How Individuals Purchase Insurance

Going Beyond Expected Utility Theory

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Today's Presentation

How Individuals Purchase Insurance: Going Beyond Expected Utility Theory

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Motivation

- **Long-run success** of insurers depends on their being able to sustainably put forward an **attractive value proposition**
- Insureds are the main contributors to insurer capital, through **reserves** and **underwriting profit**
- Sustainable profitable growth is key whether an insurer **grows organically** or **grows by acquisition**
- Better understanding of insureds leads to improved **product design**, **marketing** and **pricing**

Value to the Practicing Actuary

- **Improved predictions** of the effects of supply policy changes, like rate changes
- If insurance consumer behavior was entirely determined by context specific elements, then the actuary would be left doing guesswork when preparing forecasts of the effects of supply policy changes
- A better working understanding of insurance consumer behavior can lead to better anticipation of the effects of supply policy changes

Presentation Plan

- **Risk Transfer and Prospective Pricing**
  - The ‘traditional’ argument for the value of insurance
- **Why We Need to Go Beyond the Traditional Theory**
  - Evidence from P/C insurance that does not make sense using the ‘traditional’ arguments
- **Consumption Commitments and the Magnifying Effect**
  - An attempt to make sense of the success of credit scoring
- **Loss Aversion and Small Scale Insurance Purchasing**
  - “A Bird in the Hand is Worth Two in the Bush”
  - Decision Weights as Opposed to Probabilities
  - Diminishing Sensitivity to Losses
  - Not All Money Spent is Perceived as a Loss
- **The Consolation Hypothesis**
  - Increased willingness to pay to insure ‘objects’ we like
- **Coverage Inter-dependence**
  - How the risk premium for different coverages are correlated together

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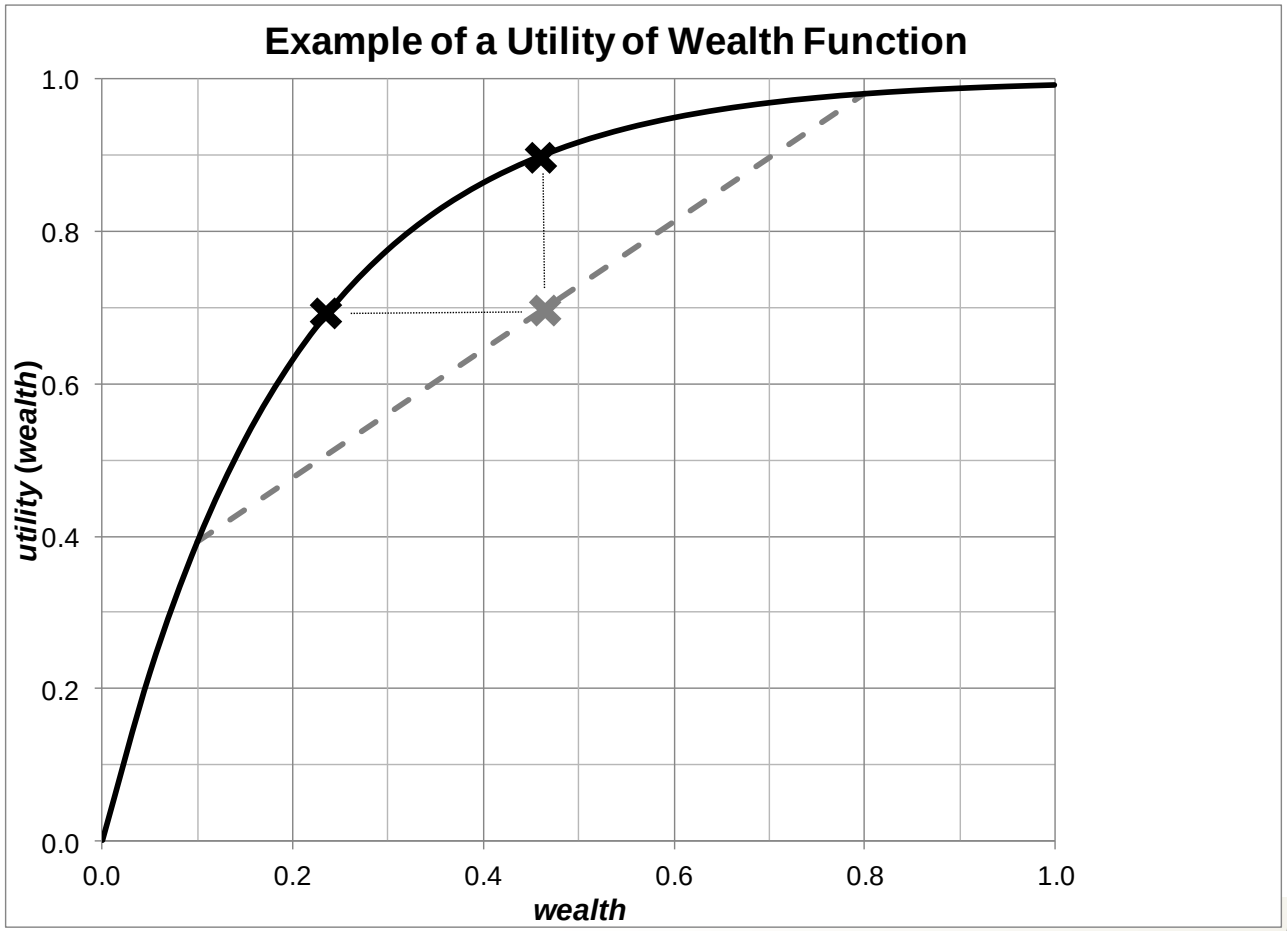
Risk Transfer and Prospective Pricing I



