Measuring Incentive Elasticities from the Model Level to Industry

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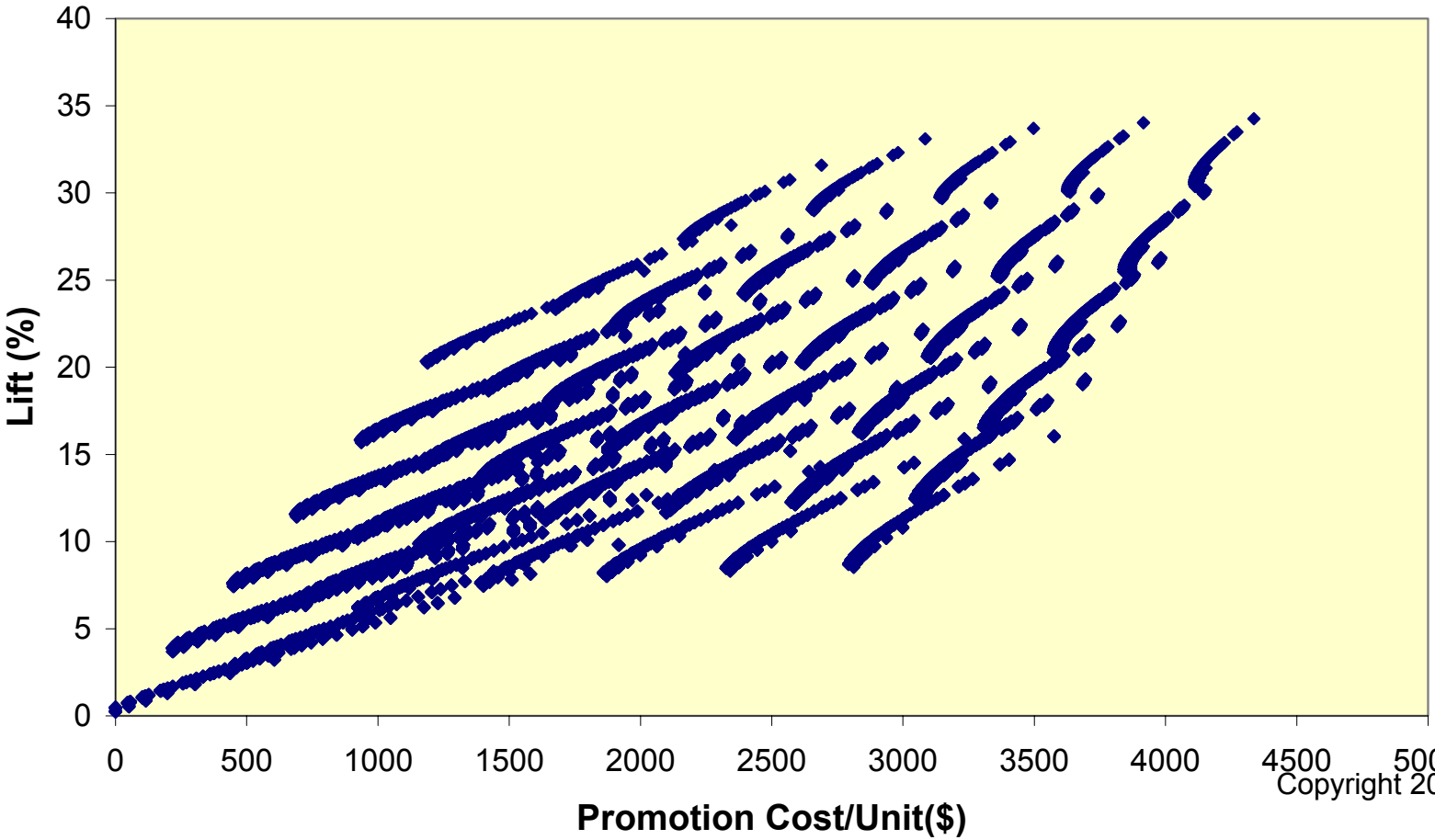
The Problem

- **Competitive dynamics and high fixed costs have led the automotive industry to a promotion (incentive) war**
- **Promotion planners face a daunting task in identifying efficient/effective promotion programs**
  - For the same level of promotion cost per unit, an efficient program could generate a lift more than 3 times higher than the one from an inefficient program
  - But, which are those efficient programs?
  - Multiple promotion tools and a complex consumer acquisition process further complicates the promotion planning process

High Variation Of Lifts For Any Given Level Of Promotion Expenditure

Jeep Wrangler



Acquisition of Automobiles:

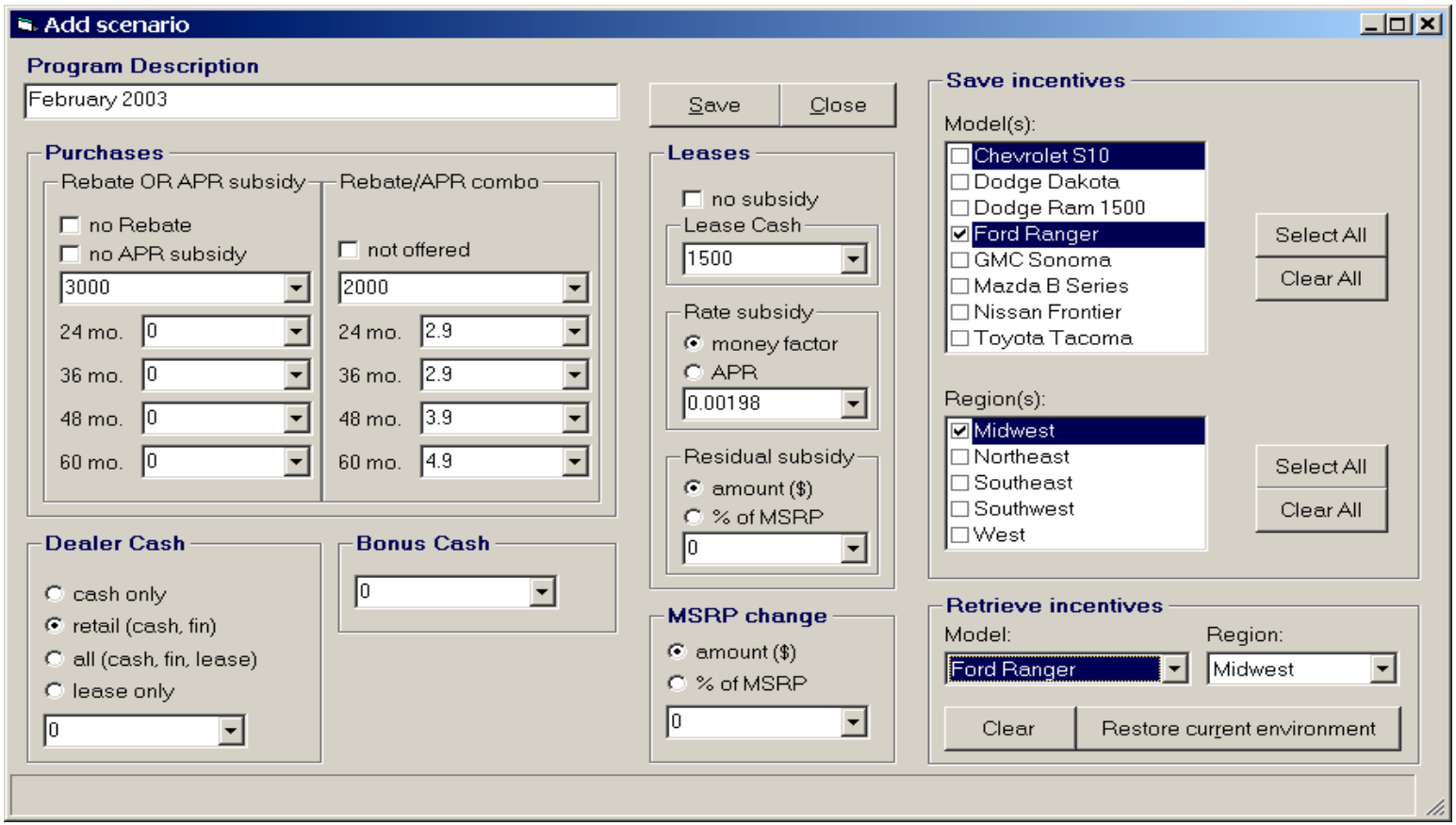
A Complex Consumer Decision

- **Vehicle type (e.g., midsize sedan, truck, SUV, etc.)**
- **Vehicle make and model (e.g., Ford Taurus, Honda Accord, Toyota Camry, etc.)**
- **Acquisition type**
  - *Purchase vs. Lease*
  - *Financing term*

Consumers Face An Intricate Menu Of Promotions (Incentives):

- **Purchase incentives**
  - **Consumer rebates**
    - **which may or may not be combined with other incentives**
  - **Subsidized financing**
    - **different "subvented" APRs for 24, 36, 48, 60 months**
    - **credit qualifying requirements**
- **Lease incentives**
  - **Lease cash**
  - **Subsidized lease interest rate**
  - **Enhanced residual value**
- **Loyalty/conquest programs**
- **Dealer incentives**
  - **sometimes contingent on volume objectives**

