Week 9: Vertical Market Structure II

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Outline

Week 9

- **Crawford & Yurokoglu (2011)**

Bundling in Cable TV Markets

Crawford & Yurokoglu (2011)

- **Question:** Should regulators require cable TV distributors (Comcast) to let consumers choose a la carte (one channel at a time) versus allowing bundled pricing?
- Bundling allows firms to extract surplus from consumers, ambiguous impact on overall welfare
- Cable TV in US has 110 million viewers spending more than $50 billion annually
- Important for structural work: few to no observed implementations, importance of counterfactuals
- Structural model of many differents facets of market:
  - Viewership & Demand for programming
  - Pricing and bundling of cable distributors
  - Input market bargaining between channels and distributors, leading to downstream input costs

Overview Cont.

Crawford & Yurokoglu (2011)

- Three types of agents in the model:
  - Viewers
  - Distributors (Comcast)
  - Channels (ESPN)
- Major innovation in this paper is to model input cost re-negotiation: i.e. bargaining between upstream channels and downstream distributors
- Counterfactual simulations are thus key focus of paper:
  - For fixed input costs, unbundling unlocks consumer surplus (19.2% welfare increase)
  - With equilibrium cost determination„ cost increases can offset welfare benefits from choice
  - Channel prices increase (passed-through), completely mutes welfare impact (0.2% increase)

Overview Cont.

Crawford & Yurokoglu (2011)

- Model has many components. Overview:
  - Viewers demand channels and bundles
  - Downstream distributors compete with one another by choosing bundles and prices, and negotiating input costs with upstream channels. Moment Inequalities / NE.
  - Bargaining between channels and distributors: Nash bargaining with Nash equilibrium in bilateral outcomes
- Results overview:
  - Intuitive viewership demand estimates, own and cross price elasticities for different bundles / formats
  - Average of 44%, lower costs for large distributors
  - Bargaining params. reject take it or leave it offers. Distributors have power over small channels, not large.
  - Counterfactual with stylized markets, a la carte, theme tiers
  - 103% increase in input costs with movement to a la carte
  - Consumer welfare change between -5.4% and 0.2%.

Themes to Think About

Crawford & Yurokoglu (2011)

- This paper intends to answer an empirical question: though there are some novel methodological advances, it should mostly be valued on the empirical content
  - Tests precision-credibility trade-off: a lot of embedded structural assumptions
  - Authors do what they can with robustness, is it enough?
  - Similar to our discussion of Nevo-Whinston: is there a better way to answer this important question right now?
- A few specific assumptions to think about:
  - Bargaining model: derived from relationship between *estimated* costs, market variation, and natural environment restrictions. Results are sensitive to this!
  - More viewership means more willingness to pay
  - Short-run analysis: quantities / types channels given
  - Nash assumptions

Model Intuition

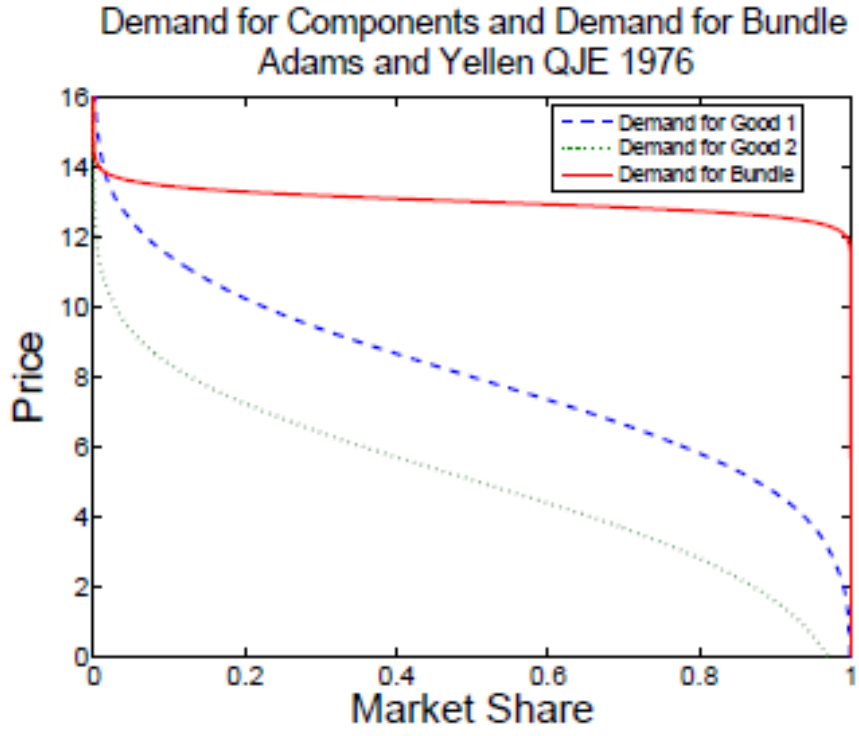
Crawford & Yurokoglu (2011)

- Insights can be understood by appealing to two literatures:
  - Welfare costs of bundling when input costs fixed
  - How input costs determined in bilateral bargaining setting
- Monopolist: Bundling allows them to sell more, a la carte unlocks surplus
- Nash bargaining: input costs maximize Nash product subject to downstream markets
- Combined picture: key to welfare is whether input cost rise dominates (if it happens) or whether traditional unbundling arguments dominate
- Cost change depends on micro-fundamentals estimted in model

Bundling Impact

Crawford & Yurokoglu (2011)

