Five Questions for Health Economics

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Presidential Address
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(ASHEcon)

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Q4:

How well is competition in the market where you live working at keeping down the costs of health care?

Managed competition?

- Much of the existing focus on promoting competition to control costs has its origins in the work on Managed Competition, laid out in Enthoven and Kronick, NEJM, 1989.
- Can it work in the US?

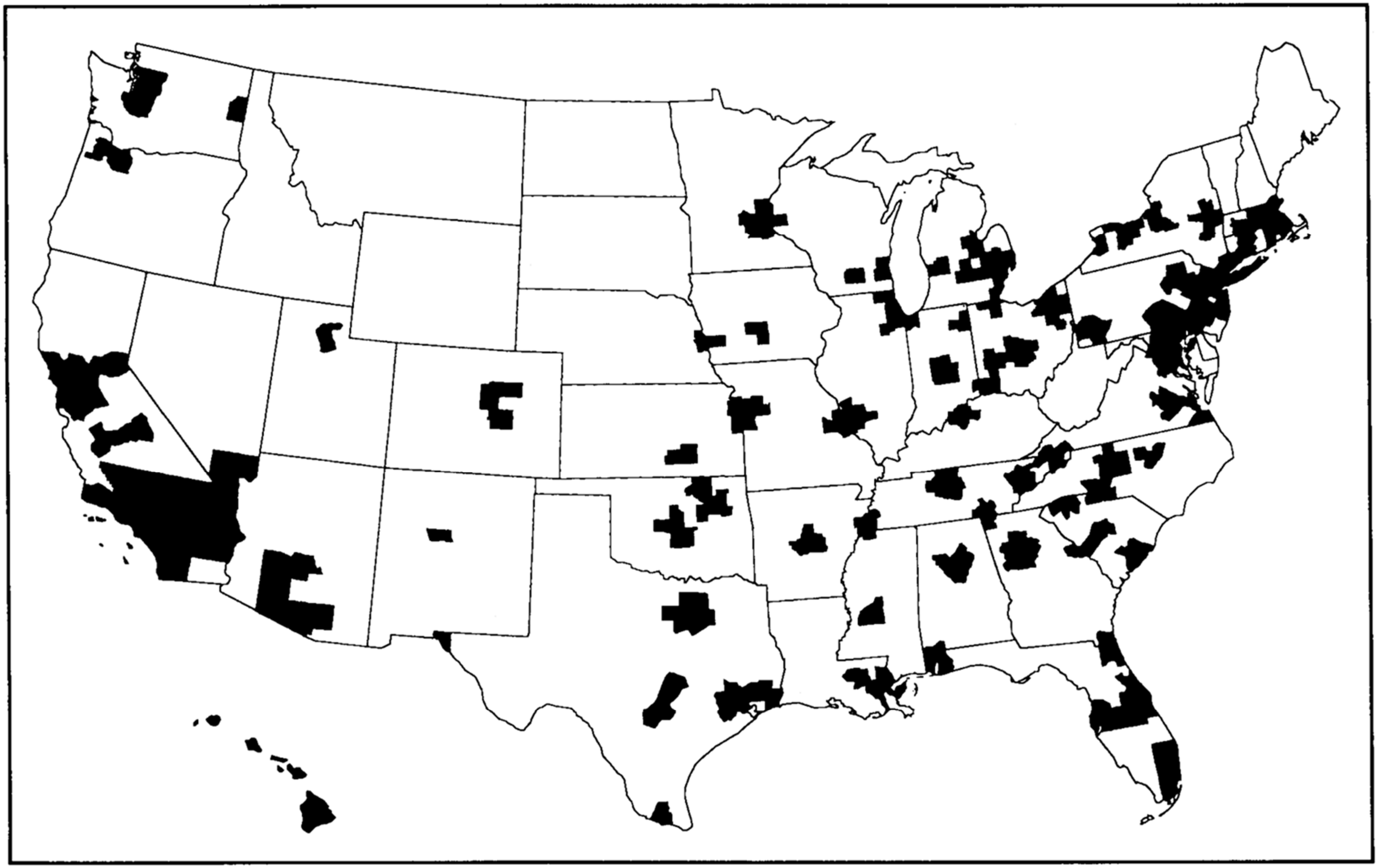

Figure 1. Health Markets with Populations ≥360,000 in the United States.
Metropolitan areas (health markets) with populations ≥360,000 are shown in black.

