

I'll Be Back: DVD Sales Forecasting

Hosted by Decisioneering, Inc.

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Guest Speaker

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I'll Be Back: DVD Sales Forecasting

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Multivariate Solutions
Research and Consulting

The Ruse-Scheme Business Model

- Ruse-Scheme is a DVD distribution company that houses up to 30,000 titles.
- Ruse-Scheme has a membership approaching 6,000,000.
- Ruse-Scheme charges its members a monthly fee for different levels of memberships.
 - Bona Fide
 - Preferred
 - Platinum
- Ruse-Scheme collects customer information when members join:
 - Each member has a member ID (e.g., email address)
 - Demographic information
 - Age
 - Income
 - Ethnicity
 - Education
 - Favorite Film Categories of movies

Today

- Ruse-Scheme wants to be able to assess the number of DVDs it must purchase in order to begin renting to its customer database.
- MVS is tasked to develop a Conditional Demand Analysis (CDA) to test customer needs.
- Tasks—
 - How to use History Data to assess future Ruse-Scheme database.
 - How to pinpoint factors that are most important when Ruse-Scheme makes DVD inventory decisions.
 - The blending of database mining, market research, and Monte Carlo simulations using Crystal Ball®
 - Producing Demand Model
 - The “Freakonomics” of follow-up.
 - Assessing time related factors (e.g. promotions)
 - Business additives for Ruse-Scheme
 - An added benefit of assessing the ‘expected value’ of each level of membership

The Ruse-Scheme Conundrum

- How many DVDs do they need to order for new releases or historical flicks that come to DVD?
 - If *Titanic*, then order a lot.
 - But what if?
 - Limited-release indie films
 - Documentaries: *Supersize Me*
 - A flop: *Basic Instinct 2*
 - Old Movies: *East of Eden*
 - Foreign Films: : *Les Invasions Barbares (The Barbarian Invasions)*

The Ruse-Scheme Database

- The Ruse-Scheme Database is able to provide a list that permits matching demographic variables to titles rented.
 - Rentals to key demographic groups.
 - Indicated favorites.
 - Time lag between release of a DVD title and it's a rental request.
 - Accepted bumps in promotions.

Developing a Model of Trial Renting

- Start at the individual level, then aggregate
 - What are the individual-level behaviors?
 - Time
- Segmentation Approach
 - Test 'accepted' industry knowledge
 - For example, male 10-13 viewers have a higher likelihood to view *Ninja Turtles* than soccer moms 26-40. True?
 - Divide the membership list into a set of homogenous segments.
 - Test membership response by emailing to a random sample of each segment.
- Segmentation results can then be correlated with membership type
 - As time passes, and historical data becomes longer, an expected value of membership by key demographic groups can be developed.
 - Asked how many DVDs members might watch in a given time period.
 - Weekly in the preferred time assessment.
 - Life changes can affect DVD rentals.

Blending Techniques

- The Role of History (Data Mining)
 - Ruse-Scheme uses its historical database.
- Market Research
 - Ruse-Scheme regularly communicates with its membership by email.
 - Recently sent an email survey to its members with the upcoming list of DVD releases and asked them to check off the ones they intended to rent within the next month.
- The CDA (Conditional Demand Analysis) is a blend of the above techniques.

Model Input

- Demographics
 - Using input from Ruse-Scheme executives and theater sales, we were able to examine key demographic groups. Regression analysis will show a link between these groups and rental sales.
- Intentions
 - For a given film, if a respondent indicates he intends to rent, the model regresses this against actual rental data (three months later).
- The Role of Film Category
 - Are fans of one film category more predictive than fans of another?
 - Sci-Fi vs. Chick Flick
 - Looking at historic rental sales, sorting by Film Category, it became clear that Film Category is a key indicator of rental intentions.

Model Input—Apply Weights to the Core CDA Regression

- Demographics
 - The Initial model uses regression analysis. Demographic weights are assigned.
 - Ruse-Scheme provides the film usage percentages.
 - The prior regression analysis indicates which demographics should be weighted.
 - Weights are created
 - Percentage Actual/Percentage Indicated (in response to email survey)
- Validity Weights
 - Do customers do as they say?
 - Matching rental intentions with actual customer rentals is a necessary, and useful, market research application.
- Model each film's rental using a finite mixture model with known intention weights.

