Boundaries of (Non-Firm) Organizations

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May, 2012

To Do

1. Brief overview of boundary of the for-profit firm.
2. Public-Private Partnerships
3. Municipal service provision
4. Hospitals

Economic Theory of Organization

> *Two important problems face a theory of economic organization–to explain the conditions that determine whether the gains from specialization and cooperative production can better be obtained within an organization like the firm, or across markets, and to explain the structure of the organization (Alchian & Demsetz, 1972)*

1. Technology
2. Moral Hazard
3. Transaction Costs
4. Property Rights

These are nicely reviewed in Lafontaine & Slade, so I presume you either read about them there or are already familiar.

Applying These Theories to the Government

Most prominent application is to service provision:

- Take as given the mix of services provided: prisons, garbage, water
- Provide with public employees or contracting out to a private provider.
- Mixed provisions also possible, with some sub-tasks kept public and others outsourced.
- Outsourcing to other public provider also possible.

For each theory of the firm there's (at least one) theory of public outsourcing built around it.

A Multi-task MH Approach (Martimort & Pouyet, 2008)

1. Context: Public-Private Partnerships, mostly for infrastructure projects. Decision on the allocation of tasks- Plan, (Finance), Build, Operate (Bennet & Iossa, 2003; Iossa & Martimort, 2009; Bettignies & Ross, 2009; Iossa & Martimort, 2011; a million more).
2. Main idea: The right task allocation among agents depends on the complementarities of the tasks. (Holmstrom & Milgrom, 1991)

Players and Payoffs

- Government principal
  - $U = Sq - c - t_B - t_O$, where q is quality, c are costs, S is sensitivity, and t_i are transfers to builder and operator.
- Potentially two agents: One who builds (and can operate), and one who can only operate (public employee, perhaps). Could actually bundle them together, so same agent does both.
  - Identical CARA utilities, with coeff. of risk aversion r and outside options of zero.
  - Building and operating efforts (e_i) that cost $e_i^2/2$.

Timing and Technology

1. Principal assigns tasks and sets compensation contracts (which can depend on q and c)
   - $t_i = k_i + a_i q + b_i c$ but we'll assume (to begin) that $t_B = k_B + aq$ and $t_R = k_R - bc$.
2. Agents put forth effort to affect costs and quality.
   - $q = e_B + \epsilon$, with $\epsilon \sim N(0, \sigma_q^2)$
   - $c = \eta - e_O - \delta e_B$, with $\eta \sim N(\eta_0, \sigma_c^2)$
   - We assume $|\delta|$ is small.
3. Actual costs and quality realized and contracts paid.

Equilibrium

- First best: $e_B = S + \delta$ and $e_O = 1$
- Second Best Unbundled: $e_B^u = \frac{S+\delta}{1+r\sigma_q^2}$ and $e_O^u = \frac{1}{1+r\sigma_c^2}$
- Second Best Bundled: Complicated, but:

$$e_B^b - e_B^u \sim \delta[1 + r(1 + \delta^2 + \delta S)\sigma_q^2]$$

$$e_O^b - e_O^u \sim \delta[S + r(S + \delta)\sigma_c^2],$$

  so bundling changes effort in the obvious directions when $\delta \gtrless 0$.
- Bundling is better iff $\delta > 0$ (positive externality)
- Intuition: with positive externality, I want to induce more effort, and I can do that by bundling. With a negative externality, the tasks are in conflict, so incentives on c are wasted (since they both encourage and discourage effort).

Extensions

- Bundling is less attractive with more flexible contracts (can better incentivize builder through contract)
- Bundling is more attractive if merger is managed as a risk-averse consortium (There is also a risk-advantage to merger.. where the joint venture imposes "mutual insurance" the firms)
- If q is unobservable, but we can give incentive pq to builder by letting him keep the asset, $p << S$, leaving the rest to principal.
  - With government ownership and $\delta \leq 0$ bundling and unbundling are the same ($e_B = 0, e_O > 0$).
  - With or without government ownership and $\delta > 0$ bundling is better than unbundling, since $e_B > 0$.
  - In fact, with $\delta > 0$, bundling and builder ownership is best.

What is Public Here?

- Not much.
- But if we add an adverse selection problem in which the externality can be positive or negative, and a potentially captured regulator who announces it, we get:
  - A negative-externality builder wants to bribe the regulator to lie so he can get bundled.
  - Revelation necessitates information rents.
  - Principal weakens incentives to decrease these rents.
  - Bundling less attractive.

Extended Literature

Almost all theoretical, but very active.

