Key Points

- President Trump recently released his updated infrastructure plan along with the Fiscal Year 2019 Budget. The plan proposes to increase federal infrastructure investment by $200 billion to provide incentives for a total new investment of $1.5 trillion in infrastructure.
- However, based on previous experience reviewed herein, most of the grant programs contained in the infrastructure plan fail to provide strong incentives for states to invest additional money in public infrastructure. Indeed, an additional dollar of federal aid could lead state and local governments to increase infrastructure total spending by less than that dollar since state and local governments can often qualify for the new grant money within their existing infrastructure programs. We estimate that infrastructure investment across all levels of government, including partnerships with the private sector, would increase between $20 billion to $230 billion, *including* the $200 billion federal investment.
- We estimate that the plan will have little to no impact on GDP.

Summary

The White House's newest infrastructure plan proposes to increase federal spending by $200 billion to stimulate a total of $1.5 trillion in new spending across all levels governments and the private sector. However, based on past evidence, much of the new federal aid would lead to state and local governments increasing total infrastructure investment by less than the value of the aid itself. We estimate that total new infrastructure investment would increase between $20 billion to $230 billion, *including* the $200 billion federal investment. There will be little to no impact on the economy.

The White House FY 2019 Infrastructure Plan

Introduction

USAFacts reports that the value of America's investment in one type of infrastructure, transportation, has waned from an average annual growth rate of 2.4 percent in the 1990's to 1.9 percent over the 10 years ending in 2015. President Trump proposes to reverse this trend by increasing federal investment in infrastructure.

Penn Wharton Budget Model (PWBM) previously reported a static estimate of $200 billion in new infrastructure spending in the White House Fiscal Year 2018 Budget as well as dynamic estimate of three options for investment in infrastructure. Our previous dynamic analysis of possible infrastructure plans ignored potential offsetting cuts to other federal infrastructure spending contained in the President's FY 2018 budget, which we reported in our static analysis. In other words, our dynamic analysis treated the entire $200 billion in the FY 2018 budget as *additional* federal spending. Ignoring potential federal offsets is a conservative assumption that gave the FY 2018 infrastructure plan the greatest chance of producing economic growth.

This brief reports our dynamic analysis based on the White House infrastructure plan that was recently made public by the White House along with the Fiscal Year 2019 Budget. Relative to the FY 2018 infrastructure plan,

the FY 2019 plan contains more details about how the $200 billion in new federal aid will be spent to encourage additional investment by state and local governments as well as the private sector. Like our previous dynamic analysis, we conservatively ignore potential federal offsets, thereby assuming that the $200 billion in the FY 2019 represents additional federal spending. Nonetheless, we show that the more specific implementation details contained in the FY 2019 plan will likely lead to a total increase in infrastructure spending of less than $200 billion due to offsets that can now occur at the state and local level.

In particular, we review the economic literature that provides estimates of state and local government responses to federal aid. Those findings suggest that a substantial share of the types of federal aid contained within the White House infrastructure plan would cause state and local governments to increase total infrastructure spending---including the federal aid---by less than the federal aid award itself. The reason is that state and local governments can often qualify for federal grants within their existing infrastructure programs (sometimes called the "fungibility of spending"). As a result, a large part of federal grant money---even if targeted for infrastructure---simply produces a positive "income effect" for state and local budgets, allowing states and localities to spend more money on non-infrastructure programs. Based on estimates in the past literature, we develop a range of the FY 2019 plan's likely net effect on total infrastructure investments. We then report our estimates of the economic impact.

Overview of The White House Infrastructure Plan

President Trump's newly released infrastructure plan proposes that the federal government invest $200 billion over 10 years to provide incentives to generate a total new investment of $1.5 trillion in infrastructure by federal, state and local governments and the private sector. As shown in Table 1, federal spending will occur through a variety of programs. Three-fourths, or $150 billion dollars, of federal spending on infrastructure is explicitly designated for *matching grants* and *block grants*.

Matching grants are federal aid grants tied to a particular project or spending category. The value of the grant is proportional to the relevant state and local government spending. The White House infrastructure plan also has *caps* or limits on these matching grants. Once the state or local government spending hits the cap, the aid provided by the matching grant is exhausted. Block grants in the White House infrastructure plan are grants given to states. Block grant funding is not tied to specific infrastructure projects and is available for state and local governments to use at their discretion for qualifying projects.