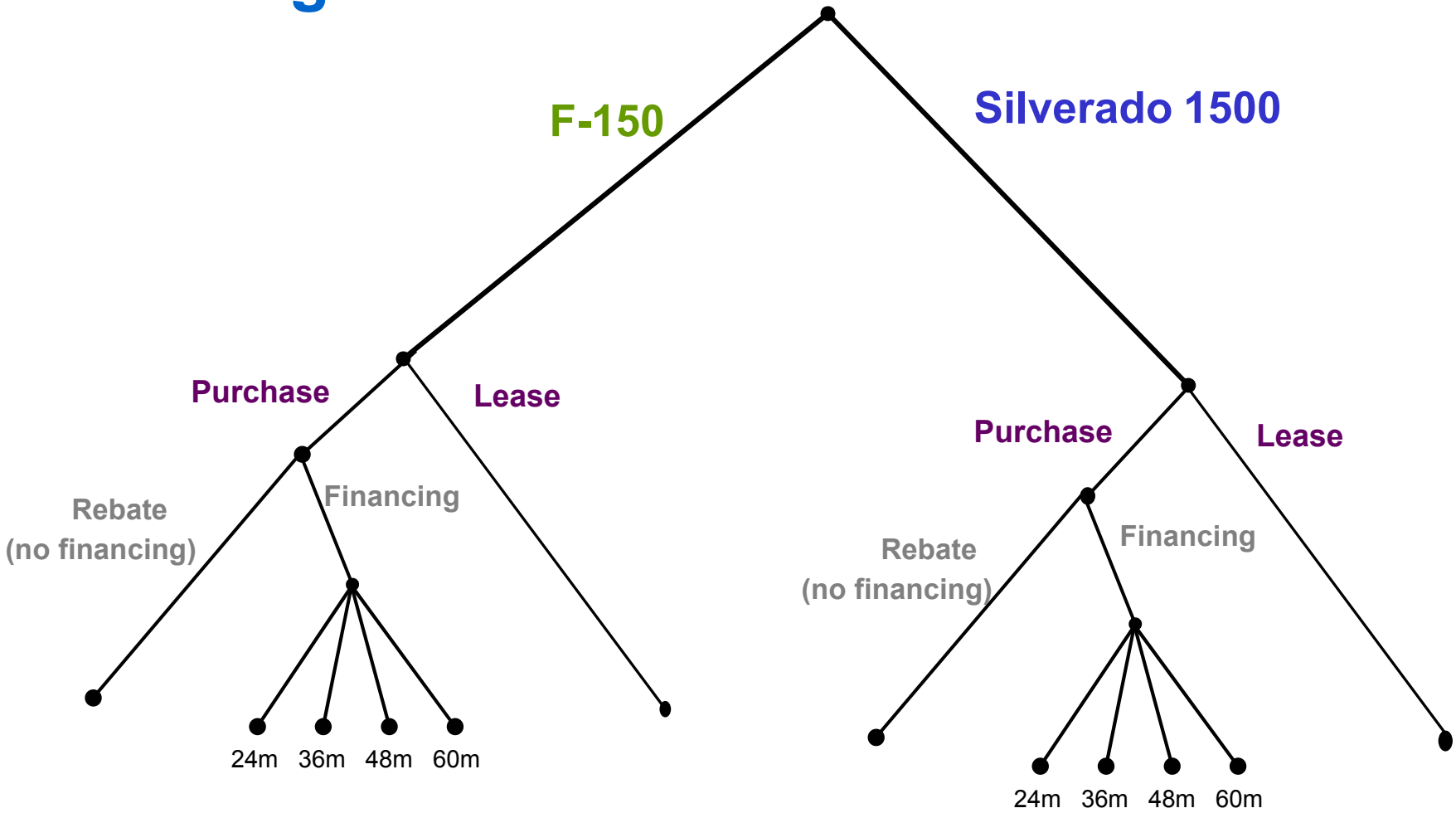
Example: Current Programs For Ford Ranger



