

Credit Card Model

Presentation Overview

- This presentation will describe how a model was used to optimise a credit card.
- It will also introduce a clear way to visualise that model.
- Agenda
 - Project Objective
 - Methodology
 - Card attributes
 - The experiment
 - Results and insights
 - Model Visualisation
 - What was implemented
 - Dollar value of the insights
 - Summary

Project Objective

- The client, a major global financial institution – wanted to model what effect changes to their credit cards would have on market share.
- Using Discrete Choice Modelling, over 80 factors could be modelled – allowing increased revenue without losing customers.

methodology

- A choice experiment was chosen as the best way to accomplish this.
- **A choice experiment:**
 - Presents hypothetical products to respondents
 - Can cover very large numbers of product configurations – in the trillions in this case
 - Forces respondents to trade-off between alternatives
 - Maximises information collected through use of an experimental design
 - Allows construction of a choice model as the data is perfectly de-correlated
- *For more information on choice models – see the choice modelling presentation or visit surveyengine.com*

Card attributes

- With the client, a list of attributes and levels of possible cards was created.
- In all there were 10^{16} combinations, i.e. more than a trillion.
- There are not enough people on the planet, nor budget, to test all these combinations.
- Instead we use an experimental design, which covers just enough of these combinations to allow us to model the rest.

Attribute	Levels
CC provider Brand	AMEX, Visa etc..
Card type	basic, premium
Annual Fee	\$0, \$10pa, \$100pa etc.. (USD)
Interest Rate	5%, 10%, 15% etc.
Features	Embedded Chip, International Access etc.
Benefits	Discounts, Miles etc
Bonuses	Reduced rate for 1 month, free entry into lottery etc...
<i>etc...</i>	

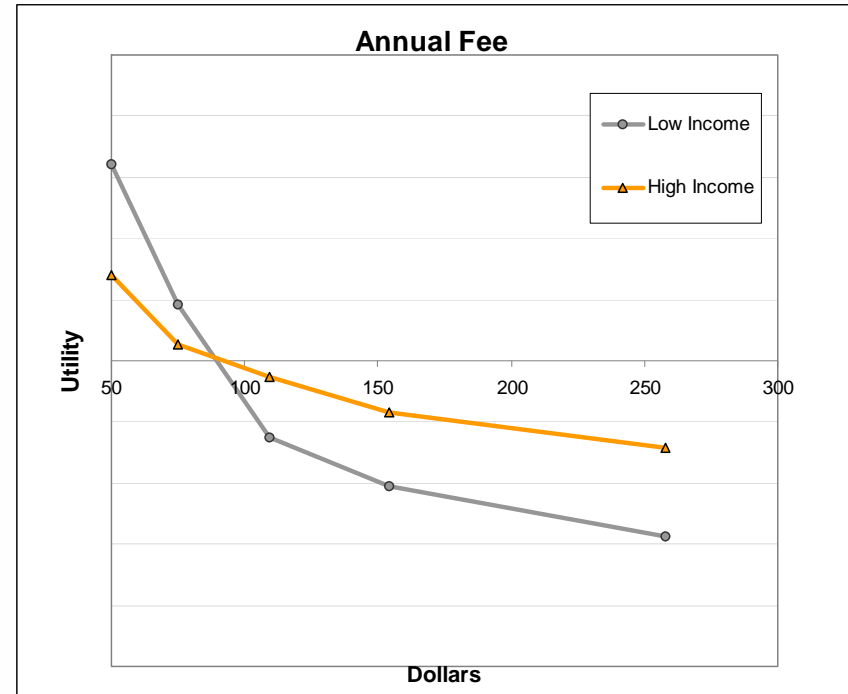
Some of the attributes tested

Results

- Enough data was obtained to model 10 segments of interest.
- Of these we are going to focus on the high income card holders.
- For comparison, a low income segment will be shown alongside.

