP2020-12, Bureau of Economic Analysis, Washington, DC, December 2020), 42, table 3.

Figure 1. Ownership of Infrastructure



Source: Bennett et al., "Measuring Infrastructure," 42, table 3.

would not be able to compete with private automobiles without large public subsidies. A common perception is that those systems provide external benefits as well as an essential service for many lower-income people.

Highways have traditionally been funded by fuel taxes, which work like user fees, because as people drive more they pay more. But as a growing share of the vehicle fleet becomes powered by electricity, fuel taxes become obsolete. One way to preserve the user fee dynamic in an electrified world is to electronically monitor miles driven and charge vehicle operators an amount proportional to the distance they travel. Like fuel taxes, mileage-based user fees could be collected by state governments, given that the per mile cost of highways varies from state to state.

One justification for federal infrastructure funding is externalities, those benefits or costs that accrue to third parties who are not involved in market transactions or local government decisions. Externalities are an important byproduct of some kinds of infrastructure, such as sewage treatment plants. In many communities, each home and business connected to a sewer pays a user fee to cover the cost of sewage treatment. The residents of each community collectively decide how much to treat local sewage in light of the benefits they expect to receive. Because sewage treatment provides external benefits to those who live downstream, the federal government also plays an important role by regulating and subsidizing sewage treatment facilities. Government can adjust for externalities by providing subsidies to supplement revenue from user fees.

Politicians are quick to claim that government spending on infrastructure investment will contribute to economic growth and development. In reality, whether infrastructure investment contributes to

economic growth depends on the location of the investment and whether households and businesses value the infrastructure at an amount greater than its costs. For example, investing in high-speed broadband in a rural area would not be a good investment if most residents' needs could be met with the slower connections they already have. Too often, infrastructure investment, especially when it has been funded by the federal government, does not generate enough benefits to cover its cost.

Much of the infrastructure that is provided by government could be privately funded. Research shows that private investment tends to generate higher returns than public investment.[20] This disparity may be explained by the fact that "large scale federal involvement" in infrastructure funding "means that the people who benefit are not the people who pay the costs."[21] As a result, decisions about which projects to fund reflect political considerations rather than maximization of net benefits.

CONCLUSION

Most kinds of infrastructure could be privately provided. But whether infrastructure is provided by the private sector, by government, or privately with government subsidies, incentives will influence how efficiently each kind of infrastructure is provided. User fees or private funding would likely lead to fewer instances where government spends on wasteful infrastructure projects that crowd out private investment.

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