Hospital Ownership and Public Medical Spending

By Mark G.Duggan

Alexandra Manta

Emory University

August 27, 2020

Research Question

- Does an increase in *hospital financing* improve the quality of medical care for *low-income* individuals?

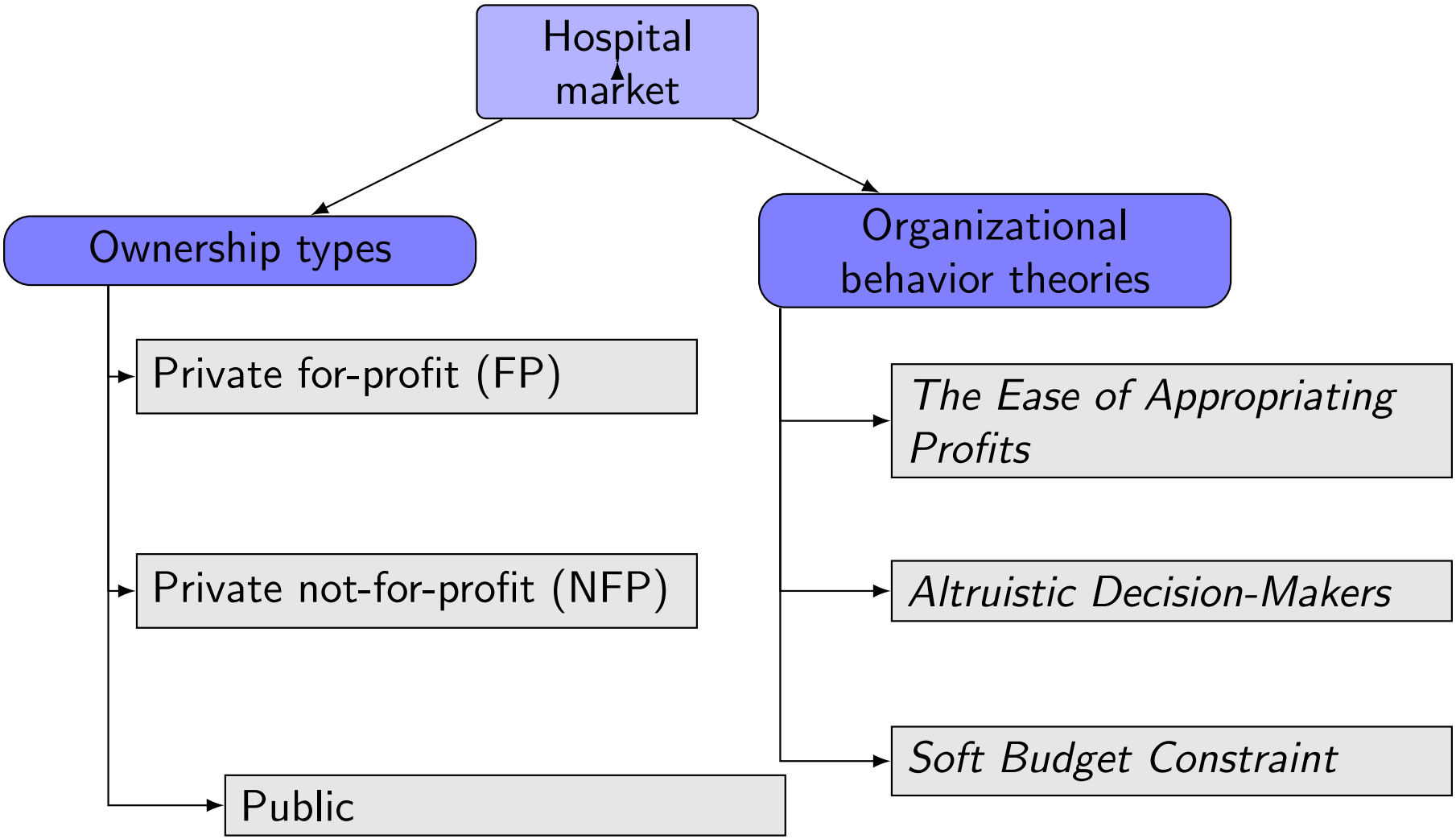
- How does a hospital's *type of ownership* influence its response to *profitable opportunities created by changes in government policy*?
- Using this plausibly exogenous *government policy change*, called Disproportionate Share Program (DSH), the author tests 3 theories of organizational behavior and then assesses their impact on health outcomes.

