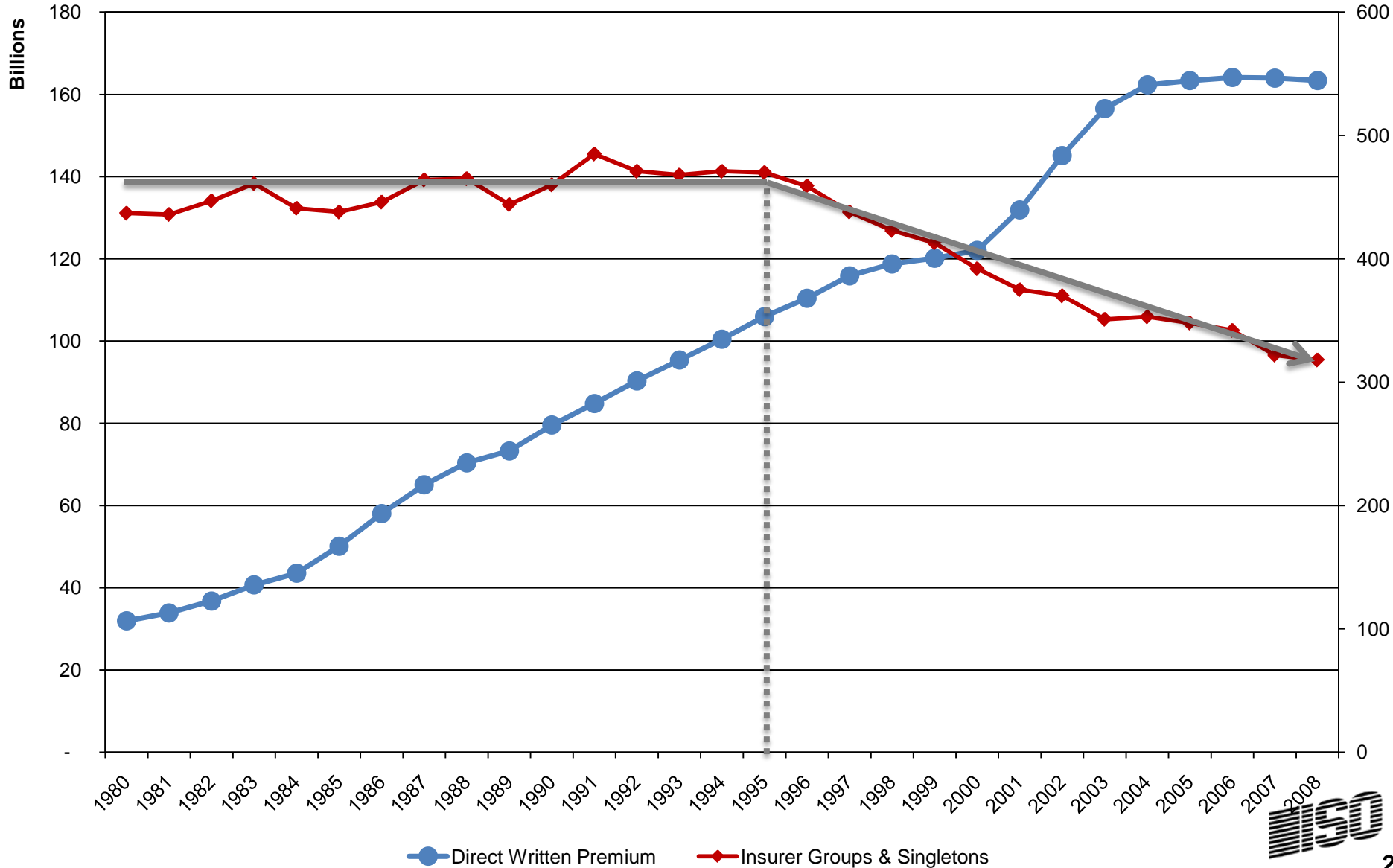# Pricing Strategy and Risk Management

David Cummings
Vice President – Research
ISO Innovative Analytics

Premium Dollars vs Number of Companies
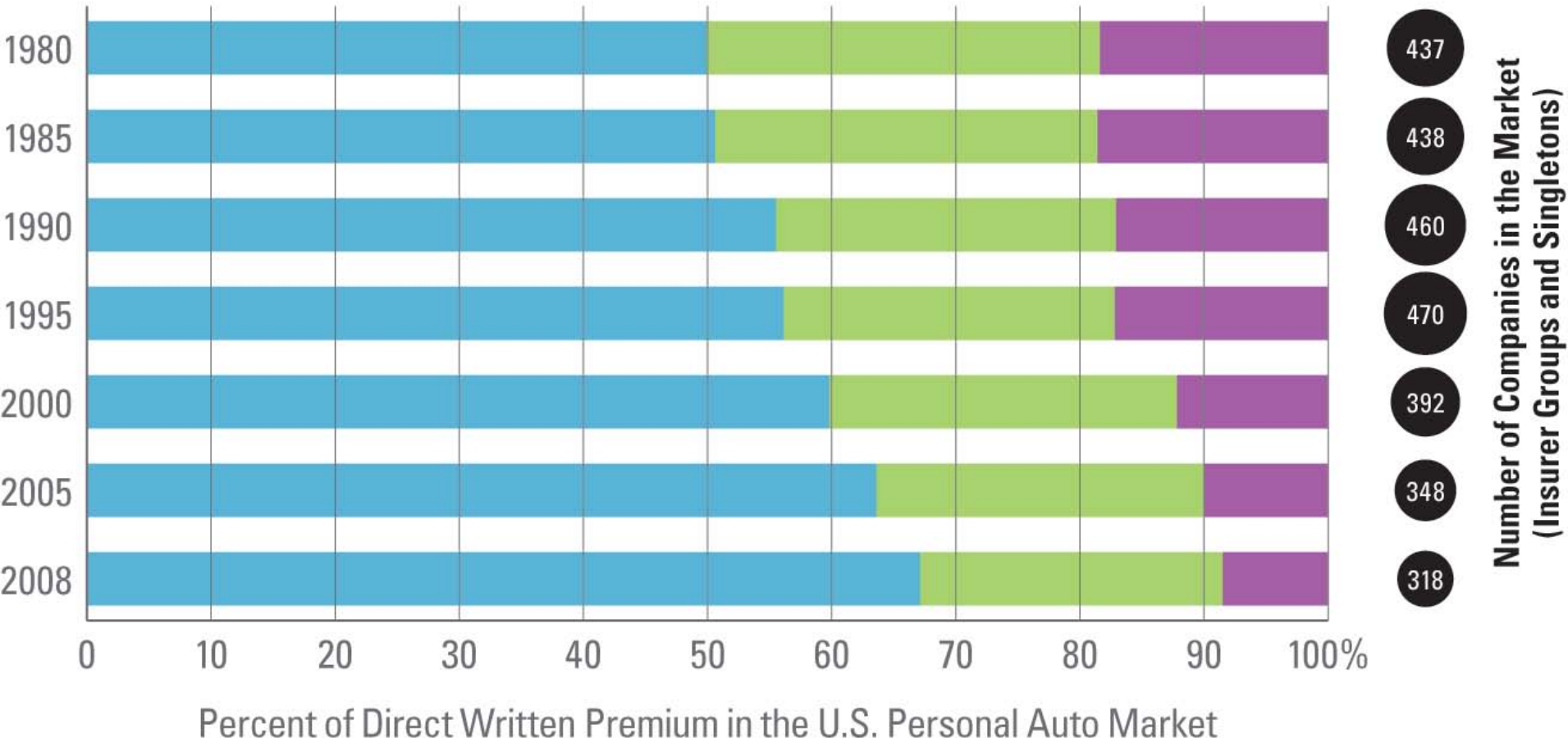
U.S. Personal Auto Market - 1980 to 2008

Legend: Direct Written Premium, Insurer Groups & Singletons

US Personal Auto Market – 1980 to 2008

Market Share by Rank in Market
U.S. Personal Auto Direct Written Premium

