

Physician Market Power and Medical-Care Expenditures

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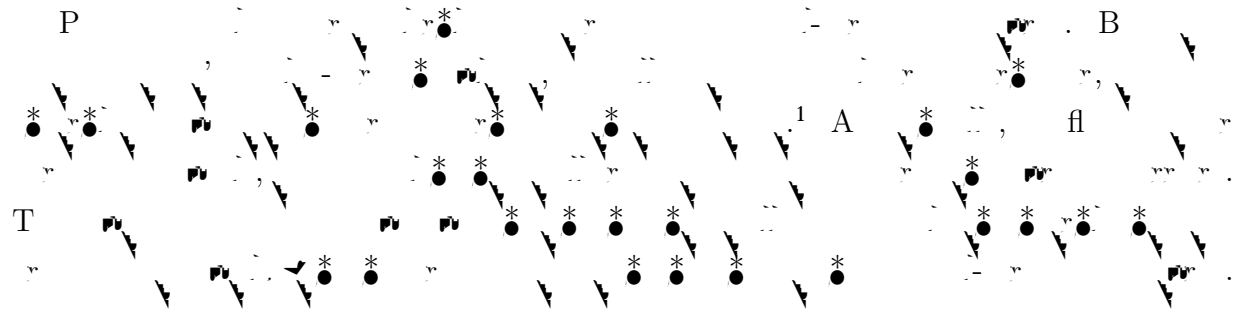
Abstract

Physicians play a critical role in determining medical-care expenditures. In this study, we empirically assess the degree to which physicians exploit their bargaining leverage over insurance carriers as a means to raise service prices. We also examine the degree to which these potentially higher payments may translate into different levels of service utilization. We find that physicians are able to translate bargaining leverage into both higher fees and higher service utilization. *Cecilia Grubb*, a cardiologist with high market power (concentration in the 90th percentile) will charge 25 percent higher prices and perform 22 percent more services than a cardiologist with low market power (concentration in the 10th percentile). The corresponding orthopedist will charge 24 percent higher prices and perform 4 percent more services. We provide evidence that the effect of bargaining leverage on service utilization may be explained by physicians responding to the negotiated service prices.

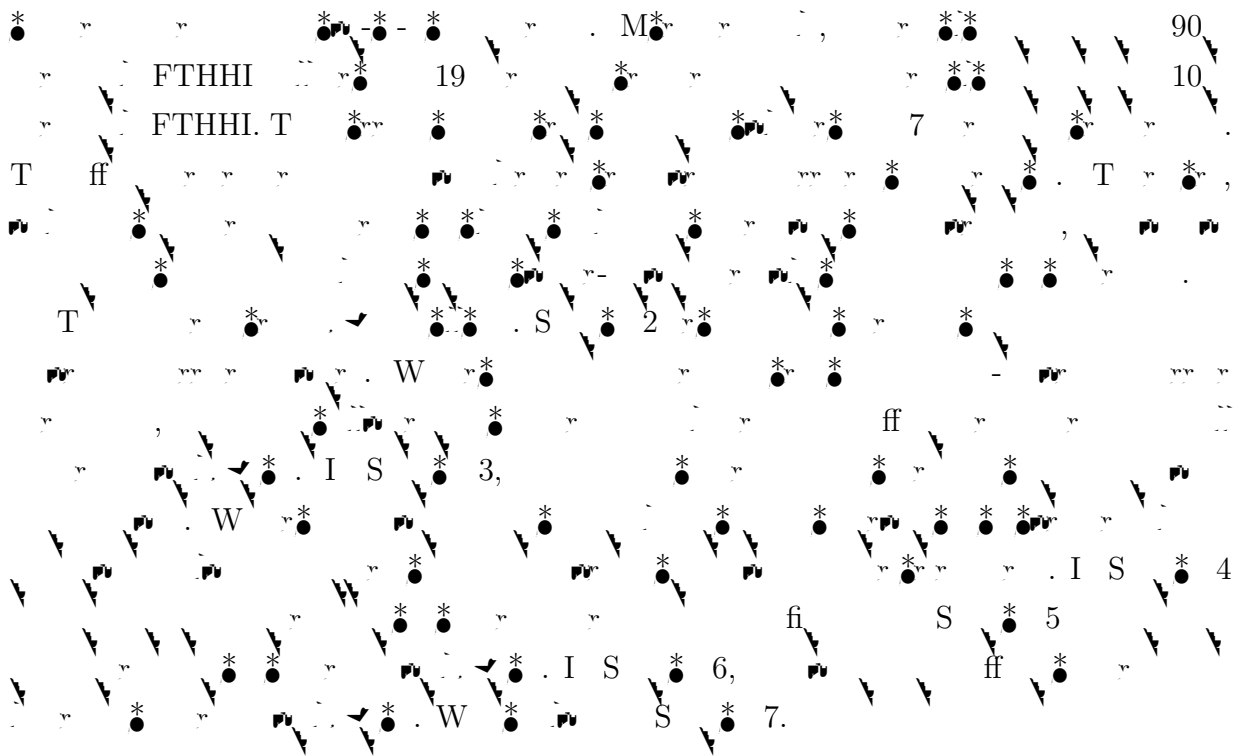
*We thank Seidu Dauda and Eli Liebman for excellent research assistance.

