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Evaluating the Economic Impact of Additional Government Infrastructure Spending

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Key Findings

- President-Elect Donald Trump and lawmakers on both sides of the aisle have expressed interest in a one-time investment in infrastructure as means to boost economic growth.
- The economic literature is all over the map when it comes to assessing the value of additional government civilian infrastructure. Estimates range from a zero to a 10 percent return on additional government capital in the United States.
- Using the Tax Foundation's Taxes and Growth Economic Model, we evaluate the economic impact of a $500 billion investment in infrastructure over the next ten years along with five funding mechanisms: borrowing; cutting government consumption spending; raising excise taxes; raising the top tax rate on individual income; and raising the corporate income tax.
- Both a deficit-financed investment in new infrastructure and one financed by lower government spending would boost long-run GDP by 0.11 percent, boost wages by 0.1 percent, and increase employment by 21.4 thousand full-time equivalent jobs.
- If funded by taxes, new infrastructure has a range of economic impacts depending on the tax used. New infrastructure funded by a broad-based excise tax would boost long-run GDP by 0.06 percent while the same investment funded by a corporate rate increase reduces long-run GDP by 0.41 percent.

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Republicans and Democrats seem to agree that the country needs increased spending on infrastructure, such as roads, bridges, and buildings. Congress seems ready to increase federal outlays either to repair existing, decaying assets, or to add infrastructure, as a means of increasing the efficiency and size of the economy and boosting wages. Some such activity, especially to maintain the existing stock, may be called for. President-elect Trump has suggested $550 billion in additional government infrastructure spending over ten years, with additional guarantees for private sector infrastructure investment.[1]

We demonstrate that infrastructure spending would, by itself, raise productive capacity by only a modest amount. Furthermore, its net contribution to the GDP over time – positive or negative – would depend heavily on how it is paid for, and what other types of economic activity (consumption or private investment) it might either spur or crowd out. In particular, it should not be allowed to substitute for, or block action on, policy changes to boost private capital formation and wage growth. This paper attempts to quantify some of the economic effects of infrastructure spending assuming various funding options using the Tax Foundation Taxes and Growth Model (TAG).

The Economic Literature on Infrastructure Spending

The economic literature is all over the map when it comes to assessing the value of additional government civilian infrastructure. Estimates range from a zero to a 10 percent return on additional government capital in the United States.[2] The Congressional Budget Office assumes an average 5 percent return on incremental government capital.[3] Of course, some investments return more, some return less. The highest returns seem to be found on local government assets, and the lowest on federal assets. One should expect more value from water and sewer projects, expansion of crowded ports, or bridges to somewhere than from government office buildings and bridges to nowhere. In addition, one must compare these returns to the value of alternative production in the private sector that is given up by directing the resources into the maintenance of the additional government infrastructure, or to the value of other government spending that was given up in favor of the infrastructure projects.

One must be careful not to attribute net gains in productive capacity in cases where additional government infrastructure is largely redundant and yields little added value. This may occur because the area is already fully serviced by alternative assets, either public or private, or where the infrastructure is more of a "show project" that has not been subjected

1 The Trump website describes an up-front $550 billion spending program, which is a bit larger, but the plan is not specific about future maintenance costs. Some observers interpret the proposal as taking the form of up to $550 billion in tax credits, at a rate of 82% of the investment, to encourage private investment in roads and bridges, and port facilities. (See, for example, columnist Rick Newman, at http://finance.yahoo.com/news/everybodys-getting-trumps-infrastructure-plan-wrong-180955638.html.) That could incentivize over $670 billion in total spending. It is not clear what the future federal support would be for maintenance in such a program.

2 See, for example, David A. Aschauer (1989), "Is public expenditure productive?" *Journal of Monetary Economics*, *23*, 177-200, Pedro R. D. Bom & Jenny E. Ligthart (2014), "What have we learned from three decades of research on the productivity of public capital?" *Journal of Economic Surveys*, *28(5)*, 889-916, and Douglas Holtz-Eakin & Amy E. Schwartz (1994), *Infrastructure in a Structural Model of Economic Growth* (NBER Working Paper Series, Working Paper No. 4824), http://www.nber.org/papers/w4824 .