Motivation

- A DSH program was applied in 1990, then in 1996 it was observed a significant increase in DSH funds received by private hospitals.
- Government funding is equivalent to increasing hospital's financial incentives to treat *low-income* individuals. How does their 'treatment' vary according to the ownership type of hospitals?

Contribution of this paper: The main objective of such *government policy changes* is to have a positive effect on the treatment of the indigent. However, the funds may end up distributed in a way that the poor are not benefited from it. This paper examines how not-for-profit, for-profit and public hospitals respond to public medical spending.

Hospital ownership types



Dataset (1985-1995)

- From the state's Office of Statewide Health Planning and Development (OSHPD).
- Includes data for *all* California hospitals and their patients.
- Includes hospital-level data which provide information regarding each hospital's
  - finances
  - services
  - employees
  - and type of ownership.

Number and ownership types of hospitals:

- 397 general acute care hospitals that were in operation in California
  - 313 privately owned
  - 84 government-owned and operated,

Summary Statistics: Table I

TABLE I
CALIFORNIA HOSPITAL MARKET: SUMMARY STATISTICS IN 1990

Ownership type	# Hospitals	Medicaid	Uninsured	Average # beds
Private NFP	209	15.4%	6.2%	227
Private FP	104	16.7%	7.5%	135
Public	84	44.1%	14.5%	166
Total	397	21.8%	8.2%	190

Data include general acute care hospitals that were in operation in California from 1987 through 1995. Medicaid and Uninsured represent the percentage of a hospital's patients who were Medicaid-insured and uninsured, respectively.

- The majority of patients at government-owned facilities were Medicaid-insured or without health insurance.
- $< 25\%$ of the patients at private NFP and private FP facilities were indigent.

