Political Incentives and Transportation Funding

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ABSTRACT

This paper examines politicians' incentives when they decide on the level and allocation of government transportation infrastructure spending. I conclude that transportation infrastructure spending is highly inefficient and often driven by political rather than economic forces. Research shows that transportation project costs are significantly underestimated and traffic flows tend to be overestimated. These errors are large and are not random, suggesting that they are deliberate in order to get projects started, resulting in an inefficient use of funds. Project benefits are concentrated in a state or district, whereas tax costs are spread out nationwide. Legislators embrace inefficient transportation projects because district or state voters do not pay the full cost, and projects proceed even when total costs exceed total benefits. Possible reforms include comparing potential project benefits and costs with those of similar completed projects to assess the accuracy of predicted costs and demand. Reducing the federal government's role in highway financing would improve outcomes.

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The transportation sector represents a large part of the US economy, contributing approximately 17 percent to gross domestic product.[1] An efficient transportation system is an important part of a strong economy.[2] It provides mobility, improving employment opportunities and leisure activities. It also plays a central role in facilitating domestic and international commerce.

Unfortunately, the US transportation system underperforms. Most major cities face serious congestion that results in longer travel times and higher emissions. One estimate is that time wasted sitting in traffic, additional air pollution, and politically driven transportation spending reduce welfare by about $100 billion annually.[3] Much of the nation's highway infrastructure is past its design life, and capacity is insufficient to serve growing areas.[4] Reducing highway congestion, providing adequate road capacity, and maintaining existing roads should be top priories for government infrastructure spending. However, despite significant infrastructure expenditures by federal and state governments, congestion and maintenance problems persist.

This paper examines the political economy of US transportation infrastructure decision making. It emphasizes the incentives that influence elected officials when they decide on the level and allocation of government infrastructure spending. First up is a discussion of the biases in project benefit-cost

1. Clifford Winston, "On the Performance of the U.S. Transportation System: Caution Ahead," *Journal of Economic Literature* 51, no. 3 (2013): 773–824.
2. There is a large literature evaluating the economic impact of infrastructure spending. See Robert Krol, "Public Infrastructure and Economic Development," in *Handbook of Economic Development*, ed. Kuotsai Liou (New York: Marcel Dekker, 1998); Krol, "Infrastructure and Economic Development," in *Encyclopedia of Public Administration and Public Policy*, ed. Melvin Dunick and Domonic Bearfield (New York: Taylor & Francis Group, 2014); and Alfredo M. Pereira and Jorge M. Andraz, "On the Effects of Infrastructure Investment," *Journal of Economic Development* 38, no. 4 (2013): 1–37.
3. See Winston, "Performance of the U.S. Transportation System," 774n1.
4. Robert W. Poole Jr., "Interstate 2.0: Modernizing the Interstate Highway System via Toll Finance" (Policy Study No. 425, Reason Foundation, Los Angeles, 2013).

analysis. The next section explains how legislative voting and institutional arrangements misallocate transportation funds. The last section highlights transportation policy reforms for a more economically efficient system.

ARE PROJECT BENEFIT-COST PROJECTIONS RELIABLE?

Politicians have limited funds to finance a long list of potential transportation infrastructure projects. Priority should go to projects with the highest net benefits. In principle, analysts are expected to apply an objective benefit-cost analysis to each project to determine its net economic impact. Once this analysis is complete, projects can be ranked. For this approach to work, decision makers must have objective and unbiased estimates of all project benefits and costs.[5]

Are projects evaluated objectively? The following quotation should worry any taxpayer. In response to the $300 million cost overrun for the Transbay Terminal in San Francisco, Willie Brown, a former Speaker of the California Assembly and former mayor of San Francisco, wrote, "We always knew the initial estimate was way under the real cost. Just like we never had a real cost for the Central Subway or the Bay Bridge or any other massive construction project. So get off it. In the world of civic projects, the first budget is really a down payment. If people knew the real cost from the start, nothing would ever be approved. The idea is to get going. Start digging a hole and make it so big, there's no alternative to coming up with the money to fill it in."[6]

Is San Francisco an outlier, or is it common practice to systematically underestimate project costs and, perhaps, to overestimate project benefits? Researchers have examined transportation projects across many countries and time periods. The results are disturbing.

