

Federal Government Cost Overruns

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The federal government has hundreds of agencies and thousands of programs, and it now spends almost \$4 trillion a year. The government has grown too large to manage efficiently. Agencies have little incentive to control costs or improve quality, and Congress does a poor job of overseeing the executive branch to ensure good performance. As a result, many federal agencies suffer from wasteful spending practices.¹

One aspect of federal waste is frequent cost overruns on major projects, such as weapon systems and infrastructure. If a government project is initially estimated to cost \$1 billion, it may end up costing \$2 billion by the time it is finished. This essay looks at the causes of cost overruns, and examines some of the budget areas that have the most serious problems, including defense, energy, and transportation.

Scope of the Problem

The federal government proceeds with large projects on the basis of estimated costs, but once projects get underway officials often revise the costs upward. Cost overruns have plagued the federal government since the beginning. Way back in 1836, for example, a Ways and Means Committee report criticized infrastructure spending by the Army Corps of Engineers. All 25 projects reviewed by the committee that year were overbudget, and “many” had cost overruns of 50 percent or more.²

Economists Stanley Engerman and Kenneth Sokoloff studied a sample of major government infrastructure projects in U.S. history and found that most had substantial cost overruns.³ The construction of the Erie Canal between 1817 and 1825, for example, went 46 percent overbudget, while the canal’s later expansion went 142 percent overbudget.

In recent years, many federal projects have had large cost overruns. The cost to create the Healthcare.gov website launched in 2013 grew from \$464 million to \$824 million.⁴ The International Space Station more than quadrupled in cost from \$17 billion to \$74 billion.⁵ The

Capitol Visitor Center in Washington soared in cost from an initial \$265 million to \$621 million by the time it was completed in 2008.⁶

Cost overruns have plagued hospital construction by the Department of Veterans Affairs.⁷ A hospital currently being built in Orlando has more than doubled in cost from \$254 million to \$616 million. And a hospital being built near Denver has quintupled in cost from \$328 million to \$1.7 billion.

Cost overruns on government projects are a global phenomenon.⁸ For example, construction costs for Olympic Games often escalate, with the 2012 London Olympics doubling in cost, and the 1992 Barcelona Olympics quadrupling in cost.⁹ Describing government infrastructure, the World Bank concluded, “studies show a history of extensive cost and time overruns in construction projects across the sectors and in countries around the world. . . . The rising expense can be crippling for governments, particularly in developing countries as they try to improve basic services.”¹⁰

A leading expert on cost overruns is Bent Flyvbjerg, a Danish professor of planning. His co-authored 2003 book, *Megaprojects and Risk*, concluded that “cost overruns of 50 percent to 100 percent in real terms are common in megaprojects.”¹¹ In one of his studies, Flyvbjerg looked at 258 large transportation projects across 20 countries.¹² He found that 90 percent went overbudget.

Another study by a team at Oxford University looked at 245 dam projects across 65 countries.¹³ The study found that average construction costs were 96 percent higher than originally budgeted, in constant dollars. Thus, real dam costs have typically doubled from the original estimates.

This issue is important because the true costs of projects determine whether or not they make economic sense. On the Oxford study, for example, the average projected benefits of the dams was just 40 percent higher than the originally estimated costs. Since the costs, on average, rose 96 percent, the study concluded that large dams are not economically viable in most cases.

Unfortunately, government policymakers and planners do not seem to learn from past mistakes. Flyvbjerg finds that the magnitude of cost overruns on major projects has not declined over time.¹⁴ Engerman and Sokoloff come to similar conclusions.¹⁵ So there appear to be systematic factors that induce governments to either consistently mismanage projects, low-ball initial cost estimates, or both.

Causes of Cost Overruns

There are technical reasons why cost overruns may occur on major projects. The costs of materials, labor, or other inputs may change in unexpected ways. Projects may face delays for reasons not envisioned. Project planners may have “optimism bias,” meaning that they are eager for a positive result and overlook possible problems.

However, expert planners and engineers should consider contingencies and include leeway in their initial cost estimates. They should study prior projects, consider risk factors, and construct conservative estimates. Optimism should be tempered by experience in dealing with problems on previous projects. If planners did make realistic projections based on experience, one would expect that, in a sample of projects, the errors in cost estimating would go both ways—some projects would be underbudget and some would be overbudget.

