Notice

The views expressed in this presentation are those of the presenter.
What is Price Optimisation?

Differential pricing between customers or Products on grounds *other than cost*

Incorporates information about a company’s *operating costs*, *consumer behaviour* and the *competitive environment* to achieve the optimal desired outcome - *maximizing profits and/or increasing sales.*
What is Price Optimisation?
The Equation

Price Optimisation – Objectives and Constraints

Incorporate company strategy and financial objectives into optimisation process.

- **Objectives** e.g. maximise profits
- **Constraints**
  - minimum volumes / sales / profits
  - individual customer constraints
  - rating engine capability
  - globally / by channel / deal

- **Scope**
- **Time horizon**
1. What is Price Optimisation?
2. Price Optimisation in Insurance: Overview
3. Price Optimisation in Insurance: Issues
4. Price Optimisation – where next?
6. Actuaries - Explore New Frontiers

Price Optimisation in Insurance - The Process

**Inputs**
- Claims cost models
- Expense models
- Market models
- Demand models
- Constraints

Parameterisation → Validation → Iterations

**Optimisation Process**

**Outputs**
- Optimised Rates
- Business Projections
- Strategy
- Life Time Values
- Profit Maximising
- Retention Targets
- Volume Play

**Model Risk**
Errors in the model predictions may attract the "wrong" set of customers or lead to an incorrect set of prices, thereby decreasing volume and profits for an organisation.
1. What is Price Optimisation?
2. Price Optimisation in Insurance: Overview
3. Price Optimisation in Insurance: Issues
4. Price Optimisation – where next?
6. Actuaries - Explore New Frontiers
Some issues raised by Optimisation

Customer fairness
- Similar insurance risks have different optimised premiums because of customer characteristics
- Poor / vulnerable less likely to shop around

But
- Customer choice to accept quote
- Demand based pricing used in other industries

Customer fairness: high renewal prices
ABI are taking measures to ensure renewing customers are given last year's premium as well as any introductory discounts that are no longer applicable.

Reputational risk
- Excessive differences between channels for same risk
- Avoid extreme profits from any segment

Motor insurance is a compulsory purchase – vulnerable customers could be exposed to adverse pricing as a result of Optimisation

Household insurance is also quasi necessary

Controversy of Price Optimisation in the US Market

The director of insurance for the Consumer Federation of America (CFA) Robert Hunter has called for a ban of pricing optimisation software and released the following statements:

"Price Optimisation is nothing less than the rejection of actuarial standards for the sake of increased profits at the expense of unwitting policyholders."

- Robert Hunter, CFA

"Price Optimisation is nothing less than the rejection of actuarial standards for the sake of increased profits at the expense of unwitting policyholders."

- Robert Hunter, CFA
Controversy of Price Optimisation in the US Market

Counter-arguments from the industry are:

- All companies consider consumer response in their pricing decisions today.
- Competitive rate adjustments are nothing new; in the past, these decisions were based on the judgement of the pricing manager whereas price optimisation supports this decision making process with analytics.
- The same actuarial standards and regulatory standards still apply to the rates whether price optimisation is used or not. These are already designed to protect the consumer by prohibiting unfair discriminatory rates.

1. What is Price Optimisation?
2. Price Optimisation in Insurance : Overview
3. Price Optimisation in Insurance : Issues
4. Price Optimisation – where next ?
6. Actuaries - Explore New Frontiers
Optimisation – Where can we go next?

Who Uses PO?

- Insurers
- Brokers
- Airlines
- Supermarkets
- Hotels
- Internet Retailers

Colour palette for PowerPoint presentations

- Dark blue: R17 G52 B88
- Gold: R217 G171 B22
- Mid blue: R64 G150 B184
- Light grey: R63 G69 B72
- Pea green: R121 G163 B42
- Forest green: R0 G132 B82
- Bottle green: R17 G179 B162
- Cyan: R0 G156 B200
- Light blue: R124 G179 B225
- Violet: R128 G118 B207
- Purple: R143 G70 B147
- Fuscia: R233 G69 B140
- Red: R200 G30 B69
- Orange: R238 G116 29
- Dark grey: R63 G69 B72

Price Optimisation - Supermarkets

<table>
<thead>
<tr>
<th>SUPERMARKET</th>
<th>PRICE BEFORE FEBRUARY 23rd</th>
<th>PRICE ON MAY 7th</th>
</tr>
</thead>
<tbody>
<tr>
<td>200g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASDA</td>
<td>£1.50</td>
<td>£2.09</td>
</tr>
<tr>
<td>TESCO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sainsbury's</td>
<td></td>
<td></td>
</tr>
<tr>
<td>500g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASDA</td>
<td>£1.50</td>
<td>£2.04</td>
</tr>
<tr>
<td>TESCO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sainsbury's</td>
<td></td>
<td></td>
</tr>
<tr>
<td>300g</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TESCO</td>
<td>£2.30</td>
<td>£2.48</td>
</tr>
<tr>
<td>Sainsbury's</td>
<td>£2.65</td>
<td>£2.50</td>
</tr>
<tr>
<td>1kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sainsbury's</td>
<td>£1.00</td>
<td>£0.99</td>
</tr>
</tbody>
</table>

23 September 2014
Price Optimisation - Supermarkets

Supermarkets use the following three pricing strategies:

**Everyday Low Price (EDLP)**
- Prices are consistently low across the board.
- Narrower product line to exploit economies of scale.
- Less advertising.

