

Advertising when experts choose and insurers pay: Selling drugs to patients

Rhema Vaithianathan
University of Auckland

CAER Workshop
28 January 2004

The Issue

- NZ and US permit Direct-to-consumer advertising (DTC) advertising of prescription drugs
- Prescription drugs is a doctor's decision, so why is advertising to patients profitable?

Economic Explanations for Advertising (Bagwell, 2001)

- Persuasive
- Search goods
- Signaling quality of experience goods
- Entry-deterrence
- Complement to consumption
- All work at the *purchaser* level

The general intuition of present paper

- When goods are purchased by uninformed consumers consulting an expert in a signaling game, advertising can change the equilibrium of the doctor-patient game

- Example of advertising for a BMI of 35
 - “Xenical may be right for you if you are considerably overweight (at least 30% above ideal weight or a BMI of 30 or greater) ...or you have other risk factors such as high blood pressure, high cholesterol, heart disease or diabetes.”

Drug company's view

“As managed care becomes the health care model and cost containment the watchword, physicians are no longer the magic road to profits. ... The physician in managed care is being dictated [to about] what he prescribes. The idea in going to the patient is to get the patient to pull the product through.” (US Drug Marketing Executive)

Patient's View

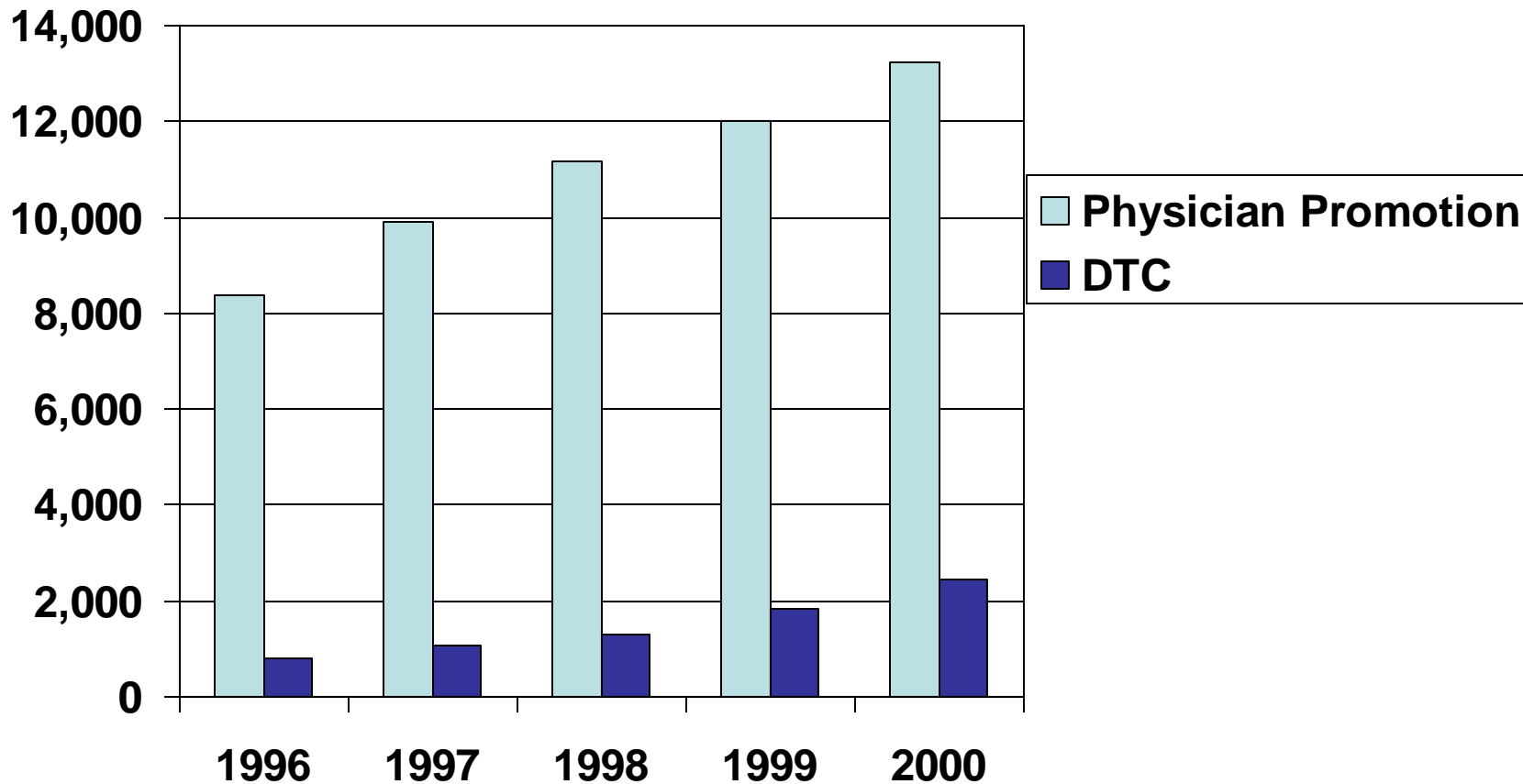
- *“one patient informed me that it was her body and that drug companies used DTC because Doctors don't have patient's best interest at heart’!! (NZ GP Survey)*