However, that is not what happens with large government projects. In studying hundreds of projects, Flyvbjerg and his colleagues conclude that the differences in initial and final cost figures “are too consistent and too one-sided for this.”¹⁶ Projects generally run overbudget, not underbudget.

The cost overrun problem has not diminished over time. Yet, as Flyvbjerg notes, “it seems unlikely that a whole profession of forecasting experts would continue to make the same mistakes decade after decade instead of learning from their actions.”¹⁷ So he concludes that project promoters purposely low-ball initial cost estimates to increase the likelihood of project approval. Flyvbjerg calls this “strategic misrepresentation.”

With the federal government, there are structural incentives that encourage both low-balled estimates and a lack of cost control on projects once they are underway. Unlike businesses, federal agencies do not have to earn profits, so they have little reason to restrain costs. A 2014 Government Accountability Office (GAO) report on Department of Defense (DoD) contracting noted:

In DoD, there can be few consequences if funds are not used efficiently. For example, as has often been the case in the past, agency budgets generally do not fluctuate much year to year and, programs that experience problems tend to eventually receive more funding to get well.¹⁸

Another problem in the government is that disciplining managers is difficult because of strong civil service and union protections. Just 0.5 percent of federal workers get fired each year, which is just one-sixth the private-sector firing rate.¹⁹ Also, federal pay is generally tied to longevity, not performance. As a result, federal managers do not have strong incentives to ensure that projects are executed on time and on budget.

Now consider the incentives in Congress. Members are inclined to support expensive federal projects that benefit voters in their districts and states, even when projects make no sense for the overall nation. Cost overruns may generate some negative publicity, but they also create benefits for politicians because they mean more spending in affected congressional districts.

Alan Stern, a former associate administrator of the National Aeronautics and Space Administration (NASA), pointed to numerous bureaucratic and political reasons for chronic cost overruns:

Endemic project cost increases at NASA begin when scientists and engineers (and sometimes Congress) burden missions with features beyond what is affordable in the stated budget. The problem continues with managers and contractors who accept or encourage such assignments, expecting to eventually be bailed out. It is worsened by managers who disguise the size of cost increases that missions incur. Finally, it culminates with scientists who won't cut their costs and members of Congress who accept steep increases to protect local jobs.²⁰

Flyvbjerg and his colleagues conclude that “project promoters routinely ignore, hide, or otherwise leave out important project costs and risks in order to make total costs appear low.”²¹ Put another way, politicians, officials, and contractors use “salami tactics.” They present artificially low costs up front to gain initial funding, and then higher costs are revealed later on one slice at a time when projects are too far along to be canceled.

Martin Wachs, an infrastructure expert at RAND Corporation, has come to similar conclusions about the causes of cost overruns:

I have interviewed public officials, consultants, and planners who have been involved [in transit projects and ridership forecasting] and I am absolutely convinced that the cost overruns and patronage overestimates were not the result of technical errors, honest mistakes, or inadequate methods. In case after case, planners, engineers, and economists have told me that they had to ‘revise’ their forecasts many times because they

failed to satisfy their superiors. The forecasts had to be ‘cooked’ in order to produce numbers that were dramatic enough to gain federal support for projects whether or not they could be fully justified on technical grounds.²²

William Ibbs, a professor of construction management at the University of California, Berkeley, concurs that governments often lowball initial cost estimates to help get projects underway: “I’m not saying they’re committing fraud, but let’s say they’re overly optimistic. . . . They’ll get the work going and then the public will be reluctant to cancel a project because they’ve spent all this money so far.”²³

Former San Francisco mayor Willie Brown has been even more blunt than Ibbs or Wachs. In a 2013 opinion piece, he described the sources of cost overruns on projects in his city:

News that the Transbay Terminal is something like \$300 million over budget should not come as a shock to anyone. 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 just 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.²⁴

Brown was in the California assembly for 30 years and mayor of San Francisco for 8 years, so he knows how the government works. He is saying that officials provide the public with fake initial estimates to get projects approved, and then projects are moved ahead before the truth is known so that there is no turning back. Note that major shares of funding for San Francisco’s Transbay Transit Terminal and Central Subway came from the federal government.²⁵

Defense Projects

The Department of Defense has long struggled with cost overruns. As one of the first major procurements under the Constitution, the government bought six Navy frigates in 1794. The ships were projected to cost \$688,889, but a myriad of problems pushed the ultimate cost up 70 percent to \$1,176,721.²⁶

Over the decades, that pattern has been repeated many times. The Pentagon building itself, constructed in Virginia in the 1940s, “was built upon a foundation of lies, secrecy, and cost overruns.”²⁷ The Pentagon building

ending up costing \$75 million to build, more than double the original estimate of \$35 million.

