
Model Year and Vehicle Rating



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CAS Ratemaking Seminar
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Discussion Topics

- Model Year Rating
- Vehicle Rating
- GLM applications
- Crash simulation and Telematics



Model Year Rating

Age	Factor	Model Year	Factor
		X + 2	(1.05)(1.05)
		PINNACLE ACTUARIAL RESOURCES, INC. X + 1	1.05
1	1.00	X	1.00
2,3	0.85	X - 1	0.95
4,5	0.75	X - 2	0.90
6 & over	0.65	X - 3	0.85

Model Year Rating

- Typically uses constant multiplicative relationship between model years
- Typically 5% for Comprehensive and Collision
- Limited to X model years with catch all for older vehicles

Model Year Rating

- Created a mechanism by which individual vehicle model years could be recognized – ***not really utilized except by several innovators.***



- Some companies are using for Liability coverages –inconsistent - some positive, some negative – overlaps with mileage

Model Year

- The ability to use Model Year effectively together with specific models has not been realized.
- **E.G. If the 1995 Honda Civic or 2003 Dodge Ram Pickup has the highest theft rate as recently published – shouldn't it have a higher rate than the later models?**

Stolen Cars Vary By Model Year



2005 HOT WHEELS
NICB'S LIST OF AMERICA'S MOST STOLEN VEHICLES

TOP 10 STOLEN VEHICLES

1. 1995 Honda Civic
2. 1989 Toyota Camry
3. 1991 Honda Accord
4. 1994 Dodge Caravan
5. 1994 Chevrolet Full Size C/K 1500 Pickup
6. 1997 Ford F150 Series
7. 2003 Dodge Ram Pickup
8. 1990 Acura Integra
9. 1988 Toyota Pickup
10. 1991 Nissan Sentra

Progressive Rating

	Class	MM	Symbol
1995 Honda Civic	HC1	0.99	5
1989 Toyota Camry	TC1	0.96	8
1991 Honda Accord	HA1	0.92	11
1994 Dodge Caravan	DG1	0.99	8
1990 Acura Integra	AI1	0.99	14
1991 Nissan Sentra	NS1	0.9	5



92-93 factor, 1.33 for '94-98, drops to .75 in 98

Luxury vehicle tops insurance claims list

The Cadillac Escalade had the highest rate of insurance theft claims for the fourth straight year, according to a study released Wednesday by the Insurance Institute for Highway Safety.

Highest losses	Claim frequency, per 1,000 insured vehicles	Average payment per claim
Cadillac Escalade	13.2	\$17,913
Mitsubishi Lancer Evolution*	11.9	\$10,326
Dodge Ram 1500 quad cab	11.1	\$10,088
Ford F-250/350 supercrew* **	8.9	\$17,702
Chrysler Sebring***	8.5	\$5,077
Lowest losses		
Toyota Sienna* ***	0.6	\$8,777
Buick LeSabre	0.5	\$4,905
Buick Park Avenue	0.5	\$3,270
Pontiac Vibe*	0.4	\$3,872
Ford Taurus	0.3	\$3,872

*4WD **2005s only ***2004-05s

SOURCE: Insurance Institute for Highway Safety

AP

Reasons Why Cars Most Stolen

- Parts - Xenon headlights, hubcaps, spoilers
- Street Racing – light cars with big engines
- Desirability - sports and luxury



Forbes – Luxury Cars only

- **Top 10 Most Stolen Vehicles**
- **Cadillac Escalade**
- **Hummer H2**
- **BMW 7L Series**
- **Honda S2000 Convertible**
- **Lincoln Navigator**
- **Chevrolet Avalanche**
- **Mercedes-Benz S-Class**
- **Chevrolet Corvette**
- **Mercedes-Benz SL-Class Convertible**
- **BMW X5**



Immobilizer

- 1999 and 2000 Honda Civics do not come with an electronic immobilizer, however all Hondas from 2001 and onward are equipped with an immobilizer. Immobilizers will be mandatory on all new cars sold beginning September 2007. The devices enable an engine computer to recognize an electronic code in the key. If the code in the key and the engine don't match exactly, the vehicle can't be started.

Vehicle Rating

- New Vehicles are usually rated by “comparison to similar” existing vehicle – **becoming less accurate as new, different vehicle type are being introduced.**
- Car and Driver

Every year, it seems to be a banner year for car and truck introductions. And 2007 is no exception. There are now well over 300 models on sale in the U.S., covering every area from mainstream sedans and sport-utes to increasingly popular segments such as crossover SUVs and subcompacts.

2006 Car and Driver

- “The 2006 model year will see the usual sort of turnover, with 50 or so new models arriving and about 30 departing. This leaves nearly 300 coupes, sedans, trucks, SUVs, and other types of vehicles crossing over into 2006 with changes that range from significant to minuscule

2005 Car and Driver

- “Of the 324 models out there for 2005—by our reckoning—64 qualify as “all-new.” For the most part, they're spread pretty evenly among the various categories and major automakers.... That's an indication of the effort by American automakers to regain market share and profits, and further affirmation of the competitive nature of the auto business. “

Electronic Stability Control

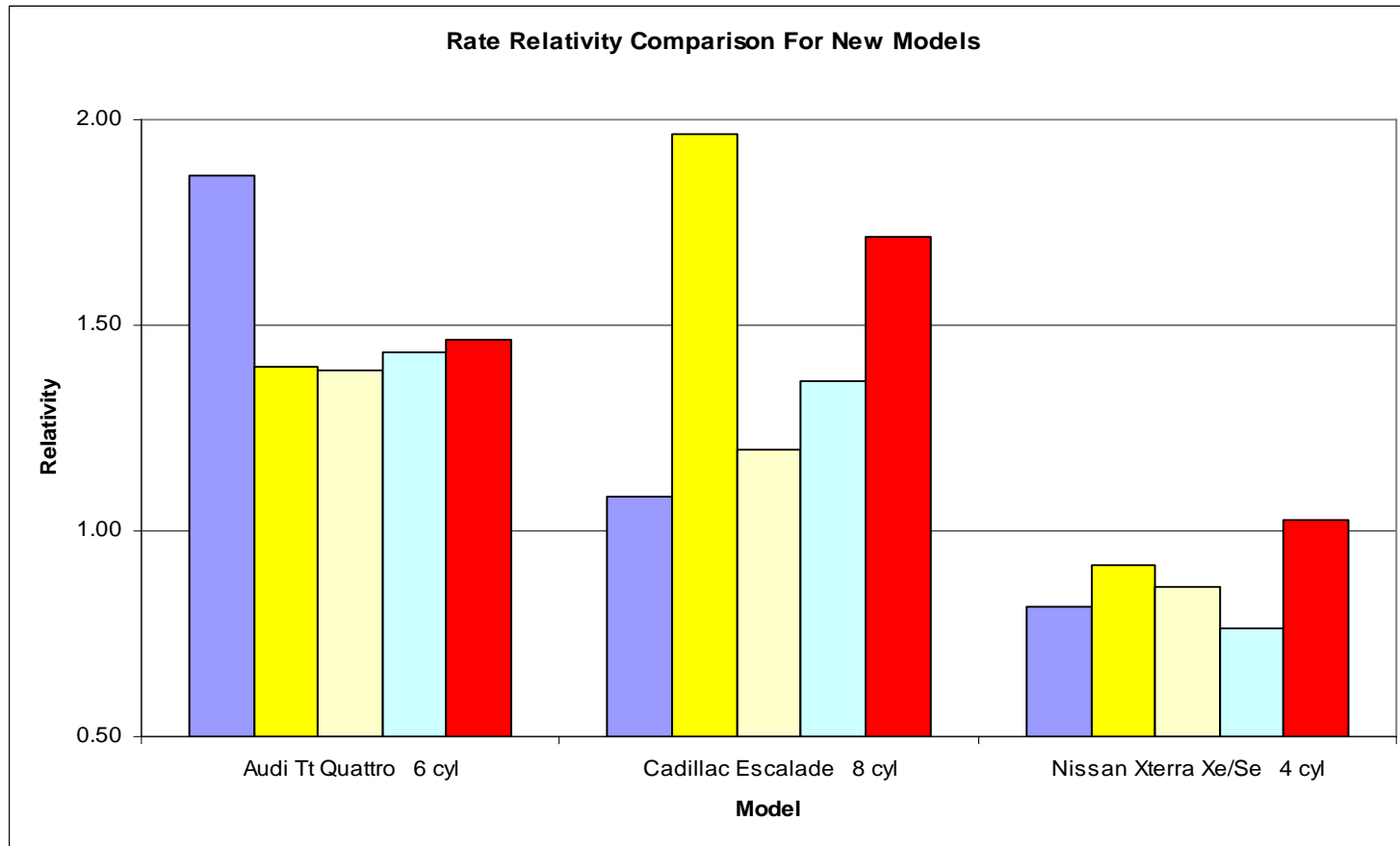
- **Electronic stability control could prevent nearly one-third of all fatal crashes and reduce rollover risk by as much as 80%; effect is found on single- and multiple-vehicle crashes**

