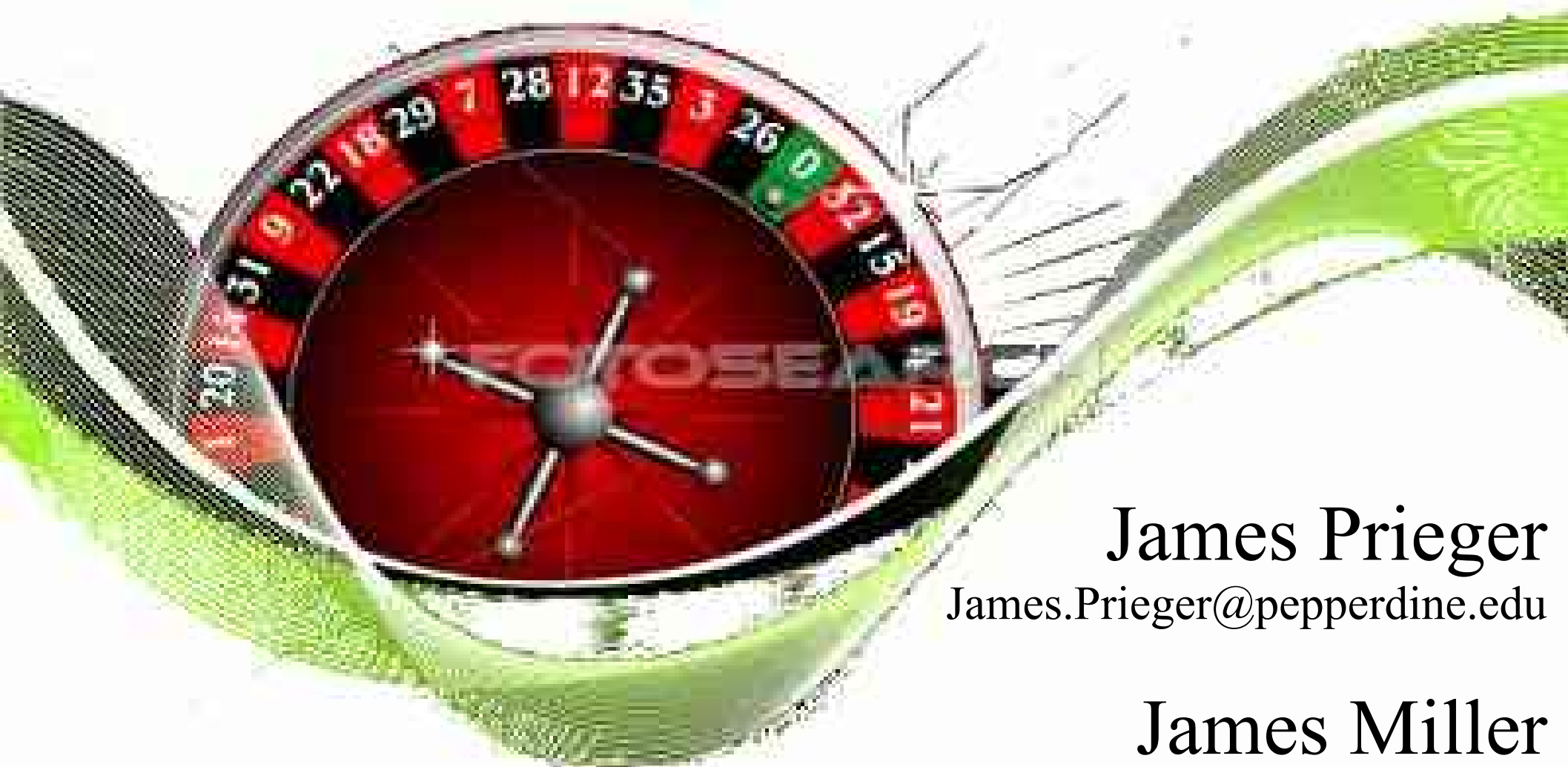


The Broadcasters' Transition Date Roulette: Strategic Aspects of the DTV Transition



James Prieger

James.Prieger@pepperdine.edu

James Miller

JamesMillerEsquire@gmail.com

Disclaimers...

The opinions expressed are those of the author and do not necessarily represent the views of the Federal Communications Commission or the United States Government.

And More Disclaimers...