†Bureau of Economic Analysis

1 Introduction

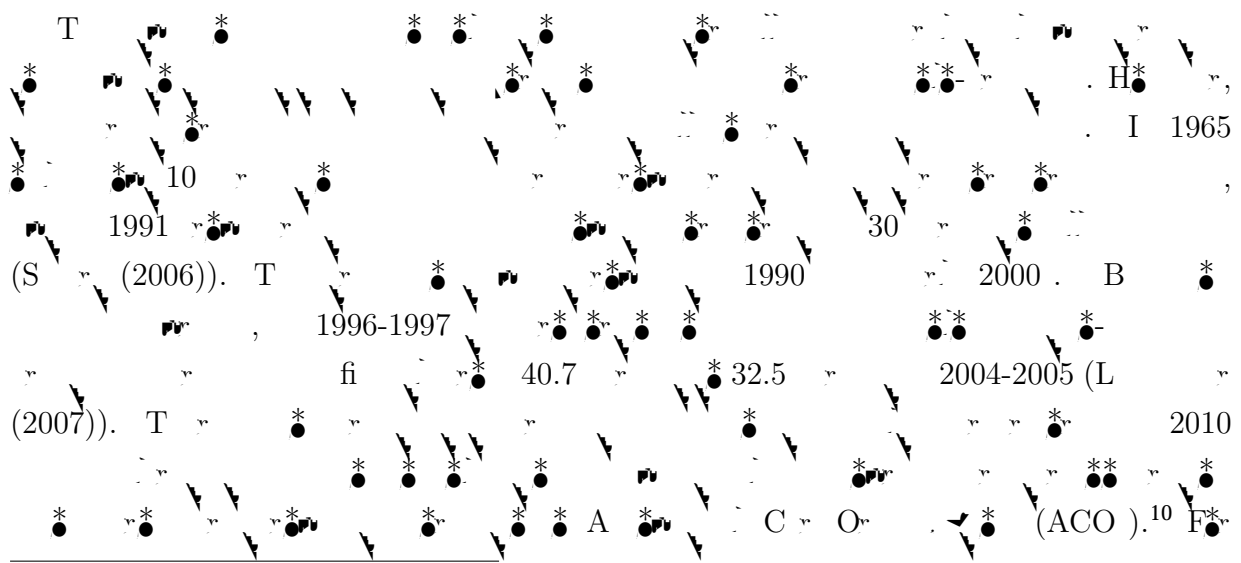


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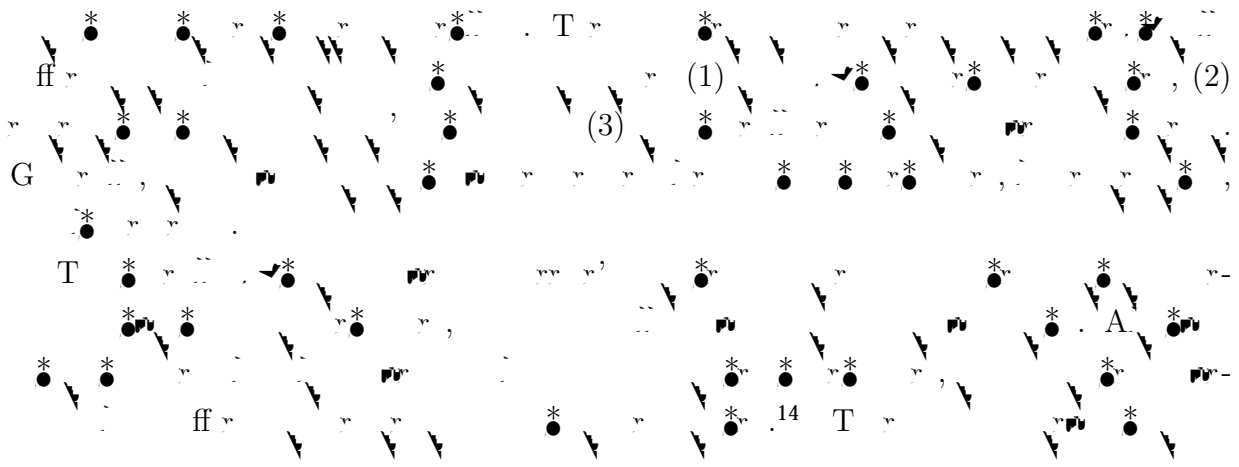


2 Physician and Health Insurance Carrier Organizations

2.1 Physician Organization



¹⁰An ACO is a network of providers that share the provision of care to patients. An ACO would normally include both physicians and hospitals and would encourage greater coordination of care among providers through financial incentives.



2.3 Physician-Insurance Carrier Bargaining



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2.3.1 First-Period

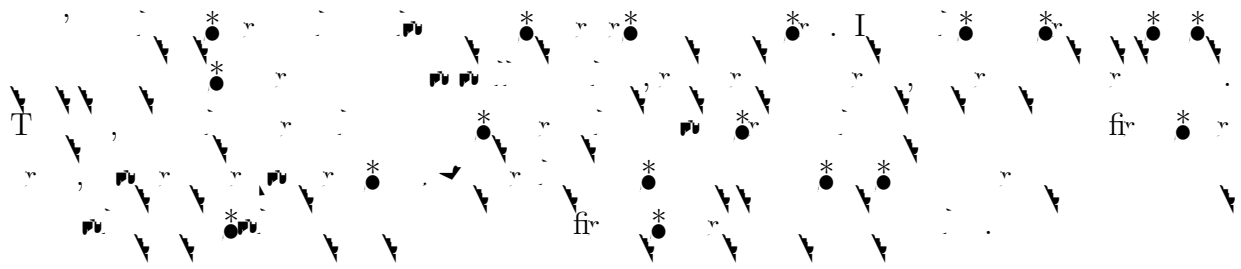
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$$Z = \left(\frac{HHI_{phys}}{HHI_{plan}} \right), \quad HHI_{phys} \quad HHI_{ins}$$

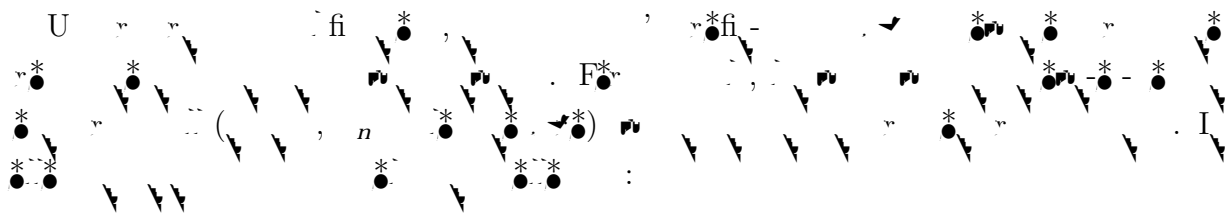
$Z_1 = 1$) C^* , P , M^* , I ... C ...
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M^* , ... Z_1 , Z_2 ,
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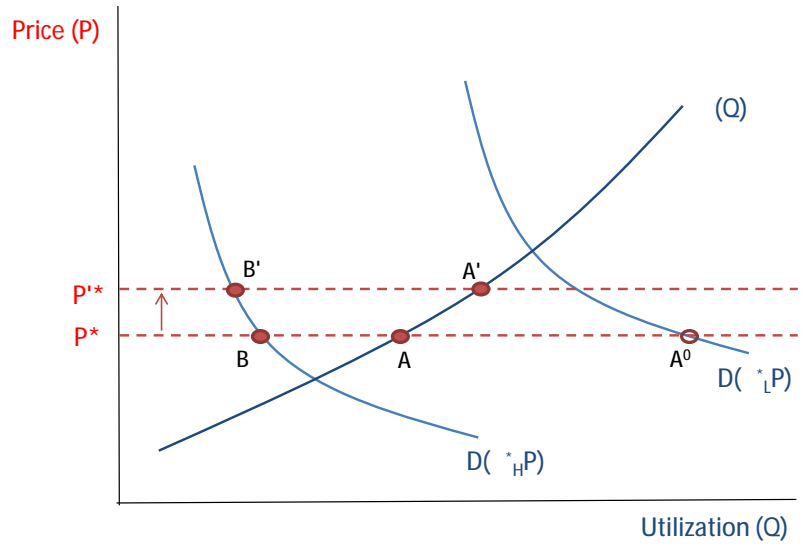