The remaining $50 billion in the White House infrastructure plan will fund high risk transformative projects, expanded federal credit, private activity bonds and a federal capital revolving fund.

Table 1: Elements of the White House Infrastructure Plan

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Element	Description	Planned Federal Spending (in billions)	Federal Spending as a Portion of Total Infrastructure Project Cost
Incentive Grants	Designed to encourage state and local governments to invest in revenue-producing infrastructure projects. Includes a look-back period for revenue previously raised. Aid to any single state is capped at 10% of the total amount available.	$100	Up to 20% of new project revenue
Rural Formula Funds	States get $40 billion in block grants, remanining $10 billion similar to incentive grants designated for rural infrastructure.	$50	50% to 80%
Transformative Projects	Grants and technical assistance to develop projects that are likely to be commercially viable but are too risky for private sector investors.	$20	30% to 80%
Infrastructure Financing Programs	Expanded credit programs and loan availability for transportation, railroads, water, and other projects.	$20	N/A
	Allow the private sector to invest in public infrastructure via tax-exempt bonds, capped by state.		
Federal Capital Revolving Fund	A fund to help federal agencies purchase real property so that large irregular real property purchases do not compete with annual opperating needs.	$10	100%
Real Property Reforms	Expedites the sale of non-productive, federally-owned property.	N/A	N/A
Reduce Deferred Maintenance on Public Lands	A fund used to maintain federal lands and sustained by receipts from leases to develop energy and mineral resources on federal lands..	N/A	N/A
Streamline Permits	Accelerates project delivery.	N/A	N/A
Total		**$200**	

Source: Legislative Outline for Rebuilding Infrastructure in America

An explanation of each type of grant is helpful for interpreting Table 1.

Incentive Grants: These grants, totaling $100 billion, are matching grants with caps that provide aid to state and local governments. The federal government offers these grants to support new, more efficient infrastructure projects that are also supported by new revenue streams such as user fees. Each state is limited to $10 billion in incentive grants. Furthermore, the incentive grant for each project cannot exceed 20 percent of new non-federal revenue generated by the project. Existing projects are eligible to receive incentive grants based on the amount of non-federal revenue the state already raised, up to a total of $5 billion for all projects.

Rural Formula Funds: These grants, totaling $50 billion, are grants available to states for qualified rural infrastructure projects in categories such as transportation, broadband, water, and power. From this $50 billion fund, $40 billion are block grants given directly to state governors to spend on qualifying projects at their discretion. The remaining $10 billion are similar to the incentive grants, but designated for projects in rural areas.

Transformative Projects Program: This program offers $20 billion to be allocated to both technical assistance and grants. The purpose of this aid is to encourage infrastructure investments that deliver new services or that embody new, untested technologies and ideas. These projects are less likely to be developed independently by the private sector as well as state and local governments because of their inherent riskiness.

Infrastructure Financing Programs: These programs, totalling $20 billion, encompass a wide range of initiatives designed to lower the borrowing rate, reduce administrative costs, and increase loan availability for infrastructure projects. The programs are available to fund projects developed by the private sector as well as state and local governments.

Federal Capital Revolving Fund: This $10 billion fund will be made available for federal agencies to buy property. Instead of allocating money out of an annual operating budget to purchase property, a federal agency can avail itself of this funding. With equal, more digestible payments spread out over the subsequent 15 years, the agency can pay back the revolving fund out of its operating budget. This fund is designed for use by federal agencies, not state and local governments.

State and Local Government Responses to Federal Infrastructure Dollars

States have discretion over their own budgets. So, when the federal government awards aid to states for infrastructure, state and local governments can, if they want, shift their own spending and revenues to fit what they think are their most pressing needs. When the federal government provides an extra $1 to state and local governments for infrastructure spending, state and local governments have a number of choices on how to adjust their spending. *Including* the extra $1 in federal grant money, state and local governments can increase total infrastructure spending by:

- More than $1
- Exactly by $1
- Less than $1

Evidence for "More than $1"

Hines and Thaler (1996) survey estimates of state and local government responses to federal aid. They find only one study, Bowman (1974), in which total spending increases by more than the federal aid. Bowman

(1974)1, in which total spending increases by more than the federal aid. Bowman (1974) finds that each dollar from a federal matching grant for West Virginia schools increases total spending, including the $1 from the grant, by $1.06--an additional 6 cents above previously planned spending levels plus federal aid.

