

A Guide to the Economics of Infrastructure Investment

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Infrastructure investments can foster broad-based economic growth.

Framework for evaluating investments & their methods of funding & finance

- Why invest?
- Which projects to select?
- Who should decide?
- How pay for infrastructure investments?

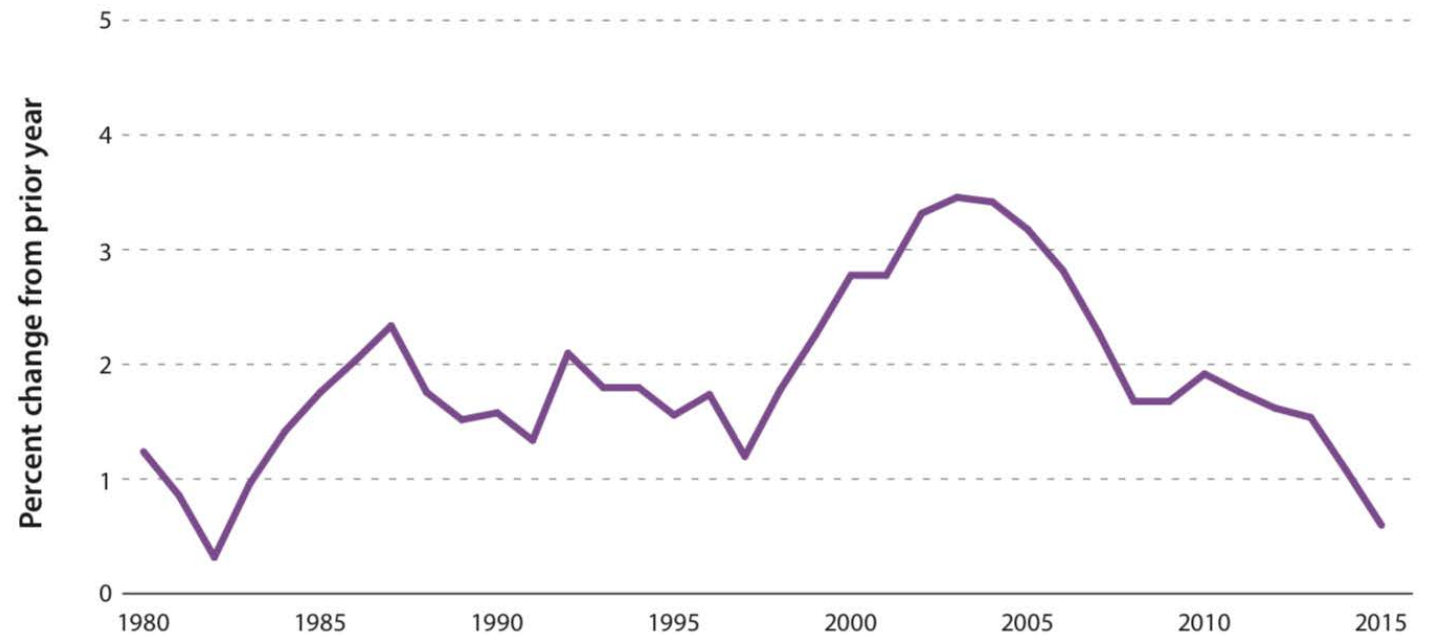
Why Invest?

Productivity growth has diminished

- Long-run, improvements in standards of living achieved through productivity growth (Gordon 2016)
- Infrastructure could be important contributor here

FIGURE 1.

