

Predicted vs. Actual Costs and Ridership - Urban Transport Projects

The background of the slide features a semi-transparent blue overlay over a photograph of urban transport. In the upper right, a white bus with the number '0399' is visible. In the lower right, a green and white train with the number '1051' is shown. The overall scene is a busy urban transit environment.

Lessons from the US

presented by

**Steve Lewis-Workman, Transport Economist
East Asia Department, Transport Division**

**ADB Transport Forum
May 26, 2010**

History of cost overruns

- **Boston, USA Central Artery (aka Big Dig)**

- Estimate \$6 billion
- Actual \$14.6 billion

➤ **143% over**

- **Tokyo, Japan Oedo Subway**

- Estimate ¥682.6 billion
- Actual ¥1,400 billion

➤ **105% over**

- **UK – France Channel Tunnel**

- Estimate £2.6 billion
- Actual £4.65 billion

➤ **79% over**

History of over-estimated ridership

- **LA Red Line**
 - Forecast 300,000/day
 - Actual 130,000/day

➤ **56% under**
- **San Juan, PR Tren Urbano**
 - Forecast 110,000/day
 - Actual 35,000/day

➤ **68% under**
- **Tokyo Oedo Subway**
 - Forecast 900,000/day
 - Actual 700,000/day

➤ **22% under**
- **Bangkok Metro**
 - Forecast 400,000/day
 - Actual 180,000/day

➤ **55% under**

Reputation for poor performance

- **Unreliable information**
- **Poor decisions**
- **Wasted resources**
- **Threatens financial sustainability in developing countries**
- **Produces culture of failure**

Three Studies from US DOT

- **1990 Urban Rail Transit Study of Ridership and Costs**
 - 10 rail projects opened between 1975 and 1990
- **2003 Predicted vs. Actual Impacts of New Starts**
 - 19 rail and busway projects opened between 1990 and 2002
- **2007 Predicted vs. Actual Impacts of New Starts**
 - 21 rail and busway projects opened between 2002 and 2007
- **Detailed ridership forecast and cost estimation analysis required of every new project opened after 2007**

