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# Personal Auto Predictive Modeling Background

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San Diego, CA

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# Pricing Historically

- Experience
- Competition
- New business/retention volume
- Marketing Input
- Rating Bureau

**Mixture Depended on Company**

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# Historical Experience

- Considerations
  - ❑ Overall loss ratio/pure premium experience
  - ❑ Loss ratio/pure premium by class
  - ❑ Overall profit (investment income)
- Actions
  - ❑ When experience worsens, increase rates
  - ❑ When experience gets better, decrease rates
- Results
  - ❑ Significant underwriting cycle

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# Marketing Input

- Considerations
  - “The rates are too high”
  - Input on what other companies are doing
- Actions
  - Decrease rates
  - Take smaller increases
- Results
  - Further limit to competitive differences

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# Rating Bureau

- Considerations

- Rating plan based on broader industry experience
- Plans filed with rating bureaus

- Actions

- Follow rate bureau plan
- Use rate bureau plan with modifications

- Results

- More limited competitive differences
- Did not reflect individual company differences

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# Historical Auto Market

- Characterized by significant underwriting cycle
- Competition was based mainly on price
- Underwriting rules were used as lever for controlling volume
- Ran roughly with economic cycle
- Pricing done independently, competitively, and using rating bureau

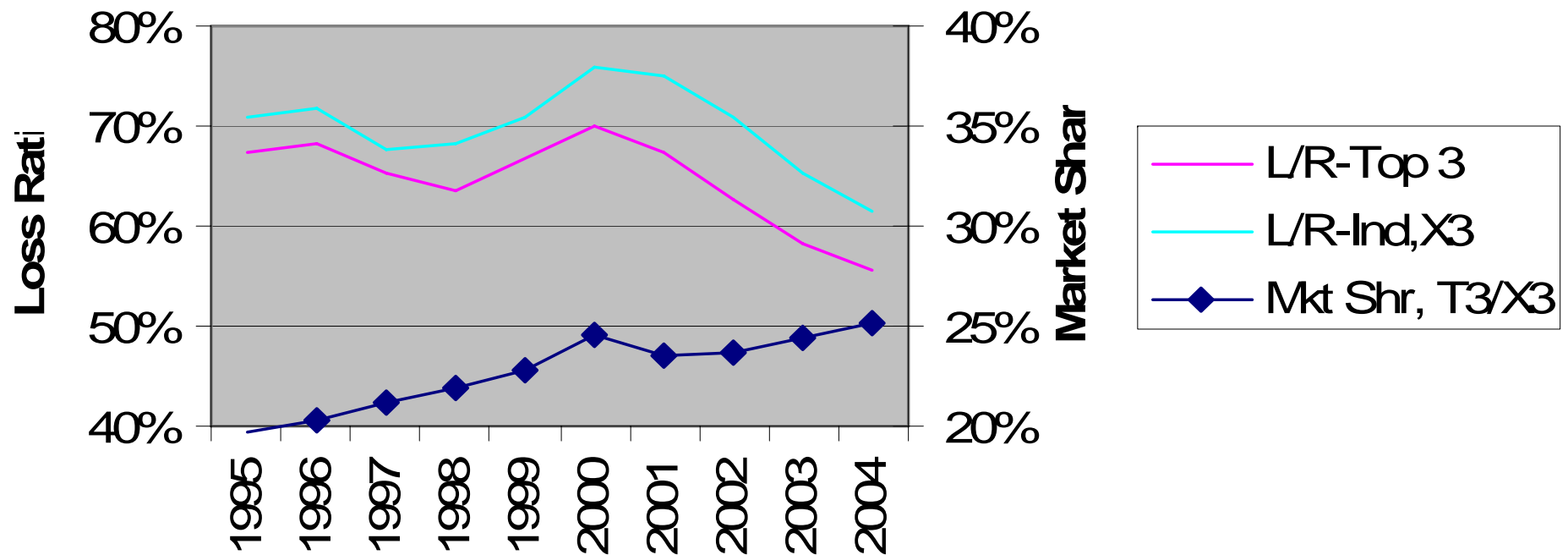
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# What Changed?

- Innovation
- Increased competition
- More sophisticated pricing
- Increased advertising
- Stock market correction – 2001

# Current Market Considerations

**Top 3 Segmenters Vs. Industry-Pers. Auto**  
**Loss Ratio (Left-axis) and Market Share (Top 3, Right Axis)**





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# Results for Personal Lines Innovators

- Pinnacle analysis of early PL market innovators
  - Progressive
  - Allstate
  - Safeco
- Loss Ratio Consistently Better (6-8%)
- Premium Market Share increased 25%
- “Profitable Growth” symptomatic of using adverse selection to your advantage

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# How to Price and Compete In Today's Market

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# Pricing Historically

- Experience
- Competition
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- Marketing Input
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**Mixture Will Change**

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# Problems With Considering Competition

- Increase in the use of tiering
- Increase in the use of new or proprietary factors
  - Insurance score
  - Prior limits
  - Historical non-chargeable losses
- Increase in the difficulty of getting competitor information
  - Filings on copy resistant paper
  - Classifying of certain information as underwriting
  - Agents may not even have manuals anymore
- Increase in the complexity of rating plans

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# Considering Competition – Competitive Positioning Presentation

- Business life cycle analysis
- Batch competitive quotes
- Market penetration studies

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# New Business/Retention Volume

- Still can monitor new business and retention volume
- May not just be a pricing solution
- Increase in competitive advertising may impact your volume

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# Marketing Input/Rating Bureau

- Marketing Input
  - May be more significant
  - May be difficult to interpret, because agents may not know everything another company is doing
- Rating Bureau
  - Does not reflect current market sophistication
  - Based on smaller market share

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# Reviewing Experience

- Data
- Analysis
- Application



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# Data

## Internal

- Rating factors
- Underwriting factors
- Marketing information
- Billing information
- Cross-line information
- Etc.