本資料の位置付け否認の告示

ここでは、英米法の一般的な解説を述べており、決して一定の事例に適した法律相談などではないことを承知した上で、ご参考にしてください。本人の見解によるものであり、アメリカ合衆国その他の代弁ではないこともご承知下さい。

Presentation

- Introduction
- DTV Regulatory Background
- DTV Technical Issues
- DTV Markets and Strategic Issues
- Econometric Primer and Model
- Data and Empirical Results

The Stations Dilemma

Furthermore, we expect that many stations will transition early and begin operating their final post-transition facilities in advance of the deadline and the onset of the winter months.

Third Periodic Review of the Commission's Rules and Policies Affecting the Conversion To Digital Television, MB Docket No. 07-91, Report and Order, FCC 07-228, 23 FCC Rcd. 2994, 3017 para. 41 (rel. December 31, 2007) (Third Review Report and Order)

- Full-power broadcast stations required to transition from NTSC to DTV by Transition Deadline
- Stations offered opportunity to go in advance of the deadline
- Power and other costs incurred prior to completing transition
- Potential loss of add revenue to competitors for early transition

DTV Regulatory Background

- Spectrum Reform
 - Public Safety
 - Upper 700 MHz
- Digital Media, Convergence, and HDTV
- Service Replication/Maximization
 - Grade B Contour
- Hard Dates (1996 Act, 1997 Budget Act)
 - 96 Act and ATS 5th R&O
 - 85% Threshold - 1997 Budget Act
 - Feb. 17, 2009 – Deficient Reduction Act of 2005
- Postponement - June 12, 2009 - DTV Delay Act

DTV Regulatory Background

Early Termination

- Prior to November 19, 2008
 - 90 day advance filling
 - approval required
- November 19, 2008 ~ February 16, 2009
 - Streamlined procedures within 90 days of Feb. 17, 2009
 - 30 Day advance notification of date to terminate
- Early Termination After Delay
 - “Early Termination” On Feb. 17, 2009 subject to prior rules
 - After March 14, 2009 under 30 day filling and other requirements (Nightlife)

Technology Opex Concerns

- Power Considerations
 - Power – Distance
 - Power – Frequency
 - Power - Digital vs. Analog
- Virtual Channels
 - Flexibility
 - Requirement to Identify as NTSC Channel

Technology Adoption Concerns

- Consumer Antenna
- Analog-Digital Converter Box
- ATSC Tuner “Hybrid” Devices
- Coverage and Loss

Market Dynamics

- Stations
- Networks
- Affiliate
- ONO
- Ownership Restrictions
- Dual-Network Rules

Econometrics Background

- Quantitative and Statistical Methods Applied to Economic Principles
- Understanding Statistical and Economic Significance (independent and dependent variables)
- Methods
 - Data Sets
 - Regression
 - Least Squares (minimize the sum of squared distances between data points for fit) and Single Equation
 - Simultaneous Equations, Non-Linear and Other Methods
 - *Inverse Logistic Function “logit”* - $\text{logit}(p) = \log(p/(1-p))$
 - Probability Units / probits
 - Tobit Model

Broadcasters' "Prisoners Dilemma"

Strategic Considerations

- Revenue from advertising pq (q station's viewership)
- $C = F + wx$ (F includes labor, rent, capital, and other non-power costs, w is the price of electricity, and x is the amount of electricity used)
- Action "a" available to each station is transition early to digital and stop analog (action $a = D$), or continue analog broadcasting (action $a = A$)
- For station switching early when the other station continues analog broadcasting, assume a known probability that something *goes wrong* causing an expected fraction ϕ_i of original q_{i0} viewers to switch to other station (station risk from action D is losing viewers to the other station)
- Benefit for the station of transitioning early is the power savings b/c takes less power to broadcast DTV than in analog - $x(a_i) \in \{x_{iA}, x_{iD}\}$, with $x_{iA} > x_{iD}$

Setting up the Game

$d_i = p\phi_i q_i^0$ expected lost revenue from transitioning early

$\Delta_i = w(x_i^A - x_i^D)$ cost savings from turning off analog

		Station 2	
		A	D
Station 1	A	$pq_{10} - C_1(A),$ $pq_{20} - C_2(A)$	$p(q_{10} + \phi_2 q_{20}) - C_1(A),$ $p(1 - \phi_2)q_{20} - C_2(D)$
	D	$p(1 - \phi_1)q_{10} - C_1(D),$ $p(q_{20} + \phi_1 q_{10}) - C_2(A)$	$pq_{10} - C_1(D),$ $pq_{20} - C_2(D)$