Bent Flyvbjerg, Mette Skamris Holm, and Søren Buhl compare the actual cost of a transportation project at the time of completion with the estimated cost at the time of the decision to build. They examine 258 transportation projects worth $90 billion built in North America, Europe, and other regions over the last 80 years and find significant cost overruns, suggesting that cost estimates produced large cost errors.[7] Table 1 shows project cost overruns.

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5. Kenneth A. Small, "Project Evaluation," in *Essays in Transportation Economics and Policy*, ed. Jose Gomez-Ibanez, William B. Tye, and Clifford Winston (Washington, DC: The Brookings Institution, 1999).

6. Willie Brown, "When Warriors Travel to China, Ed Lee Will Follow," *SFGate*, July 27, 2013, http://www.sfgate.com/bayarea/williesworld/article/When-Warriors-travel-to-China-Ed-Lee-will-follow-4691101.php.

7. Bent Flyvbjerg, Mette Skamris Holm, and Søren Buhl, "Underestimating Costs in Public Works Projects," *Journal of the American Planning Association* 68, no. 3 (2002): 279–95.

TABLE 1. TRANSPORTATION PROJECT COST OVERRUNS

Project type	Number of projects	Average cost overrun (%)
Rail	58	44.7
Fixed link	33	33.8
Road	167	20.4
All projects	258	27.6

Source: Bent Flyvbjerg, Mette Skamris Holm, and Søren Buhl, "Underestimating Costs in Public Works Projects," *Journal of the American Planning Association* 68, no. 3 (2002): 283.

Table 1 shows an average cost overrun of nearly 28 percent. Rail, especially high-speed rail, had the largest cost overrun, almost 45 percent, and roads had the lowest overrun, around 20 percent. There appears to be little difference between the US and European errors. The sample includes cost estimates for projects built before World War II, and the development of computers should have improved modern cost estimates. However, more recent cost estimates show no improvement. The authors conclude that these large and systematic errors were made intentionally to mislead voters.

The same authors also examine the accuracy of traffic flow forecasts using 210 rail and road projects in 14 nations, worth $58 billion total, built from 1969 to 1998.[8] They compare the actual traffic in the first year of operation with the original forecast. Table 2 reports their results on the size and distribution of the traffic forecast errors. The forecast error is calculated as the percentage difference between actual and estimated traffic flow. A negative error indicates the forecast exceeded the actual traffic flow and was overly optimistic.

TABLE 2. TRANSPORTATION TRAFFIC FORECAST ERROR SIZE AND DISTRIBUTION

	Rail	Roads
Average error (%)	–51.4	9.5
Percentage of projects with inaccuracies > 20%	84.0	50.0
Percentage of projects with inaccuracies > 40%	72.0	25.0
Percentage of projects with inaccuracies > 60%	40.0	13.0

Source: Bent Flyvbjerg, Mette K. Skamris Holm, and Søren L. Buhl, "Inaccuracy in Traffic Forecasts," *Transport Reviews* 26, no. 1 (2006): 11.

8. Bent Flyvbjerg, Mette K. Skamris Holm, and Søren L. Buhl, "Inaccuracy in Traffic Forecasts," *Transport Reviews* 26, no. 1 (2006): 1–24.

"To accurately estimate future costs, ridership, and traffic flows, analysts must correctly project economic growth, demographic trends, and inflation. It is no surprise that efforts to forecast costs and traffic flows result in large errors."

The average project forecast error reported in the first row indicates rail traffic was overestimated by 51.4 percent. Road forecasts underestimated traffic flows by about 9.5 percent. Forecasting lower road traffic flows may make the construction of roads less attractive. If politicians prefer, for environmental reasons, to get commuters out of their cars and into rail systems, then underestimating road benefits might serve their purpose.

The remaining table entries illustrate the distribution in traffic flow forecast errors. Eighty-four percent of rail traffic forecast errors were greater than 20 percent, and 40 percent of rail projects had forecast errors greater than 60 percent.

Kenneth Button and Zhenhua Chen compare traffic forecasts for 26 US highway projects from 1986 through 2004.[9] Because four of these projects were public-private partnerships, they ask whether having a greater private sector role in the evaluation stage of a highway project reduces traffic forecast errors. They find that both types of ownership overestimated actual traffic flows five years into the future. In this study, public-private partnership errors are about half the size of the public forecast errors. However, there are only four public-private partnerships in the sample, insufficient to conclude that public-private partnerships are the solution to forecast bias in transportation project analysis.

