

Predictive Modeling: Rules of Thumb for Communicators

**Predictive Modeling Seminar
Insurance Marketing Communications Association
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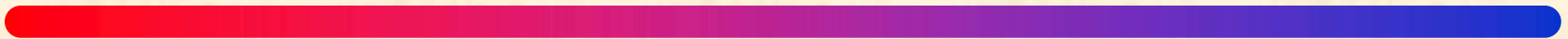
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PREDICTIVE MODELING:

The Basics





Predictive Modeling: Communications Challenges

- **Predictive Modeling Can Be Complex**
 - Actuaries/Economists use a variety of statistical techniques
 - Understanding how they work requires formal statistical training
 - Underwriters apply them, usually as part of an already sophisticated and automated underwriting process
- **Use of Some Predictive Factors/Models May Not be Intuitive**
- **Usage Often Not Explained or Even Revealed to Communicators**
- **Benefits Not Well Articulated to Communicators or Customers**
- **Failure to Recognize & Enlist Agents as Communicators**
- **Communications Obstacles in the Regulatory Context**
 - Regulators may have difficulty understanding
 - Tendency is to react negatively
 - May seize on issue for political gain
- **Models Maximize for Statistical Accuracy**
 - Some May Feel Models Are Too Impersonal
 - Invasion of Privacy Concerns?



Predictive Modeling: What is It?

- **What is Predictive Modeling?**
 - While people (even within the insurance industry) tend to view it as new, it is in fact quite old—as old as insurance itself.
 - **DEFINITION: Predictive modeling is a process used to create a statistical model of future behavior. In insurance, predictive models are primarily concerned with forecasting probabilities, trends and relativities.***
 - A predictive model is made up of a number of *predictors*, variable factors that are likely to influence future behavior or results.
 - In auto insurance, for example, a customer's gender, driving experience, type of vehicle, driving record, miles driven, etc., help predict the likelihood and cost of future claims. To create a predictive model, data is collected for the relevant predictors, a statistical model is formulated, predictions are made and the model is validated (or revised) as additional data becomes available. The models may employ a simple or extremely complex and employ a wide variety of statistical techniques.
- **Use of Some Predictive Factors/Models May Not be Intuitive**

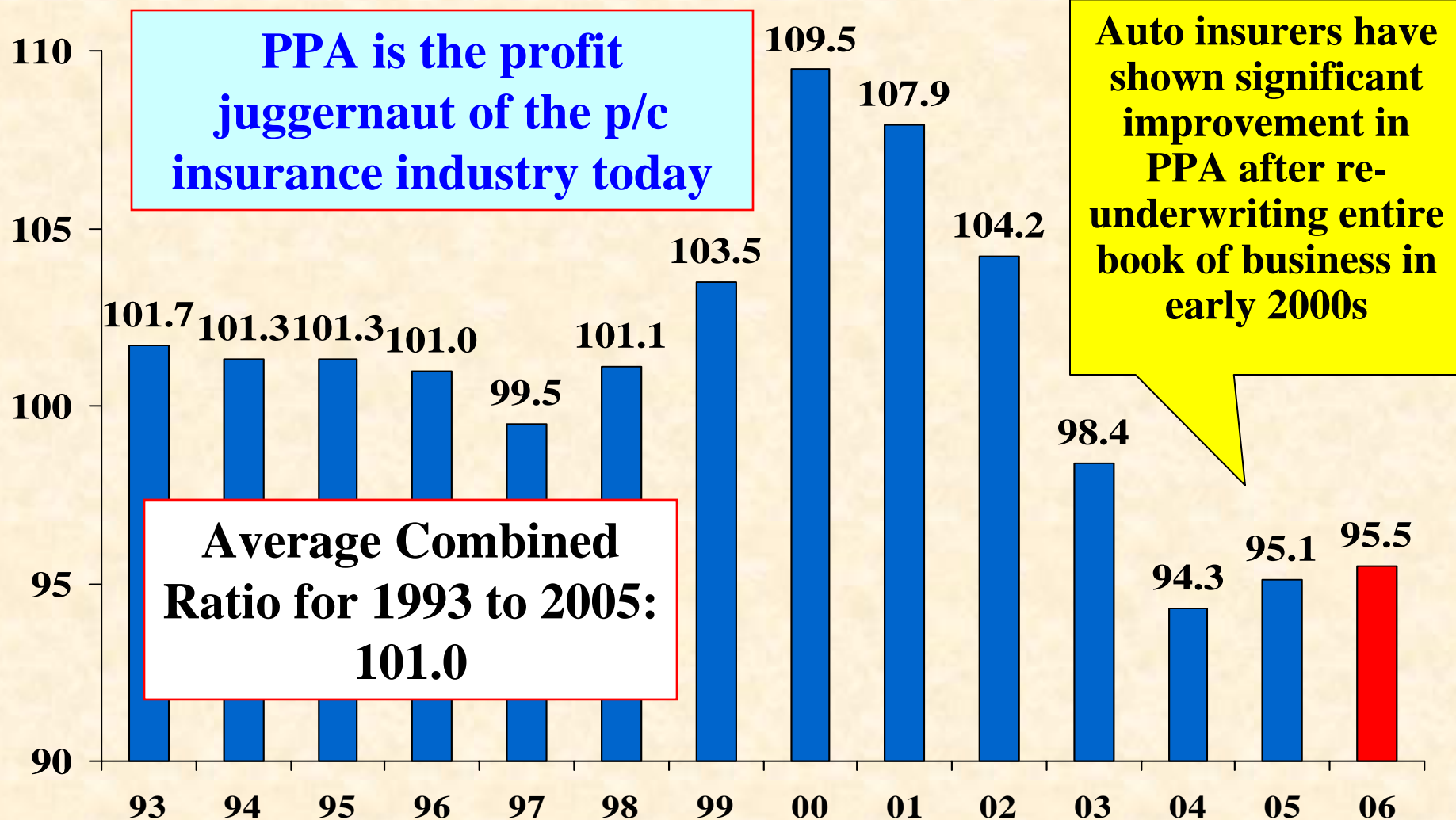


Predictive Modeling: Why Do We Hear So Much About it Today?

- **Insurers rewrote their entire auto and homeowners book of business beginning in the later 1990s/early 2000s in response to huge losses in both of these key lines (which together account for nearly 50% of industry premiums)**
- **This re-underwriting process was effectively a re-evaluation of risk presented by each policyholder and the adequacy of the premium paid by the policyholder to transfer that risk.**
- **In most cases the premium was inadequate and premiums rose**
- **Re-underwriting process included the use of sophisticated new models designed to better match price with risk**
- **By definition, these models included more and better rating factors as well as new statistical methodologies for gauging interactions between these factors.**
- **Policyholders and regulators incorrectly associated new factors in the models as being solely responsible for the increase**
- **Credit-based “Insurance Scores” are the best known example**



Private Passenger Auto (PPA) Combined Ratio





Predictive Modeling: Why Now?