3 Congressional Budget Office (2016). *The Macroeconomic and Budgetary Effects of Federal Investment*, https://www.cbo.gov/publication/51628 .

to a cost-benefit analysis. This can matter greatly. For example, economist Paul Krugman has speculated that the burst of infrastructure spending in Japan during the so-called "lost decade" failed to improve economic performance because the country was already "saturated" with useful transportation and other assets.[4] Also recall the 2005 dispute over the merits of the proposed Ketchikan – Gravina Island bridge in Alaska, disparaged by some as "the bridge to nowhere". (The latter is not to be confused with the actual Bridge to Nowhere built in 1936 in the San Gabriel Mountains near Azusa, California. That bridge was isolated soon after by severe floods and washouts and is now accessible only on foot or horseback! See picture.[5])

Estimating the Economic Impact of Additional Infrastructure Investment

When funding additional infrastructure, one must also ask where the money to pay for the project comes from. One must factor in the dead-weight loss generated by whatever tax was levied to pay for the assets. This is the question we focus on in this paper. We have modeled what to expect, on a permanent basis, from having an additional $500 billion of infrastructure in place. The baseline is the CBO budget forecast for the GDP over the next decade. We adopt the following methodology, and show all results in 2017 dollars:

4 Krugman, Paul. 2009. *The Return of Depression Economics and the Crisis of 2008*. New York: W. W. Norton & Company. http://www.univpgri-palembang.ac.id/perpus-fkip/Perpustakaan/Empiricsm/Krugman,%20Paul%20-%20The%20Return%20of%20Depression%20Economics%20and%20the%20Crisis%20of%202008,%202e%20(Norton%3B%202009).pdf

5 Photo, Victor Rocha

We assume additional infrastructure spending of $500 billion spread over ten years, resulting in a gradual increase in the amount of infrastructure in place. Following its installation, the $500 billion in new infrastructure is shown to contribute about $25 billion a year to GDP in the form of productivity gains, assuming a 5 percent return in line with the CBO assumption noted above.[6]

We assume the infrastructure would require an increase in depreciation-related outlays to maintain the assets over time, requiring resources to be redirected from other types of output when the economy is in full-employment equilibrium. A $500 billion expansion of government capital would require a subsequent increase in annual federal outlays on depreciation-related expenses by about $9 billion a year, in 2017 dollars. Roads and bridges are assumed to have in excess of a 50-year life, and require about 2 percent of their initial cost in annual maintenance.

We examine several choices of how to pay for the $9 billion in annual maintenance (adjusted over time for inflation), which would have further ramifications on GDP and government finances. These payment options include borrowing (which would increase the deficit), cutting government consumption outlays (leaving total spending and the deficit unchanged), and raising taxes in several ways in amounts equal to the infrastructure cost on a static basis (before taking the effects of the tax on the GDP into account). Some of the tax increases would fall mainly on private sector capital formation; some would fall more on labor income; some would fall on consumption spending affecting both labor and capital.

We assume that the tax increases or spending reductions begin in the first year, and that maintenance costs begin to accumulate in year two and build to their full level in year eleven. This leaves some tax revenue or spending cut money in the early years to pay for less than a fifth of the initial cost of building the infrastructure. The rest of the initial cost is assumed to be paid for by borrowing. Any borrowing is assumed to add to the federal deficit and debt, which increases interest outlays in the federal budget (using CBO interest rate projections).

In our analysis, we examine the long-run effects of permanent changes in government policies, including increases in the amount of government capital. Added capital, once built, may add to productive activity by producing services directly to final consumers (water and sewer lines) or by enhancing production or economic efficiency (ports and roads). The expected benefits of the projects over time is the difference between the ongoing annual maintenance costs and the annual services generated by the additional assets. That is what we model.

6 The proposal is for total spending of $500 billion in nominal dollars. The $500 billion spread out over 10 years, at $50 billion a year, is $458 billion in 2017 dollars. The annual addition to GDP from the 5 percent return would be $22.9 billion in 2017 dollars.

Results

Table 1 shows the effects of adding an additional $500 billion infrastructure through borrowing and paying for ongoing maintenance in five ways: by borrowing; cutting government consumption spending; raising an excise tax such as the gasoline tax or airport ticket tax; raising the top bracket income, capital gains, and dividend tax rates; and raising the corporate income tax. (An economic result similar to an excise tax could be had by placing a toll or fee on the use of the asset.) All dollar amounts are shown as of the long-run equilibrium levels expected in 2027, but presented in real 2017 dollars to put them into perspective.

Table 1.

Economic and Budgetary Impact of $500 Billion in Additional Infrastructure Spending Over Ten Years

	Method of Funding				
	Borrowing	Reduction in Government Spending	Excise Taxes or User Fees	Increase Top Tax Rate on Wages, Capital Gains, and Dividends	Increase in Corporate Income Tax Rate
Long-Run GDP	0.11%	0.11%	0.06%	-0.09%	-0.41%
Long-Run GDP (Billions of 2017 dollars)	$21.19	$21.19	$12.02	-$16.24	-$77.30
Wage Rate	0.09%	0.09%	-0.05%	-0.04%	-0.35%
Full-Time Equivalent Jobs (Thousands)	21.4	21.4	-12.9	-56.3	-77.3
Annual federal deficit, as of 2027 (Billions of 2017 dollars)					
Static deficit	-$26.42	$0.00	$0.00	$0.00	$0.00
Dynamic deficit	-$21.53	$7.81	$3.05	-$6.31	-$24.26
(negative number = rise; positive number = fall)					

Note: Assumes $500 billion in additional infrastructure spending for ten years, with most of the initial cost paid for by borrowing. Assumes a 5% economic return on added infrastructure, spending cuts, or tax increases beginning immediately that are sufficient, on a static basis, to cover projected long-term maintenance (depreciation) on the added infrastructure and additional interest on the resulting debt buildup.