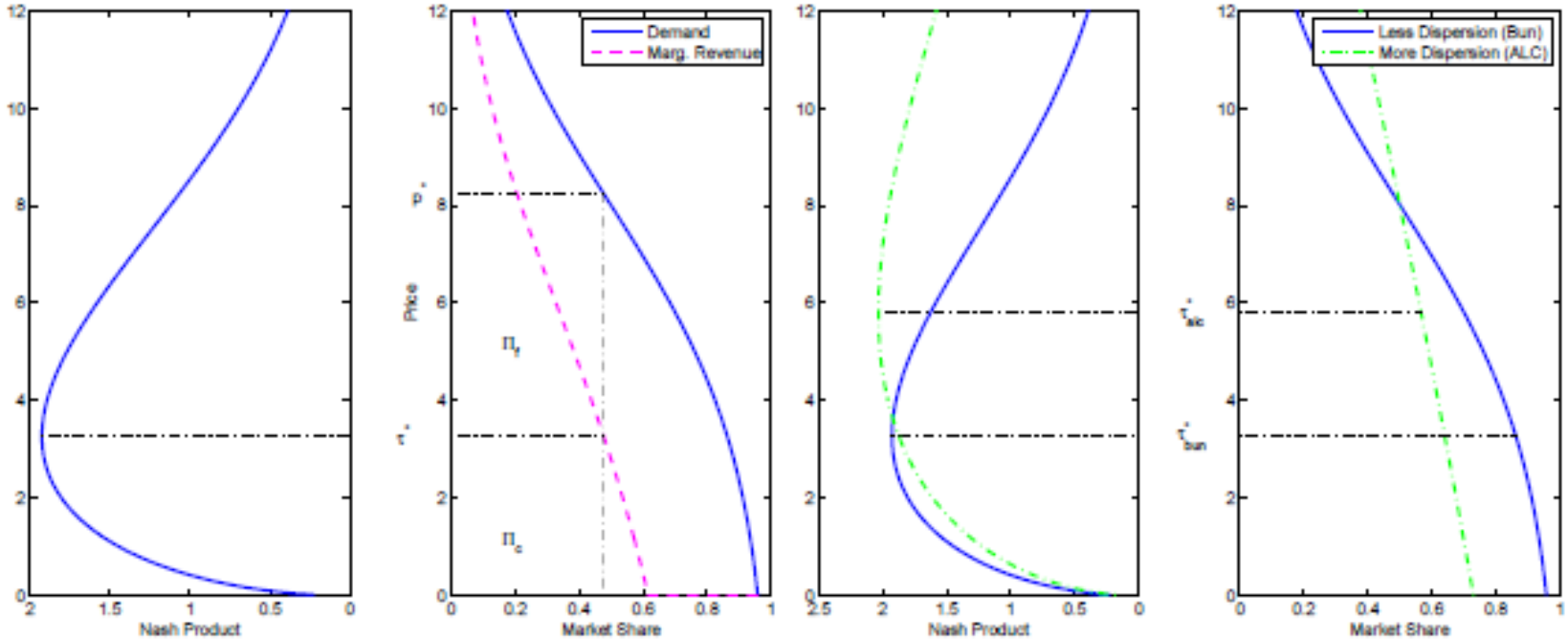
Figure 1: Dispersion in WTP for components is higher than dispersion in WTP for a bundle



Bargaining and Bundling

Crawford & Yurokoglu (2011)

Figure 2: Nash Bargaining for Input Costs



Data

Crawford & Yurokoglu (2011)

- Brings together interesting data from a variety of sources. Good data, ambitious question
- Market Data and Viewership data from a few different sources
- Factbook Cable System and Satellite Data:
  - 1997-2007, collected by telephone and mail survey of cable systems
  - Cable system bundle compositions, bundle prices, number of monthly subscribers per bundle, number of houses passed by cable system, system ownership
  - Observation of system-bundle-year
  - Most firms offer one bundle (very different than now!)
  - Variation in bundles over time / location. Satellite bundle fixed nationally, collected by hand

Data

Crawford & Yurokoglu (2011)

- Aggregate Channel (SNL Kagan Data):
  - 2006 edition, data on channels going back to 1984
  - At channel level, total subscribers, license fee revenue, advertising revenue, ownership
  - Data from private communication and consulting
  - Key variables are average input cost, advertising revenue
- Nielsen DMA tuning data for viewership:
  - 56 largest DMA's for 50 biggest cable channels from 2000-2006
  - DMA, program, channel, and rating
  - Aggregated to channel-DMA-year-month
  - Variation with demographics is important

Data

Crawford & Yurokoglu (2011)

- Mediamark Individual Level Data:
  - Random sample of US consumers for media usage, consumer behavior and demographics
  - 2000-2007, 25,000 people per year, how much do they watch each of 75 channels
- Data Quality Issues:
  - 4/5 of observations in Factbook market share data and cable prices are missing or not updated! Assume missing at random conditional on characteristics...
  - Simplify how satellite enters market calculation (1 Tier)
  - Fill in individual level data from Mediamark into households to fit model (implications for viewing)

Basic Bundle Data

Crawford & Yurokoglu (2011)

Table 1: Factbook Summary Statistics

	N	Mean	SD	Min	Max
All Bundles					
Price	25,490	23.46	9.20	0.00	87.06
Market Share	25,490	0.44	0.27	0.00	0.99
Total Cable Channels	25,490	20.3	16.1	0	176
Basic Only Markets					
Basic Service					
Price	14,732	23.70	6.36	0.00	80.25
Share	14,732	0.54	0.22	0.00	0.99
Total Cable Channels	14,732	17.3	9.4	0	95
Basic and Exp. Basic Markets					
Basic Service					
Price	4,046	13.49	5.71	0.00	47.67
Share	4,046	0.11	0.15	0.00	0.89
Total Cable Channels	4,046	8.91	7.68	0	56
Expanded Basic Service					
Price	4,046	27.39	7.92	0.00	87.06
Share	4,046	0.57	0.19	0.00	0.97
Total Cable Channels	4,046	26.5	10.0	0	77
Basic, Exp. Basic, and Dig. Basic Markets					
Basic Service					
Price	493	13.26	5.60	0.00	38.68
Share	493	0.09	0.09	0.00	0.65
Total Cable Channels	493	8.3	6.3	1	35
Expanded Basic Service					
Price	493	34.62	7.81	0.00	61.51
Share	493	0.39	0.16	0.01	0.84
Total Cable Channels	493	47.1	10.7	18	89
Digital Basic Service					
Price	493	44.56	10.07	0.00	70.27
Share	493	0.15	0.10	0.00	0.53
Total Cable Channels	493	78.8	19.1	37	176

Basic Channel Data

Crawford & Yurokoglu (2011)