Legend: Top 10 (blue), 11-50 (green), Rest of Industry (purple)

Number of Companies in the Market (Insurer Groups and Singletons):
- 1980: 437
- 1985: 438
- 1990: 460
- 1995: 470
- 2000: 392
- 2005: 348
- 2008: 318

Percent of Direct Written Premium in the U.S. Personal Auto Market

80/20 Rule in this auto market

Company Distribution: Counts by Market Share for Years 1980 and 2008
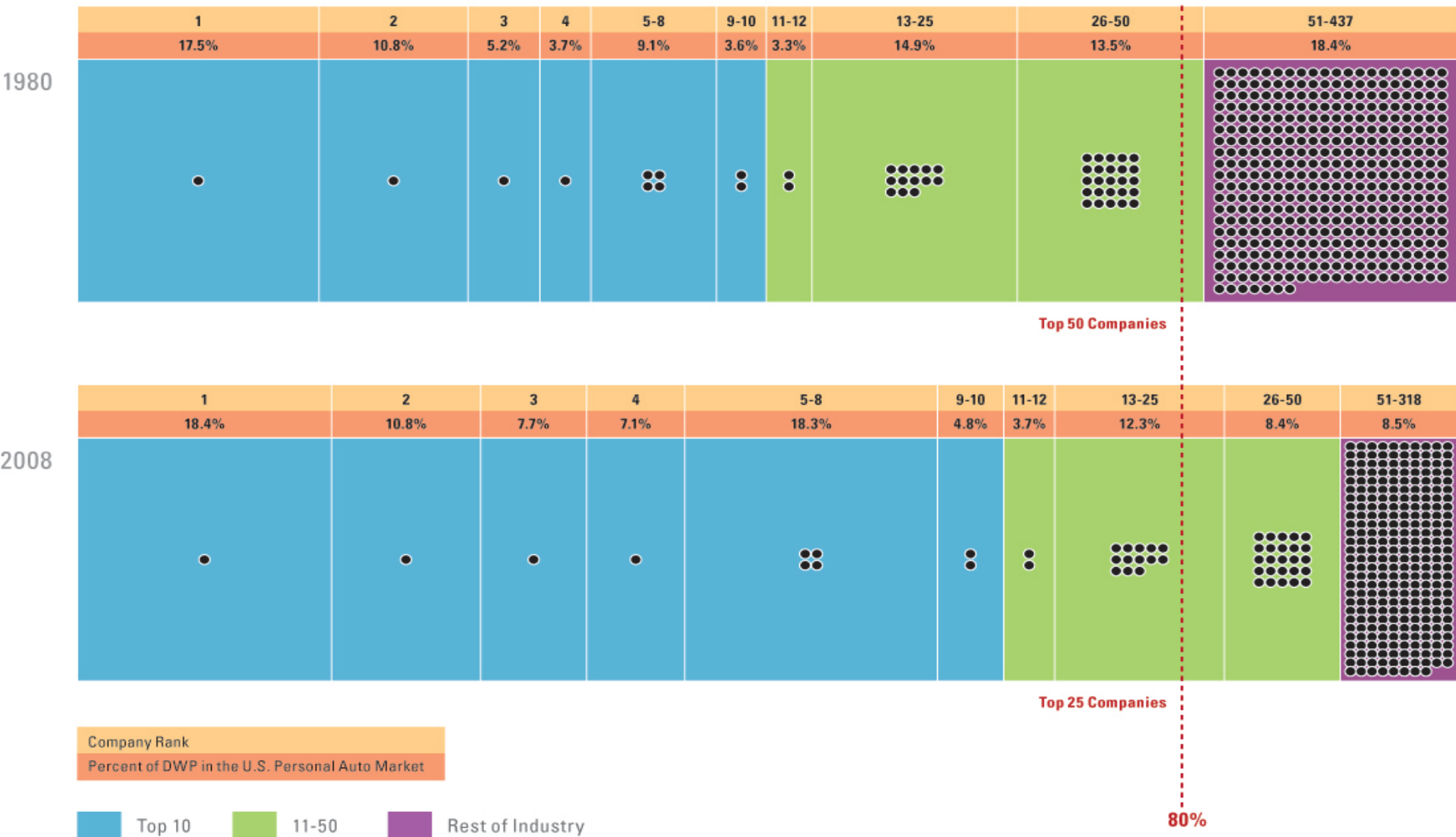
Lessons Learned