Results - Annual fee

- Respondents had a consistently negative preference for higher fees as expected. Low income card holders were more sensitive to both high fees and low fees.
- Both segments were also more sensitive to price at the lower end.
- **Interpretation**
 - The obvious interpretation is that wealthier individuals are less price sensitive.
- Both segments showed a much larger dislike of fees at lower levels than at higher ones.
- **Strategic Implications**
 - A relatively easy way to increase revenue without causing too much loss in share would be to increase Annual Fee where it already is high, especially for the High Income segment.



Results – Interest Rates

- Respondents had a consistently negative preference for higher interest rates. Again we see that the Platinum segment was less price sensitive than the Low-Fee card holders

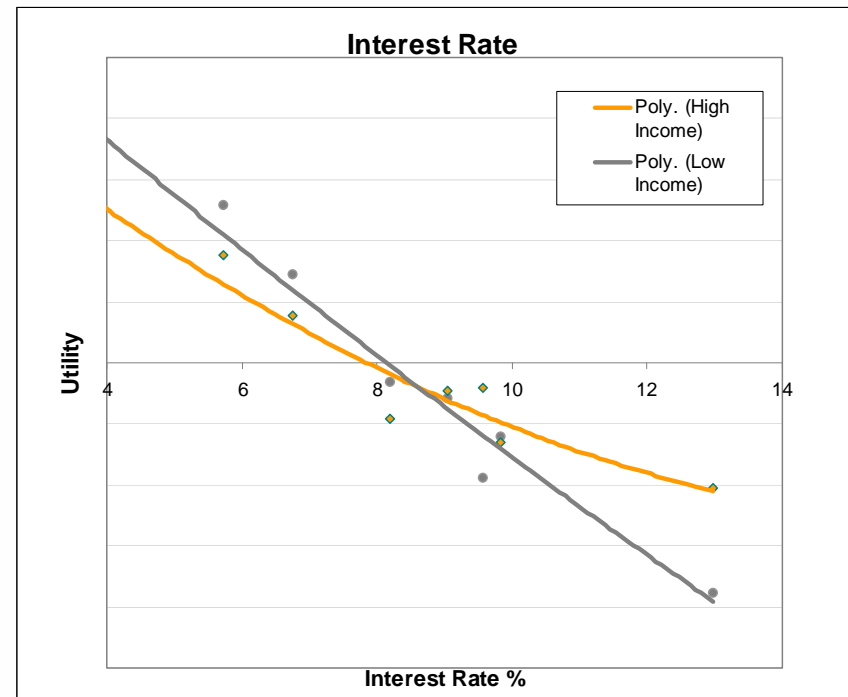
▪ Interpretation

- Interest rate preference is almost perfectly linear with a small uneven region around 17%. Most likely this is due to the actual values chosen for the experiment which contained false signaling information such as “%12.99”.

▪ Strategic Implications

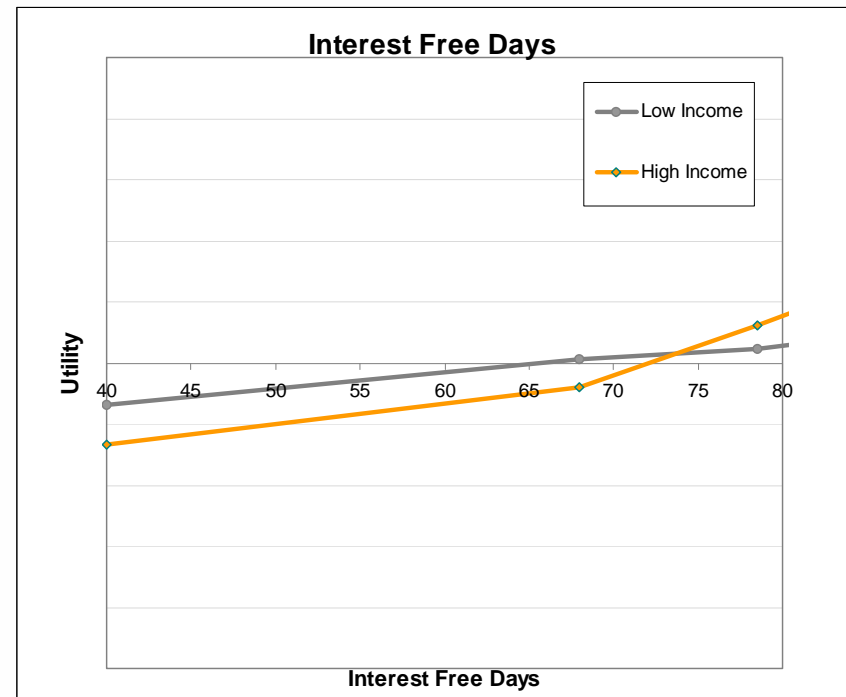
- Comparing the utilities of Interest rate with Annual fee we see that 5% interest is worth about the same as \$100 annual fee for the Platinum segment.