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ESC - availability

- **ESC is standard on 40 percent of 2006 passenger vehicle models and optional on another 15 percent. It's standard on every 2006 Audi, BMW, Infiniti, Mercedes, and Porsche. Another 8 vehicle makes (Cadillac, Jaguar, Land Rover, Lexus, Mini, Toyota, Volkswagen, and Volvo) offer at least optional ESC on all of their models. But ESC, standard or optional, is limited to 25 percent or fewer models from Chevrolet, Dodge, Ford, Hummer, Mazda, Mitsubishi, Saturn, Subaru, and Suzuki**

Significant Differences By Company for New Models



Aluminum Parts, Hybrid Cars Boost Crash Costs

(NU Online News Service, March 3, 12:25
p.m. EST)

- Auto repair costs are going up in part because of changes in parts and new, more complex vehicles, an insurance information management firm said.

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GLM Applications

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Advantages of using GLM for Symbol 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.

Considerations

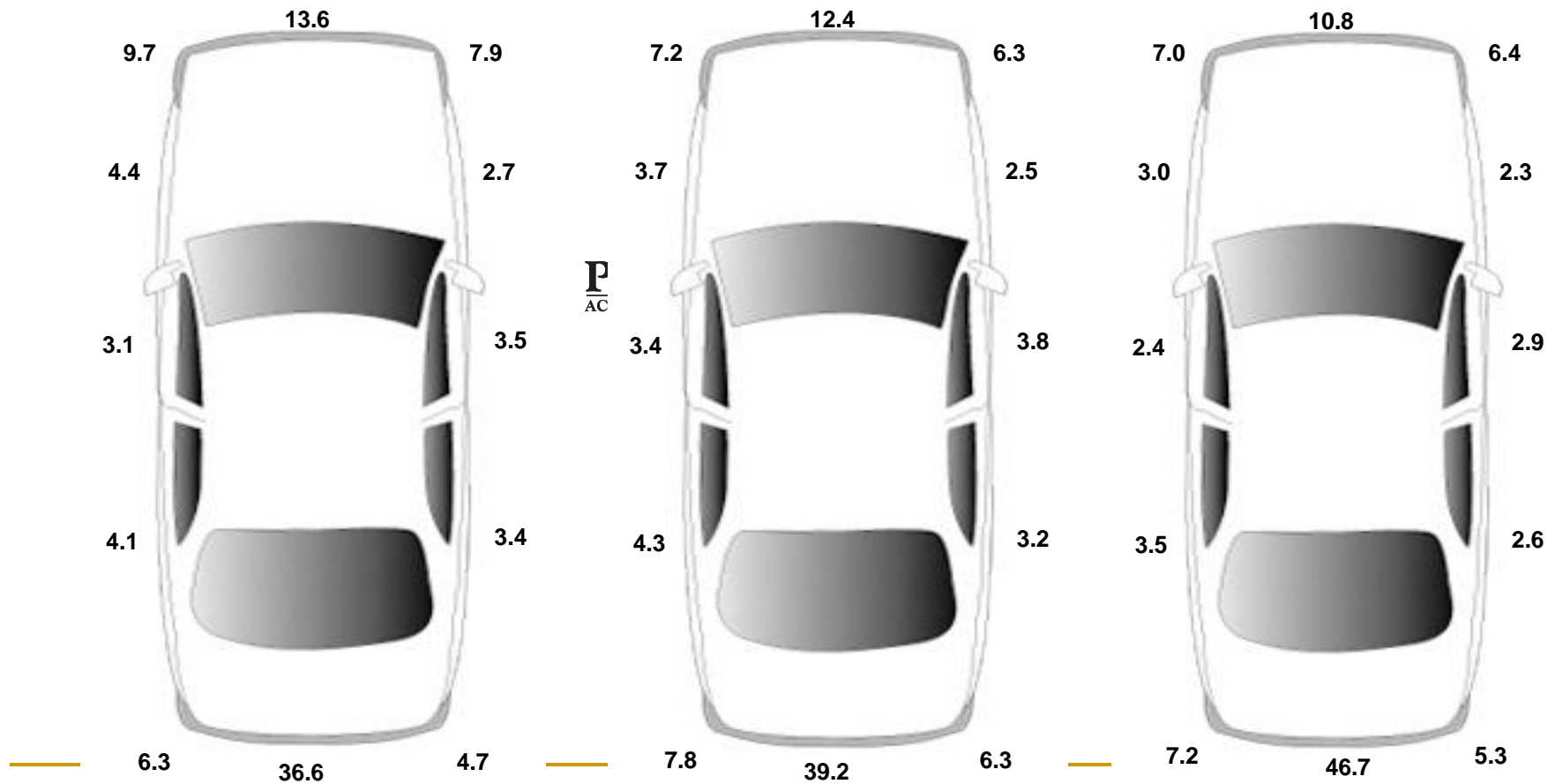
- Need VIN.
- Append external data via Polk, HLDI, ISO, Carfax or other.
- Need VIN for liability too.