2.3.2 Second-Period



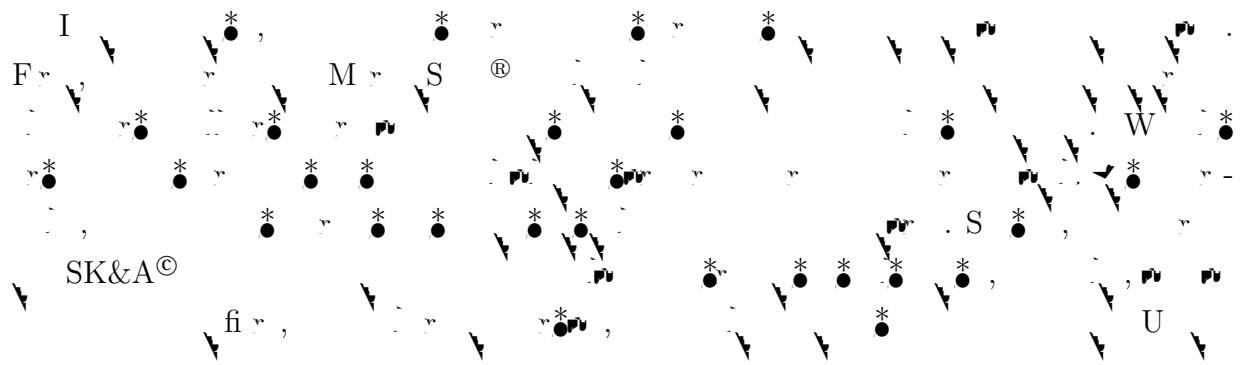
$$P_n^* = \int_0^{Q_n} Q_n P_n^* (s) ds \quad (1)$$

F 1: S -P U D




 Dr. (1988).²⁵ E (1974), F (1978), T, W, S, U

3 Data


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3.1.1 Physician Expenditure of an Episode of Care

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$$TE_n = \sum_{j \in n} p_{jn} \quad (3)$$

p_{jn} (P
 n.²⁸ P
 M S ® W

²⁶Approximately 3 percent of our sample are capitated episodes. These observations are likely to include closed HMO systems such as Kaiser-Permanente patients.

²⁷We isolated episodes where the patient sees the same physician for the entire episode of care, however, results were not sensitive to this exclusion.

²⁸Note that each episode occurs only once in the data, thus we do not have a panel of episodes.

j $^{29} N^*$ $p,$ $c,$ $t.^{30} T$ $k,$
 MEG H^*

3.1.2 Decomposing the Expenditure of an Episode of Care

A S $2,$ T W

$$Q_n = \sum_{j \in n} \bar{p}_j \quad (4)$$

\bar{p}_j \bar{p}_j M A T H^* \bar{p}_j (RVU)

$\Delta(T E_n) = \Delta(Q_n) + \Delta(P_n)$

$$\Delta(T E_n) = \Delta(Q_n) + \Delta(P_n) \quad (6)$$

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3.2 SK&A^c Data

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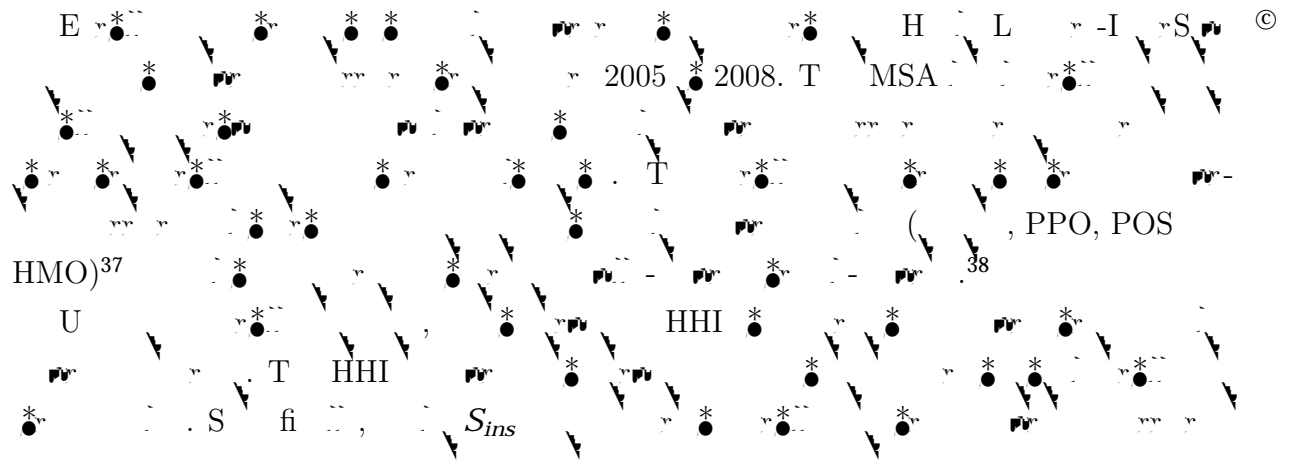
³¹We removed outliers we believe are attributable to clerical data input error by discarding episodes in the bottom first percentile and top 99th percentile based on price per service and utilization.

³²SK&A has a research center that verifies every field of every record in its data base. The data also includes the names of DOs, NPs, PAs and office managers.

³³The six month frequency of their telephone survey may be important, since SK&A reports that on average, 14.2% of physicians move each year. Although all the information in the survey is telephone

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3.3 HealthLeaders-InterStudy^c Data