## External

- Insurance score
- Demographic information
- Vehicle characteristics
- Distance to fire station
- ZIP code level demographics
- CLUE

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# Internal Information

- Rating factors
  - To the extent not reflected completely in rating plan
- Underwriting factors
- Marketing information
- Billing information
- Cross-line information
- Etc.

# Credit Information

- Sources
  - Equifax
  - Experian
  - TransUnion
  - Third party vendors
- Information Available
  - Credit scores
  - Payment history
  - Balance information
  - Public records



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# Demographic Information

- Auto
  - Occupation/employment status
  - Number of occupants/children in the household
  - Age of youngest/oldest driver
  - Drivers per vehicle

# Expanded Claim Information

- Prior claims by coverage (auto)
- Prior claims by peril (homeowners)
- Length since prior claims
- Not at fault claims



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# Current Auto Market Considerations

## Examples of new rating variables

- ❑ Occupation/Education
- ❑ Homeownership
- ❑ Number of children
- ❑ Smoking
- ❑ More sophisticated vehicle rating
- ❑ Payment plan/payment history
- ❑ Number of drivers/vehicles
- ❑ Time since last incident

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# Experience – Traditional Analysis

- Analyzing Rating Factors
  - One-way analyses
  - Competitive reviews
- Limited numerical analysis of U/W criteria
  - Professional judgment
- Potential double count in the rating factors and U/W tiering criteria

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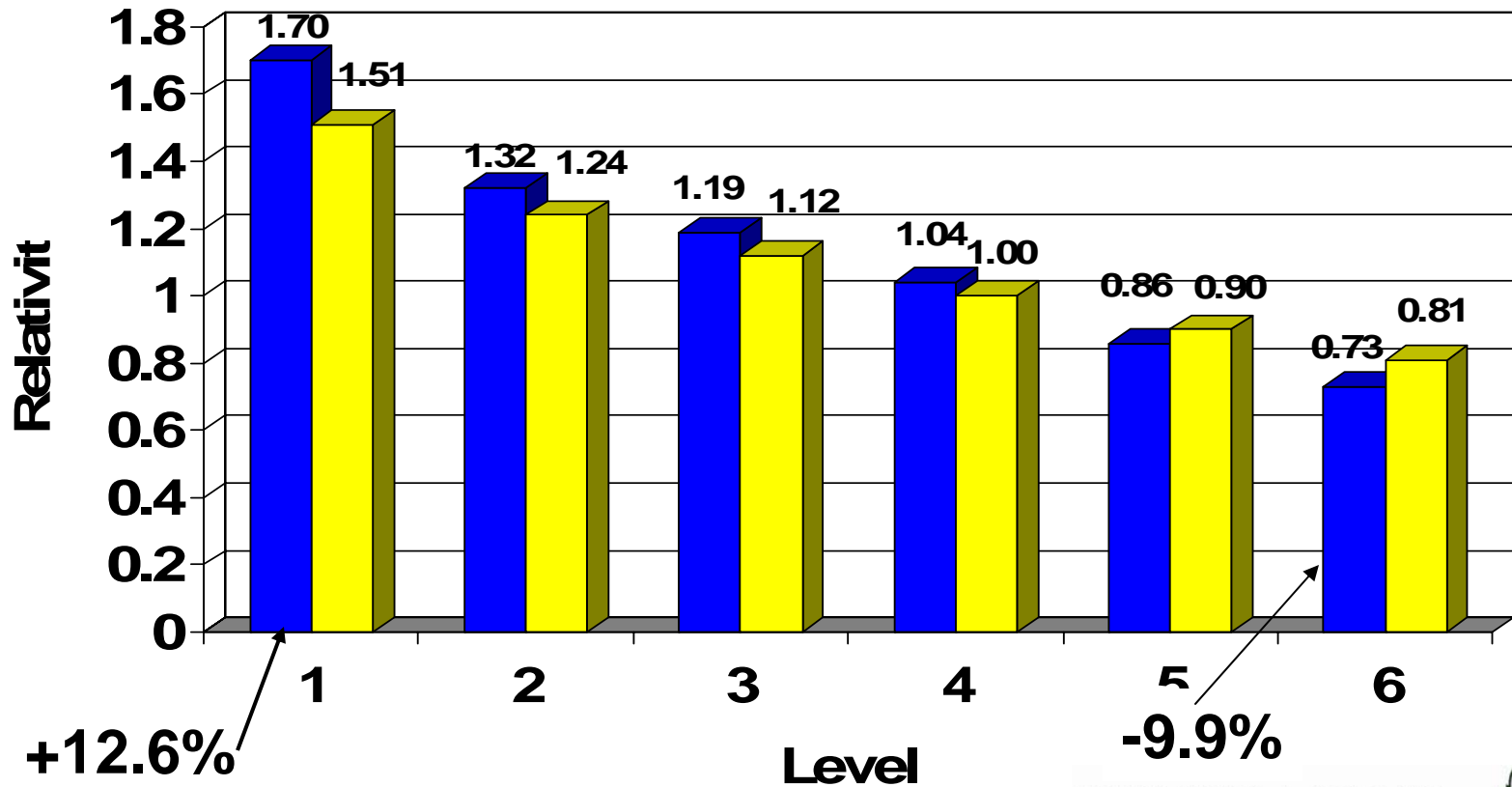
# Current Market Considerations

