# Table of Contents

# Introduction

Economics as a Tool for Transportation Decision-making **Reference Overview Chapter 1. Costs and Benefits of Transportation** 1.1 Introduction 1.2 Internal Costs and Benefits Accounting Costs Capital vs. Operating Costs Marginal vs. Average Costs Total Costs: Fixed vs. Variable, and Short Run vs. Long Run **Opportunity Costs** 1.3 External Costs and Benefits 1.4 Summary 1.5 An In-Depth Look Estimating Value of Travel Time (VOTT) Estimating Value of Reliability (VOR) Cost Functions and Returns to Scale in Production **1.6 References Chapter 2. Pricing of Transportation Services** 2.1 Introduction 2.2 What is an Optimal Price? **Maximizing Profit** Maximizing Social Benefits Yield Management 2.3 Roadway Pricing Short-Run Marginal Cost Pricing Long-Run Marginal Pricing Static vs. Dynamic Pricing Second-Best Pricing Implementing Roadway Pricing Freight Movements 2.4 Road Pricing's Impacts on Equity

Measures to Improve Horizontal Equity

Measures to Improve Vertical Equity

2.5 Summary

2.6 References

# **Chapter 3. Regulation and Competition**

3.1 Introduction

3.2 Regulations

Environmental

Safety

Workers' Wages

# 3.3 Deregulation

Railroad and Motor Carrier Deregulation

**Airlines Deregulation** 

# 3.4 Competition

Competition in Public Transit Systems

Competition between Bidders

- 3.5 Summary
- 3.6 An In-Depth Look

**Regulatory Evolution** 

**3.7 References** 

# Chapter 4. Movement, Transportation, and Location

- 4.1 Introduction
- 4.2 Accessibility and Mobility
- 4.3 Transportation and Location Choice
  - Theories of Business Location

Theories of Residential Location

**Policy Impacts** 

4.4 Transportation and Land Values

Theoretical Expectations

Rail Transit

Highway Investment

- 4.5 Transportation and Wages
- 4.6 Transportation and Economic Development
  - Economic Impact of Relief Routes

Economic Impact of Access Management

4.7 Summary

4.8 References

# **Chapter 5. Investment and Financing**

- 5.1 Introduction
- 5.2 U.S. Railroad, Road, and Bridge Investment Needs

Importance of Transportation Infrastructure

- U.S. Railroad Infrastructure
- U.S. Roads and Bridges
- 5.3 Financing

Revenue Sources

**Expenditure Sources** 

Traditional Project Delivery Methods

Innovative Financing

5.4 Summary

5.6 References

#### Chapter 6. Project Evaluation

- 6.1 Introduction
- 6.2 Engineering Economic Analysis

Discount Rate and Time Value of Money

Net Present Value (NPV)

Internal Rate of Return (IRR)

Incremental Rate of Return ( $\Delta ROR$ )

Payback Period

Breakeven Analysis

Cost-Benefit Analysis (CBA)

Life Cycle Cost Analysis (LCCA)

- **Constrained Optimization**
- 6.3 Multicriteria Analysis

Simple Additive Weighting (SAW)

Data Envelopment Analysis (DEA)

6.4 Sensitivity Analysis

Single Factor Sensitivity Analysis: A Transportation Application

Multiple Factor Sensitivity Analysis: A Transportation Application

Monte Carlo Methods

6.5 Summary

6.6 References

# Chapter 7. Economic Impact Analysis of Transportation Investments and Policies

- 7.1 Introduction
- 7.2 Why Economic Impact Analyses Are Conducted

Prediction and Evaluation

Motivations

7.3 Economic Indicators

Measuring Economic Indicators

Impact Measures

- 7.4 Generative and Redistributive Impacts
- 7.5 Paths of Economic Analysis
- 7.6 Input-Output (IO) Modeling

The Foundation of the IO Model

Using the IO Model

**Multiplier** Analysis

Limitations of IO Modeling

7.7 Computable General Equilibrium (CGE) Models

The CGE Model Structure

Strengths and Limitations of CGE Models

7.8 Summary

Recommended Reading

7.9 An In-Depth Look

Double-Counting

Creating the IO Model

CGE Model Foundation

7.10 References

# **Chapter 8. Econometrics for Data Analysis**

8.1 Definitions and Steps for Econometric Analysis

Some Caveats

Some Terminology

Understanding the Data: Use of Summary Statistics

8.2 Data Sets for Regression Models

Cross-Sectional, Time-Series, and Panel Data Sets

8.3 Specifying the Model

Parameter Estimation

Choice of Estimation Methods: Error Terms' Distributions

Choice of Estimation Methods: Error Term Correlation

Common Modeling Mistakes

8.4 Nonlinear Parameter Estimation MethodsGeneralized Least Squares (GLS) EstimationInstrumental Variables (IV) EstimationSystems of Equations Models (SEMs)

# 8.5 Panel Data Models and Parameter Estimation Methods

Pooled OLS

Fixed Effects (FE) Modeling

First Difference (FD) Modeling

Random Effects (RE) Modeling

8.6 Discrete Choice Models and Estimation Methods

8.7 Time-Series Modeling

Single Response Variable Settings

Multivariate Response Variable Settings

- 8.8 Computer Programs for Econometric Applications
- 8.9 Statistical Significance and Prediction
- 8.10 Summary

8.11 An In-Depth Look

Systems of Simultaneous Equations

**Recursive and Non-Recursive SES** 

Seemingly Unrelated Regression (SUR)

Single-Equation Estimation Methods

Systems of Equation Models (SEM)

8.12 References

# Chapter 9. Data Sets

References

Examples of Existing Data Sets

# **Chapter 10. Case Studies**

10.1 Case Study 1: Cost-Benefit Evaluation of Network Improvements

- 10.2 Case Study 2: The Economic Impacts of Bypasses
- 10.3 Case Study 3: The Economic Impacts of Congestion Pricing
- 10.4 Case Study 4: Right-of-Way Acquisition Costs
- 10.5 Summary
- 10.7 References