Rental Intention Differences

Boys 10-13 Years Old Summer Family Movies

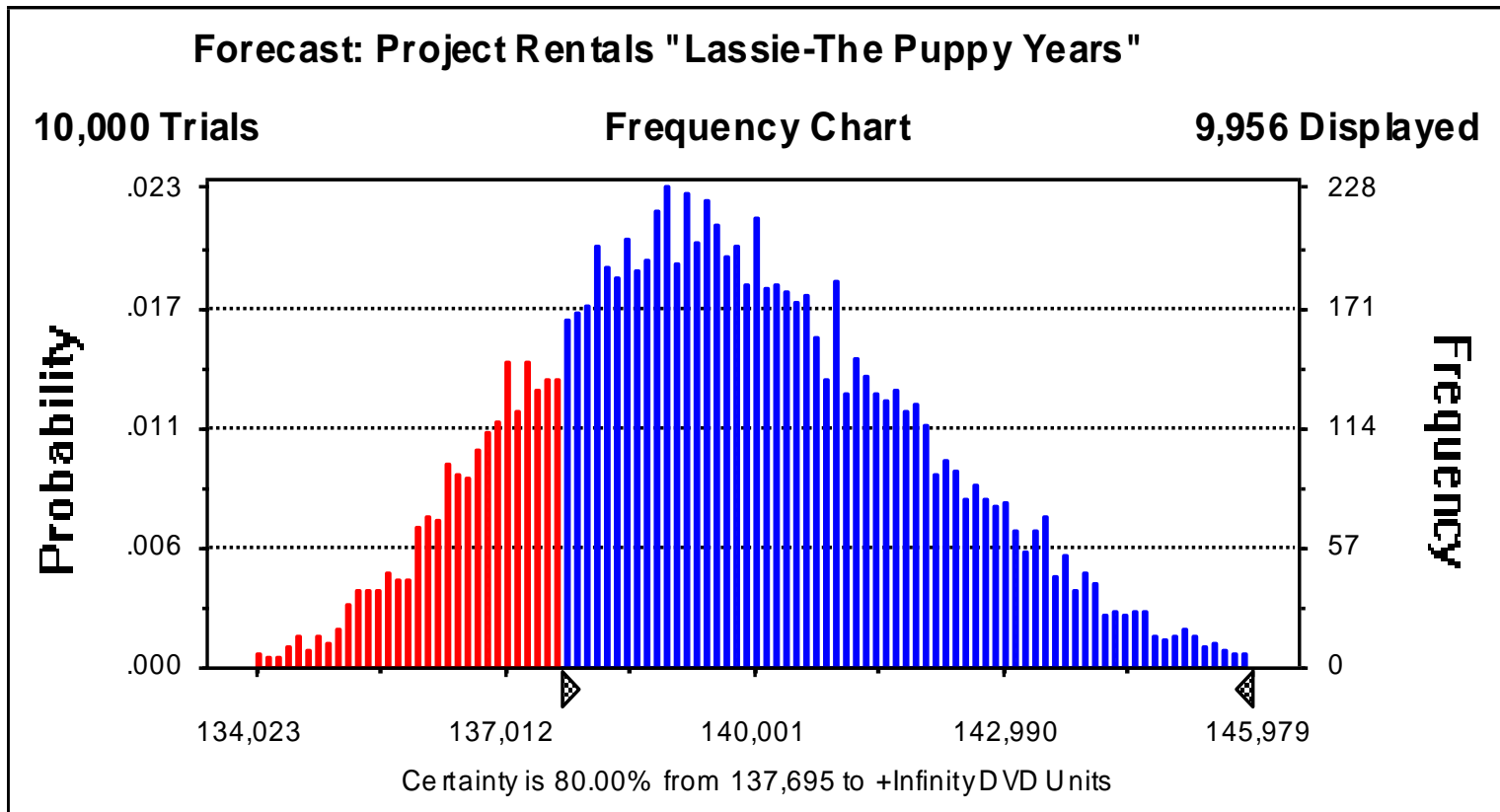
	Intent to Rent	Rented (3 Month Gap)	Difference
X-Men 14	55%	42%	13%
Garfield--The Labor Day Musical	26%	13%	13%
Bad News White Sox	37%	25%	12%
The Wild Child	26%	18%	8%
Lawrence Goes to School	8%	2%	6%
Teenage Ninja Turtles Fight Godzilla	32%	26%	6%
Lassie--The Puppy Years	15%	10%	5%
Over the Hedgerow and Into the Woods	53%	49%	4%