PIN Incentive Modeling Approach

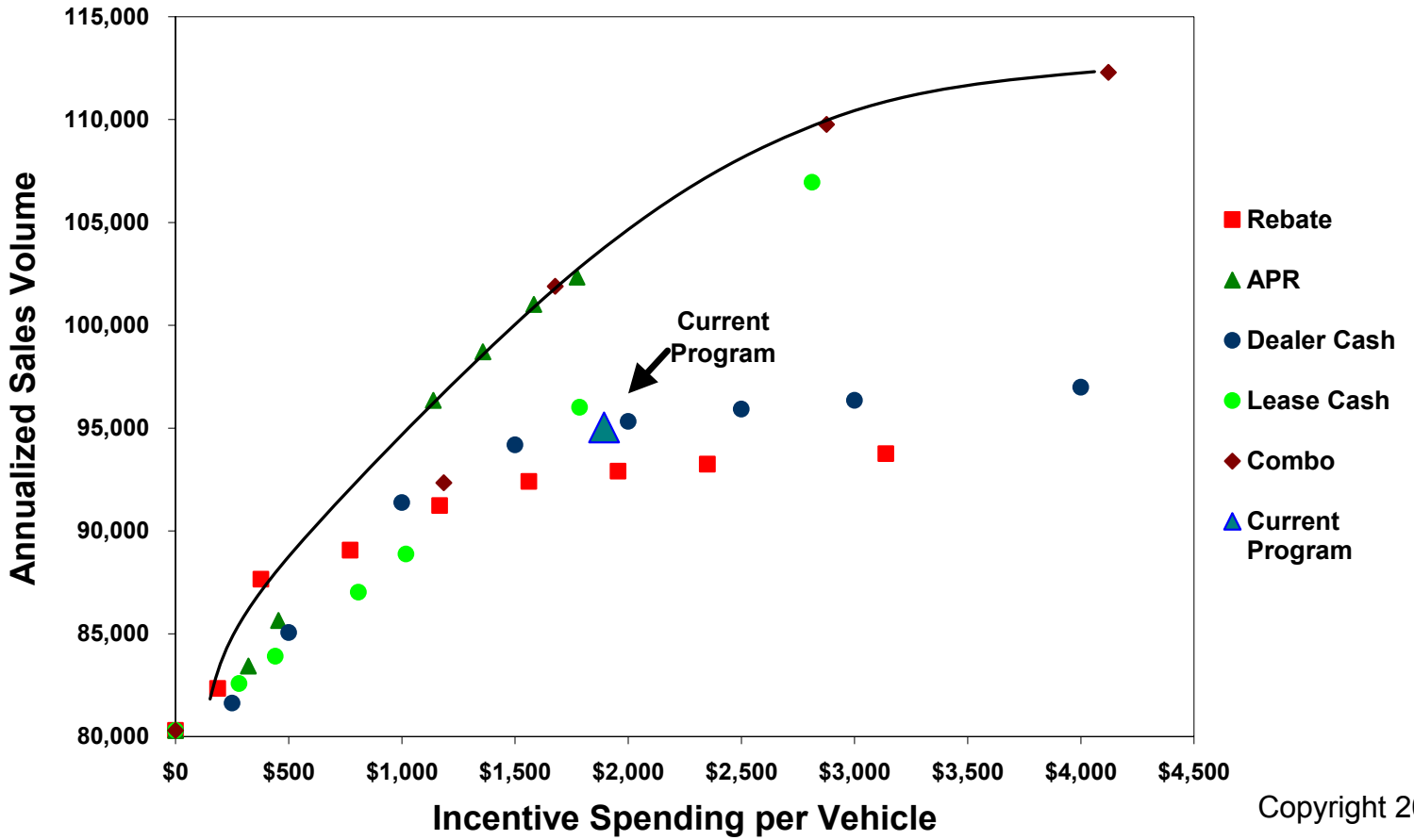
- Based on point-of-sales transaction data
  - Only one transaction per household
- Nested Logit
  - Brand choice
  - Transaction-type
  - Financing Term
- Regional heterogeneity through hierarchical Bayes

Nested Logit Structure



PIN Incentive Modeling can be used to determine the optimal level of spending and incentive type.