Knight (2002)2 and Bowman (1974) claim that the limited evidence in favor of more than $1 increase in state spending may be due to the limited availability of matching grants *without caps*. Matching grants without caps encourage states to allocate more of their spending to infrastructure because the grants lower the state and local governments' cost of investing in additional infrastructure across the entire range of the projects. DelRossi and Inman (1999)3 find that changes in the cost of infrastructure investment have a strong effect on legislators' demand for the size of infrastructure projects. By contrast, block grants do not appear to change the price of an additional dollar of infrastructure investment and so are more *infra-marginal* in their impact. Therefore, an additional dollar of aid in the form of a block grant is not going to increase total infrastructure spending by more than a dollar. Matching grants *with caps* behave similarly to block grants. If the state or local government exhausts its matching funds, the price the government pays for further infrastructure investment is the same as it is in the block grant.

Evidence for "Exactly by $1"

Alternately, one dollar of federal aid might lead to one more dollar in total infrastructure spending. Inman (1971)4finds that a dollar more of federal aid leads to about a dollar more in total spending. Similarly, Weicher (1972)5 finds that each dollar in additional state aid to municipalities increases spending from federal, state, and local sources of about 90 cents, just short of a dollar.

Evidence for "Less than $1"

The majority of the studies, however, find that total infrastructure spending from local, state, and federal sources increases by less than $1 for each additional $1 in federal aid. In this case, state and local governments may shift some or all of the resources that would have been spent to other priorities. Although total spending goes up by less than a dollar in all of these studies, the range of these estimates is wide.

Most of the studies suggest that for every dollar in federal aid, total spending goes up by an intermediate amount, often around 50 cents. Weicher (1972) looks at state government grants to school districts and finds that each dollar in aid is reflected in about a 40 cent increase in educational spending. Gramlich and Galper (1973)6 finds similar numbers for state governments and large urban governments---43 and 25 cents respectively. A dollar of state grant money to West Virginia schools increases total spending by 50 cents according to Bowman (1974); Missouri schools spend about 58 cents according to Olmsted et al. (1993).7 Feldstein (1975)8 finds that a dollar of state grant money to towns in Massachusetts increases total spending by about 60 cents, Case et al. (1993)9 finds that grants across 45 states yield about 65 cents in additional total spending for each dollar in aid. More recently, Singhal (2008)10 finds that for every dollar from the tobacco settlement---similar to a federal block grant---about 20 cents is spent on anti-tobacco programs.

A final set of studies finds that total spending goes up very little or not at all in response to federal aid. Knight (2002) uses a statistical methodology to show that, once legislative preferences are accommodated, total spending may not change at all in response to a change in federal aid. Carlino and Inman (2016)11 find that only 13 cents of that dollar of federal aid sticks to infrastructure spending, leading to 87 cents being shifted to other state spending, debt reduction, lower taxes, or higher state reserve funds.

Applying the Empirical Literature to the FY 2019 White House Infrastructure Plan

We now map the evidence for state and local spending reviewed in the previous section to the individual components of the White House FY 2019 infrastructure plan outlined in Table 1 above. Because the previous literature indicates a potential range of state and local spending estimates, we consider three spending scenarios---Low, Medium and High---that are ordered by increasing amounts state and local spending in Table 2.

Table 2: Three Options for State and Local Government and Private Sector Response to Federal Aid for Infrastructure

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		Net Change to Infrastructure Spending by Federal, State and Local Governments Under the White House Infrastructure Plan, (billions of dollars)		
Federal Spending Program	**White House Plan (billions of dollars)**	**Low**	**Medium**	**High**
Incentive Grants	100	0	50	100
Rural Formula Funds	50	0	25	50
Transformative Projects	20	0	20	40
Infrastructure Financing Programs	20	10	20	30
Federal Capital Revolving Fund	10	10	10	10
Federal Spending	**200**	**200**	**200**	**200**
Net Total Spending	**1,500**	**20**	**125**	**230**

Note: Under each of the above options the federal government spends $200 billion.