Robert Bain examines the traffic flow forecasts of 100 privately financed toll roads, tunnels, and bridges built from 2002 through 2005.[10] He finds that the forecasts overestimated traffic flows by an average of 23 percent, which suggests that private forecasters also bias project traffic flow projections. If the group making the projections were risking its own funds, or intended to work on future projects, the projections should be unbiased. Since they are not,

9. Kenneth Button and Zhenhua Chen, "Demand Forecasting Errors and the Ownership of Infrastructure," *Applied Economic Letters* 21, no. 7 (2014): 494–96.
10. Robert Bain, "Error and Optimism Bias in Tollroad Traffic Forecasts," *Transportation* 36, no. 5 (2009): 469–82; Bain, *Toll Road Traffic and Revenue Forecasts: An Interpreter's Guide* (Seville, Spain: Robert Bain Publicaciones Digitales SA, 2009).

there may be an incentive for private project promoters to bias the forecasts in order to speed funding. The bottom line for both investors and taxpayers is the need for skepticism when examining these forecasts.

Forecasting the cost of building and the demand for large transportation projects is difficult. To accurately estimate future costs, ridership, and traffic flows, analysts must correctly project economic growth, demographic trends, and inflation. It is no surprise that efforts to forecast costs and traffic flows result in large errors. If the forecast errors were random and did not persist over time, it would seem that the errors resulted from technical issues and from the general uncertainty associated with trying to predict the future. The strong tendency to underestimate transportation project costs and to overestimate traffic flows, and the persistence of these errors over time, suggests that errors are deliberate. Politicians and special interest groups (construction unions and companies, engineering firms, and bureaucrats) have effectively captured the process. While politicians pretend that the estimates have been done in a scientific way, in reality, they are a "strategic misrepresentation."[11] Transportation expert Martin Wachs draws a similar conclusion. He argues that estimates are presented to the public as scientific and unbiased, but are actually intended to get the project started for political gain.[12]

How big of an impact do these forecast biases have on transportation infrastructure decisions? Flyvbjerg agrees with Wachs. He concludes that many transportation projects are "financial disasters," often providing negative returns.[13] He describes the outcomes of benefit-cost studies as the "survival of the unfittest," where projects that should not be built survive by biased analysis. These biases result in a forecast of project viability that significantly exceeds actual project viability.[14]

Even if systematic errors only increase benefit-cost ratios of viable projects, the result is an inefficient use of limited government funds. There is an opportunity cost associated with using funds on projects with low actual benefit-cost ratios. Shifting funding from projects with low benefit-cost ratios to projects with high benefit-cost ratios will increase efficiency and output. Other projects,

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11. See Flyvbjerg, Holm, and Buhl, "Underestimation Costs," 229n7.
12. Martin Wachs, "Ethics and Advocacy in Forecasting for Public Policy," *Business and Professional Ethics Journal* 9, no. 1–2 (1990): 141–57.
13. Bent Flyvbjerg, "Survival of the Unfittest: Why the Worst Infrastructure Gets Built—and What We Can Do about It," *Oxford Review of Economic Policy* 25, no. 3 (2009), 344–67, and Flyvbjerg, "Design by Deception: The Politics of Megaproject Approval," *Harvard Design Magazine*, no. 22 (Spring/Summer 2005): 50–59.
14. Bent Flyvbjerg, Nils Bruzelius, and Werner Rothengatter, *Megaprojects and Risk: An Anatomy of Ambition* (New York: Cambridge University Press, 2003).

perhaps even nontransportation projects in education or health care, may provide higher net benefits.[15] If the spending results in taxes being higher than necessary, that will have a negative impact on economic growth.

Elected officials may request benefit-cost analysis of potential projects, yet ignore the results.[16] An example of this behavior can be found in the Transportation Investment Generating Economic Recovery (TIGER) program that was part of the 2009 stimulus package. TIGER was designed to be a competitive grant program to finance state and local transportation projects. Each project application included a benefit-cost analysis. Department of Transportation (DOT) staff evaluated and rated each analysis for quality. The staff also rated the likelihood that project benefits would exceed costs. Project selection by the DOT was to be primarily based on expected net benefits rather than on noneconomic factors such as community sustainability or the distribution of funds across states. Anthony Homan, Teresa Adams, and Alex Marach examined 154 applications, 51 of which were funded. After controlling for factors such as the transportation mode and the grant size relative to total cost, the quality of the benefit-cost analysis and the likelihood that benefits exceed costs were not statistically significant determinants of project funding.[17] In other words, DOT leadership essentially ignored the benefit-cost analysis and made the awards based on other, possibly political factors.