- This means that a reduction of 5% in interest would allow an increase of \$100 in annual fee, without affecting market share.



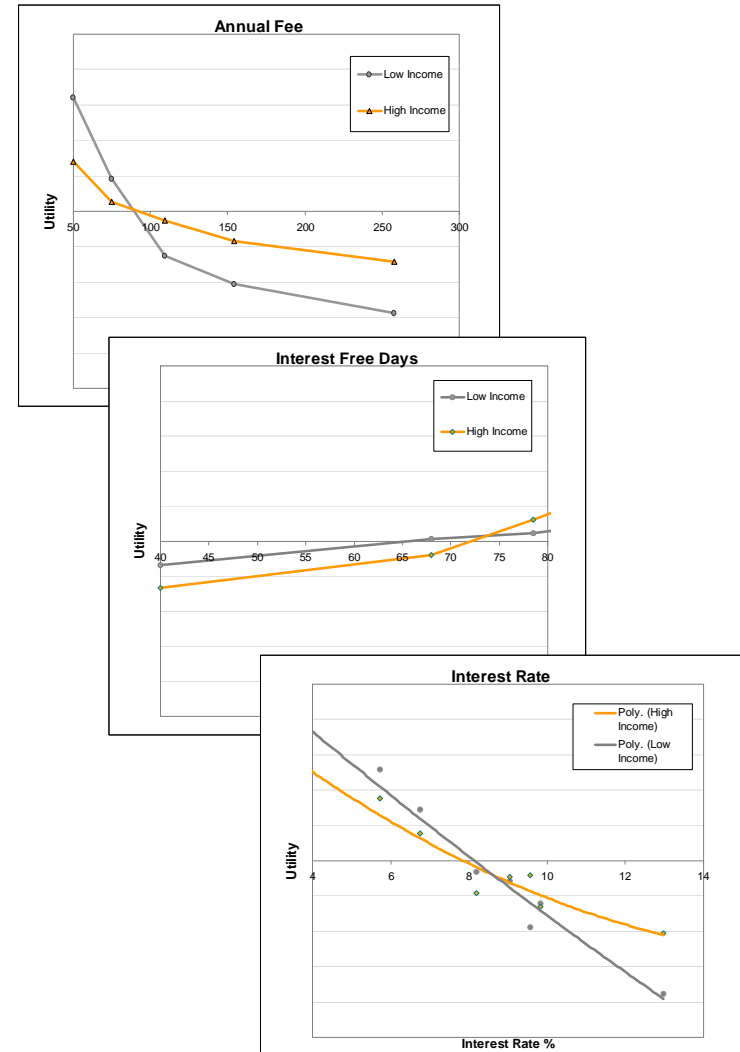
Results – Interest Free Days

- There is a slight increase in preference for interest free days for both segments – however not as dramatic as for Interest Rates and Annual fees.
- **Interpretation**
 - Cardholders sense that more days to pay off the card are better than fewer, however they are not good calculating the true cost – which is indeed complicated as it involves remembering the dates of each purchase.
- **Strategic Implications**
 - Reducing Interest Free Days would have little impact on market share – yet would likely have a positive effect on revenue.