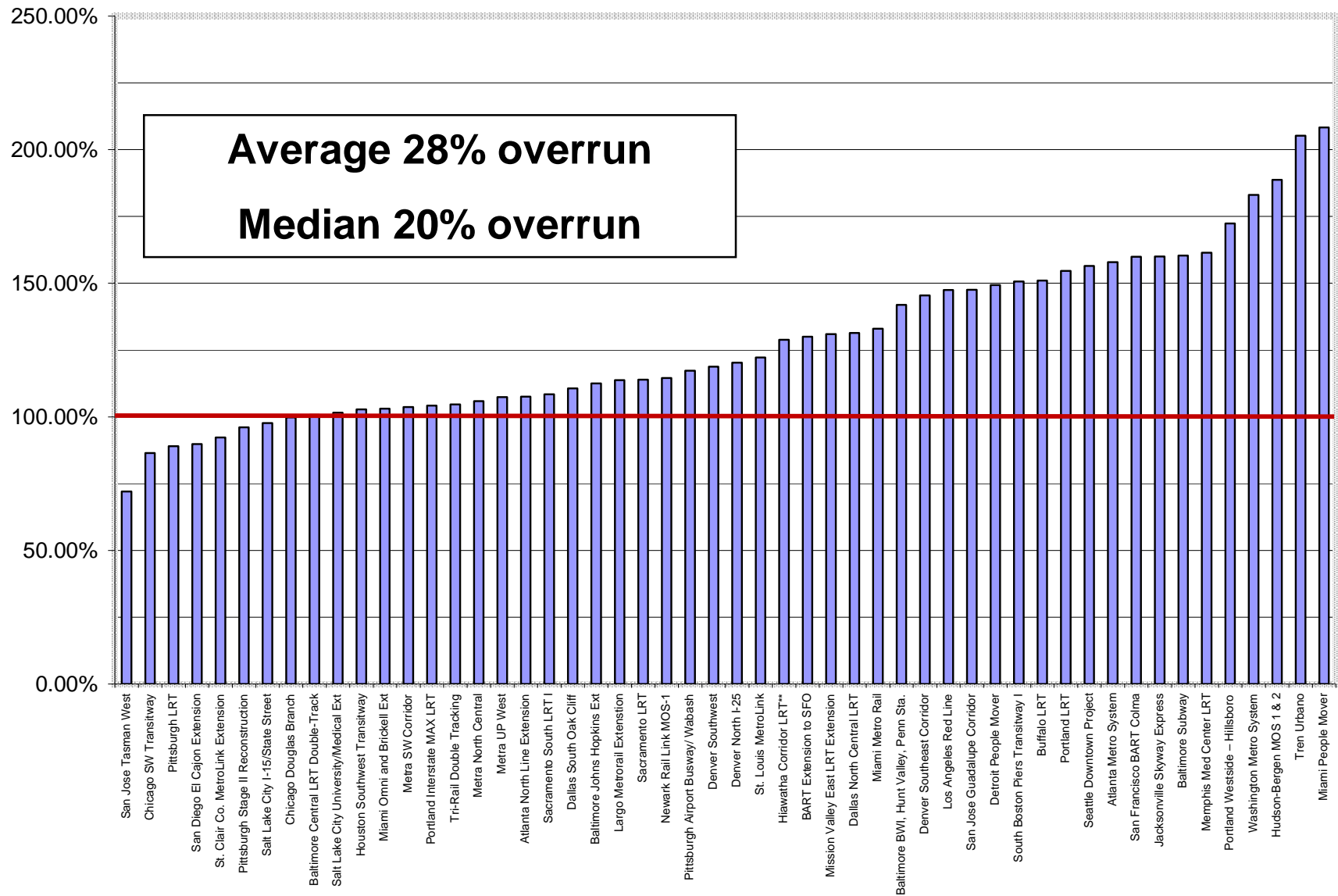
Assembled data

- Average weekday project boardings/alightings by station
- Construction costs
- At 4 key points
 - Alternatives analysis (select mode/alignment)
 - Final EIS (approval to begin final design)
 - Government funding contract approval
 - After opening (latest available data for ridership)
- All data reviewed/approved by project sponsors