Source: The Marketplace in Health Care Reform -- The Demographic Limitations of Managed Competition
Richard Kronick, David C. Goodman, John Wennberg, and Edward Wagner
N Engl J Med 1993; 328:148-152January 14, 1993

Dafny, Duggan, Ramanarayanan, AER, 2012

- AMA: 94% of 314 market areas were found to have "highly concentrated" insurance markets
- Using a large employer health insurer dataset, 1998-2006 they analyzed health plans in 139 market areas and found:
  - The fraction falling into the top "highly concentrated" category (HHI > 1800) increased from 69 to 99%
  - The median four-firm concentration ratio increased from 79 to 90%
  - The proportion of large firms self-insuring increased from 55 to 80%

Robert Kocher, and Nikhil R. Sahni, *NEJM*, 2011

- The past decade has seen a 75% increase in hospital-owned doctor practices,
- More than half of physician practices now owned by hospitals.

Ellis, “Employee Choice of Health Insurance” REStat, 1989

- Documented severe biased selection in one natural experiment cost differences of 5:1
- 31% of enrollees either defaulted (refusing to make a choice) or chose an inferior plan
- Non-parametric estimates of loss function suggest risk-loving behavior toward large losses

Ellis, Employee Choice of Health Insurance, *REStat*, 1989

1982-1983 Large NY financial firm begins to offer flexible benefits in place of the one indemnity plan it had previously been offering.

Ignored 6% in HMOS

All plans have same 20% Copay after deductible, and full inpatient coverage,

	Premium	Deductible	Stoploss
1982 plan:	$85	$100	$1000
1983 plans			
Plan 1	$ 156	$100	$2000
Plan 2	$ 96	$200	$1000
Plan 3	$ 80	$300	$1000

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Ellis, Employee Choice of Health Insurance, *REStat*, 1989

All plans have same 20% Copay after deductible, and full inpatient coverage,

	Premium		Deductible	Stoploss
1982 plan:	$85		$100	$1000
1983 plans:				
Plan 1	$ 156	> **60**	$100	**$2000**
Plan 2	$ 96	> **16**	**$200**	$1000
Plan 3	$ 80		**$300**	$1000

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What plan would you choose?

Two key findings

Dominated plan

- Conducted benefit coverage simulations for various people according to their year one levels of health spending, and Plan 1 is never an optimal plan given the high incremental (+$60) premium, and *the* higher stoploss.

Defaulters

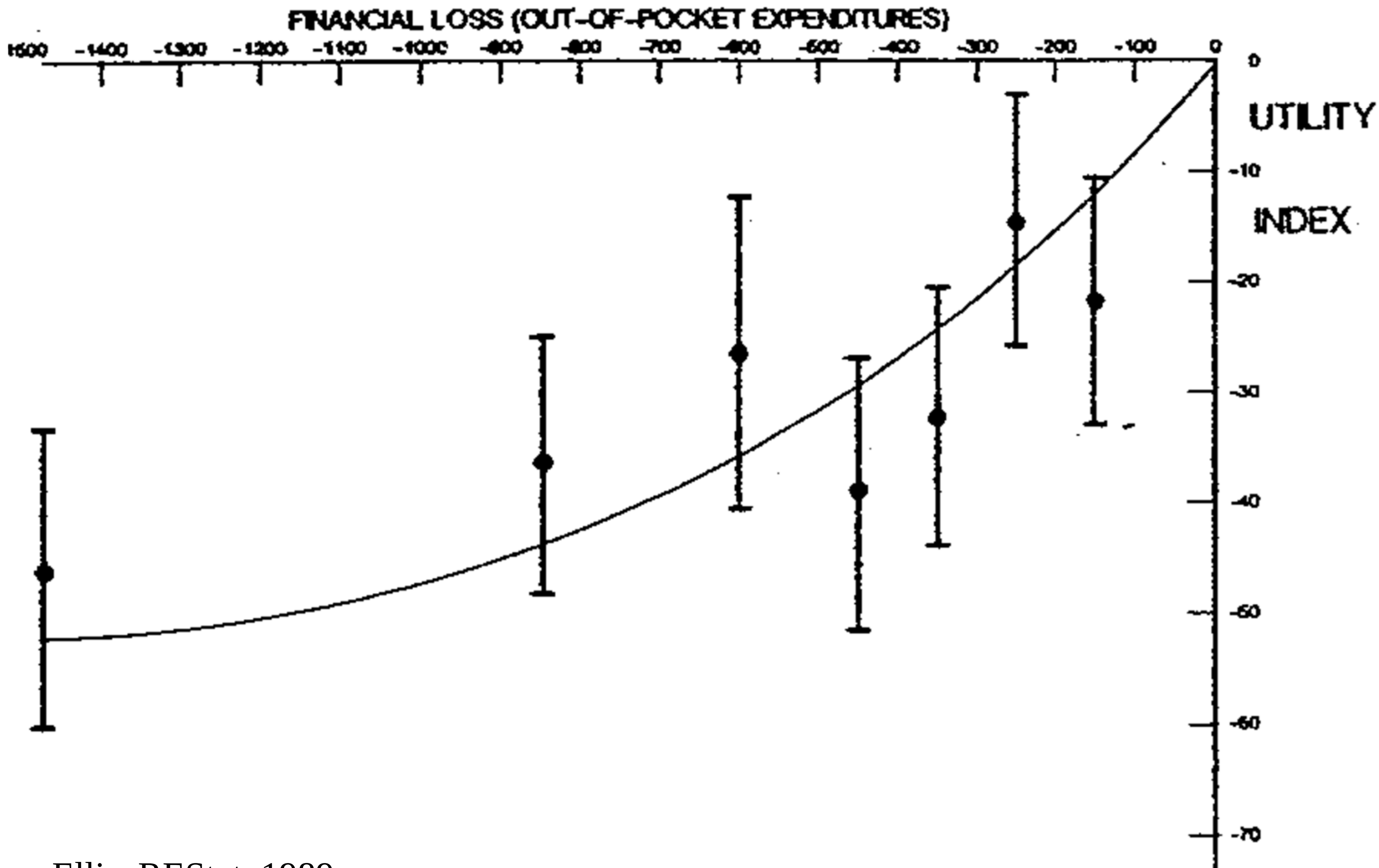
- Although the bank tried to get everyone to choose one of the plans 14.4 percent refused to and defaulted into plan 1.