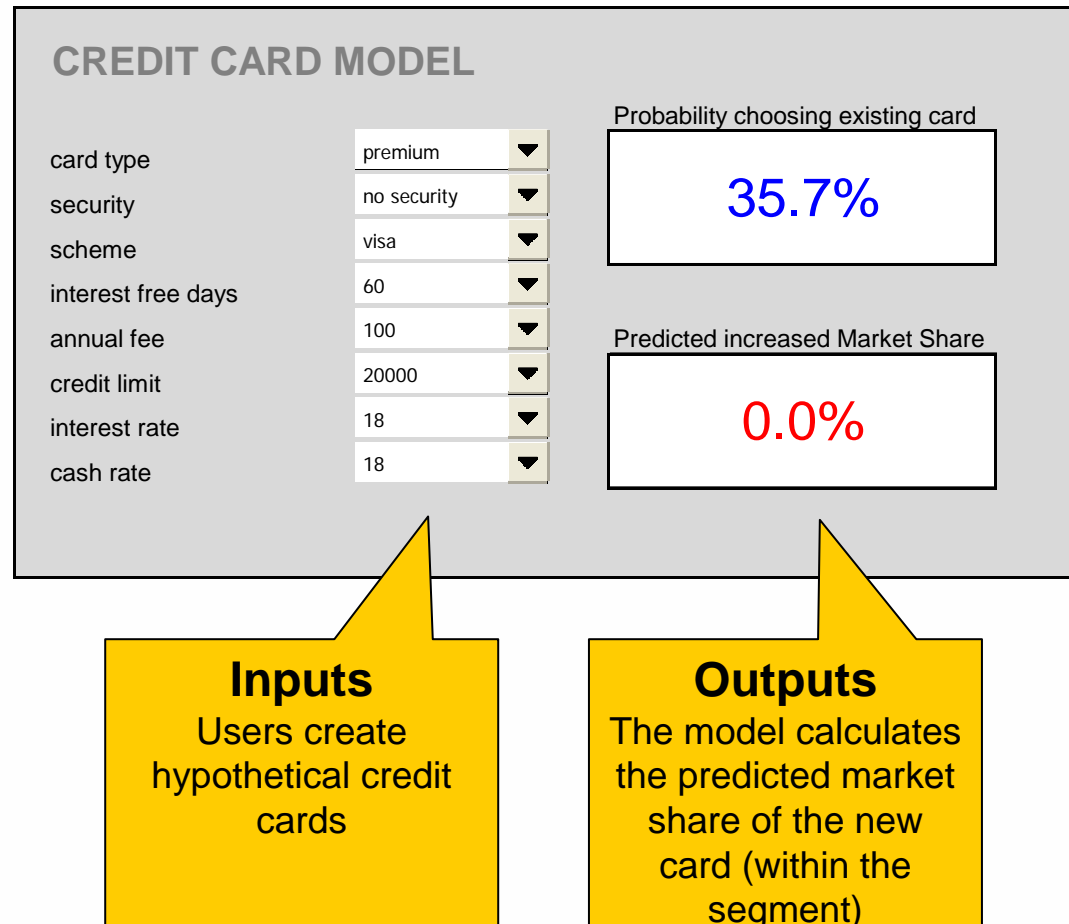
Putting it all together

- From the model we can see the clear effect of individual factors. That is people don't like paying annual fees or higher interest rates and would like longer to pay off their card.
- While the output yields rich information about how people value the different aspects of credit cards, it becomes increasingly difficult for non-experts to get a feel for what total product configuration is optimal.
- So, to aid interpretation and exploration – we hide the model in a 'black box' with only the inputs and outputs exposed. This is known as a Decision Support System or DSS.
- The DSS allows us to quickly explore alternatives and see the effect on market share.