- **Looking Backward**
  - Pricing strategy was key driver for market success
  - Early adopters gained significant competitive advantage
  - Evidence of varying risk tolerances among insurers

- **Looking Forward**
  - Competitive pressures continue to mount
  - Pricing methodologies and data resources are evolving rapidly
  - Significant risk for underperforming strategies

Pricing Strategy and Risk Management

- **Chapter 1:   Strategic Risk Management**

- **Chapter 2:   Modeling the Competitive Marketplace**

- **Chapter 3:   Linking Marketplace Models to Strategic Risk Management**

Pricing Strategy and Risk Management

- **Themes for this discussion**
  - Blending quantitative and qualitative techniques for risk management
  - Using models as a tool to understand complex dynamics
  - Enabling better strategic decisions through risk analysis

- **Not part of this discussion**
  - Catastrophe modeling/risk management
  - Capital management
  - Economic capital

Pricing Strategy and Risk Management

- **Chapter 1: Strategic Risk Management**

- Chapter 2: Modeling the Competitive Marketplace

- Chapter 3: Linking Marketplace Models to Strategic Risk Management

Understanding Strategic Risk

- **How do you define strategy?**

- **A proposed "unifying definition"**
  - A science and art of planning
  - Using political, economic, psychological and organizational resources
  - To achieve major organizational goals

  from Don Mango, "An Introduction to Insurer Strategic Risk", 2007 ASTIN Colloquium Papers

Understanding Strategic Risk

- ## A definition of "*strategic risk taking*"

  Corporate strategic moves that cause returns to vary, that involve venturing into the unknown, and that may result in corporate ruin – moves for which the outcomes and probabilities may be only partially known and where hard-to-define goals may not be met.

  From Baird/Thomas, "Toward a Contingency Model of Strategic Risk Taking." Academy of Management Review, vol.10, no. 2 (1985), pp 230-243.

- ## What sort of strategic risks do insurers face?

- ## How are these risks considered in strategy development?

Understanding Strategic Risk

- ## A concept of *Strategic Risk Management*

  Strategic risk analysis is an input for the strategy development process, aiding strategy formulation, evaluation, choice and implementation. No distinction is drawn between strategic risk analysis and strategy formulation. Instead, both are viewed as parts of an iterative, adaptive and flexible policy dialogue process.

  From Hertz/Thomas, "Decision and Risk Analysis in a New Product and Facilities Planning Problem." Sloan Management Review, 24, 2 (Winter 1983).

- ## What types of analyses enable the strategy development process?

Weaknesses of Forecasting Analyses for SRM

"Forecasts are not always wrong; more often than not, they can be reasonably accurate. And that is what makes them so dangerous. They often work because the world does not always change. But sooner or later forecasts will fail when they are needed most: in anticipating major shifts in the business environment that make whole strategies obsolete."

"The way to solve this problem is not to look for better forecasts by perfecting techniques or hiring more or better forecasters. The better approach is to accept uncertainty, try to understand it, and make it part of our reasoning"

From Pierre Wack, "Scenarios: uncharted waters ahead," Harvard Business Review, Sept-Oct 1985, pp 73-89.

