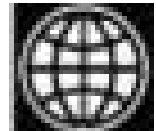


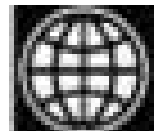
Toll Road Revenue Forecast Quality Assurance/Quality Control



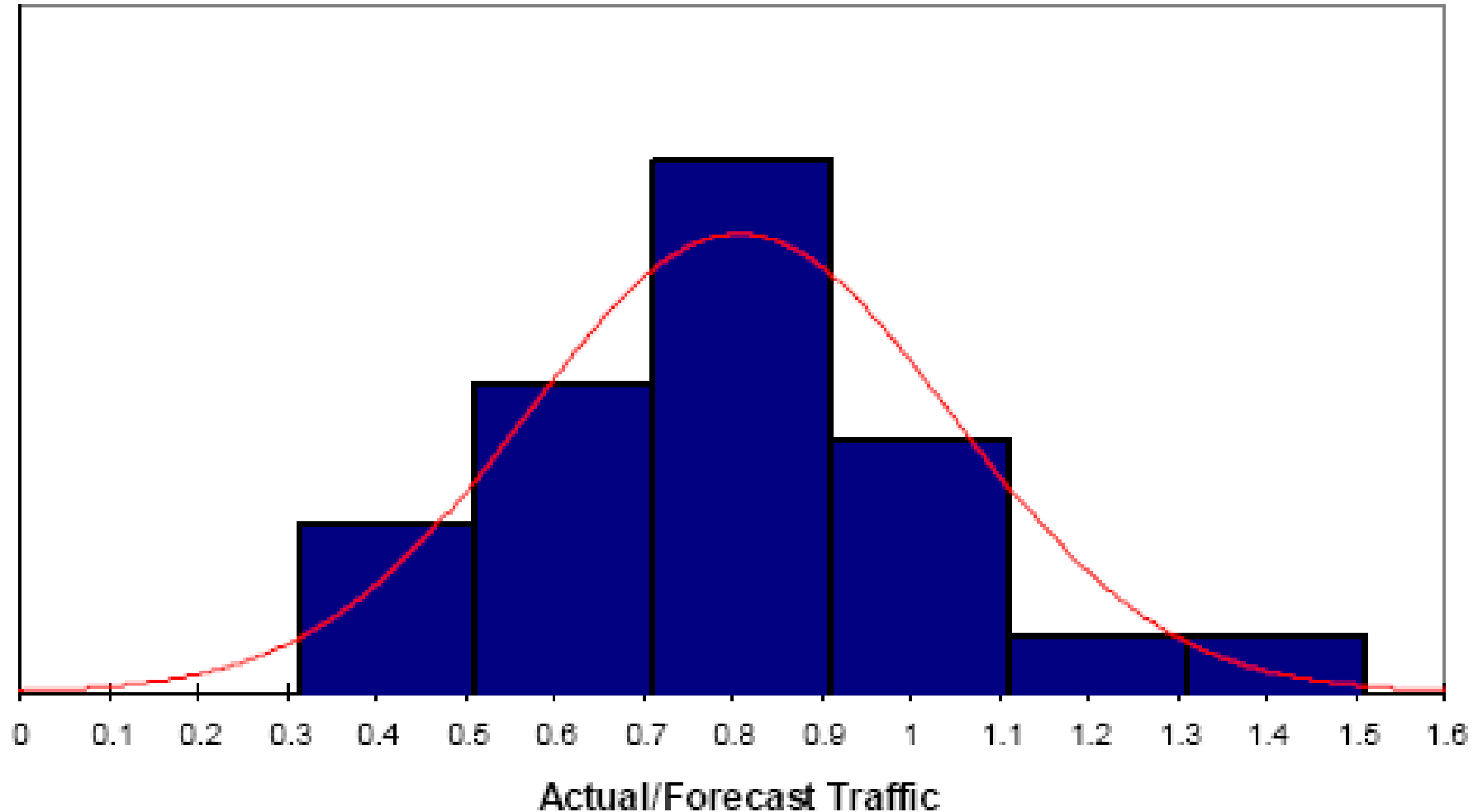
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What's the Problem?