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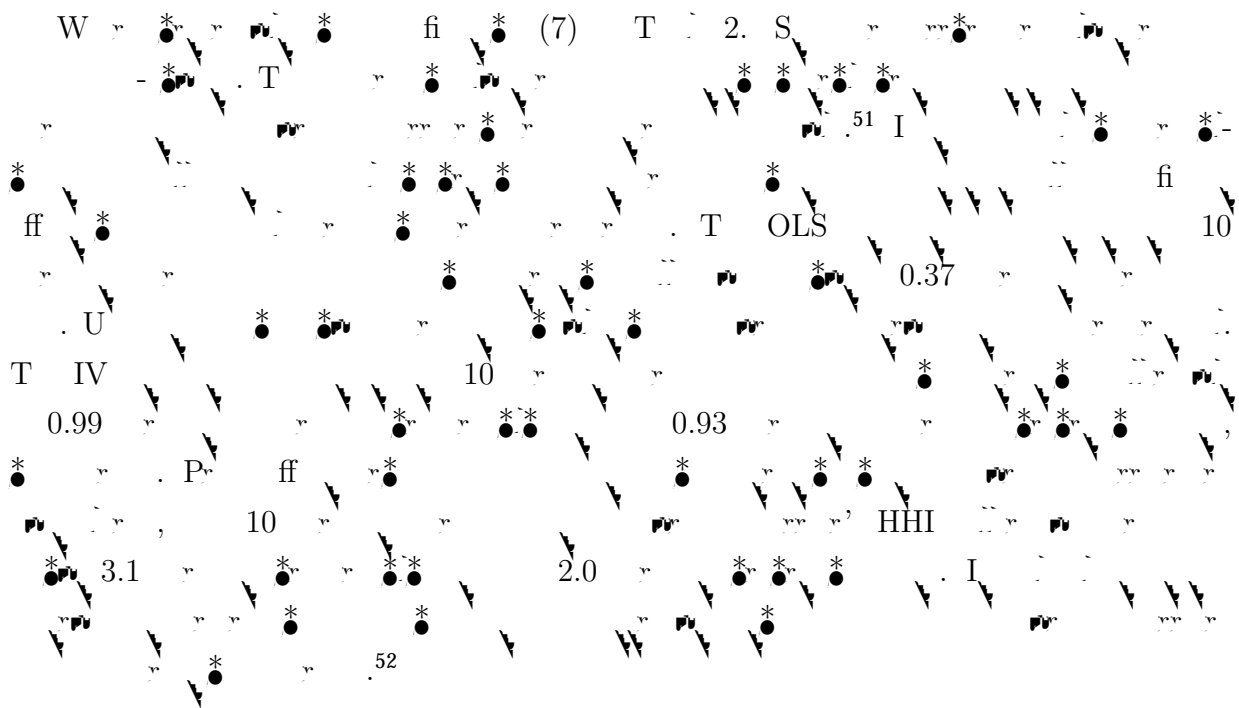
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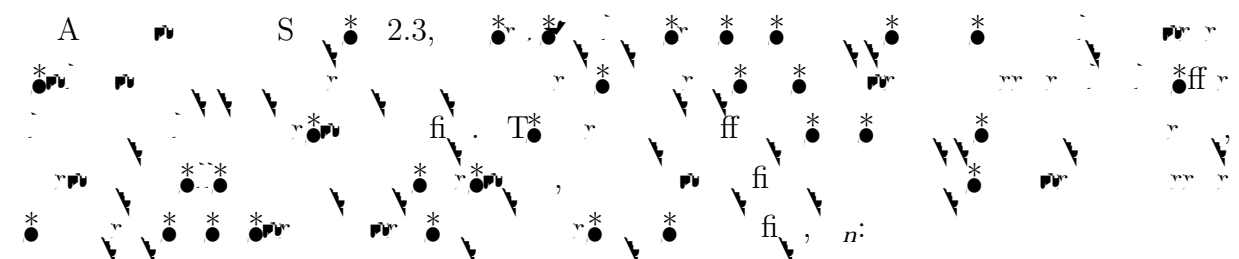
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Table 2: Doctor's Salary Premium

	OLS		IV	
	Coefficient	Standard Error	Coefficient	Standard Error
$(FTHHI_{phys})$	0.037*** (0.005)	0.032*** (0.004)	0.099*** (0.014)	0.093*** (0.017)
(HHI_{ins})	0.019** (0.010)	0.025*** (0.008)	-0.311*** (0.094)	-0.197** (0.087)
$(medval_{phys})$	0.057** (0.024)	0.064*** (0.023)	0.056*** (0.022)	0.069*** (0.020)
$(rent_{phys})$	-0.042 (0.044)	-0.115*** (0.039)	-0.096** (0.048)	-0.136*** (0.038)
$(facwage_{phys})$	0.004 (0.006)	0.017*** (0.005)	-0.001 (0.007)	0.016*** (0.006)
$(medinc_{low})$	-0.032** (0.013)	0.041*** (0.014)	-0.029 (0.021)	0.065*** (0.017)
UNIV	0.022** (0.009)	0.016* (0.009)	0.013 (0.013)	0.003 (0.013)
$(medinc_{pat})$	0.033*** (0.007)	0.015** (0.006)	0.029*** (0.008)	0.013* (0.007)
$(educ_{pat})$	0.079*** (0.026)	0.163*** (0.028)	0.153*** (0.036)	0.205*** (0.035)
EPO	-0.034*** (0.007)	-0.037*** (0.007)	-0.032*** (0.007)	-0.025*** (0.008)
HMO	-0.033*** (0.006)	-0.004 (0.006)	-0.040*** (0.006)	-0.005 (0.006)
POS	-0.013*** (0.005)	-0.002 (0.005)	-0.017*** (0.005)	-0.004 (0.005)
PPO	0.005 (0.004)	0.009** (0.004)	0.001 (0.004)	0.007* (0.004)
HDHP	-0.001 (0.011)	0.001 (0.006)	-0.002 (0.011)	0.005 (0.007)
CDHP	0.033*** (0.005)	0.037*** (0.004)	0.030*** (0.005)	0.038*** (0.004)
EMPLOYER	-0.004 (0.009)	0.026*** (0.005)	-0.006 (0.008)	0.024*** (0.007)
Observations	3668963	4135610	3664382	4131612