Possible Vehicle Characteristics

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

Percent of Property Damage Liability Claims by Point of Impact



CAS **Passenger cars** Ratemaking Seminar

Pickups

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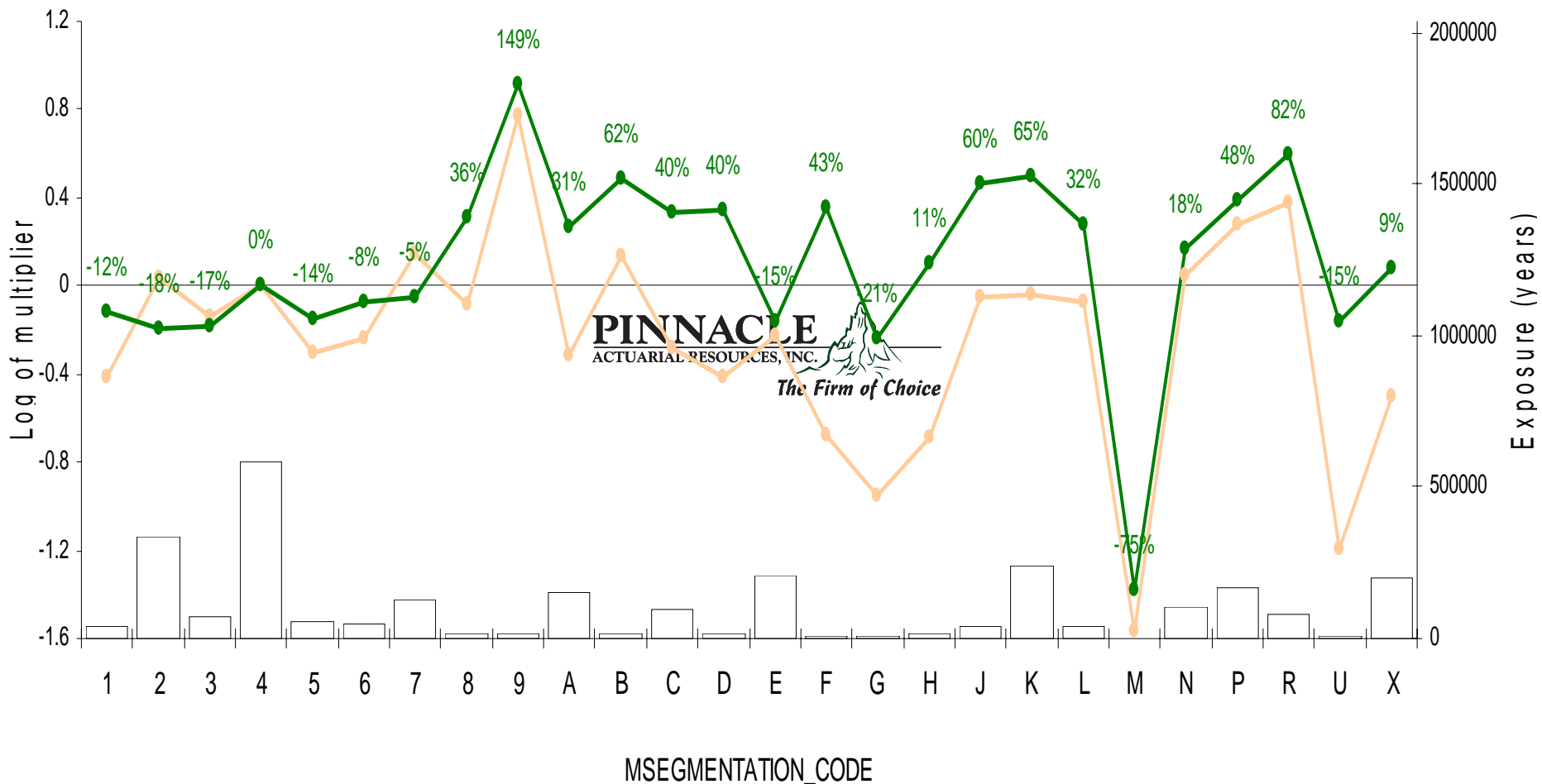
Additional Non-traditional Characteristics

- 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

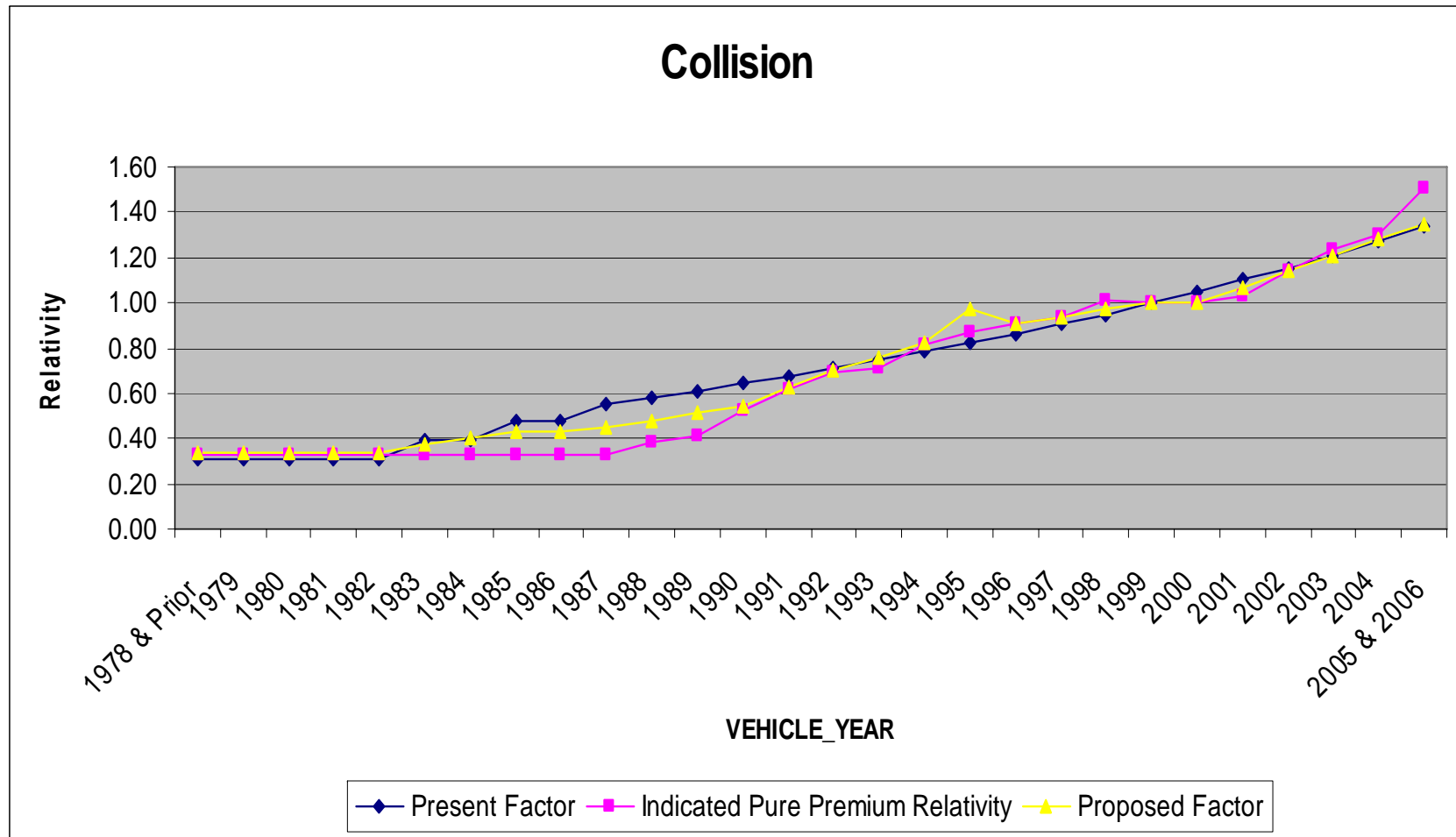
A	Compact Pickup	1	Entry Level (Car)
B	Midsize Pickup	2	Basic Economy (Car)
C	Fullsize Pickup	3	Lower Midsize (Car)
D	Heavy Duty Pickup	4	Upper Midsize (Car)
E	Minivan (Passenger)	5	Upper Midsize Specialty (Car)
F	Minivan (Cargo)	6	Traditional Large (Car)
G	Passenger Van	7	Basic Sporty (Car)
H	Full Size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