- Consistent, world-wide record of revenue forecasts made at time of initial agreements being signed being far too high
- Not a random process of an equal number of “actuals” being over and under forecasts



Host Jurisdictions with a History of Tolling Normal (0.81, 0.24)

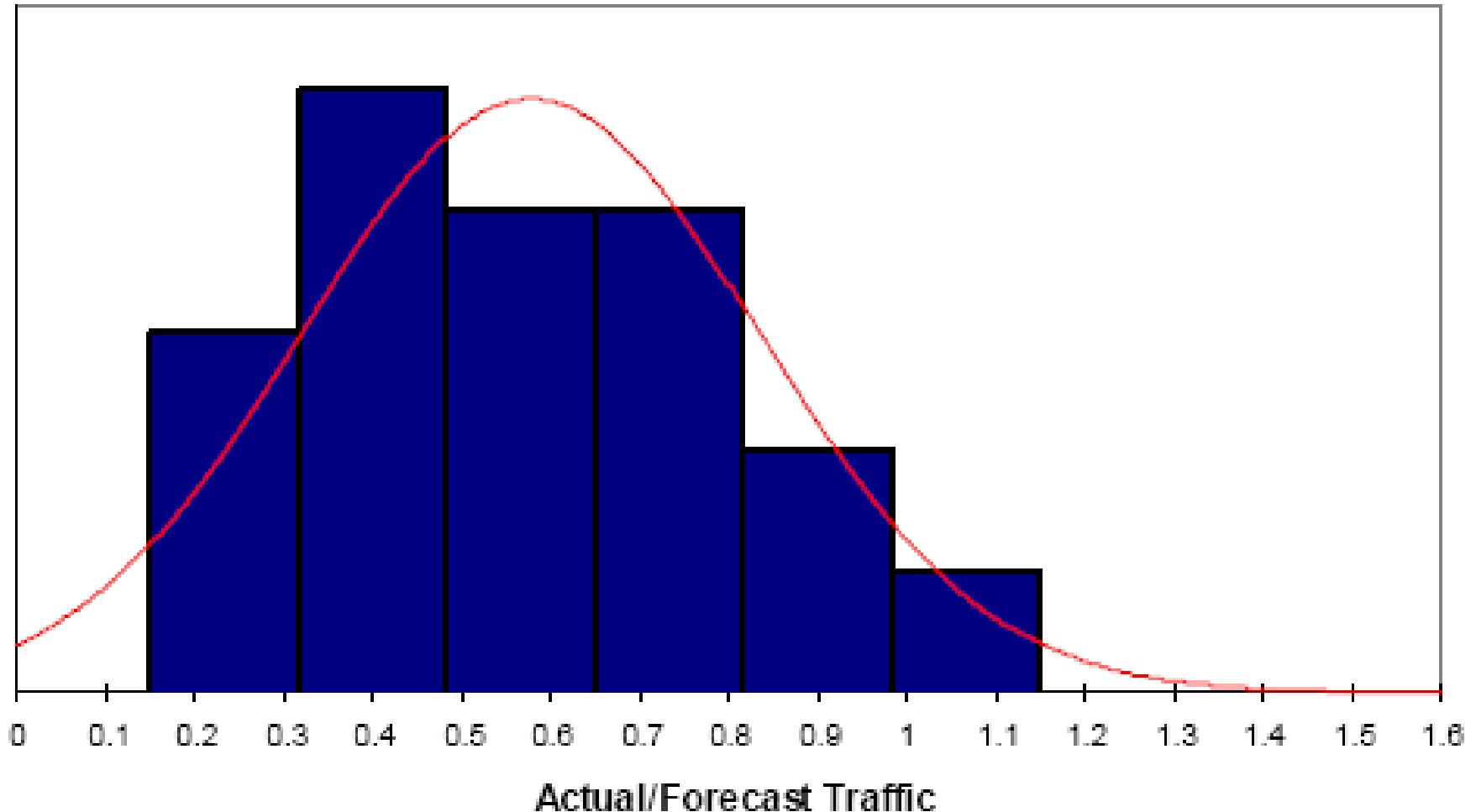


Source of Chart: Robert Bain, Jan Willen Plantagie
"Traffic forecasting Risk Study," Infra-News Standard
and Poor's, 2003

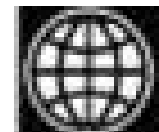


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Host Jurisdictions with No History of Tolling
Normal (0.58, 0.26)