- Predictive modeling is not new—big issue in most industries
- Some form of it has been around since the earliest days of insurance—used in personal and commercial lines
- In recent years the cost of data storage and acquisition have declined as has the cost of computing power
- More data is available to insurers today at lower cost
- Powerful computers make analysis (mining) of the this data easier, faster and more fruitful
- **Public and regulators have pushed for more individualized rates (and less reliance on factors like territory)**
- Insurers responded by accelerating trend toward individual risk rating→smaller pools of increasingly homogeneous individuals
- Consequently, rating systems becoming fairer & more accurate
- **Implies that subsidies are being removed from system**
- Recipients of subsidies don't like their removal nor do regulators who view insurance as an extension of the social welfare system



Insurance Scores: The Perfect Example of a Communications Breakdown

- **Insurers began to implement use of credit-based insurance score in the early/mid-1990s, but not on a large scale until late 1990s very early 2000s.**
- **Insurers had found that scores were among the most accurate of all rating factors for predicting future loss.**
- **Roll-out and use of credit was not communicated to most key personnel who come in contact with customers, regulators or media**
- **Why credit works was not intuitive for most people (e.g., what does credit information have to do with my driving ability?)**
- **Agents dislike having to explain why premiums rose due to credit factors**
- **Special cases warranted special treatment abounded: No credit, life-changing events, identity theft**
- **Consumer protections formalized only later (e.g., NCOIL)**
- **Race issue became (and remains) big (but is red herring)**

***PREDICTIVE
MODELING:
JUST PART OF THE
RATEMAKING &
UNDERWRITING PROCESS***



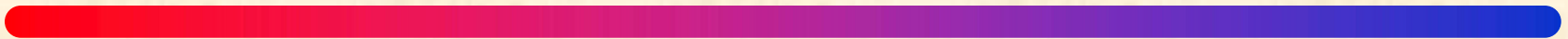


Predictive Data Can Be Historical, Class or Individual Specific

- **Historical Information:** Used to identify trends in data
 - Actuaries use a variety of statistical techniques; get base rate
- **Class Rating**
 - Data are adjusted for geographic, industry-specific factors or other factors statistically correlated with risk of future loss
 - E.g. Urban zip codes = greater accident frequency
 - E.g. Occupation in workers comp
- **Individual Risk Rating**
 - **Policyholder-specific risk factors are taken into account**
 - E.g., Model of car; wood frame vs. masonry home; office vs. construction worker
 - Credit profile
 - “Black box” data;
 - **FUTURE: GPS Tracking (on voluntary basis)**
- **Experience Rating**
 - Adjustments made to premium based on policyholder’s past claim filing activity

UNDERWRITING:

***Key to Accurate Risk
Assessments & Rates***



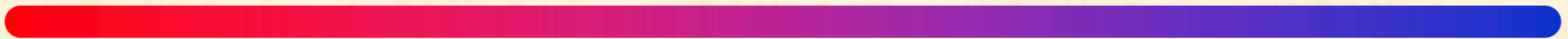


What is Underwriting?

- **Underwriting**
 - Process by which insurer determines whether policy should be issued and on what terms
- **Complex Process**
 - Many market and individual factors considered
 - All relate to riskiness/likelihood of loss
- **Insurers All Use Underwriting Guidelines**
 - Helps keep insurers focused, disciplined, profitable, *solvent*
 - E.g., no writing risks within 5 miles of coast, no high-rise construction risks, no limits above \$1 million, no sportscars
- **Underwriting Tools**
 - Objective is to improve accuracy of loss forecasts
 - Creates a more fair, equitable rating system for all
 - Premium is more closely associated with risk

RATING FACTORS

***Helping to Match
Premium Charged to
Risk Assumed***



Categories of Typical Auto Insurance Rating Factors/Criteria

- **Vehicle Type Factors**
- **Use of Vehicle Factors**
- **Location (Territorial) Factors**
- **Driving History**
- **Prior Insurance**
- **Personal Factors**
- **Other**



Typical Auto Insurance Rating Criteria

Vehicle Type Factors

- **Number of vehicles to be insured on policy**
- **Number of operators in household**
- **Make, model & body style of each vehicle**
- **Age of vehicle (model year)**
- **Safety features (e.g., airbags, anti-lock brakes)**
- **Anti-theft devices**

Use of Vehicle Factors

- **Distance driven annually**
- **Commuting distance**
- **Number of days per week used to commute**
- **Who drives vehicle the most?**
- **Years of driving experience (youthful operator?)**
- **Use of vehicle for business purposes**



Typical Auto Insurance Rating Criteria

- **Location (Territorial) Factors**
 - Location where vehicle is kept
 - Garage or street parking
- **Driving History**
 - Accidents
 - Moving violations
 - Convictions (e.g., DUIs)
 - Personal claims history
- **Prior Insurance Factors**
 - Currently insured?
 - Number of years with current insurer?
 - Current Bodily Injury limits



Typical Auto Insurance Rating Criteria

- **Driving History**

- Accidents
- Moving violations
- Convictions (e.g., DUIs)
- Personal claims history

- **Prior Insurance Factors**

- Currently insured?
- Number of years with current insurer?
- Current Bodily Injury limits



Typical Auto Insurance Rating Criteria

- **Personal Factors**

- **Marital Status**
- **Gender**
- **Occupation**
- **Education**
- **Student?**
- **Homeowner?**

- **Other Factors**

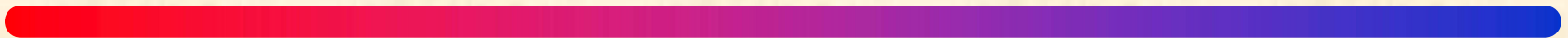
- **Information from credit reports**
- **Drivers education, defensive driving course taken**

Examples of Relationships Between Underwriting Criteria & Losses



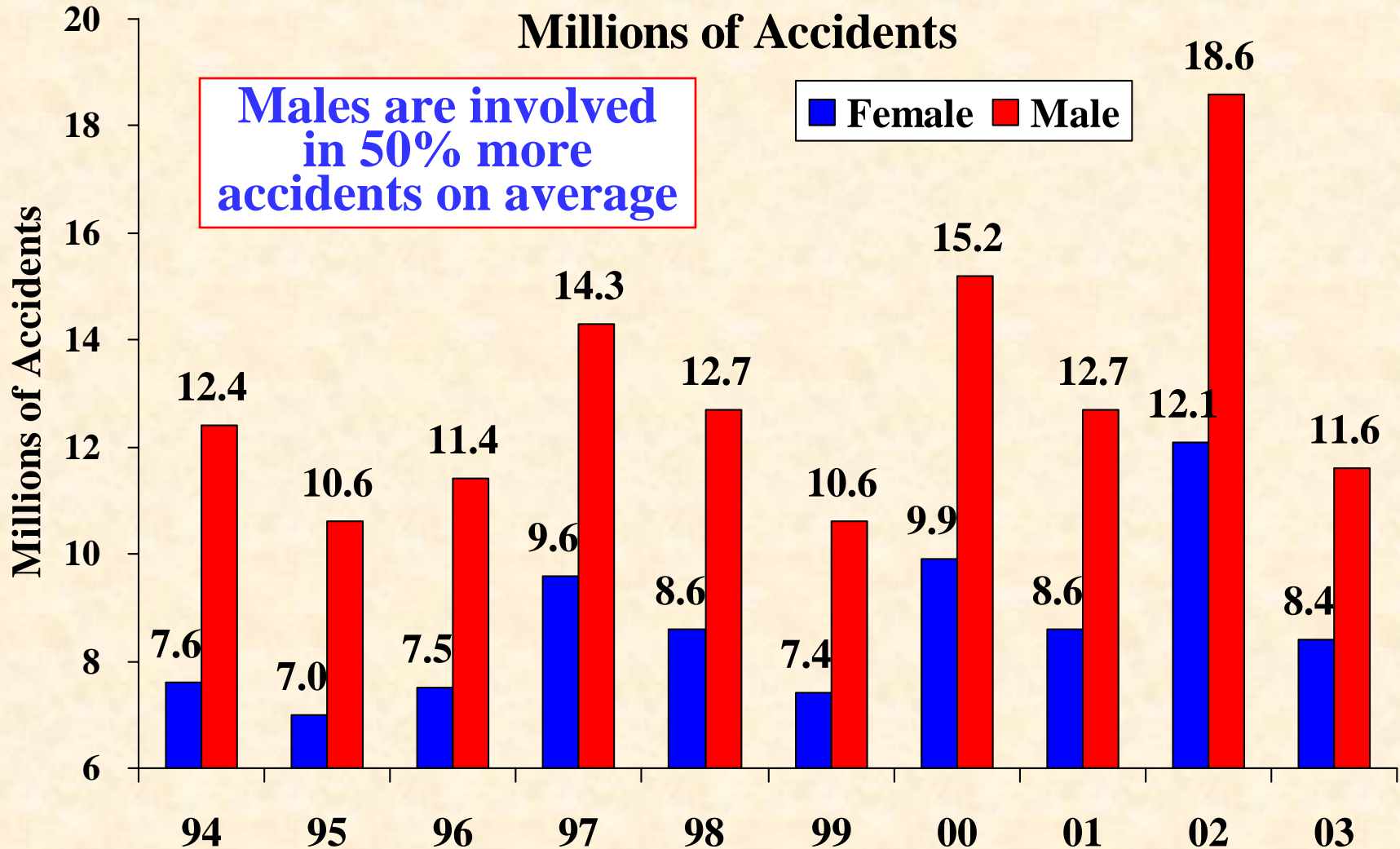
Example 1:

GENDER & AUTO INSURANCE



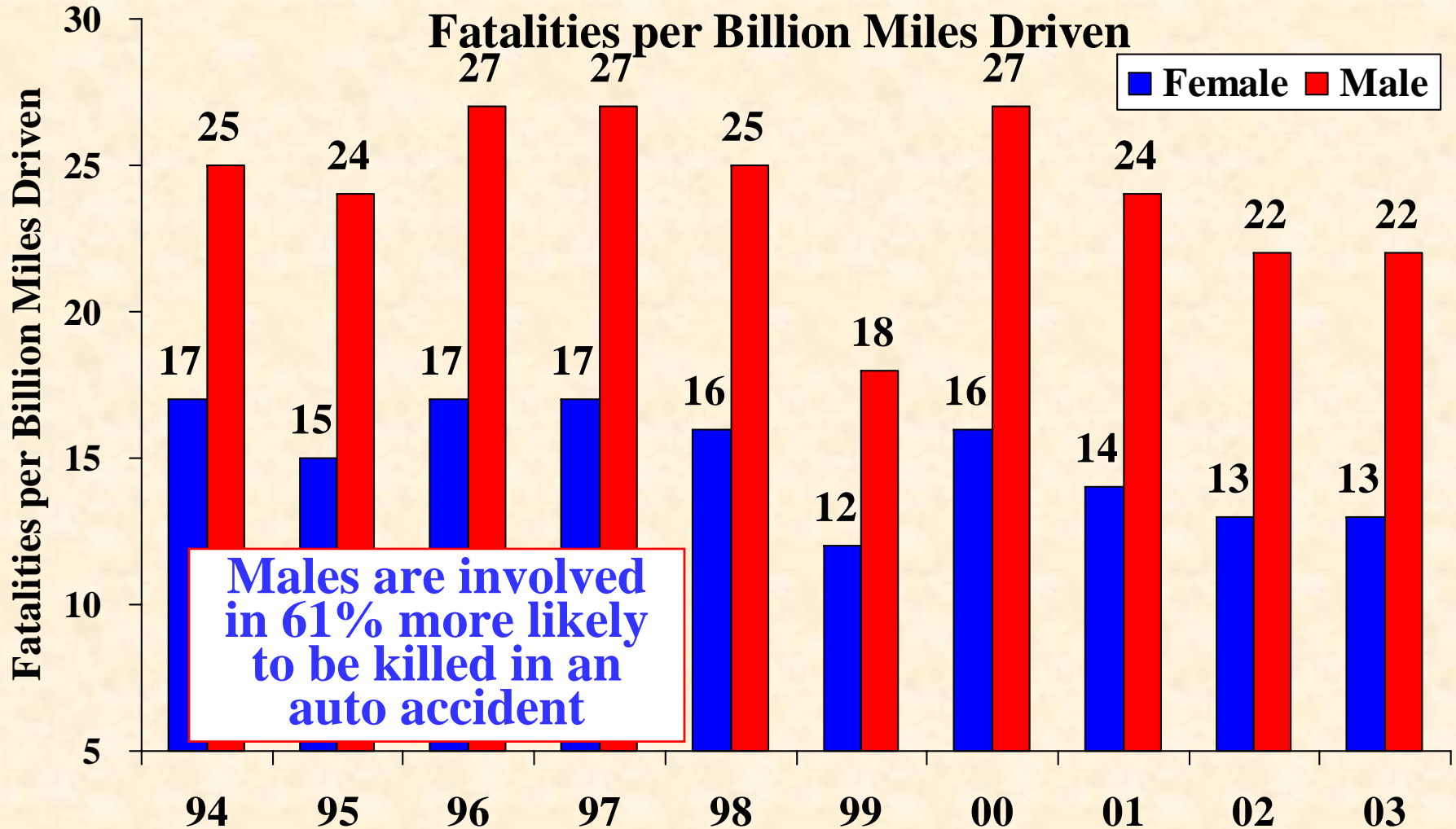


Sex of Drivers Involved in All Auto Crashes, 1994-2003





Fatality Rate by Sex of Drivers Involved in Auto Crashes, 1994-2003



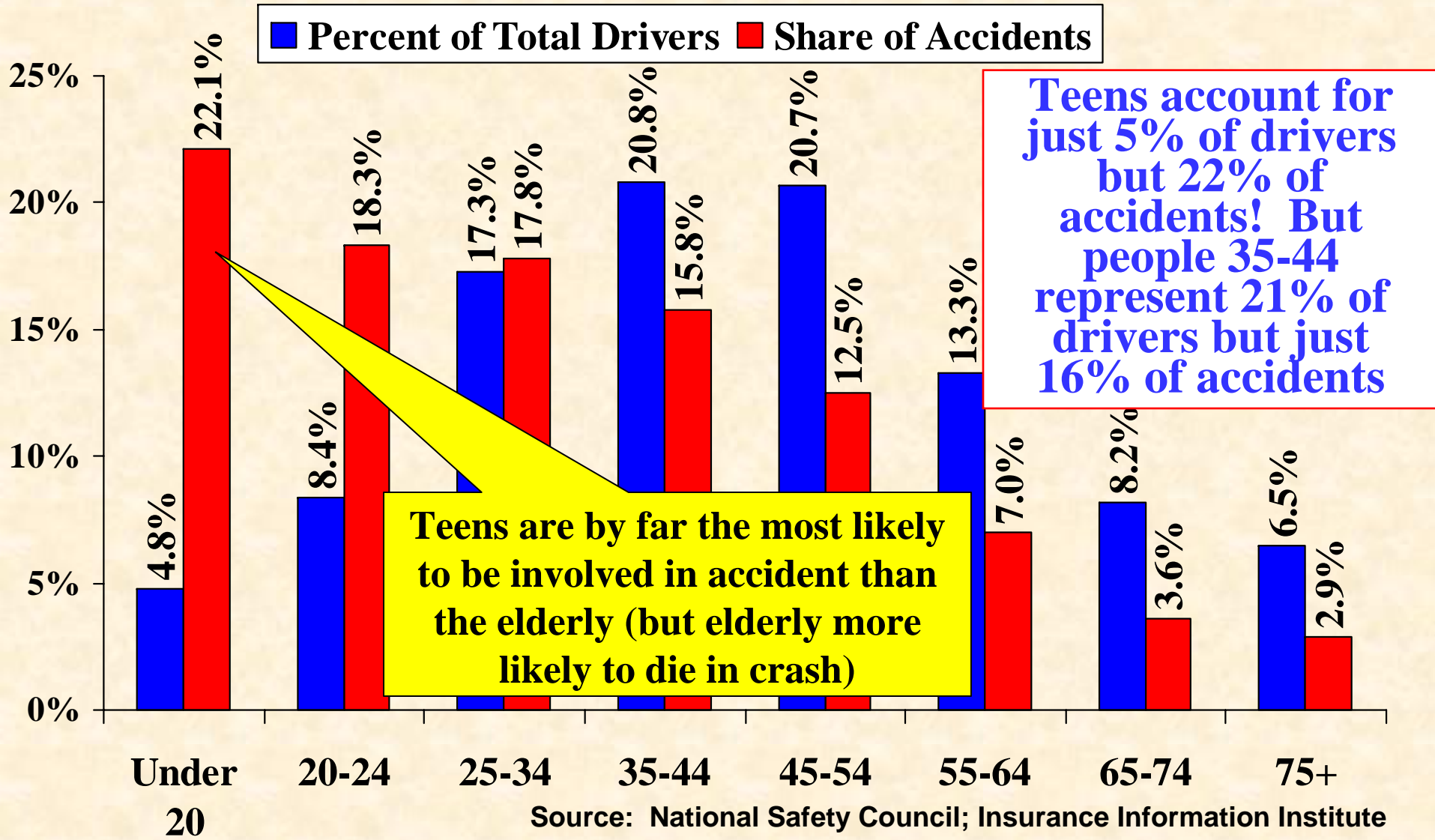
Example 2:

DRIVER AGE



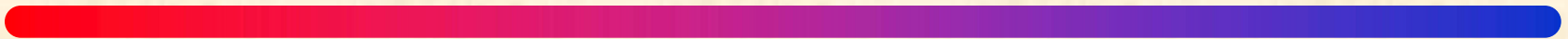


Accidents by Age of Driver, 2003



Example 3:

INSURANCE SCORING (CREDIT)





Importance of Rating Factors by Coverage Type

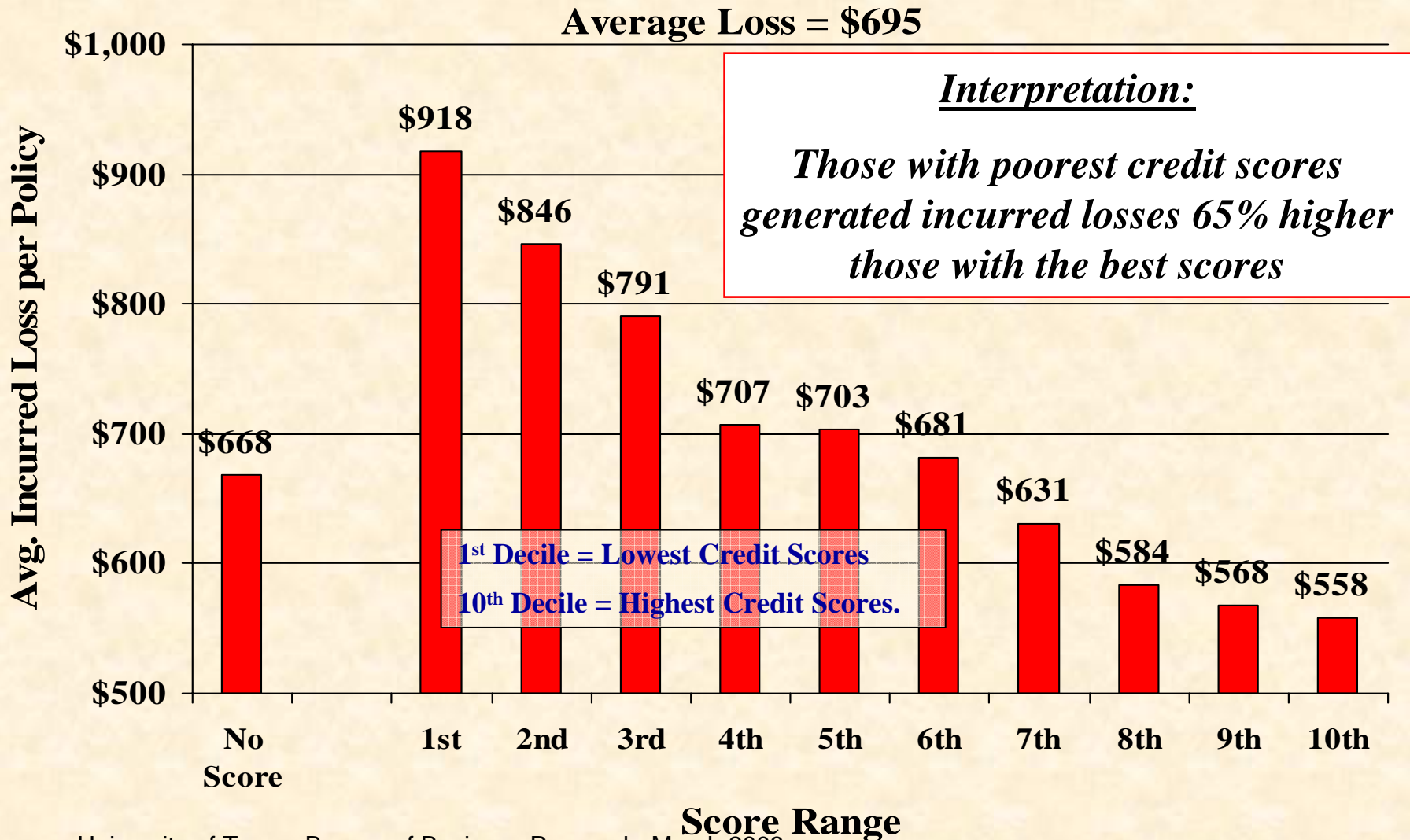
| Coverage | Factor 1 | Factor 2 | Factor 3 |
|----------------------|-------------------|-------------------|-------------------|
| BI Liability | Age/Gender | Ins. Score | Geography |
| PD Liability | Age/Gender | Ins. Score | Geography |
| PIP | Ins. Score | Geography | Yrs. Insured |
| Med Pay | Ins. Score | Limit | Age/Gender |
| Comprehensive | Model Year | Age/Gender | Ins. Score |
| Collision | Model Year | Age/Gender | Ins. Score |

Source: *The Relationship of Credit-Based Insurance Scores to Private Passenger Automobile Insurance Loss Propensity* Michael Miller, FCAS and Richard Smith, FCAS (EPIC Actuaries), June 2003 (Presented at June 2003 NAIC meeting).



Texas Auto: Average Loss per Policy

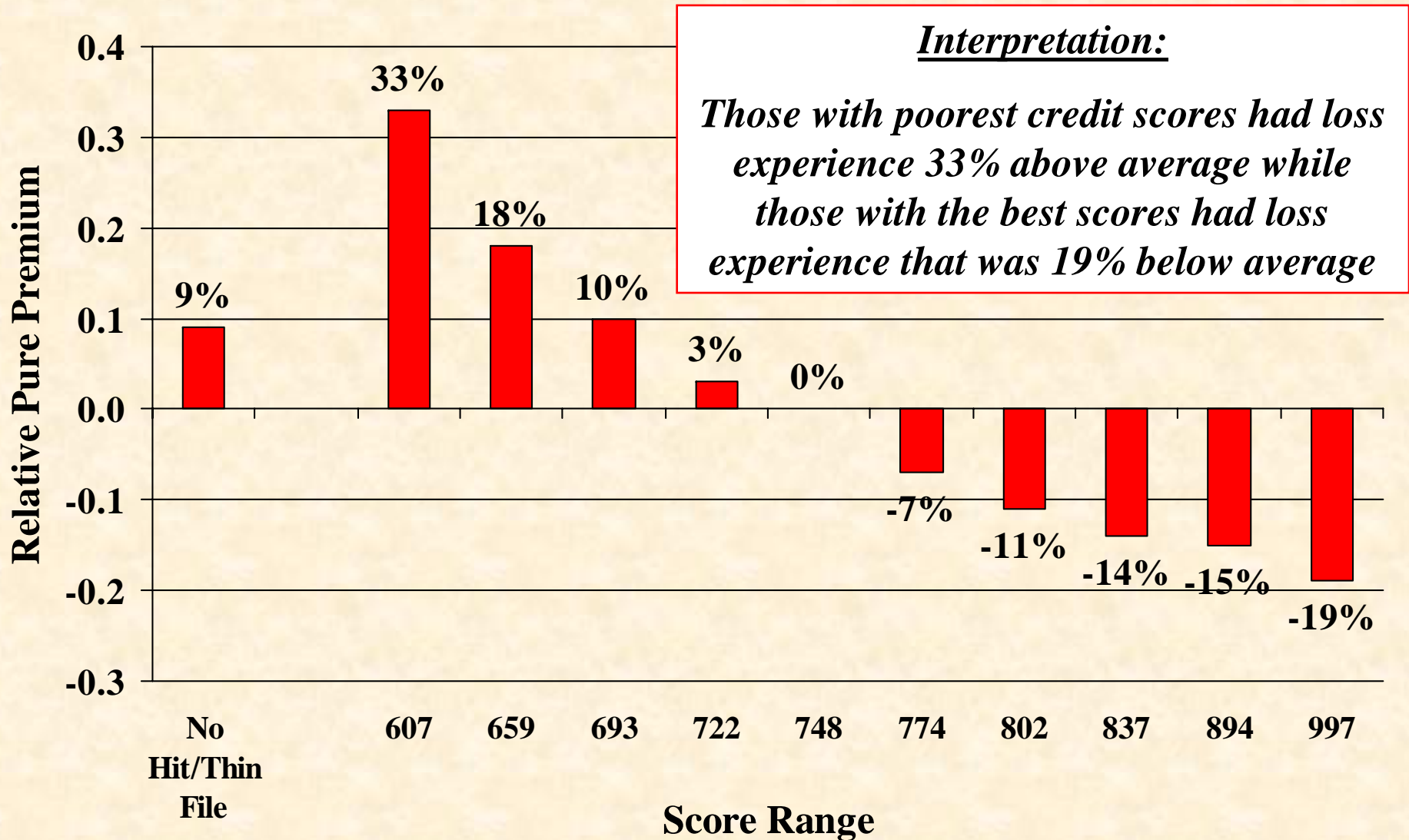
(by Credit Score Decile, Total Market)