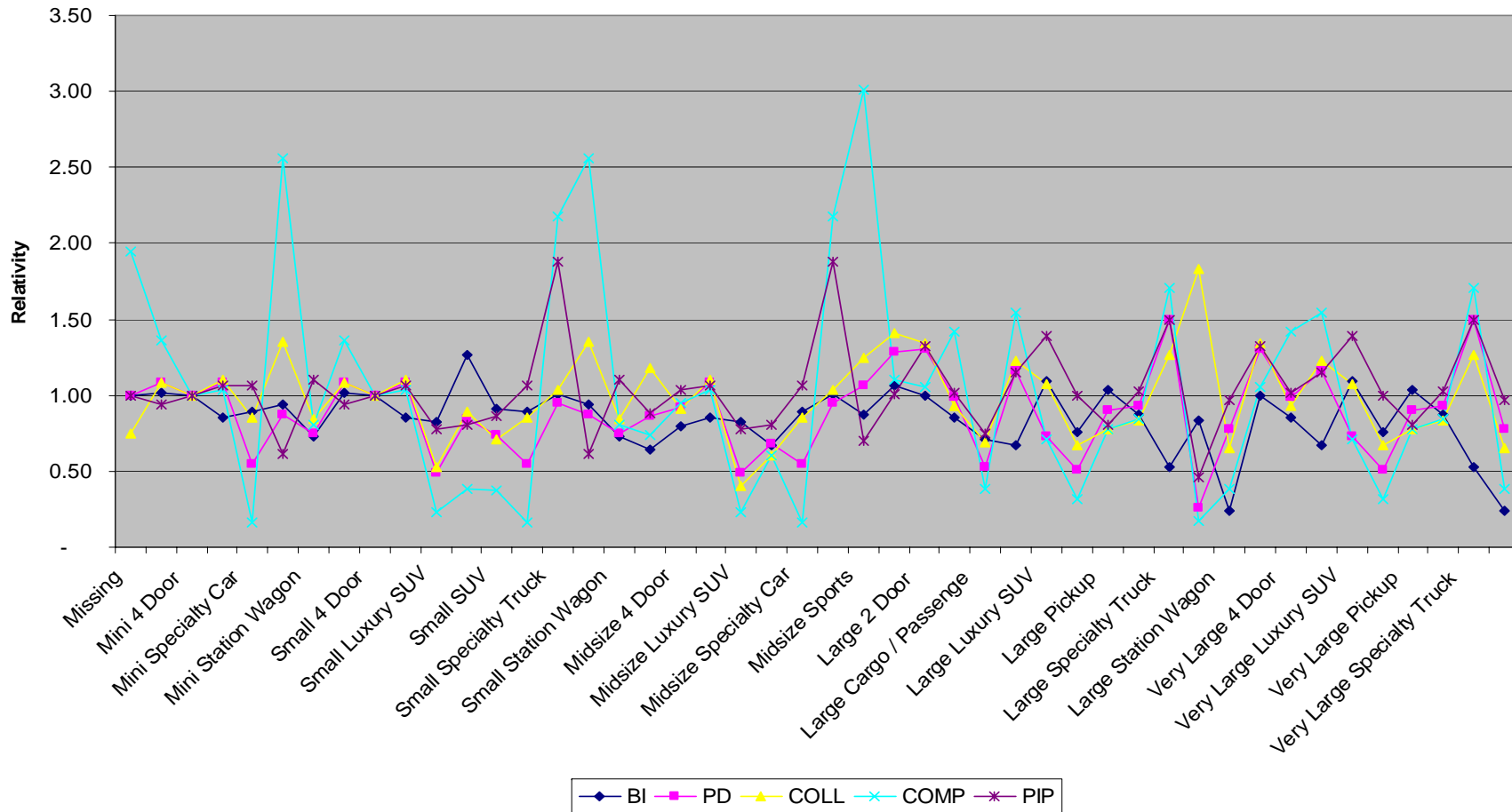
R **Prestige Luxury (Car)**
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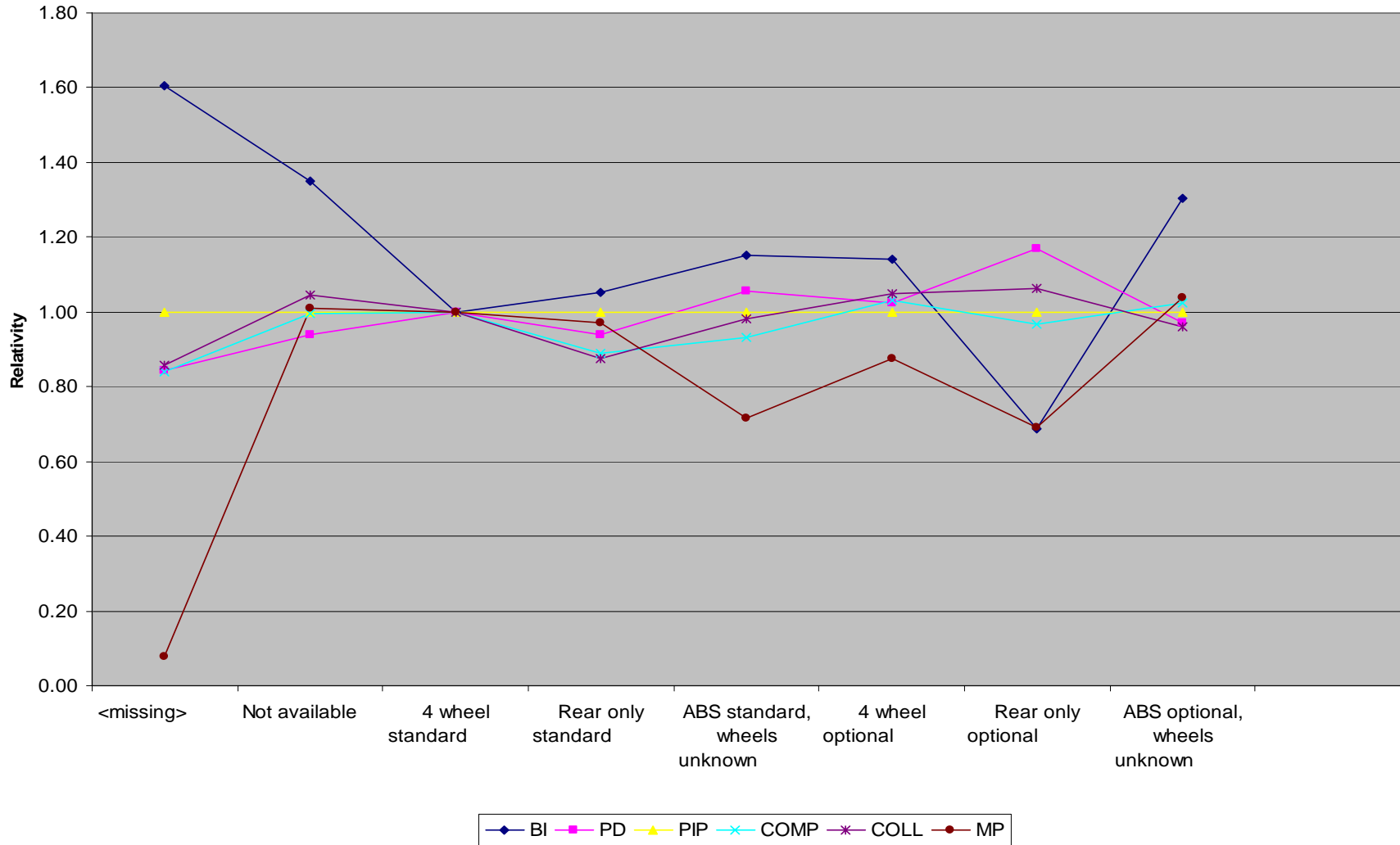
Sample By Coverage Results