Risk Transfer and Prospective Pricing II

- This helps rationalize the demand for insurance for **'catastrophic' events**
- Identified **key factors** for the demand for insurance:
  - **Initial wealth**: richer people are potentially more risk tolerant
  - **Frequency** and **severity** of the loss: the more likely or more severe the loss, the more valuable the coverage
  - **Risk aversion**: the more risk averse the person, the more valuable the coverage

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Needing to Go Beyond the Above Theory

- If you had to guess, for a ‘typical’ homeowners insurance portfolio
  - What premium are people willing to pay to move from a 1 000$ deductible to a 500$ deductible?
  - What do you think is the associated loss cost associated with the lowering of the deductible?
- Compare the layer loss ratio you obtain to the all layers combined loss ratio of a ‘typical’ homeowner’s policy. Who thinks the all layer loss ratio is higher? lower?

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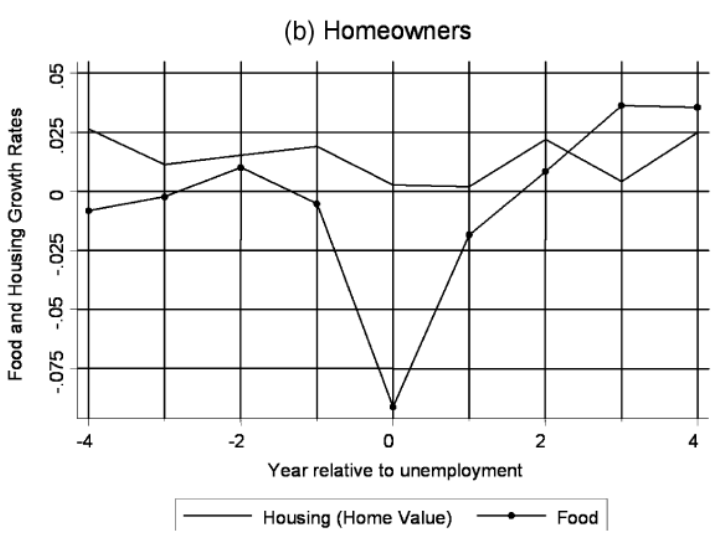
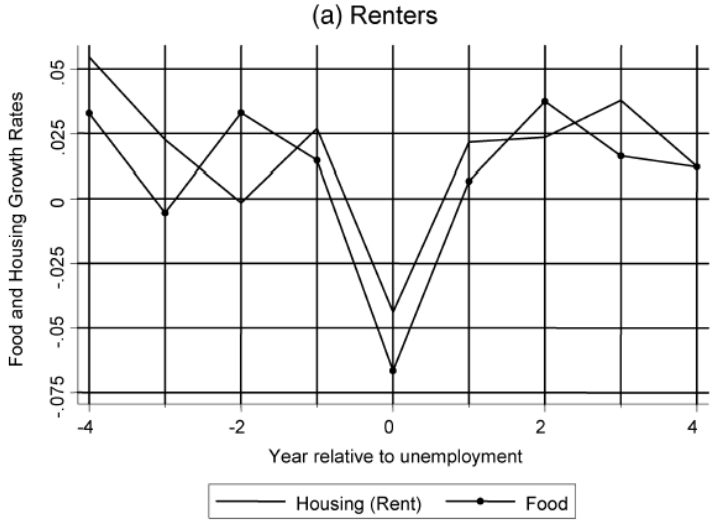
Consumption Commitments: Magnifying Effect I