4.2 Determinants of Benefits

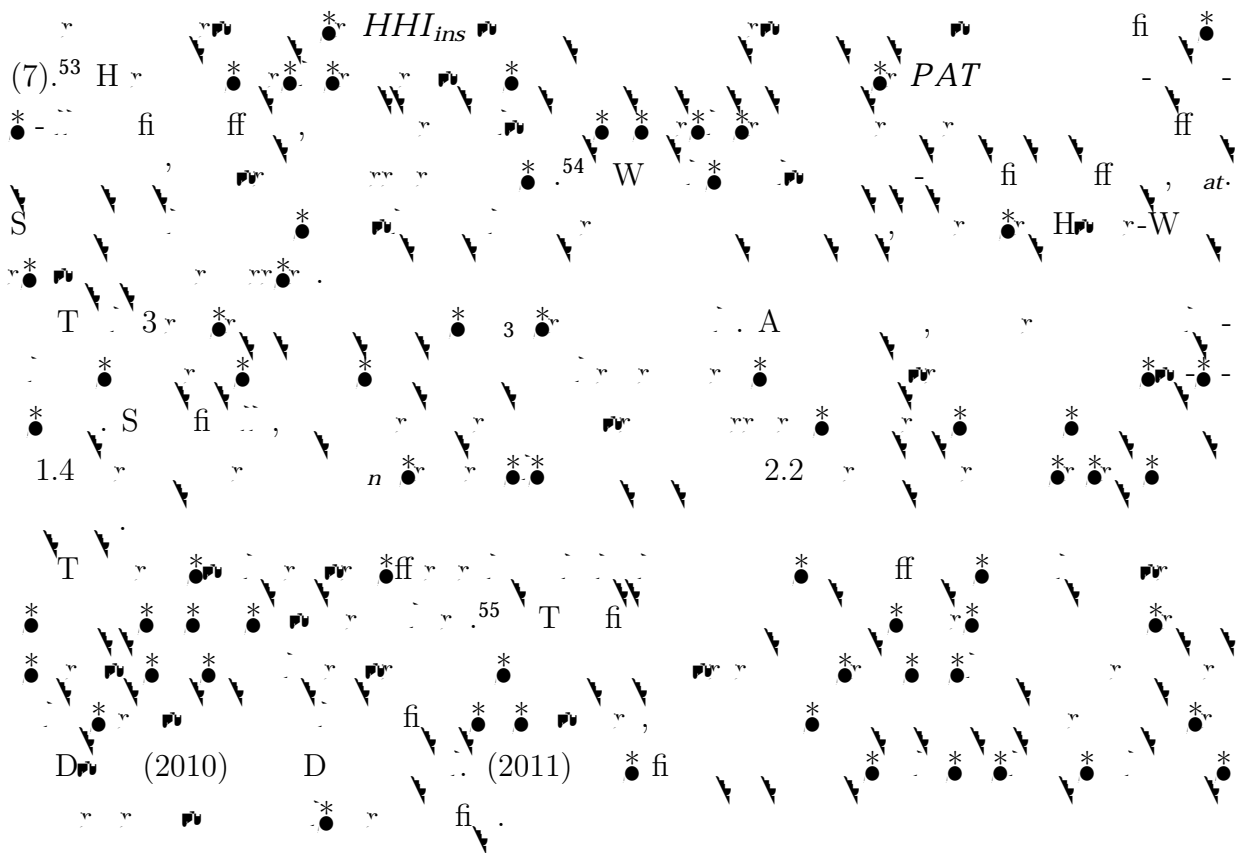


$$\ln(\ln(p)) = \beta_3 (\widehat{HHI}_{ins}) + \beta_4 PAT + \beta_5 at + \beta_6 d + \beta_7 n \quad (8)$$

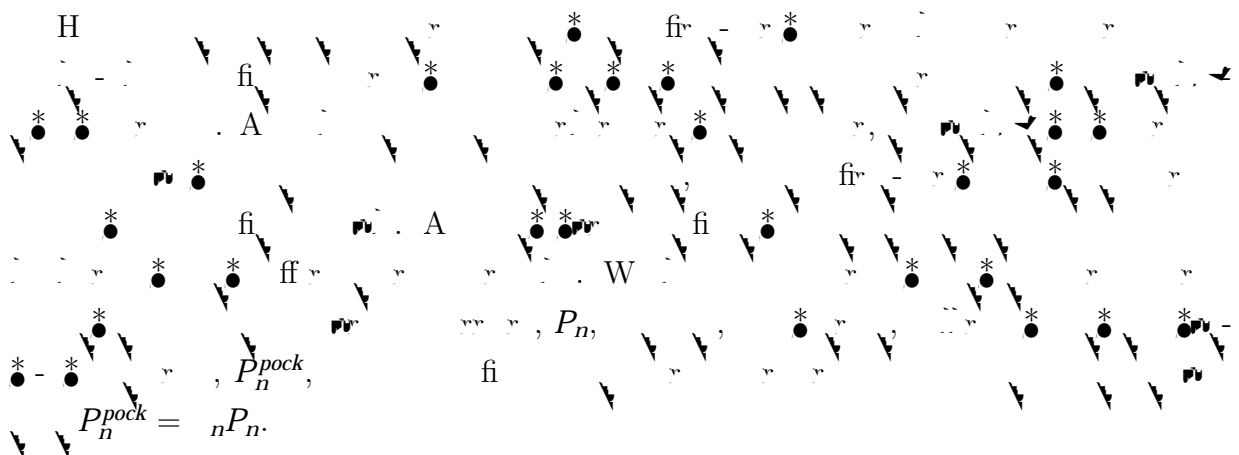
and under 65 for the MSA and for the county (four total instruments). No qualitative results changed, however standard errors grew a bit.

⁵¹We also estimated a different specification of the episode price, P , regression where we used procedure price, p , as the dependent variable while including procedure fixed effects. This specification will be identical to specification (7) if physicians bargain with insurance carriers according to a discount on *all* procedures. That is, if $p = p \delta_j$ for some $j < 1$, then it follows that $\ln(P) = \ln(-\frac{jn}{j})$, which is equivalent to $\ln(\ln(p))$ as the dependent variable. No results changed using this specification indicating that, on average, physicians likely bargain over their entire fee schedule.

⁵²As an alternative to the OLS results, we also estimate the fee regression using county fixed effects and we obtain a similar coefficient on the physician $FTHHI$ coefficient, although it is slightly lower. The county fixed effects will control for all factors unique to a provider in a county that are not captured by other variables. Although the county fixed effects make identification more difficult, we are still able to identify competitive effects from the fact that different providers compete in a different fashion for patients in neighboring counties.



5 Estimation of Second Period: Service Utilization



⁵³Results did not significantly change when we limited the instrument set to two variables: the population of the MSA and the unemployment rate of the county. Results under this specification were $\beta_3 = .20$ for orthopedics and $\beta_3 = .11$ for cardiology, both significant at the one percent level.

⁵⁴No results changed when we included the vector $COST$ and the vector $QUAL$.

⁵⁵As far as we are aware, only the recent work of Dafny et al (2011) tests the effects of health insurance competition on benefits in commercial insurance markets.

Table 3: Doctor's Office Visits

	Column 1	Column 2
$\ln(HHI_{ins})$	0.141*** (0.008)	0.216*** (0.006)
$\ln(medinc_{pat})$	-0.025*** (0.004)	-0.024*** (0.003)
$\ln(educ_{pat})$	-0.484*** (0.015)	-0.285*** (0.011)
EPO	-0.429*** (0.007)	-0.332*** (0.006)
HMO	-0.694*** (0.003)	-0.520*** (0.003)
POS	-0.586*** (0.003)	-0.424*** (0.003)
PPO	-0.323*** (0.003)	-0.214*** (0.002)
HDHP	0.111*** (0.015)	0.303*** (0.012)
CDHP	-0.077*** (0.006)	0.083*** (0.005)
EMPLOYER	-0.016*** (0.002)	0.026*** (0.001)
Observations	2974302	3822689

Notes: The dependent variable is the logarithm of the share of expenditures paid by the patient, $\ln(\cdot)$. Both regressions include a dummy variable indicating the patient's gender, a polynomial in the patient's age (i.e. AGE , AGE^2 , and AGE^3), a polynomial in the number of co-morbidities, state-half-year and disease-stage-of-illness fixed effects. The omitted plan types are "basic medical" and "comprehensive," *BMCOMP*. Huber-White robust standard errors are reported. One, two, and three asterisks indicate significance at the 10-percent, 5-percent, or 1-percent significance level, respectively.