Scenario Planning
A tool for Strategic Risk Management

- **Range of future outcomes is simplified into a limited number of possible "scenarios"**

- **Scenarios are used to explore the joint impact of various uncertainties**

- **Scenarios change several variables at one time, trying to capture the new states that will develop after major shocks or deviations in key variables**

- **Scenarios are more than just simulation output. They include subjective interpretations of factors that often cannot be explicitly modeled.**

From Shoemaker, "Scenario Planning: A Tool for Strategic Thinking."
Sloan Management Review, 36, 2 (Winter 1995) pp 29 - 40.

Scenario Planning Case Study

- **Royal Dutch/Shell before the 1973 oil crisis**
  - Long range studies suggested very different business environment 30 years in future
  - Planners used scenarios to help make abstract changes more concrete -- How would we get there from here?
    - Would there be an oil supply disruption?
    - How would producing countries respond to the disruption?
    - What strategies would help Shell succeed in each scenario?
  - Scenarios helped to challenge embedded assumptions in management's previous world view
  - Prepared managers to respond when crisis emerged

From Pierre Wack, "Scenarios: uncharted waters ahead," Harvard Business Review, Sept-Oct 1985, pp 73-89.

Pricing Strategy and Risk Management

- **Chapter 1:   Strategic Risk Management**

- **Chapter 2:   Modeling the Competitive Marketplace**

- **Chapter 3:   Linking Marketplace Models to Strategic Risk Management**

Modeling the Competitive Marketplace

- **For pricing strategies, much of the uncertainty lies in how customers and other companies will act**

- **Complex dynamics that play out over multiple years**

- **Traditional ratemaking methods generally ignore these dynamics**

- **Actuaries can provide better insights into the uncertainties of the competitive marketplace**

Illustration

- **Two insurers write 3 policies each**
- **Laggard Insurance prices all policies in same class**
- **Luminary Mutual uses more accurate segmentation**
- **Both companies have same profit provisions (10% of premium)**

Reference: Cummings, "The Business Impact of Advanced Analytics", Contingencies, Nov/Dec 2009, pp 46-51.

Illustration – Initial State

Laggard Insurance

Actual Expected Cost	Policy Premium	Profit
$600	$880	$280
$800	$880	$80
$1,000	$880	-$120
	Total	**$240**

Luminary Mutual

Actual Expected Cost	Policy Premium	Profit
$600	$660	$60
$800	$880	$80
$1,000	$1,100	$100
	Total	**$240**

Illustration – After Year 1

Laggard Insurance

Actual Expected Cost	Policy Premium	Profit
$800	$880	$80
$1,000	$880	-$120
$1,000	$880	-$120
	Total	-$160

Luminary Mutual

Actual Expected Cost	Policy Premium	Profit
$600	$660	$60
$600	$660	$60
$800	$880	$80
	Total	$200

New Policy Premium = $1,027

Illustration – After Year 2

Laggard Insurance

Actual Expected Cost	Policy Premium	Profit
$1,000	$1,027	$27
$1,000	$1,027	$27
	Total	$54

New Policy Premium = $1,100

Luminary Mutual

Actual Expected Cost	Policy Premium	Profit
$600	$660	$60
$600	$660	$60
$800	$880	$80
$800	$880	$80
	Total	$280

Illustration – After Year 3

Laggard Insurance

Actual Expected Cost	Policy Premium	Profit
$1,000	$1,100	$100
	Total	**$100**

Luminary Mutual

Actual Expected Cost	Policy Premium	Profit
$600	$660	$60
$600	$660	$60
$800	$880	$80
$800	$880	$80
$1,000	$1,100	$100
	Total	**$380**

Illustration Summary

Laggard Insurance
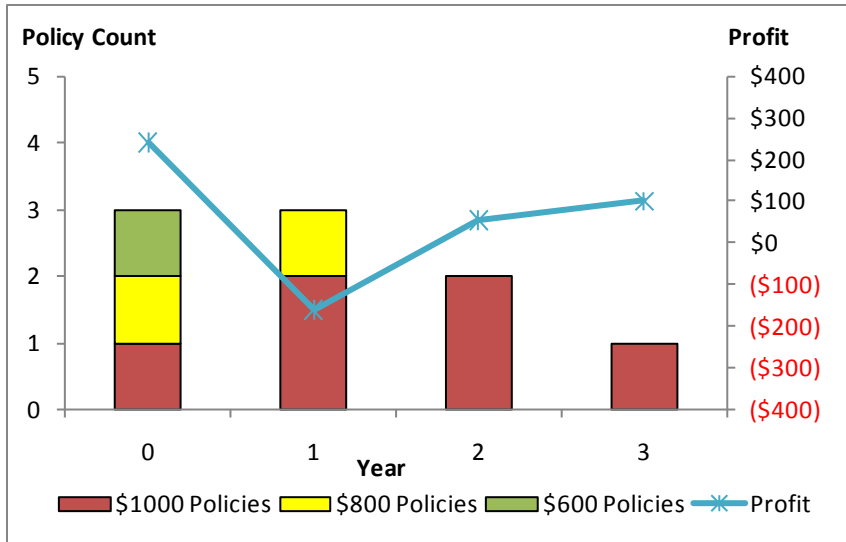
Luminary Mutual
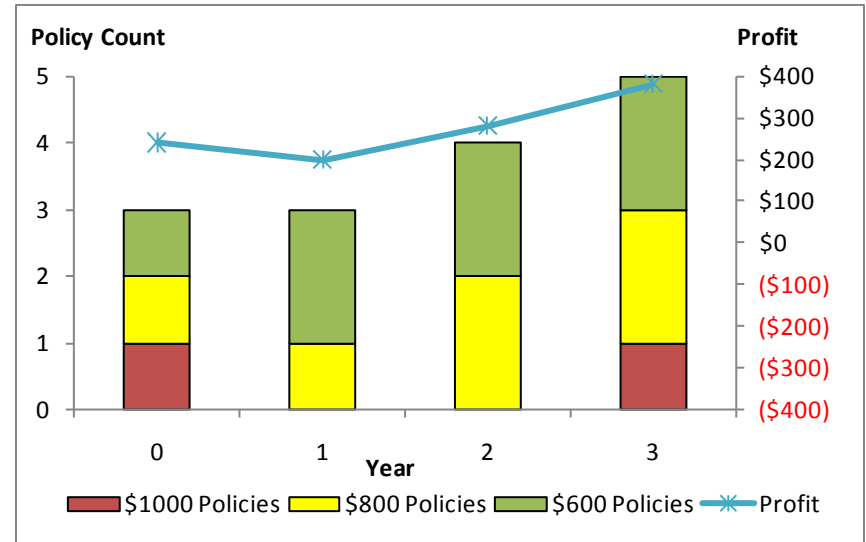
The Discounted Cash Flow Trap

