

Economic Brief

February 2022, No. 22-04

Does Infrastructure Spending Boost the Economy?

By [Marios Karabarbounis](#)

Public infrastructure investment is not like other government stimulus. Public investment acts as a typical demand stimulus but also provides important services to the private sector to assist with production of goods. This article analyzes the effects of public investment — especially highway construction, which is traditionally one of the largest components of public investment — on output. Dynamic effects turn out to be very important: Most studies find substantial benefits for the economy not in the immediate aftermath of the investment spending but a few years ahead.

The new public infrastructure spending bill — the Infrastructure Investment and Jobs Act, signed into law Nov. 15 — has been advertised as a long-overdue, much-needed fiscal package aiming at improving national and local infrastructure and restoring the competitiveness of the U.S. economy. The bill focuses on spending in both core infrastructure (such as highways, ports and airports) and less traditional infrastructure (such as internet access and cybersecurity). Total spending in the bill amounts to around \$550 billion over the next five years, with transportation (\$110 billion), power infrastructure (\$73 billion) and broadband (\$65 billion) being the largest investment categories.

What does the economics literature suggest about the effects of such spending? Is the new spending going to stimulate the economy in the short run? Is it going to expand production capacity in the long run? Some view these types of government programs as wasteful spending that crowds out private consumption and investment activity, potentially adding to already heightened post-pandemic inflation. Others see this spending as effective for supporting the economy in times of economic distress and as an integral part of long-run economic growth.

Valerie Ramey's excellent survey on the macroeconomic consequences of public infrastructure in the book "[Economic Analysis and Infrastructure Investment](#)" summarizes the literature's basic findings about public infrastructure:

1. Public infrastructure has small stimulative effects on output in the short run but large effects in the long run.
2. The small short-run effects are due to delays in implementing the programs and the large substitutability of investment goods across time.
3. The long-run effects depend on the elasticity of output to public capital, which is generally found to be positive but small.

Definition of the Multiplier

When the government purchases goods or invests in new infrastructure, overall economic output changes. The change in output relative to the amount spent is called the "multiplier" of government spending. A multiplier of one, for example, means that an added dollar of government spending boosts economic output by one dollar. The long-standing question in macroeconomics is whether government purchases stimulate the economy even further (suggesting a multiplier above one) or crowd out private economic activity (suggesting a multiplier below one).

Economic Environment

The answer is not straightforward as there is no "one" number for the multiplier. The overall economic environment matters. For example, the effect of fiscal policies varies over the business cycle. Multipliers have been shown to be larger in recessions than in expansions, as noted in the 2012 paper "[Measuring the Output Responses to Fiscal Policy](#)" by Alan Auerbach and Yuriy Gorodnichenko. In addition, they depend on whether spending increases or decreases, as documented in the 2022 paper "[Understanding the Size of the Government Spending Multiplier: It's in the Sign](#)" by Regis Barnichon, Davide Debortoli and Christian Matthes.

Government spending multipliers have also been found to be larger when nominal interest rates are at very low levels (the so-called "zero lower bound"), as seen in the 2011 paper "[When Is the Government Spending Multiplier Large?](#)" by Lawrence Christiano, Martin Eichenbaum and Sergio Rebelo. The way the government finances the new spending also matters significantly. Deficit-financed multipliers are found to be larger than tax-financed multipliers.

Data Variation

The size of the multiplier also depends on the underlying data variation. Some recent literature measures the fiscal multiplier using subnational data. These studies do not provide direct evidence on aggregate effects, only relative effects (that is, how one state responds to an extra dollar of government spending relative to the average state). Nevertheless, estimates based on regional variation are useful to infer the aggregate multiplier and the way the stimulus interacts with the economy, as noted in the 2019 paper "[Geographic Cross-Sectional Fiscal Spending Multipliers: What Have We Learned?](#)" by

Gabriel Chodorow-Reich and my 2021 working paper "[Regional Consumption Responses and the Aggregate Fiscal Multiplier](#)," co-authored with Bill Dupor, Marianna Kudlyak and Saif Mehkari.

Consumption of Government Purchases

Last but not least, the size of the multiplier depends on the composition of government purchases. Government purchases can be divided into two categories:

- Consumption expenditures, which is spending to provide and produce goods and services for the public
- Investment expenditures, which is spending in fixed assets or capital used whose services last longer and benefit the public for many years

The new spending bill targets the purchases on the latter type of goods: roads, airports, internet, clean water, etc.

Measuring the Multiplier from Highway Spending

In their 2012 paper "[Roads to Prosperity or Bridges to Nowhere? Theory and Evidence on the Impact of Public Infrastructure Investment](#)," Sylvain Leduc and Daniel Wilson estimate the fiscal multiplier using evidence on state-level highway spending between 1993 and 2010. Contrary to what one might expect, they find that highway spending actually decreased GDP for up to five years from the start of the program (except for the first year). Nonetheless, highway spending increased GDP at longer horizons (around six to eight years), with multipliers estimated at three or higher.