In 2006 Comptroller General David Walker said that the Pentagon has “a long-standing track record of over-promising and under-delivering with virtual impunity.”²⁸ In 2008 the GAO found, “DoD’s major weapon system programs continue to take longer, cost more, and deliver fewer quantities and capabilities than originally planned.”²⁹ And in 2014 the GAO noted, “Weapon systems acquisition has been on GAO’s high risk list since 1990. . . . While some progress has been made on this front, too often we report on the same kinds of problems today that we did over 20 years ago.”³⁰

Congress has made some reforms to help reduce defense cost overruns, but the problem does not seem to have diminished. For 91 major programs the GAO examined in 2005, R&D costs were 33 percent overbudget, on average, and procurement costs were 18 percent overbudget.³¹ For 78 major programs examined in 2014, R&D costs were 53 percent overbudget, and procurement costs were 46 percent overbudget.³² These overruns are measured in constant dollars.

Policymakers often blame the Pentagon’s use of cost-plus or cost-reimbursement contracts—rather than fixed-price contracts—as a key problem. Cost-plus contracts seem to give a “blank check” to contractors because they allow costs to rise over time. And, indeed, studies find that cost-plus contracts typically have more cost growth than do fixed-price contracts.³³

However, some experts argue that a greater use of fixed-price contracts would not necessarily reduce overall procurement costs.³⁴ Producing advanced weapons is a complex activity, which makes it difficult to set tight up-front parameters. As a result, fixed-price contracts are often modified to add new capabilities, which tends to push up overall costs.³⁵ So finding the best solution for Pentagon contracting is not easy, and different types of contracts are likely appropriate for different types of procurement.

Nonetheless, there is wide agreement that current DoD procurement suffers from a bloated bureaucracy and excess paperwork, and it moves far too slowly.³⁶ The system produces results biased strongly toward cost overruns. Consider the Joint Strike Fighter, or F-35, which is the Pentagon’s largest acquisition program at almost \$400 billion. Real, per-unit costs of the fighters have soared 75 percent since 2001, as shown in Table 1.³⁷

Another high-profile cost overrun was the purchase of new Marine One helicopters for the president. The VH-71 project began in 2002, and then estimated costs began to rise, eventually doubling from \$6.5 billion to \$13 billion.³⁸ The GAO pinned the blame on DoD mismanagement.³⁹ Fortunately, the DoD scrapped the VH-71 program in 2009, but after \$3.2 billion had already been spent.⁴⁰

In sum, the Pentagon and Congress share the blame for ongoing problems in defense procurement. The GAO says that the military branches “overpromise capabilities and underestimate costs to capture the funding needed to start and sustain development programs.”⁴¹

As for Congress, many members fight attempts to restrain spending in their districts, including spending on weapons that the Pentagon does not want. As defense analyst Winslow Wheeler noted in his book about the dysfunction in military budgeting, gaining parochial advantage “has become a full-time preoccupation that permeates Congress’s activities and members’ decisionmaking processes.”⁴²

Table 1. Sampling of Defense Cost Overruns

Defense Projects ⁴³	Cost Estimate and Date of Estimate	
	Original	Recent or Final
Littoral Combat Ship	\$360m (2004)	\$667m (2014)
Evolved Expendable Launch Vehicle	\$102m (1998)	\$376m (2013)
Joint Strike Fighter	\$79m (2001)	\$138m (2013)
JPALS Landing System	\$29m (2008)	\$77m (2014)
G/ATOR Radar	\$24m (2005)	\$61m (2014)

Notes: Costs in this table are per-unit in constant 2015 dollars. By contrast, Tables 2 and 3 show total costs in nominal dollars. m=million.