- Hart/Shleifer/Vishney (1997/2003) looking an prisons with less extensive contracts.
- Iossa/Martimort (2008) looking at contract duration, financing and regulation
- Bennett/Iossa (2010) looking at PPPs with private non-profits.
- Iossa/Martimort (2012), looking at mechanism design approach with non-verifiable costs and externalities.
- Auriol/Picard (2011) looking at PPP versus procurement with a focus on their information consequences.

A TCE approach (Levin & Tadelis, 2010)

1. Context: understanding the service-provision decision in U.S. municipalities (Lopez-de-Silanes, Shleifer & Vishney, 1997; Hefetz & Warner, 2004; Warner & Hebdon, 2001; Bel & Fageda*, 2009; a million more).
2. Main idea: Monitoring quality of contractual performance is hard, but employment relationship gives weak incentives for effort. Use contracts when quality is not that important or easy to monitor (Bajari & Tadelis, 2001).

Players and Payoffs

- Government principal: $U_P = V(q|s) - d(\hat{q}|m) - w$
  - q is quality, s is sensitivity to quality, $V_q > 0$, $V_{qq} < 0$, $V_{qs} > 0$
  - $d(\hat{q}|m)$ is the cost of writing and verifying a contract specifying quality $\hat{q}$. $d(0, m) = 0$, $d_q > 0$, $d_{qm} > 0$, and (sometimes) $d_{qq} > 0$.
  - w are wages to the agent.
- Agent: $U_A = w + (T - t)r - c(e)t$
  - t is time spend working out of a budget of T and r is outside option of time.
  - e is effort intensity $c_e > 0$ and $c_{ee} > 0$

Timing and Technology

1. Principal writes contract $(\hat{w}, \hat{q}, \hat{t})$, specifying required quality, required time, and wage. If $\hat{q} > 0$, he bears contracting cost. If $\hat{t} > 0$, principal bears a tiny cost (for uniqueness).
2. Agent accepts/declines offer and puts in effort and time.
3. $q(e, t) = (\rho + e)t$, where $\rho > 0$ is baseline productivity.
4. If contract is satisfied, payment made.

Equilibrium

- The optimal contract either sets $\hat{t} = 0$ or $\hat{q} = 0$ but not both.
  - Intuition: If I set two constraints that both bind, I could pay less by lowering the $\hat{t}$ requirement while keeping the $\hat{q}$ requirement.
  - Why ever use $\hat{t}$? Because there are insignificant contracting costs.
  - Why ever use $\hat{q}$? Because it induces efficient effort mix, so you pay less (ignoring contracting costs).
- Interpretation: Two methods of organizing
  - Employment: hours requirement.
  - Contracting Out: quality requirement.

Comparative Statics and Predictions

Outsourcing decreases in

- m, the difficulty of specifying and monitoring quality.
  - Services that are complicated will be done in house.
- s, the principal's sensitivity to quality (assuming $d_{qq} > 0$, i.e., quality is increasingly difficult to monitor as it increases).
  - Services that citizens care a lot about will be done in house.

Auxiliary Predictions

Some less theoretically grounded predictions

- Small cities, since efficient scale may be a primary determinant- more outsourcing.
- Mayors, since political patronage may be important- less outsourcing (versus city managers)
- Old cities may have well-installed rent-seeking employment- less outsourcing
- Less financially constrained cities may value a dollar saved less (relative to monitoring effort)- less outsourcing
- And all 4 may be less responsive to differences in m and s.

Data

- Method of provision: ICMA survey- $\approx$ 1000 cities and 29 services: 3 methods (contract w/ other public)
- Contracting difficulty: survey of 23 city managers, who rank services on 3 dimensions. Did the same for MBA students with private-sector managerial experience. Answers highly correlated. Combine into principal component.
  - Difficulty of specifying/monitoring quality
  - Degree of unpredictability
  - Difficulty of replacing contractors
- Sensitivity: similar survey method asking about citizens sensitivity.
- City-level financial, political, and demographic data from various sources.