Demand Curve: Example



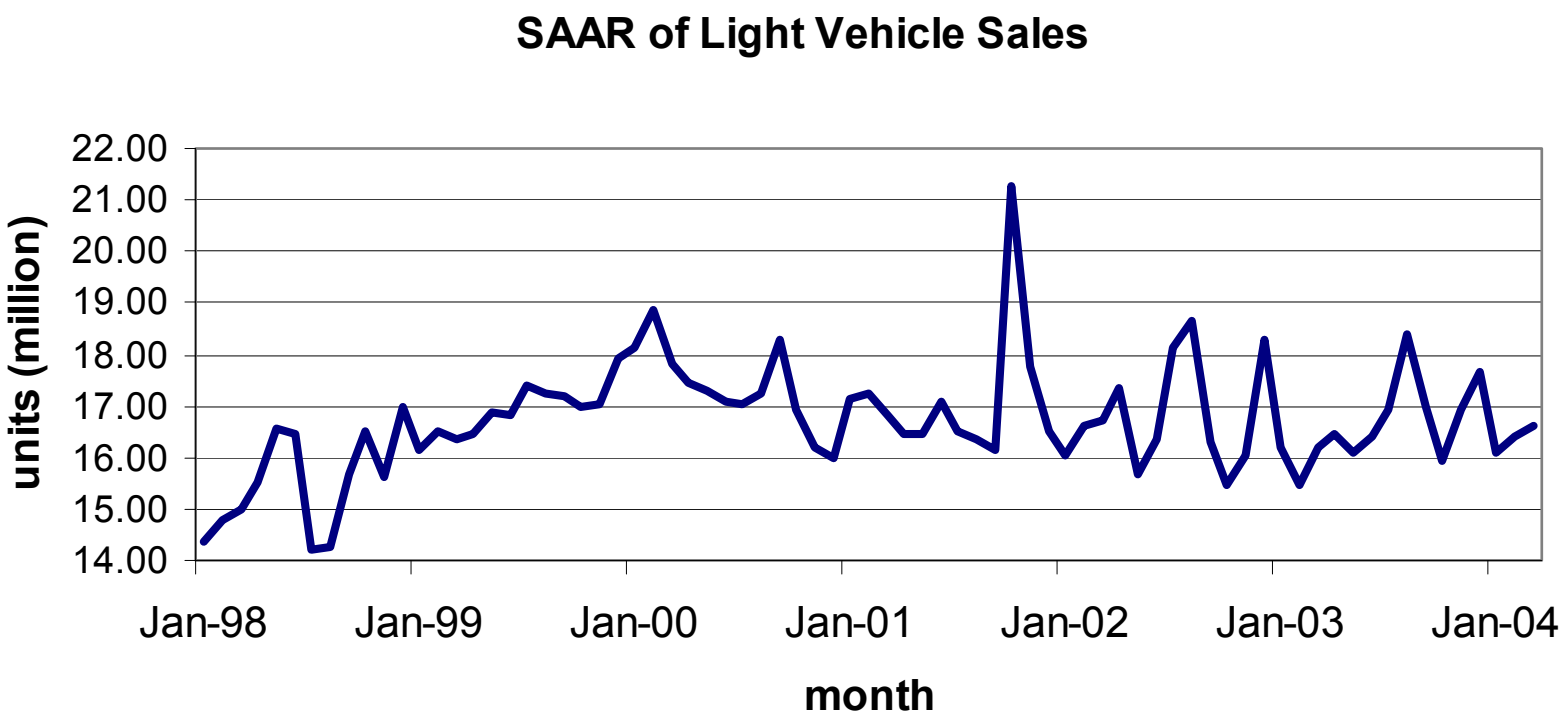
PIN Incentive Planning Capabilities

- **To be used for:**
  - Planning and evaluating pricing actions and incentive actions
  - Evaluating competitive actions
  - Simulating competitive responses
  - Evaluating short-term actions to handle over/under supply
  - Evaluating cost of New Incentives

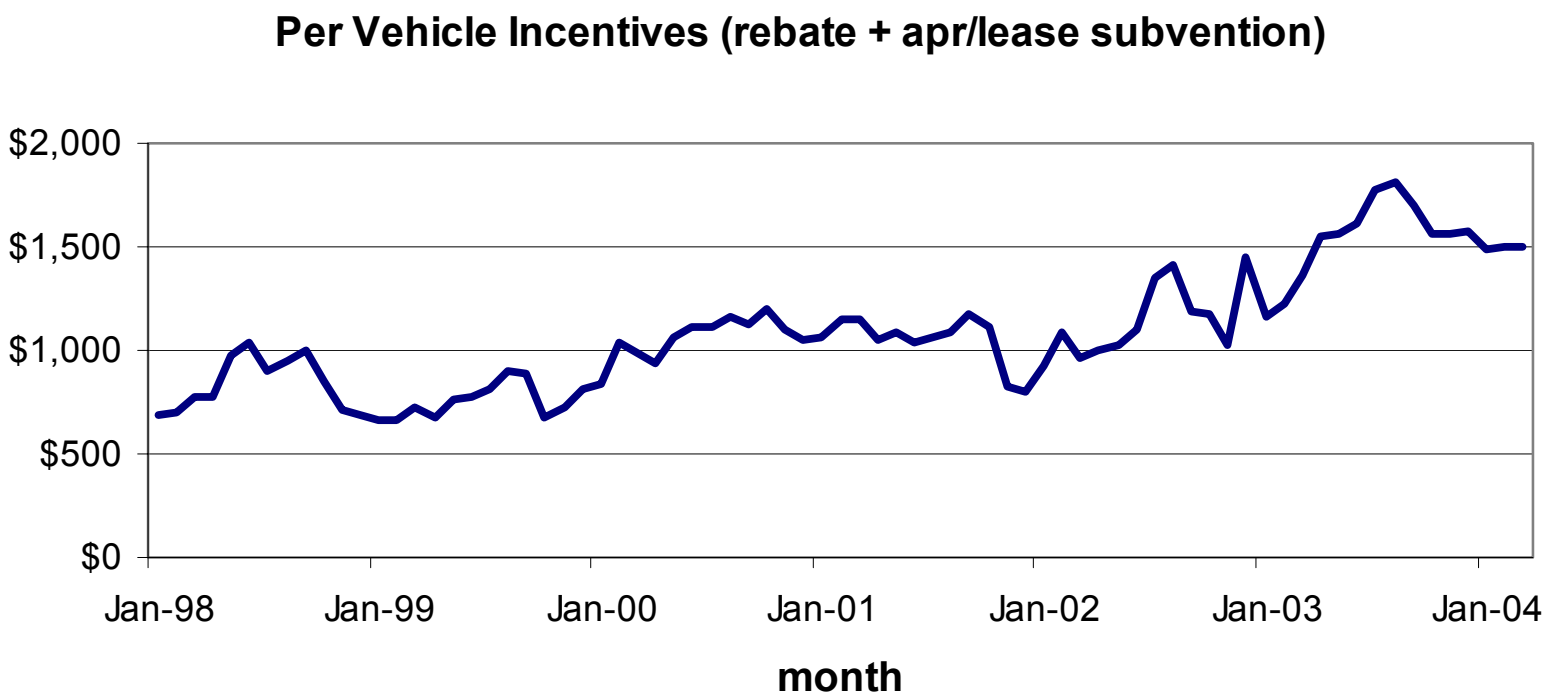
Incentive Effects on Auto Industry

- Incentive offers help manufacturers gain market share
- Do incentives have an effect on overall vehicle sales?
- Can long-run effect be quantified?