Doctor's View

“I have lost quite a few patients because I did not prescribe Xenical, Reductil, Symbicort etc. (advertised drugs) because they were not appropriate” (NZ GP survey)

The Policy Context

DTC and physician promotion trends (US)



Source: Rosenthal, Berdnt and Donohue *et al* (2003)

Banning DTCA favoured

- DTCA is thought to
 1. Increases utilisation and expenditure
 2. Uninformative due to the drug company bias
 3. Interferes with patient-doctor relationship
 4. Inappropriate prescribing

Objective

- Analyse incentives on the part of the advertiser to advertise *prescription* drugs
- Compare three regimes:
 1. DTCA Banned
 2. Permissive DTCA
 3. Regulated DTCA

The Model

Timing of Game

DTCA BANNED

- Nature moves
- -
- Doctor signals state to patient
- Patient forms belief on state and {REQUEST, NOT REQUEST}
- Doctor {TREAT, NOT TREAT}

DTCA

1. Nature moves
2. Advertiser {AD, No AD}
3. Doctor signals state to patient
4. Patient forms belief on state and {REQUEST, NOT REQUEST}
5. Doctor {TREAT, NOT TREAT}

1. State of Nature (θ) determines net benefit to patient
 - e.g. patient has BMI of 35, is Xenical a good idea?
 - 4 states with equal probability
2. Drug company observes state and advertises or not
 - eg: “Xenical is proven effective for those with BMI >30”
 - Permissive Regime
 - Advertise permitted in all states
 - Truth-in-Advertising Regime
 - Advertise only allowed in states *where benefits are greater than side-effects*

3 – 5. Patient doctor game

- All patients see the doctor
- Doctor signals state
 - e.g. “The side effects of Xenical greater than benefit for patients with BMI < 40”
- Patient observes advertising and what the doctor says
- Patient decides on REQUEST
 - “I want to be prescribed Xenical”
- Doctor decides on TREAT