Setting up the Game

If station 1 expects that station 2 will choose to stay with analog (action A), then (comparing the payoffs to 1 in the first column of the bimatrix above) 1 chooses to coordinate its actions and also stay analog if and only if $d1 \geq \Delta1$

This condition states that station 1 is willing to coordinate on action A if the expected costs of transitioning ($d1$) outweigh the benefits (the cost savings $\Delta1$)

		Station 2	
		A	D
Station 1	A	$pq10 - C1(A),$ $pq20 - C2(A)$	$p(q10 + \phi2q20) - C1(A),$ $p(1 - \phi2)q20 - C2(D)$
	D	$p(1 - \phi1)q10 - C1(D),$ $p(q20 + \phi1q10) - C2(A)$	$pq10 - C1(D),$ $pq20 - C2(D)$

Setting up the Game

If, instead, station 1 expects that station 2 will choose to switch early (action D), then (comparing the payoffs to 1 in the second column of the bimatrix above) 1 chooses to coordinate its actions and also play D if and only if $d_2 < \Delta_1$.

If not, then the expected benefits of letting station 2 move first (d_2) would outweigh the costs of transitioning and station 1 would play A.

		Station 2	
		A	D
Station 1	A	$pq_10 - C_1(A),$ $pq_20 - C_2(A)$	$p(q_10 + \phi_2q_20) - C_1(A),$ $p(1 - \phi_2)q_20 - C_2(D)$
	D	$p(1 - \phi_1)q_10 - C_1(D),$ $p(q_20 + \phi_1q_10) - C_2(A)$	$pq_10 - C_1(D),$ $pq_20 - C_2(D)$

Setting up the Game

Given that the decision facing station 2 involves the same considerations, it is apparent that Nash equilibrium thus depends on the size of Δ_i relative to d_1 and d_2 , for $i = 1, 2$.

		Station 2	
		A	D
Station 1	A	$pq_10 - C_1(A),$ $pq_20 - C_2(A)$	$p(q_10 + \phi_2q_20) - C_1(A),$ $p(1 - \phi_2)q_20 - C_2(D)$
	D	$p(1 - \phi_1)q_10 - C_1(D),$ $p(q_20 + \phi_1q_10) - C_2(A)$	$pq_10 - C_1(D),$ $pq_20 - C_2(D)$

Nash Outcomes

Case 1 – Neither Station Switches Early

- Both stations face small cost savings from transitioning relative to expected lost revenue
- Classic Prisoners' Dilemma: both stations would like to end up in the (D,D) cell of the game, where operating costs are lower, but have incentive to stay analog to avoid giving the other firm an advantage.

Case 4 - Both Stations Switch Early

- Both stations face large cost savings from switching early relative to the expected gain of viewers from the other station if delaying
- Difference large enough that the aspect of the Prisoners' Dilemma disappears

Case	Conditions	Nash equilibrium
1	$d_1 \geq \Delta_1$ and $d_2 \geq \Delta_2$	(A, A)
2	$\Delta_2 \leq d_1 < \Delta_1$	(D, A)
3	$\Delta_1 \leq d_2 < \Delta_2$	(A, D)
4	$d_1 < \Delta_2$ and $d_2 < \Delta_1$	(D, D)

Nash Outcomes

Case 2 & 3 - Non-coordination outcomes

- One of the stations' electricity cost savings outweighs its potential lost viewership, and switches early
- Other station's relatively small electricity cost savings lead it to wait, hoping to gain viewers from the other station.

Case	Conditions	Nash equilibrium
1	$d_1 \geq \Delta_1$ and $d_2 \geq \Delta_2$	(A, A)
2	$\Delta_2 \leq d_1 < \Delta_1$	(D, A)
3	$\Delta_1 \leq d_2 < \Delta_2$	(A, D)
4	$d_1 < \Delta_2$ and $d_2 < \Delta_1$	(D, D)

Conclusions from the Formal Game

- Formal game confirms
 - Stations will coordinate on delaying transition when their own cost savings are small relative to risk of losing viewers.
 - Stations will coordinate on transitioning when their prospect of gaining viewers from the other station is small relative to their cost savings.
 - Here the strategic element of the decision of how the other station's decision affects your station's profit is apparent.
- *Less obvious result:*
 - Stations will not coordinate their actions when the expected cost of one station transitioning unilaterally (d_i for station i) falls midway between the electricity cost savings of the two stations.