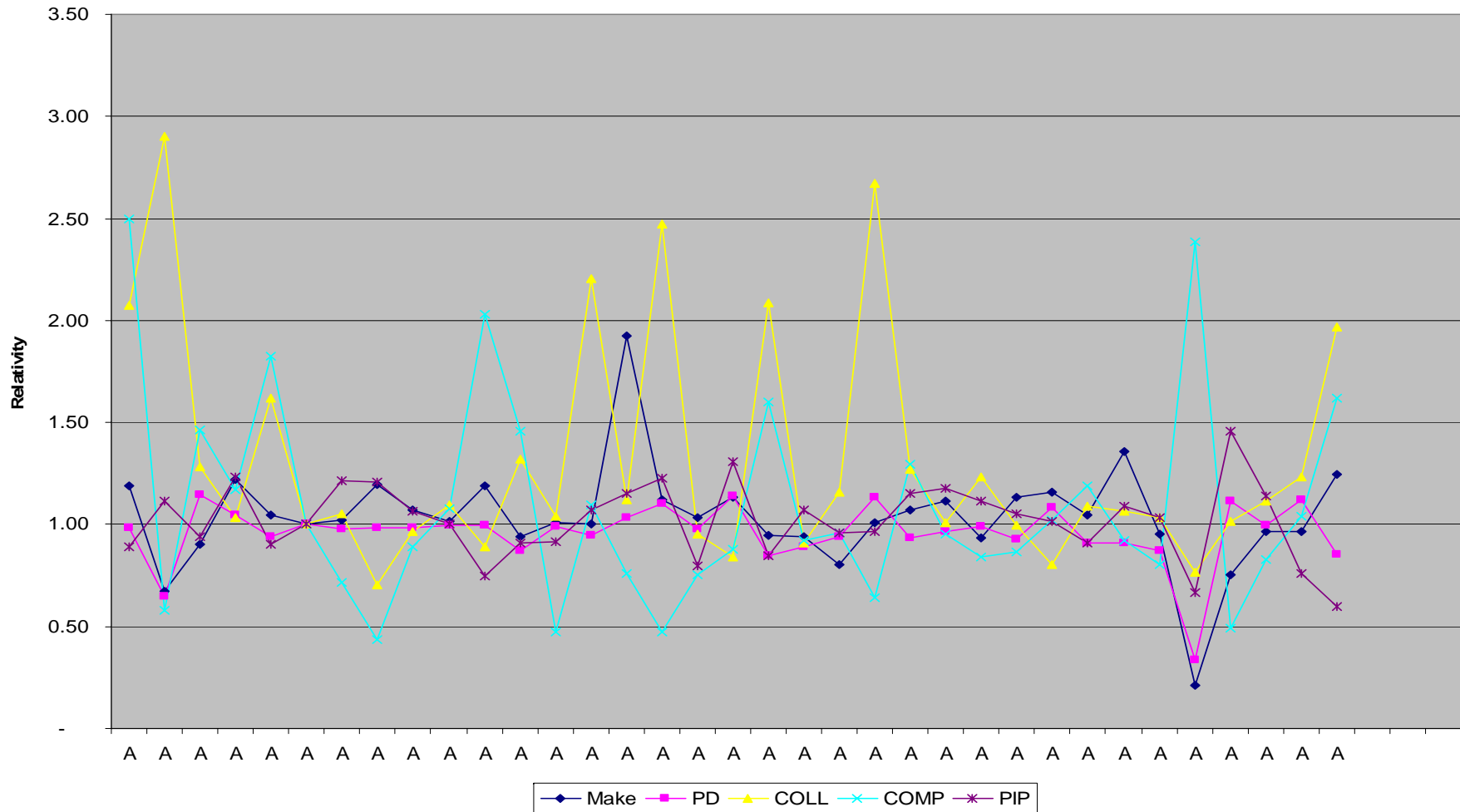
Vehicle Class - Indicated Pure Prem Relativities



