Valuing Customers

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Customers as Assets

- "A widening consensus is growing that the importance of (intangible) assets – from brand names and customer lists …-- means that investors need to know more about them. A task force appointed by SEC will encourage companies to provide more information regarding those assets."
  - New York Times, May 22, 2001
- "The world is coming our way." J.D.C. Little

Overview

- RFM Models
- Simple models of LTV
- Antecedents of LTV
- From customer value to firm value

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RFM Models

- Scoring models
  - Aaker, Kumar and Day (1998)
  - Hughes (2000)
- Predictive models
  - AID, CHAID, CART, Discriminant Analysis
  - Colombo and Jiang (1999)
  - Bult and Wansbeek (1995)

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From RFM to LTV

- Spreadsheet approach (Reichheld 1996, Blattberg & Deighton 1996)

Margin		m_1	m_2	m_3	…	m_t
Retention		r_1	r_1r_2	$r_1r_2r_3$	…	$r_1r_2r_3…r_t$
Number of Customers	n_0	n_1	n_2	n_3	…	n_t
Acquisition Cost	AC_0	AC_1	AC_2	AC_2	…	AC_t
Discount	1	$1/(1+i)$	$1/(1+i)^2$	$1/(1+i)^3$	…	$1/(1+i)^t$

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Simple Models of LTV

- Constant margin, 100% retention

$$LTV = \frac{m}{(1+i)} + \frac{m}{(1+i)^2} + \ldots = \int_0^\infty m e^{-it} dt = \frac{m}{i}$$

- Constant margin, retention r

$$LTV = \frac{mr}{(1+i)} + \frac{mr^2}{(1+i)^2} + \ldots = \int_0^\infty m e^{-\left(\frac{1+i-r}{r}\right)t} dt = m\frac{r}{1+i-r}$$

Berger and Nasr (1998)
Gupta and Lehmann (2001)

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Margin Multiple

$$\frac{r}{1+i-r}$$

Retention Rate	Discount Rate			
	10%	12%	14%	16%
60%	1.20	1.15	1.11	1.07
70%	1.75	1.67	1.59	1.52
80%	2.67	2.50	2.35	2.22
90%	4.50	4.09	3.75	3.46

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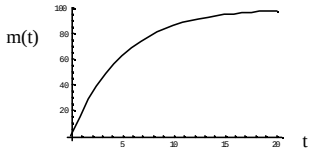
Simple Models of LTV

- Concave function for margin, constant retention r



$$m(t) = a(1-e^{-bt})$$

$$LTV = \int_0^\infty m(t)e^{-\left(\frac{1+i-r}{r}\right)t}dt = \frac{abr^2}{(1+i-r)(1+i-r(1-b))}$$

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Antecedants of LTV

- Service quality
  - Negative evidence
    - McKinsey & Co (1992), A.T. Kearney (1992), Arthur D. Little (1992)
  - Positive evidence
    - Aaker & Jacobson (1994), Hendrick & Singhal (1997), Easton & Jarrell (1998)
- Satisfaction
  - Empirical:Anderson, Fornell and Lehmann (1994)
  - Analytical: Hauser, Simester & Wernerfelt (1995)

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Antecedants of LTV

- Duration of stay and retention
  - Positive evidence: Reichheld (1996)
  - Negative evidence: Reinartz & Kumar (2000)
- Modeling retention
  - Hazard models (Helsen & Schmittlein 1993)
  - Stochastic models (Schmittlein, Morrison & Colombo 1987)
- Loyalty and loyalty programs
  - Loyalty programs work: Dreze & Hoch (1998)
  - Loyalty programs don't work: Sharp & Sharp (1997), Dowlings & Uncles (1997)

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Antecedants of LTV

- When do loyalty program work?
  - Convex relation between reward and usage (Kivetz 2000)
  - Exploit principal agent
  - Psychological principles work (Kivetz and Simonson 2001)
- Lessons from Economic Theory
  - Price competition effect (Chen 1997, Fudenberg & Tirole 2000)
  - No Prisoner's dilemma (Shaffer & Zhang 2001, Nalebuff 2001)
  - Imperfect targetability effect (Chen, Narasimhan and Zhang 2001)
  - Acquisition or retention (Fudenberg & Tirole 2000, Shaffer & Zhang 2000)
  - When customers focus on future benefits (Koppalle, Neslin and Singh 2001)
  - When category expands (Koppalle, Neslin and Singh 2001)