Increased Government Borrowing

In the case of borrowing, total long-run GDP increases by 0.11%, or about $21 billion, inclusive of the government maintenance spending. Wages rise by 0.09%, and hours worked by 0.02%, equivalent to 21,000 additional full-time jobs. There is a permanent increase in the annual deficit, including an increase in interest expenses of about $17 billion in addition to the $9 billion in maintenance costs going forward, totaling about $26 billion on a static basis. (Interest costs are included at levels as of the end of the 10-year budget window in 2027.) The added growth reduces that static deficit to $21 billion on a dynamic basis. The added infrastructure boosts GDP, but increases the deficit by a similar amount.

Reduction in Government Spending

An immediate cut in government consumption spending of about $20 billion would pay for a portion of the initial infrastructure build-out and offset the long-run interest and maintenance costs of the increase in government investment in infrastructure on a static basis, with no rise in the deficit. Infrastructure financed in this manner raises GDP, wages, jobs, and private capital by similar amounts as in the borrowing case, but without the increase in the annual deficit. The growth associated with the expanded infrastructure reduces the deficit by roughly $8 billion on a dynamic basis.

Increase Excise Taxes or Use Fees

Raising an excise tax (or placing equivalent tolls or fees on the use of the assets) of about $20 billion to pay for the infrastructure reduces the gains from the infrastructure spending by about 40 percent compared to the previous two cases. The added infrastructure raises the productivity of private capital, increasing GDP and private output. This effect outweighs the negative effect on capital formation from the portion of the excise taxes that fall on capital income; as a result, GDP rises by 0.06%. However, the productivity effect is not sufficient to outweigh the negative effect of the tax on labor income; full-time jobs fall by 13,000 due to a 0.05 percent drop in wages. The deficit is unchanged on a static basis, and shrinks by $3 billion on a dynamic basis due to the modest economic growth.

Increase the Top Individual Tax Rate on Wages, Capital Gains, and Dividends

The individual income tax increases reduce GDP, wages, jobs, and private capital formation even more than the excise tax case. Damage to GDP and capital formation increases as the income tax shifts more toward hitting saving and investment. The nearly $20 billion rise in the individual income taxes lowers total GDP by just under 0.09%. The lower GDP eliminates 17 percent of the initial static tax revenue, leaving a net revenue gain of just over $16 billion. The income tax rate increase cuts jobs by 56,000 compared to taking no action. Wages fall by 0.4%. The annual dynamic deficit widens by over $6 billion by 2027.

Increase the Corporate Income Tax Rate

The rise in the corporate income tax rate of a bit more than $19 billion lowers total GDP by 0.41% percent and private GDP by 0.42%. The lower GDP eliminates 96% of the initial $19.4 billion in static tax revenue; revenue rises by less than $1 billion compared to the baseline. The corporate tax rate increase cuts private capital by $484 billion, about the same amount as the increase in infrastructure. It cuts jobs by 77,000 and lowers wages by 0.35%. The long-run federal deficit change, zero under static assumptions, increases by $24 billion by the end of the decade, in 2017dollars. The corporate rate hike leaves a larger deficit than simply borrowing the money for the infrastructure, and causes a significant drop in GDP and employment.

7

Conclusion

The limited gains forecast to occur from government infrastructure investment should not be surprising. Governments do not feel they have to earn a return on their capital spending, the way the private sector does. As a result, governments are content to put money into projects with little or no net benefits, diverting resources from private uses yielding greater economic gains. Infrastructure projects should be undertaken if they are highly beneficial, but not undertaken simply because money looks cheap. If a project has been evaluated, and shown to have economic merit equal to alternative uses of the money, then go ahead. If such projects exist, 2017 will not be a bad time to do it, because borrowing costs are indeed low, but only if the projects are worth doing in the first place.

Productivity and wages are not generally suffering from an insufficiency of infrastructure. They are suffering from a dearth of private sector capital formation, which has been hindered by our current tax code. Until the deficiencies with our tax code are addressed, boosting infrastructure will have limited effect on production, jobs, and wages.