Energy Projects

Mismanagement is pervasive in the Department of Energy (DOE). The largest part of DOE’s budget is spending on the National Nuclear Security Administration (NNSA), which handles the safety of America’s nuclear weapons stockpile. NNSA activities are plagued with cost overruns.⁴⁴ For example, “costs have skyrocketed for the Mixed Oxide Fuel Fabrication Facility at the Savannah River plant in South Carolina.”⁴⁵ When the NNSA began this program in 2002, it was expected to cost \$1 billion, but by 2014 costs had soared more than seven-fold to \$7.8 billion. The project has already consumed \$5 billion in taxpayer funding, and a group of outside experts is now calling for it to be cancelled.⁴⁶

The second largest part of DOE’s budget is spending to clean up federal nuclear weapon sites. This activity has cost a remarkable \$150 billion or more since 1990.⁴⁷ Unfortunately, “efforts to treat and dispose of high-level waste have been plagued with false starts and failures, resulting in steadily growing estimates of the program’s total cost,” noted GAO.⁴⁸

In 2008 GAO found that “nine of 10 cleanup projects we reviewed have experienced cost increases and schedule delays in their life cycle baseline, ranging from \$139 million for one project to more than \$9 billion for another, and schedule delays ranging from 2 years to 15 years.”⁴⁹ The largest nuclear site cleanup is at Hanford in Washington State. A key waste treatment plant at Hanford ballooned in cost from \$4.3 billion in 2000 to \$13.4 billion by 2012, as shown in Table 2.⁵⁰

Federal energy research has been another black hole for taxpayer dollars. One boondoggle was the Illinois-based FutureGen. It was launched in 2003 to build a low-emission coal power plant and demonstrate carbon capture technologies. It was originally estimated to cost \$950 million, but by 2008 the cost had ballooned to \$1.8 billion.⁵¹ The George W. Bush administration wisely cancelled it. But in 2010, the Obama administration revived the project, which it dubbed FutureGen 2.0. This version of the project also went overbudget, and was eventually cancelled in 2015.⁵² The project made no economic sense, but was sustained for years by the dogged efforts of Illinois members of Congress.

Table 2. Sampling of Energy Cost Overruns

Energy Projects	Cost Estimate and Date of Estimate	
	Original	Recent or Final
Hanford waste site ⁵³	\$4.3b (2000)	\$13.4b (2012)
Superconducting Supercollider ⁵⁴	\$4.4b (1987)	\$11.8b (1993)
NNSA-Savannah River ⁵⁵	\$1.0b (2002)	\$7.8b (2014)
National Ignition Facility ⁵⁶	\$2.1b (1995)	\$5.3b (2014)
Clinch River Reactor ⁵⁷	\$400m (1971)	\$4.0b (1983)
FutureGen clean coal ⁵⁸	\$950m (2003)	\$1.8b (2008)

Note: m=million, b=billion.

Transportation Projects

Cost overruns on transportation projects have plagued American governments since at least the 19th century. The Erie Canal, which opened in 1825, suffered a large cost overrun, as noted, but in the end it turned out to be an economic success. The problem was what happened next: the Erie’s success prompted politicians in Michigan, Pennsylvania, Ohio, Indiana, Maryland, and Illinois to spend lavishly on their own, often dubious, canal schemes.⁵⁹ The states overestimated the demand for canals and underestimated the construction costs. Routes were

often chosen for political reasons, not to maximize economic benefits. It turned out that the Erie Canal was a uniquely high-return route, while nearly all the rest of the state-sponsored canals in the 19th century were boondoggles that created large taxpayer losses.

Today's equivalent of boondoggle canals is urban rail systems, which cost federal taxpayers \$13 billion a year.⁶⁰ Federally funded rail projects have long been prone to cost overruns and inflated ridership projections. A 1990 Department of Transportation (DOT) report examined the costs of 10 large rail projects.⁶¹ Nine of the projects had cost overruns, and the average overrun was 50 percent.

Little has changed since that study. Martin Wachs, the RAND infrastructure expert, says, "of 35 public transit projects I have studied in the U.S., 33 overestimated patronage [ridership] and 28 underestimated costs."⁶² A recent study by Randal O'Toole and Michelangelo Landgrave looked at the costs of 45 urban rail projects across the nation since the 1980s.⁶³ They found that, on average, rail projects doubled in cost between when they were approved and when they were completed.

Looking internationally at a sample of 58 rail projects, Flyvbjerg and colleagues found that the average cost overrun, in constant dollars, was 45 percent.⁶⁴ On the benefits of rail projects, they found that ridership was 51 percent less, on average, than originally estimated. O'Toole and Landgrave find a similar overestimate of ridership.