Results-Main Effect of Difficulty

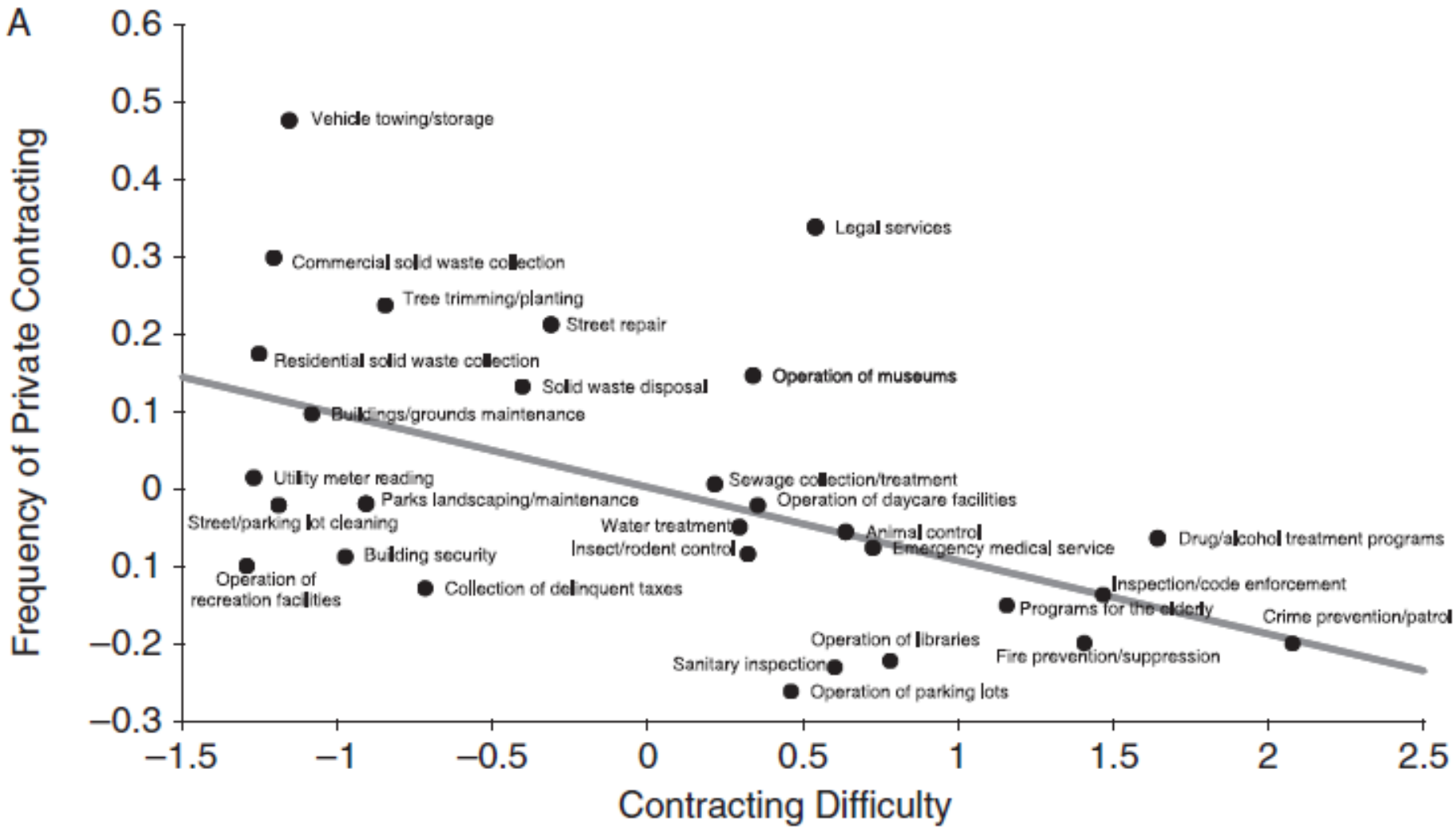


Figure 1A
Contract Difficulty and Private Contracting

Results-Interactions

TABLE VI
DETERMINANTS OF CONTRACTING, INTERACTION EFFECTS

Multinomial Logit Model for Private and Public Contracting

	Public		Private	
Service Characteristics				
Contracting difficulty	0.077	(0.028)	0.016	(0.038)
Resident sensitivity	−0.070	(0.008)	−0.078	(0.010)
Contracting Difficulty x City Characteristics				
Difficulty * Population 10–25k	−0.018	(0.012)	−0.004	(0.017)
Difficulty * Population 25–50k	−0.010	(0.014)	−0.048	(0.019)
Difficulty * Population >50k	−0.026	(0.015)	−0.053	(0.021)
Difficulty * Manager	0.009	(0.009)	−0.001	(0.012)
Difficulty * Other FOG	0.010	(0.028)	0.006	(0.033)
Difficulty * Public Employee Unions	−0.005	(0.008)	0.004	(0.011)
Difficulty * City Debt/Revenue	0.002	(0.004)	0.000	(0.006)
Difficulty * East	0.022	(0.020)	0.019	(0.023)
Difficulty * South	0.011	(0.010)	−0.026	(0.014)
Difficulty * West	0.029	(0.010)	−0.039	(0.013)
Difficulty * Urban	−0.023	(0.013)	0.036	(0.017)
Difficulty * Suburban	−0.005	(0.010)	−0.007	(0.014)
Difficulty * Inc. after 1950	0.004	(0.009)	−0.022	(0.013)
Difficulty * County med. Income (10k)	0.002	(0.005)	−0.017	(0.007)
Difficulty * Percent republican	−0.021	(0.033)	0.009	(0.047)
Additional Controls	City Fixed Effects			

Note: Reported coefficients are marginal effects on probability of different modes of service provision. In-house provision is the base outcome. Standard errors are clustered at the city level.