Data altered to protect confidentiality

Dry Run - Known Rentals

Lassie, The Puppy Years

- Rentals of the kiddy flop, *Lassie, The Puppy Years* are known.
- Inputs for *Lassie, The Puppy Years* are entered into Crystal Ball Excel Sheet



Lassie, The Puppy Years—Comparison

Probability of Event (or Greater)	Projected Rentals "Lassie-The Puppy Years"
Percentiles	Project Rentals "Lassie-The Puppy Years"

100%	132,527
90%	136,785
80%	137,695
70%	138,369
60%	138,962
50%	139,523
40%	140,120
30%	140,803
20%	141,626
10%	142,755
0%	147,335

← Gray Line: There is an 80% chance that 138,000 rentals or more will take place.

← **Actual 3 month rentals 138,612**

← Blue Line: Expected Value; 50% chance of 140,000.

← Red Line: Ruse-Scheme is advised to order 142,000 copies.

Rollout the Model

- Film
 - Horror Film: *Second Term*
- Details
 - Summer flick
 - Flop despite massive spin
 - Quick release into DVD (before approval ratings drop further)
 - More popular in Red states
- Model Particulars
 - Mixed Model
 - The Monte Carlo mix will be higher among key demographic groups.
 - Regional considerations

Input altered to protect confidentiality

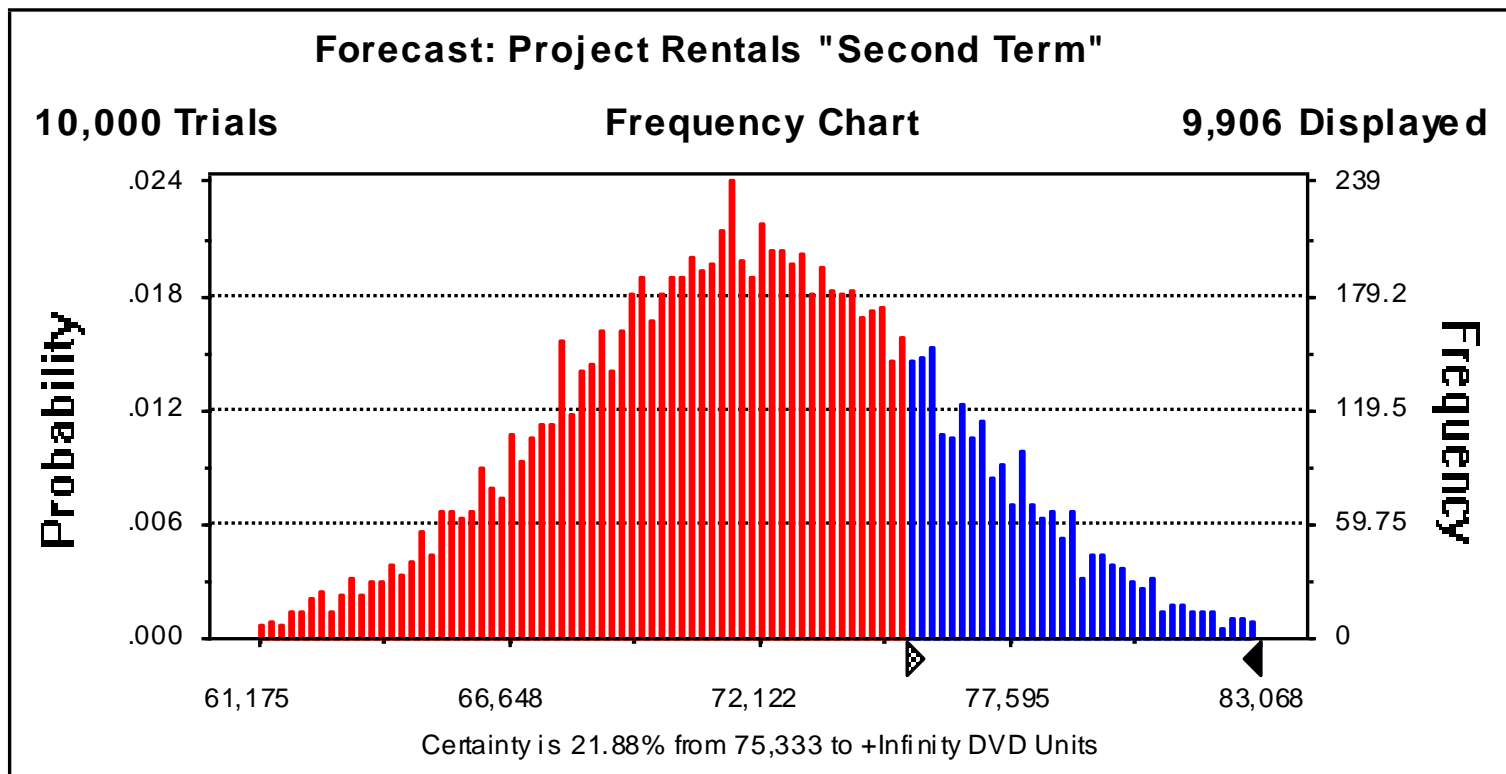
- Below represents a sample input of one of the mixes in the model
- Inputs are the CDA regression.