DSH (1990) per diem for a private hospital

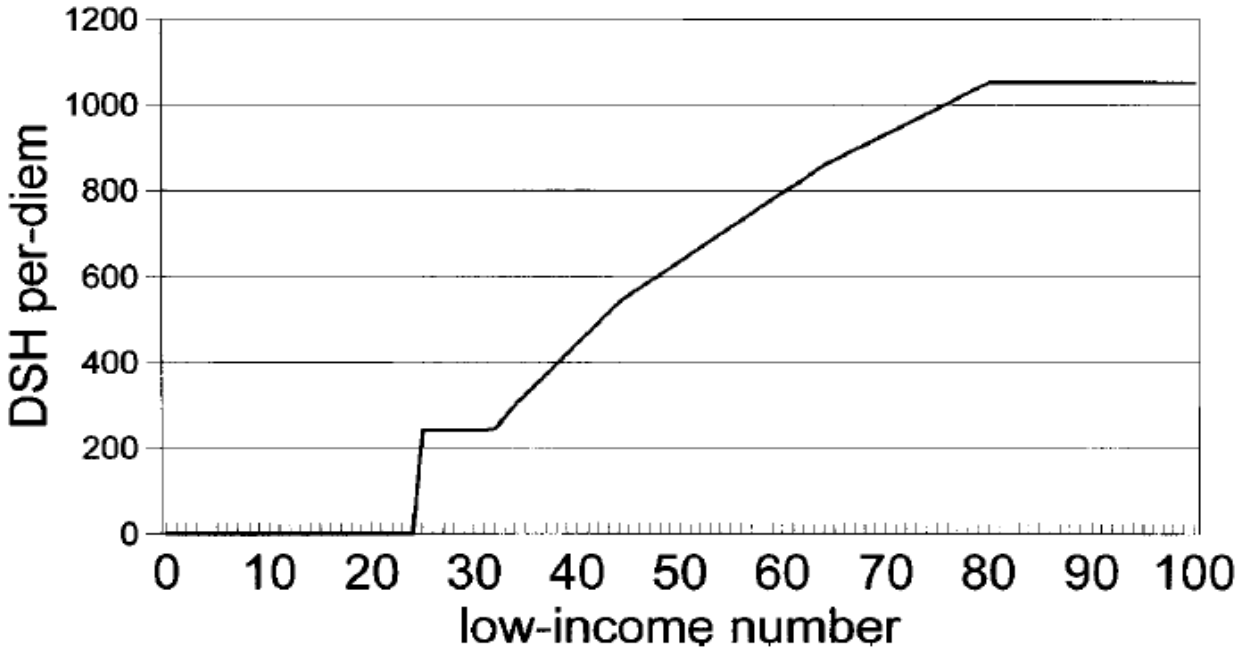


FIGURE I
DSH per diem for Private Hospital

The DSH program(1990) had two main effects.

1. It significantly *increased the revenues* of those hospitals with a low-income patients number $> 25\%$.
2. It enhanced hospitals' financial *incentives to treat low-income patients*.

The Reallocation of Low-Income Patients: Table & Fig. II

TABLE II

THE SHARE OF MEDICAID AND UNINSURED PATIENTS AT EACH TYPE OF HOSPITAL

Ownership type	Medicaid			Uninsured		
	1985	1990	1995	1985	1990	1995
Private NFP	44.2%	45.1%	55.8%	37.8%	47.9%	41.5%
Private FP	14.9%	12.4%	14.9%	13.4%	14.5%	10.5%
Public	40.9%	42.5%	29.3%	48.8%	37.6%	48.0%

Data include all general acute care hospitals that were in operation in California in each year. Values represent the percentage of Medicaid and uninsured patients at each type of hospital in 1985, 1990, and 1995.

- **Both** types of *private hospitals* responded *more aggressively* to the change in incentives than did government-owned institutions.

- The DSH program significantly *increased* the profitability of treating Medicaid patients, while leaving virtually *unchanged* the incentive to treat uninsured patients.

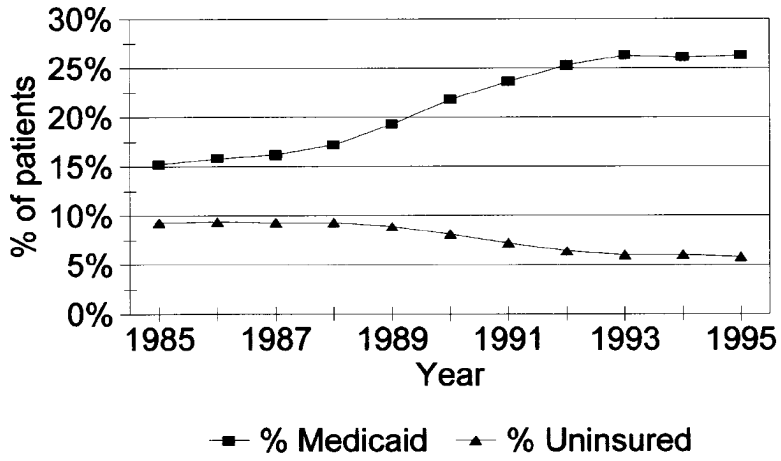


FIGURE II
Percent of Patients Medicaid or Uninsured

Total DSH payments by hospital ownership type

TABLE III
TOTAL DSH PAYMENTS BY TYPE OF HOSPITAL

Ownership type	1991	1996
Private NFP	66.0	184.0
Private FP	20.9	100.9
Public	1631.8	1471.6
Total	1718.7	1756.5

Dollar amounts are in millions. 1991 payments are based on 1990 Medicaid patient days. Payments for 1996 are based on 1995 Medicaid patient days.

- Notice the *difference* in DSH payments between *private* and *public* hospitals!