Results-Fiscal Constraints

TABLE VII
EFFECT OF STATE LAWS ON CONTRACTING

Multinomial Logit for Frequency of Private and Public Contracting (N = 18,588)

	(1)		(2)	
	Public	Private	Public	Private
Labor Laws				
State prohibits strikes by public employees	−0.008	−0.096	−0.015	−0.087
	(0.018)	(0.047)	(0.021)	(0.047)
City authorized to engage in collective bargaining			0.007	0.037
			(0.008)	(0.015)
Budget Constraint Laws				
State law permits short-term borrowing	0.023	−0.013	0.030	−0.001
	(0.008)	(0.017)	(0.010)	(0.022)
State imposes city debt limits	−0.014	0.068	−0.004	0.071
	(0.018)	(0.028)	(0.018)	(0.031)
State mandates balanced budget	0.019	−0.028	0.027	−0.025
	(0.009)	(0.014)	(0.012)	(0.017)
State law authorizes 'take over' of finances	−0.045	0.091	−0.049	0.062
	(0.009)	(0.044)	(0.010)	(0.049)
State assesses property tax	0.064	−0.093	0.098	−0.058
	(0.027)	(0.019)	(0.039)	(0.028)
Additional Controls	City Characteristics, Service FE		City Characteristics, Service FE	

Note: Reported coefficients are marginal effects on probability of different modes of service provision. In-house provision is the base outcome. Standard errors are clustered at the city level.

Results-Spending

TABLE VIII
CITY EXPENDITURE AND PRIVATE CONTRACTING

Linear Regression Model of ln(City Expenditure per Capita) (N = 1043)

	(1)		(2)		(3)	
	Coeff.	s.e.	Coeff.	s.e.	Coeff.	s.e.
Degree of Private Contracting						
Fraction of city services privately contracted	−0.305	(0.122)	−0.387	(0.122)	−0.246	(0.122)
City Charateristics						
Population 10-25k	0.119	(0.059)	0.094	(0.058)	0.059	(0.057)
Population 25-50k	0.058	(0.066)	0.020	(0.066)	−0.060	(0.066)
Population > 50k	0.100	(0.074)	0.051	(0.074)	−0.041	(0.076)
Manager	0.012	(0.041)	0.004	(0.041)	−0.007	(0.039)
Other form of government	0.093	(0.125)	0.108	(0.123)	0.085	(0.117)
Unions	0.047	(0.038)	0.034	(0.038)	0.004	(0.036)
City Debt/Revenue	0.061	(0.022)	0.057	(0.022)	0.094	(0.021)
East	0.316	(0.085)	0.313	(0.084)	0.364	(0.084)
South	0.136	(0.050)	0.134	(0.049)	0.179	(0.052)
West	−0.021	(0.047)	−0.003	(0.047)	0.050	(0.052)
Urban	0.017	(0.064)	0.018	(0.063)	−0.015	(0.060)
Suburban	−0.390	(0.051)	−0.372	(0.051)	−0.261	(0.051)
Incorporated after 1950	−0.291	(0.046)	−0.252	(0.046)	−0.106	(0.046)
County med. Income (10k)	0.131	(0.025)	0.141	(0.025)	0.119	(0.024)
Percent republican	−0.681	(0.162)	−0.687	(0.160)	−0.846	(0.161)
Number of city services provided			0.009	(0.002)		
Additional Controls					Individual service provision dummies	

Interpretation and Relation to For-Profit

What's public here?

- Relatively limited set of contracts... no relational contracts allowed.
- Direct preference for public employment (Mayor)
- Income effects and budget constraints. (Fiscal Constraints)

Do these things matter? Hard to know, because there are no for-profit cities.