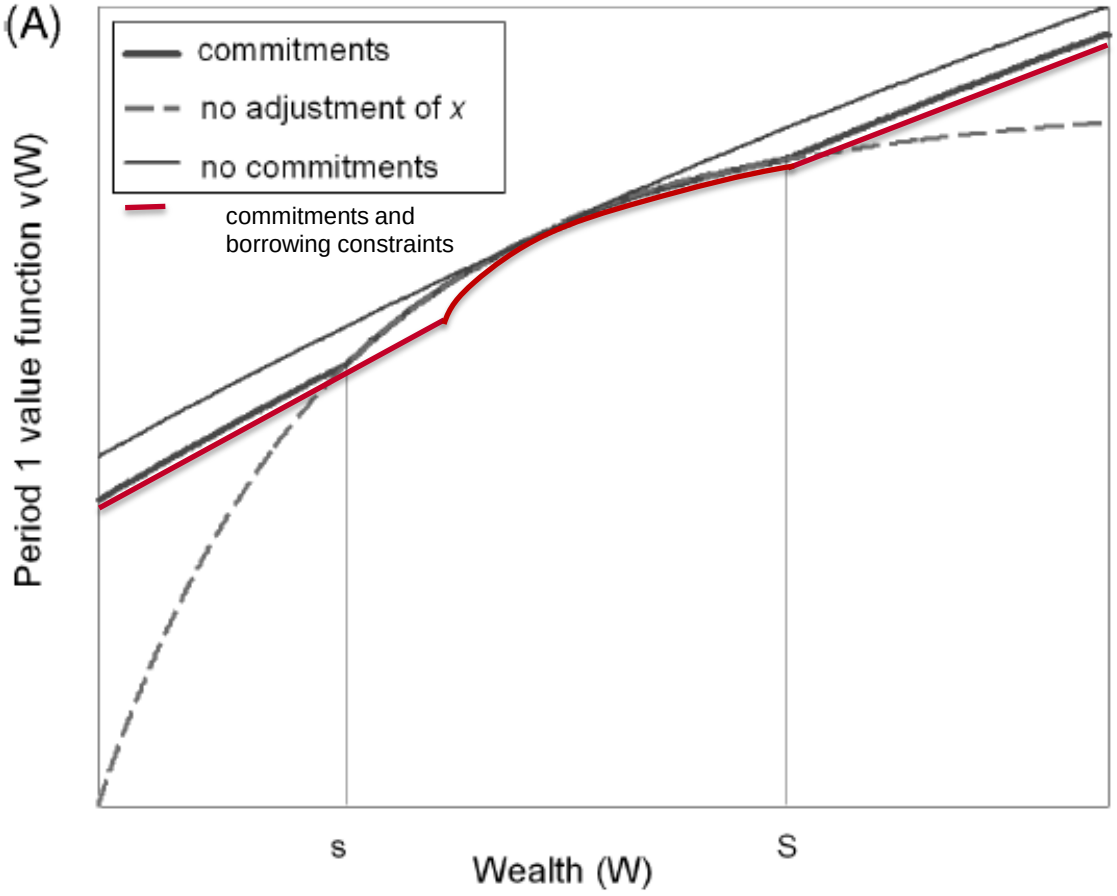
- What are common examples of consumption commitments?
  - What are the **impacts** of commitments?
- What are common examples of non-committed consumption?
- What happens if a person does not have **access to credit** to smooth out adverse income shocks?
- In short, consumption commitments **increase measured risk aversion** for moderate downside risk

Illustration of Consumption Adjustments





Utility Function with Commitments



Consumption Commitments: Magnifying Effect II

- An attempt at understanding why credit scoring works:
  - Assume that an individual is risk averse in the sense defined above
    - Look at the difference in incentives for a committed *versus* an uncommitted individual
    - **Careful**: Having an incentive to be cautious is not the same as being cautious
- Sub-portfolio Profitability Predictions
  - According to the theory, starting from the 'traditional' theory first explored, which coverage should see a greater risk premium that insureds are willing to pay:

1. theft or water damage coverage, or
2. fire insurance coverage?