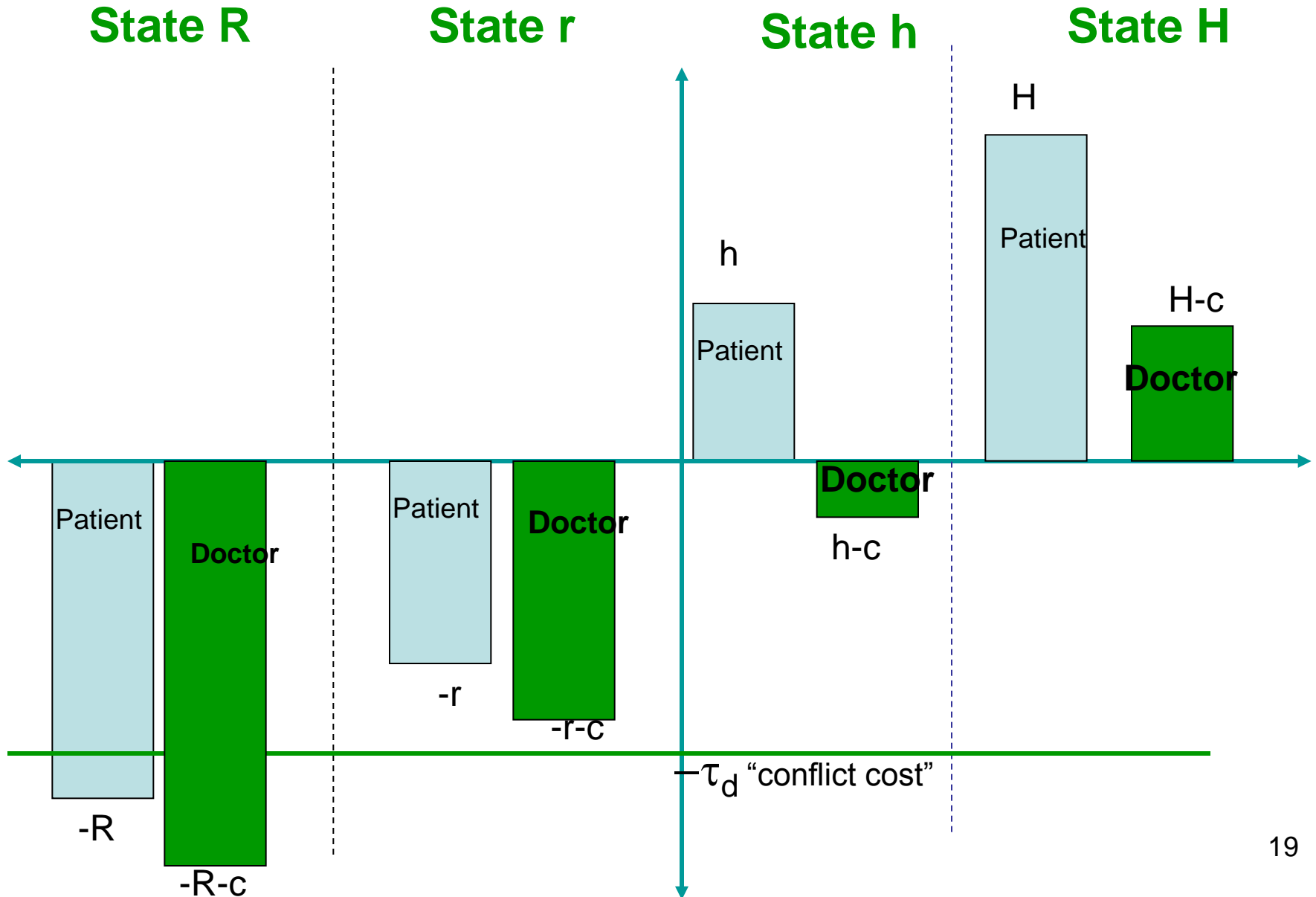
Payoff

- Doctor cares about benefit to patient BUT supply side cost sharing scheme imposes c every time he prescribes
- If a patient requests and doctor refuses, there is conflict cost of τ_d and τ_p
- 69% of NZ GPs surveyed said they felt under pressure to prescribe advertised drug (Toop, 2003)
- Costs α for drug co to advertise
- Gets π when drug prescribed