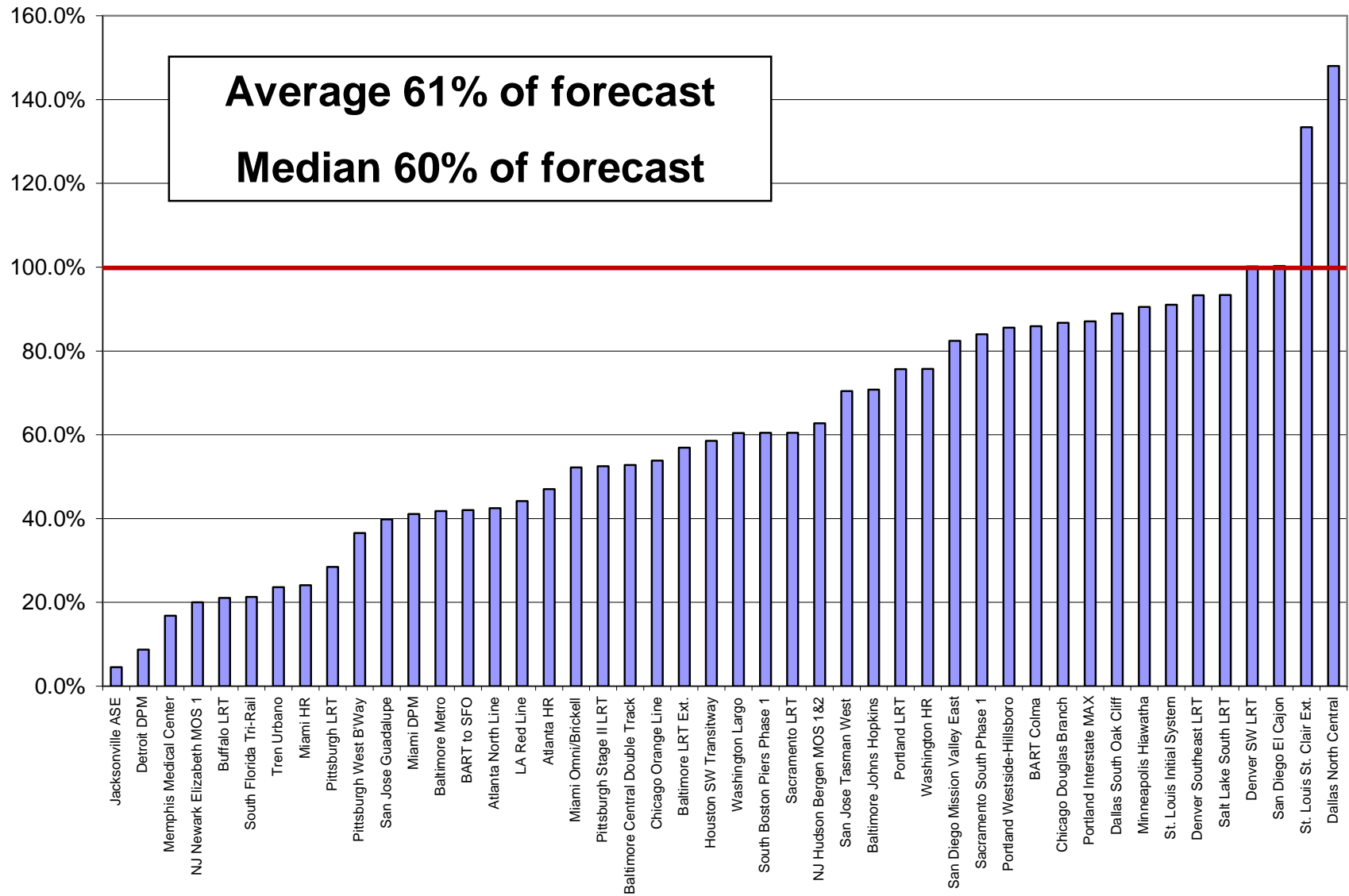
Adjusting to comparable year

- **Adjusted actual ridership by average annual system-wide transit ridership growth to “forecast year” if still future**
- **Cost compared in real \$ (no inflation)**
 - **Remove financing charges**
 - **Focus on project cost estimation**
 - **Actual costs adjusted by removing prior year inflation impacts (ENR inflation by cost category)**

Actual cost as % of estimates



Actual ridership as % of forecast



Lies or incompetence?

**PROBABLY
BOTH**

Are forecasts getting better?

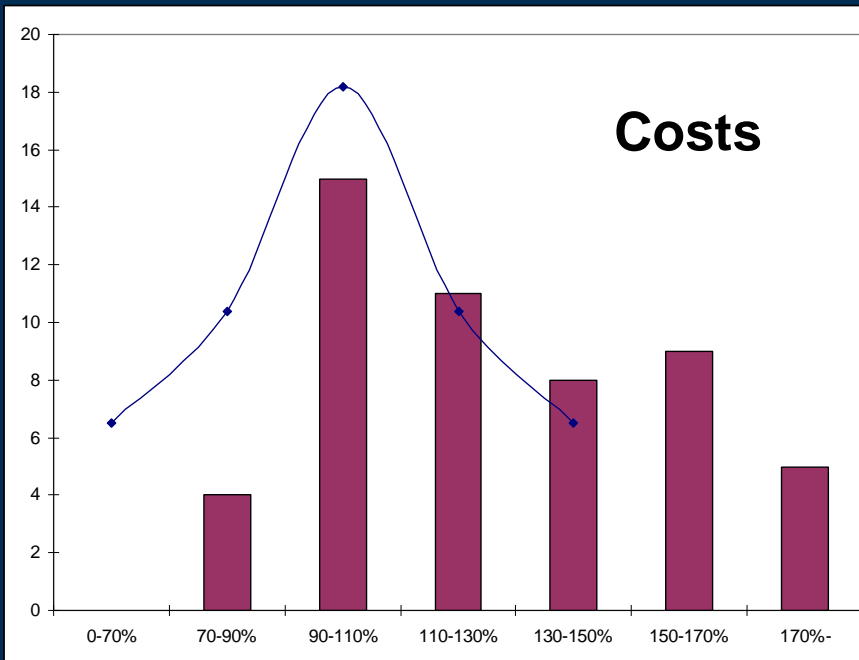
- **Cost estimates as % of actual**

Study	Average	50 th Percentile
USDOT (FTA) 1990	150%	151%
USDOT (FTA) 2003	121%	115%
USDOT (FTA) 2007	140%	122%