Change in Labor Productivity, 1980–2015

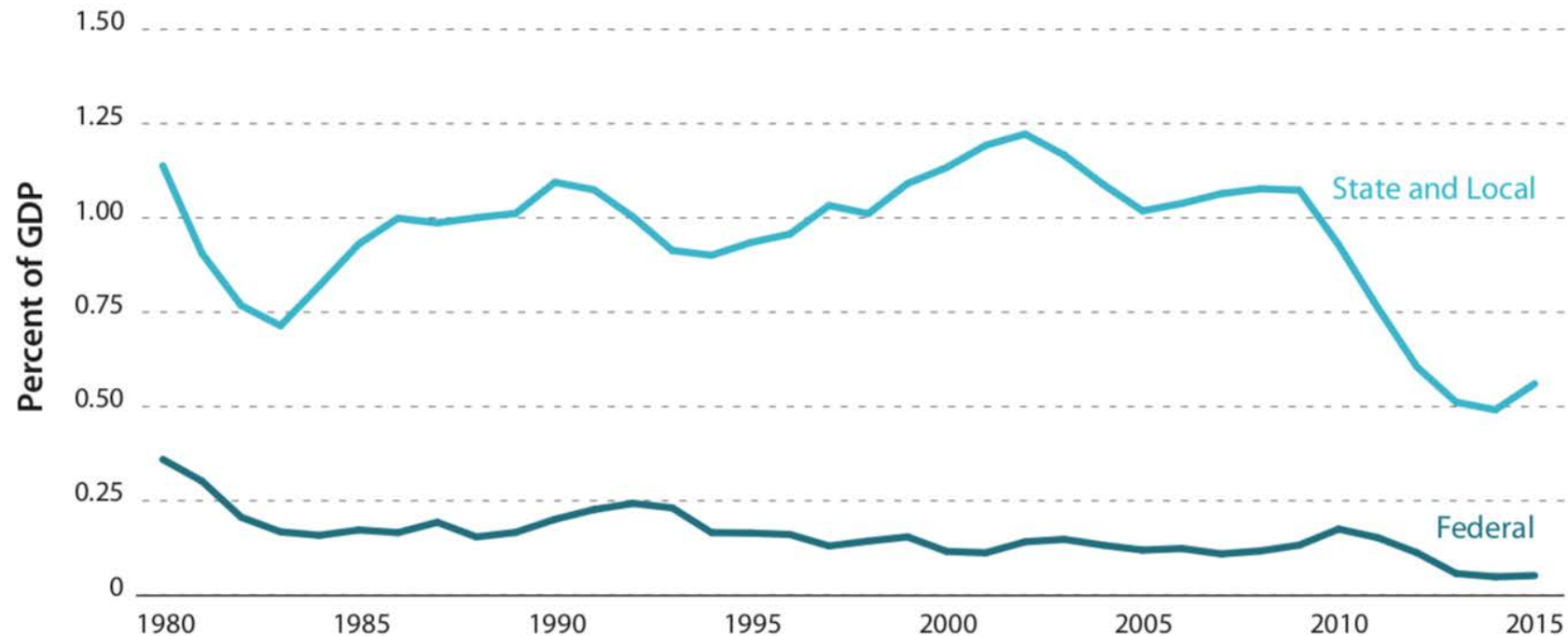


Source: Bureau of Labor Statistics 2016; authors' calculations.
Note: Values are shown as a trailing, five-year moving average.

Public Investment has Slowed Considerably

FIGURE 2.