- Most larger companies are using predictive modeling
- Many larger companies have started to implement new rating plans
  - Use of more sophisticated variables
  - More sophisticated use of traditional variables (age, accident surcharges, etc.)
- Has resulted in significant decrease in new business penalty
- Smaller companies are becoming more sophisticated



# Pricing Analysis - Credit Scores

## One Way vs. Multivariate Analysis



■ Loss Ratio ■ GLM

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# Range of Credit Relativities

	<u>One-Way Analysis</u>	<u>GLM with Additional Elements</u>
High Relativity	3.06	1.93
Low Relativity	.69	.76
Ratio	4.44	2.54

**43% decrease in the range of credit score relativities**

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# Applications

- New rating plans
- Vehicle classification
- Custom insurance score
- Expanded SDIP
- Territory definitions
- Tiering plan
- Scorecard
- Refinement of experience debits/credits

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# Advantages of using Vehicle Characteristics for Rating

- **Easier to rate newer vehicle types.**
- More accurate reflections of safety equipment and other vehicle characteristics.
- For physical damage coverages, and now Liability and PIP symbol can account for significant differences in rates between different insureds.
- Get leg up on competition that don't use GLM.
- Obviates some credibility issues.

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# Considerations

- Need VIN.
- Append external data via Polk, HLDI, ISO or other.
- Need VIN for liability too.

# Possible Vehicle Characteristics

<b>Lease</b>	<b>Model year</b>	<b>Gross vehicle weight</b>
<b>Lien</b>	<b>Symbol</b>	<b>High performance code</b>
<b>daytime running lights</b>	<b>ton rating</b>	<b>Roof type</b>
<b>anti lock brakes</b>	<b>vehicle existing damage</b>	<b>Transmission</b>
<b>ESC (Electronic stability control)</b>	<b>Anti theft device</b>	<b>Wheel base</b>
<b>airbags/passive restraint</b>	<b>Cubic inch displacement</b>	<b>New / Used indicator</b>
<b>weight</b>	<b>Cost price new</b>	<b>Height</b>
<b>engine size</b>	<b>Body type</b>	<b>Length</b>
<b>make</b>	<b>Carburetion</b>	<b>Width</b>
<b>model</b>	<b>Cylinders</b>	<b># of doors</b>
<b>segmentation</b>	<b>Driving wheels</b>	<b>Backup avoidance</b>
<b>theft device</b>	<b>Fuel type</b>	

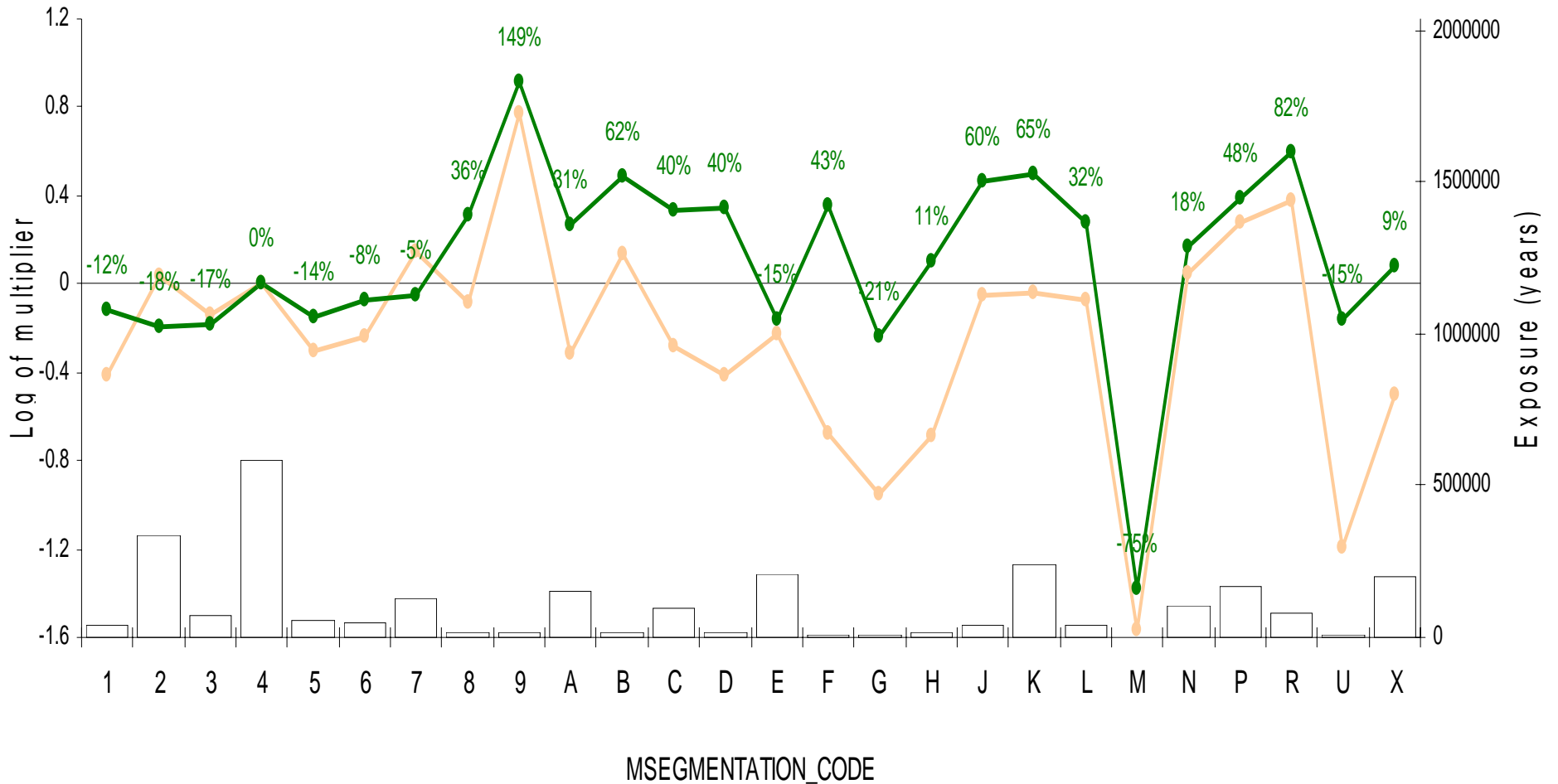
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# Additional Non-traditional Characteristics