- **Ridership forecasts as % of actual**

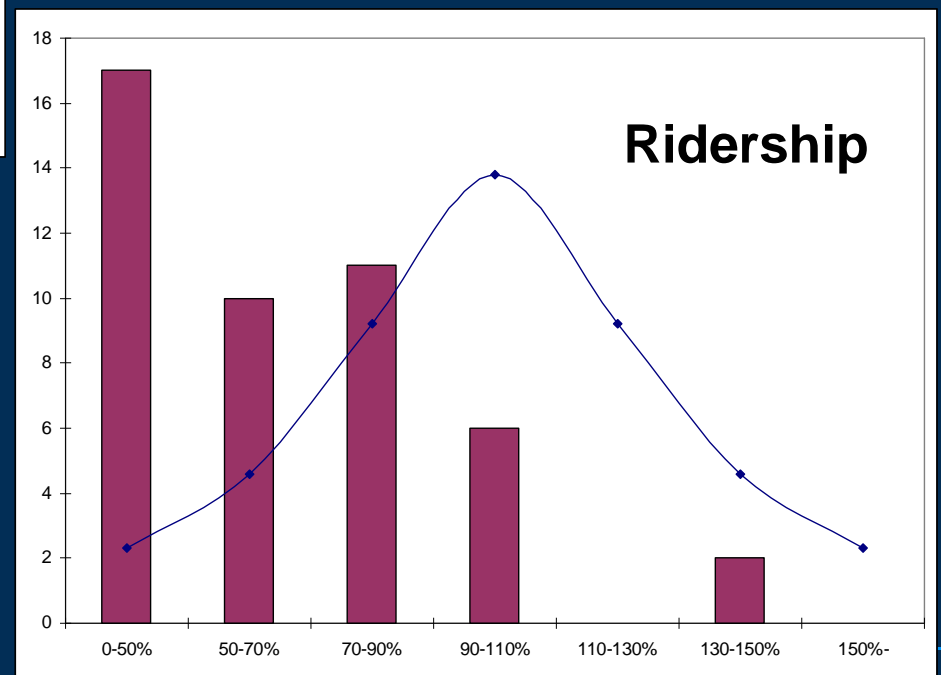
Study	Average	50 th Percentile
USDOT (FTA) 1990	42%	41%
USDOT (FTA) 2003	69%	71%
USDOT (FTA) 2007	60%	64%