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From Customer Value to Firm Value

- Valuation for Internet companies difficult
- Traditional methods and their modifications
  - Damodaran (2001)
- Wall Street's "innovations"
- Accounting approaches
  - Trueman, Wong & Zhang (2001), Hand (2000)

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Valuing Customers

- Value = Benefit - Cost

  $= f_1(n_t, m_t, i, r) - f_2(n_t, c_t, i)$

Gupta, Lehmann and Stuart (2001)

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The Benefit

- Number of customers, margin and benefit at each time period will be

Time 1	$n_1 r$				m_1
2	$n_1 r^2$	$n_2 r$			m_2
3	$n_1 r^3$	$n_2 r^2$	$n_3 r$		m_3
4	$n_1 r^4$	$n_2 r^3$	$n_3 r^2$	$n_4 r$	m_4
.	.	.	.	.	.

$$n_1\left[\frac{m_1 r}{(1+i)} + \frac{m_2 r^2}{(1+i)^2} + \ldots\right] \qquad n_2\left[\frac{m_2 r}{(1+i)^2} + \frac{m_3 r^2}{(1+i)^3} \ldots\right]$$

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The Benefit

- In general,

$$Benefit = \sum_{k=0}^{\infty} \sum_{t=k}^{\infty} n_k \frac{m_t r^{(t-k)}}{(1+i)^t}$$

- In continuous time we have

$$Benefit = \int_{k=0}^{\infty} \int_{t=k}^{\infty} n(t) m(t) e^{-\left(\frac{1+i-r}{r}\right)t} dt dk$$

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The Cost

- Similarly the acquisition cost is

$$Cost = \int_{t=0}^{\infty} n(t) c(t) e^{-it} dt$$

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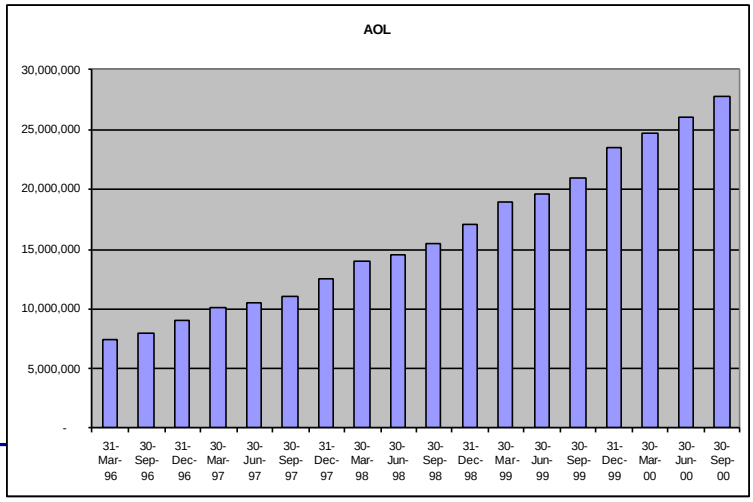
Number of Customers



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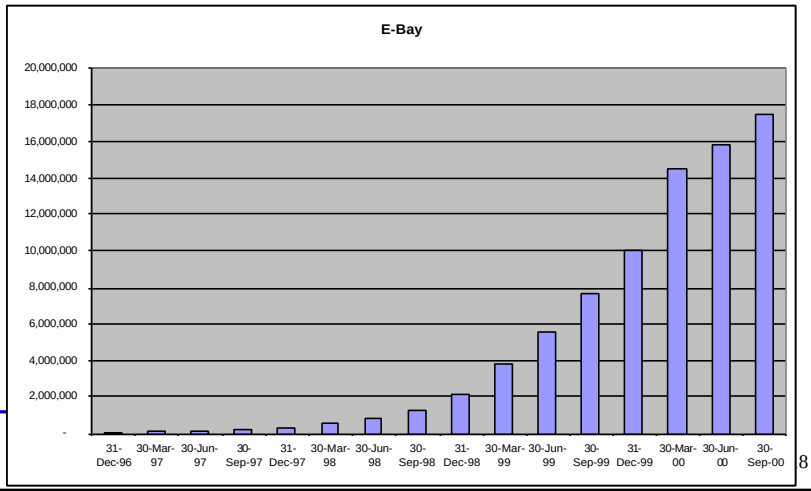
Number of Customers