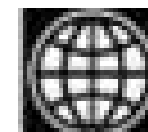
Source of Chart: Robert Bain, Jan Willen Plantagie
“Traffic forecasting Risk Study,” Infra-News Standard
and Poor’s, 2003



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Actual/Forecast	2002 Study	2003 Study
Minimum	.31	.15
Maximum	1.19	1.51
Mean	.73	.74
Number of case Studies	32	68

Source of Chart: Robert Bain, Jan Willen Plantagie
 “Traffic forecasting Risk Study, ”Infra-News Standard
 and Poor’s, 2003



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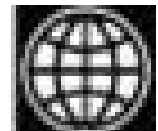
May not mean projects are necessarily “bad” for society as a whole, but:

- Situation can skew public decision-making
- May result in over-investment, in wrong facility, in wrong place
- Can create unexpected financial burden for governments
- May prevent same level of public investment from being made in projects with potentially greater return



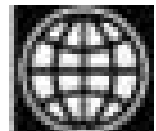
What are the Causes?

- Not a lack of fundamental technical knowledge;
 - Fifty+ year knowledge base, including 2000 Nobel Economics Prize-winning work by Dan McFadden of U. Cal. Berkeley
- Not unexpected “acts of G-d”



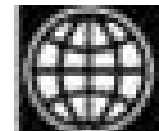
What are the Causes?

- **Compound “optimism”** in virtually every part of forecasting process
 - Input assumptions
 - Structure, development and application of models



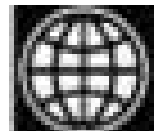
Compound optimism: Input assumptions

- GDP growth
- Population, employment growth
 - Totals (forecasts too high)
 - Allocation within regions to sub-areas
- Development, land use
- Toll road levels of service, time savings
- Competition



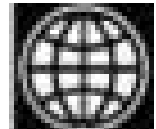
Compound optimism: Forecasting Methods

- Values of time, elasticities
- Traffic mix (i.e., autos versus trucks)
- Ramp-up period
- Temporal variation

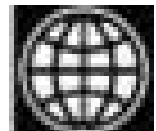


Forecasting Issue

- Complexity of toll schedules

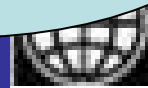
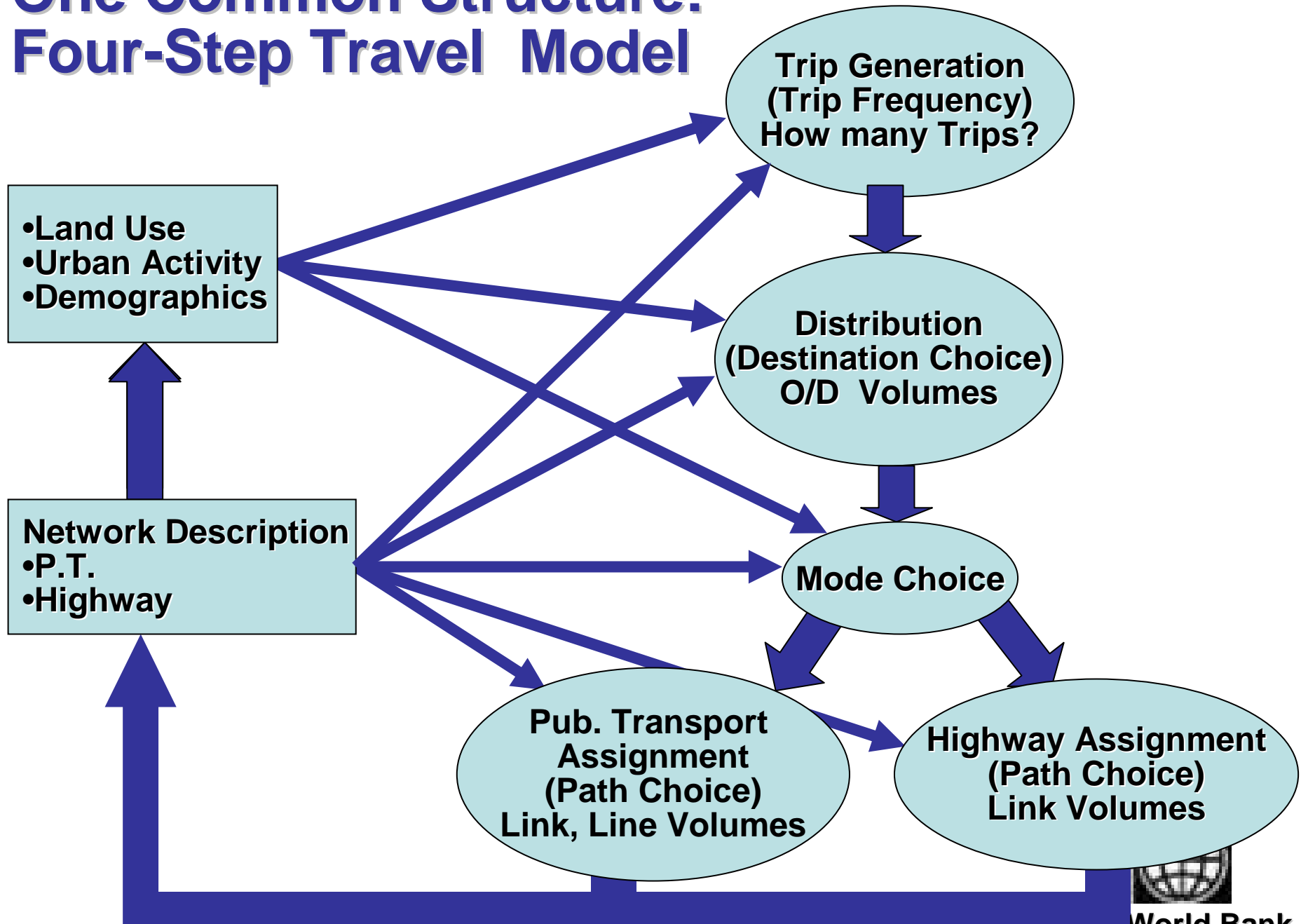