Both studies found that cost overruns on rail projects have not diminished over time. Looking at transportation projects overall, Flyvbjerg and colleagues concluded, "The use of deception and lying as tactics aimed at getting projects started appears to best explain why costs are highly and systematically underestimated and benefits overestimated in transport infrastructure projects."⁶⁵

One current project with a large cost overrun is the East Side Access train tunnel in New York City between Queens and Manhattan. The original proposal in 1999 put the cost at \$4.3 billion and completion by 2009. But now the project is expected to cost \$10.8 billion and be completed by 2023, as shown in Table 3.⁶⁶ Federal taxpayers will pay \$2.7 billion of the project's bill.

Another troubled project is the World Trade Center rail station in New York. When completed this year, the station will have cost about \$4 billion, double the original estimate of \$2 billion.⁶⁷ The *Wall Street Journal* found that political infighting and the conflicting demands of numerous government agencies pushed up the costs. It concluded that the station is "a project sunk in a morass of politics and government."⁶⁸

The morass of transportation bureaucracy is made worse by federal involvement in state and local projects. GAO points to the "fragmented approach as five DOT agencies with 6,000 employees administer over 100

separate programs with separate funding streams for highways, transit, rail, and safety functions. This fragmented approach impedes effective decision making and limits the ability of decisionmakers to devise comprehensive solutions to complex challenges."⁶⁹ By adding more officials and more paperwork, federal involvement in state projects reduces accountability and encourages cost overruns.

Table 3. Sampling of Transportation Cost Overruns

Transportation Projects	Cost Estimate and Date of Estimate	
	Original	Recent or Final
Boston Big Dig ⁷⁰	\$2.6b (1985)	\$14.6b (2005)
NYC East Side Access ⁷¹	\$4.3b (1999)	\$10.8b (2014)
San Francisco Bay Bridge ⁷²	\$1.4b (1996)	\$6.3b (2013)
Denver International Airport ⁷³	\$2.1b (1990)	\$4.8b (1995)
NYC WTC Rail Station ⁷⁴	\$2.0b (2004)	\$4.0b (2015)
Denver West Light Rail ⁷⁵	\$250m (1997)	\$707m (2013)
VA-Springfield Interchange ⁷⁶	\$241m (1994)	\$676m (2003)

Note: m=million, b=billion.

Conclusions

Cost overruns on large government projects are pervasive. The problem appears to stem from a mixture of deception and mismanagement, and it has not diminished over time. One of the consequences is that taxpayers are likely footing the bill for many projects that cost more than the benefits delivered. Flyvbjerg argues that cost overruns result in the "survival of the unfittest," meaning that projects with the most exaggerated benefits and low-balled costs get approved, rather than the most worthy ones.⁷⁷

To help cure the cost overrun disease, the federal government should increase transparency in major contracting. Agencies should release details about proposed projects early in the process, and they should actively solicit critiques of projects from independent engineers and economists.

Federal agencies should also benchmark the costs and schedules of proposed projects against similar past projects to inject more realism into planning.⁷⁸ And agencies should perform detailed evaluations of projects after they are completed, so that policymakers and contractors can learn from them and avoid mistakes in the future.

The gains from such improved efficiencies would be large. A McKinsey Global Institute study looked at hundreds of infrastructure projects worldwide, and found that productivity could be improved by up to 60 percent by better project selection, more efficient permitting and construction, and better use of existing assets.⁷⁹

In the United States, productivity would be improved by decentralizing funding and decisionmaking for projects out of Washington whenever possible. Energy research should be left to the private sector. Urban transit should be left to local governments and the private sector. Highway funding should be left to state governments and the private sector.

It is true that cost overruns and other inefficiencies are a risk on all types of large projects, whoever undertakes them. But the federal government's track record on major project management is particularly poor, and many federal agencies do not learn from past mistakes. By using their own funding, state and local governments and the private sector would have stronger incentives to minimize costs and reduce delays on major investment projects.

¹ These issues are discussed in Chris Edwards, "Why the Federal Government Fails," Cato Institute Policy Analysis no. 777, July 27, 2015.

² The report is excerpted in Chester Collins Maxey, "Log-Rolling," Thesis for Master of Arts, University of Wisconsin, 1914, p. 38. And see Todd Shallat, "Success through Failure," *Water Resources Impact*, American Water Resources Association, January 2003.