Distribution of errors



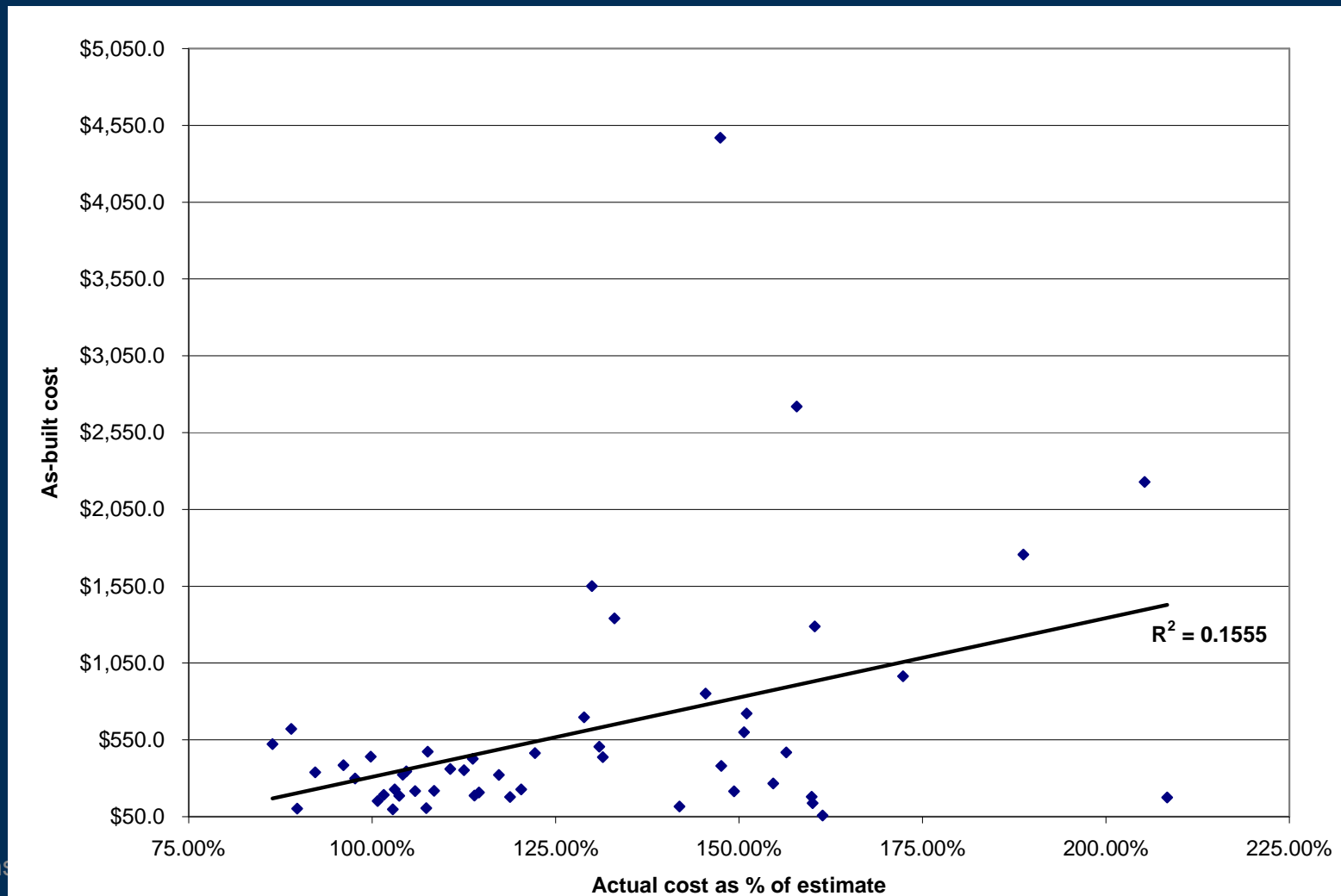
- **Forecast errors significantly skewed**

- **Sample means significantly different from 1.0**



Do larger projects → higher % overruns?

- Not really, but budgetary impact much larger



Some observations

- **Difficult to determine specific causes for individual projects after the fact**
 - **Intentions hard to determine**
 - **Lack of archived data, no functioning travel model, costs in inconsistent formats**
- **2003 study supplemented by detailed analysis of several case studies**
 - **Ridership forecasts that did better tend to have higher population/employment than predicted**

A problem only in US?

- **Studies by Bent Flyvbjerg, et al. on costs**
- **International data set – 258 projects**
 - 90% of projects overrun costs
 - Rail projects - highest escalation (45% over)
 - Road projects - lowest escalation (20% over)
 - No improvement over time (70 years of data)
- **Developing countries have HIGHER overruns**

Does private ownership reduce cost overruns?

- No evidence that it does, though data sparse (Flyvbjerg, 2004)
- Average cost overruns on bridge/tunnel projects
 - Private → 34%
 - State owned enterprise → 110%
 - Other public → 23%
- Average cost overruns on high speed rail
 - State owned enterprise → 88%
 - Other public → 15%
- Average cost overruns on urban rail
 - State owned enterprise → 36%
 - Other public → 54%

How to improve?

- **Funding partners must tolerate uncertainty**
- **Reference class forecasting (rely on data not engineers)**
- **Change incentives**
 - **Force choices on decision-makers – no free money**
 - Formula based multi-modal subsidy allocations
 - Higher local government or private partner share
 - **Change subsidy schemes**
 - Pay for performance after completion
 - Fixed subsidy amount at AA
 - **Don't use “hurdle rates”**
 - **Shame**

Thank You