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“A Bird in the Hand is Worth Two in the Bush”

- Asset integration
  - Do we always look at prospects in terms of terminal wealth or from a gain/loss perspective? (*i.e*. the endowment effect)
- Relative sensitivity to losses compared to gains
  - When we think in terms of gain/loss, just how much more do we care about losses?
- Product Design Prediction:
  - How do insureds think of the deductible payment when they suffer a loss?
  - What is the anticipated reaction of insureds to a mandatory increase in their deductibles?

Utility Function under Loss Aversion I

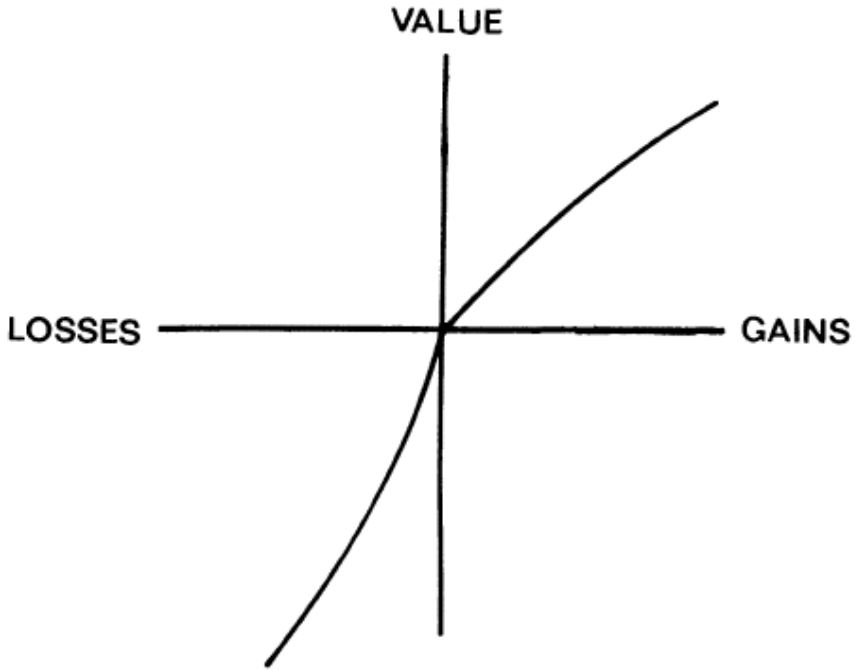

FIGURE 3.—A hypothetical value function.

Decision Weights as Opposed to Probabilities I

- 'Traditional' expected utility theory makes use of probabilities to weight together utility of outcomes
  - But, individuals tend to attach **greater than probability decision weights when the probabilities are small**
    - *Vice versa* when the probabilities are big
- Sub-portfolio Profitability Prediction:
  - Which coverage should see a larger willingness to pay than would have been predicted so far?
  - Fire coverage, or
  - Auto collision coverage?