To understand methodological issues, must understand forecasting process.



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One Common Structure: Four-Step Travel Model



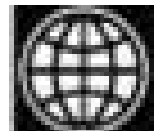
QA/QC



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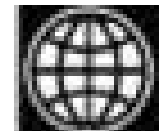
First, Review Methodological Issues

- Model structures
- Calibration, parameters (e.g., implicit values of time, elasticities)
- Validation results



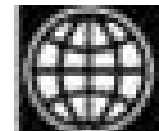
Second, Review Inputs, Outputs

- Check trends over time for *all* input and output parameters, for each model step;
- Examine expected changes over time for location(s)
- Compare to other, analogue places which today are similar to what given location



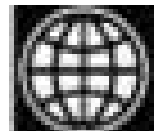
Second, Review Inputs, Outputs

- Check inputs and results from every stage of process
 - Are expected/forecast changes reasonable?
 - Are forecasts reasonable, in the absolute, when compared to current “actuals” elsewhere in given region or nation or other, analogues?



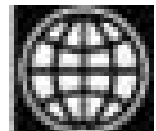
Parameters to Focus on:

- Input Assumptions
 - GDP, individual income, population, employment, motorization growth
 - Fuel and other costs
 - Allocation of growth to sub-areas, land use assumptions
 - Extent and capacity of whole system; Is everything assumed to be there going to be, but not more?
 - Competition?



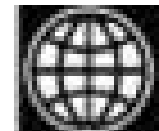
Analyze More than Just Final Volumes:

- Review **all** results
 - Aggregate trip rates
 - Trip lengths
 - Mode shares?
 - Regional
 - Sub-area
 - Daily, weekly, monthly travel volumes
 - Comparisons of demand forecasts and capacity



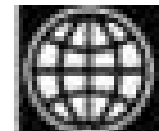
Perform Sensitivity Analyses

- Focus on key parameters whose future values are uncertain
 - Fuel prices
 - Pop., employment totals and sub-regional allocations
 - Motorization
 - Levels of service
- Perform analyses (deterministic, Monte-Carlo) of changes in individual parameters and comprehensive “best/worst/likely case” scenarios
- Evaluate changes and calculate implicit elasticity's and/or values of time



Compare Implicit Elasticity's Against Historic Records.