Table 2: Channel Summary Statistics

	Cable System Carriage		Household Viewership			
Data Source	Factbook		Nielsen	Mediamark		
Channel	Any Tier (Pcntge)	Basic Tier (Pcntge)	Mean Rating	Mean Rating	StdDev Rating	Cume
ABC Family Channel	91.2	75.7	0.4	0.6	1.5	31.6
AMC	55.3	30.9	0.5	0.6	1.4	27.2
Animal Planet	22.8	12.1	0.3	0.6	1.5	34.8
Arts & Entertainment	68.3	48.7	0.7	0.8	1.7	37.8
BET Networks	21.1	10.9	0.4	0.3	1.5	10.6
Bravo	13.3	3.3	0.2	0.2	0.7	14.4
Cartoon Network	29.1	15.7	1.6	0.5	1.8	20.9
CNBC	37.6	19.7	0.2	0.5	1.4	29.5
CNN	94.5	77.5	0.7	1.8	3.0	53.8
Comedy Central	25.1	11.1	0.5	0.5	1.3	27.6
Country Music TV	48.0	37.2	0.2	0.2	1.0	13.5
Court TV	16.2	4.5	0.4	0.4	1.4	18.1
Discovery Channel	88.0	71.6	0.6	1.1	1.9	50.9
Disney Channel	41.6	29.6	1.2	0.5	1.4	21.2
E! Entertainment Television	22.9	11.0	0.3	0.3	0.9	24.4
ESPN	96.7	76.7	0.9	1.1	2.2	40.7
ESPN 2	36.6	21.4	0.3	0.5	1.4	25.2
Food Network	13.6	4.5	0.4	0.5	1.5	26.7
Fox News Channel	20.0	10.0	0.8	1.0	2.2	40.0
Fox Sports Net	19.4	11.3	0.3	0.4	1.2	20.2
FX	21.0	9.9	0.5	0.4	1.2	23.3
GSN	8.7	0.8	0.2	0.2	0.9	7.4
Golf Channel	10.9	1.8	0.0	0.1	0.6	6.9
Hallmark Channel	8.2	3.3	0.3	0.2	1.0	10.8
HGTV	26.3	13.2	0.6	0.6	1.6	27.5
History Channel	32.0	18.5	0.6	0.8	1.7	37.9
Lifetime	63.2	41.8	0.9	1.0	2.2	34.4
MSNBC	14.4	5.0	0.3	0.5	1.3	30.2
MTV	52.7	30.2	0.7	0.4	1.4	21.8
MTV2	1.9	0.1	0.0	0.1	0.7	7.8
National Geographic Channel	6.5	1.1	0.1	0.2	0.8	13.2
Nickelodeon	73.8	52.5	1.8	0.4	1.3	17.7
Oxygen	2.8	0.2	0.1	0.1	0.5	7.2
Syfy	33.4	18.4	0.5	0.4	1.4	20.9
SoapNet	4.0	0.4	0.1	0.1	0.6	2.5
Speed Channel	11.8	3.2	0.1	0.1	0.7	7.8
Spike TV	24.0	15.0	0.5	0.4	1.1	18.9
TBS Superstation	96.3	90.7	1.1	0.9	1.7	39.8
The Weather Channel	64.1	46.0	0.3	0.7	1.3	50.3
TLC	45.1	29.9	0.5	0.5	1.3	29.0
TNT	85.2	63.7	1.3	0.9	1.8	41.3
Toon Disney	8.6	2.1	0.2	0.1	0.7	6.1
Travel Channel	16.8	8.3	0.2	0.2	0.7	18.7
TV Guide Channel	19.3	11.5	0.2	0.2	0.6	17.5
TV Land	23.2	15.0	0.8	0.6	1.8	23.9
USA Network	88.8	66.3	1.2	0.8	1.6	37.4
Versus	9.3	1.4	0.1	0.1	0.5	4.8
VH1	39.6	22.6	0.4	0.3	0.9	18.2
WE: Women's Entertainment	7.2	0.8	0.1	0.1	0.5	5.9

Model

Crawford & Yurokoglu (2011)

- Stages / Setup:
  - Channels and distributors bargain bilaterally to determine input costs
  - Distributors set prices and bundles
  - Households make purchases
  - Households watch channels

Household Viewing Model

Crawford & Yurokoglu (2011)

- j bundle, n cable system, d DMA, m month-year, c channel, b set of all bundles, C_j are channels in bundle j
- Example: Comcast Digital Basic Arlington VA in DC DMA, November 2003
- Household viewing utility (not watching is channel 0):

$$v_{ij}(t_{ij}) = \Sigma_{c \in C_j} \gamma_{ic} log(1 + t_{ic})$$

- Will later estimate distribution of γ across i and c allowing for correlations
- Each household i solves:

$$max_{t_{ij}} \Sigma_{c \in C_j} \gamma_{ic} log(1 + t_{ic}) \; s.t. \; \Sigma_c t_{ijc} \leq T$$

Household Viewing Model

Crawford & Yurokoglu (2011)

- Solution to maximization yields indirect utility:

$$v_{ij}^*(\gamma_i, C_j) = \Sigma_{c \in C_j} \gamma_{ic} log(1 + t_{ic}^*)$$

- Infer how much household values channel from how much they watch it relative to other channels
- Bundle data not enough to inform on household level viewing patterns. Household viewing data has no price information. Combination of these data, together with assumption on channel valuation, is what allows estimation.

Bundle Purchase Model

Crawford & Yurokoglu (2011)

- Utility for household i buying bundle j is:

$$u_{ijndm} = v^*_{ijndm} + z'_{jndm}\psi + \alpha_i p_{jndm} + \xi_{jndm} + \varepsilon_{ijndm}$$

- z are other observed system and bundle characteristics like who is offering it, year offered, bundle name dummy,
- $\alpha_i = \alpha + \pi_p y_i$
- Unobserved attributes could be tied Internet service, digital service, technical service, equipment quality, etc.

