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## The Numbers Guy

Carl Bialik examines the way numbers are used, and abused.

Sex, and Studying It, Are  
Complicated

OCTOBER 15, 2010, 9:36 PM ET

### When Construction Costs Runneth Over

Article

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By Carl Bialik

My [print column](#) examines cost overruns on major building projects in light of New Jersey Gov. Chris Christie's decision to halt a major rail-tunnel project linking his state to New York.

He was reacting to estimates he cited from Federal Transit Administration officials that the proposed tunnel would cost between \$11 billion and \$14 billion, several billion dollars more than expected. New Jersey would be responsible for extra costs, prompting Christie to stop work.

There is considerable disagreement about those figures. They are not final numbers and are inaccurate, according to a Department of Transportation official. Neysa C. Pranger, spokeswoman for the Regional Plan Association, said \$10 billion is the average cost estimate from officials with the various agencies and engineers involved, though she noted that there are no official reports about costs. Christie and Transportation officials are spending this week and next negotiating a compromise that would allow the tunnel to move forward.

A [2002 study](#) by Bent Flyvbjerg and two co-authors demonstrated that Christie had plenty to worry about — most projects run over projected costs. Much is at stake in getting cost estimates right, Flyvbjerg said, pointing to the long-term impact on Greece's economy from cost overruns for the 2004 Summer Olympics in Athens. "Projects are now getting so big that they can be extremely damaging to national finances," Flyvbjerg said.

Even once projects are completed, ongoing costs of maintain rail lines can make them a bad deal, according to [a study by Clifford Winston and Vikram Maheshri](#). The researchers found that rail systems' benefits rarely surpassed their social costs, though the research didn't account for potential environmental and safety benefits nor the potential for a parking shortage in cities without rail transit. "Who's ever been turned down for re-election for supporting these public projects that run huge deficits?" asked Winston, a senior fellow of economic studies at the Brookings Institution think tank.

Flyvbjerg attributes much of the cost overrun to lying by project planners, noting that cost estimates haven't gotten better over the years. Researchers who have studied irrational optimism note, though, that irrationally and repeatedly feeling optimism is a typical characteristic of the behavioral trait. "People have a tendency to think what they want to think is true," said Erik Angner, professor of philosophy and economics at the University of Alabama at Birmingham, who has studied [irrational optimism among economists](#). "It's conceivable that bidders are lying. But it's also conceivable they managed to convince themselves they can do it as cheaply as they say they can."

This trait has been demonstrated in many countries. "We have pretty strong indications that the basic cognitive bias to plan 'for the best case' is widespread cross-culturally," said Dale Griffin, professor of marketing at the University of British Columbia's Sauder School of Business, who has studied irrational optimism.

"I find optimism even when optimism is costly," said Astri Muren, an economist at Stockholm University who also [has studied irrational optimism](#).

"I'm not going to sit here and tell you that people never lie," said Ed Mellow, chief executive of Independent Project Analysis Inc., an Ashburn, Va.-based company that advises organizers of large building projects, "but people aren't lying here any more than they are in the normal course of life." Instead, he said the problem is that "more bad things can happen than good things." Most surprises to builders are bad ones, yet many budgets are based on everything running as expected.

"When I hear a number on a big project, I routinely just add 50% to it," said Richard Little, director of the University of Southern California's Keston Institute for Public Finance and Infrastructure Policy. "For most part, assumptions for these cost estimates are that everything is going to work perfectly. I'm old enough now to assume that nothing works perfectly."

Tom Warne, who has worked on major projects for the Utah and Arizona state transportation departments, said that projects, once approved, gain momentum, and supporters of related



#### About The Numbers Guy

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The Numbers Guy examines numbers in the news, business and politics. Some numbers are flat-out wrong or biased, while others are valid and help us make informed decisions. Carl Bialik tells the stories behind the stats, in occasional updates on this blog and in [his column](#) published every Saturday in The Wall Street Journal. Carl, who holds a degree in mathematics and physics from Yale University, also writes daily about [sports numbers](#) on WSJ.com. He welcomes your comments at [numbersguy@wsj.com](mailto:numbersguy@wsj.com).