Score Range



Indicated Relative Pure Premium by Insurance Score (PD Liability)*

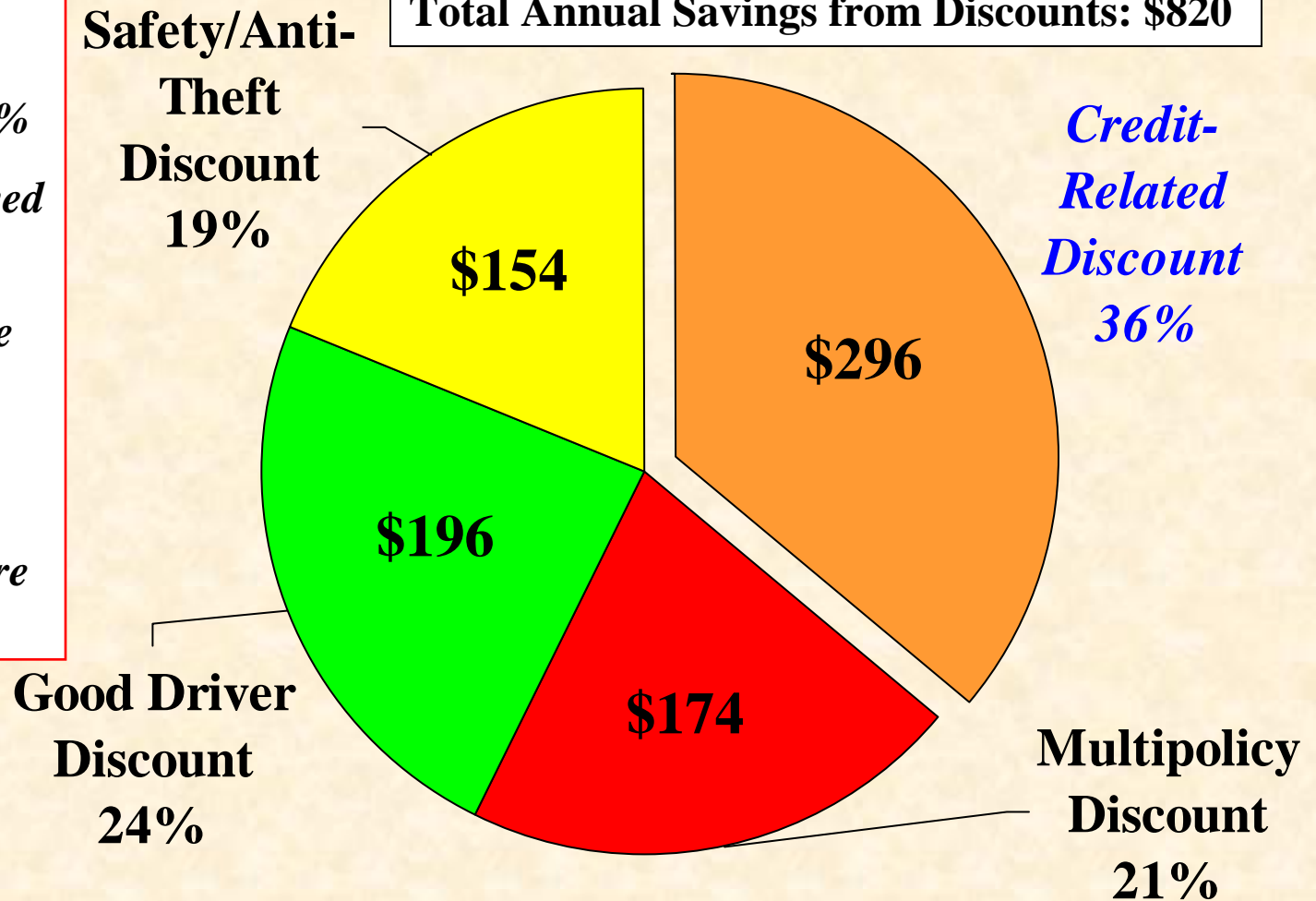




Example: Credit Discount Can Save \$100s per Year*

- *Credit discount lowered annual premium by 14.7%*
- *Policyholder saved nearly \$300*
- *Credit was single largest discount*
- *Opponents of credit will force people to pay more for coverage*

Total Annual Savings from Discounts: \$820



*Annualized savings based on semi-annual data from example

Example 4:

WORKER AGE

(A Workers Comp Example)