Bundle Purchase Model

Crawford & Yurokoglu (2011)

$$\begin{aligned} \delta_{jdnm} &= z'_{jdnm}\psi + \alpha p_{jndm} + \xi_{jdnm} \\ \mu_{ijdnm} &= v^*_{ijdnm} + \pi_p y_i p_{jdnm} \end{aligned}$$

- Given this, and logit errors assumed, the market share for bundle j:

$$s_{jndm} = \int \frac{exp((\delta_{jndm} + \mu_{ijndm}))dF^n(i)}{1 + \sum_{k \in ndm} exp((\delta_{kndm} + \mu_{ikndm}))}$$

Distributor Competition

Crawford & Yurokoglu (2011)

- The profit of a distributor before fixed cost is:

$$\Pi_{fndm}(\mathbf{b_{ndm}}, \mathbf{p_{ndm}}) = \sum_{j \in \mathbf{b_{fndm}}} (p_{jndm} - \sum_{c \in C_{jndm}} \tau_{fc}) s_{jndm}(\mathbf{b_{ndm}}, \mathbf{p_{ndm}})$$

- f denotes a distributor, τ_{fc} are distributor-channel specific license fees paid for every household that gets c
- Separate the bundles into those offered by distributor f and the rest of those offered. Then the Bertrand Nash assumption implies:
  - $\forall f$, $\forall ndm$, b_{fndm} and p_{fndm} maximize $\Pi_{fndm}(b_{fndm}, p_{fndm})$ given $b_{\_fdmn}$ and $p_{\_fdmn}$
  - If price changed *or bundle makeup changed* profits would be lower conditional on other prices and offerings: used to construct moment inequalities

Channel-Distributor Bargaining

Crawford & Yurokoglu (2011)

- Assumed output of many bilateral negotiations between upstream and downstream firms. Bargaining has externalities because of downstream competition.
- MSOs (distributors) negotiate for all markets at once, channel conglomorates bargain for all components
- Linear fee is what is bargained over, similar to industry structure (though agreements have many other non-monetary facets)
- Let $\Psi = \{\tau_{fc}\}$ be the set of input costs:
- Profit function for conglomorate K is:

$$\Pi_K(\tau_{fK}; \Psi_{-fK}) = \Sigma_{c \in K}(\Sigma_f \tau_{fc} Q_{fc}(\Psi)) + r_c^{ad} t_c(\Psi)$$

- $Q_{fc}(\Psi)$ is total number of channel c subscribers from f, and r is advertising revenue per household hour watched

Channel-Distributor Bargaining

Crawford & Yurokoglu (2011)

- Distributor and channels maximize Nash product subject to asymmetric bargaining parameters:

$$NP_{fK}(\tau_{fK};\Psi_{-fK}) = \left[\Pi_f(\tau_{fK};\Psi_{-fK}) - \Pi_f(\infty;\Psi_{-fK})\right]^{\zeta_{fK}} \left[\Pi_K(\tau_{fK};\Psi_{-fK}) - \Pi_K(\infty;\Psi_{-fK})\right]^{1-\zeta_{fK}}$$

- Endogenous viewership computed in every candidate downstream equilibrium
- Negotiations are simultaneous and separte, so Ψ_{-fk} is con jectured. Setting bargaining parameter to 0 is equivalent to upstream Nash Bertran pricing.
- The Bargaining Equilibrium has Nash Eq. in Nash bargains:
  - $\forall f$ and $\forall k$, τ_{fK} maximizes $NP_{fK}(\tau_{fK};\Psi_{-fK})$ given Ψ_{-fK}
- No informational asymmetries for bargainers, binding agreements

Estimation: Household Preferences

Crawford & Yurokoglu (2011)

- Use GMM with the following moments:
  - Fraction of households that watch 0 hours by channel for eight combinations of three demographic groups (black, age, family)
  - Mean hours watched per household per demographic group
  - Covariance in DMA rating with mean DMA demographics
  - Mean hours watched per household per channel
  - Cross channel covariance in hours watched
  - Agg. cable and satellite market share by income
  - Covariance in demand side instruments and unobserved demand shock

- Household prefernces γ are:

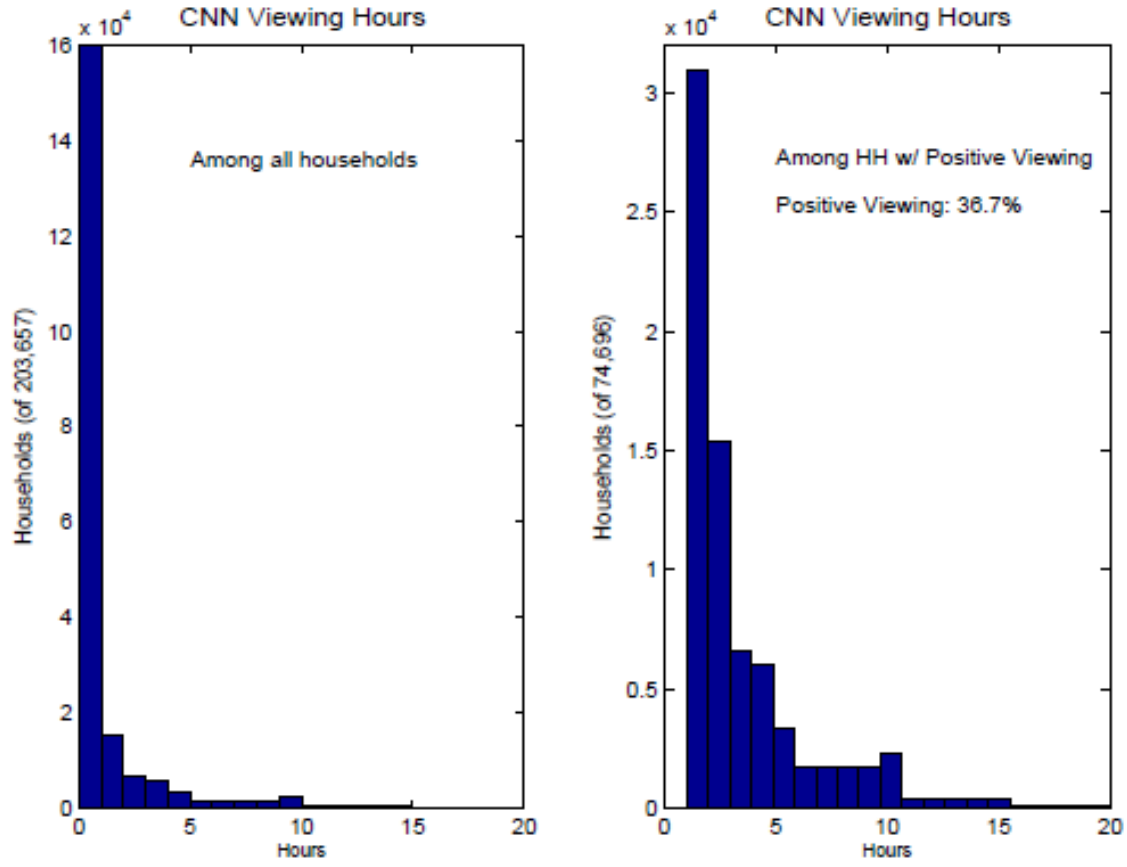
$$\gamma_i = \chi_i(\Pi o_i + v_i)$$

- o_i demographics, $\chi_i = 1$ with some probability depending on o_i

Viewership Data Example

Crawford & Yurokoglu (2011)