MEANS AND STANDARD DEVIATIONS OF VARIABLES BY HEALTH COVERAGE CHOICE FOR CONTINUOUSLY ELIGIBLE PLAN ENROLLEES WITH INDIVIDUAL COVERAGE

	Plan 1 Enrollees				
	Defaulters	Choosers	Plan 2	Plan 3	All Enrollees
Age	33.9	37.0	37.4	35.2	36.3
1982 Covered $	421	806	588	94	544
	(1481)	(1907)	(4061)	(533)	(3234)
1983 Covered $	546	1035	683	221	669
	(2079)	(3066)	(2435)	(837)	(2391)
1982 Out-of-Pocket $	102	195	120	21	119
1983 Out-of-Pocket $	141	253	177	69	172
Number of Enrollees	821	945	3260	652	5678
Percent of Enrollees	14.4	16.6	57.4	11.5	100.0

Ellis, REStat, 1989

FIGURE 1.—LOSS FUNCTION IMPLICIT IN TABLE 3 PARAMETERS



Ellis, REStat, 1989

Physician Market Power and Medical-Care Expenditures

Abe Dunn and Adam Hale Shapiro
Department of Commerce, Bureau of Economic Analysis (BEA)

April 26, 2012
BEA working paper.

Ellis Lecture Slides and Comments
Feb 2013

Abstract

We study the degree to which greater physician market power via consolidation leads to higher service prices in the commercially insured medical-care market. We also examine whether these potentially higher service prices translate into different levels of physician service utilization. We find that **physicians in more concentrated markets charge higher service prices.** However, due to the unique nature of patient cost sharing as well as the incentives of physicians, these **higher prices lead to either no change or, in some cases, an expansion of services**. This is in contrast to a typical market, where higher prices attributable to consolidation are thought to decrease quantity demanded.

Unique data

Lack of research on effects of physician consolidation
Lack of information about physician-firms.
Particularly hard to link to medical care expenditure information.

This study links historical data on physician firms and insurance concentration with a comprehensive data set on commercial payments.

The physician data are from the **SK&A physician database** and include information on

- firm size, specialty, and specific geographic coordinates of over 95 percent of physician firms in the United States used to calculate concentration levels.
- Information on physician location, specialty, name, medical practice group, and health system.
- The database is updated every six months, spans 2005 to 2008, and includes 95 percent of office-based physicians practicing in the United States.

Commercial health insurance claims from the MarketScan Research Database from Thomson Reuters.

HealthLeaders-Interstudy provides comprehensive information on enrollment for health insurance firms

Best data I have seen used to study this topic.

Methodology

Looks at the effects of competition on both service price and utilization at the patient level.

Second, the precise geographic coordinates of physicians are used to build a consistently defined concentration measure that takes into account the distance and travel time of patients to competing doctors in surrounding areas.

Refer to this measure as the “Fixed-Travel-Time Herfindahl-Hirshman Index” (FTHHI). Similar to the measure used in Kessler and McClellan [2000], the FTHHI is designed to remove endogeneity bias stemming from higher quality providers attracting more patients.

Third, using individual patient claims and a program provided by Thomson Reuters that categorizes claims into “episodes” of treatment (called the Medstat Episode Grouper), we are able to build a uniform measure of the quantity of physician services per episode of treatment. This allows us to study the effects of competition on a consistently defined measure of service utilization, which has not previously been studied.