Many government agencies have forecasting responsibilities. In evaluating a cost or revenue forecast for a transportation project, biased forecasts or errors that persist over time suggest an incentive structure that rewards this behavior. This behavior would not result if a high cost estimate had the same political consequences as a low cost estimate.

Cost or benefit estimates are likely to be influenced by politicians and their appointed administrators. As a result, government analysts face pressure to bias the forecast in a direction that favors the objectives of the elected officials they serve.[18] If building a new road is important for reelection, agency

15. The Congressional Budget Office evaluated airport and highway project data from the Federal Aviation Administration and Federal Highway Administration and found negative and positive benefit-cost ratios on projects. See CBO, *The Economic Effects of Federal Spending on Infrastructure and Other Investments* (Washington, DC: CBO, 1998).

16. Anthony C. Homan, Teresa M. Adams, and Alex J. Marach, "A Statistical Analysis of the Role of Benefit-Cost Analysis in Awarding Tiger Grants," *Public Works Management and Policy* 19, no. 1 (2014): 37–50.

17. Ibid.

18. This can happen in the private sector as well. Terence Lin finds stock analysts often bias their earnings forecasts upward in exchange for information in "Rationality and Analysts' Forecast Bias," *Journal of Finance* 56, no. 1 (2001): 369–85.

pressure will bias benefit-cost estimates in a way that puts the project in a more economically favorable light. The analyst's pay and future job opportunities may depend on how closely they play along. While the analyst's professional reputation serves as a check on this process, it appears that political pressures dominate. Elected officials are likely to reward analysts whose estimates make it easier to carry out official agendas.[19]

Large, biased benefit-cost projection errors make the outcome of infrastructure projects highly uncertain. Projects that appear to be economically viable when proposed often turn out poorly. Ultimately, the impact of an infrastructure project depends on its net rate of return. Research on the rate of return associated with infrastructure investment provides a range of estimates from 0 to as high as 100 percent.[20] As a result, it is difficult to know what the average rate of return is on infrastructure investment. Furthermore, it is not clear what the actual rate of return will be on an individual project. The finding that infrastructure spending is often unrelated to output and productivity does not mean there are no economically worthwhile transportation projects to be built, but the political incentives lead to less funding for worthwhile projects while other projects with lower net benefits get funded instead.

REFORMING THE BENEFIT-COST ANALYSIS PROCESS

We probably cannot eliminate the political pressure to bias projections in the direction that interest groups and politicians prefer. The payoff to politicians and interest groups is too high to ignore. However, certain reforms could improve benefit-cost estimates for transportation infrastructure projects.

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19. Robert Krol, "Evaluating State Revenue Forecasting under a Flexible Loss Function," *International Journal of Forecasting* 29, no. 2 (2013): 282–89, and Krol, "Forecast Bias of Government Agencies," *Cato Journal* 34, no. 1 (2014): 99–112.

20. For survey papers, see Krol, "Public Infrastructure and Economic Development"; Krol, "Infrastructure and Economic Development"; Pereira and Andraz, "On the Effects of Infrastructure Investment." See also David Aschauer, "Is Public Expenditure Productive?," *Journal of Monetary Economics* 23 (1989): 177–200; Alicia Munnell, "How Does Public Infrastructure Affect Regional Economic Performance?," *New England Economic Review* (September/October 1990): 11–32; Douglas Holtz-Eakin, "Public-Sector Capital and the Productivity Puzzle," *Review of Economics and Statistics* 76 (1994): 12–21; Robert Krol, "Public Infrastructure and State Economic Development," *Economic Development Quarterly* 9, no. 4 (1995): 331–38; Chad Shirley and Clifford Winston, "Firm Inventory Behavior and the Returns from Highway Infrastructure Investments," *Journal of Urban Economics* 55 (2004): 398–415; Sarantis Kalyvitis and Eugenia Vella, "Public Capital Maintenance, Decentralization, and U.S. Productivity Growth," *Public Finance Quarterly* 39, no. 6 (2011): 784–809; and Alfredo Pereira and Jorge Andraz, "On the Regional Incidence of Highway Investments in the USA," *Public Finance Quarterly* 48, no. 3 (2012): 819–38.