When the five programs are added together, Table 2 shows that we estimate that total infrastructure spending will increase by $20 billion in the Low spending scenario, $125 billion for the Medium scenario, and $230 for the High scenario. Of course, some of the FY 2019 infrastructure plan components will produce relatively more "bang for the buck" within each of the three spending scenarios, which we now discuss:

Incentive Grants: The incentive grants in the FY 2019 infrastructure plan do not provide strong incentives for state and local governments to invest additional money in infrastructure. These grants are mostly matching grants with caps, which will not change the cost of additional infrastructure once the grant is exhausted. In addition, states could qualify for incentive grants with existing qualifying programs or change the parameters on previously-planned projects, neither of which would represent any new investment. As such, these incentive grants are actually closer in design to block grants. The majority of the studies in the literature related to these types of grants suggest an increase to total spending of less than $1 for each $1 of federal grant money. For

each $1 of federal grant money, we assume that total spending increases by $0, 50 cents and $1 dollar for the Low, Medium and High spending scenarios, respectively. Therefore, $100 billion incentive grants generate low, medium, and high values of $0, $50, and $100 billion in new public infrastructure, respectively.

Rural Formula Funds: The White House infrastructure plan explicitly labels the $40 billion in state aid as block grants. The remaining $10 billion in rural formula funds are similar to the incentive grants, which, as noted above, are actually similar in design to block grants in the FY 2019 infrastructure plan. Therefore PWBM uses the same ranges for rural formula funds and incentive grants. The $50 billion in rural formula funds generates $0, $25, and $50 billion in new public infrastructure.

Transformative Projects Program: This program is designed to assist in developing newer, riskier projects. As such, these funds and grants are less likely substitutes for other state needs. Therefore these programs are probably going to generate more infrastructure than the incentive and rural formula grants. For this category, PWBM places more weight on the studies that show that $1 of federal aid leads to $1 in total additional spending. These projects are also different than traditional infrastructure investments because they are riskier. Riskier projects will produce a wider range of values for the infrastructure being developed by this program. Therefore, PWBM uses a range of $0, $20, and $40 billion dollars for the value of the public infrastructure created through this $20 billion federal program.

Infrastructure Financing Programs: The White House plans to use this program to improve the availability of loans and the borrowing rate to promote infrastructure investment from the private sector and state and local governments. Lower interest rates and greater credit availability results in a lower cost of building infrastructure and encourages additional investment. The literature, which focuses on how state and local governments respond to federal grants, probably understates the additional infrastructure generated by these types of credit programs. Part of a possible increase in infrastructure investment, however, will be muted as state and local governments change their existing projects to take advantage of this program. Some state and local governments will take planned infrastructure projects that rely on alternate funding and instead apply to these infrastructure financing programs for project funding. Therefore, PWBM applies a wide range of estimates for how state and local governments respond to this program: $10, $20, and $30 billion dollars by this $20 billion federal program.

Federal Capital Revolving Fund: This fund provides money for agencies to buy physical assets such as land and buildings. Some of these assets may have been bought through the existing procurement process. However, as the new fund allows agencies to repay these loans over 15 years, those funds will be available again to purchase more assets. State and local government projects are mostly unaffected by this program. PWBM assumes that the full $10 billion allocated to this program is turned into additional public infrastructure.

Economic Effects

As in the previous literature and our previous dynamic brief of possible infrastructure plans, we model investment in public capital as a complement to private capital. In other words, more public capital investment raises the productivity of private capital and labor.

The economic effects of the FY 2019 infrastructure plan are shown in Table 3, assuming that the federal share of $200 billion is deficit financed. By 2027, public capital rises by between 0.1 and 1.2 percent, across our three (Low, Medium and High) spending scenarios. However, debt is 0.5 to 0.9 percent higher as well. Even though public capital is modeled as a complement to private capital, higher debt dampens private capital accumulation.