Non-Profits- (Marsh & Warren)

1. Context: California Hospitals' decision to provide services in house or outsource them (Coles & Hesterly, 1998).
2. Main idea: If outsourcing is a cost/quality tradeoff, non-profits will outsource less than for-profits, especially when quality is particularly important and budgets are big. (Glaeser & Shleifer, 2001)

Data on California Hospital Services

- 433 short term care general hospitals, 1996-2008
- 28% for-profit, 54% non-profit, 13% district, 5% local
- 103 services in all, but not every hospital has every service (average 55).
- 242k hospital x service x year combinations, 207k outsourced to any extent

Examples of Services (Revenue Generating) $N = 67$

DAILY HOSPITAL (23)
Psychiatric Acute - Adult
Psychiatric Acute - Child
Obstetrics Acute
Neonatal Intensive Care

AMBULATORY SERVICES (11)
Emergency Services
Medical Transportation Services
Psychiatric Emergency Rooms

ANCILLARY SERVICES (33)
Cardiac Catheterization Services
Cardiology Services
Electromyography
Anesthesiology

Examples of Services (Non-Revenue Generating) $N = 36$

GENERAL SERVICES (16)
Printing and Duplicating
Non-Patient Food Services
Pharmacy
Grounds

ADMINISTRATIVE SERVICES (15)
Public Relations
Medical Records
Nursing Administration
Community Health Education

FISCAL SERVICES (5)
General Accounting
Credit and Collection
Admitting

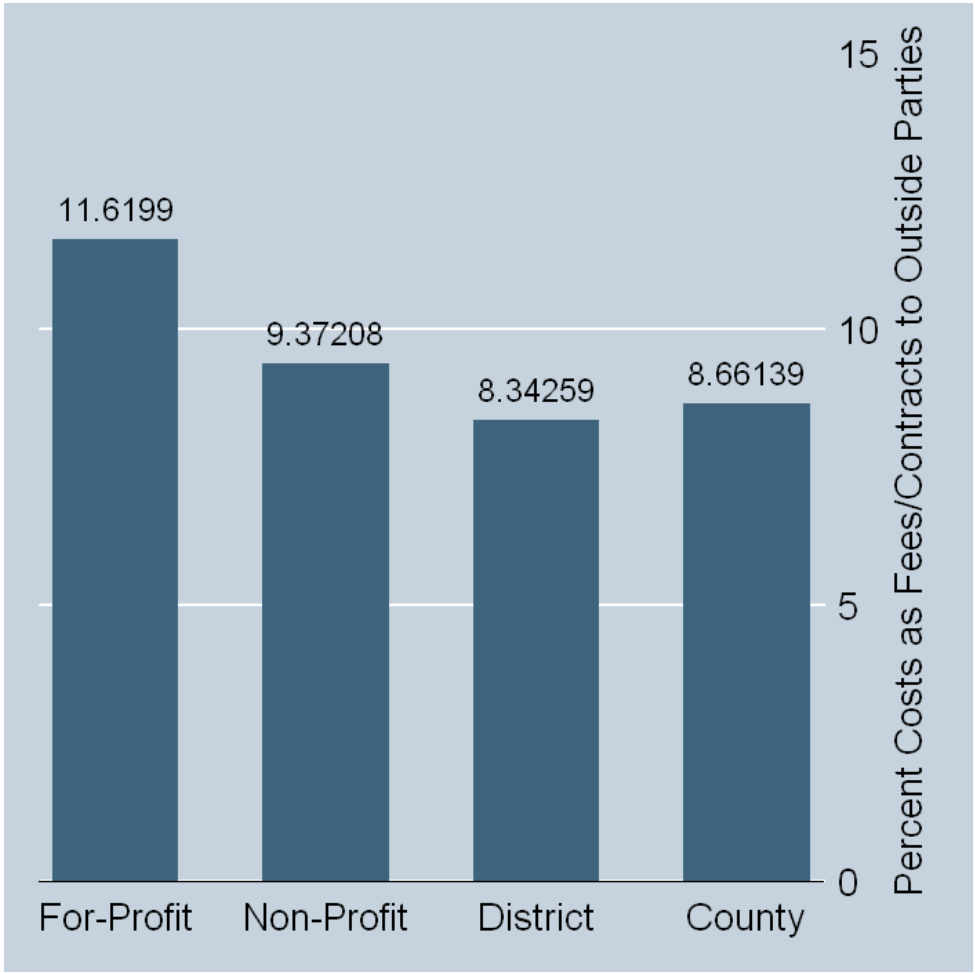
Cost-based Measure of Outsourcing

For every service, direct costs divided into 10 categories: Salary and Wages, Employee Benefits, Reclassified Physician and Student Compensation, Supplies, Depreciation, Leases and Rentals, Other Direct Expenses, **Purchased Services**, and **Professional Fees**.