5.1 Determinants of Service Utilization

Overall, the determinants of service utilization are:

$$Q_n = \beta_1 \widehat{P_n} + \beta_2 \widehat{P_n^{pock}} + \beta_3 COST + \beta_4 QUAL + \beta_5 PAT + \beta_6 at + \beta_7 d + \beta_8 n; \quad (9)$$

The model is estimated using the following variables:

- P_n : Price
- P_n^{pock} : Price of a pack
- $COST$: Cost
- $QUAL$: Quality
- PAT : Patent
- at : Advertising
- d : Distance
- n : Number of stores

The model is estimated using the following equation:

$$Q_n = \beta_1 \widehat{P_n} + \beta_2 \widehat{P_n^{pock}} + \beta_3 COST + \beta_4 QUAL + \beta_5 PAT + \beta_6 at + \beta_7 d + \beta_8 n; \quad (7)$$

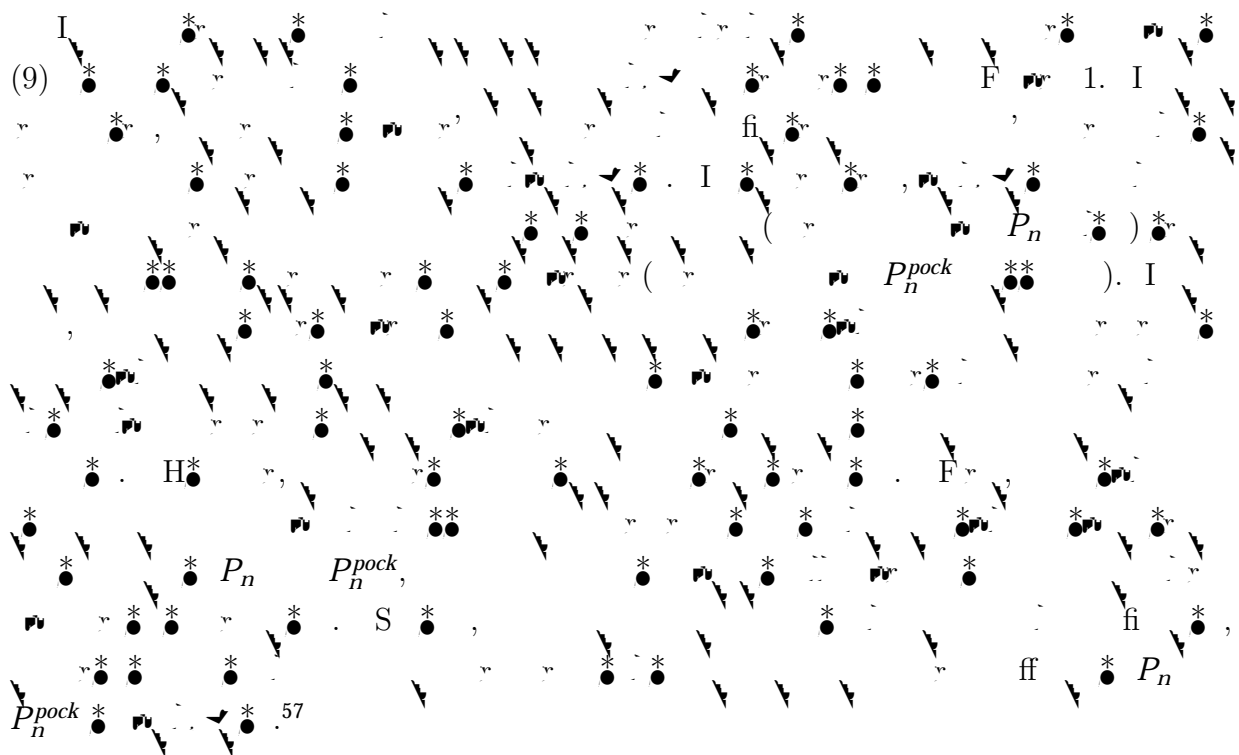
The model is estimated using the following variables:

- P_n : Price
- P_n^{pock} : Price of a pack
- $COST$: Cost
- $QUAL$: Quality
- PAT : Patent
- at : Advertising
- d : Distance
- n : Number of stores

Table 4: Doctor Supply Utilization

	Control	Observations
\widehat{P}_n	1.127*** (0.153)	0.274*** (0.068)
\widehat{P}_n^{pock}	-0.464*** (0.082)	-0.144*** (0.048)
\widehat{medinc}_{pat}	0.010 (0.012)	0.029*** (0.005)
\widehat{educ}_{pat}	-0.459*** (0.044)	-0.361*** (0.024)
EPO	-0.092** (0.038)	-0.063*** (0.018)
HMO	-0.219*** (0.058)	-0.119*** (0.025)
POS	-0.220*** (0.051)	-0.067*** (0.021)
PPO	-0.146*** (0.028)	-0.036*** (0.011)
HDHP	0.062*** (0.022)	0.073*** (0.018)
CDHP	-0.030*** (0.011)	0.073*** (0.007)
EMPLOYER	0.034*** (0.007)	-0.056*** (0.004)
\widehat{medval}_{phys}	-0.081*** (0.011)	-0.066*** (0.008)
\widehat{rent}_{phys}	0.426*** (0.044)	0.228*** (0.020)
$\widehat{facwage}_{phys}$	-0.033*** (0.007)	-0.017*** (0.004)
\widehat{medinc}_{low}	-0.071*** (0.021)	-0.027** (0.011)
UNIV	-0.012 (0.013)	-0.036*** (0.006)
Observations	2962919	3798361

Notes: The dependent variable is the logarithm of the utilization of services, $\ln(Q)$. All regressions include a dummy variable indicating the patient's gender, a polynomial in the patient's age (i.e. AGE , AGE^2 , and AGE^3), a polynomial in the number of co-morbidities, as well as state-halfyear and disease, stage-of-illness fixed effects. The omitted plan types are "basic medical" and "comprehensive," $BMCOMP$. Standard errors are clustered by disease, provider, and county. One, two, and three asterisks indicate significance at the 10-percent, 5-percent, or 1-percent significance level, respectively.



5.2 Net Effects of a Change in Service Price on Utilization



⁵⁷If a switching model is the correct specification, then the absolute values of the elasticities of individuals and physicians may be greater than the values estimated. In particular, the empirical model averages the elasticities of consumers that are responding to P and those that are constrained by their physician's decision and have a P elasticity of 0.

Although one may be concerned that the empirical model does not precisely conform to the proposed theory, it is worth noting that specification (9) fits closely to a related theory of physician-induced demand where the profit margin of the physician influences the consumer preferences for different levels of services. That is, a higher profit margin may cause a physician to induce a patient to seek additional services, as in McGuire and Pauly (1991). However, since the key empirical predictions from either of the two theories are the same (that is, negative effect on utilization from P and positive effect from P), empirically distinguishing between these theories may be challenging. More importantly, the policy implications of both theories are very similar, so for many practical purposes it may not matter which of the two theories is the correct one.