- Branded title
- Length of last ownership
- Salvaged
- Prior damage
- Was vehicle repossessed

# Example Company Vehicle Classification Job

Run 2 Model 1 - Collision Pure Premium - Smoothed standard risk premium model (single claim type)

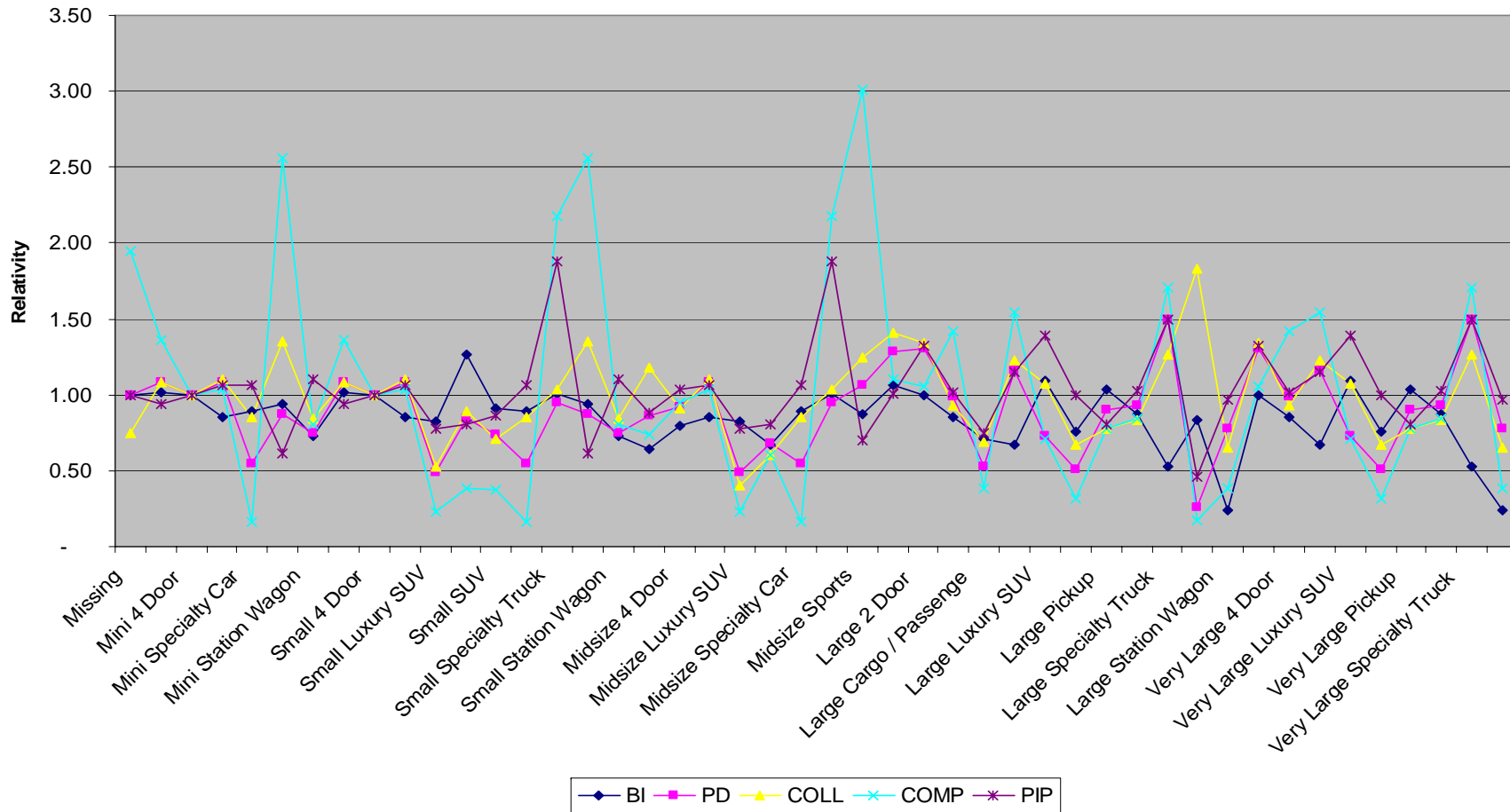




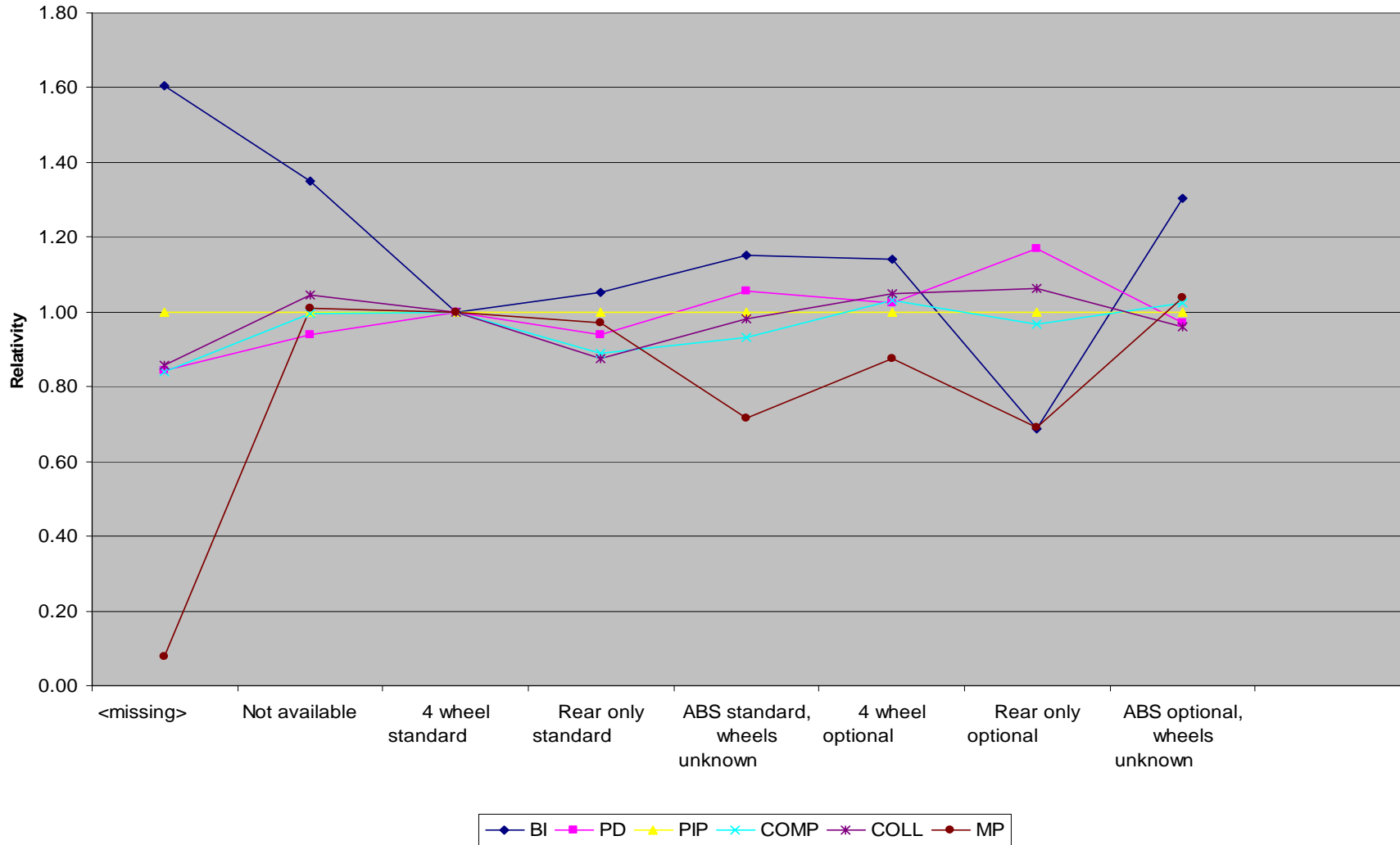
# Polk Segmentation Code

<b>A</b>	<b>Compact Pickup</b>	<b>1</b>	<b>Entry Level (Car)</b>
<b>B</b>	<b>Midsize Pickup</b>	<b>2</b>	<b>Basic Economy (Car)</b>
<b>C</b>	<b>Fullsize Pickup</b>	<b>3</b>	<b>Lower Midsize (Car)</b>
<b>D</b>	<b>Heavy Duty Pickup</b>	<b>4</b>	<b>Upper Midsize (Car)</b>
<b>E</b>	<b>Minivan (Passenger)</b>	<b>5</b>	<b>Upper Midsize Specialty (Car)</b>
<b>F</b>	<b>Minivan (Cargo)</b>	<b>6</b>	<b>Traditional Large (Car)</b>
<b>G</b>	<b>Passenger Van</b>	<b>7</b>	<b>Basic Sporty (Car)</b>
<b>H</b>	<b>Full Size Van (Cargo)</b>	<b>8</b>	<b>Middle Sporty (Car)</b>
<b>J</b>	<b>Full Size Utility</b>	<b>9</b>	<b>Prestige Sporty (Car)</b>
<b>K</b>	<b>Sport Utility</b>		
<b>L</b>	<b>Mini Sport Utility</b>		
<b>M</b>	<b>Medium/Heavy Trucks</b>		
<b>N</b>	<b>Basic Luxury (Car)</b>		
<b>P</b>	<b>Middle Luxury (Car)</b>		
<b>R</b>	<b>Prestige Luxury (Car)</b>		