Projected cash stream from investing in innovation

Usual DCF or NPV comparison

Assumed cash stream resulting from doing nothing

Should make this comparison

More likely cash stream resulting from doing nothing
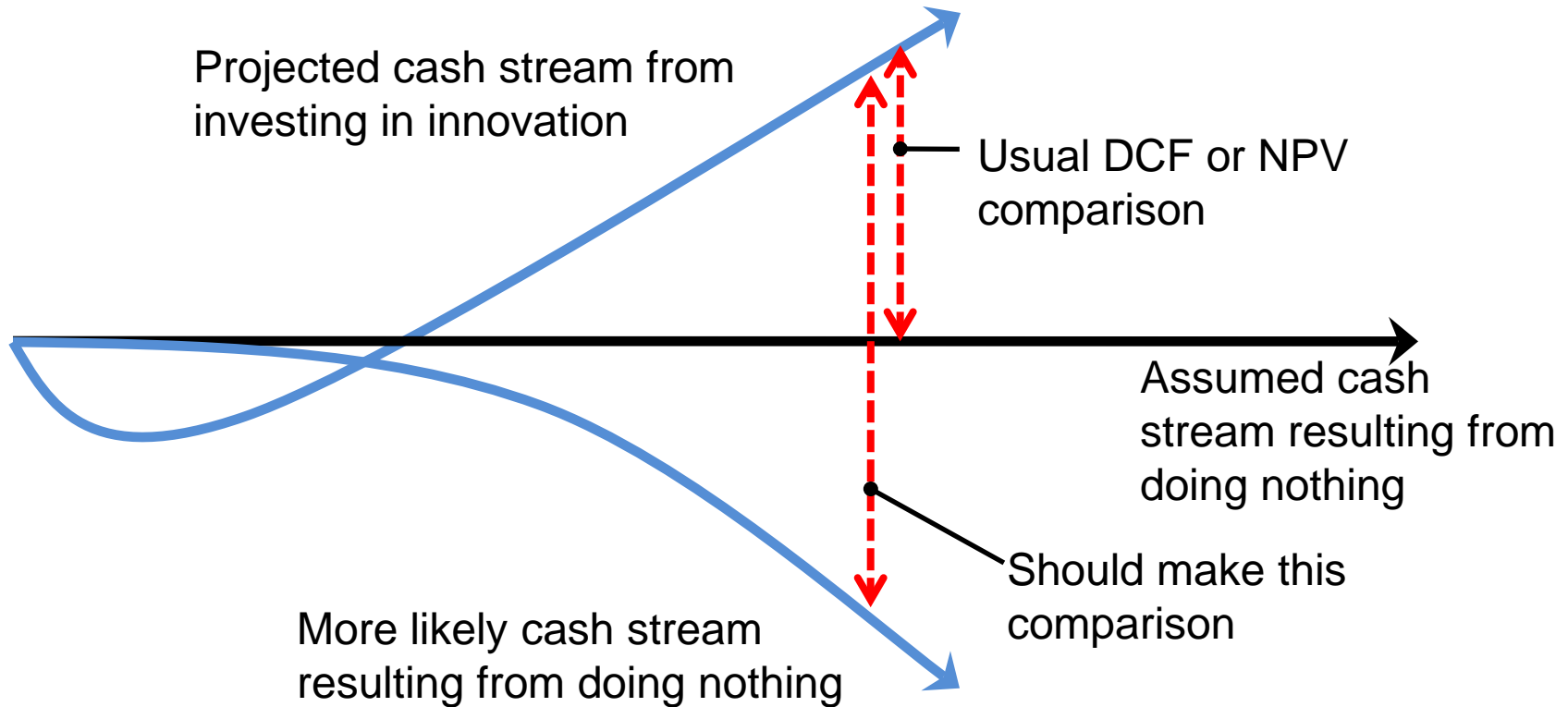
Source: Christensen, Kaufmann, Shih, "Innovation Killers: How Financial Tools Destroy Your Capacity to Do New Things", Harvard Business Review, Jan 2008