First, any benefit-cost calculation should be subject to outside peer review.[21] A group of specialists at universities not directly involved with the project could be selected to review the analysis. While it is likely to be difficult to find completely objective reviewers, an independent review can provide some perspective, possibly improving results. This approach appears to have improved the revenue forecasts of the Congressional Budget Office and of budget agencies outside the United States.[22]

Second, Flyvbjerg suggests it would make sense, where possible, to compare estimates of costs and traffic flows with outcomes of completed projects of comparable size under similar economic and demographic conditions.[23] If there is a sample of comparable projects, a distribution of outcomes can be constructed. Then, the estimates for the new project can be compared with previous outcomes of similar projects. This process could help establish the degree of confidence taxpayers should have in the estimates. Making this information public would provide taxpayers with a basis to decide whether the projections seem reasonable.

Third, each benefit and cost estimate should be calculated using a range of possible assumptions. For example, what happens to the benefit-cost ratio when using an alternative discount rate? How sensitive are the estimates to variations in key assumptions, such as economic growth and inflation rates? Are the estimates robust?[24]

Finally, to generate the right incentives, tie an analyst's salary or bonuses to the accuracy of his or her cost and benefit projections. Compensation for outside reviewers should also be tied to accuracy.

LEGISLATIVE VOTING PRACTICES AND INSTITUTIONS

Transportation infrastructure in the United States is financed using federal, state, and local funds. A major source of funding is the federal Highway Trust Fund, whose funding and spending priorities Congress reauthorizes every five years, although political wrangling can delay the reauthorization. The Federal Highway Administration divides the total funding of a highway authorization bill among the states based on a formula contained in the legislation.[25]

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21. See Small, "Project Evaluation," 168n5.
22. See Krol, "Forecast Bias of Government Agencies," 99–112n17.
23. Flyvbjerg, "Survival of the Unfittest."
24. See Small, "Project Evaluation," 158–60n5.
25. Todd M. Nesbit and Steven F. Kreft, "Federal Grants, Earmarked Revenues, and Budget Crowd-Out: State Highway Funding," *Public Budgeting & Finance* 29, no. 2 (2009): 94–110.

The formula depends on state characteristics: population growth, urban density, and economic growth. Most federal funds transferred to the states come in the form of an 80 percent federal, 20 percent state matching grant. These funds come with regulations and constraints dictated by Congress. Approximately one-third of recent appropriations from the Highway Trust Fund have been allocated for demonstration projects, earmarks, and nonroad expenditures.[26] Ultimately, it is Congress that determines the amount and allocation of funds.

A theoretical justification for giving the federal government a large role in the provision of local public goods, like transportation projects, is the presence of spillover benefits.[27] This means that some benefits from a particular project, such as a road, are captured by individuals who live outside its political jurisdiction. If all transportation spending were financed by local taxes, some individuals would benefit from a road without paying for it. Where there are spillovers, even if the road's total cost equals the total benefits—including those that accrue to nontaxpaying users—if the community where the road is located does not capture all the benefits, it will not build some economically worthwhile roads. Because of these benefit spillovers, the argument goes, all communities would spend less on transportation, and the nation would not have a road system that would maximize economic welfare. Assuming the size of these spillovers can be measured and political incentives do not bias funding, both strong assumptions, using federal revenues to finance local road construction reduces the problems created by benefit spillovers.

An alternative solution to the benefit spillover problem would be to charge a toll to use a major highway. Then

"Unfortunately, having the federal government play such a major role in financing the transportation system results in the construction of many noneconomic transportation projects."

26. Ronald D. Utt, "Next Highway Reauthorization Bill Should Terminate the Transportation Enhancement Program" (WebMemo No. 3407, Heritage Foundation, Washington, DC, 2011).
27. Charles R. Hulten and Robert M. Schwab, "A Fiscal Federalism Approach to Infrastructure Policy," *Regional Science and Urban Economics* 27, no. 2 (1997): 139–59; and Wallace E. Oates, "An Essay on Fiscal Federalism," *Journal of Economic Literature* 37, no. 3 (1999): 1120–49.

all users would contribute to financing the road and the federal financing role could be reduced or eliminated. Local streets could be financed by general taxes imposed by the town or city.