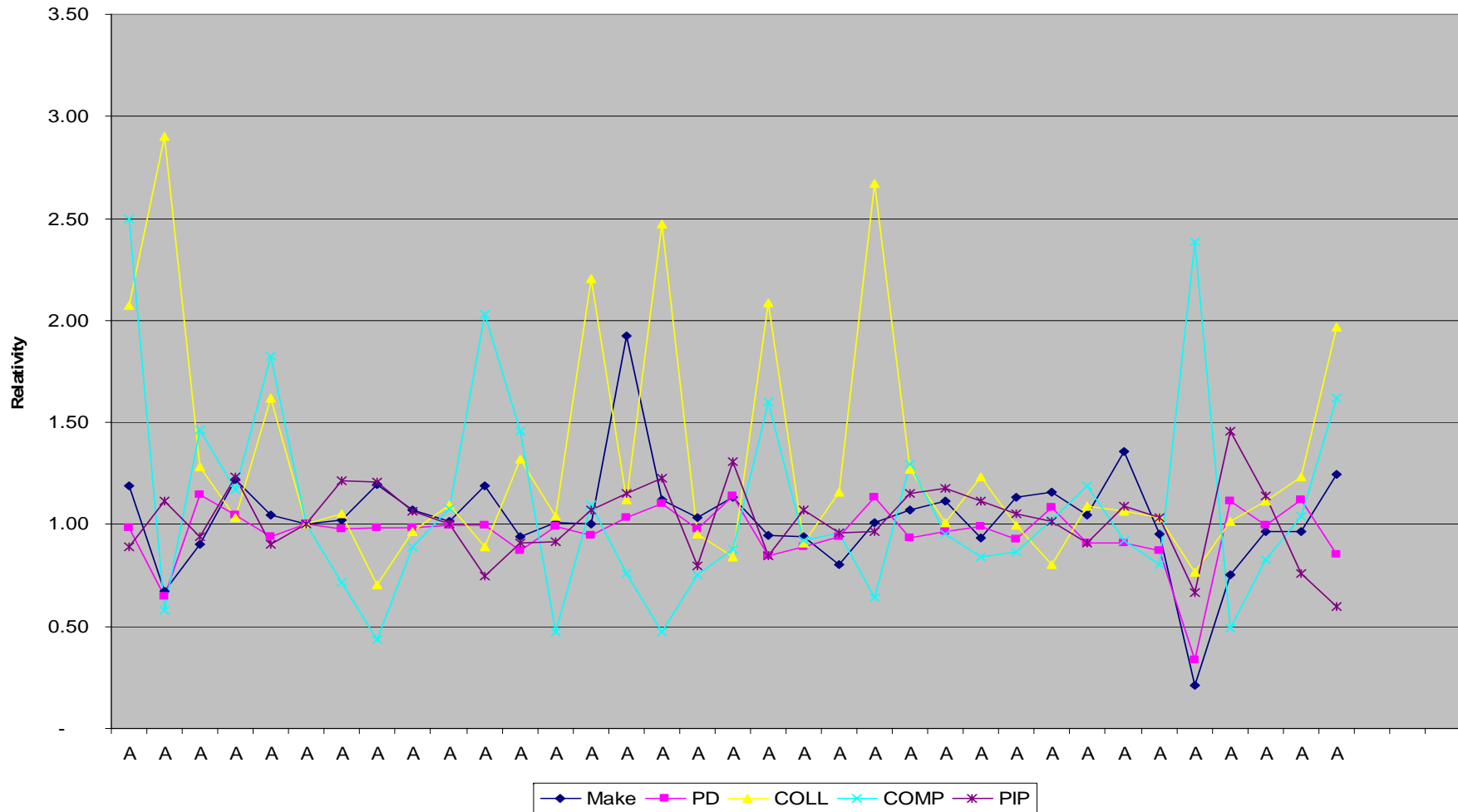
# Vehicle Class - Indicated Pure Prem Relativities