Calculating NPV

Laggard Insurance
"Do Nothing"

Year	Profit
0	$240
1	-$160
2	$54
3	$100
NPV	**$207**

Luminary Mutual
"Invest in Segmentation"

Year	Profit
0	$240
1	$200
2	$280
3	$380
NPV	**$875**

NPV Calculated using a 15% Discount Rate

Calculating NPV – Considering Marginal Costs

Laggard Insurance
"Do Nothing"

Year	Profit
0	$240
1	-$160
2	$54
3	$100
NPV	**$207**

Luminary Mutual
"Invest in Segmentation"

Year	Profit	Marginal Costs	Net Profit
0	$240	$100	$140
1	$200	$20	$180
2	$280	$25	$255
3	$380	$25	$355
		NPV	**$723**

NPV of "Status Quo" Scenario = $788

NPV Calculated using a 15% Discount Rate

Impact of Pricing Strategy

- **Assessing the value of a pricing strategy**
  - Requires understanding of marketplace dynamics
  - Requires projections of revenue, retention, and conversion effects

- **Basis of comparison is not "status quo"**
  - Project the "do nothing" scenario appropriately

Relaxing the Assumptions

- **Pricing**
  - What if Laggard tried to compete by lowering profit expectations?

- **New Scenario**
  - Laggard uses 5% profit provision
  - Luminary keeps 10% profit provision