A relevant question is whether benefit spillovers are large. Edward Gramlich estimated that the benefit spillovers on the interstate highway system are around 30 percent, suggesting a limited role for the federal government in financing highways.[28] However, there continues to be a debate on the size of these spillovers.[29] Allowing Congress to vote on transportation spending to solve the benefit spillover problem creates other inefficiencies in the process that outweigh any spillover problems.

Legislative voting on federal highway spending is problematic because funds for local projects come from a common pool. The benefits from a transportation project are concentrated in the community or region that receives the funds, while the costs are spread out over the entire nation. Furthermore, the federal funds spent in a jurisdiction benefit local construction companies and their employees. While these funds may be viewed as a cost to unorganized taxpayers outside the jurisdiction, they are benefits received by local firms and workers. Therefore, these groups will organize and lobby for these project funds. This strengthens the incentive to fund inefficient or low-benefit infrastructure projects.[30]

Unfortunately, having the federal government play such a major role in financing the transportation system results in the construction of many noneconomic transportation projects. Voters in a community and their political representatives will want to build any project for which the benefits exceed the community's share of the cost. This bias can result in projects whose total cost exceeds the community's total benefit, implying that the project is a net loss to society. Such projects get built because the community only pays a part of the cost, rather than the full cost. If the town was footing the project's entire cost, it would be less inclined to build the project. This kind of thinking drives the voting of a community's representatives in Congress. As a result, the level and distribution of transportation spending does not maximize economic welfare and is inefficient.

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28. Edward Gramlich, "Infrastructure Investment: A Review Essay," *Journal of Economic Literature* 79, no. 3 (1994): 1176–213.

29. Jeffrey P. Cohen and Catherine J. Morrison Paul, "Public Infrastructure Investment, Interstate Spatial Spillovers, and Manufacturing Costs," *Review of Economics and Statistics* 86, no. 2 (2004): 551–60; and Alfredo M. Pereira and Jorge M. Andraz, "On the Regional Incidence of Highway Investments in the USA," *Annals of Regional Science* 48, no. 3 (2012): 819–38.

30. Barry R. Weingast, Kenneth A. Shepsle, and Christopher Johnson, "The Political Economy of Benefits and Costs: A Neoclassical Approach to Distributive Politics," *Journal of Political Economy* 89, no. 4 (1981): 642–64.

Brian Knight examines transportation project voting in Congress.[31] He argues that a legislator is more likely to support transportation project spending as the number of projects in the district increases. This support is balanced against a desire to limit voters' total tax burden. In other words, as the number of own-district projects increases and the number of projects elsewhere declines, the legislator is more likely to vote for the bill.

From 1998 through 2003, the US House of Representatives voted on 1,653 transportation projects worth $9.5 billion.[32] Knight finds, unsurprisingly, that higher district spending had a positive effect on voting yes, while higher total spending negatively impacted support for a bill. He finds no evidence of spillover effects; projects in districts with a common border did not get more support. This finding is evidence that spillover benefits tend to be small, the implication being that the federal government should play a smaller role in financing highways. He also finds that congressional districts with members on the Transportation Authorization Committee received three times more funding than other districts.

Knight tries to determine whether the total level of transportation spending maximizes economic welfare. Consumer welfare is greatest when funds are allocated across projects so that the last dollar spent (the social marginal benefit of a project) equals the tax cost (the social marginal cost). Knight finds that national marginal costs exceed national marginal benefits, indicating that national economic welfare would increase if the federal government were to spend less on transportation. He estimates the welfare loss of the excess spending at $7.2 billion annually. While most politicians and commentators argue for more spending on transportation infrastructure, these results suggest otherwise. Taxpayers should rethink the allocation of funds across states.

Logrolling can also distort transportation spending decisions in Congress. For committee leaders to pass a transportation bill, they must garner support from more than 50 percent of the legislature. Diana Evans examines this issue by looking at how highway demonstration projects influenced the vote on the 1987 transportation bill.[33] At the time, owing to the recent completion of the interstate highway system, there was opposition to additional transportation

31. Brian Knight, "Parochial Interests and the Centralized Provision of Local Public Goods: Evidence from Congressional Voting on Transportation Projects," *Journal of Public Economics* 88, no. 3 (2004): 845–66.

32. For additional evidence on this type of voting behavior, see Dennis C. Mueller, *Public Choice III* (New York: Cambridge University Press, 2003).