Changes in hospitals' Medicaid and Uninsured admissions: '85-'90 versus '90-'95

TABLE V

CHANGES IN HOSPITALS' MEDICAID AND UNINSURED ADMISSIONS: 1985–1990 VERSUS 1990–1995

	$\Delta MEDICAID_{95,90}$		$\Delta UNINSURED_{95,90}$		$\Delta MEDICAID_{90,85}$	
	(1)	(2)	(3)	(4)	(5)	(6)
$\Delta MCPRED_{95,90}$	−.742***	−.678***				
	(.081)	(.080)				
$\Delta UNPRED_{95,90}$			.962***	.984***		
			(.043)	(.043)		
$\Delta MCPRED_{90,85}$					.452***	.433***
					(.030)	(.031)
FOR-PROFIT		−270		34		−279*
		(199)		(55)		(153)
PUBLIC		−1064***		266***		358**
		(216)		(59)		(176)
CONSTANT	600	873	−5	−65	372	394
	(90)	(116)	(25)	(33)	(69)	(94)
# OBSERVATIONS	401	401	401	401	431	431
R^2	.173	.221	.555	.577	.341	.357

The first four specifications include the hospitals that were in operation in California from 1990–1995, while the final two include the facilities that were open throughout the 1985–1990 time period. PUBLIC and FOR-PROFIT are dummy variables for a hospital's type of ownership (private not-for-profit is the omitted category). $\Delta MEDICAID_{t+1,t}$ equals the change in the number of Medicaid hospital patients at a hospital from year t to $t+1$. $\Delta MCPRED_{t+1,t}$ represents the predicted change in the number of Medicaid patients, using t as the base year and the algorithm described in the Appendix. $\Delta UNINSURED_{t+1,t}$ and $\Delta UNPRED_{t+1,t}$ are the corresponding variables for the actual and predicted number of uninsured patients. Standard errors are included in parentheses.

- In response to the change in financial incentives caused by DSH, private hospitals *cream-skimmed the profitable Medicaid patients* from public facilities.
- (The results do not support the theory that private NFP hospitals are less responsive. More details in next slide.)

Model : Are NFPs Less Responsive?

The author runs specifications of the following form, using hospital data between $(1988 - 1995)$:

$$\begin{aligned} \text{MEDICAID}_{jt} = \beta_0 BEDS_{jt} + \beta_1 MCPRED_{jt} + \beta_2 OBSTET_{jt} \\ + \beta_3 OWN_{jt} + \beta_4 LOW > 15_{j,t-1} \\ + \beta_5 DSH_t * OWN_{jt} + \beta_6 DSH_t * LOW > 15_{j,t-1} \\ + \beta_7 DSH_t * LOW > 15_{j,t-1} * OWN_{jt} \\ + \alpha_j + \lambda_t + \epsilon_{jt} \end{aligned}$$

- where
  - $MEDICAID_{jt}$: number of Medicaid patients admitted by hospital j in year t,
  - α_j is a hospital fixed effect,
  - λ_t is a year fixed effect.
  - $LOW > 15_{t-1}$ is equal to one if the number of a hospital's low-income patients was greater than 15 percent in year $t - 1$.
  - $DSH_t * LOW > 15_{t-1}$ equals zero for all hospitals from $1988 - 1990$.
  - OWN ownership types I interact a hospital's ownership type.
  - DSH dummy to control for other factors that were differentially affecting each of the three types of hospitals in the post-DSH period.
  - $MCPRED$,is hospital j's predicted number of Medicaid patients in year t
  - $OBSTET$ hospital's service mix and ($BEDS$) its size.

Estimation : Are NFPs Less Responsive?