When deficit-financed, the White House infrastructure plan, therefore, has no effect on GDP, potentially even slightly reducing it.

Table 3: The Effects of $200 Billion of Federal Investment in Public Capital Funded with Higher Deficits on Key Variables Relative to Current Policy in Year Shown

DOWNLOAD DATA

Year	Net Change to Infrastructure Spending by Federal, State and Local Governments	Revenue (% change)	Debt (% change)	GDP (% change)	Hours Worked (% change)	Average Hourly Wages (% change)	Public Capital Services (% change)	Private Capital Services (% change)
2027	Low	-0.1	0.9	-0.1	0.0	-0.1	0.1	-0.2
	Medium	0.0	0.9	0.0	0.0	0.0	0.7	-0.1
	High	0.1	0.8	0.0	0.0	0.0	1.2	-0.1
2037	Low	-0.1	0.7	-0.1	0.0	-0.1	0.1	-0.2
	Medium	0.0	0.6	0.0	0.0	0.0	0.4	-0.2
	High	0.0	0.5	0.0	0.0	0.0	0.8	-0.1

Note: The $200 billion in federal infrastructure investment is financed with higher deficits. Consistent with our previous dynamic analysis and the empirical evidence, the projections above assume that the U.S. economy is 40 percent open and 60 percent closed. Specifically, 40 percent of new government debt is purchased by foreigners. The government is assumed to focus spending on "shovel ready" projects and so, the above projections assume double the spending rates and building rates applied by CBO (2016). Consistent with empirical evidence, the projections above assume that the elasticity of output to a change in public capital is 0.05. The projections above assume a high rate of return to private capital. Projections that assume a low rate of return to private capital are not materially different. Revenue estimates change with the distribution of taxable income that reflect a dynamic economy.

Table 4 shows the economic effects, assuming that the federal share of $200 billion is financed by user fees, which is modeled as an efficient lump-sum tax on households over the next 10 years. Public capital rises between 0.1 to 1.2 percent by 2027. Since the $200 is not deficit financed, debt actually falls by as much as 0.1% due to a growing economy and tax base. The combination of more public capital and lower debt leads to a modest boost to private capital and an economy that is slightly larger than under current policy.

Table 4: The Effects of $200 Billion of Federal Investment in Public Capital Funded with User Fees on Key Variables Relative to Current Policy in Year Shown

DOWNLOAD DATA

Year	Net Change to Infrastructure Spending by Federal, State and Local Governments	Revenue (% change)	Debt (% change)	GDP (% change)	Hours Worked (% change)	Average Hourly Wages (% change)	Public Capital Services (% change)	Private Capital Services (% change)
2027	Low	0.0	0.0	0.0	0.0	0.0	0.1	0.0
	Medium	0.1	-0.1	0.1	0.0	0.0	0.7	0.0
	High	0.2	-0.1	0.1	0.0	0.1	1.2	0.1
2037	Low	0.0	0.0	0.0	0.0	0.0	0.1	0.0
	Medium	0.1	-0.1	0.0	0.0	0.0	0.4	0.0
	High	0.1	-0.2	0.1	0.0	0.1	0.8	0.1

Note: The $200 billion in federal infrastructure investment is financed with higher deficits. Consistent with our previous dynamic analysis and the empirical evidence, the projections above assume that the U.S. economy is 40 percent open and 60 percent closed. Specifically, 40 percent of new government debt is purchased by foreigners. The government is assumed to focus spending on "shovel ready" projects and so, the above projections assume double the spending rates and building rates applied by CBO (2016). Consistent with empirical evidence, the projections above assume that the elasticity of output to a change in public capital is 0.05. The projections above assume a high rate of return to private capital. Projections that assume a low rate of return to private capital are not materially different. Revenue estimates change with the distribution of taxable income that reflect a dynamic economy.

Conclusion

President Trump has presented a broad outline for infrastructure policy with a federal commitment of $200 billion. We find that most of the $200 billion will not be spent on programs that encourage state and local governments to vastly expand spending on infrastructure. As a result, the plan has a very small impact on the size of the economy. The plan produces slightly better outcomes when funded by user fees than when deficit-financed.

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