³ Stanley L. Engerman and Kenneth L. Sokoloff, "Digging the Dirt at Public Expense: Governance in the Building of the Erie Canal and Other Public Works," National Bureau of Economic Research, Working Paper 10965, December 2004, Table 1.

⁴ Department of Health and Human Services, Office of the Inspector General, "Federal Marketplace: Inadequacies in Contract Planning and Procurement," January 2015, p. 18.

⁵ A NASA report found, "The final configuration of the ISS cost more, took longer to complete, and is less capable than NASA and its partners envisioned. NASA originally estimated assembly of the station would be complete by 2002 at a total cost to the agency of \$17.4 billion.

However, construction was not completed until 2011, and through fiscal year (FY) 2013 the agency has spent approximately \$74.4 billion." National Aeronautics and Space Administration, Office of Inspector General, "Extending the Operational Life of the International Space Station Until 2024," September 18, 2014.

⁶ Ashley Halsey III, "6 Years Later, Capitol Visitor Center Puts Out Long-Awaited Welcome Mat," *Washington Post*, December 1, 2008.

⁷ Government Accountability Office, "VA Construction: Actions to Address Cost Increases and Schedule Delays at Denver and Other VA Major Medical-Facility Projects," GAO-15-564T, April 24, 2015, p. 4.

⁸ In Britain, a think tank examined 240 large U.K. government projects and found an average cost overrun of 38 percent. See Taxpayers' Alliance, "Out of Control: How the Government Overspends on Capital Projects," November 20, 2009.

⁹ Bent Flyvbjerg and Allison Stewart, "Olympic Proportions: Cost and Cost Overrun at the Olympics 1960–2012," Saïd Business School Working Papers, University of Oxford, June 2012.

¹⁰ The World Bank, News, "Construction Sector Transparency Program Goes Global," November 8, 2012.

¹¹ Bent Flyvbjerg, Nils Bruzelius, and Werner Rothengatter, *Megaprojects and Risk: An Anatomy of Ambition* (Cambridge, UK: Cambridge University Press, 2003), p. 136. The authors discuss some private projects, but their main focus is government projects.

¹² Bent Flyvbjerg, Mette Skamris Holm, and Soren Buhl, "Underestimating Costs in Public Works Projects: Error or Lie?" *Journal of the American Planning Association* 68, no. 3 (2002).

¹³ Atif Ansar et al., "Should We Build More Large Dams? The Actual Costs of Hydropower Megaproject Development," *Energy Policy* 69 (2014).

¹⁴ Bent Flyvbjerg, Nils Bruzelius, and Werner Rothengatter, *Megaprojects and Risk: An Anatomy of Ambition* (Cambridge, UK: Cambridge University Press, 2003), p. 16.

¹⁵ Stanley L. Engerman and Kenneth L. Sokoloff, "Digging the Dirt at Public Expense: Governance in the Building of the Erie Canal and Other Public Works," National Bureau of Economic Research, Working Paper 10965, December 2004, p. 31.

¹⁶ Bent Flyvbjerg, Nils Bruzelius, and Werner Rothengatter, *Megaprojects and Risk: An Anatomy of Ambition* (Cambridge, UK: Cambridge University Press, 2003), p. 45.

¹⁷ 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), p. 351.

¹⁸ Government Accountability Office, "Defense Acquisitions: Addressing Incentives Is Key to Further Reform Efforts," GAO-14-563T, April 30, 2014, p. 8.

¹⁹ Andy Medici, "Federal Employee Firings Hit Record Low in 2014," www.federaltimes.com, February 24, 2015. And see Chris Edwards, "Federal Firing Rate by Department," *Cato@Liberty*, Cato Institute, June 6, 2014.

²⁰ Alan Stern, "NASA's Black Hole Budgets," *New York Times*, November 23, 2008.

²¹ Bent Flyvbjerg, Mette Skamris Holm, and Soren Buhl, “Underestimating Costs in Public Works Projects: Error or Lie?” *Journal of the American Planning Association* 68, no. 3 (2002).

²² Quoted in Stanley L. Engerman and Kenneth L. Sokoloff, “Digging the Dirt at Public Expense: Governance in the Building of the Erie Canal and Other Public Works,” National Bureau of Economic Research, Working Paper 10965, December 2004, p. 29.