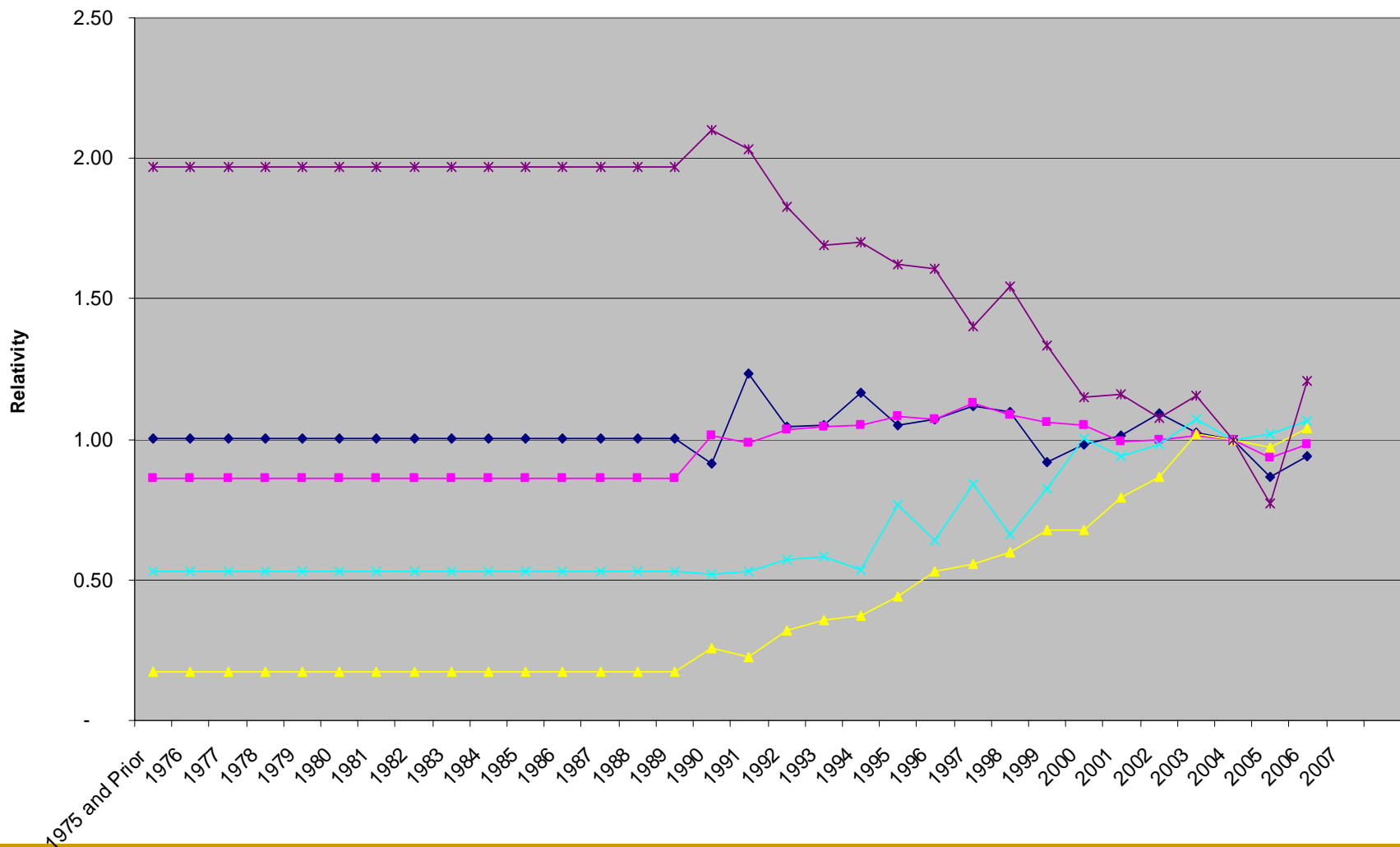
Anti_lock_brakes



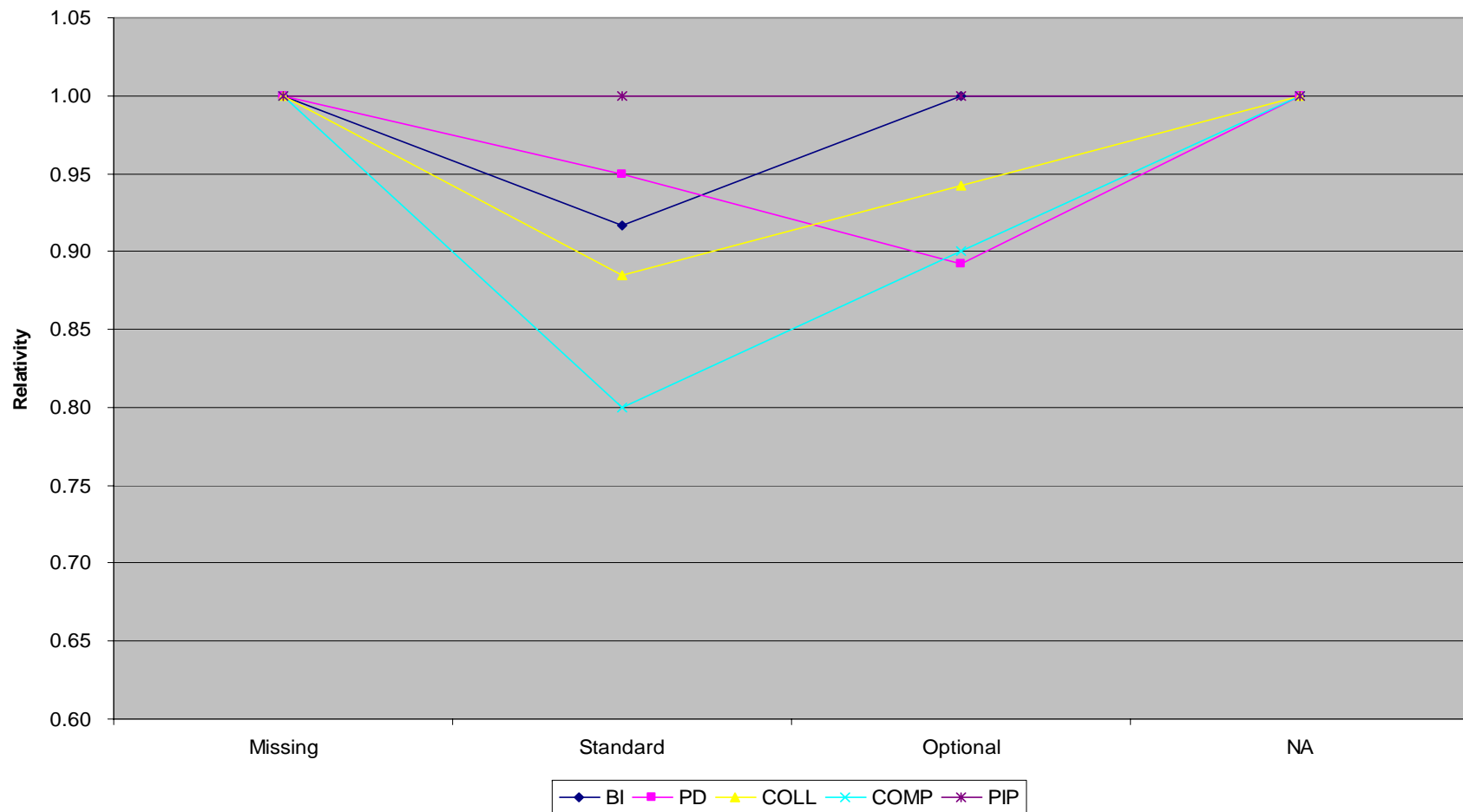
Make



Model Year

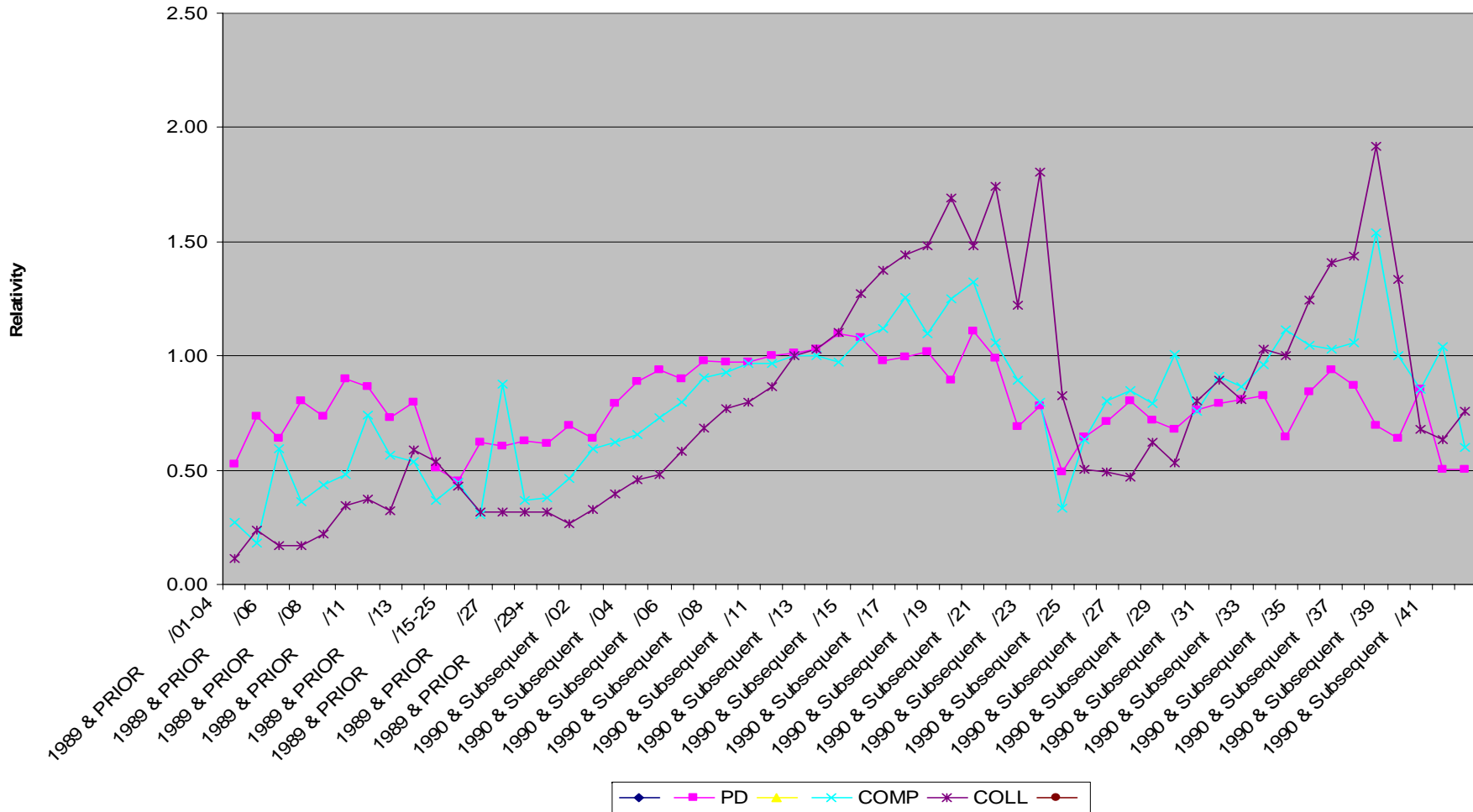


Dynamic Stability Control - Indicated Pure Prem Relativities



Symbol

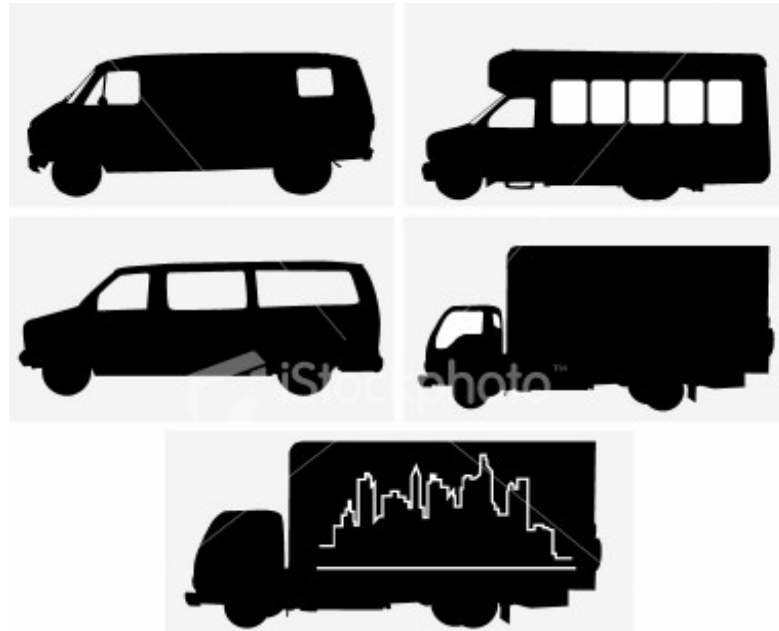
My_symbol



Commercial Auto Applications

- VIN decoding works as well in CA as PPA
 - Truck VINs define their ICC weight class (which is more detailed than ISO weight classes)
 - Private passenger types (cars) are not typically symbol rated in CA and either can be or the vehicle characteristics can be used to create a simplified symbol system.
 - Many of the characteristics that PPA VIN decoding returns are also available and valuable for CA (passive restraints, antilock breaks, engine size, model year)
 - However, VIN only contains information about the truck as it left the assembly line and many features are added post production

Not All Trucks are the Same

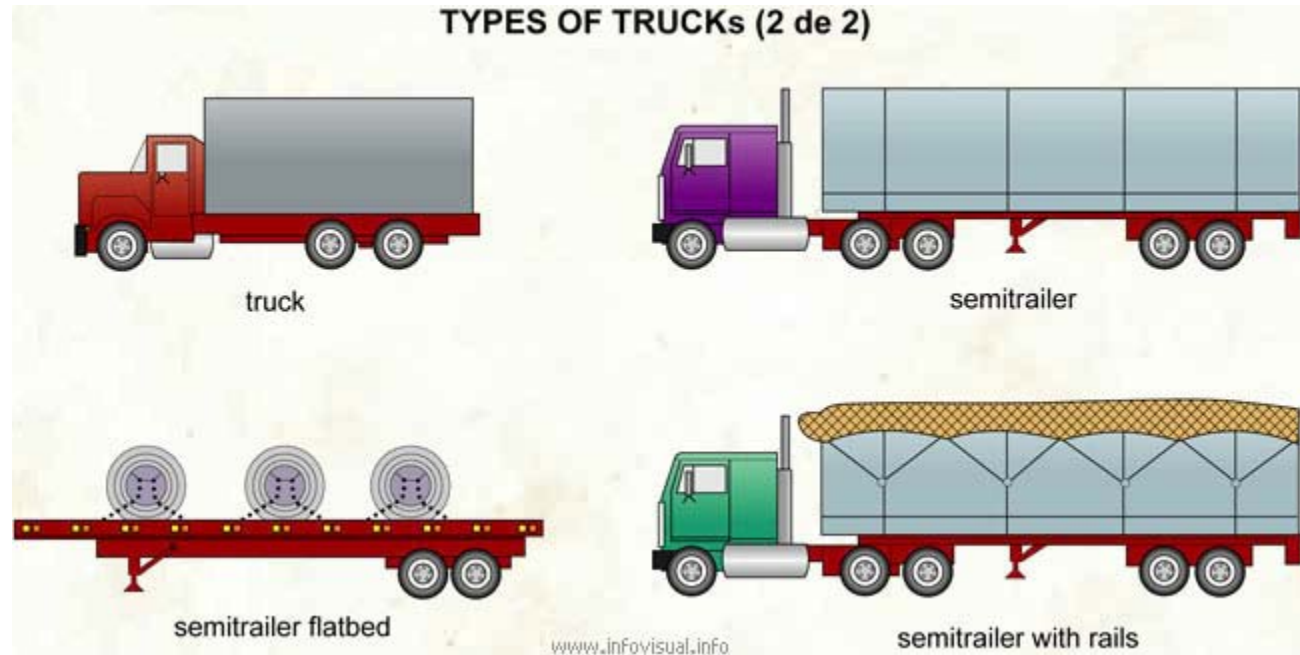
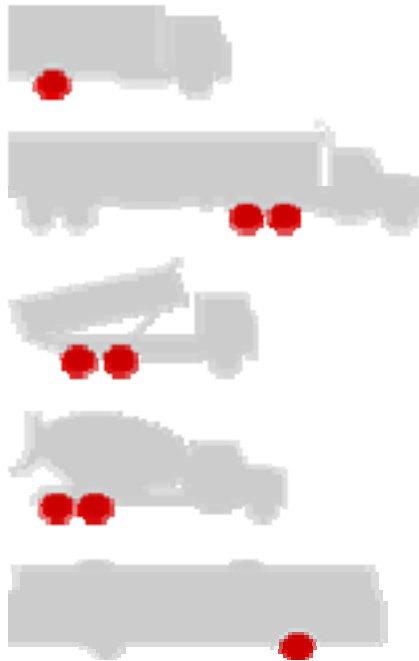


Commercial Auto Applications

- The type of container on a truck (aka body type) also matters (refrigerator, dump, flatbed, box, tanker, cranes and specialize equipment (e.g. scaffolding for ladders etc.))
- The type of container on a trailer also matters (refrigerator, low boy, flatbed, box, tanker) as does what kind of cargo you're hauling (coiled steel, chemicals, grain, perishables, less than trailer load (LTL), sand and gravel, moving and storage)



Not All Trucks are the Same



Commercial Auto Applications

- Mileage information is typically not available/verifiable unless the insured is engaged in for hire trucking, however, Standard Industrial Classification (SIC) codes can be a strong indicator of mileage/vehicle use. For example, contractors normally drive to the jobsite while wholesalers tend to drive routes to retailers all day and florists make deliveries.

Commercial Auto Applications

- Personal use is also a key factor (pickup trucks and company cars with a cooler full of beer at a softball field on Thursday night are a real and difficult risk). Unfortunately, it is hard to verify until after a claim, especially on small risk where a fenced garaging location may not be verified due to policy size.

Vehicle Weight

- ISO's class plan has four vehicle weight classes: Light, Medium, Heavy and Extra-Heavy.
- Alternatively, the Interstate Commerce Commission (ICC) developed eight weight classes that do a much better job of grouping similar vehicles that are readily verifiable using VINs.

