Outline

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- Distance-based pricing
- Congestion pricing
  - Overview
  - Scheme types
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  - Context of Malaysia
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Typical Motivations for Initiating Pricing Strategies

- **Primary:**
  - Demand management (i.e., congestion abatement)
    - Time, fuel, reliability
  - Revenue generation
    - Decreasing contribution from vehicle fuel tax
    - Build additional infrastructure or expand (transit) services
    - Stable and predictable revenue source

- **Secondary:**
  - Increased economic efficiency → net benefits to society
  - Internalize external costs
  - Increase transit ridership
  - Increase capacity utilization
  - Improve distribution of goods
Some Pricing Strategies

- **“Common”**
  - Distance-based pricing
    - Intercity and urban
  - Congestion pricing
    - Urban and congested corridors

- **More innovative**
  - Car sharing
  - Variable insurance
Distance-Based Pricing

- Passenger and freight vehicles
  - U.S. consideration
  - Revenue generation
    - Gas tax replacement
      - fuel economy
      - alternative fuel vehicles
  - Measure vehicle miles traveled (VMT)
  - Considered infeasible to replace gas tax in U.S. at this time
    - Cost (admin & tech)
    - Gas tax “sufficient” for next 20 yrs.
Distance-Based Pricing

- **Heavy vehicles only (Swiss case)**
  - **Goals**
    - Internalize external costs
    - Revenue generation
    - Reduce alpine road traffic
  - **Results**
    - Fleet adaptation
      - Replacement of high-emission trucks
      - More specialized vehicles
    - Organizational changes
      - Industry mergers
      - Freight and fleet management
    - Some indication for mode shift
    - Little influence on consumer prices

Source: Rapp Trans AG
Congestion Pricing Overview

- A.K.A. Value, Dynamic, Variable, & Peak-Period Pricing
  - It is:
    - Modifying travel demand to achieve a desired change in consumer behavior
    - Charging customers more during peak periods than off-peak to reduce the demand fluctuation throughout the time period when capacity is fixed
  - Used in other industries:
    - Telephone companies
    - Airlines
    - Hotels
    - Energy
  - Most likely used for roads and parking
  - Elasticities for road value pricing are typically between 0 to -0.5
  - Can be time-, spatial-, or distance-based
  - Can be fixed-price or dynamic
  - Increasing consideration in recent years
    - ITS technology
    - More case studies to draw upon
    - Congestion is an ever-increasing problem
Possible Effects of Congestion Pricing

- For highway traffic flow, the elimination of a few trips from the peak period could create substantial reductions in overall congestion. Source: FHWA, 1999

- How are trips eliminated?
  - Move to off-peak times
  - Move to less congested routes
  - Alternative modes of travel selected
  - Increased vehicle occupancy rate
  - Combine or eliminate some low-value trips
Pricing Schemes

- Basic road value pricing schemes:
  1. Areawide value pricing
  2. Single facility, route, or corridor value pricing
  3. Partial facility (i.e. lanes) value pricing
  4. Vehicle-use pricing
Technology

ELECTRONIC TOLL COLLECTION

- Automatic Vehicle Identification (AVI)
  - Toll tags and tag readers
    - Lasers
    - RF
    - IR
    - Automatic Number Plate Recognition (ANPR)

- Automatic Vehicle Location (AVL) Systems
  - Similar to those used for fleet management
  - Data can be stored in on-board processing units
  - Facility-specific

- GPS
  - Could be integrated with ITIS
  - Limitations in urban areas

- AVI and AVL can be linked with “smartcards”
  - Malaysia Toll Roads
smartcards

- Integration with multiple modes and services
  - Transit
  - Parking
  - Toll roads
  - Taxis
- “Open”

A multi-application smart card (Source: GemPlus)
Singapore

- Area Licensing Scheme introduced 1975
  - First in world
  - Part of an overall transport strategy
  - High entry barrier to car ownership
  - Peak-period fee almost 5% of car-owning household’s annual income
  - Results: traffic entering zone dropped >40% and greatly increased transit use and carpooling
- Upgraded to Electronic road pricing system in 1998
- Key ERP Characteristics:
  - Expanded areawide scheme
  - Results: reduction of 15% in vehicle crossings
  - Cordon Entry Points (approx. 30 gantries) to “Restricted Zone”
  - AVI w/ smartcards and In-Vehicle Unit (IU)
  - 7:30 AM to 7:00 PM M-F
  - Fees
    - Fees vary every half-hour at pre-determined rates (i.e. predictably dynamic)
    - Different prices for different user groups
    - Fare charged each time entering cordon
Singapore ERP Configuration

Fig. 3 ERP system equipment configuration
London

- Areawide pricing scheme
  - Central London
- 7:00 AM to 6:30 PM
- Users self-report
- ANPR technology for enforcement
- Fees:
  - One-time £5 fee each day
  - Discounts to certain groups
    - e.g. electric vehicles
  - Flexible payment options for different users (e.g. fleet accounts)
- Result:
  - Travel delays and journey time reliability have improved 30%
  - Journey times have decreased 14%
  - Large shift to public transport
Congestion Pricing Requires an Increased Focus on:

- Multimodal/intermodal facilities
  - EFPS
  - Parking lots
- Transit (from mode shifts)
- Land-use
- TOD
- Non-motorized transport
Public Acceptance

- More likely to “sell” value pricing when it is part of an overall transport strategy
- Pre-Implementation
  - Mostly negative views when applied to current facilities
  - Viewed more acceptable when applied to new facilities (providing alternatives)
- Dynamic pricing less acceptable if alternatives absent
- Post-implementation surveys typically show public support
- Equity could be addressed by establishing “credits”
  - Baseline # of crossings, miles, boardings, etc. gifted to targeted (e.g. low-income) groups
- Privacy issues need to be addressed
- Information campaigns
Salient Characteristics for Successful Implementation

- Clearly defined goals
- Politically feasible
- Simple
  - Predictable prices
- Marketing and educational campaigns
- Equitable
- Enforceable
- Low administrative costs and burdens
- Promotes sustainability
  - e.g., discounts to alternative fuel vehicles
Salient Characteristics for Successful Implementation (cont.)

- Use of revenue?
- Offer alternatives
- Price fluctuation for congestion management
- Address user groups individually
  - Differentiation of charges, technology, and payment options
- Technology
  - Established
  - Accommodate foreign vehicles
  - User-friendly
  - Flexible
  - “Open” system
    - Integration with other modes and systems
Context of Malaysia

- **Point 1:**
  - Developed World
    - Freeway corridor congestion
  - Developing world
    - True urban gridlock

- **Point 2:**
  - Many of Malaysia’s toll roads are private
    - Increased difficulty for implementation and architecture
    - Contractual toll limits

- **Point 3:**
  - Low vehicle operating costs

- **Point 1 + Point 2 + Point 3 =**
  - Areawide congestion charging may be a strong strategy
  - Technology is available
  - Further research needs to look at Malaysia-specific characteristics of the system
Questions and Discussion