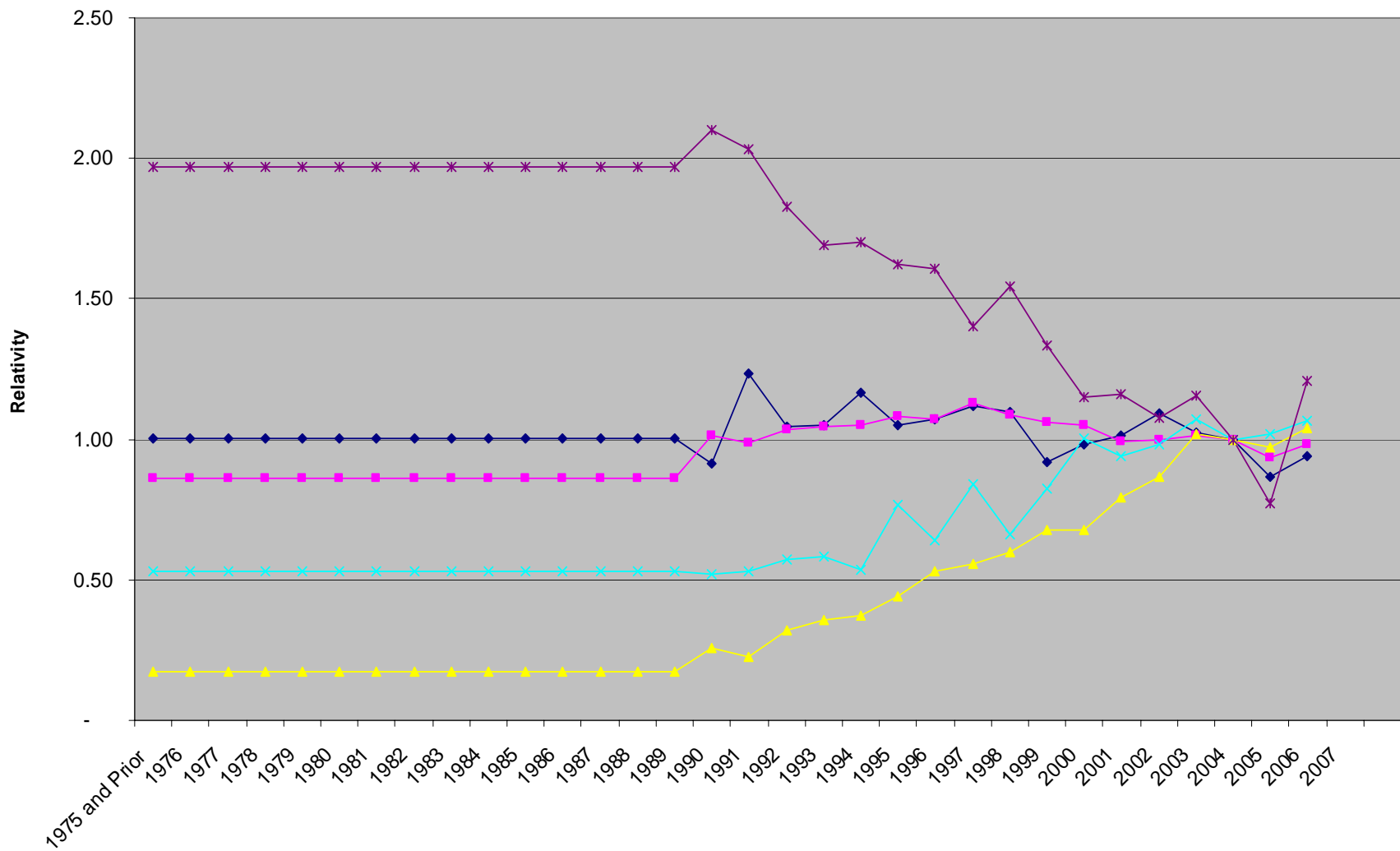
Anti\_lock\_brakes



# Make



# Model Year



◆ BI 
 ■ PD 
 ▲ COLL 
 ✕ COMP 
 ✱ PIP

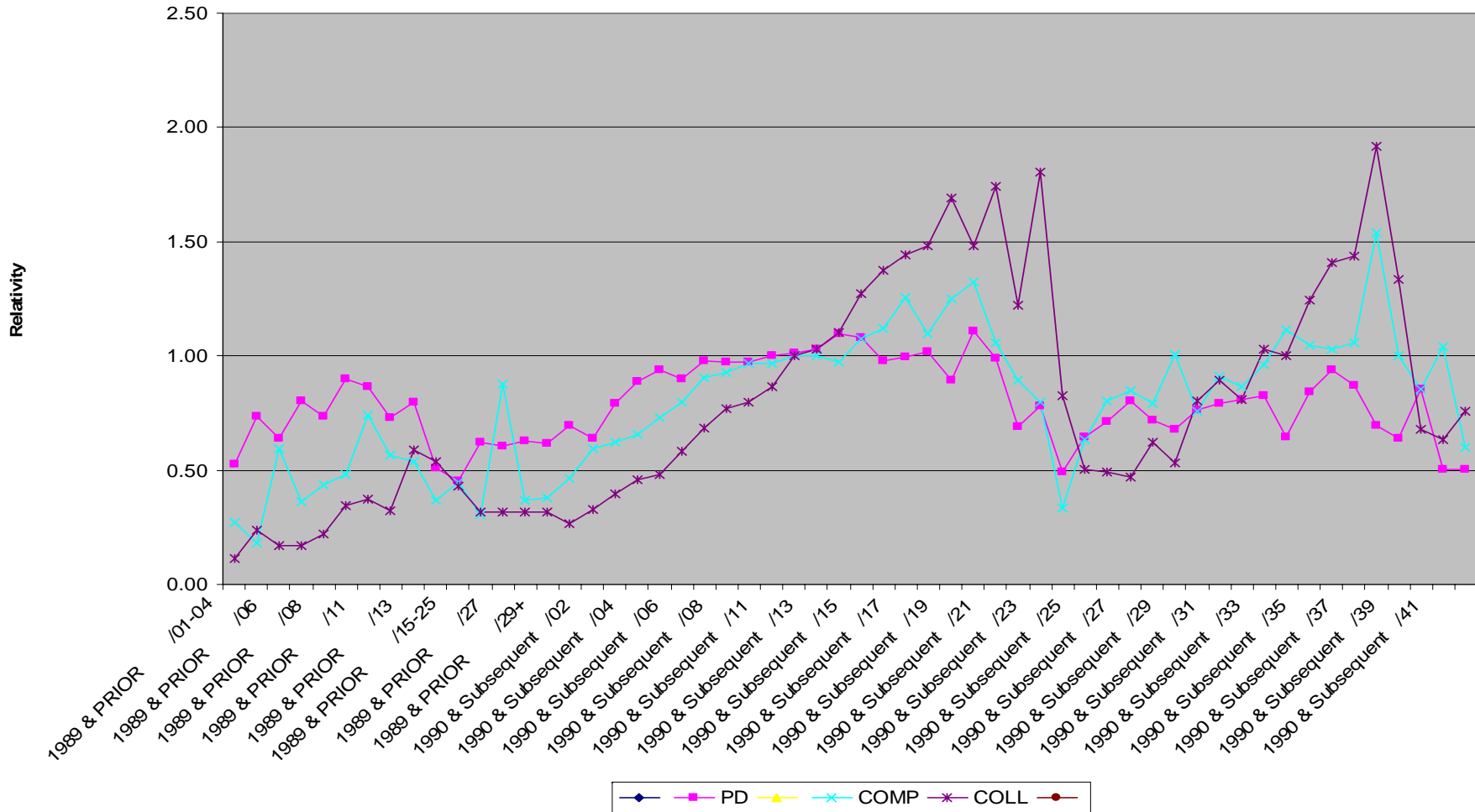
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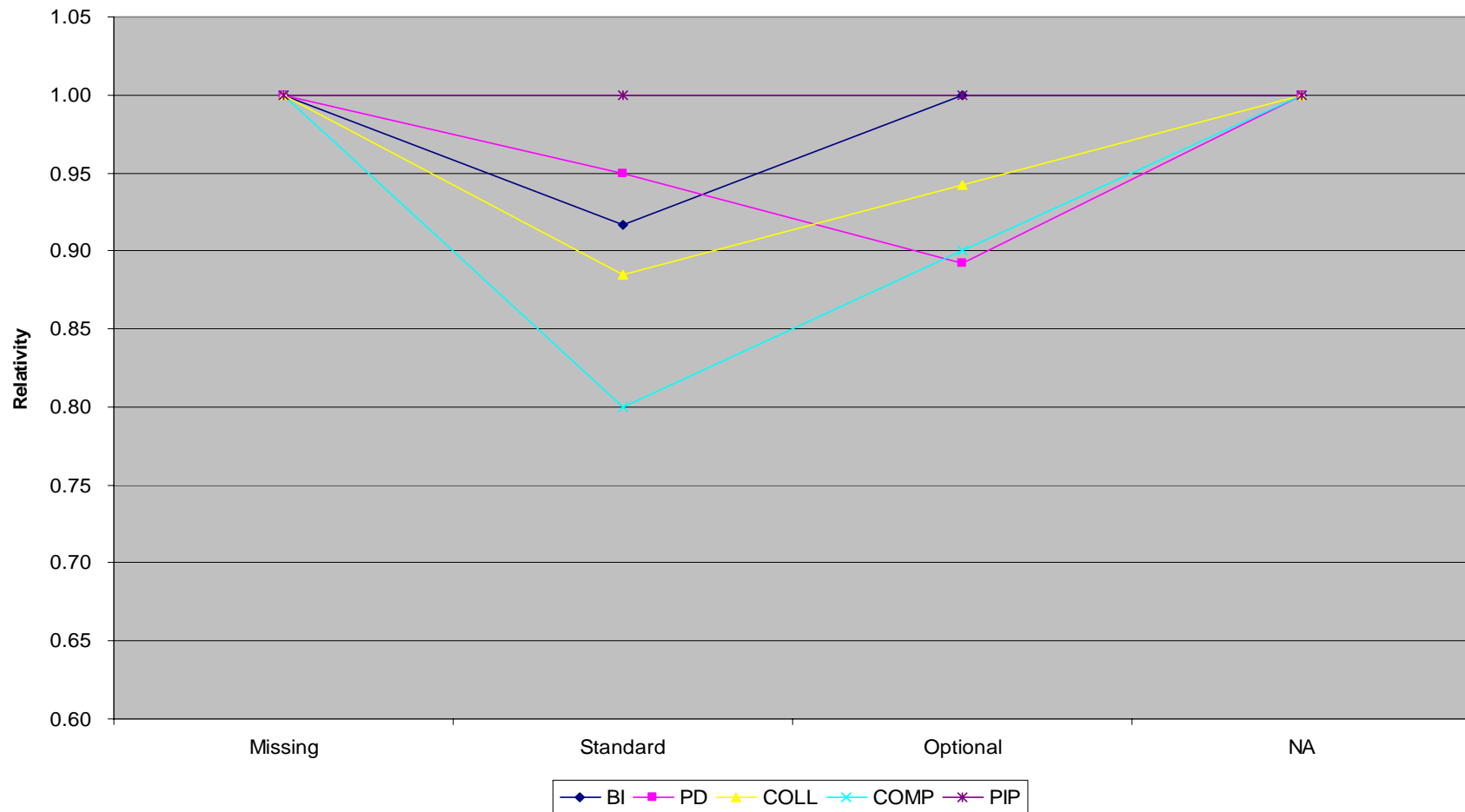


# Symbol

My\_symbol



## Dynamic Stability Control - Indicated Pure Prem Relativities



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# HLDI Hybrid Analysis, December 2007

Claim frequencies were slightly higher for hybrids compared with regular versions for 8 of the 12 vehicle series. Average loss payments per claim and average loss payments per insured vehicle year (overall losses) also were higher for hybrid versions for all but two vehicle series.



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## IRC Research Documents Higher Injury Claim Costs With Lighter Weight Vehicles

- IRC found that the average auto injury claim payment in accidents involving lighter-weight vehicles was 14.3 percent greater than the average payment in accidents involving heavy vehicles

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## IRC Research Documents Higher Injury Claim Costs With Lighter Weight Vehicles

- Among claimants in heavier vehicles, 46 percent lost no time from work following their accidents. In contrast, only 38 percent of claimants in the lighter-weight vehicles lost no time from work. Claimants injured in lighter-weight vehicles were also 12 percent more likely to be hospitalized following their injury than were claimants in heavier vehicles.

# Pricing Historically

- Experience ↑
- Competition ↓
- New business/retention volume ↓
- Marketing Input ↑
- Rating Bureau ↓

**Mixture Will Change**