33. Diana Evans, "Policy and Pork: The Use of Pork Barrel Projects to Build Policy Coalitions in the House of Representatives," *American Journal of Political Science* 38, no. 4 (1994): 894–917.

funding. To ensure the bill's passage, committee leaders allocated demonstration projects to increase support. House leaders provided 100 of these projects to 76 House members and the bill passed. In her statistical work, Evans finds that members who received a demonstration project in their district were more likely to support the transportation bill. Logrolling can increase spending, in this case as part of a transportation bill, to ensure passage of a bill facing legitimate opposition. In addition, the demonstration projects were allocated to buy votes, and not because the projects made any economic sense.

"Political institutions, such as election rules or term limits, also influence infrastructure spending."

The complications brought on by the democratic process to determine transportation infrastructure spending are not unique to the United States. Research shows that similar political forces plague spending decisions in other developed countries, including France, Spain, Canada, and Norway. Researchers have found that lobbying efforts by interest groups and reelection incentives cause politicians to allocate transportation and other infrastructure spending for political reasons rather than based on the project's net benefits.[34] A study by Philip Keefer and Stephen Knack examines a large cross section of developing countries from 1974 through 1998.[35] They find that government corruption and noncompetitive elections result in higher levels of infrastructure spending on projects with low benefit-cost ratios. They conclude that much of this spending is not productive. Instead, the spending steers benefits to government

34. See Olivier Cadot, Lars-Hendrick Röller, and Andreas Stephan, "Contribution to Productivity or Pork Barrel? The Two Faces of Infrastructure Investment," *Public Choice* 90, no. 6–7 (2006): 1133–53; Albert Solé-Ollé, "Inter-regional Redistribution through Infrastructure Investment: Tactical or Programmatic?," *Public Choice* 156, no. 1–2 (2013): 229–52; Marcelin Joanis, "The Road to Power: Partisan Loyalty and the Centralized Provision of Local Infrastructure," *Public Choice* 146, no. 1–2 (2011): 117–43; and Jon H. Fiva and Gisle James Natvik, "Do Re-election Probabilities Influence Public Investment?," *Public Choice* 157, no. 1–2 (2013): 305–31.

35. Philip Keefer and Stephen Knack, "Boondoggles, Rent Seeking, and Political Checks and Balances: Public Investment under Unaccountable Governments," *Review of Economics and Statistics* 89, no. 3 (2007): 566–72.

officials or their cronies. They point out that infrastructure spending is not likely to drive economic development in countries with low-quality political environments.

Political institutions, such as election rules or term limits, also influence infrastructure spending. Douglas Dalenberg and Kevin Duffy-Deno investigate the effect of election rules on infrastructure spending using US city-level data.[36] They argue that outcomes will differ if local officials are elected citywide rather than by voters in smaller communities (as in a ward system). As with federal funding, in a ward or council district system, infrastructure funding comes from a common pool of tax revenues. In this situation, a portion of the higher taxes associated with infrastructure spending in one ward comes from voters in other wards. Local politicians weigh the increase in support associated with an infrastructure project against the lost votes associated with higher taxes. In a ward system, because part of the cost of a ward-specific infrastructure project is spread out over the entire city, city council members are more likely to support local infrastructure spending. The result should be a higher overall infrastructure stock in the city because of the election structure. Dalenberg and Duffy-Deno look at a sample of 30 cities and find that from 1960 through 1981, cities with ward elections had a higher infrastructure stock than cities with citywide elections. In this case, the city's political structure may override the economic merits of infrastructure spending.

Term limits leave current policies open to change because the next government might have different priories. To constrain the next administration, current politicians may choose durable infrastructure projects that lock in place their own spending priorities. High tax and debt levels used to fund infrastructure projects limit a future government's ability to expand in other policy areas. Crain and Oakley test this hypothesis using state level data for 1978 through 1988. They find that the absence of term limits, a stable majority political party, and a biennial budget all increase political durability and significantly lower the public capital stock of the states. They also find higher public capital stock in states where voters had access to an initiative system and where the capital budget is separate from the general fund. These results show that institutional factors outside of project benefits and costs influence infrastructure spending in the United States.

36. Douglas R. Dalenberg and Kevin T. Duffy-Deno, "At-Large Versus Ward Elections: Implications for Public Infrastructure," *Public Choice* 70, no. 3 (1991): 335–42.