Competing on Profit Provision

- ## **Retention/Conversion**
  - Assume some policies will stay with current insurer despite price differences
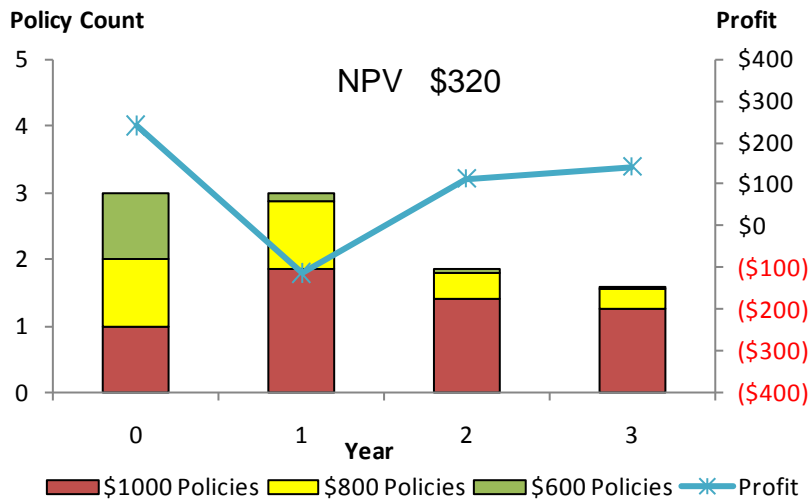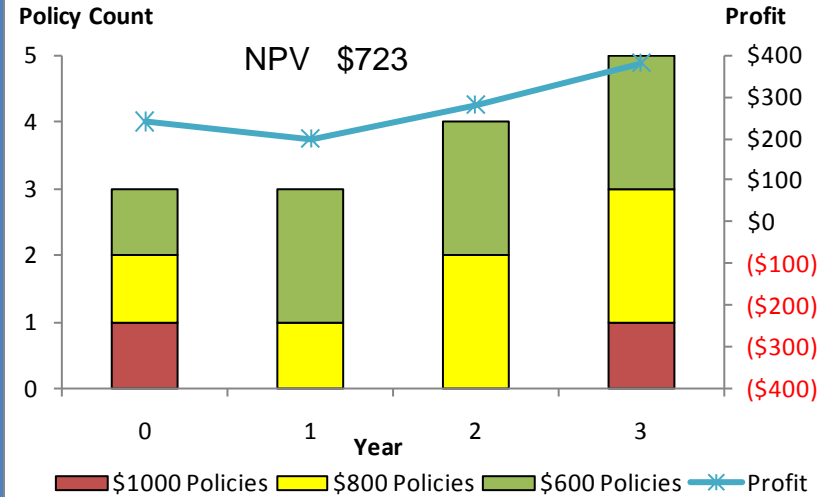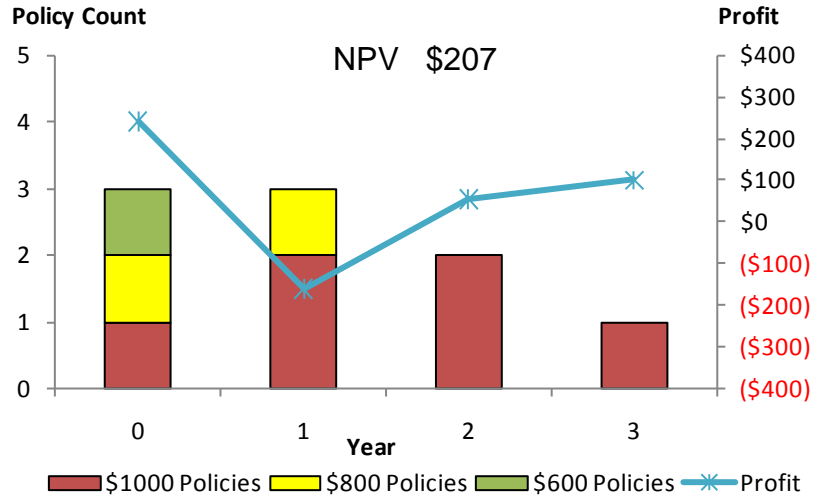
Laggard's Retention/Conversion Probability
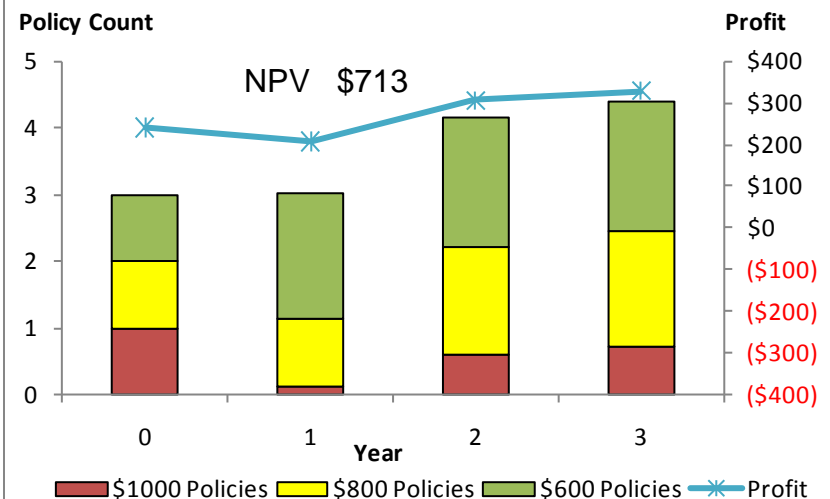
High Retention Price Elasticity
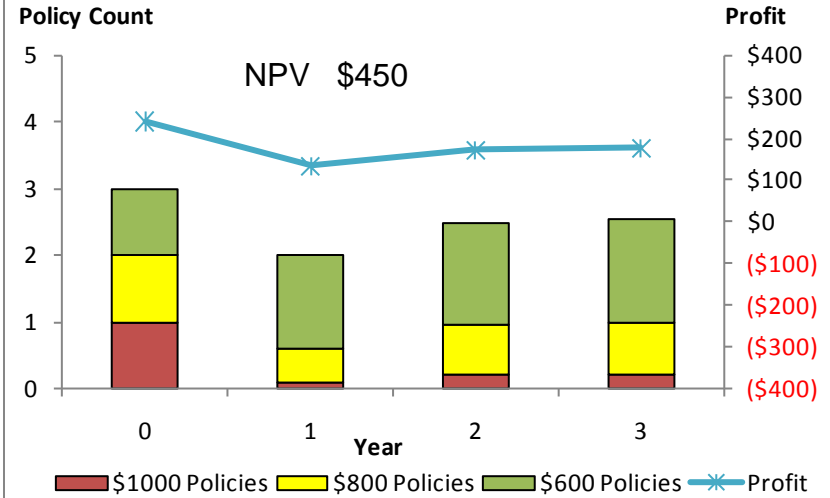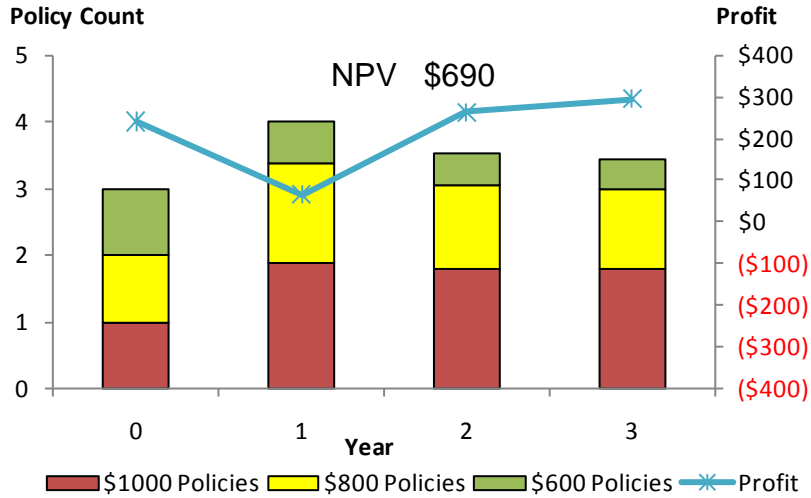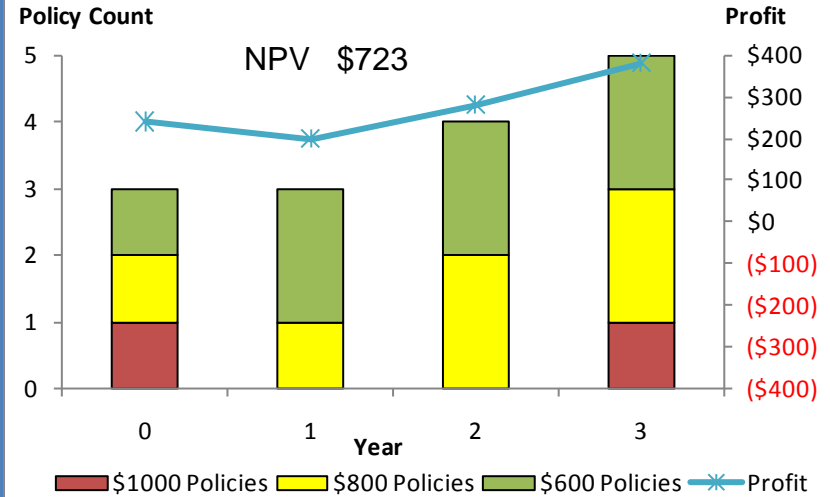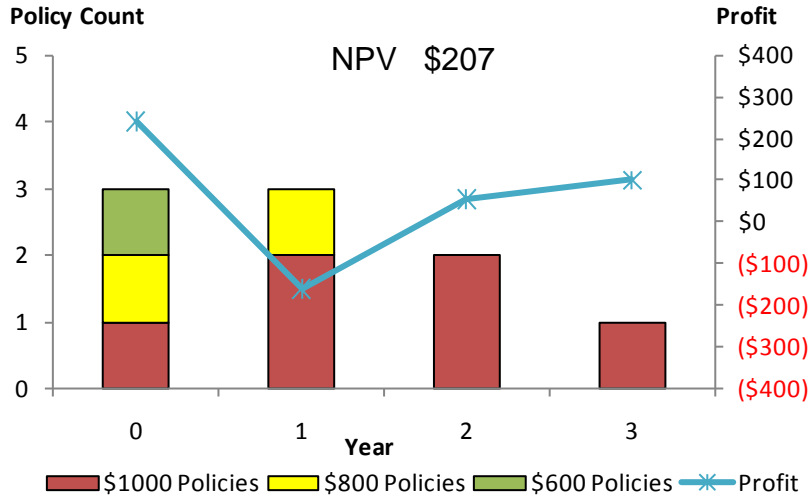
- **Add stochastic elements to this model**
  - Recognize the uncertainty that exists in this model
  - Explore the combined effects of varying key assumptions