TABLE VI
IMPACT OF DSH INCENTIVES ON HOSPITAL MEDICAID AND UNINSURED ADMISSIONS: 1988–1995

	$MEDICAID_t$		$UNINSURED_t$	
	(1)	(2)	(3)	(4)
$MCPRED_{t,87}$	−.129***	−.114***		
	(.020)	(.020)		
$UNPRED_{t,87}$			.906***	.919***
			(.017)	(.017)
$LOW > 15_{t-1}$		78		−43
		(89)		(32)
$DSH_t * LOW > 15_{t-1}$		542***		6
		(129)		(46)
$DSH_t * NFP_t * LOW > 15_{t-1}$		161		55
		(139)		(49)
$DSH_t * PUBLIC_t * LOW > 15_{t-1}$		−628***		86
		(174)		(61)
$PRIVATE\ NFP_t$		−29		22
		(151)		(53)
$DSH_t * PRIVATE\ NFP_t$		199**		−51*
		(88)		(31)
$PUBLIC_t$		251		−101
		(231)		(82)
$DSH_t * PUBLIC_t$		20		28
		(136)		(48)
$BEDS_t$		3.40***		.34
		(.69)		(.25)
$OBSTET_t$		688***		136***
		(112)		(40)
# OBSERVATIONS	3171	3171	3171	3171
R^2	.951	.955	.956	.957

- The results suggest that **both** types of private hospitals were similarly more responsive to DSH incentives than public ones were.
  - Are NFP less responsive than the FP ones? No!*

Model : Do public hospitals have a soft budget constraint?

The author runs the following specification:

$$\begin{aligned}\Delta REVENUES_j = &\alpha + \beta_1 * DSH_j \\ &+ \beta_2 * (DSH_j * FOR\text{-}PROFIT_j) \\ &+ \beta_3 * (DSH_j * PUBLIC_j) \\ &+ \mu_1 * FOR\text{-}PROFIT_j \\ &+ \mu_2 * PUBLIC_j + \lambda^* BEDS_j + \epsilon_j\end{aligned}$$

- where
  - $\Delta REVENUES_j = \sum_j (\Delta MEDICAID\ REV_j + \Delta SUBSIDIES_j + \Delta OTHER\ REV_j)$
  - *DSH* payments in hospital j from 1992 to 1995

Estimation : Do public hospitals have a soft budget constraint?

TABLE VIII
IMPACT OF DSH FUNDS ON HOSPITAL SUBSIDIES AND REVENUES

	Δ MEDICAID REV	Δ SUBSIDIES	Δ OTHER REV	Δ REVENUES
DSH	1.52***	.00	−.38*	1.15***
	(.09)	(.10)	(.22)	(.22)
DSH * PUBLIC	−.39***	−1.04***	.39*	−1.03***
	(.09)	(.10)	(.22)	(.22)
DSH * FOR-PROFIT	−.04	.02	.54	.52
	(.38)	(.41)	(.92)	(.94)
PUBLIC	−935	2019***	120	1204
	(590)	(649)	(1452)	(1472)
FOR-PROFIT	−86	−216	−3605***	−3907***
	(550)	(605)	(1354)	(1373)
$BEDS_{90}$	3.58**	−.57	13.29***	16.31***
	(1.66)	(1.82)	(4.08)	(4.13)
CONSTANT	500	331	1152	1983*
	(480)	(528)	(1181)	(1197)
# OBSERVATIONS	371	371	371	371
R^2	.98	.97	.08	.28

Dependent variable in the first column is the change in each hospital's Medicaid revenue. Specifically, it equals $MCAIDREV_{9295} - MCAIDREV_{90}$, with $MCAIDREV_{9295}$ equal to average Medicaid revenue in the 1992–1995 time period. The dependent variables in the other columns (change in local government subsidies, change in other revenues, and change in total revenues) are defined similarly. DSH represents the average funds from the Disproportionate Share Program from 1992–1995. Sample includes the 371 hospitals in operation in California from 1987 to 1995 that reported revenue information in all years. Dollar amounts (in thousands) are inflation-adjusted to 1990 dollars. Standard errors are included in parentheses.