Payoffs

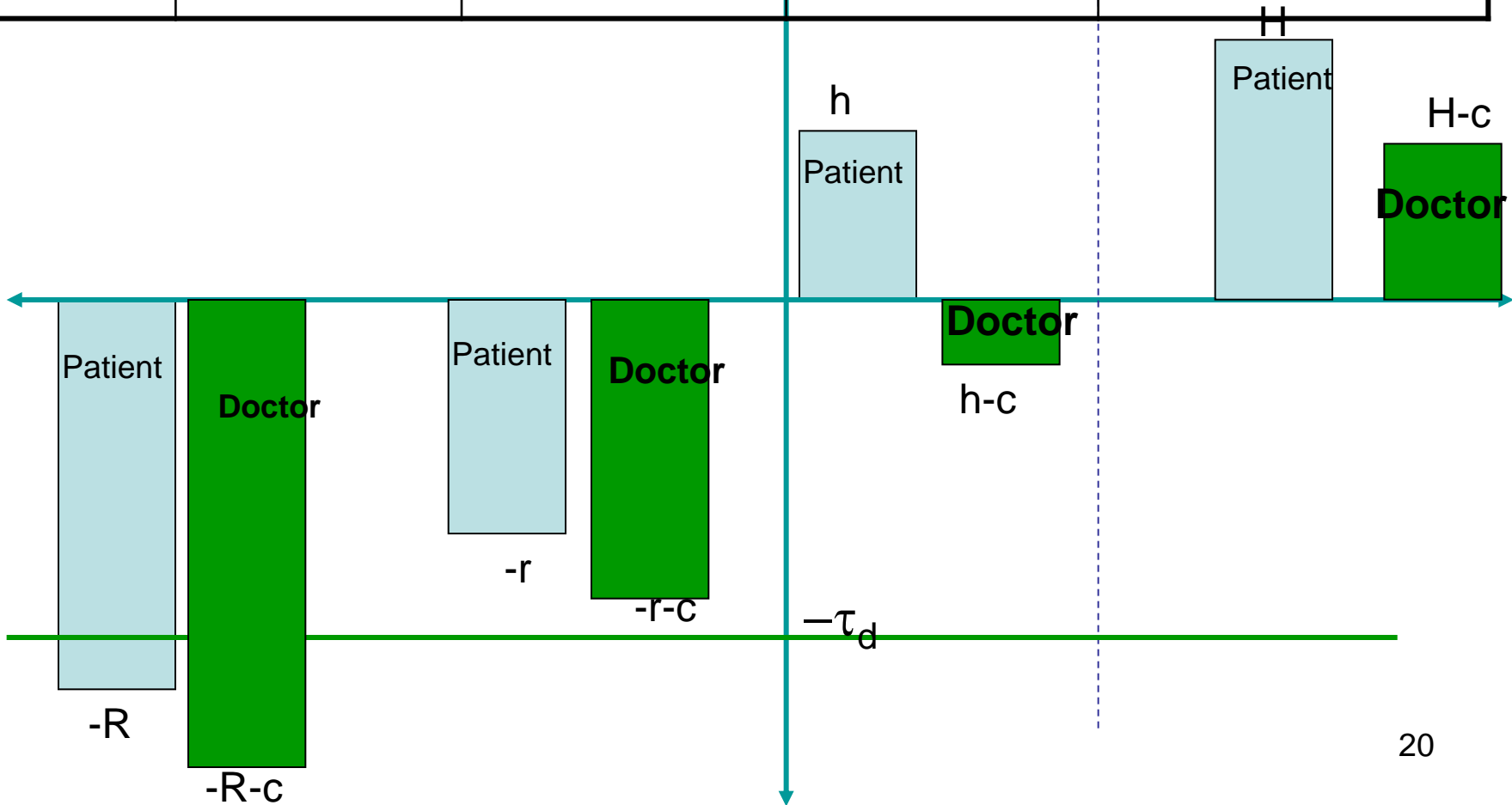
	Doctor	Patient	Drug Company	
			<i>Advertise</i>	<i>Not Advertise</i>
No Request	0	0	$-\alpha$	0
Request and Treat	<i>benefit</i> (θ) $- c$	<i>benefit</i> (θ)	$\pi - \alpha > 0$	π
Request and Not Treat	$-\tau_d$	$-\tau_p$	$-\alpha$	0

Treatment Pay-offs (θ)



Incentives (θ)

Doctor	NO REQUEST	NO REQUEST	NO REQUEST	REQUEST
...if requested	REFUSE	TREAT	TREAT	TREAT
Patient	NO REQUEST	NO REQUEST	REQUEST	REQUEST



Equilibrium

Solution concept

- DTCA Banned is a 2 player cheap-talk game
- DTCA permitted is a 3 player signaling game
- Pure Strategy
- Perfect Bayesian Nash Equilibrium
 - on observing AD/ NO AD and hearing doctor, patients update on state using Bayes rule (where possible)
 - Everyone's message/ actions maximise their expected utility
- Neologism proof