Figure 3: Distribution of Viewing for CNN, Mediamark (MRI) Data



Estimation: Household Preferences

Crawford & Yurokoglu (2011)

- v_i unobserved heterogeneity estimated with rich correlation structure
- Household maximization subject to paramateization yields $\hat{t}_{ijcndm}(\Pi, \rho, \Delta, \Sigma)$ for bundle j
- Specification captures mass at 0 with preferences following exponential distribution after (as in data)
- Match moments conditional on bundle, estimate jointly with bundle choice to get unconditional preferences
- Identification:
  - ρ - proportion watching 0 by demographic group, Π - mean hours by demographics and covariance in DMA ratings with DMA demo.
  - Δ -mean and variance in hours watched, Σ from cross channel covariance (net of demographics)

Estimation: Household Preferences

Crawford & Yurokoglu (2011)

- α, π, ψ estimated similar to BLP
  - Given π and γ distribution, find δ_{jndm} to equate observed and predicted market shares using contraction mapping
  - Estimate α and ψ using linear IV with instruments Z
  - Assume non-price characteristics independent of ξ
  - Instrument is average price of other cable system bundles within the same DMA as n (a la Nevo, Hasusman)
  - What do we think of these instruments?
- See paper for actual formal implementation of moments, and discussion of empirical data being matched

Cost Estimation

Crawford & Yurokoglu (2011)

- Input costs identified from:
  - National average input costs
  - Necessary price/bundle Nash Eq. conditions
  - Observed prices and bundles
- Input costs paramaterized as follows:

$$\hat{\tau}_{fc}(\eta, \rho) = (\eta_1 + \eta_2 \tau_c) exp(\rho_1 MSOSIZE_1 + \rho_2 VI_{fc})$$

- τ_c observed national average cost
- Restrictive paramaterization, but captures size effect

Cost Estimation

Crawford & Yurokoglu (2011)

- First moment condition sets average τ_{fc} equal to Kagan national averages
- Next, they use FOC for Bertrand Nash pricing assumption to solve for implied marginal costs, which they set equal to sum of C_j predicted marginal costs (use some instruments here)
- Use moment inequalities for equilibrium bundle choice:
  - Estimation penalizes cost parameters that lead to bundles different than observed equilibrium bundles
  - Need moment inequalities because bundle choice is a discrete choice, so no FOC
  - Intricate assumption about unobservables for channels across all markets, summing to 0

Cost Estimation

Crawford & Yurokoglu (2011)

- Assume that known errors for firm in bundle choice is common to all markets (ndm) (common to moment inequalities literature)
- This implies the moment conditions:

$$E[\Delta r_{fdnm}(b, b') + \Delta r_{fndm'}(b', b)] \geq 0$$

- Seems like they are summing this up over different (ndm) but notation suggests different m. Some confusion over exactly what is going in here.
- Takes four cost moment conditions, including instrumentation for pricing, and solves for η and ϕ

Bargaining Parameter Estimation

Crawford & Yurokoglu (2011)

- Parameters to estimate are pairwise parameters ζ_{fK}
  - Not identified with additional data: functions of estimated cost/demand parameters, and bargaining game!
  - Choose values to minimize estimated input cost distance from game predictions!!! What do you think?
  - Demand / pricing imply set of input costs with positive profits
  - Bargaining parameters select a value from this set
- Identification relies on two key ingredients:
  - Estimate pair-specific input costs
  - Marginal cost upstream production known = 0 (crucial!)
- Solving for eqm. input costs, downstream things must be recomputed. Determines conglomorate value (e.g. advertising / revenue)
- Estimate bargaining params. for simplified market structure