These findings suggest that government investment may actually hurt economic activity at least in the short run. What can explain the negative short-run response of output to public infrastructure spending? One answer is that there are significant delays in government investment that can decrease the multiplier.

For example, the American Recovery and Reinvestment Act (2009-2013) specifically targeted shovel-ready projects to battle such delays in helping the U.S. recover from the Great Recession. However, spending peaked during 2010, or almost a year after the recession's end. Of course, that does not mean the stimulus wasn't helpful, as unemployment usually stays elevated even after the end of recessions and slowly declines back to normal.

In his 2020 paper "[Government Consumption and Investment: Does the Composition of Purchases Affect the Multiplier?](#)," Christoph Boehm proposes another reason for the small short-run response of output to public investment spending: The substitution across time between investment goods is much higher than the substitution across time between consumption goods.

For example, if the price of automobiles increases, most households will keep driving their current cars and delay buying new cars until prices return to normal. This is not true with consumption goods (such as groceries), as households have much less willingness or ability to adjust or delay their purchases.

As a result, government purchases can crowd out private activity more when targeted toward investment goods as opposed to consumption goods. Boehm estimates a government consumption multiplier of around 0.8 and a government investment multiplier near zero.

Public Infrastructure and Inflation

Inflation rises when there is too much demand for goods relative to supply. For instance, inflation rose sharply due to the pandemic, reaching levels comparable to the 1980s. In addition to supply constraints, generous government assistance during the pandemic (for example, checks given to many households) has been associated with the rise in prices. As a result, many argue that an additional large fiscal package risks adding fuel to an overheated economy.

Boehm's distinction between consumption and investment goods allows us to draw some conclusions about the expected response of inflation to government investment. When the demand for goods is very sensitive to price changes (as is the case with investment goods), the adjustment in prices to external stimulus is typically small. Intuitively, it takes only a small change in prices to convince consumers to delay their purchases so that the available output can be purchased by the government. Therefore, according to this theory, we should not expect the infrastructure bill to add significant inflationary pressures.

Productivity and Long-Run Investment Multipliers

In contrast to short-term negative effects, Leduc and Wilson find large and positive long-run multipliers. This result aligns with the view that public infrastructure can enhance the productive capacity of the private sector and increase long-term output. For example, a popular narrative surrounding the productivity boost in the 1950s and 1960s (and the subsequent slowdown in the following decades) is explained by the rise and decline in highway spending.

In his 1999 paper "Roads to Prosperity? Assessing the Link Between Public Capital and Productivity," John Fernald uses a clever strategy to interpret this correlation. Some industries are intensively using roads to transport goods and services, while others less so. If roads are productive, industries that use roads more intensively should benefit more.

Fernald's basic finding is that changes in road growth are associated with larger changes in productivity growth in industries that are more vehicle intensive. In addition, the slowdown in productivity in the 1970s appears larger in industries with large vehicle shares. Thus,

Fernald finds that public investment can explain a substantial share of the slowdown in productivity growth.

However, he is less optimistic regarding the future growth effects of highway spending. Building roads now may not offer as high of a return to investment as 60 years ago. Thus, it might be more appropriate to view highway spending as a one-time boost in productivity that has already occurred and is less likely to be repeated.

The Output Elasticity of Public Capital

Most of the evidence about the short-run and long-run effects of public infrastructure stimulus has been based on highway spending. There is also a vast literature estimating the overall effect of public capital (not just roads and highways) on the production function of private firms.

In their 2013 paper "[What Have We Learned From Three Decades of Research on the Productivity of Public Capital?](#)," Pedro Bom and Jenny Ligthart summarize three decades of research that measures the elasticity of output on public capital. The authors reviewed around 600 papers and report an average estimate of around 10 percent.

The range in estimates is very wide, though, which causes concern regarding the performance of macroeconomic models that include public investment. A relatively small change in the value of the elasticity can alter the model's predictions to a large extent, such as whether private investment is crowded out or crowded in.

Conclusion

The new public infrastructure spending law has raised questions about its ability to stimulate output and its effects on inflation. The large macroeconomic literature suggests public investment spending has the following effects.

For one, the short-run effects of public investment on output will likely be small. For another, the long-run effects of the spending bill will likely be larger, although generally there is large uncertainty about how much public capital can increase future productive capacity.

Finally, the effect on inflation might turn out to be small, since prices do not generally rise as fast when there is higher demand for very elastic investment goods.

Marios Karabarbounis is an economist in the Research Department at the Federal Reserve Bank of Richmond.

This article may be photocopied or reprinted in its entirety. Please credit the author, source, and the Federal Reserve Bank of Richmond and include the italicized statement below.

Views expressed in this article are those of the author and not necessarily those of the Federal Reserve Bank of Richmond or the Federal Reserve System.



Subscribe to Economic Brief

Receive an email notification when Economic Brief is posted online:

Contact Us

RC Balaban

(804) 697-8144