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projects often try to hook their project in. "If you have a big project like the ARC, and you're in an adjacent community, you might think, 'If I could just hook my project to it, the momentum of the big job will carry my job to the finish line,'" Warne said. "You're hitching your wagon to a winning project."

Because of such changes, and other factors, initial cost estimates often are revised higher even before the final bill is tabulated. "Cost estimates are always adjusted from the time it's just an idea to the time you do environmental work, to the time you do design," Warne said.

He attributes changes in project costs to such factors, rather than outright deception. "It sounds like there's some sort of conspiracy among transportation guys," Warne said of Flyvbjerg's viewpoint that strategic misrepresentation leads to cost overruns. "That's not the nature of the industry."

"It might be that public attitudes change, and the public wants to see the project designed more aesthetically, or there might be a change in gas prices over the life of the project," said William Ibbs, professor of civil and environmental engineering at the University of California, Berkeley.

The New Jersey rail-tunnel project is particularly subject to potential cost overruns, Warne and others said. "Tunneling under the river is as complex as it gets," Warne said. "You're going through geologic conditions that can change. The whole tunneling process is high-risk in terms of construction methods and procedures. You never know from one day to the next what is going to happen."

"We often don't know many of the detailed engineering situations until the dirt is turned," said Michael D. Meyer, a civil engineer at Georgia Tech.

Giovanni Migliaccio, assistant professor of construction management at the University of Washington, pointed to [guidelines from the Association for the Advancement of Cost Engineering](#) that suggest cost estimates at the earliest stages will have four to 20 times as much error as estimates made later, when a project is almost completely defined. In his research, Migliaccio has found that cost estimates made at the time building begins are, on average, accurate, with some cost overruns and some underruns.

Skewed incentives can contribute to poor cost estimates. "A lot of it has to do with where the buck stops," said Mark Hallenbeck, director of the University of Washington's Washington State Transportation Center, "and historically, the buck stops elsewhere." Once the bill comes due, the sponsoring official might say, "I'm out of office, and hey, you got a cool train," Hallenbeck said. He added, "You're trying desperately to find a political solution. There are lots of incentives to hold the price down while increasing the attributes. If you're not getting the numbers you want, you can put pressure on consultants to get the numbers you want."

"The incentives in our business largely are associated with getting projects done on time," Warne said, "and a disincentive for going over the schedule. There's not really an incentive structure to get public-agency employees to keep costs down."

When costs do overrun, public agencies don't always have an effective mechanism for retrieving them from contractors. The Big Dig in Boston, which had [billions of dollars in cost overruns](#), led to just [tens of thousands in cost recovery](#). "Cost recovery on the Big Dig was a joke," said a person with involvement in the cost-recovery process.

W. Keith Campbell, professor of social psychology at the University of Georgia, said the ability to get away with inflated numbers may evoke narcissistic misrepresentation by project managers. "The more ambiguity, the more you can get away with things," Campbell said.

Peter Morris, professor of construction and project management at University College London, said that cost isn't the only target project managers should focus on. Whether the project itself works can be just as important. Stephen Hayes, chief executive of the International Centre for Complex Project Management in Canberra, Australia, asked, "Just because a project ran over budget, did it fail?"

"A very interesting issue is whether the optimistic bias is overall a good thing, as it leads to projects like the Sydney Opera House being financed — whereas any realistic projection of cost and time would have led to its rejection," Griffin said.

Some public agencies are trying new approaches to prevent cost overruns. Some use a method called [Construction Manager/General Contractor](#), which aims to better align incentives on cost. Another approach is called [integrated project delivery](#).

William Ibbs, professor of civil and environmental engineering at the University of California, Berkeley, who has written about [large building projects](#), said some sort of change is needed because the sluggish construction sector will pick up when the economy does. "This issue is going to go wild," Ibbs said. "There are going to be lots of disputes and lots of problems, unless we change some of the patterns."