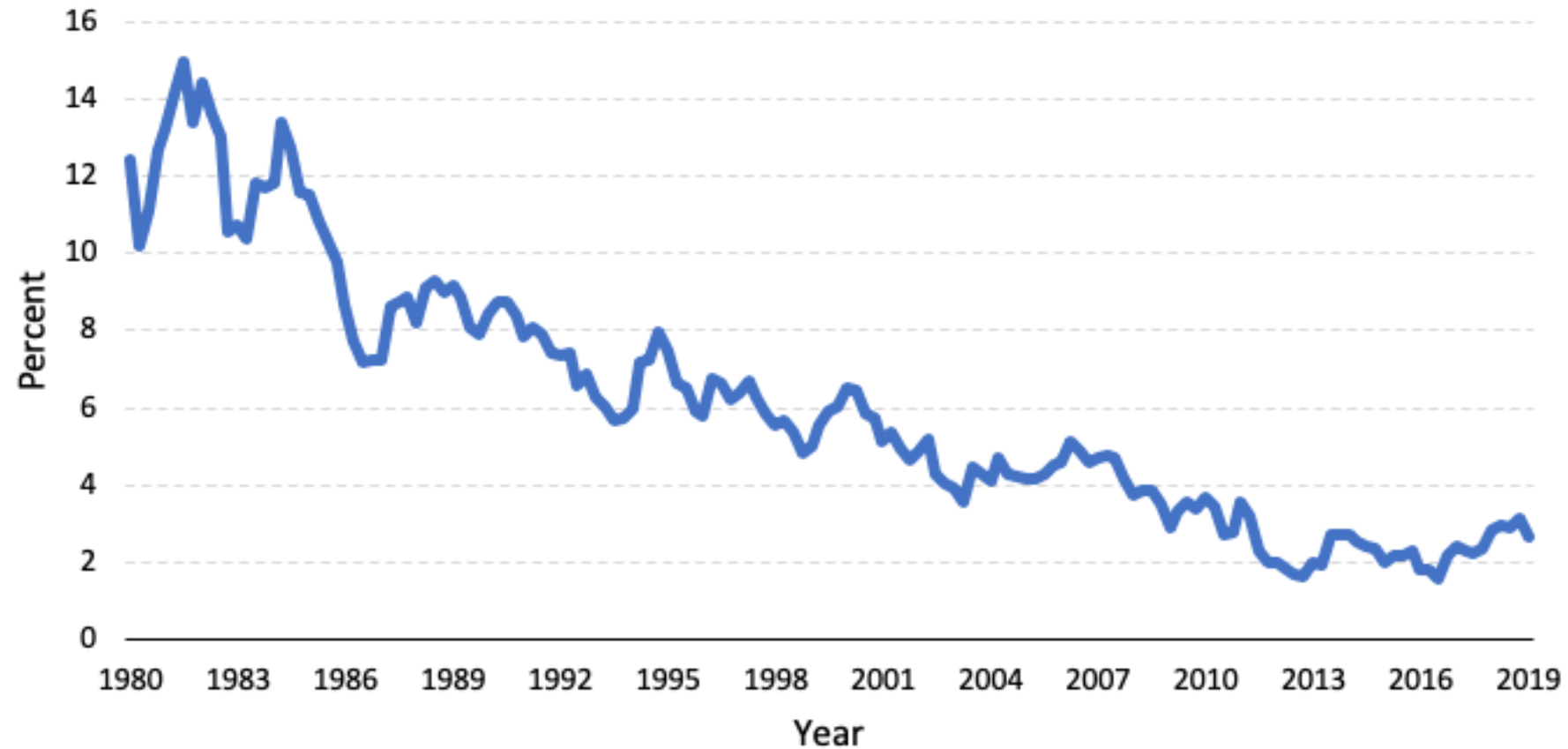
Public Non-Defense Net Investment: Federal vs. State and Local, 1980–2015



Source: Bureau of Economic Analysis 2016.

Now is a Good Time to Invest

10-Year Treasury Note Yields, 1980-2019



Investment Should Increase when Interest Rates are Low

Decide whether to spend by comparing risk of project & expected return to the guaranteed rate of return on government bonds.