- The results suggest that **both** types of private hospitals experienced *significant increases in their revenues* (see DSH coefficients).
  - Do government-owned organizations have a soft budget constraint? Yes!*

Estimation : Are NFP hospital more altruistic than the FP ones? *DSH funds impact on hospitals' profits.*

TABLE IX
IMPACT OF DSH FUNDS ON HOSPITAL PROFITS

	Δ REVENUES	Δ COSTS	Δ NET INCOME
DSH	1.15***	−.01	1.16***
	(.22)	(.20)	(.10)
DSH * PUBLIC	−1.03***	.13	−1.16***
	(.22)	(.20)	(.10)
DSH * FOR-PROFIT	.52	.37	.15
	(.94)	(.86)	(.44)
PUBLIC	1204	1855	−650
	(1472)	(1361)	(693)
FOR-PROFIT	−3907***	−3864***	−43
	(1373)	(1268)	(646)
$BEDS_{90}$	16.31***	20.32***	−4.02**
	(4.13)	(3.82)	(1.95)
CONSTANT	1983	1373	609
	(1197)	(1106)	(563)
# OBSERVATIONS	371	371	371
R^2	.28	.29	.28

Dependent variable in the first column is $REVENUES_{9295} - REVENUES_{90}$, with $REVENUES_{9295}$ equal to the average revenue in the 1992–1995 time period. The dependent variables in the other columns (the change in total costs and the change in net income) are defined similarly. DSH represents average funds from the Disproportionate Share Program from 1992–1995. Sample includes the 371 hospitals in operation in California from 1987 to 1995 that reported revenue information in all years. Dollar amounts (in thousands) are inflation-adjusted to 1990 dollars. Standard errors are included in parentheses.

- The results suggest that according to the DHS coef. the NFPs increased their net income approximately 1-to-1 with their DHS payments, while the public facilities had no significant effect on net outcome.

Estimation : Are NFP hospitals more altruistic than the FP ones? *DSH funds impact on hospitals' total net worth.*

TABLE X
IMPACT OF DSH FUNDS ON HOSPITAL NET WORTH

	Δ NET WORTH	Δ NET PPE	Δ NET FIN ASSETS
DSHSUM	.85***	.01	.85***
	(.12)	(.08)	(.12)
DSHSUM * PUBLIC	−.92***	−.01	−.91***
	(.12)	(.08)	(.12)
DSHSUM * FOR-PROFIT	.15	−.16	.31
	(.53)	(.35)	(.52)
PUBLIC	4596	6295***	−1700
	(3345)	(2226)	(3246)
FOR-PROFIT	2925	359	2566
	(3118)	(2075)	(3025)
$BEDS_{90}$	37.27***	18.74***	18.52**
	(9.39)	(6.25)	(9.11)
CONSTANT	−3707	−2208	−1498
	(2720)	(1810)	(2639)
# OBS	371	371	371
R^2	.199	.051	.212

Dependent variable in the first column is equal to the change in hospital net worth from 1990 to 1995. Δ NET PPE equals the change in each hospital's net property, plant, and equipment, which also includes current and planned construction. Δ NET FIN ASSETS equals the change in each hospital's net financial assets. DSHSUM represents total funds from the Disproportionate Share Program during the time period of interest. Sample includes the 371 hospitals in operation in California from 1987 to 1995 that reported revenue information in all years. Dollar amounts (in thousands) are inflation-adjusted to 1990 dollars. Standard errors are included in parentheses.

- The results do not suggest that the decision-makers in private NFP hospitals have much different motives than their FP counterparts.
  - Are NFP hospital more altruistic than the FP ones? No!*

Model : Does DSH program improve health outcomes?

The author runs the following specification:

$$\Delta MORT_{jt} = \alpha + \beta \Delta MCPRIV_{jt} + \lambda \Delta MORT_{j,t-1} + \mu \Delta MCAID_{jt} + \Theta \Delta LBW_{jt} + \gamma \Delta X_{jt} + \epsilon_{jt}$$

- where
  - $\Delta MORT_{jt}$: the change in infant mortality rate in zip code j in 1990-1995,
  - $\Delta MCAID_{jt}$ equals the change in the percentage of infants who were insured by the Medicaid program within zip code j,
  - $\Delta MCPRIV_{jt}$ is the change in the number of Medicaid newborns attending private facilities as a percentage of all babies born in that zip code,
  - $\Delta MORT_{j,t-1}$ controls for each zip code's preexisting infant mortality rate trend,
  - ΔLBW_{jt}: the change in the percentage of babies born at low-birthweight,
  - ΔX_{jt} changes in the demographic characteristics of infants and their mothers.