Model Visualisation – the DSS

- With a DSS, any card can be created as input into the model.
- The overall preference for the card is calculated and displayed as a probability of choice – or market share.
- Comparing this to the current card is a simple way to see whether the new card is preferred.



Starting with the current card

CREDIT CARD MODEL

card type	premium	▼
security	no security	▼
scheme	visa	▼
interest free days	60	▼
annual fee	100	▼
credit limit	20000	▼
interest rate	18	▼
cash rate	18	▼

Probability choosing existing card

35.7%

Predicted increased Market Share

0.0%

CREDIT CARD MODEL

card type	premium	▼
security	no security	▼
scheme	visa	▼
interest free days	60	▼
annual fee	400	▼
credit limit	20000	▼
interest rate	18	▼
cash rate	18	▼

Increase
annual fee

Probability choosing existing card

28.3%

Predicted increased Market Share

-7.4%

See the
change in
Share
here

CREDIT CARD MODEL

card type

premium

security

no security

scheme

visa

interest free days

50

annual fee

400

credit limit

20000

interest rate

18

cash rate

18

decrease
interest free
days

Probability choosing existing card

24.6%

Predicted increased Market Share

-11.1%

See the
change in
Share
here

CREDIT CARD MODEL

card type

premium

security

no security

scheme

visa

interest free days

50

annual fee

200

credit limit

20000

interest rate

16

cash rate

16

Decrease
interest
rates

Probability choosing existing card

27.9%

Predicted increased Market Share

0.5%

See the
change in
Share
here

Finding the optimal product

■ In this example, by exploring the model – we find that the bank could increase revenue without losing market share by

- raising annual fee
- reducing interest free days
- dropping interest rates

■ The model predicts that market market will remain the same.

■ The interpretation is that people overvalue the reduction in interest rate – compared to the fee and reduced time to pay off.

Increased annual fee
⇒ **Preference drops 7.4%**

CREDIT CARD MODEL	
card type	premium
security	no security
scheme	visa
interest free days	60
annual fee	400
credit limit	20000
interest rate	18
cash rate	18

Probability choosing existing card
28.3%

Predicted increased Market Share
-7.4%

Decreased interest free days
⇒ **Preference drops another 3.7%**

CREDIT CARD MODEL	
card type	premium
security	no security
scheme	visa
interest free days	50
annual fee	400
credit limit	20000
interest rate	18
cash rate	18

Probability choosing existing card
24.6%

Predicted increased Market Share
-11.1%

Decreased interest rate
⇒ **Preference rises back to current share**

CREDIT CARD MODEL	
card type	premium
security	no security
scheme	visa
interest free days	50
annual fee	200
credit limit	20000
interest rate	16
cash rate	16

Probability choosing existing card
27.9%

Predicted increased Market Share
0.5%

What was implemented

- After exploring the model for the premium card holders – the institution decided an overall strategy
 - Keep existing share, but...
 - Maximise profitability of these high value customers
- The model informed them that this could be achieved by...
 - Increasing the annual fee
 - reducing interest free days
 - dropping interest rates
- These results were implemented

What was this insight worth?

- Bank internal revenues are not published, however we can make an educated estimate.
- Loss in revenue from an interest rate drop would offset by the increased revenue from reducing the interest free days so we could ignore the effect of these two changes.
- Assuming 100,000 if the population are Premium Card holders, and each will now pay \$100 pa more (but not move institutions as predicted), the estimated increase in revenue would be.... \$10 Million pa for this card alone.

! The important point is that increased charges and revenue incur no loss of market share.

Summary

- Choice Models provide insights into individual factors.
- Models make accurate about any product configuration.
- Visualisation tools such as a Decision Support Systems aid product experts who are not mathematicians.
- An optimal new product configuration was found using the DSS.
- The insights from the Premium Card holder model and DSS were implemented.
- Estimated increase in annual revenue from just one of the 8 models implemented was \$10 Million US.

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