THE AGEING WORKFORCE

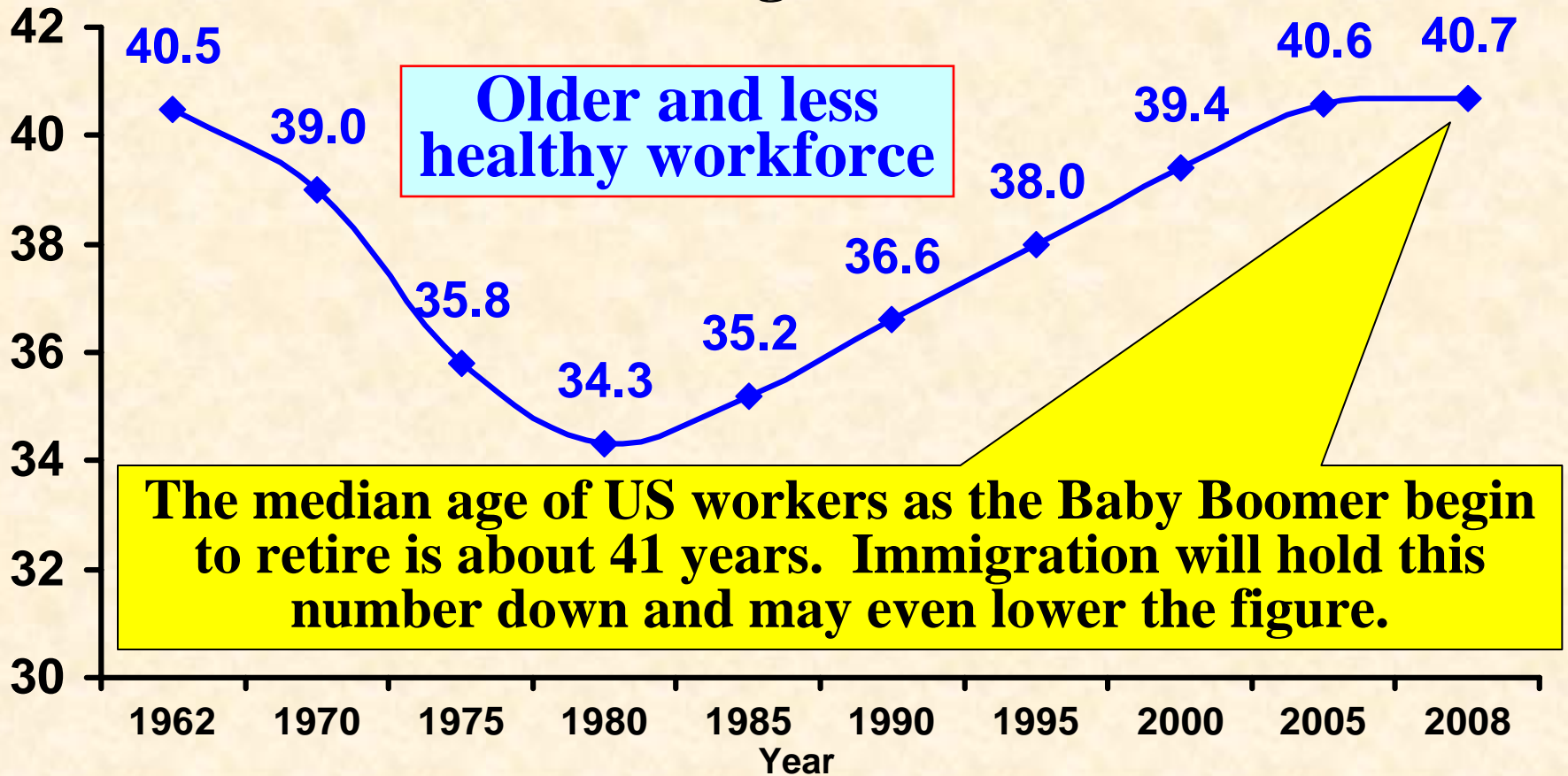
Age Could be Used a
Predictor of
Occupational Injury and
Loss, But it is Not





U.S. Workforce is Aging: Significant Implications for Workers Comp

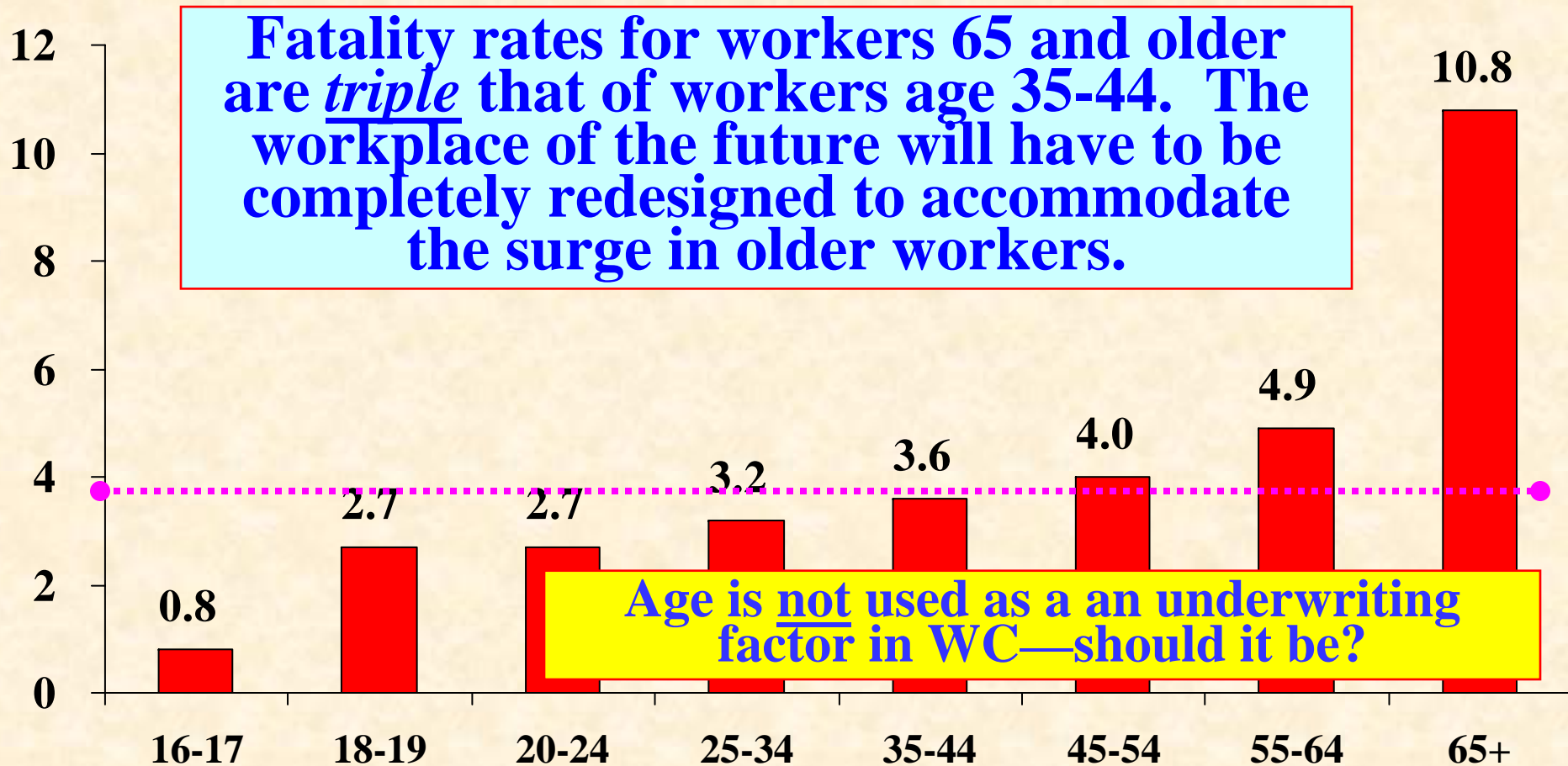
Median Age of U.S. Worker





Fatal Work Injury Rates Climb Sharply With Age

Fatal Work Injuries per 100,000 Workers (2006)



Example 5:

WORKER WEIGHT

*(Another Example
Relevant to Workers*

!!! Comp that is Not Used)