Three Period Model

Period 0: Entry of physician and insurance firms.
Period 1: *(a)* Service price (P) negotiated.
(b) Insurance benefits (α) chosen.
Period 2: Service utilization (Q) decided.

One can think of Period 0 as the time period when the long-run equilibrium entry of insurers and physicians occurs, which determines market structure. Period 1 and Period 2 can be thought of as a dichotomy between those variables determined before the patient seeks care versus those variables determined after the patient seeks care.

Insurer's decision

Insurance carrier enters a local market if its profit from entry is positive:

$$\pi_{ins} = M \cdot \mathbf{d}(prem, P^{pock}) \cdot [prem - \mathbf{AVC}(P^{pock}, P, Q(P^{pock}, P))] - F > 0$$

where
d(*prem, Ppock*) = individual insurance demand
prem=premium,
Ppock=amount paid out-of-pocket,
M= market size covered by the insurance carrier
AVC(*Ppock, P,Q*(*Ppock, P*)) = average variable cost of the insurance carrier,
Q(*Ppock, P*)= utilization, a function of the service price, and the out-of-pocket price.
F= insurance carrier's fixed cost.
(Unclear why some variables are in bold)

Aside on pasting in from pdf files

Pasted in as text:

πins = M **d**(*prem, Ppock*) [*prem* - **AVC**(*Ppock, P,Q*(*Ppock, P*))] - *F* > 0

Cut and pasted in using 75% screen resolution in Adobe :

$$\pi_{ins} = M \cdot \mathbf{d}(prem, P^{pock}) \cdot [prem - \mathbf{AVC}(P^{pock}, P, Q(P^{pock}, P))] - F > 0$$

Cut and pasted in using 300% screen resolution in Adobe:

$$\pi_{ins} = M \cdot \mathbf{d}(prem, P^{pock}) \cdot [prem - \mathbf{AVC}(P^{pock}, P, Q(P^{pock}, P))] - F > 0$$

Physician firm's entry decision

$$\pi_{phys} = m \cdot \mathbf{s}(P) \cdot [\mathbf{TE}(P, P^{pock}) - \mathbf{\Psi}(Q(P^{pock}, P))] - f > 0.$$

Where
TE(*P, Ppock)*= total physician revenues = *P Q*(*Ppock, P*)

Ψ(*Q*(*P, Ppock*)) = physician cost,
s(*P*) = service price,
m = market size covered by the physician
= the number of individuals in the physician's geographic market that are expected to have an episode.

The profit per patient is the price per service, *P*, times the amount of services per episode, *Q*, minus the total cost of those services Ψ. The physician firm's fixed cost is *f*.

Something wrong with notation definition. TE should be ***average*** *revenue per customer.*

Further points

M ≠ m

F ≠ f

(Insurer's market differs from Physicians)

α assumed to be ignored by physicians?

Period 1:

$$\pi_{ins}^{V} = -\mathbf{AVC}(P^{pock}, P, Q(P^{pock}, P)) = -[1-\alpha] \cdot \mathbf{s}(P) \cdot \mathbf{TE}(P, P^{pock})$$

$$\pi_{phys}^{V} = \mathbf{s}(P) \cdot [\mathbf{TE}(P, P^{pock}) - \mathbf{\Psi}(Q(P, P^{pock}))].$$

Period 1

Physician and insurer may differ on desired prices: Nash bargaining outcome as proposed by Horn and Wolinsky [1988]) *(Also in Ellis and McGuire, 1990).*