DTCA Banned Game

1. Nature moves
2. -
3. Doctor signals state to patient
4. Patient forms belief on state and {REQUEST, NOT REQUEST}
5. Doctor {TREAT, NOT TREAT}

An Equilibrium in DTCA Banned Game

If Doctor Says:

H'

h'

r'

R'

Patient Believes:

H

{h,r,R}

{h,r,R}

{h,r,R}

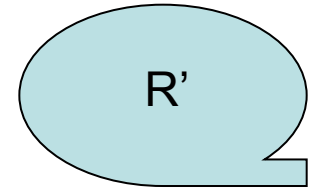
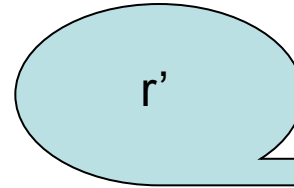
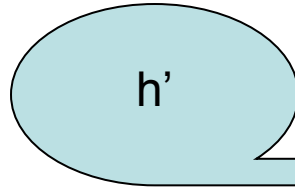
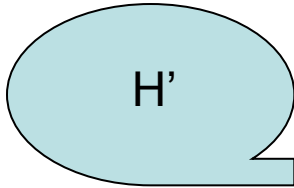
	H	h	r	R
Doctor Says	H	R	R	R
Patient	REQUEST	?	?	?
Doctor	TREATS			

What does the patient do if she believes $\{h,r,R\}$?

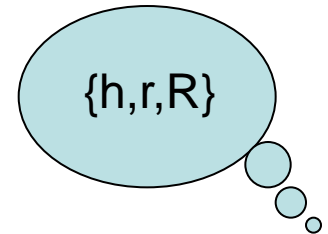
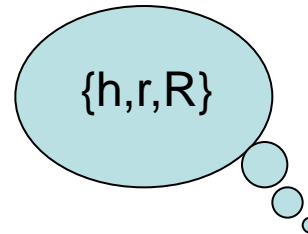
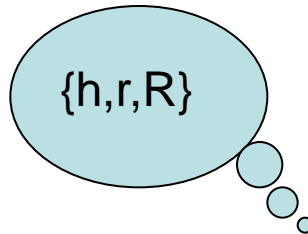
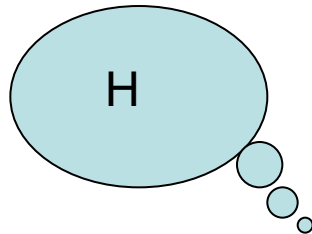
- Bayes rule and pure strategy implies equal chance of h,r , and R
- NOT REQUEST if $h-r-\tau_d < 0$
- We refer to this as $\{H\}^{\text{REQ}} \{h,r,R\}^{\text{NREQ}}$

$\{H\}$ REQ $\{h,r,R\}$ NREQ

If Doctor Says:



Patient Believes:



	H	h	r	R
Doctor Says	H	R	R	R
Patient	REQUEST	NOT REQUEST	NOT REQUEST	NOT REQUEST
Doctor	TREATS			

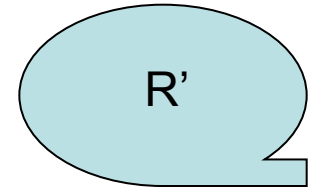
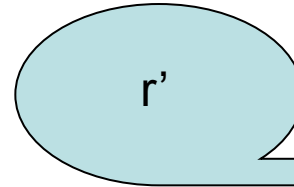
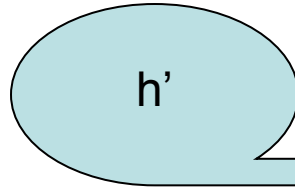
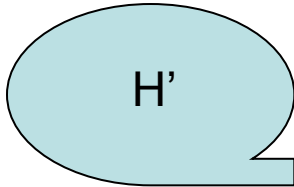
The Neologism Proof Refinement

- Due to Farrell (1993)
- Credible off equilibrium statements can break equilibria
- It is therefore a refinement of PBNE
- Allows us to eliminate the following equilibria