²³ Antonio Olivo and Katherine Shaver, “Why Costs Often Creep on Public-Works Projects,” *Washington Post*, May 14, 2014.

²⁴ Willie L. Brown, Jr., “When Warriors Travel to China, Ed Lee Will Follow,” *San Francisco Chronicle*, July 27, 2013.

²⁵ Transbay Transit Center, “FAQs,” <http://transbaycenter.org/project/faqs>. And see Central Subway, “Project Funding/Budget,” www.centalsubwaysf.com/content/project-fundingbudget.

²⁶ Joseph Fordham, U.S. Naval Institute, “#PlatformsMatter—The Rebirth of the U.S. Navy: A Fleet of Frigates to Equal None,” Naval History Blog, March 27, 2014.

²⁷ James Mann, “The House That War Built,” *Washington Post*, June 17, 2007.

²⁸ R. Jeffrey Smith, “Tanker Inquiry Finds Rumsfeld’s Attention Was Elsewhere,” *Washington Post*, June 20, 2006.

²⁹ Government Accountability Office, “Defense Acquisitions: Better Weapon Program Outcomes Require Discipline, Accountability, and Fundamental Changes in the Acquisition Environment,” GAO-08-782T, June 3, 2008, p. 1.

³⁰ Government Accountability Office, “Defense Acquisitions: Addressing Incentives Is Key to Further Reform Efforts,” GAO-14-563T, April 2014, p. 1.

³¹ Government Accountability Office, “Defense Acquisitions: Better Weapon Program Outcomes Require Discipline, Accountability, and Fundamental Changes in the Acquisition Environment,” GAO-08-782T, June 3, 2008, p. 5.

³² Government Accountability Office, “Defense Acquisitions: Assessments of Selected Weapon Programs,” GAO-15-342SP, March 2015, p. 170.

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³⁴ Chong Wang and Joseph San Miguel, “Unintended Consequences of Advocating Use of Fixed-Price Contracts in Defense Acquisition Practice,” Naval Postgraduate School Acquisition Research Symposium, April 30, 2011.

³⁵ Department of Defense, “Performance of the Defense Acquisition System: 2014 Annual Report,” June 13, 2014.

³⁶ Charles Josef Duch, “Pentagon Purchasing Is Overdue for an Overhaul,” op-ed, *Wall Street Journal*, July 23, 2015.

³⁷ Government Accountability Office, “Defense Acquisitions: Assessments of Selected Weapon Programs,” GAO-15-342SP, March 2015.

³⁸ Government Accountability Office, “Defense Acquisitions: Applications of Lessons Learned and Best Practices in the Presidential Helicopter Program,” GAO-11-380R, March 2011.

³⁹ Ibid.

⁴⁰ Christopher Drew, “Work Halted on Helicopter for President,” *New York Times*, May 15, 2009.

⁴¹ Government Accountability Office, “Defense Acquisitions: Better Weapon Program Outcomes Require Discipline, Accountability, and Fundamental Changes in the Acquisition Environment,” GAO-08-782T, June 3, 2008, highlights page.

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⁴⁴ For example, see Hans M. Kristensen, “B61-12: NNSA’s Gold-Plated Nuclear Bomb Project,” Federation of American Scientists, July 26, 2012.

⁴⁵ Walter Pincus, “The Explosive Cost of Disposing of Nuclear Weapons,” *Washington Post*, July 3, 2013.

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⁴⁷ Author’s calculations based on *Budget of the U.S. Government, Fiscal Year 2016* (Washington: Government Printing Office, 2015), Public Budget Database.

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⁴⁹ Government Accountability Office, “Nuclear Waste: Action Needed to Improve Accountability and Management of DOE’s Major Cleanup Projects,” GAO-08-1081, September 2008, p. 5.

⁵⁰ Government Accountability Office, “Hanford Waste Treatment: DOE Needs to Take Action to Resolve Technical and Management Challenges,” GAO-13-38, December 2012, p. 14.

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- ⁵² Peter Folger, "FutureGen: A Brief History and Issues for Congress," Congressional Research Service, R43028, April 3, 2013, p. 3.
- ⁵³ Government Accountability Office, "Hanford Waste Treatment Plant: DOE Needs to Take Action to Resolve Technical and Management Challenges," GAO-13-38, December 2012, p. 14.
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