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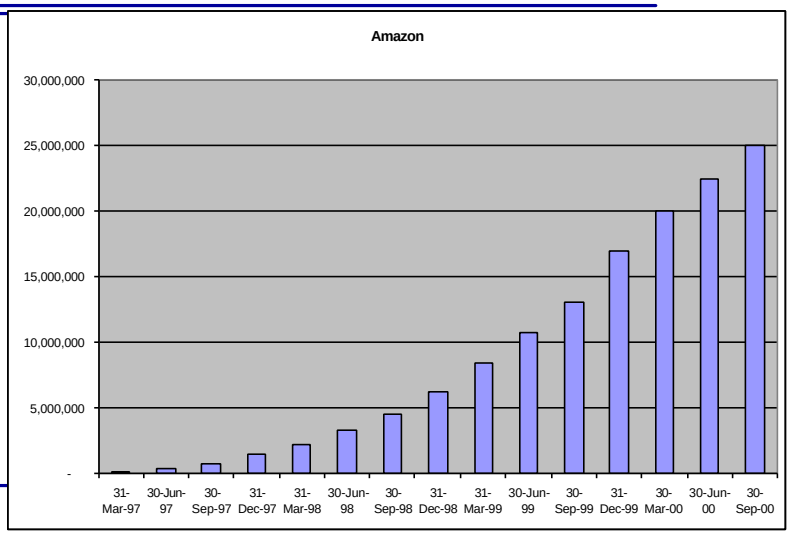
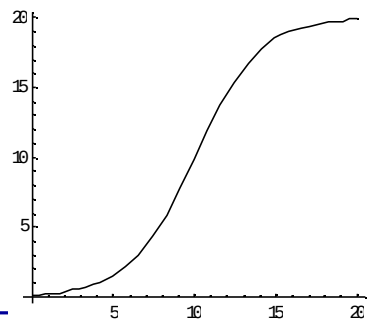
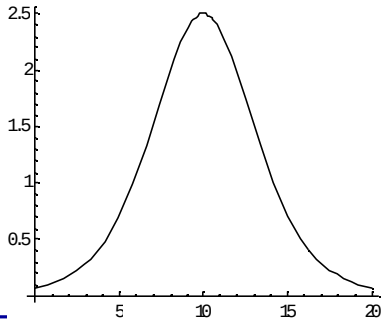
Number of Customers



Modeling Number of Customers

$$N(t) = \frac{a}{1+\exp(-b-ct)} \qquad dN(t) = n(t) = \frac{a.c.\exp(-b-ct)}{(1+\exp(-b-ct))^2}$$





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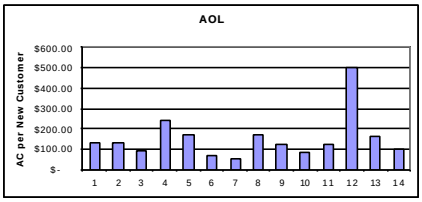
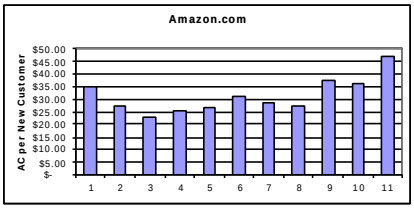
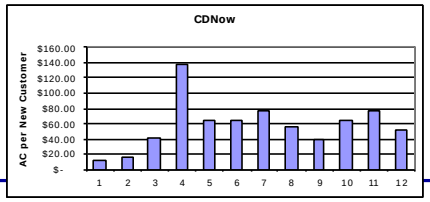
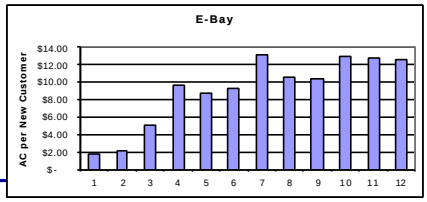
Acquisition Cost per New Customer