Table 5: Net Effect of Cost, Service, and Quality on Utilization

	Cost			Service		
	Fixed	Linear	Higher	Fixed	Linear	Higher
$\ln(Q_n)$	0.925*** (0.153)	1.189*** (0.172)	0.493*** (0.173)	0.157** (0.066)	0.360*** (0.079)	-0.252*** (0.069)
Observations	3669343	1834671	1834671	4133673	2066836	2066836

Notes: The dependent variable is the logarithm of the utilization of services, $\ln(Q)$. All regressions include a dummy variable indicating the patient's gender, a polynomial in the patient's age (i.e. AGE , AGE^2 , and AGE^3), a polynomial in the number of co-morbidities, state-halfyear and disease/stage-of-illness fixed effects, as well as variables in the vector PAT , $COST$, and DEM . Standard errors are clustered by disease, provider, and county. One, two, and three asterisks indicate significance at the 10-percent, 5-percent, or 1-percent significance level, respectively.

Table 5 presents the net effect of cost, service, and quality on utilization. The dependent variable is the logarithm of the utilization of services, $\ln(Q)$. All regressions include a dummy variable indicating the patient's gender, a polynomial in the patient's age (i.e. AGE , AGE^2 , and AGE^3), a polynomial in the number of co-morbidities, state-halfyear and disease/stage-of-illness fixed effects, as well as variables in the vector PAT , $COST$, and DEM . Standard errors are clustered by disease, provider, and county. One, two, and three asterisks indicate significance at the 10-percent, 5-percent, or 1-percent significance level, respectively.

$$\ln(Q_n) = \beta_0 + \beta_1 \ln(P_n) + \beta_2 COST + \beta_3 QUAL + \beta_4 PAT + \text{state} + \text{disease} + \text{error}_n \quad (10)$$

Table 5 presents the net effect of cost, service, and quality on utilization. The dependent variable is the logarithm of the utilization of services, $\ln(Q)$. All regressions include a dummy variable indicating the patient's gender, a polynomial in the patient's age (i.e. AGE , AGE^2 , and AGE^3), a polynomial in the number of co-morbidities, state-halfyear and disease/stage-of-illness fixed effects, as well as variables in the vector PAT , $COST$, and DEM . Standard errors are clustered by disease, provider, and county. One, two, and three asterisks indicate significance at the 10-percent, 5-percent, or 1-percent significance level, respectively.

$\frac{\partial Q_n}{\partial P} = \beta_1 \frac{\partial P}{\partial P} + \beta_2 \frac{\partial P^{pock}}{\partial P} = \beta_1 + \beta_2 \frac{P^{pock}}{P}$

$$\frac{\partial Q_n}{\partial P} = \beta_1 + \beta_2 \frac{P^{pock}}{P} \quad (10)$$

$P^{pock} = P$, then:

$$\frac{\partial Q_n}{\partial P} = \beta_1 + \beta_2 \left[\frac{\partial P}{\partial P} + \frac{\partial P^{pock}}{\partial P} \right] \quad (11)$$

$\frac{\partial Q_n}{\partial P} = \beta_1 + \beta_2 \left[1 + \frac{\partial P^{pock}}{\partial P} \right]$

$\frac{\partial Q_n}{\partial P} = \beta_1 + \beta_2 \left[1 + \frac{\partial P^{pock}}{\partial P} \right]$

$$\frac{\partial Q_n}{\partial P} = \beta_1 + \beta_2 \left[1 + \frac{\partial P^{pock}}{\partial P} \right] \quad (12)$$

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$$\frac{\partial Q_n}{\partial P} = \beta_1 + \beta_2 \left[1 + \frac{\partial P^{pock}}{\partial P} \right] \quad (13)$$

$$\frac{\partial Q_n}{\partial P} = \beta_1 + \beta_2 \left[1 + \frac{\partial P^{pock}}{\partial P} \right] \quad (13)$$

$\frac{\partial Q_n}{\partial P} = \beta_1 + \beta_2 \left[1 + \frac{\partial P^{pock}}{\partial P} \right]$

$\frac{\partial Q_n}{\partial P} = \beta_1 + \beta_2 \left[1 + \frac{\partial P^{pock}}{\partial P} \right]$

$$\frac{\partial Q_n}{\partial P} = \beta_1 \widehat{FTHHI}_{phys} + \beta_2 \widehat{HHI}_{ins} + \beta_3 COST + \beta_4 QUAL + \beta_5 PAT + \beta_6 at + \beta_7 d + \beta_8 n \quad (14)$$

⁵⁹Plugging in our estimated values of β_1 , β_2 from (7), β_3 from (8) and β_1 and β_2 (9), we calculate the marginal effect of physician concentration on service utilization to be 0.07 for cardiology and 0.01 for orthopedics, and for marginal effect for insurance carriers is -0.27 for cardiology and -0.06 for orthopedics.

Table 6: Market Supply and Unemployment

	Control	Unemployment
\widehat{FTHHI}_{phys}	0.088*** (0.019)	0.017* (0.009)
\widehat{HHI}_{ins}	-0.395*** (0.113)	-0.114*** (0.043)
\widehat{medval}_{phys}	-0.047*** (0.012)	-0.051*** (0.008)
\widehat{rent}_{phys}	0.370*** (0.037)	0.173*** (0.019)
$\widehat{facwage}_{phys}$	-0.034*** (0.009)	-0.011*** (0.003)
\widehat{medinc}_{low}		

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References

- [1] Alesina, A., Naciri, N. 2011. "Can Medicare Costs be Reduced? Some Evidence from the Medicare Private Insurance Program", *Journal of Health Economics*, 34(4): 737-763
- [2] Cutler, C., D. Deaton, S. Lleras-Muney, M. 2003. "Can Medicare Payments be Reduced?" *RAND Journal of Economics*. 34(4): 737-763
- [3] Cutler, J., Hermalin, S., W. Franks, G. 1986. "Insurance, Expenditures, and Health Care Costs." *The Review of Economics and Statistics* V. 68, N. 2, pp. 232-240
- [4] Cutler, D., L. Lleras-Muney, D. 2011. "The (Perverse) Medicare Program: Unintended Consequences." *Journal of Economic Perspectives* 25(2) pp. 3-25.
- [5] Cutler, M., L. Lleras-Muney, S. C. Lleras-Muney, A. G. Lleras-Muney, T. N. Lleras-Muney, J. 2010. "Growth and Health Care Expenditures: A Long-Run Perspective." *American Journal of Managed Care*, 16(2) pp. 131-138.
- [6] Cutler, M., Hermalin, R., Cutler, D. 2009. "Insurance and Health Care Expenditures." *Health Affairs* 28(5) 1253-1255
- [7] Deaton, L. 2005. "Does Health Care Expenditure Matter?" *American Economic Review*.
- [8] Deaton, L. 2010. "Are Health Care Expenditures Matter?" *American Economic Review*.
- [9] Deaton, L., M. Deaton, S. R. Deaton, 2011. "Private Health Insurance and Health Care Expenditures: Evidence from the U.S. Health Insurance Program." *American Economic Review*.
- [10] Deaton, S. 2009. "Can Medicare Payments be Reduced? A Review." *Inquiry* V. 46, N. 3, pp. 291-304.
- [11] Deaton, D., 1988. "Does Health Care Expenditure Matter?" *Economic Inquiry*. V. 26 pp. 251-298.