Results

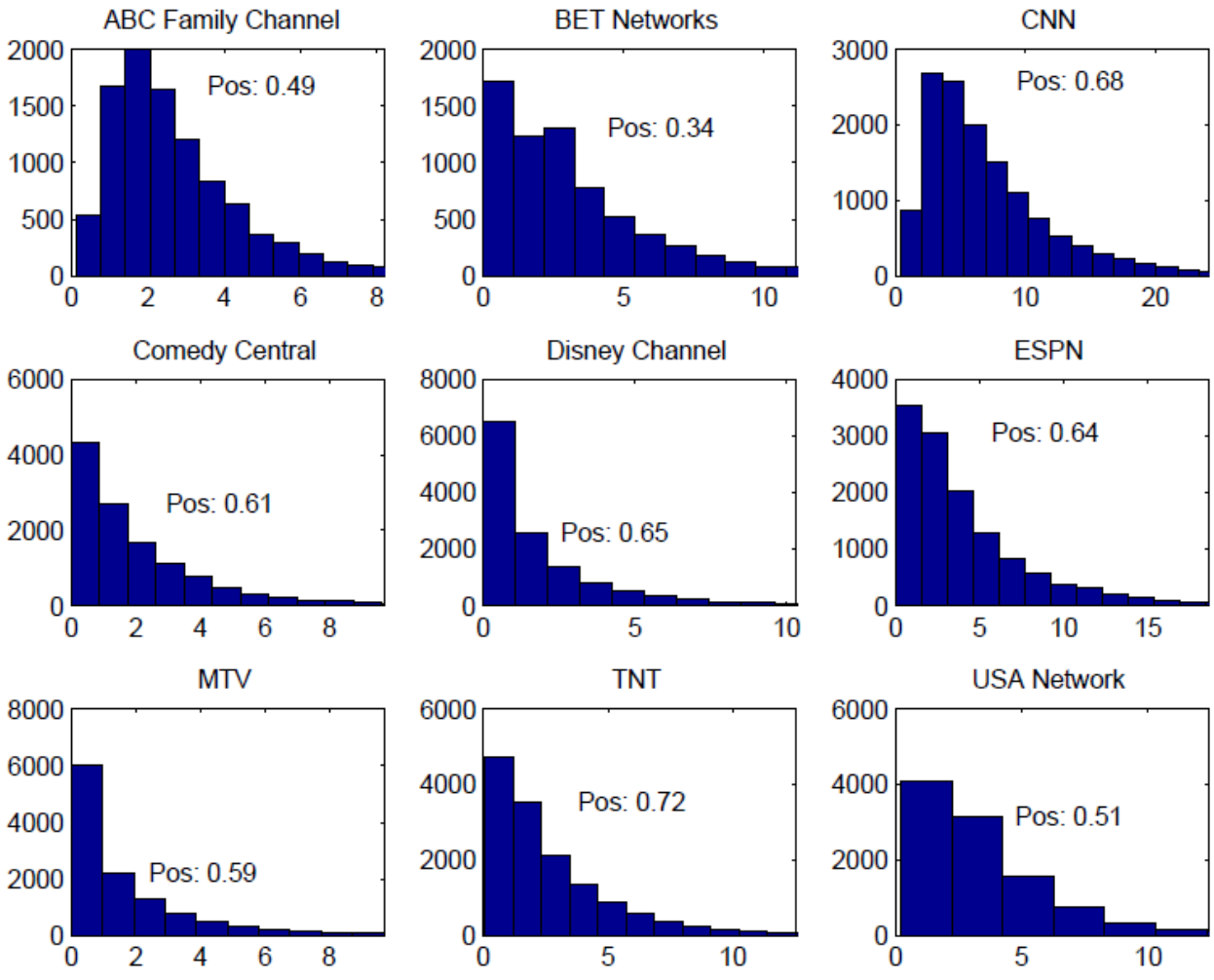
Crawford & Yurokoglu (2011)

- Reasonable bundle price elasticities and implied average margins of 44%, consistent with past work
- WTP estimates mimic Nielsen ratings and Mediamark survey data
- 5% of dispersion in channel preferences attributed to deomgraphics, 95% to unobservables!
- Heterogeneity in demographics does matter for some channels (BET) and correlations 'make sense'
- Input Cost Estimates:
  - Median MC of $11.08 Basic, $20.74 Digital Basic
  - Estimate differences in input costs for downstream firms based on size and vertical integration (not big diff.in costs)
  - 17% lower input costs for Comcast (large distributor)
- Bargaining params fall between 0.25 and 0.75. Distributors vs. large and small channels.

Estimated Viewer WTP

Crawford & Yurokoglu (2011)

Figure 4: Estimated WTP for a Subset of Channels



Estimated WTP

Crawford & Yurokoglu (2011)

Table 4: Estimated WTP

Channel	Mean WTP	StdDev WTP	Share Positive	Mean WTP Family HH	Mean WTP Black HH	Highest Correlated Channel
ABC Family Channel	1.59	2.24	0.49	1.68	1.80	'TV Land '
AMC	1.40	1.59	0.51	1.15	1.83	'MSNBC '
Animal Planet	2.05	3.02	0.58	2.08	1.81	'National Geographic Channel '
Arts & Entertainment	2.10	2.63	0.58	1.90	2.23	'History Channel '
BET Networks	1.27	2.74	0.34	1.34	4.54	'MTV2 '
Bravo	0.65	0.67	0.61	0.63	0.76	'ESPN '
Cartoon Network	2.06	4.01	0.49	2.27	2.54	'Nickelodeon '
CNBC	2.02	2.97	0.55	1.84	2.01	'CNN '
CNN	5.38	5.91	0.68	4.94	8.30	'Fox News Channel '
Comedy Central	1.51	2.39	0.61	1.52	1.34	'MTV '
Country Music TV	0.89	1.56	0.37	0.89	0.79	'Food Network '
Court TV	1.76	3.11	0.50	1.79	2.23	'Arts & Entertainment '
Discovery Channel	2.70	2.99	0.65	2.55	2.67	'Animal Planet '
Disney Channel	1.43	2.51	0.65	1.52	1.72	'Nickelodeon '
E! Entertainment Television	1.15	1.69	0.62	1.16	1.10	'VH1 '
ESPN	3.08	4.46	0.64	2.86	3.63	'ESPN 2 '
ESPN 2	1.80	3.12	0.62	1.75	2.02	'ESPN '
Food Network	2.06	3.25	0.71	2.08	2.18	'TV Guide Channel '
Fox News Channel	4.07	5.89	0.60	4.10	4.69	'CNN '
Fox Sports Net	1.63	2.82	0.55	1.58	1.55	'ESPN 2 '
FX	1.45	2.59	0.51	1.47	1.41	'USA Network '
GSN	0.74	2.97	0.08	0.83	1.51	'ESPN 2 '
Golf Channel	0.52	1.86	0.12	0.38	0.68	'CNN '
Hallmark Channel	1.43	3.96	0.16	1.47	2.09	'Country Music TV '
HGTV	2.60	4.67	0.42	2.59	3.02	'Food Network '
History Channel	2.70	4.06	0.40	2.53	3.09	'Arts & Entertainment '
Lifetime	2.25	3.73	0.31	2.46	5.57	'AMC '
MSNBC	1.69	3.23	0.29	1.38	2.61	'AMC '
MTV	1.22	2.28	0.59	1.25	1.36	'VH1 '
MTV2	0.71	1.23	0.52	0.79	0.63	'VH1 '
National Geographic Channel	1.03	1.60	0.69	1.04	0.92	'Animal Planet '
Nickelodeon	1.31	2.55	0.50	1.45	1.35	'Disney Channel '
Oxygen	0.41	0.44	0.60	0.49	0.64	'Disney Channel '
Syfy	1.74	2.97	0.54	1.74	1.82	'USA Network '
SoapNet	0.49	1.04	0.42	0.52	0.58	'TBS Superstation '
Speed Channel	0.33	0.41	0.56	0.41	0.19	'Versus '
Spike TV	1.18	2.00	0.57	1.18	1.07	'The Weather Channel '
TBS Superstation	2.05	2.85	0.69	1.98	2.23	'TNT '
The Weather Channel	1.71	1.83	0.70	1.59	1.66	'Spike TV '
TLC	1.82	2.81	0.61	1.84	1.57	'Discovery Channel '
TNT	2.36	3.10	0.72	2.31	2.54	'USA Network '
Toon Disney	0.44	1.69	0.13	0.57	0.90	'Cartoon Network '
Travel Channel	0.76	2.27	0.15	0.80	0.74	'Nickelodeon '
TV Guide Channel	0.50	0.75	0.57	0.54	0.60	'Food Network '
TV Land	2.06	3.40	0.59	2.11	2.45	'ABC Family Channel '
USA Network	2.12	3.19	0.51	2.19	2.62	'TNT '
Versus	0.23	0.31	0.49	0.28	0.21	'Speed Channel '
VH1	0.74	1.28	0.56	0.75	0.90	'MTV2 '
WE: Women's Entertainment	0.45	0.69	0.50	0.49	0.53	'National Geographic Channel '