**Further reading:** This isn't a new problem. RAND reported on [cost overruns](#) in 1979. [Magne Jørgensen has studied](#) unjustified optimism in projections for software-development projects. A [1996 study](#) demonstrated that students are overly optimistic about their grades and postgraduation salaries.

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2:44 pm October 18, 2010

**GCM** wrote:

In response to Ted Levy's questions:

1) Construction contracts may rely on "fixed price" agreements (i.e., lump sum). A public agency will select the one that fits the project. If the agency forces proposers to assume additional risks, it should expect a higher initial price (at bid) time. If this initial price is binding (lack or lesser recovery for additional costs), there is chance that this price will be higher (contractors will "build" the risk into their price). On the other hand, these contracts are expected to encounter a lower escalation during delivery (at a larger price). However, the real problem is somewhere else. Most of the escalation occur before a contract is in place. At the initial stages, the public agency is figuring out what they want, what issues may occur, and if benefits exceed costs (for approval purposes: after all for each project approved there are many that aren't). At these stages, there is a large margin of error and as Jack Dickert stated in an earlier posting, projects that underestimate risks/costs have more chances to be approved than projects that overestimate risks/costs. As a result, we end up with a majority of projects that were underestimated.

2) ROI may be produced, but rely on many assumptions that are difficult to verify. For a transportation project, one category of benefits is "user costs." Basically, this is an evaluation of the costs to motorists. If the project expects to reduce commuting time (let's say 20 minutes per day) to 10,000 motorists, there are AASTHO-developed methods to evaluate these benefits. Similarly, you may want to evaluate effect of economic development of a certain area. As it is clear, all these benefits are evaluated (i.e. best guess), but are difficult to actually assess for years to come.

10:12 pm October 17, 2010

**Ted Levy** wrote:

I have two questions. I am sure they are both quite naive:

1. Why do the public sector buyers not demand fixed price contracts, instead of assuming the price risk themselves? In my business, we manufacture large machines which take a long time to complete. We assume the risk of price fluctuation in metals, assembly costs, shipping costs, etc

2. Why do the public sector builders not produce return on investment calculations? How else to prioritize projects? Why build a project that may be underutilized, like the bridge to nowhere or some of the highway expansions currently underway on little used roads, simply to create employment? They are not good investments for the taxpayer

2:21 pm October 17, 2010

**Jayesh, London** wrote:

For every Sydney Opera House, there are a dozen Millenium Domes.

8:37 pm October 16, 2010

**Jack Dickert, Redondo Beach, CA** wrote:

Also remember the old saying: It's easier to get forgiveness (for over running a proposal), then it is to get permission (to start a project with a realistic bid)!

1:35 pm October 16, 2010

**Fiona Usa** wrote:

As environmentalists say, think globally, act locally. But what act will local yokels be up to now, with all of Obama's election time courting of the public, or shall I say, public officials, who like money thrown their way for expensive construction and transportation "projects" in the name of building up "infrastructure" Obama announced an expensive spending program to build up infrastructure early this week but will this gazillion dollars worth of money be spent to help you or the various and sundry construction companies that hire undocumented, nonunion workers in

Northern Virginia?

If the president is going to spend union campaign contributions pretending you are so cool on MTV, you should stipulate that all "projects" using federal funds should hire nothing but qualified workers who are documented workers. No undocumented workers.

Also, the public does not deserve every notion on some local pol's wish list, like this one from a pol in Arlington,, Virginia

<http://www.sungazette.net/articles/2010/05/21/arlington/news/nw134a.txt#blogcomments>

from Archives - Arlington > News:

Federal Funding Increasingly Appears Key to Columbia Pike Streetcar Plan

by SCOTT McCAFFREY, Staff Writer

(Created: Friday, May 21, 2010 8:14 AM EDT)

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The future of a streetcar system in the Columbia Pike corridor appears to increasingly hinge on the largess of a kindly relative with deep pockets: Uncle Sam.

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