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# System Design, User Cost and Electronic Usage of Journals

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**Economics & Use of Digital Library Collections**

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# The User Cost Issue

- Two-Tiered Problem
- Institutions Select Access Products
  - Which products?
  - Quantity of each
- Access Product Decisions Determine User Costs
  - None
  - Password
  - Credit Card

# Implications of User Costs

- User costs major determinant of access patterns
- Institutions
  - Maximize “Social Welfare” subject to increasingly binding budget constraint
- Electronic Publishers
  - System design choices have large effect on user costs
  - Revenue Implications

# Questions to be addressed

- Begin to quantify responsiveness of demand to changes in user costs
  - Password Costs
  - Additional Costs
- Quantify effects of user cost on optimal (i.e. lowest cost) bundle of access products

# Overview of Access Products

- Traditional Subscriptions
  - lowest monetary cost of access
  - mimics print subscription
- Generalized Subscriptions
  - prepayment for bundle of 120 articles
- Per Article Purchases
  - \$7.00 per article

# Access Costs: High

- Monetary and Non-Monetary Costs
- Per Article Purchase
  - Password Authentication
  - Credit Card Entry and delay costs
  - \$7.00 Fee
  - Transaction Costs if Reimbursed

# Access Costs: Medium

- Only Non-Monetary Costs
- Obtaining and Entering Password + Delay Costs
  - Spend Generalized Token
  - Subsequent Access to Per Article Purchase by Purchaser
  - Institution 14: Purchase Article

# Access Costs: Low

- No Appreciable Access Costs
- “Unmetered” Content
  - Non Full-Length Articles
  - Published 2 calendar years prior
- Articles in Traditional Subscription
- Articles previously purchased with a Generalized Token
- All Accesses by Institution 13

# User Cost Effects: Overview

Institution	Group	Predominant User Cost	Normalized Paid Per 100 Unmetered Accesses
13	Blue	None	50.97
3	Red	Password	13.50
9	Red	Password	20.36
10	Red	Password	31.69
11	Red	Password	7.59
12	Red	Password	26.44
Average	Red	Password	15.14
14	Blue	Password	15.06
15	Blue	Credit Card	4.72

# Effects of Expected Cost on Access

- Large Disparity of Normalized Paid Access among Red Group
- Institution with Larger Subscription Base
  - More Content is Accessed at Zero Cost
  - Users Have Lower Expected Cost of Access
- Hypothesis
  - Users accustomed to free access will be less willing to pay password cost

# Effects of Expected Costs on Access

Institution	Normalized Paid Per Unmetered Access	% Free in Sub Base	Prompted Login %
10	31.69	6.94%	13.47%
12	26.44	11.05%	7.14%
14	15.06	31.41%	29.63%
3	13.50	83.62%	8.38%
11	7.59	74.21%	2.64%

## Correlation Coefficients

Paid Access and Subscription Coverage -0.872632

Prompted Login and Subscription Coverage -0.362476

# Estimation of Credit Card Costs on Access

- *Requests for Payment* not explicit in log
  - Design Implication!
  - Log events consistent with request for credit card payments a noisy signal
- Used consistent events per access in months w/Tokens as baseline noise
- Results: Payment Rates: 1% - 75%
- Expectations appear to matter

# Credit Card Costs: Access Log Estimation

Institution	Credit Card Requests	Credit Card Payments	Percent	Factor
6	260	194	74.62%	Never tokens
15	137	73	53.28%	Never tokens
3	53	13	24.53%	Library Subsidy
11	562	61	10.85%	Library Subsidy
9	190	1	0.53%	No subsidy

# Estimation of Credit Card Costs on Access

- Institutions that depleted tokens
- Assume that Token spend rate would have remained constant
- Requests for payment=Extrapolated Token Spending
- Results
  - Same relative percentages
  - 2x as many payments requests than previous estimate

# Estimation of Credit Card Costs on Access

- Another Measure of High Cost Effect
- Institutions Depleting Tokens
- Dramatic decrease in “Normalized Paid Access” mirrors low Payment rate

	Institution 3	Institution 3	Institution 9	Institution 11
30 days prior	13.56	18.43	20.20	16.03
30 days subsequent	0.25	0.29	.15	0.35
Percent Change	-98.16%	-98.43%	-99.26%	-97.82%

# Effects of User Costs on Optimal Bundle

- Optimal Bundle=Lowest cost of access for **given** set of accesses
- Given set of accesses not exogenous
- Re-Scale “paid” access by assuming no access cost
- Recalculate optimal bundle based on new access set

# Effects of User Costs on Optimal Bundle

- Results of Re-scaling Access Set
  - Optimal Number of Subscriptions Increase
  - Generally, increase in Optimal Cost less than increase in total access
  - The larger the access barrier taken away, the larger the increase in optimal cost
    - Increased Access
    - Greater Monetary cost per access

# Effect of User Costs on Optimal Bundle

## Selected institutions and years

Inst. ID	Year	Trad. Subscriptions		Addition. Articles		Increase Optimal Cost	Increase Total Access
		Actual Optimal	Rescaled Optimal	Actual Optimal	Rescaled Optimal		
3	1998	500	556	1099	1130	9.39%	12.53%
3	1999	737	805	236	146	4.85%	7.46%
11	1998	24	31	2532	3019	21.11%	21.09%
12	1998	1	1	254	287	17.76%	13.67%
14	1999	0	0	168	249	48.21%	48.21%
15	1999	12	17	242	366	47.56%	60.36%

# Conclusions

- User costs have large effect on realized demand
  - Approx. 2/3 reduction with each increase
- Users expectations of costs appears to affect willingness to bear costs
- User costs need to be considered in devising optimal bundle
  - Cost increases not necessarily large