

AACE
INTERNATIONAL
RECOMMENDED
PRACTICE

68R-11

**ESCALATION ESTIMATING USING
INDICES AND MONTE CARLO
SIMULATION**

SAMPLE

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AAACE International Recommended Practice No. 68R-11

ESCALATION ESTIMATING USING INDICES AND MONTE
CARLO SIMULATION
TCM Framework: 1.6 – Risk Management

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Note: As AAACE International Recommended Practices evolve over time, please refer to www.aacei.org for the latest revisions.

SAMPLE

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INTRODUCTION

Scope

This recommended practice (RP) of AACE International defines basic principles and methodological building blocks for estimating escalation using forecasted price or cost indices while also addressing uncertainty using Monte Carlo simulation. The methods in this RP are an extension of the principles and methods in RP 58R-10, *Escalation Estimating Principles and Methods Using Indices*, from a probabilistic and scenario/sensitivity viewpoint. This RP will guide practitioners in developing or selecting appropriate methods for their definitions and situation. While this RP discusses the relationships of escalation estimating to other risk cost and schedule accounts (namely contingency), dealing with those cost types is not the focus of this RP. This RP assumes that practitioners are already familiar with Monte Carlo simulation as typically applied in spreadsheet applications.

Escalation estimating is an element of both the cost estimating and risk management processes. Like other risks, escalation is amenable to mitigation, control, etc. However, this RP is focused on escalation quantification, not on treatment (i.e., how it is addressed through contracting, bidding, schedule acceleration, hedging, etc.) or control. In terms of cost estimating, this RP covers practices applicable to all classes of estimates^[2]. Escalation uncertainty is partly driven by schedule risk; therefore this RP also references AACE's focus on integrated cost and schedule risk analysis and contingency estimating^[3,4]. The examples in this RP emphasize capital cost estimating and scheduling, but the principles apply equally to operating, maintenance and other cost and time evaluations. While a model such as that covered in this RP could be used for scheduling optimization in consideration of escalation, optimization is not covered here.

As with RP 58R-10, *Escalation Estimating Principles and Methods Using Indices*, this RP recommends segregating escalation versus exchange rate impacts and their estimation for projects with resources priced in currencies other than the base currency.

Outline

The following is an outline of this RP's content:

- Background
- General Principles and Methods
 - General Principles
 - Escalation Estimating Using Indices: Summary Approach and Challenges
- Monte Carlo Model Development
 - Model Variables
 - Selection of Probability Distribution Functions
 - Treatment of Dependencies/Correlation
 - Integration with Cost/Schedule Contingency Models
- Summary
- References
- Contributors

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Background

Background on the topic of escalation is covered in RP 58R-10, *Escalation Estimating Principles and Methods Using Indices*, which should be studied prior to this one. That RP highlights that escalation is always uncertain and should therefore be considered in the risk management process. However, escalation is usually quantified using different methods than used for other risks (i.e., contingency). Being driven by conditions in the economy, which are external to the project, it is less amenable to quantification techniques that use project system empirical data (e.g., parametric contingency estimating), or project team input (e.g., methods dependent on brainstorming or Delphi techniques). Given its economic nature, it is recommended that those with the most economics expertise (e.g., economists) be included in the process of developing escalation estimating methods and estimates, including evaluations of uncertainty.

As with contingency estimates, it is the estimator's responsibility to quantify the uncertainty of the escalation estimate, usually by providing a distribution or range (e.g., 80% confidence or P10/P90 range), so that management can make effective investment and project decisions and fund the escalation account as they see fit in accordance with their decision and risk management policies.

The methods elaborated in this RP may not be applicable for small projects with short durations in fairly stable economies. However, this RP addresses large projects with multi-year durations that typically dominate capital budgets. Often, the economy is not stable over these durations, and escalation may be the largest single cost account in these projects. In this situation, robust methodologies are needed.

Probabilistic methods in industry escalation estimating are not widely used or reported. A few references are included in this RP^[6,8,9]. However, the increasing number of extended duration mega-projects and increasing volatility in the global economy has increased the need for improved practices and we hope this RP will help trigger increased development and reporting in this area of practice.

RECOMMENDED PRACTICE

General Principles and Methods

General Principles

As discussed in RP 58R-10, *Escalation Estimating Principles and Methods Using Indices*, there is no preferred way to quantify risks, including escalation. Each method has advantages and disadvantages and its advocates. However, there is general agreement that any recommended practice or method for estimating or forecasting the cost of uncertainty should address the principles identified in RP 40R-08, *Contingency Estimating: General Principles*. The methods discussed in this RP are consistent with those principles.

In recognition of the differences between contingency and escalation estimating, the principles in RP 40R-08 are clarified or expanded as follows:

- Differentiate between escalation, currency and contingency
- Leverage economist's knowledge (based on macroeconomics)
- Use indices appropriate to each account including addressing differential price trends between accounts
- Use indices that address levels of detail for various estimate classes
- Leverage procurement/contracting specialists knowledge of markets
- Ensure that indices address the specific internal and external market situation
- Facilitate estimation of appropriate spending or cash flow profile
- Calibrate or validate data with historical data