Implication from the Model

- Each station is more likely to transition early the *greater is its* Δ .
 - This implies that higher electricity prices and greater power savings from transition make the decision to transition early more likely.
- Each station is more likely to transition early the *lower is its* d .
 - This implies that a lower probability of losing viewers, a lower number of viewers potentially lost, and lower ad prices make the decision to transition early more likely.
- Each station is more likely to transition early the *greater the difference between its* Δ *and rival's* d .
 - Further implies that a lower expected number of the rival's viewers potentially gained, and (as in (2)) lower ad prices make the decision to transition early more likely

$d_i = p\phi_i q_i^0$ expected lost revenue from transitioning early

$\Delta_i = w(x_i^A - x_i^D)$ cost savings from turning off analog

Empirical Results & Models - Data

- Stations Decisions
 - FCC reports
- Stations Characteristics
 - DMA, state of location, and network affiliation of a station (if any) from Warren's TV and Cable Factbook
 - Power Characteristics and station's digital broadcast footprint from FCC
- Market Info
 - DMA level variables from the SRDS Media Solutions database (includes demographic variables from Claritas and ad price data from SQAD)
 - Data from Nielsen on the number of TV households in each DMA

Market-Based Empirical Results & Takeaways

- larger markets show less early transitioning is in accord with implications 2 and 3 from the model
- early switching displays a U-shaped correlation with age of the household head
 - youngest and oldest age categories, correlation is positive, while it is negative for the middle ages
 - Possible artifact of the data or Demonstration of Baby Boomer and GenX Demographic Advertising Value
- Highest income brackets also negative correlation
 - High income groups also valuable viewers for ad sales
- Only significant racial and ethnic correlation is a negative correlation with fraction of population that is Hispanic
 - Hispanics third most sought-after demographic group

Market-Based Empirical Results & Takeaways

- Transitioning early is negatively (but not significantly) correlated with the number of coupon requests, households, and OTA-only households on the NTIA waitlist at the time of the transition
 - Measures of lack of readiness serve as proxies for ϕ
 - Nielsen's two measures of "unreadiness", percentage of partially and completely DTV-unready households also negatively correlated (Only latter is significant)
- Implications 2 and 3 predicting higher ad prices associated with less early transitioning also supported by empirical results (however not statistically significant)
- Unemployment rate in DMA not significantly correlated with the transition decision, although model suggests local economic conditions affecting local ad prices may be

Station-Based Empirical Results & Takeaways

- 36% of the 1,747 stations full-power commercial and non-commercial stations broadcasting at the time of the transition transitioned early
- Variation among networks--three traditional networks more conservative than most others, switching early only 30-33% of the time
 - FOX and the CW were average,
 - Ion and Univision were far below average (16% and 17%, resp.).
 - PBS and stations in the “other” category (independents, non-PBS public or educational stations, and niche networks) were more likely to switch early than average (44% and 40%, resp.)
 - _ PBS does not rely on paid advertising and viewers may be less likely to turn to other networks should problems arise

Station-Based Empirical Results & Takeaways

- Consistent with correlations found in the DMA-level analysis, and consistent with the implications of the model, negative coefficients found for Hispanics, the prime age group, and high-income households
- Coefficient for the Asian group is positive, possibly indicating that advertisers perceive them to be a less-desirable demographic segment

Station-Based Empirical Results & Takeaways

- Results generally in line with the theory, with a few exceptions.
- The alternate measure of market size, population covered, is highly significant, in accord with implication 2.
- More DTV interference leads to a lower propensity to switch early, also in accord with implication 2.
- Both electricity prices and the change in ERP have negative coefficients, in accord with implication 1, but are insignificant.
- Ad prices and more viewers losing signal after transition are negatively (but insignificantly) correlated with switching early, in accord with implication 2.
- The two strategic variables, the population covered by and the DTV interference of the other stations in the DMA, have positive coefficients as predicted by implication 3, although only the former is significant.
- One result does not follow the theory.
 - Coupon waitlist coefficient is positive (but insignificant), while implication 2 suggests it should be negative.
 - However, no statistically significant refutations at the 5% level of our theoretical model.

Conclusions and Applications

- Model provides a useful tool for understanding both effects of DTV transition regulatory efforts on achieving the important policy goals as well as strategic thinking of broadcasting entities
- Paper explored and tested assumptions about model using stations' decisions and other data from broadcasting industry and presents promising empirical results
- Examinations of data yield results that are in line with predictions of the model
- Further work in this area could provide greater insight into stations' decision making process and ultimately help market observers and regulators evaluate success of regulatory efforts

ご清聴、どうも有り難うございました！