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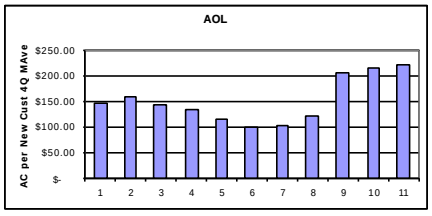
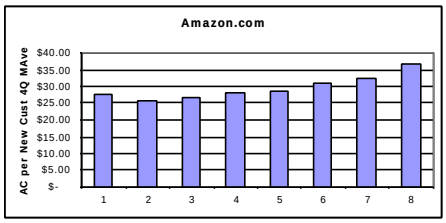
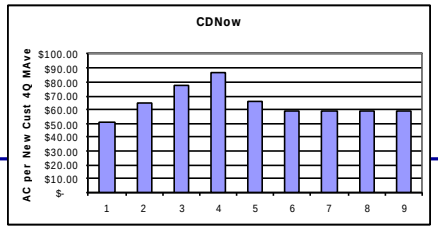
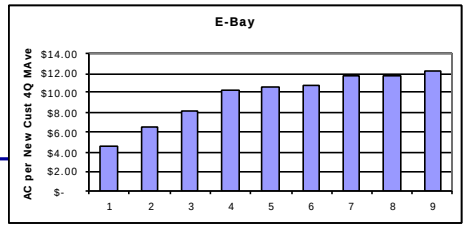
Acquisition Cost per New Customer
(4 Qtr Moving Average)

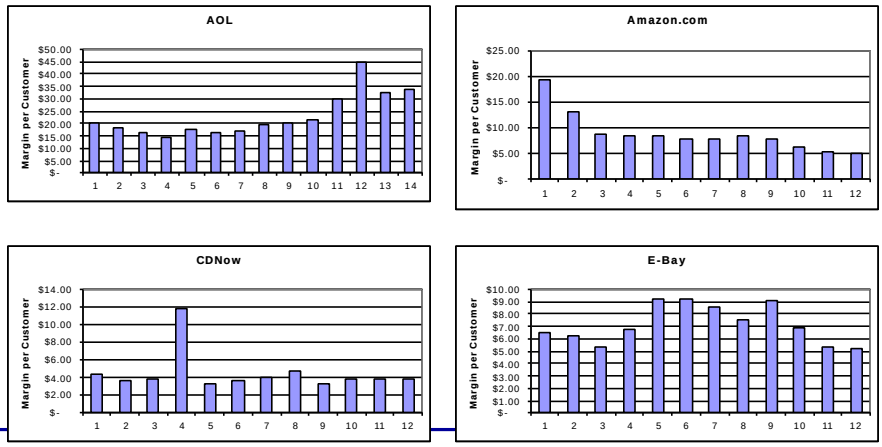








Margin per Customer



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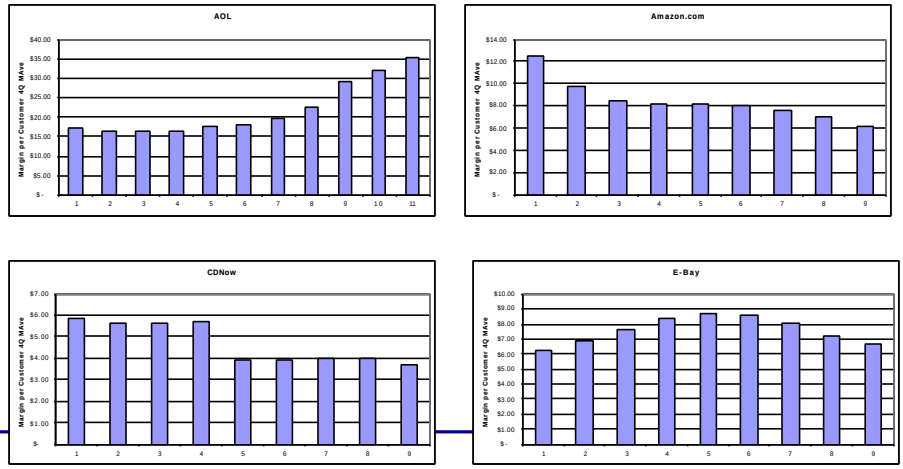
Margin per Customer

4 Qtr Moving Average



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Preliminary Results

Company	Customers	Margin	AC	Market Cap	Customer Value		
	(Millions)	($)	($)	(Billions)	60%	70%	80%
amazon.com	27.88	31.08	31.32	6.00	1.38	1.79	2.38
E*TRADE	3.56	303.88	264.37	2.48	1.71	2.19	2.90
Capital One	35.69	132.80	97.60	13.69	11.47	15.57	21.65

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Issues in Modeling LTV

- Contractual vs. non-contractual situations
- Modeling lapsed customers or switchers
- Models of cross-selling
- Modeling retention
- Cost allocations
- Optimal allocation of resources

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