- From same location;
- From other places using secondary resources
 - TCRP Report 12, Traveler's Response to Transportation System Changes, Pratt et al



Traveler Response to Transportation System Changes Interim Handbook

Prepared for:

Transit Cooperative Research Program
Transportation Research Board
National Research Council
TCRP Project B-12

Submitted by:

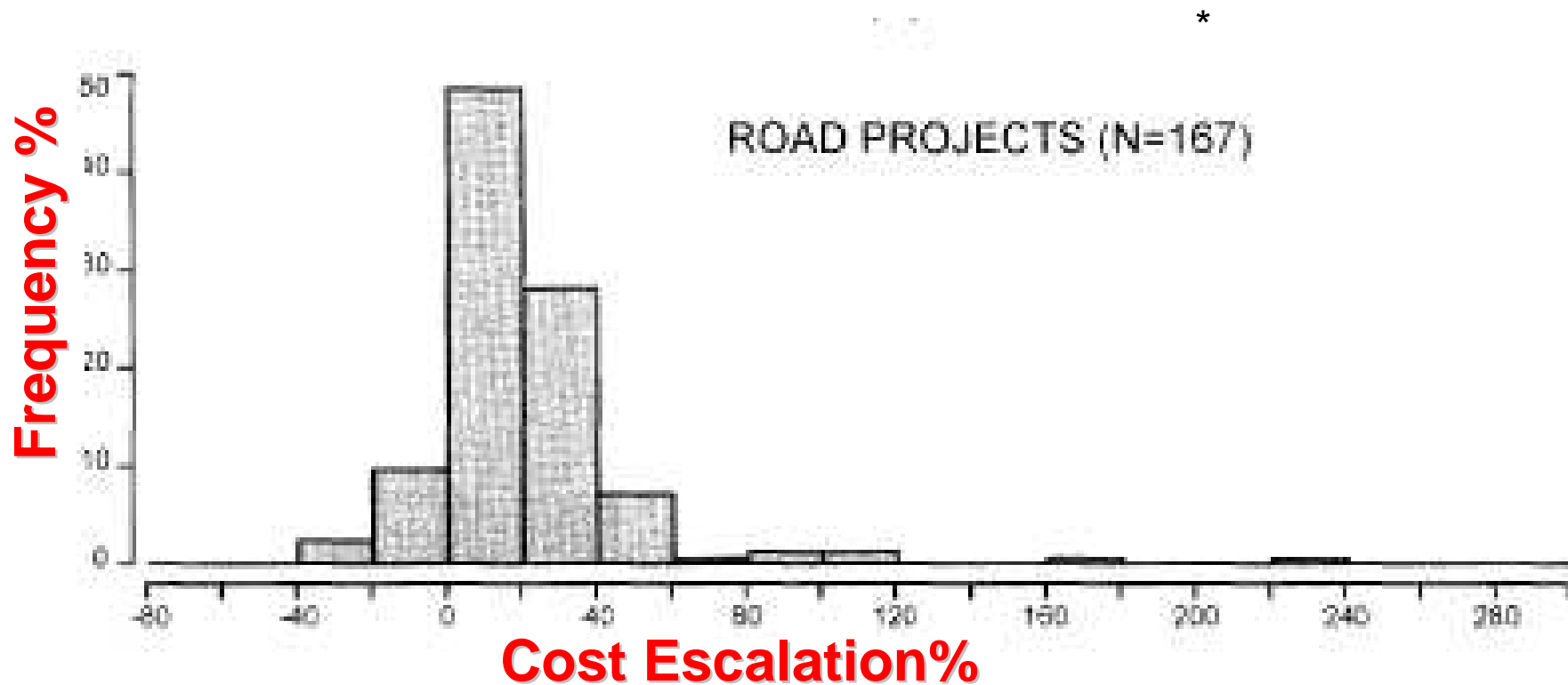
Richard H. Pratt, Consultant, Inc.
Garrett Park, Maryland
and
Texas Transportation Institute
Cambridge Systematics, Inc.
Parsons Brinckerhoff Quade & Douglas, Inc.
SG Associates, Inc.
McCollom Management Consulting, Inc.