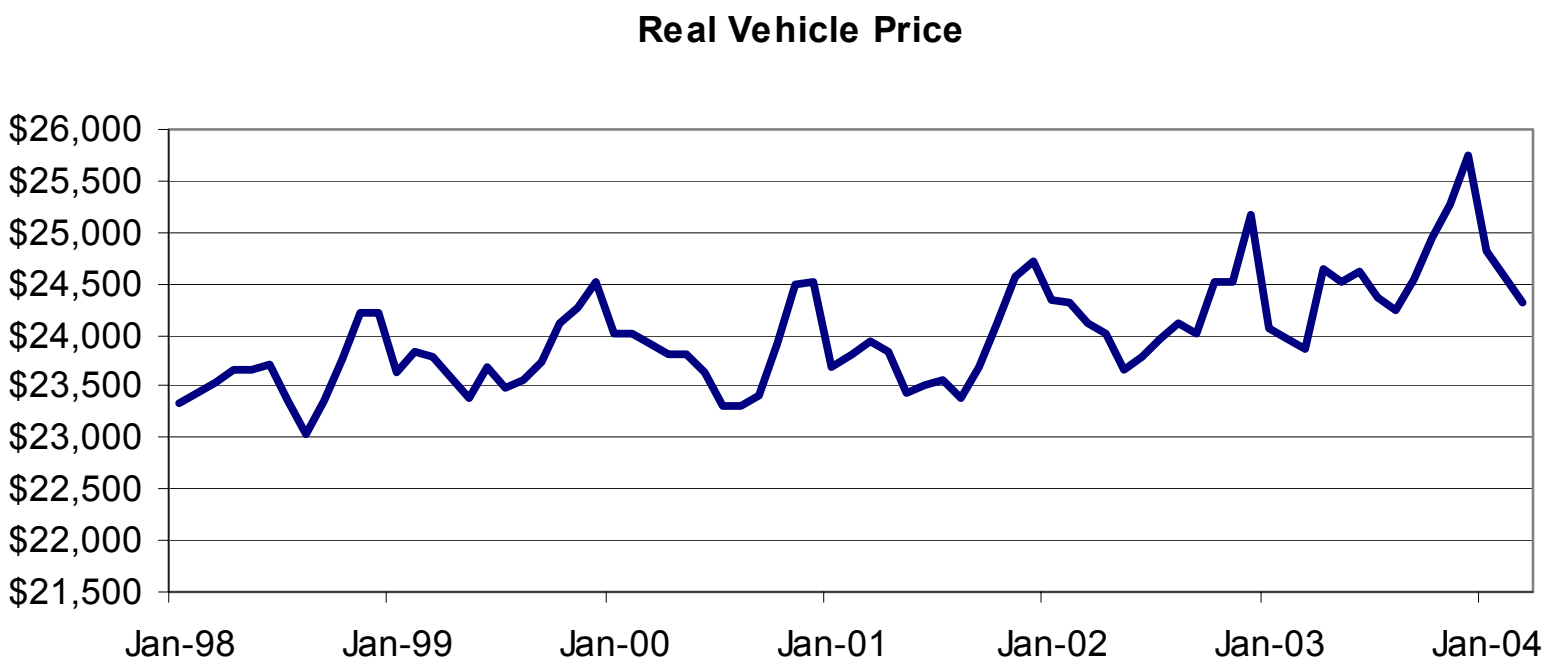
Monthly Sales



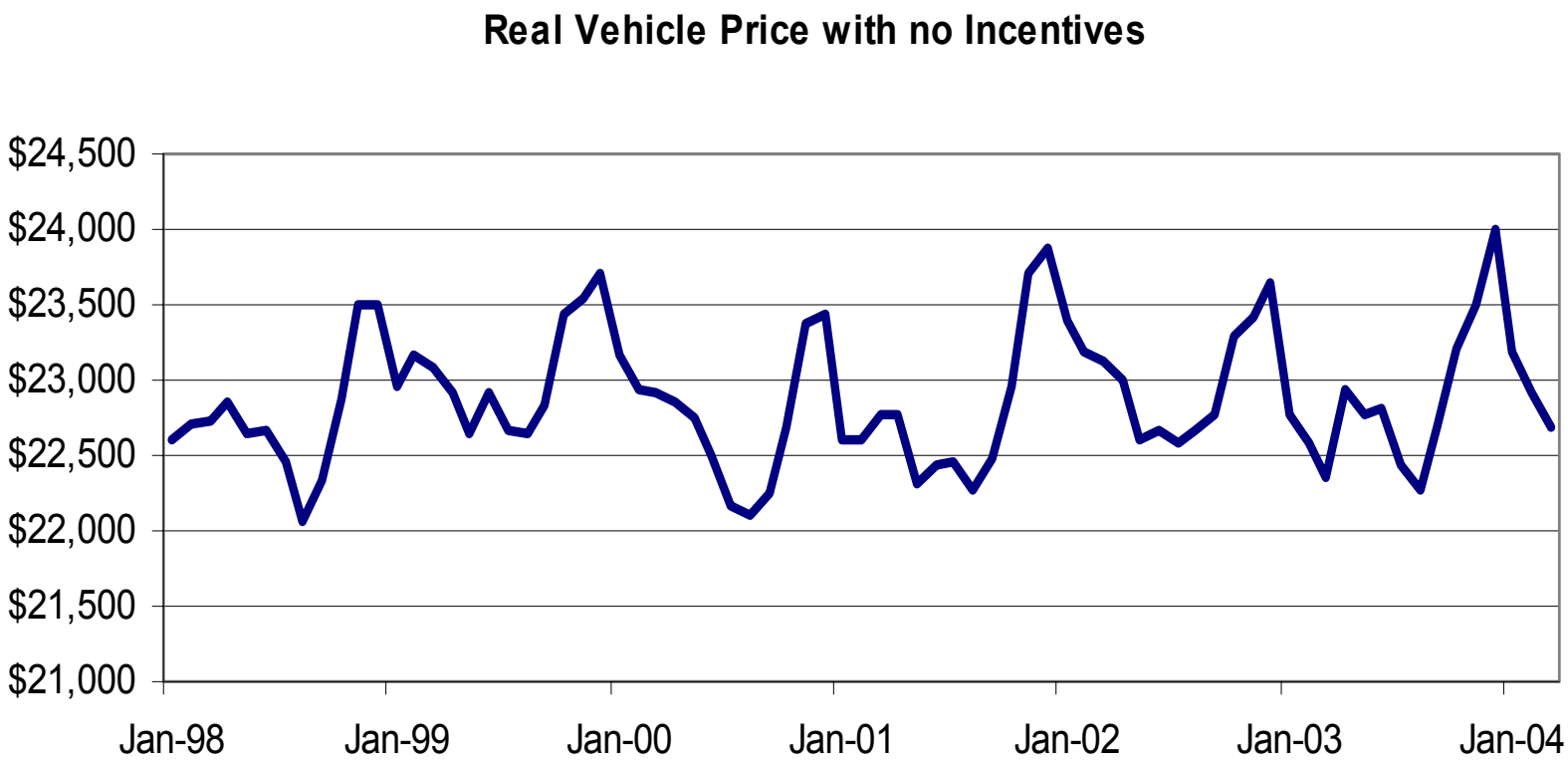
Incentives on an Upward Trend



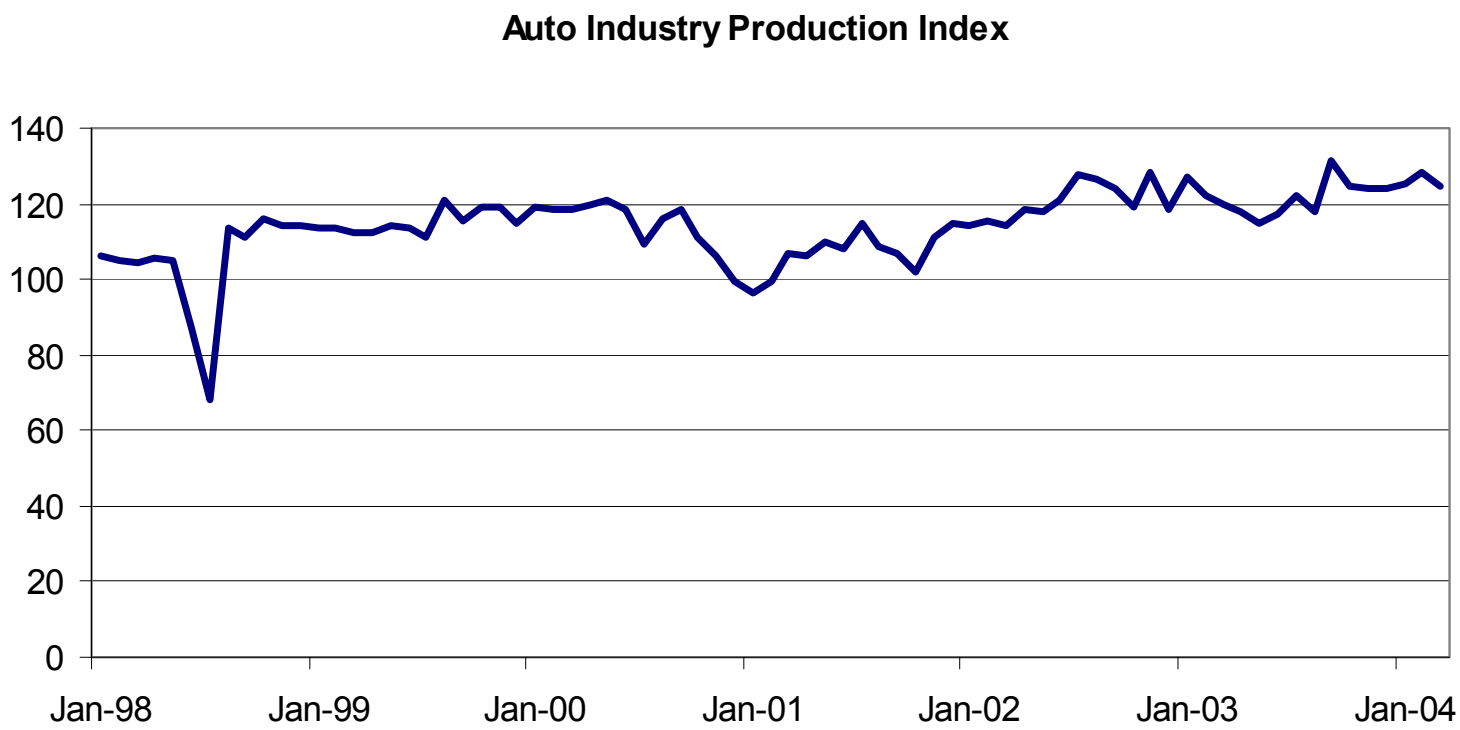
Seasonality in Real Price



Seasonality In Real Price After Incentives



Industry Production Index



- **Macroeconomic Model**: (Jan 1998 – Mar 04)
  - Vector Autoregression Impulse Response Function (Cholesky Decomposition)
  - Variables: (all in logs)
    - auto industry production index (x1)
    - real vehicle price excluding offered incentives (x2)
    - real incentives per vehicle (x3), CA as proxy for national (corr > 0.9)
    - monthly SAAR of light vehicle and truck sales (x4)