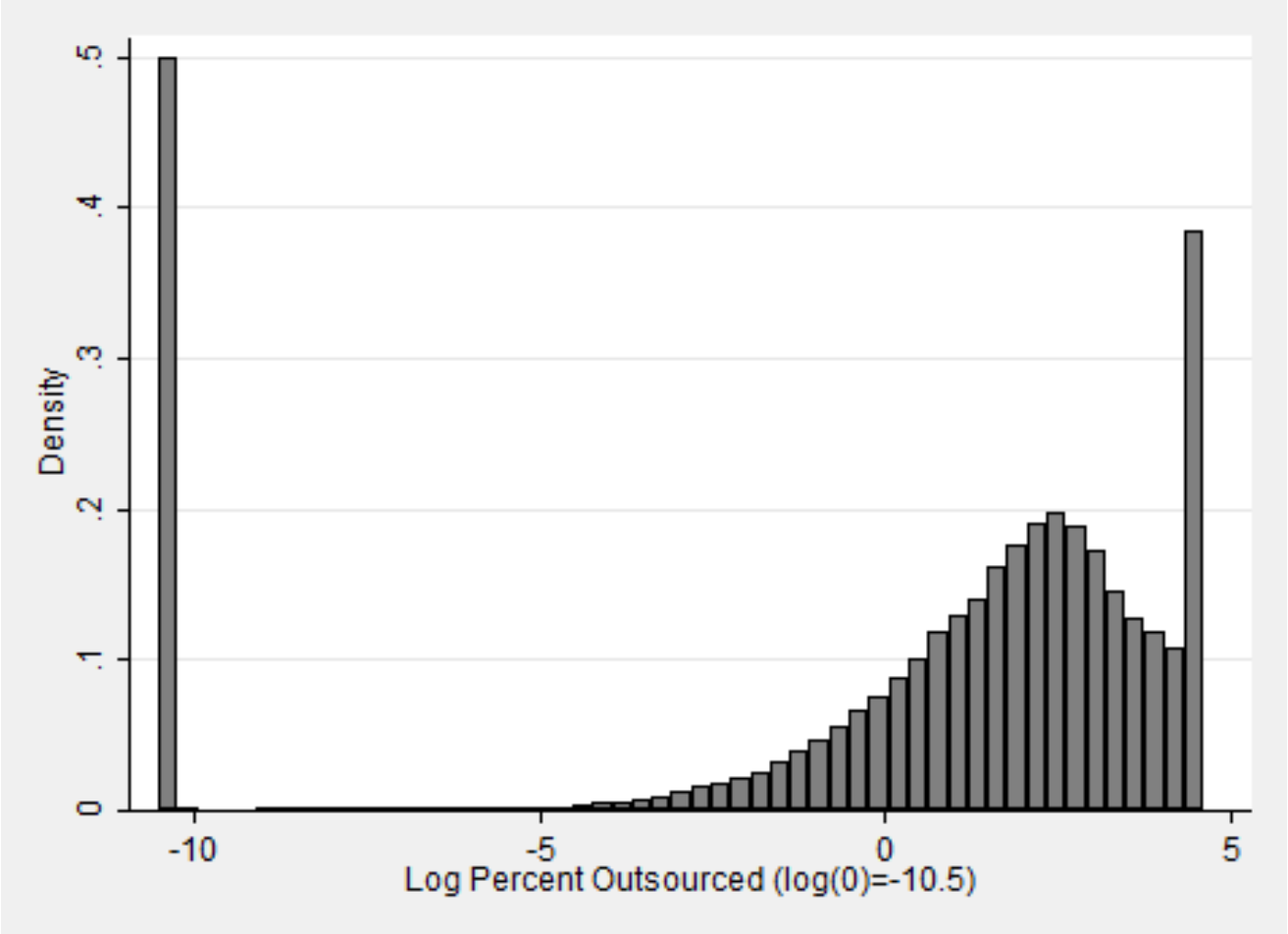
- Purchased Services- Medical, Repairs and Maintenance, Medical School Contracts, Management Services, Collection Agencies, and other Purchased Services
- Professional Fees- Physician's Fees, Therapist Fees, Consulting and Management Fees, Legal, Audit, Registry Nursing Personnel, Other Contracted Services, other Professional Fees

$$PCTOUT_{hst} \equiv \frac{PurchedServices_{hst} + ProfessionalFees_{hst}}{TotalDirectExpenses_{hst}} * 100$$

For Profits Contract More than Non-Profits or Government Hospitals



A Little more Complicated than That



A Model- Cost/Quality Trade-off (Glaeser & Shleifer 01)