Base: Ruse-Scheme “Second Term” Targeted Demographic Independent Variables:	Beta Weight	Level of Statistical Significance
Stated Intention to Rent Film	0.41	Yes – 95%
Film Category	0.32	Yes – 95%
Gender	0.29	Yes – 95%
Theatre Sales	0.25	Yes – 90%
Red State Movie Renters (% Rental Intentions)	0.18	Yes – 90%
Summer Boost—July 4 th Release	0.16	Yes – 80%
Film Category Advertising Budget Category	0.13	No
Age 25-36 (Rental Intentions)	0.09	No
Months from Nationwide Film Release	0.08	No

*Conditional Demand Analysis (regression analysis)

Unknown Rental Sales

- The fearsome flop, *Second Term*, is going to DVD
- Tiered Inputs for *Second Term* are entered into Crystal Ball Excel Sheet



"Second Term" Recommendations

Probability of Event (or Greater)	Projected Rentals "Third Term"
Percentiles	Project Rentals "Lassie-The Puppy Years"
100%	54,924
90%	66,686
80%	68,584
70%	69,887
60%	71,065
50%	72,152
40%	73,174
30%	74,326
20%	75,656
10%	77,537
0%	88,538

Red Line: Ruse-Scheme is advised to order about 76,000 copies

Comments

- The model is used on a per film basis.
 - Individual movies are modeled
 - Model can be modified to encompass 'Categories'.
 - An average rental scheme for a group of movies
 - Optimization of purchasing within budget using OptQuest
- As the model evolves, use industry expertise to tighten the measurements.
- Sub-models per category or by market.
 - West Coast vs. Chicago metropolitan area.
- Follow-up data-mining not only determines the validity of member rental intentions, it provides additional insights.

Market Research Application

- As a by-product Ruse-Scheme executives can examine average differences
 - Average gap per flick
 - List of flicks for demographic groups
 - For example, 'Divorced men, graduate degree, 35-44 years old, no kids'.
- The “Freakonomics” of Follow-up
 - Do actual box office (theatre) sales correlate with Ruse-Scheme membership rental patterns?
 - Time of year—Do holiday promotions and summertime flicks impact Ruse-Scheme membership intentions?
 - Is a combination of the two, when applied to film category, able to produce a validity model?

Pre-Post Application to Advertising

- Does media advertisement bump rental sales and/or Ruse-Scheme membership validity?
- If so, can Ruse-Scheme sell this idea to particular films who want add to their rental revenue?
 - For example, “Second Term” is in the red. Can a joint advertising venture with Ruse-Scheme boost membership rental activity, and close the financial gap?
 - Should Ruse-Scheme allow individual studios to purchase their membership list to advertise their films?

Future Research with Time

- As further data comes in, Ruse-Scheme will be able to assess the value of membership.
 - Given the tiers of membership, how many flicks do the various members rent?
 - The stability of parameters across cohorts and film category can be assessed.
 - Attrition
 - Upgrading
 - Death
 - Further pricing information may emerge.
- Compare this model to more complex models (with some help)
 - Fit of the forecast
 - Parameter validity
 - Cost/benefits of inventory assessment

Conclusion

- We used historical and behavioral data to parameterize the return distributions
- Manage risk
- Produce tiered models
- The mix of techniques produces not only the desired goals, but a side dish of valuable information
- Crystal Ball enables risk analysis of uncertain inventory controls

Thank you for attending the Web Seminar

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