March 2000

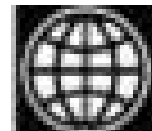


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Need for Better Q/A – Q/C is not Unique to Usage and Revenue

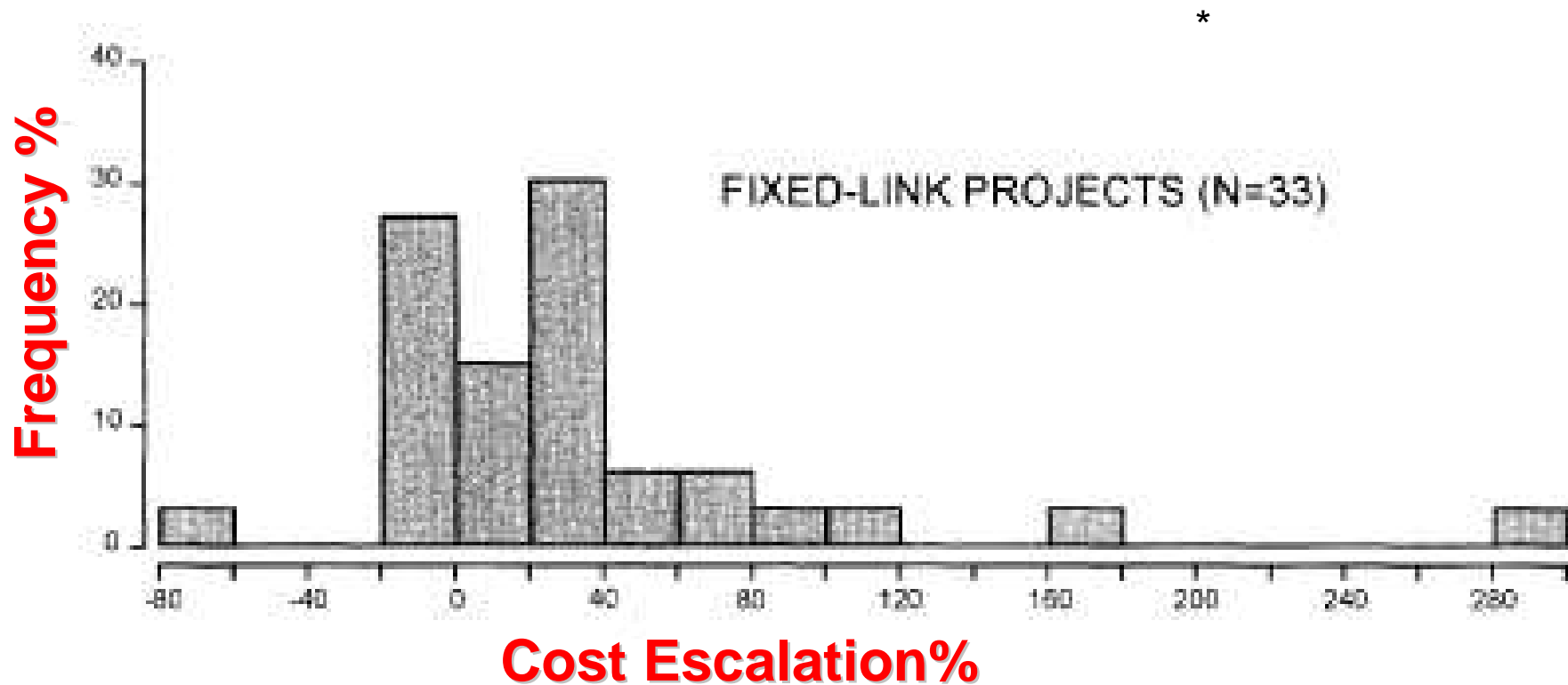


“Underestimating Costs in Public Works Projects;” Flyvberg, Holm, Buhl;
Journal of American Planning Association, Summer 2002,

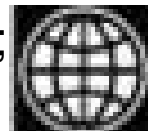


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Need for Better Q/A – Q/C is not Unique to Usage and Revenue



“Underestimating Costs in Public Works Projects;” Flyvberg, Holm, Buhl;
Journal of American Planning Association, Summer 2002,



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Possible Policy “Fixes”

- Require proponents to perform and document explicit Q/A – Q/C process, including analysis by totally independent reviewer(s);
- Require proponents to perform and document explicit sensitivity analyses, especially with all uncertain inputs consistently pessimistic;
- Disseminate information on quality of forecast work by individual companies to proponents and financial community.