**Promotional (Hi-Lo) Pricing**
- Heavy use of special deals.
  - Some staple foods sold as loss leaders to attract customers.
  - Greater flexibility to clear overstock.
  - Loyalty cards.

**Hybrid EDLP/Hi-Lo**
- Combination of EDLP and Hi-Lo by varying number of sale products or frequency of special deals.

Supermarkets capture Big Data on sales which is then sold on to suppliers.

Consultants such as Dunnhumby advise supermarkets on retail optimisation, yet as far as we know, actuaries are not involved in this area.

---

Price Optimisation - Supermarkets

*Big Data = Big Opportunity for Actuaries?*

- Volumes of sales for each product
- Spending Amounts
- Location
- Customer gender
- Payment methods
- Weather related trends in sales
- Consistency of purchases/loyalty to product
- Bulk buys
- Correlations between products
- Time of week
- Shopping Frequency
- Seasonal trends
- Loyalty card point transfers
- Impact of special offers
- Time of Day
- Brand preferences

---

23 September 2014
Price Optimisation - Airline Industry

Once a flight is scheduled the airline’s costs (fuel, crew etc) are “fixed”, so maximising profit from a flight is about maximising revenues.

Traditionally airlines used market segmentation to capture willingness to pay. They allocate seats between different fare classes with differences in:

- purchase restrictions (advance notice)
- length of stay conditions (e.g. Sat night stay)
- cancellation/change terms and conditions.

Price Optimisation - Airline Industry

The airline industry has been revolutionised by low cost carriers. Costs are cut by:

- “no frills” flights
- flying to secondary airports
- charging for optional extras (baggage, food etc)
- admin fees

Low cost carriers use some element of dynamic pricing. Customer bookings (demand) are modelled based on past experience, and the number of seats reserved on a flight is monitored.

Prices are adjusted based on:

- the “sell rate” (number of bookings per hour/day)
- the “search rate” (number of enquiries made for a specific flight per day/week)
- the available capacity.
Price Optimisation - Airline Industry

A team of academics showed that assuming an exponential demand curve, revenue is maximised when daily pricing is set such that the number of tickets sold each day remains steady over time.

Ryanair (Rome-London Route): bookings and fares relationship illustrate that this model is in use.

• Airlines also collect Big Data on their customers
• Loyalty cards provide further insight
• Is there an opportunity for actuaries to bring their modelling skills to a new industry?
• Emirates – “Revenue Optimisation Manager, $175k Tax Free, Dubai”

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>0.021</td>
<td>0.001</td>
</tr>
<tr>
<td>Route frequency</td>
<td>0.1</td>
<td>0.0409</td>
</tr>
<tr>
<td>Ryanair ASK/departure</td>
<td>-9.013</td>
<td>3.4414</td>
</tr>
<tr>
<td>Ryanair ASK/destination</td>
<td>-8.822</td>
<td>3.2156</td>
</tr>
<tr>
<td>Overall taxation</td>
<td>0.298</td>
<td>0.1119</td>
</tr>
<tr>
<td>Departure GDP</td>
<td>-0.00071</td>
<td>0.0002</td>
</tr>
<tr>
<td>Destination GDP</td>
<td>-0.00046</td>
<td>0.0002</td>
</tr>
<tr>
<td>% Of fully booked flights</td>
<td>24.116</td>
<td>7.4912</td>
</tr>
<tr>
<td>Departure population density</td>
<td>0.00043</td>
<td>0.0008</td>
</tr>
<tr>
<td>Destination population density</td>
<td>0.001</td>
<td>0.0008</td>
</tr>
<tr>
<td>Total number of competitors</td>
<td>0.038</td>
<td>0.5403</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std error</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length</td>
<td>-0.00022</td>
<td>0.000016</td>
</tr>
<tr>
<td>Route frequency</td>
<td>-0.00015</td>
<td>0.0007</td>
</tr>
<tr>
<td>Ryanair ASK/departure</td>
<td>0.111</td>
<td>0.0524</td>
</tr>
<tr>
<td>Ryanair ASK/destination</td>
<td>0.042</td>
<td>0.049</td>
</tr>
<tr>
<td>Overall taxation</td>
<td>0.00326</td>
<td>0.0017</td>
</tr>
<tr>
<td>Departure GDP</td>
<td>0.00000165</td>
<td>0.00000404</td>
</tr>
<tr>
<td>Destination GDP</td>
<td>0.00000295</td>
<td>0.000004088</td>
</tr>
<tr>
<td>% Of fully booked flights</td>
<td>-0.078</td>
<td>0.1142</td>
</tr>
<tr>
<td>Departure population density</td>
<td>-0.0001</td>
<td>0.000012</td>
</tr>
<tr>
<td>Destination population density</td>
<td>-0.0001</td>
<td>0.000012</td>
</tr>
<tr>
<td>Total number of competitors</td>
<td>0.016</td>
<td>0.0082</td>
</tr>
</tbody>
</table>
1. What is Price Optimisation?
2. Price Optimisation in Insurance: Overview
3. Price Optimisation in Insurance: Issues
4. Price Optimisation – where next?
5. Actuaries - Exploring New Frontiers

Where next for the Actuarial Profession?

Retailers such as supermarkets and airlines have started using more sophisticated modelling to price products.

New frontiers that the actuarial profession could step into?