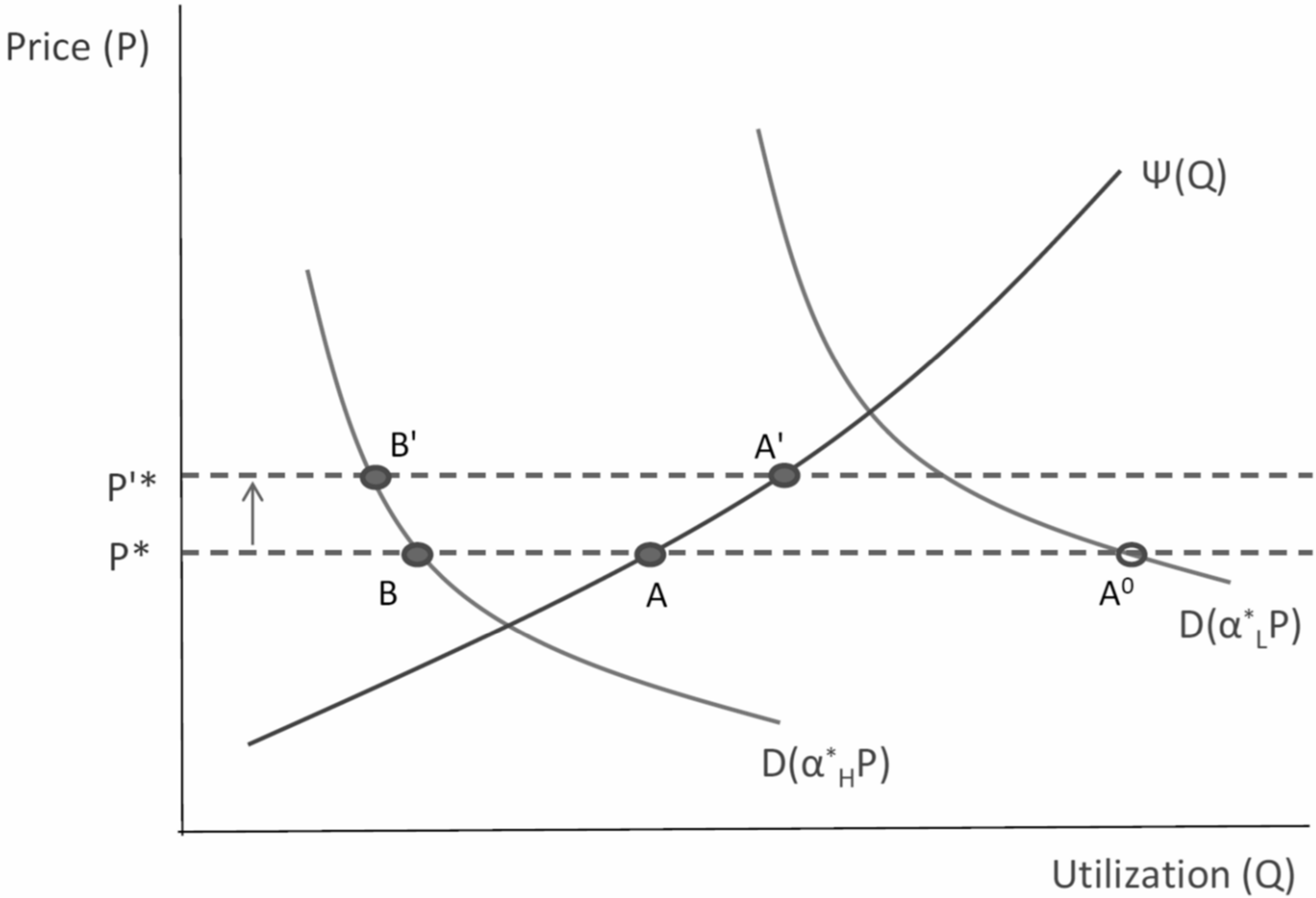
where δi is the disagreement payoff

$$\max_{P} \left[m \cdot \pi^{V}_{ins} - m \cdot \delta_{ins}\right]^{b_{ins}} \left[m \cdot \pi^{V}_{phys} - m \cdot \delta_{phys}\right]^{b_{phys}}$$

where δi is the disagreement payoff (threat point)

P* is the solution to this bargain

Figure 1: Period 2 Utilization Decision



Aside on figures

- Which of the following slides is better?