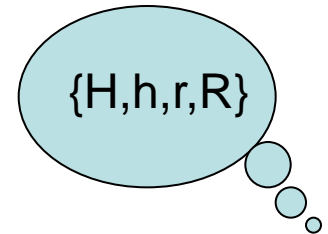
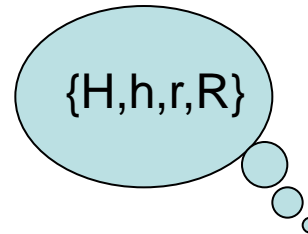
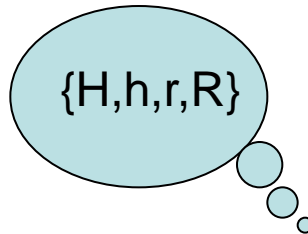
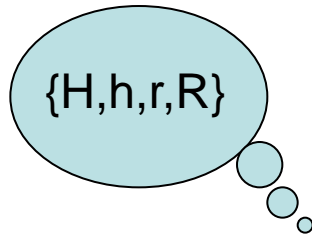
$\{H, h, r, R\}^{NREQ}$ is PBNE

Assume $H+h-r-\tau_p < 0$

If Doctor Says:



Patient Believes:



	H	h	r	R
Doctor Says	R	R	R	R
Patient	NOT REQUEST	NOT REQUEST	NOT REQUEST	NOT REQUEST

DTCA Banned Equilibria

- Equilibria depends on size of h
- The smaller the h the better the agency relationship

$r + \tau_p < h$	$\{H, h, r, R\}^{REQ}$	Doctor-patient conflict
$r + \tau_p > h$	$\{H\}^{REQ} \{h, r, R\}^{REQ}$	Patient Compliance

Permissive DTCA

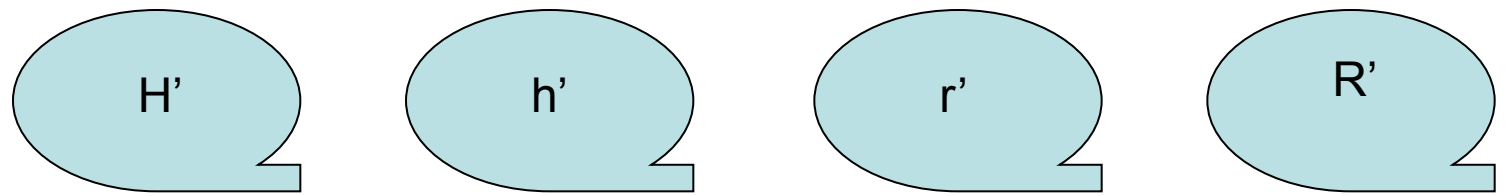
Drug Company

- Can advertise in *any* state
- Does not want to advertise in R
- Patients know this

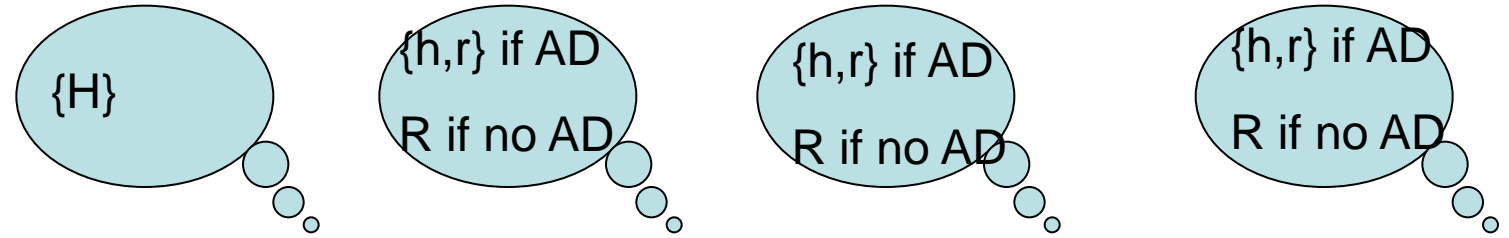
$\{H\}^{REQ} \{h,r\}^{REQ} \{R\}^{NREQ}$ is NP-PBNE