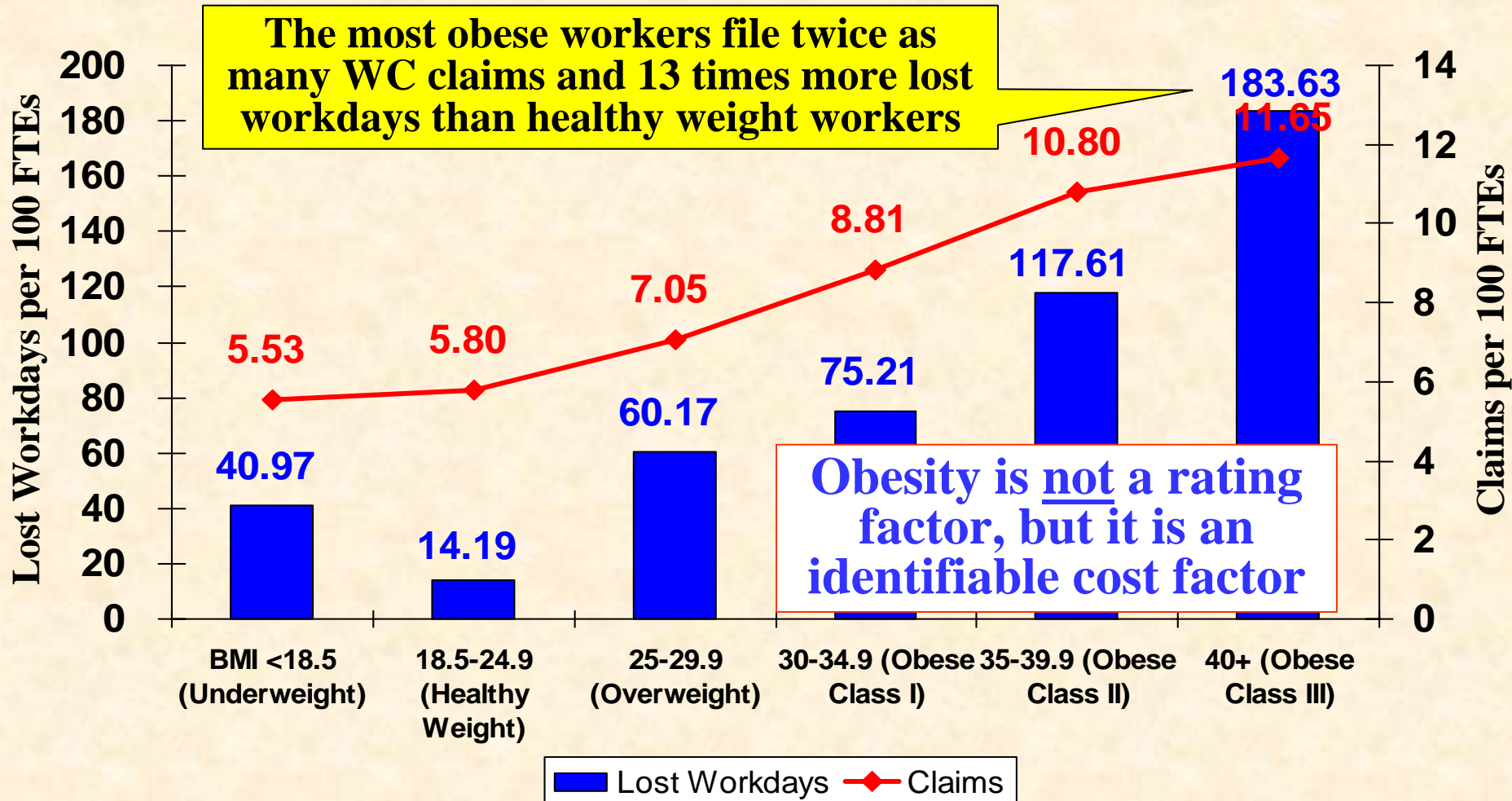
THE OBESITY EPIDEMIC

Major Cost Driver that
WC Has Yet to Address



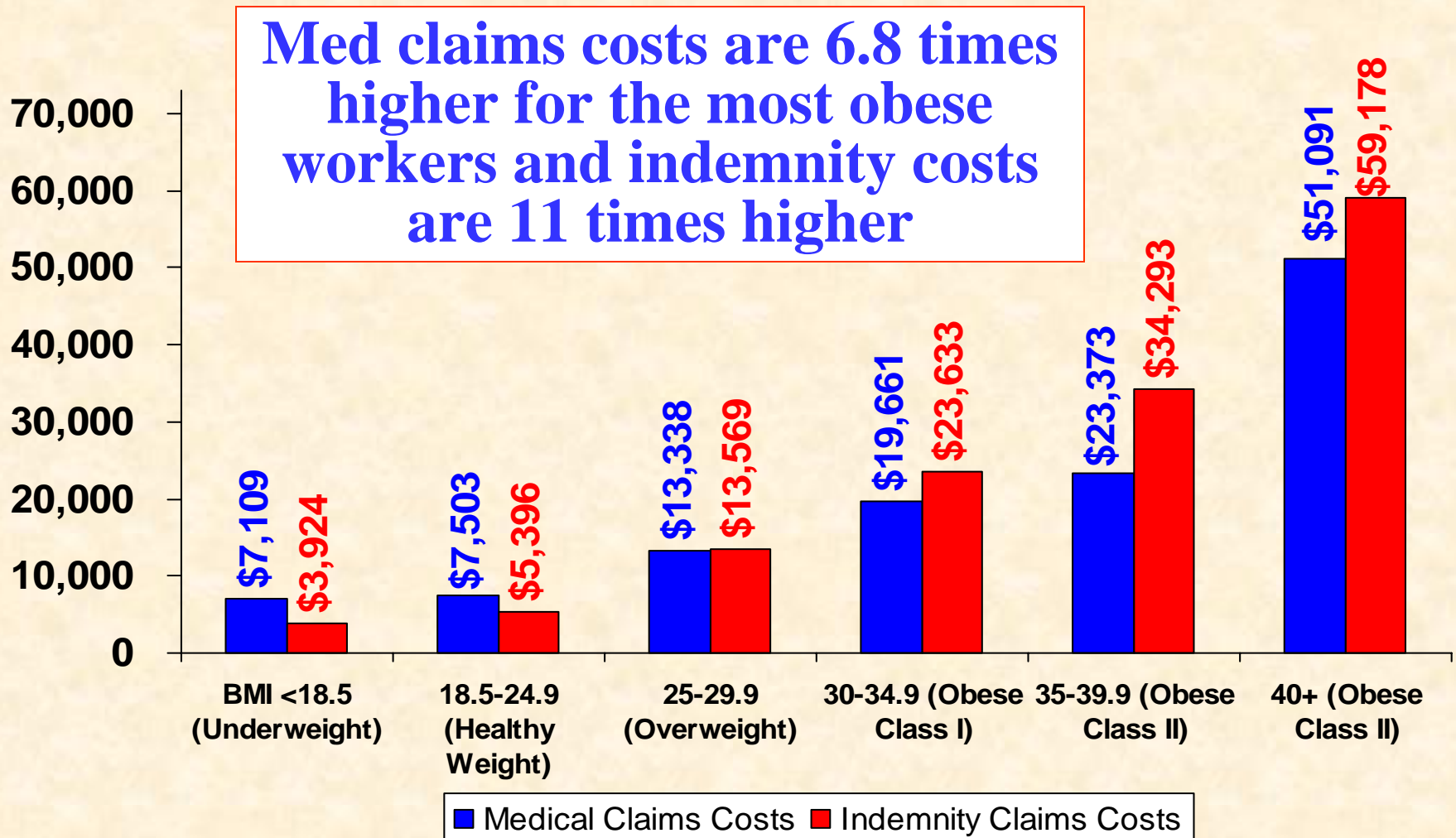


WC Claims and Lost Workdays by Body Mass Index (BMI)