Figure 1: Period 2 Utilization Decision

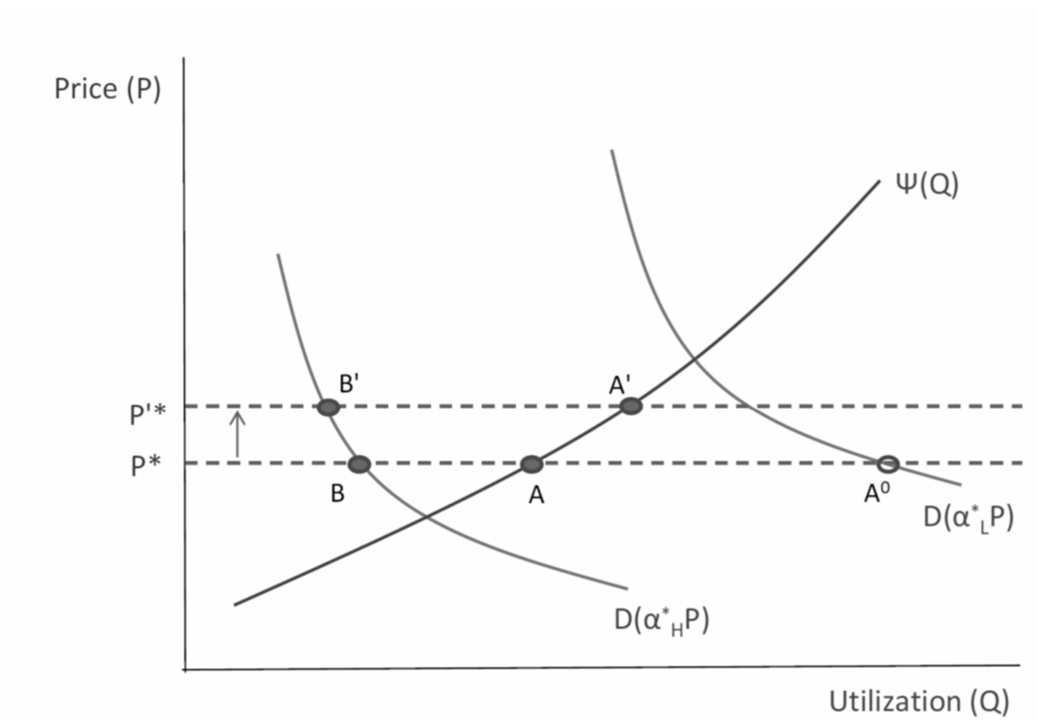
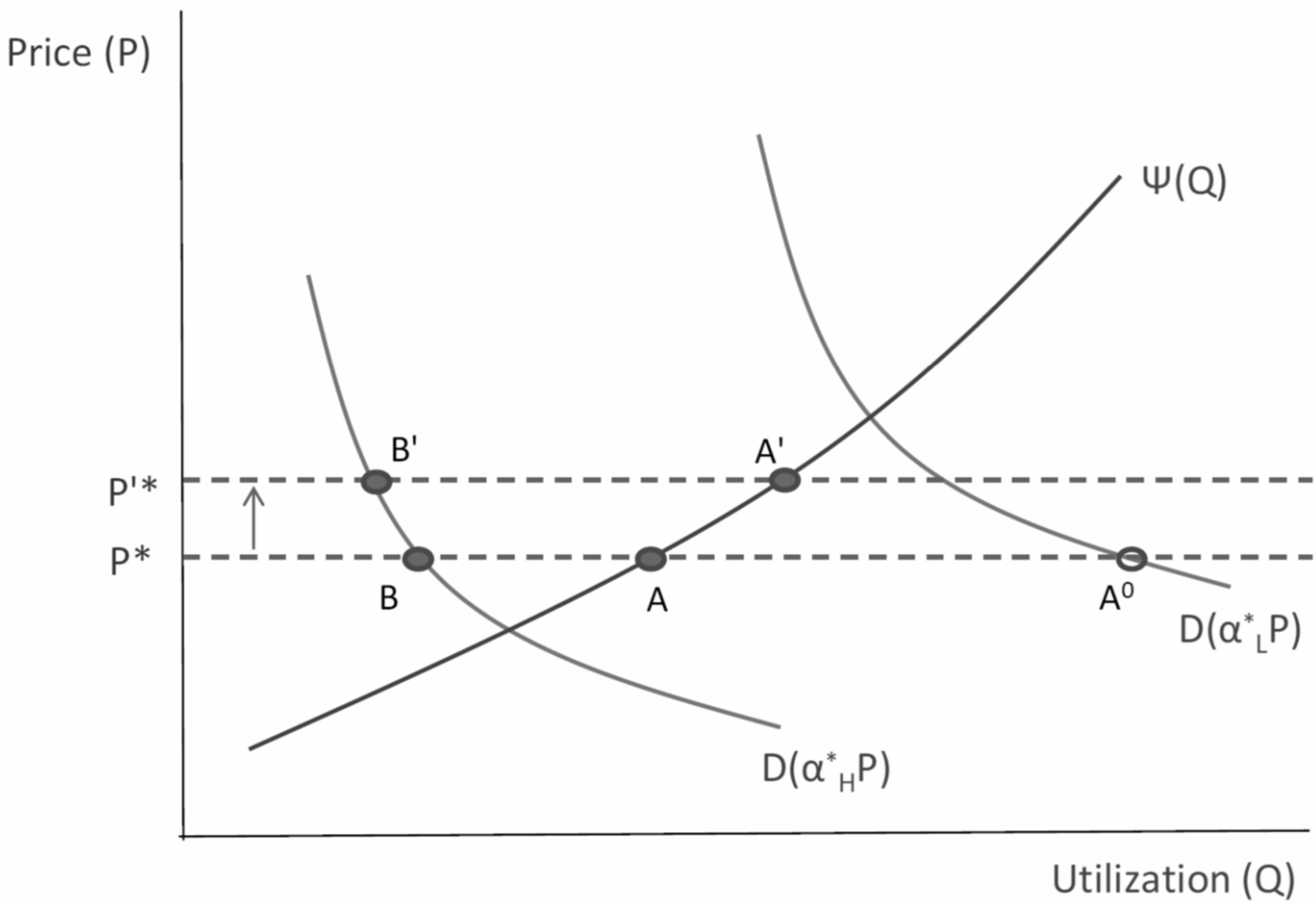


Figure 1: Period 2 Utilization Decision



Period 2

- Physician solves pure profit max problem

$$\max_{Q} \; Q_n P_n^* - \int_0^{Q_n} \psi(t)dt$$

$$Q_n^* = \psi^{-1}(P_n^*)$$

Findings and interpretation on service prices *(largely from intro)*

Physician concentration is **positively and significantly correlated** with service price levels. Specifically, a 10 percent increase in the FTHHI will cause about a 1 percent increase in physician fees.