Assume $h > r$

If Doctor Says:



Patient Believes:



	H	h	r	R
Drug Co	NO AD	AD	AD	NO AD
Doctor Says	H' (Ad or not)	R' (Ad or not)	R' (Ad or not)	R' (Ad or not)
Patient	REQUEST	REQUEST	REQUEST	NOT REQUEST

Advertising with Permissive DTCA

- The DTCA Banned NO AD equilibria continue to be equilibria
- Additional Advertising Equilibria are

$r < h$	$\{H\}^{REQ,NO AD} \{h,r\}^{REQ,AD}$ $\{R\}^{NREQ,}$	Advertising is Informative
$r > h$	No Advertising Equilibria	Doctor is too good an agent

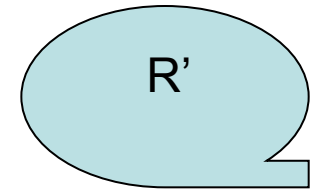
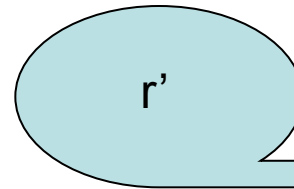
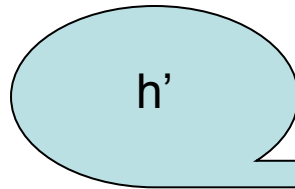
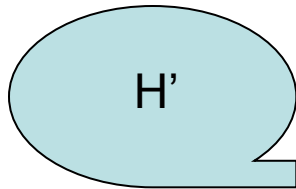
Truth-in-Advertising

Drug Company

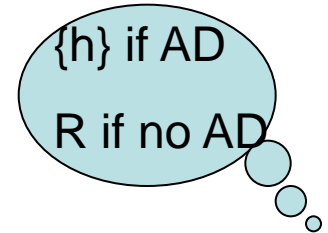
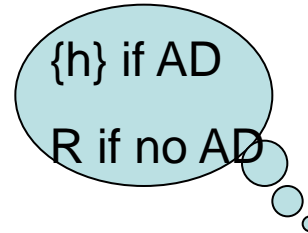
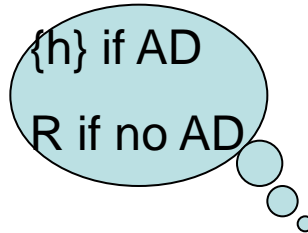
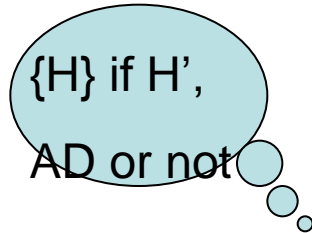
- Can advertise only in H and h
- Patients know this
- So, when observing advertising, always believe $\{H,h\}$
- Advertising is as credible as the doctor
- Advertising equilibria always exists

$\{H\}^{REQ} \{h\}^{REQ} \{r,R\}^{NREQ}$ is NP-PBNE

If Doctor Says:



Patient Believes:



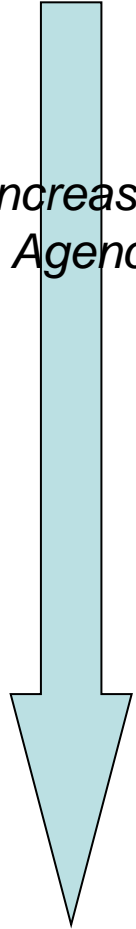
	H	h	r	R
Drug Co	NO AD	AD	(NO AD)	(NO AD)
Doctor Says	H' (Ad or not)	R' (Ad or not)	R'	R'
Patient	REQUEST	REQUEST	REQUEST	NOT REQUEST

Advertising with Regulated DTCA

- $\{H\}^{REQ, No AD} \{h\}^{REQ, AD} \{r, R\}^{NREQ}$ is always an equilibria
- When h is small, NO ADVERTISING is no an equilibria under regulated regime