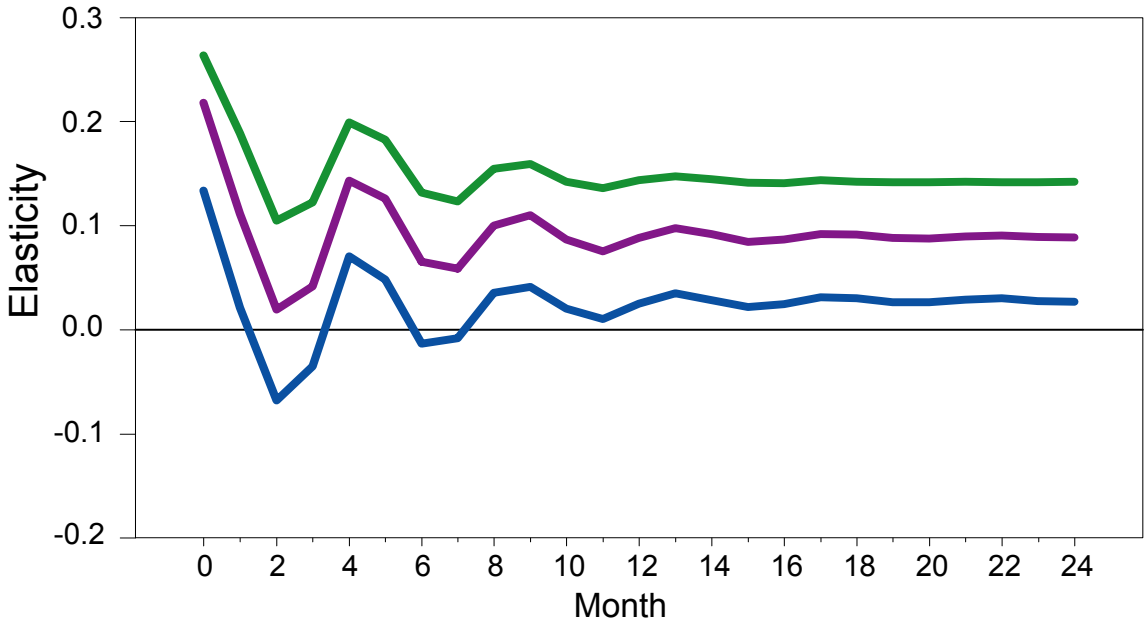
$$\Delta x_t = A_0 + A_1 \Delta x_{t-1} + A_2 \Delta x_{t-2} + A_2 \Delta x_{t-3} + e_t$$

$$x_t = \begin{bmatrix} x_{1t} \\ x_{2t} \\ x_{3t} \\ x_{4t} \end{bmatrix}$$

Industry Incentive Elasticity

Incentive Elasticity On SAAR Of Industry Sales

Change In SAAR Volume Per 1% Change In Total Incentives Per Vehicle



Period	Avg Incentive	Avg Real Price
1998-2003	$1,081	$24,003

1% change in incentives = $10.81
Percentage change in real price = 10.81/24,003 = 0.00045
Expected change in sales = 0.089% = 0.00089
Implied price elasticity =1.98

Final Remarks

- Long-run elasticity of incentives are less than short-run, as expected
- There is a pull-forward effect of incentives on industry sales
- A 1% permanent change in incentives per vehicle increases industry volume by about 0.089% in the long-run (about a year)
- There are other shocks affecting total sales volume and hence the elasticity represents how sales would react in time if all other shocks were out of the picture
- Segment level analysis can be performed with a similar model
- Cross-segment shopping needs to be incorporated for a better assessment on incentives on the industry.

Elasticity Interpretation

- April 2003 – March 2004 SAAR = 16.74 million
- Average monthly incentive = $1601
- 25% increase in incentives = $400
- 2.2% increase in sales
- 17.10 million SAAR