Linking this finding to historical survey data discussed in Rebitzer and Vortruba [2011] implies that physician consolidation has caused about an 8 percent increase in fees over the last two decades (1988 to 2008).

Health-plan concentration is **inversely correlated** with service price fees.

Insurance carriers in more concentrated health insurance markets pay **lower** fees to physicians.

Findings and interpretation on **utilization** *(from intro)*

A key to our identification stems from our theoretical model, which outlines how patients and physicians likely respond to price variations. **Patients with ungenerous benefits will face large variations in their out-pocket expenses due to movements in the service price. By contrast, patients with generous benefits will be less sensitive to movements in the service price, allowing physicians to move along their supply curve.**

We exploit this dichotomy in order to estimate demand and supply elasticities with respect to service price using a structural switching regression framework. We find a price elasticity of supply in the range of 0.27 to 0.34 for orthopedists and 0.57 to 1.26 for cardiologists.

While in most markets an upward sloping supply curve would be unsurprising, in the health service market, this means that **physicians treat patients according to service price levels.**

In other words, a physician with a higher price-cost margin will perform more services. On the demand side, we find a service price elasticity of demand in the range of -0.32 to -0.43 for orthopedics and -0.05 to -0.28 for cardiology patients. This finding supports prior research which suggest that patients are price sensitive, but relatively inelastic (Manning et al. [1987] and Keeler and Rolph [1988]).

Findings and interpretation on **utilization** *(from intro)*

Depending on the relative pull between physicians and patients, utilization can either increase or decrease as a result of an increase in physician market power. **Our estimates imply higher physician bargaining leverage (and lower insurance carrier bargaining leverage) raises fees,** but the effect on utilization depends on the particular market studied.

For orthopedic patients, the demand response roughly cancels the physician supply response, resulting in no statistically significant change in service utilization. Interestingly, our estimates in the sample of cardiologists imply that the supply response outweighs the demand response, resulting in higher service utilization. Overall, our findings indicate that the unique nature of patient cost sharing and incentives of physicians leads to either no change or, in some cases, an expansion of services. This is in contrast to a typical market, where higher fees attributable to consolidation are thought to decrease quantity demanded.

Using data from Rebitzer and Vortruba [2011] they calculated two chain-linked series of HHIs based on their survey information as well as the SK&A data—one based on the lower bound of the reported firm size bin and another based on the upper bound. The lower bound estimate implied a growth prices of 8.15 percent and the upper bound implied growth in prices of 8.85 percent.

Table 1: Summary Statistics

	Mean	SD	10th Ptile	90th Ptile
	Cardiology			
$FTHHI_{phys}$	0.119	0.107	0.026	0.241
HHI_{ins}	0.231	0.100	0.130	0.358
P_n	1.012	0.339	0.684	1.338
Q_n	459.6	717.9	23.0	1336.9
TE_n	459.9	755.1	24.3	1298.7
HMO_n	0.107	0.309	0	1
PPO_n	0.657	0.474	0	1
POS_n	0.106	0.308	0	1
$HDHP_n$	0.002	0.041	0	0
$CDHP_n$	0.019	0.139	0	0
$BMCOMP_n$	0.107	0.310	0	0
$EMPLOYER_n$	0.606	0.488	0	1
AGE_n	51	11	36	63
$COMORBID_n$	5.93	3.37	2	10
α_n	0.27	0.31	0	0.85

Table 1: Summary Statistics on Orthopedics Sample

	Orthopedics			
$FTHHI_{phys}$	0.104	0.105	0.022	0.218
HHI_{ins}	0.233	0.101	0.130	0.358
P_n	1.032	0.279	0.742	1.356
Q_n	462.5	729.7	59.3	1176.3
TE_n	463.7	769.4	67.0	1166.7
HMO_n	0.112	0.315	0	1
PPO_n	0.661	0.473	0	1
POS_n	0.121	0.326	0	1
$HDHP_n$	0.002	0.045	0	0
$CDHP_n$	0.024	0.15	0	0
$BMCOMP_n$	0.079	0.264	0	0
$EMPLOYER_n$	0.576	0.494	0	1
AGE_n	40	18	13	61
$COMORBID_n$	5.59	3.20	2	10
α_n	0.30	0.29	0.025	0.83
Stage of Illness	1.01	0.167	1	1