- **Use the model to better understand complex dynamics**
  - Can retention strategies sufficiently protect against adverse selection?
  - How important is relative price level?
  - Should the strategy change if most of my competitors have adopted new segmentation?

A stochastic model of the marketplace

- **Three Insurers**
  - My Insurer, Laggard, and Luminary
  - Initial portion of market that is Laggard/Luminary is stochastic

- **Each insurer has their own random variables:**
  - Average price level
  - Retention Model – probability of retaining a customer vs lower priced competitor

- **Vary whether My Insurer invests in new segmentation**

A stochastic model of the marketplace

- **Very simple distributional assumptions**
  - Goal is to test and observe the dynamics of the system
  - Use uniform distribution in most cases, to help stress the corners

- **Simulate individual policies over three years**
  - A form of "Agent Based Modeling"

Pricing Strategy and Risk Management

- **Chapter 1:** Strategic Risk Management

- **Chapter 2:** Modeling the Competitive Marketplace

- **Chapter 3:** Linking Marketplace Models to Strategic Risk Management

Insights from the stochastic model

- **"Investing" in segmentation dominates "Don't Invest"**

  – Even after considering marginal implementation costs

- **Best results of "Investing" occur when**

  – I have competitive average price levels

  – I have good retention

- **Best results of "Don't Invest" occur when**

  – When my retention is strong, particularly compared to Luminary

  – When my average price level is lower than Luminary's

- **Effects of Market Share for "Investing"**
  - If Laggard dominates the market, I can gain market share even with higher average price levels
  - If Luminary has strong market share, my price level needs to remain competitive.

- **Effects of Market Share for "Don't Invest"**
  - Market share has little clear effect
  - Retention and Price Level effects are dominant
  - But how long can you hold onto these advantages?

Using Insights in Strategy Development

- **Examine model results in a qualitative fashion**
  - Are there strategies that seem to be robust across many types of scenarios?
  - Are there a set of scenarios where the "best strategy" changes?
  - Do the "winning" strategies fit with managements view of the world? If not, what should change? The model or the worldview?
  - How feasible are some of the alternative successful strategies? Do they require the "stars to align"?

Using Insights in Strategy Development

- **Potential Next Steps**
  - Develop business plans to execute on successful strategies
  - Prepare contingent strategies based on how world evolves
  - Use "worldview challenging" scenarios to educate management on what to look out for

    "Strategies are the product of a worldview. When the world changes, managers need to share some common view of the new world. Scenarios express and communicate this common view, as shared understanding of the new realities to all parts of the organization." -- Pierre Wack

Using Insights in Strategy Development

- **Iterate the Strategic Risk Analysis process**
  - Use insights to improve/focus the risk models
  - Reconsider the elements that are predetermined vs. uncertain
  - Move beyond "first generation scenarios" to enable better insights around major business uncertainties

Pricing Strategy and Risk Management

- **Themes for this discussion**
  - Blending quantitative and qualitative techniques for risk management
  - Using models as a tool to understand complex dynamics
  - Enabling better strategic decisions through risk analysis

- **Questions/Comments**

David Cummings
dcummings@iso.com