Summary

Increasing Agency



	Banned	Permissive	Regulated
$h > r + \tau_p$ "Conflict"	$\{H, h, r, R\}^{REQ}$	No-Ad <i>plus</i> $\{H\}^{REQ, NOAD}$ $\{h, r\}^{REQ, AD}$ $\{R\}^{NREQ, NO AD}$	No-Ad <i>plus</i> $\{H\}^{REQ, NOAD}$ $\{h\}^{REQ, AD}$ $\{R\}^{NREQ, NO AD}$
$h < r + \tau_p$ "Partial Agency"	$\{H\}^{REQ}$ $\{h, r, R\}^{NREQ}$	No Ad <i>plus</i> $\{H\}^{REQ, NOAD}$ $\{h, r\}^{REQ, AD}$ $\{R\}^{NREQ, NO AD}$	$\{H\}^{REQ, NOAD}$ $\{h\}^{REQ, AD}$ $\{R\}^{NREQ, NO AD}$
$h < r$ "Strong Agency"	$H\}^{REQ}$ $\{h, r, R\}^{NREQ}$	NO EQ	$\{H\}^{REQ, NOAD}$ $\{h\}^{REQ, AD}$ $\{R\}^{NREQ, NO AD}$

Arguments against DTCA

“DTCA increases utilisation and the drug bill ”

Number of States in which the drug is sold			
	Banned	Permissive Advertising	Regulated
$h > r + \tau_p$ “Conflict”	3	3	2
$h < r + \tau_p$ “Partial Agency”	1	3	2
$h < r$ “Strong Agency”	1	NO EQ	2

- Maximum states are 3
- Care with interpreting empirical studies
- Equilibrium advertising is followed by REQUEST and TREAT
- Does not imply that advertising *induces* treatment

“DTCA increases doctor-patient conflict”

Doctor's pay-off		Patient's Pay-off		
	Banned	Permissive Advertising	Regulated	
$h > r + \tau_p$ “Conflict”	$H + h - r - 3c - \tau_d$ $H + h - r - \tau_d$	$H + h - r - 3c$ $H + h - r$	$H + h - 2c$ $H + h$	
$h < r + \tau_p$ “Partial Agency”	$H - c$ H	$H + h - r - 3c$ $H + h - r$	$H + h - 2c$ $H + h$	
$h < r$ “Strong Agency”	$H - c$ H	No Equilibrium	$H + h - 2c$ $H + h$	

Advertising reduces conflict costs (τ_d)

US vs. NZ

“Drug companies never comply with regulated DTCA”

Drug Company Pay-off			
	Banned	Permissive Advertising	Regulated
$h > r + \tau_p$ “Conflict”	3π	$3\pi - 2\alpha$	$2\pi - \alpha$
$h < r + \tau_p$ “Partial Agency”	π	$3\pi - 2\alpha$	$2\pi - \alpha$
$h < r$ “Strong Agency”	π	No Equilibrium	$2\pi - \alpha$

- Drug companies maximise their profit with banning and doctor agent conflict
- Prefer regulation under strong agency

“DTCA increases harmful treatment”

Drug prescribed is state r ? Advertising in state r ?			
	Banned	Permissive Advertising	Regulate
$h > r + \tau_p$ “Conflict”	Yes No Ad	Yes Ad	No No
$h < r + \tau_p$ “Partial Agency”	No No Ad	Yes Ad	No No
$h < r$ “Strong Agency”	No No Ad	No Equilibrium	No No

- Drug never prescribed or advertised in R
- Regulated advertising minimises harmful treatment
- Drug companies never advertise in H

Industry View Supports Regulation

- *[regulation of DTCA] builds public confidence in advertising, and thereby increases the effectiveness of advertising investments, by acting in visible ways to ensure the accuracy of the information consumers get in ads." (Advertising Age, 2003)*

Conclusion

- advertising only works when there is some doctor-patient conflict
- patients always (ex post) better off with advertising
- Drug companies, doctors and third-party payers may or may not be better off with banning
- Regulation needs to monitor r states not R

Additional Issues

- Equilibrium Selection
- Ignore strategic pricing of drugs
- Ex-ante efficiency
- Supply side cost sharing (h) is endogenous
- Doctors might have superior information