Input Cost Model Results

Crawford & Yurokoglu (2011)

Table 5: Input Cost Parameters

	All Moments		No Bundling Moments	
Parameter	*Estimate*	*Standard Error*	*Estimate*	*Standard Error*
Constant	0.16	0.00	0.20	0.00
Kagan Scale	0.91	0.00	0.93	0.00
MSO Size	-0.08	0.00	-0.10	0.00
Vertical Integration Dummy	-0.14	0.01	-0.16	0.01

Bargaining Results

Crawford & Yurokoglu (2011)

Table 7: Conglomerate Bargaining Parameters

Conglomerate	Big Cable	Small Cable	DirecTV	Dish Network
ABC Disney	0.28	0.25	0.18	0.17
Viacom	0.49	0.48	0.54	0.53
NBC Universal	0.50	0.49	0.52	0.51
Comcast (Content Division)	0.69	0.68	0.67	0.66
Scripps	0.55	0.55	0.58	0.58
News Corporation	0.42	0.39	0.34	0.32
Rainbow Media	0.70	0.69	0.68	0.67
Discovery Networks	0.62	0.61	0.63	0.63
Time Warner	0.40	0.38	0.38	0.37
Hallmark	0.69	0.69	0.71	0.71
Lifetime	0.43	0.43	0.43	0.43
Oxygen	0.73	0.72	0.71	0.70
Weather Channel	0.69	0.69	0.69	0.69
TV Guide	0.77	0.77	0.76	0.76

Counterfactual Results

Crawford & Yurokoglu (2011)

- Socially optimal (fixed channels) to give every household with positive WTP every channel
- Bundling excludes those who value some channels
- A la carte allows them to purchase some, but excludes some others who don't want to pay marginal price for certain channels (but still have positive WTP)
- Bundling theory suggests consumers with highly variant prefs. better off in a la carte
- Long-run implications of model really are unclear. Which channels will exit and which will enter?
- Short-run assumptions:
  - Preferences invariant to change
  - No entry and exit, no programming changes
  - Other costs (marketing etc.) are same
  - No extra cognitive costs

Counterfactual Results

Crawford & Yurokoglu (2011)

- Compute bundling, a la carte with no input price renegotiation, and a la carte with price renegotiation
- Also simulate change in ad revenue (but different types of consumers are watching in a la carte!!!)
- Without renegotiation consumer surplus up 19.2% with a la carte, total surplus up 4%
- With regenotiation consumers surplus up 0.2%, total surplus up 2.4%
- Input prices up 103%, consumer payments up 2.2%
- Considerable heterogeneity across channels in impact of a la carte (both license fees and advertising revenue impacted)
- Theme-tiers and bundle size pricing

Welfare Impact

Crawford & Yurokoglu (2011)

Table 8: Baseline Counterfactual Results: Full À La Carte

	Bundling	ALC No Reneg	% Change	ALC With Reneg	% Change
Non-welfare Outcomes					
Cable & Sat Penetration	0.880	0.998	13.3%	0.993	12.8%
Total Affiliate Fees	$18.22	$18.22	0.0%	$36.98	103.0%
Mean Consumer Expn	$27.63	$21.07	-23.8%	$28.24	2.2%
Number Channels Received	42.8	22.0	-48.5%	19.3	-54.9%
Number Channels Watched	22.2	22.0	-0.5%	19.3	-12.8%
Welfare Outcomes					
Channel Profits					
Total License Fee Rev	$16.03	$7.95	-50.4%	$15.44	-3.7%
Total Advertising Rev	$13.38	$14.71	10.0%	$14.73	10.1%
Total Channel Revenue	$29.41	$22.67	-22.9%	$30.16	2.6%
Distributor Profits	$11.59	$13.11	13.1%	$12.81	10.4%
Total Industry Profits	$41.00	$35.78	-12.7%	$42.97	4.8%
Mean Consumers Surplus	$45.82	$54.59	19.2%	$45.91	0.2%
Total Surplus	$86.82	$90.37	4.1%	$88.88	2.4%

Counterfactual Channel Impact

Crawford & Yurokoglu (2011)