Vehicle Weight

- This verifiable approach to vehicle weight also addresses popular misconceptions regarding specific vehicle types.
- The most common misperception is that all pick-up trucks are “Light.” Most large pickup trucks have gross vehicle weights well in excess of the “Light” limit of 10,000 pounds.

National Underwriter – July, 2007

- “From a physical damage perspective, new designs in trucks to reduce their weight and streamline them for fuel efficiency have led to more damage to the vehicle in lower speed collisions.”
- Where a steel bumper used to protect the tractor with minimal front-end damage, now an entire engine hood must be replaced with engine parts, which are now protected”

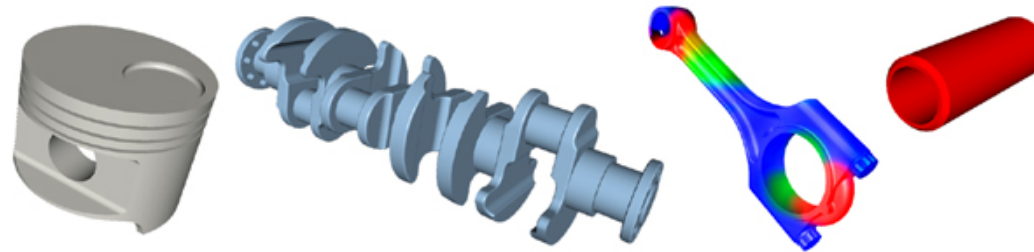
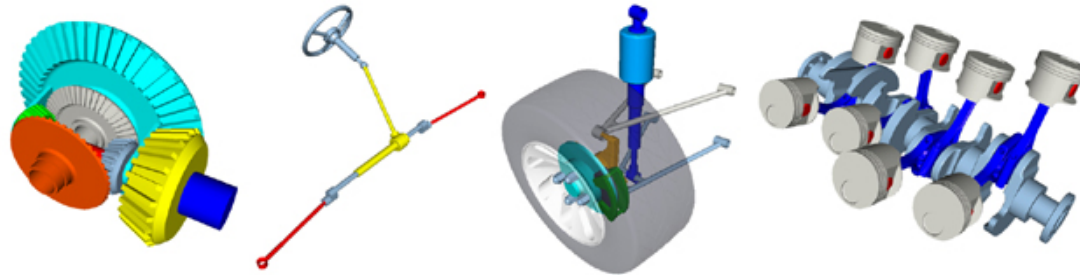
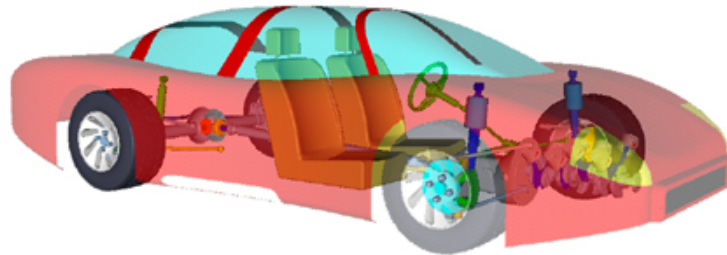


Tomorrow

- Greater use of true multi-variate analyses by actuaries will greatly improve predictability of symbol rating.
- Computer simulation of crashes will vastly improve accuracy of initial symbol assignment.
- Use of Telematic devices to verify driving characteristics.

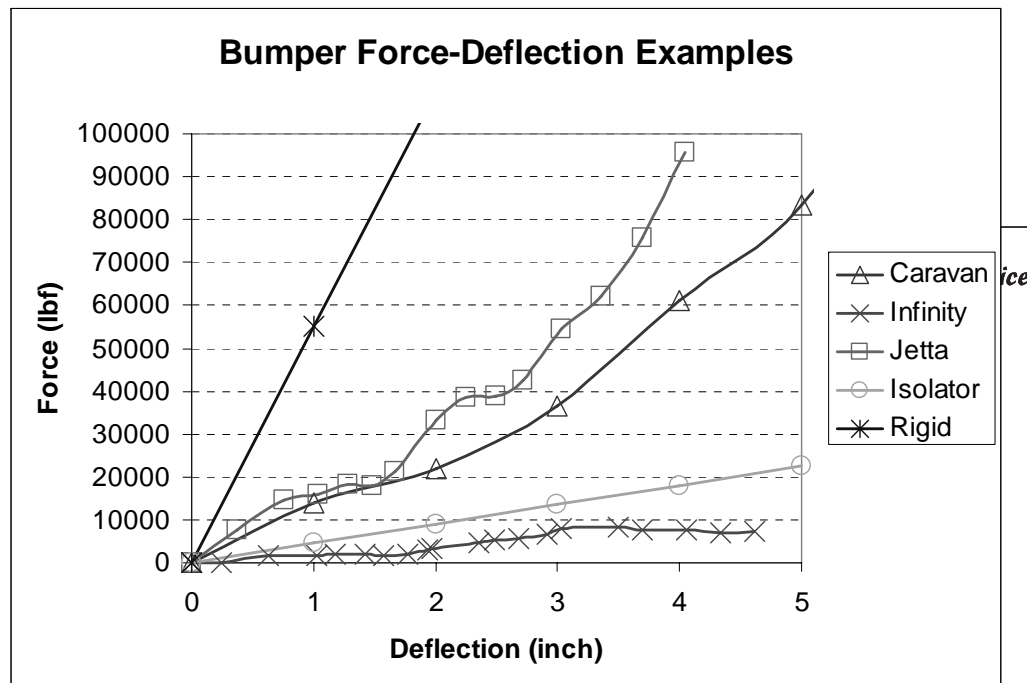
THE POWER OF SIMULATION

Enables vehicles and vehicle components to be virtually tested under real world stresses, strains, crash avoidance situations, driver reactions, high-speed and low-speed crashes, etc.

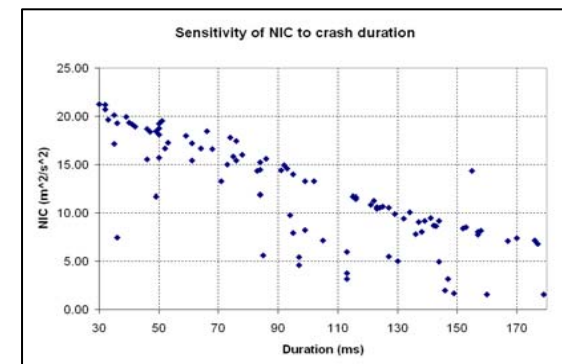
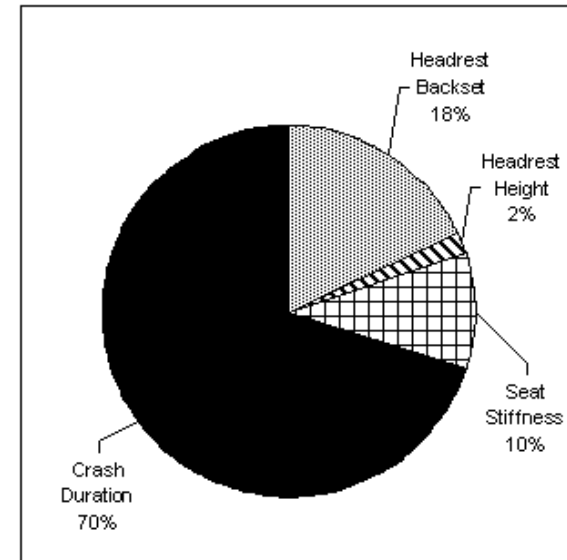


EXAMPLE: INJURY EFFECT OF BUMPER DESIGN

Key Bumper Characteristics



Affect on Whiplash Injury



Telematics