Estimation : Does DSH program improve health outcomes?

TABLE XII
IMPACT OF REALLOCATION ON CHANGES IN INFANT MORTALITY RATES

	Δ MORTALITY$_{95,90}$				
	(1)	(2)	(3)	(4)	(5)
Δ MCPRIV$_{95,90}$	.0000	−.0005	.0005		
	(.0019)	(.0020)	(.0021)		
DSHPER$_{91}$				−2.4E-4	1.5E-3
				(5.8E-3)	(5.3E-3)
Δ MORTALITY$_{90,89}$		−.3928***	−.3948***		−.3948***
		(.0198)	(.0199)		(.0199)
Δ MEDICAID$_{95,90}$		.0030	.0026		.0030
		(.0031)	(.0036)		(.0029)
Δ LBW$_{95,90}$		.0358***	.0334***		.0332***
		(.0089)	(.0089)		(.0089)
Δ HISPANIC$_{95,90}$			−.0044		−.0044
			(.0034)		(.0033)
Δ BLACK$_{95,90}$			.0116*		.0116*
			(.0069)		(.0069)
Δ AGE <25$_{95,90}$			.0042		.0043
			(.0046)		(.0046)
Δ AGE >34$_{95,90}$			.0045		.0044
			(.0061)		(.0060)
CONSTANT	−.16***	−.23***	−.22***		−.22***
	(.03)	(.03)	(.04)		(.04)
# OBSERVATIONS	1382	1382	1382	1382	1382
R^2	.0000	.2316	.2350	.0000	.2350

The dependent variable equals the change in the infant mortality rate in the zip code from 1990–1995. ΔMCPRIV$_{95,90}$ is the change in the number of Medicaid newborns attending private facilities as a percentage of all newborns. DSHPER$_{91}$ is the average DSH dollars (in thousands) per Medicaid newborn in the zip code (described further in Section VI). ΔMORTALITY$_{90,89}$ is the change in the infant mortality rate from 1989 to 1990, and ΔMEDICAID$_{95,90}$ equals the change in the percentage of newborns who are Medicaid-eligible. ΔLBW$_{95,90}$ is the change in the percentage of infants born weighing less than 2500 grams. ΔHISPANIC$_{95,90}$ and ΔBLACK$_{95,90}$ represent the change in the percentage of newborns who are Hispanic and black, respectively. ΔAGE <25$_{95,90}$ and ΔAGE >34$_{95,90}$ equal the change in the percentage of women delivering newborns who are younger than 25 and older than 34, respectively. Standard errors are included in parentheses.

- The results suggest that the infants *did not have better improvements* across different areas (zip code).
  - Does DSH program improve health outcomes for low-income individuals? No!*

Conclusions

- In this paper the author exploit a plausibly exogenous *change in hospital financing* to test three theories of organizational behavior:
  - *The Ease of Appropriating Profits*: Reject that NFP hospitals are less responsive than FP ones.
  - *Altruistic Decision-Makers*: Reject. NFPs are no more inclined than profit-maximizing facilities to use cash windfalls to improve medical care quality for the poor.
  - *Soft Budget Constraint*: Accept. Public hospitals were unresponsive to financial incentives because any increases in their revenues were taken by the local governments that own them. (That's the *critical difference* among the 3 types of hospitals)
- The reallocation of Medicaid patients from public to private hospitals caused by the DSH program **did not improved health outcomes for the poor**. More specifically, areas in which substantial reallocation occurred did not have better improvements in health outcomes, as measured by *changes in infant mortality*.
- Finally, programs that aim to improve medical care for the poor *must be much more carefully designed* if they are to benefit the indigent.