Equations estimated

$$\ln(P_n) = \beta_1 \ln(FTHHI_{phys}) + \beta_2 \ln(HHI_{ins}) + \delta' COST + \kappa' QUAL + \lambda' PAT + \zeta_{at} + \zeta_d + \varepsilon_n.$$

$$\ln(\alpha_n) = \beta_3 \ln(\widehat{HHI}_{ins}) + \lambda' PAT + \zeta_{at} + \zeta_d + \varepsilon_n.$$

$$\ln(Q_n) = \gamma \ln(P_n) + \delta' COST + \kappa' QUAL + \lambda' PAT + \zeta_{at} + \zeta_d + \varepsilon_n,$$

$$\frac{\partial \ln(Q)}{\partial \ln(FTHHI_{phys})} = Pr(\omega_n = 1|X) \cdot \beta_1 \cdot \gamma^D + [1 - Pr(\omega_n = 1|X)] \cdot \beta_1 \cdot \gamma^S.$$

$$\ln(Q_n) = \phi_1 \ln(\widehat{FTHHI}_{phys}) + \phi_2 \ln(\widehat{HHI}_{ins}) + \delta' COST + \kappa' QUAL + \lambda' PAT + \zeta_{at} + \zeta_d + \varepsilon_n.$$

Table 2: Determinants of Service Price

	Cardiology			Orthopedics		
	OLS	IV		OLS	IV	
	(i)	(ii)	(iii)	(i)	(ii)	(iii)
$\ln(FTHHI_{phys})$	0.038***	0.105***	0.106***	0.033***	0.111***	0.171***
	(0.005)	(0.015)	(0.018)	(0.004)	(0.021)	(0.047)
$\ln(HHI_{ins})$	0.019**	-0.321***	-0.290**	0.025***	-0.240**	-0.556**
	(0.010)	(0.095)	(0.135)	(0.008)	(0.096)	(0.226)
Instruments	-	Pop. Dist.	Firm Dist.	-	Pop. Dist.	Firm Dist.
Observations	3668971	3664391	3668971	4133902	4129905	4133902

Table 3: Determinants of Benefit Schedule

	Cardiology			Orthopedics		
	OLS	IV		OLS	IV	
	(i)	(ii)	(iii)	(i)	(ii)	(iii)
$\ln(HHI_{ins})$	0.069***	0.140	0.209*	0.043**	0.215***	0.236**
	(0.022)	(0.095)	(0.111)	(0.017)	(0.073)	(0.098)
Instruments	-	Pop. Dist.	Firm Dist.	-	Pop. Dist.	Firm Dist.
Observations	2977925	2974327	2977921	3824770	3821133	3824767

Table 4: Subsample Analysis

	Cardiology		Orthopedics	
γ^D	0.501	0.179	-0.255	-0.112
	(0.318)	(0.292)	(0.165)	(0.134)
γ^S	1.112***	0.281	0.349*	0.356**
	(0.368)	(0.295)	(0.179)	(0.176)
Full Sample	0.875***	0.283	0.120	0.134
	(0.334)	((0.276)	(0.159)	(0.134)
Instruments	Pop. Dist.	Firm Dist.	Pop. Dist.	Firm Dist.

Table 5: Switching Regression

	Cardiology		Orthopedics	
γ^D	-0.049	-0.283**	-0.429***	-0.321***
	(0.099)	(0.092)	(0.109)	(0.101)
γ^S	1.256***	0.567*	0.267*	0.336***
	(0.328)	(0.274)	(0.141)	(0.120)
$Pr(\omega_n = 1)$	0.340	0.302	0.610	0.607
Instruments	Pop. Dist.	Firm Dist.	Pop. Dist.	Firm Dist.
Log Likelihood	-6.26e6	-6.15e6	-6.81e6	-6.83e6
Observations	3664391	3669333	4131763	4131592

Table 6: Market Structure and Service Utilization

	Cardiology			Orthopedics		
	OLS	IV		OLS	IV	
	(i)	(ii)	(iii)	(i)	(ii)	(iii)
$\ln(FTHHI_{phys})$	0.001	0.095***	0.072	-0.018***	0.023	0.040
	(0.015)	(0.021)	(0.046)	(0.005)	(0.025)	(0.042)
$\ln(HHI_{ins})$	-0.079***	-0.441***	-0.378	-0.006	-0.172	-0.254
	(0.027)	(0.114)	(0.307)	(0.012)	(0.106)	(0.213)
Instruments	-	Pop. Dist.	Firm Dist.	-	Pop. Dist.	Firm Dist.
Observations	3668971	3664391	3668971	4133902	4129905	4133902