Assume firms maximize

$$u(\pi, Z, q) = \pi + v(Z) + bq,$$

subject to

$$\pi + Z \leq I(q) - F,$$

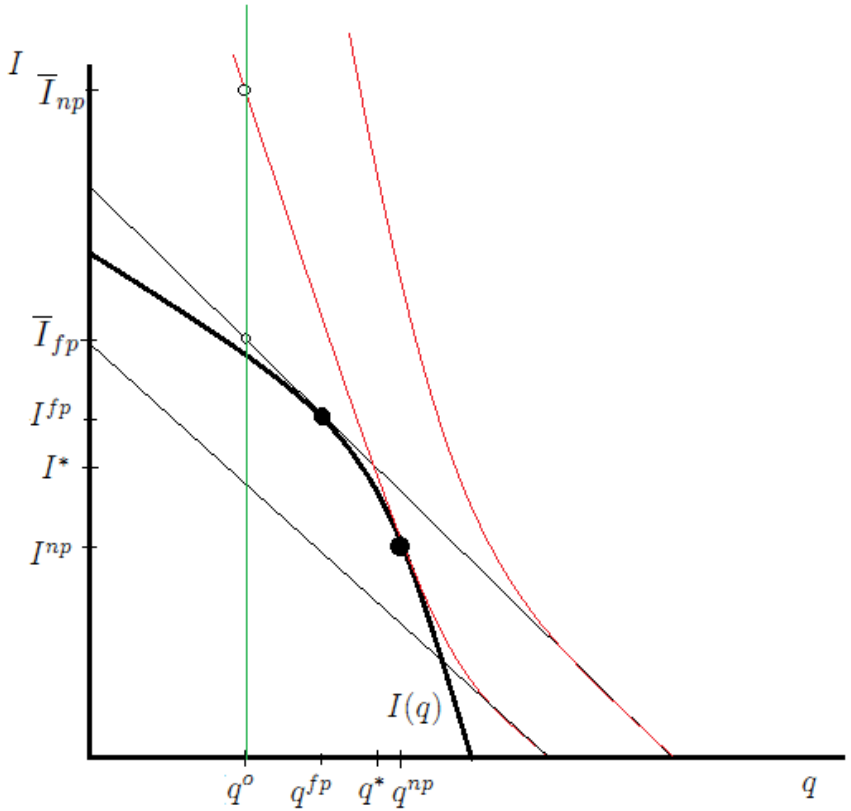
- $I(q) - F$ is income, net of costs, as a function of quality (q)
- $v(Z)$ is the increasing and concave returns to perquisites (Z), with $v'(0) = 1$;
- b is a preference for quality, and π is profits.
- Let $q = 0$ represent the income-maximizing quality level, so $I(q)$ is concave and decreasing in q.

Let q^{fp} and q^{np} represent the maximizing choices for firms of each type, and the associated incomes $I^j \equiv I(q^j) - F$.

Result: $q^{fp} < q^{np}$ **and** $I^{fp} < I^{np}$**.**

A Model-Choices

Given some q, let $\overline{I}_j(q)$ represent the cutoff income such that a firm of type j would choose the pair (q, I) over in-house production for any $I \geq \overline{I}_j(q)$.