High guaranteed rate, capital holders have attractive outside alternative

Low interest rates should spur more to invest in projects

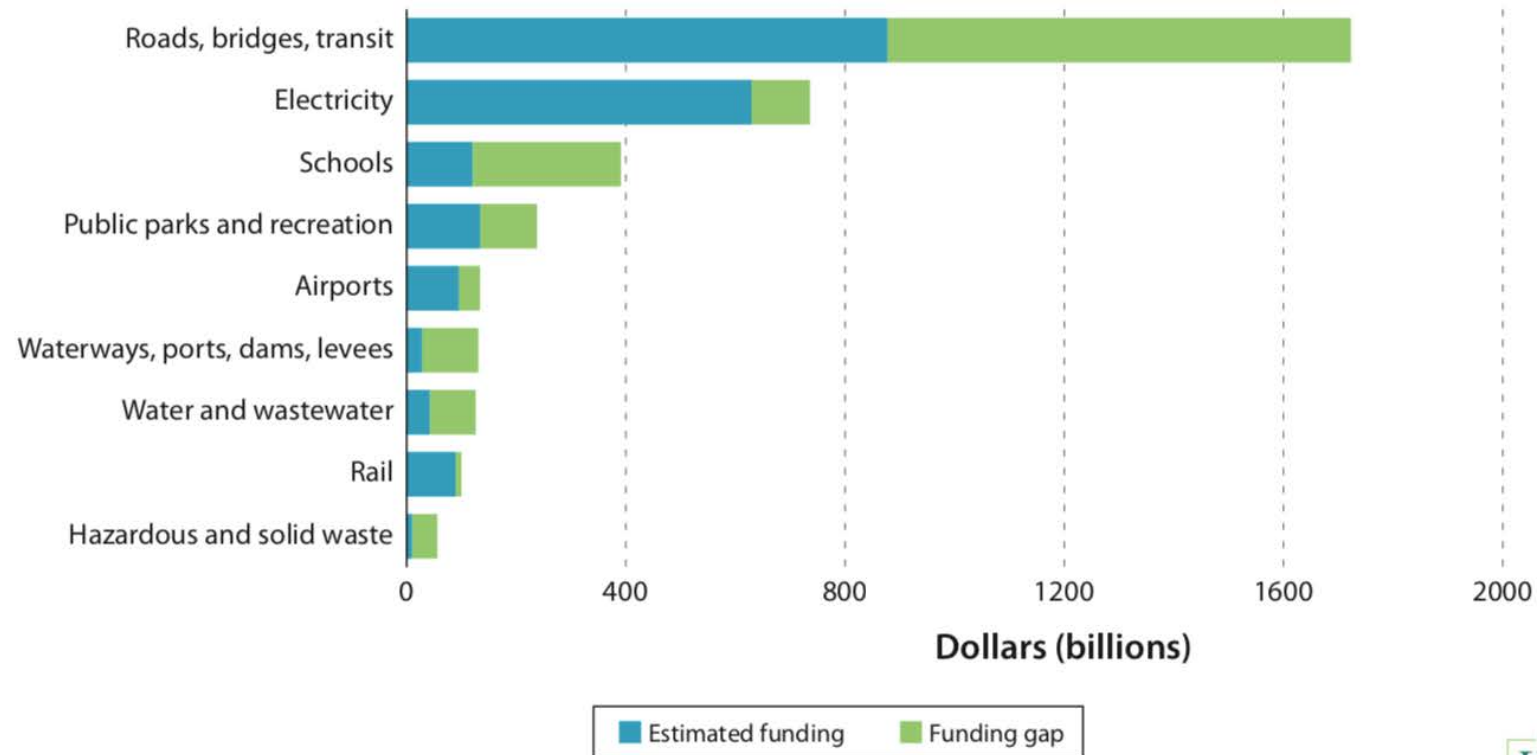
Example: hypothetical project that returns \$120 in 7 years on \$100 initial investment

Real Interest rate	Net present value	Is investment justified?
1%	\$11.93	Yes
2%	\$4.47	Yes
3%	-\$2.43	No
5%	-\$14.72	No
10%	-\$38.42	No

Note: Assumes \$120 in benefits after seven years, initial costs of \$100, and no inflation.

Infrastructure Deficits are Large

FIGURE 4.
Infrastructure Needs, Funded and Unfunded, 2013–2020



Source: American Society of Civil Engineers 2013 via Center on Budget and Policy Priorities 2016.

Current Government Spending on Infrastructure

	Highways	Mass Transit & Rail	Aviation	Water
Federal	\$46.3	\$15.5	\$16.0	\$18.4
State & local	\$118.3	\$52.9	\$20.0	\$128.5

Values reported in billions. Source: Congressional Budget Office 2015.

Note: Water infrastructure includes spending on water transportation (\$9.8 billion), water resources (e.g. dams, levees, reservoirs, and watersheds; \$28.2 billion), and water utilities (e.g. supply and wastewater systems; \$108.9 billion). Estimates are for 2014.