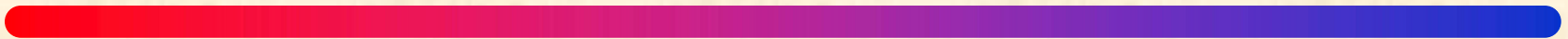


Medical & Indemnity WC Claims Costs by BMI



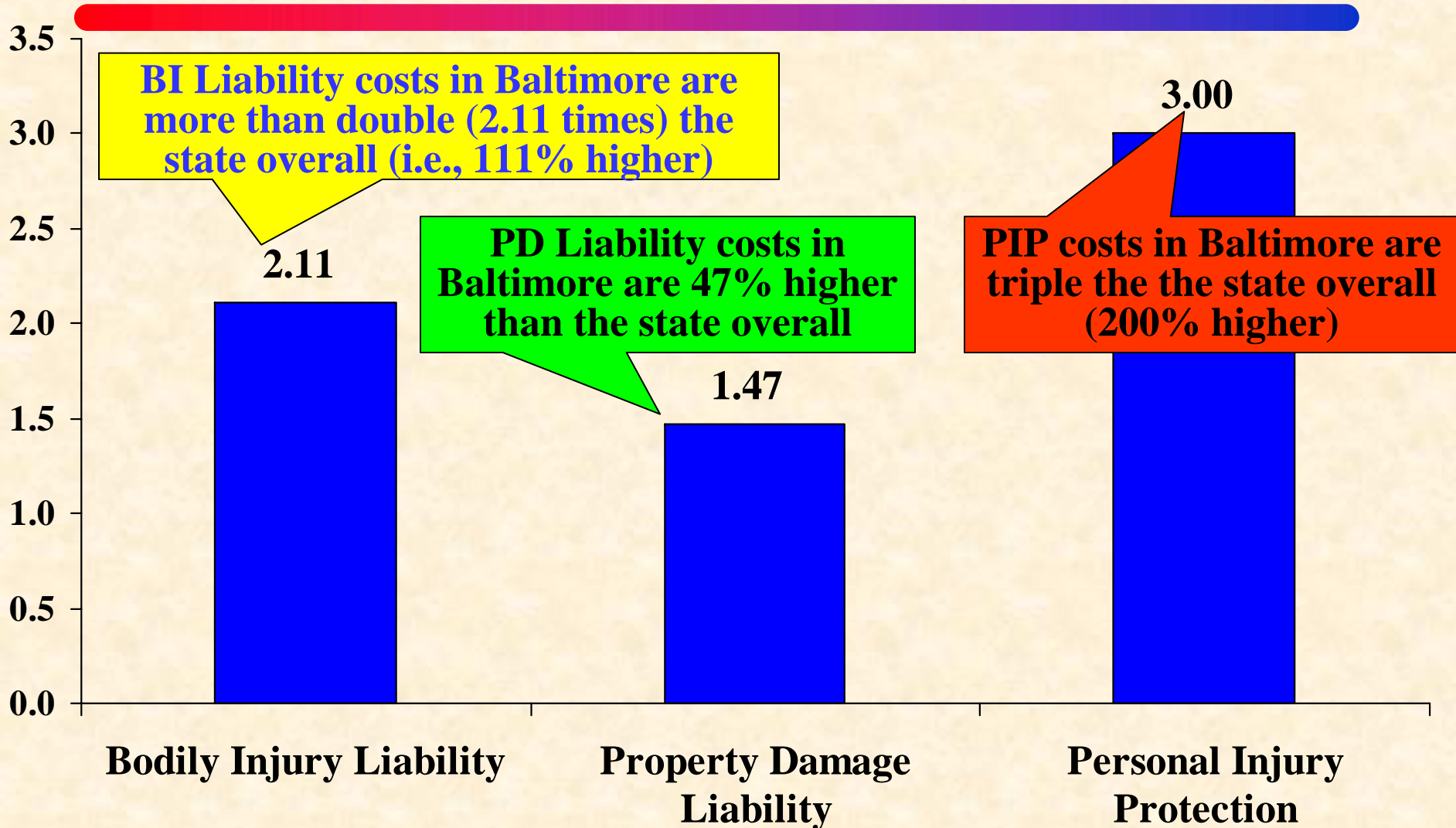
Example 6:

TERRITORY





Baltimore Relativity to State Loss Cost, 2001-2003

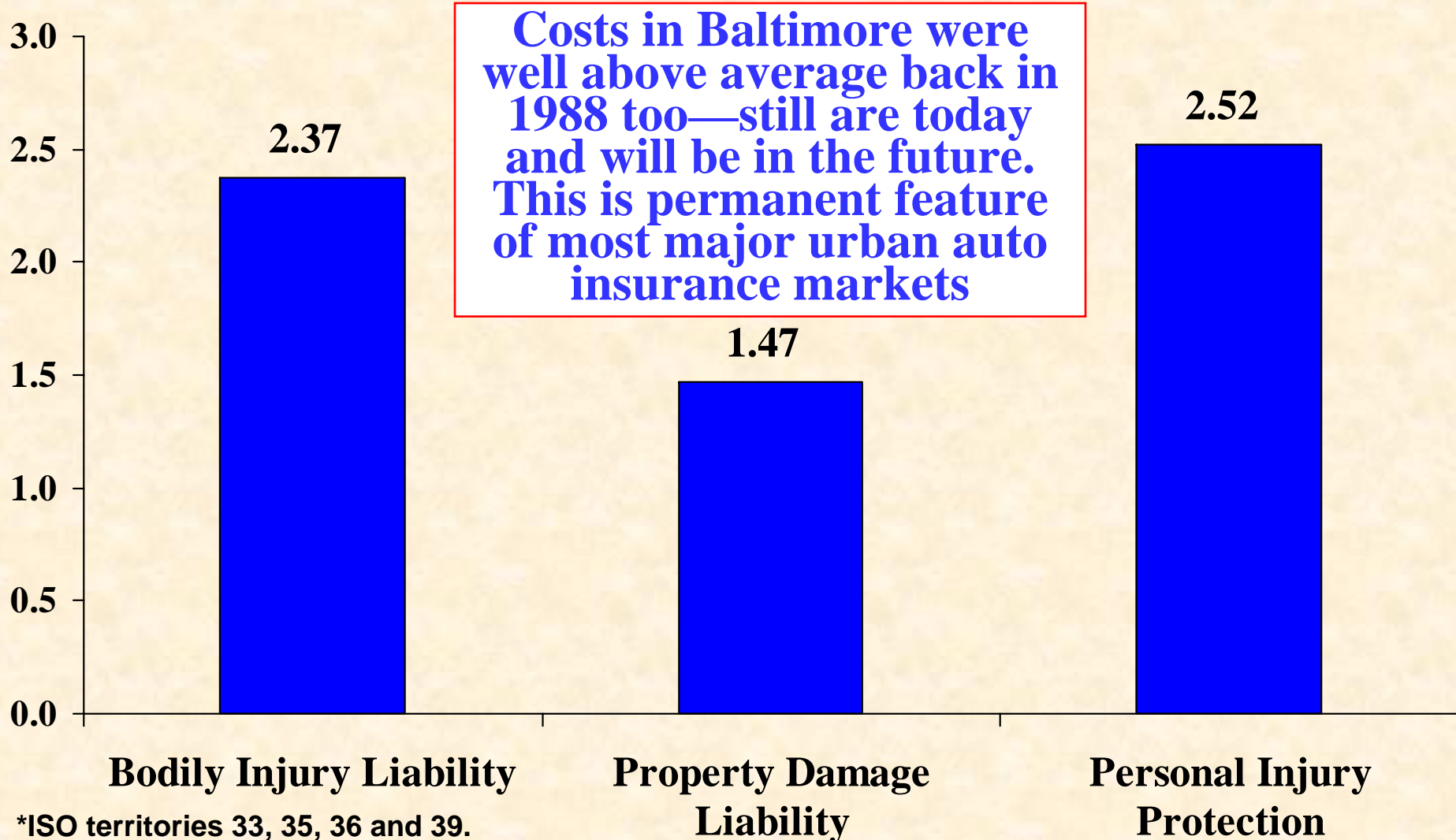


*ISO territories 33, 35, 36 and 39.

Source: ISO.



Baltimore Relativity to State Loss Cost, 1988



*ISO territories 33, 35, 36 and 39.

Source: ISO.



Are There Limits to What Predictive Modeling Can or Should Do?

- **Predictive Modeling Increases Accuracy, Equity in Rates**
 - Incumbent on insurers to use this information subject to limits imposed by policymakers
- **Advances in Data Storage, Retrieval, Computing Will Advance the Frontier of Predictive Models**
- **Concern that Individual Risk Rating Will Replace Risk Pooling is Absurd**
 - No model will ever be 100% accurate
 - Some degree of pooling will always exist
- **Societal Boundaries Will Always Exist**
 - Predictive modeling will never be used to its full potential
 - Privacy/"Big Brother" concerns



Predictive Modeling: 6 Rules of Thumb for Communicators

1. **EDUCATE:** Educate Yourself to Develop Understanding of How Products Work
 - Get to know actuaries and underwriters in your company
2. **PARTICIPATE:** Get Communications (not just Marketing) Involved at a Much Earlier Stage of Product Cycle
3. **ANTICIPATE:** Potential Communications Challenges *Before* Rollout
4. **IDENTIFY:** Subject Area Experts as Technical Resources
5. **DISSEMINATE:** Create Plan to Help Employees with Customer, Regulator & Media Contact Understand How Product Operates
6. **COORDINATE:** Ensure Marketing, Government Affairs, Customer Service, Agents all Operating from Same Playbook



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