POLICY CONCLUSIONS

Transportation infrastructure spending decisions are made in a political environment. Reforming government to more effectively allocate transportation spending remains a daunting challenge. Since transportation spillover benefits are modest, the ideal reform would be to end the federal gasoline tax used to fund the Highway Trust Fund.[37] Each state could then decide on an appropriate funding approach given its transportation system goals. Once funding has been shifted to the state and local levels, transportation infrastructure decisions would be more efficient because these jurisdictions would bear the costs and capture most of the benefits from any transportation project. Better decisions would be made if the political entity bore a project's full cost.

Alternatively, if eliminating the Highway Trust Fund is not possible, funds should be transferred to states as fixed block grants.[38] While there are also political problems with allocating funds at the state level, there is a greater chance that the funds would be better allocated. It is also important to end regulations that dictate how funds are used. For example, states should not be forced to build new capacity if maintenance spending provides higher net benefits.[39]

States should be free to use congestion tolls on interstate highways to improve the use of existing roads. The increase in efficiency would be significant. Congestion pricing would give states and cities better information about their highway needs.[40] In some cases, the reduction in congestion would eliminate the need to add lanes to highways. The current funding system takes a build-your-way-out-of-congestion approach: that is, the solution to congestion

37. Ending the federal gasoline tax introduces another problem. Using fossil fuels produces air pollution. One argument for taxing gasoline consumption, independent of financing highways, is to internalize the negative externality from consuming gasoline. For a discussion of this issue and an estimate of the optimal gasoline tax, see Ian W. H. Parry and Kenneth A. Small, "Does Britain or the United States Have the Right Gasoline Tax?," *American Economic Review* 95, no. 4 (2005): 1276–89.
38. This is what Congressman Ron Desantos (R-FL) and Senator Mike Lee (R-UT) have proposed in their 2015 Transportation Empowerment Act. The law proposes to reduce the federal gasoline tax from 18.4 cents per gallon to 3.7 cents per gallon over five years beginning in fiscal year 2016. During the transition, the federal tax would remain at 18.4 cents per gallon and states would receive an increasing proportion of gas-tax revenues as block grants with no restrictions on how each state uses the funds. The tax would be reduced to 3.7 cents per gallon on October 1, 2020. The remaining federal funds could only be used to maintain or improve the interstate highway system.
39. Kalyvitis and Vella, "Public Capital Maintenance."
40. For a discussion of how the transition to a new funding system would work and how to deal with privacy issues, see Tracy R. Miller, "Improving the Efficiency and Equity of Highway Funding and Management," Mercatus Working Paper (Arlington, VA: Mercatus Center at George Mason University, 2014), http://mercatus.org/publication/improving-efficiency-and-equity-highway-funding-and-management-role-vmt-charges.

problems is to build more highways. Adding highway lanes increases traffic volume, but may fail to solve the congestion problem.[41] Furthermore, it is impossible to determine the efficient level of highway spending when the price for driving is zero. Observing consumption at prices that reflect the cost of additional construction allows policy makers to assess whether additional roads make economic sense. Another option is to expand the private sector's role in funding, building, and managing transportation infrastructure to generate experimentation that could improve the system's efficiency.

All governments face competing demand for tax revenues. Given this constraint, government officials should determine spending priorities to fund the transportation projects that have the highest value to society, as determined by objective benefit-cost analysis. However, in the political world, elected officials face and respond to pressures from special interest groups. These lobbying pressures, combined with politicians' interests in being reelected, greatly politicize the process, moving the actual outcome away from the ideal.

Given the incentives that cause the political decision-making process to allocate resources in an inefficient manner, how likely is it that transportation policy reforms can occur? Most federal elected officials have been unwilling to cede control over transportation infrastructure spending even though the interstate highway system was completed in the early 1980s. The most likely development to force policy reform is the financial pressure governments face from growing entitlements. As entitlement spending, public pensions, and health care become a larger share of the federal budget, there may be pressure to shift transportation spending responsibilities to state and local governments, where spending from a common pool of tax dollars is less of a problem. The shift in financing responsibility would more closely match project benefits to costs.

41. Gilles Duranton and Matthew A. Turner, "The Fundamental Law of Road Congestion: Evidence from US Cities," *American Economic Review* 101, no. 6 (2011): 6–56.

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