Infrastructure Investments can Increase Productivity

- Early work (Aschauer 1989, Munnell 1990) finds strong relationship between public investments and long-run productivity growth, unclear whether relationship is causal
- More-recent work: positive, smaller impacts on productivity (Chandra & Thompson 2000, Fernald 1999)
 - Varies by sector & region
 - Industries connected to new infrastructure higher payoffs – vehicle-intensive industries benefit from road building
 - Public investments in certain areas (electric & gas facilities, mass transit, airfields) spur private investments in long run (Pereira 2001)
 - Mixed evidence on roads (Turner 2018)

Which Projects Should be Selected?

- First question, always, is there a role for government?
 - Is there a market failure at play? (public goods, externalities)
- Second: do the investment's expected benefits exceed its costs?

Helpful Guidance for Decisions

- Fix it first
 - Repair & maintenance often have higher returns than new construction
 - e.g. 1/3 of nation's major urban roads were rated in substandard or poor condition in 2016
 - CBO: spending on highways could be more efficient by increasing \$\$ on repairs, decreasing \$\$ on system expansion
- Count all the costs – including maintenance
 - Low-bidder firms that use suboptimal construction materials/techniques may lower initial construction costs but increase future cost of maintenance
- Count non-pecuniary benefits
 - E.g. Lead abatement confers health benefits that has been shown to increase test scores, lower crime

Who Should Decide?

- Level of government responsible for funding, implementation
 - Advantages and disadvantages to local, state, federal government
 - Local & state
 - Potentially better equipped to gauge value of projects to jurisdiction
 - Can have more difficulty funding investments—e.g. if local economic downturns make it hard to fund projects when most needed
 - May not optimally invest if there are spillover benefits to neighboring jurisdictions
 - Federal
 - Easier access to financing, perspective that incorporates benefits/costs across jurisdictions
 - More scope to take advantage of economies of scale

Insulate from Political Pressure, As Possible

- Politics -> spending not flowing to greatest need or benefits greatest
- Formula funding helps... sort of
 - 92% of federal highway spending through FY2020 allocated by formula
 - Favors older roads, also small & rural states
 - Disadvantages relatively productive investments (airports, transport, electrical grid) in favor of roads (likely less productive, but highly visible to constituents)
 - Many economists favor national infrastructure banks

How Pay for Infrastructure Investments?

- When possible: user fees
 - i.e. payments made by those who access the infrastructure
 - Classic example: toll roads. Other projects – airports, water treatment, ports – funded in part w/user fees
 - Good test: if fees are sufficient to pay for cost of construction, operation -> worth pursuing investment
 - Inverse not always true, due to market failures
- When not possible or socially desirable to provide access at no cost: taxes
 - Can lead to poor selection among potential project – no “market test”
 - Also, it’s costly to raise tax revenue because taxes have distortionary impact on economic activity

Debt Finance Often Appropriate

- Infrastructure investments: immediate expenses followed by stream of revenues
- Debt often preferred
 - Current revenues can be insufficient due to magnitude of investment, timing, inability to raise taxes
 - Of course, user fees can only be collected after project completed
- Have to consider:
 - Additional debt-service payments
 - If benefits not primarily monetary, how to pay
 - Politicians have excessively short-term focus, tempted to delay too much

When PPP?

- Often, private firm pays some/all of cost of investment for right to collect fees/taxes in the future
 - Firm takes on some of risk (development costs, user fees)
- Saves outlay of government funds
- Important to remember: still have to pay for it with taxes or user fees!
- Chief benefit is involvement of private firm in construction & operation of investment
 - If monitoring by government less than ideal, firm may internalize costs more – “skin in the game”

Conclusions

- Infrastructure demands increased attention.
 - Simply returning to a state of good repair will be both costly & valuable
- Important to consider basic questions:
 - What projects should be undertaken?
 - Who should conduct the projects?
 - How be funded and financed?
- User fees often part of good infrastructure policy – especially when can help to distinguish between productive and unproductive projects, & mitigate congestion in use