Decision Weight Function

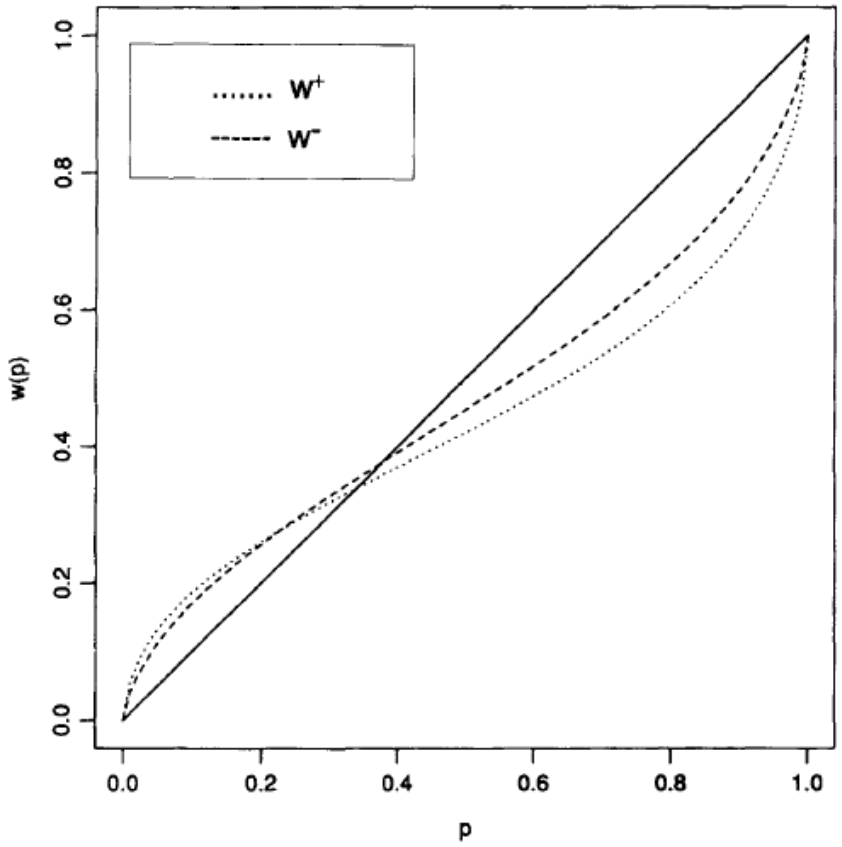

Figure 3. Weighting functions for gains (w^+) and for losses (w^-) based on median estimates of γ and δ in equation (12).

Decision Weights as Opposed to Probabilities II

- Distinguish decision weights from **probability mis-estimation**
  - As humans are limited capacity information processors, they tend to revert to the use of **heuristics** that can lead them astray
  - Have you ever heard an actuary say the following?
    - "That insured is due to have a loss: it's been so long since the last claim."
    - Probabilistically, if we have evidence that claim inter-arrival times are memoryless, that statement has to be false
  - Take-up Rate Prediction:
    - Do you think take-up rates for flood coverage increase, remain the same, or decrease after a flood?

Diminishing Sensitivity to Losses I

- Do you recognize yourself in the following situation?
  - Jane and Melody frequently play chess together and to make it interesting, they sometimes play for money
    - They just had a 100$ bet on a chess game and Jane lost and is now reeling from the fact that she just lost 100$
      - Assume that Jane is using her morning wealth as a reference no gain/no loss point
  - Even though Jane usually only wins one game out of three against Melody, she takes a double-or-nothing bet
  - Why would that bet be attractive to her?

Utility Function under Loss Aversion II

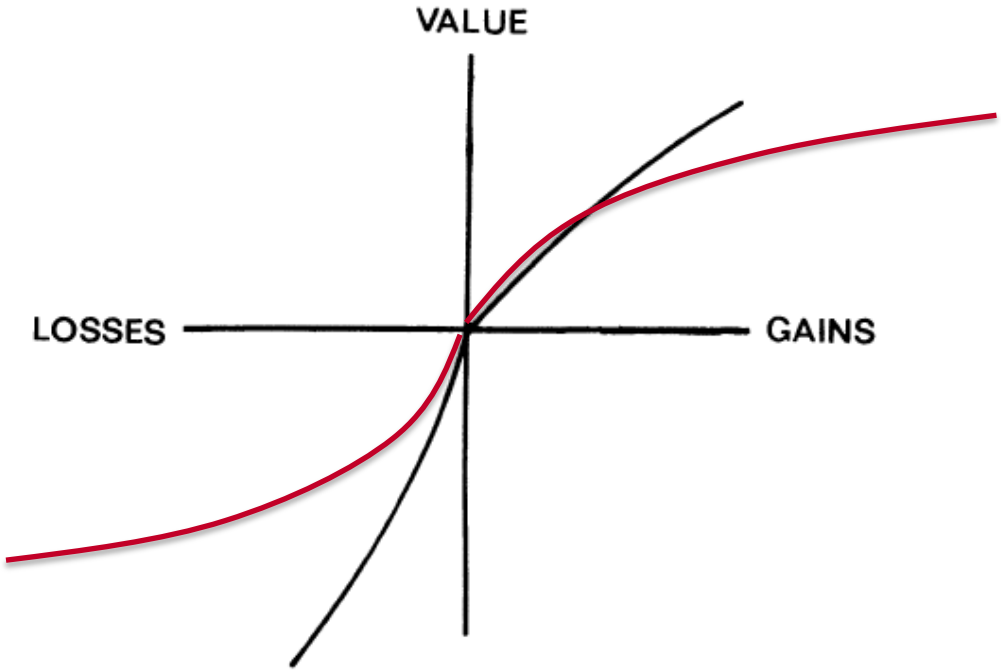

FIGURE 3.—A hypothetical value function.