Table 9: Input Cost and Welfare Effects by Channel

	Input Cost Effects			Profit Effects				
Channel	Bundling Input Cost	ALC Input Cost	% Change	Total Bundling Revenue	Total ALC Revenue	% Change	% Change License Fee Rev	% Change Advert Rev
ABC Family Channel	$0.32	$0.83	156.9%	$0.46	$0.58	24.5%	29.9%	15.9%
AMC	$0.32	$0.54	67.8%	$0.41	$0.43	3.9%	-2.2%	16.9%
Animal Planet	$0.20	$0.97	372.8%	$0.25	$0.53	109.3%	150.0%	9.8%
Arts & Entertainment	$0.31	$1.08	250.6%	$0.57	$0.91	58.8%	109.4%	13.3%
BET Networks	$0.26	$0.58	127.3%	$0.56	$0.55	-1.7%	-26.8%	15.4%
Bravo	$0.27	$0.51	92.3%	$0.39	$0.40	1.4%	2.0%	0.6%
Cartoon Network	$0.26	$0.78	199.1%	$0.54	$0.62	14.7%	19.4%	11.3%
CNBC	$0.34	$0.93	170.6%	$0.53	$0.70	30.7%	43.7%	13.6%
CNN	$0.49	$2.92	498.0%	$0.81	$1.98	144.1%	265.3%	7.2%
Comedy Central	$0.23	$0.66	187.5%	$0.61	$0.72	18.2%	43.2%	5.8%
Country Music TV	$0.18	$0.56	211.1%	$0.26	$0.29	10.8%	17.7%	0.2%
Court TV	$0.22	$0.85	276.1%	$0.35	$0.49	41.5%	63.9%	12.2%
Discovery Channel	$0.34	$1.47	339.6%	$0.59	$1.16	95.9%	182.0%	10.0%
Disney Channel	$0.77	$0.70	-8.9%	$0.68	$0.27	-59.6%	-59.6%	0.0%
E! Entertainment Television	$0.30	$0.48	62.0%	$0.41	$0.38	-7.6%	-15.8%	7.2%
ESPN	$2.44	$0.87	-64.5%	$3.80	$2.33	-38.6%	-75.9%	9.5%
ESPN 2	$0.33	$0.71	114.2%	$0.46	$0.48	3.9%	1.8%	7.7%
Food Network	$0.19	$0.85	352.9%	$0.49	$0.71	44.0%	122.1%	4.5%
Fox News Channel	$0.36	$1.83	411.8%	$0.70	$1.27	82.4%	171.8%	8.9%
Fox Sports Net	$1.56	$0.79	-49.3%	$1.51	$0.46	-69.4%	-77.4%	8.9%
FX	$0.36	$0.68	90.3%	$0.61	$0.58	-5.3%	-19.8%	10.2%
GSN	$0.19	$0.42	124.3%	$0.23	$0.12	-47.7%	-76.0%	20.7%
Golf Channel	$0.32	$0.14	-57.5%	$0.37	$0.10	-72.6%	-99.9%	14.9%
Hallmark Channel	$0.17	$0.63	272.5%	$0.33	$0.32	-3.7%	-28.6%	17.1%
HGTV	$0.25	$1.04	310.8%	$0.60	$0.82	38.4%	77.2%	15.2%
History Channel	$0.29	$2.29	699.5%	$0.53	$1.16	120.5%	237.0%	13.5%
Lifetime	$0.32	$0.85	166.8%	$0.81	$0.88	9.3%	-4.6%	16.7%
MSNBC	$0.26	$0.69	168.3%	$0.33	$0.31	-4.8%	-14.6%	16.1%
MTV	$0.37	$0.47	28.3%	$1.02	$0.93	-8.4%	-44.6%	8.6%
MTV2	$0.17	$0.54	223.0%	$0.19	$0.21	9.4%	12.4%	-0.5%
National Geographic Channel	$0.29	$0.65	120.9%	$0.34	$0.32	-5.1%	-6.2%	-1.2%
Nickelodeon	$0.48	$0.45	-7.5%	$1.38	$1.23	-10.5%	-61.8%	12.5%
Oxygen	$0.24	$0.09	-63.7%	$0.31	$0.16	-48.0%	-76.1%	16.5%
Syfy	$0.27	$0.70	160.0%	$0.55	$0.63	15.3%	18.3%	13.0%
SoapNet	$0.22	$0.44	98.8%	$0.24	$0.15	-37.9%	-47.0%	3.7%
Speed Channel	$0.27	$0.42	56.7%	$0.32	$0.18	-43.9%	-51.8%	-21.3%
Spike TV	$0.29	$0.60	106.7%	$0.54	$0.53	-1.1%	-8.6%	5.8%
TBS Superstation	$0.38	$0.88	132.0%	$0.89	$1.04	16.5%	33.1%	6.6%
The Weather Channel	$0.22	$0.60	174.4%	$0.34	$0.56	64.7%	102.4%	15.1%
TLC	$0.27	$0.83	205.9%	$0.42	$0.57	35.7%	55.5%	9.5%
TNT	$0.84	$0.93	11.1%	$1.35	$1.15	-15.2%	-33.6%	6.9%
Toon Disney	$0.21	$0.39	86.1%	$0.24	$0.10	-57.9%	-83.2%	17.7%
Travel Channel	$0.26	$0.45	69.7%	$0.32	$0.16	-50.5%	-74.9%	14.4%
TV Guide Channel	$0.16	$0.14	-16.2%	$0.24	$0.18	-24.3%	-49.4%	15.9%
TV Land	$0.21	$0.86	301.1%	$0.34	$0.53	57.0%	92.8%	11.9%
USA Network	$0.51	$0.84	65.0%	$1.13	$1.17	3.7%	-12.2%	14.1%
Versus	$0.25	$0.29	17.7%	$0.26	$0.13	-51.8%	-60.4%	-8.9%
VH1	$0.24	$0.44	80.8%	$0.55	$0.50	-9.7%	-27.3%	1.4%
WE: Women's Entertainment	$0.22	$0.32	46.1%	$0.26	$0.19	-28.5%	-39.8%	5.1%
Total	$18.22	$36.98	103.0%	$29.41	$30.16	2.6%	-3.7%	10.1%

Robustness

Crawford & Yurokoglu (2011)

- Robustness checks they do, among others, include:
  - Positive distributor channel margins in counterfactual
  - Different preference distributions
  - No taste correlation
  - Half or double renegotiated input cost (makes a huge impact!!!)
  - Relax value-time watched link
- If input costs change by half, consumer welfare goes up 18%, if it doubles, -27%!

Final Questions and Thoughts

Crawford & Yurokoglu (2011)

- Model is well-written and possible to understand: implementation/mechanics of what is driving identification could take another 20 pages to explain clearly
  - Could this be easily replicated, even with the same data?
- One way to answer this question. Paper makes important theoretical point, couldn't be answered with simple data variation currently (maybe possible in future?)
- What are the assumptions that bother you the most?
- Would you feel comfortable using this to inform policy?
- What are ways to potentially simplify what they have done without losing the ability to say something?
- Are there any data problems that interact with the model in an undesirable way?