[12] Dr. D., S., M., W., W. 1993. P. C. H. M: T S P D P -D C. " *Journal of Law and Economics*, V. 36, . 179-204.

[13] Dr. D., R. L., W. W., J. Z., 2008. I. " *Journal of Health Economics*, V. 27, . 362-376.

[14] Dr. D., A. G., M. M., 2003. D ff C. HMO M.

- [24_ Grolnick, J., Klevorick, J., Meltzer, D. 1999. Paying for Quality: A New Approach. *Journal of Health Economics*. Vol. 18, Issue 4, April 1999, Pages 473-490.
- [25_ Hays, D., Klevorick, A., Culy, S. P., C., Brennan, W. 1990. Paying for Quality: A New Approach. *New England Journal of Medicine* Apr 12;322(15):1059-63.
- [26_ Hirschman, D. 2003. *Managed care and monopoly power: The antitrust challenge*. Cambridge: Harvard University Press.
- [27_ Hirschman, J., Grolnick, B. 2009. Re-Union, M. U. - "U. I. P. B."
- [28_ Klevorick, E.B., Meltzer, G. Z., J. 1999. The Cost-Effectiveness of Care. *Journal of Health Economics*, Vol. 18, . 69-86.
- [29_ Klevorick, E. R., J. 1988. The Economic Impact of Health Insurance. *Journal of Health Economics*, .
- [30_ L. A., Grolnick, J.M. P. M. M.-S., S. S. P. H. S. C. T. R. R. N. 18. /CONTENT/941. Published April 2007. April 15, 2008.
- [31_ M. Grolnick, T.G. M.V. P., 1991. Paying for Quality: A New Approach. *Journal of Health Economics* . 385-410.
- [32_ N. J. 1988. Cost-Effectiveness. *Journal of Health Economics*, Vol. 7, . 259-284.
- [33_ P., M.V., 1980. *Doctors and Their Workshops: Economic Models of Physician Behavior*. University of Chicago Press, Chicago.
- [34_ P., G. C., Brennan, R. T., 1996. Economic Impact of Health Insurance. *Medical Care Research and Review*, 53(4), 417-440.
- [35_ S. B., Grolnick, P.M., W. DE, F. ES. 2008. Doctor Pay in the U.S. *Health Affairs* 2008 Mar-Apr; 27(3):813-23.

[36_S] S. D.R. 2006. *Medical group practices in the US, 2006*. Chicago, IL: American Medical Association.

[37_S] S. A. 2003. *Industry structure and performance: The case of the hospital industry*. *The Journal of Industrial Economics*

Appendix

A Construction of Fixed-Travel-Time HHI

W \bar{k} F^* $x =$
flat; longg. U G^* M \bar{k} F^* x
 $\bar{k} = 80$ T^* c $speed_c$ 0.1
 O M T c \bar{k} $speed_c$
 F^* x_0 fi
 x_i k_{x_i} I x_0 k_{x_i}
 x_0 x_i W
 x_0 x_i W
 x_i x_0 V $k_{x_i} + "_{i0} > V$ k_{x_0} V
 $"_{i0}$ 0 \bar{k} A $k_{x_0} = 0$
 x_0 x_i $($ k_{x_i} $)$

$$Pr("_{i0} > k_{x_i}) = \begin{cases} 1 & (1-\bar{k})k_{x_i} & k_{x_i} \leq \bar{k} \\ 0 & & k_{x_i} > \bar{k} \end{cases} \quad (15)$$

S \bar{Q} x_0 E (15)
 S fi I $Pr("_{i0} > k_{x_i})$ \bar{Q}
 x_0 I $Pr("_{i0} > k_{x_i})$ \bar{Q}
 x_i $E[S_{x_i}(x_0)] = Pr("_{i0} > k_{x_i})$ I
 N^* x_i $E[S_{x_i}^*(x_0)] = N^* Pr("_{i0} > k_{x_i})$

-325()2[(, 3[6,)-325(-22) -26(r)52.91

A

HHI

SK&A

h, SK&A

F

SK&A

HHI(x_h) = ∑_i S_{x_i}^{*}(x_h)²

HHI_c = 1/M_c ∑_{i ∈ c} HHI(x_h)

HHI_c M r S ® . S M r S ®

3[6 3[6

{ *educ_{pat}* - T * * *
 { *EPO* - A * * *
 * * *
 { *HMO* - A * *
 * *
 { *POS* - A * *
 * *
 { *PPO* - A * * *
 * * *
 { *HDHP* - A * * *
 * * *
 { *CDHP* - A * * *
 * * *
 { *EMPLOYER* - A * * *
 * * *
 { *AGE* - T
 { *AGE*²

C Estimates of First-Stage Instrumental Variables

	Control		Outcome	
	$(FTHHI_{phys})$	(HHI_{ins})	$(FTHHI_{phys})$	(HHI_{ins})
(pop_{flow})	-0.016 (0.469)	0.340 (0.262)	1.432** (0.599)	0.251 (0.225)
$(pop35_{flow})$	0.671** (0.294)	-0.172 (0.165)	-1.006*** (0.383)	-0.180 (0.144)
$(pop45_{flow})$	-1.382***	-0.200**	1.955T	11588111.9-0.200)

D.1 Robustness: Market Structure on Price

	E * C * O *		E * C * O *	
	C *	O *	C *	O *
($FTHHI_{phys}$)	0.107*** (0.015)	0.082*** (0.016)	0.114*** (0.015)	0.090*** (0.019)
(HHI_{ins})	-0.304***	-0.161**	-0.288***	-0.233**

D.2 Robustness: Market Structure on Utilization

	E		E	
	C	O	C	O
$\hat{\beta}$ ($FTHHI_{phys}$)	0.099*** (0.021)	0.006 (0.009)	0.145*** (0.021)	0.018* (0.010)
$\hat{\beta}$ (HHI_{ins})	-0.353*** (0.113)	-0.085** (0.042)	-0.181 (0.126)	-0.079 (0.053)
$\hat{\beta}$ ($scale$)	1T [0**			

0.145*2Q870T [(**) -21T .398 213.01-45.0
3-4 398 2**