Diminishing Sensitivity to Losses II

- Individuals' perception of gains and losses is not entirely different from our senses:
  - **<u>As magnitudes increase, our sensitivity to magnitudes decreases</u>**
    - In the preceding case, even though a 200$ loss is worse than a 100$ loss, it is not twice as bad
    - Therefore, the attractiveness of finishing the day with no loss is more attractive than finishing the day with a 200$, taking into account the odds
- Insurance Take-Up Prediction:
  - Individuals that have recently become poorer may not be attracted by small/medium scale insurance, even if the price is favorable to them

Not All Money Spent is Perceived as a Loss

- Let's discuss how the 0 (no loss/no gain) point is formed.
- Do you think you would react the same way in all the following situations? In what situation is your willingness to pay greatest?
  - Imagine the case of small scale insurance, say for your cell phone, for rented skis, for your e-tablet, *etc*.
    - When you get to the store, you discover that insurance coverage is available and you have to purchase on the spot
    - You are actively shopping for coverage that you are aware already exists
    - You are wondering whether or not to maintain coverage that they already have

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The Consolation Hypothesis I

- Factors other than money can affect our insurance purchasing behavior, our claiming behavior, and our reaction to advertising
  - Chief among those non-monetary factors are the **attachments that we feel** for the 'objects' we insure
    - The consolation hypothesis says that we are more likely to claim and have higher willingness to pay for insurance for 'objects' we like
      - Contrast this with the reprisal motive for claiming: individuals that feel they have been wronged by a party are more likely to pursue indemnification from that party

The Consolation Hypothesis II

- Claiming Behavior Predictions:
  - Under the reprisal motive for claiming, insureds that had bad experiences with insurers are more likely to claim and inflate their claims
  - Under the consolation hypothesis, individuals that felt more attached to the damaged ‘objects’ are more likely to file a claim ‘just above’ the deductible
- Sub-Portfolio Profitability Prediction:
  - If the insurer is able to identify ‘objects’ that the insured feels greater attachment to, the insurer will be able to charge a higher premium for the coverage of those ‘objects’

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Coverage Inter-dependence

- Assume that, as an insurer, you already have access to a fully functional client database
  - Do you think the relative profitability of insureds is connected across lines of business?
    - In a non-P/C study (Einav *et al*, 2010), it was found that "one's choices in other insurance domains are substantially more predictive of one's choice in a given insurance domain than one's detailed demographic or one's claim experience in that domain".
  - While I am not aware of any public study confirming or refuting this in the P/C world, it is likely to apply there too

If We Have Time

Appendix: Private Research I

Objectives of R&D must be clearly defined:

- Is it to determine an initial pricing structure for a new product or refine an existing pricing structure for current products?

Type of data:

- Quantitative vs. Qualitative
- Direct (from consumers) vs. Indirect (from operations, agents, brokers, etc.)
- Small sample vs. At large sampling
- In-house vs. Outsourced

Appendix: Private Research II

- When analyzing retention/new business/closing ratios and/or quote activity, it is important to isolate the appropriate effects:
  - when looking at the effect of a marketing campaign, **how much activity would there have been without the campaign**?
  - **is the customer leaving because** they have ceased to exist, they do not have an insurable interest anymore, they lost access to their agent/broker, the product/ service/ experience does not meet their need/expectation, the price is too high?

Appendix: Private Research III

- When analyzing retention / new business / closing ratios and / or quote activity, it is important to isolate the appropriate effects:
  - are there **seasonal effects**?
  - what is the appropriate **stability / responsiveness** balance? (length of time of data, credibility, credibility complement)
  - when do **apparent trends** become credible?
  - what would have had happened **if the quoted price had been different**?

Appendix: Private Research IV

- **Who's the client? Who decides? Who pays? Who influences the client?**
- What is the customer's level of **risk aversion**?
- Is the customer **'*naturally*' price sensitive**?
- What are the **insurance alternatives** available to the customer? What are the substitutes to insuring with you available to the client?
- Is the decision **emotional? automatic? rational?**
- **How valuable** are services, extra protection, *etc*. to the customer? Is the comparison of value between your products / services / experiences and those of alternatives difficult to do for the client?
- Are there signs that the **client sees great lifetime value in its relationship with the insurer**? How long has the client been with the insurer? What are the costs for the client to switch insurers?
- How much money **is the client already spending with you** (in $ or in %)?
- Does your pricing appear **fair** to the client?