A Model- Outsourcing

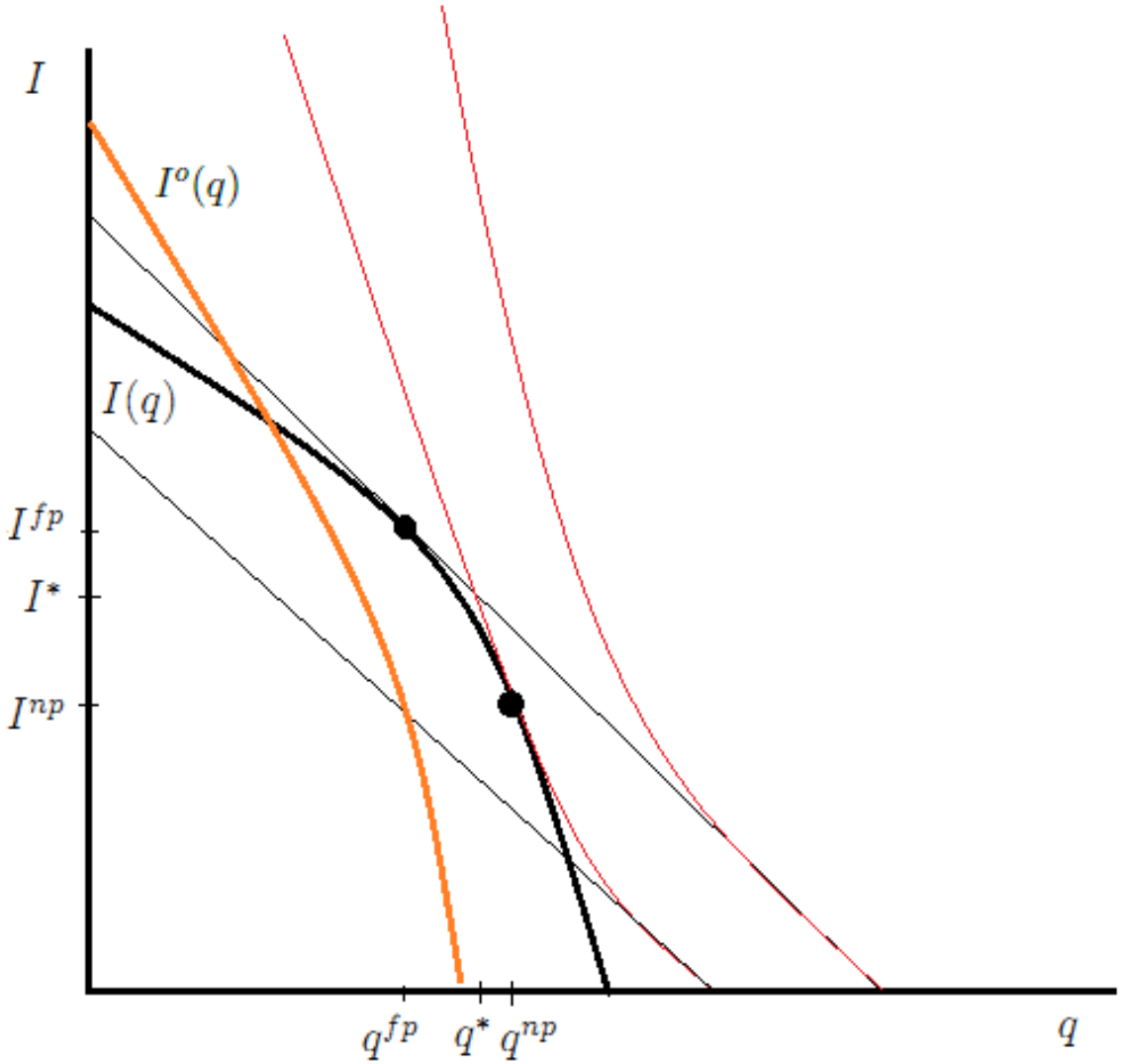
Proposition

There is a unique combination (q^*, I^*) *such that* $u(0, I^*, q^*) = u(0, I^{np}, q^{np})$ *and* $u(I^*, 0, q^*) = u(I^{fp}, 0, q^{fp})$. *This combination is bracketed by the other two, in the sense that* $q^{fp} < q^* < q^{np}$ *and* $I^{fp} > I^* > I^{np}$. *Furthermore,*

1. *If* $q \geq q^*$ *then* $\bar{I}_{np}(q) \leq \bar{I}_{fp}(q)$.
2. *If* $q \leq q^*$ *then* $\bar{I}_{np}(q) \geq \bar{I}_{fp}(q)$.

Finally, a firm of type j *will outsource if and only if there is some quality level such that* $I^o(q) > \bar{I}_j(q)$.

Outsourcing Income Cutoffs, for $q^o < q^*$



Testable Implications

Corollary

If $I^o(q) > I(q)$ only if $q < q^*$, then a non-profit firm will outsource only if an otherwise identical for-profit firm does. *If $I^o(q) > I(q)$ only if $q > q^*$, then a for-profit firm will outsource only if an otherwise identical non-profit firm does.*

Proposition

If $q < q^*$, then $\bar{I}_{NP}(q) - \bar{I}_{FP}(q)$ is positive and increases in b and decreases in F.

Econometric Model

$$y^*_{hst} = \sum_j \beta_j Own^j_{ht} + \gamma_{1s} + \gamma_{2s} Output_{hst} + \Gamma X_{ht} + \epsilon_{hst}, \quad (1)$$

- Hospital ownership status dummies (3)
- Size and scope: log(beds)/# of services (2)
- Service dummies (103)
- Service-specific output, in logs (103)
- Year Dummies (13)
- County Dummies (57)

Service-Specific Outputs

- For daily hospital services: Patient days
- For ambulatory services: Visits
- For ancillary services, more hodgepodge: deliveries, operating minutes, procedures, tests, sessions, etc.
- For non-revenue services, varies even more widely:
  - Printing and duplicating: Reams of paper used
  - Food service: Meals served
  - Social work services: Number of personal contacts
  - Housekeeping: Square feet serviced

Extensive and Intensive Margins

- Extensive Margin- Yes/No: Outsource if $y^* \geq 0$
- Intensive Margin- How much: $y^* = ln(pctout)$, conditional of $pctout > 0$.
- If we assume (ϵ^e, ϵ^i) are jointly normal, can estimate the system of choices using the Heckman selection model.
- Turns out to make no difference, so I'll just do the two margins independently.

Basic Results

	Extensive *Outsourced*	Intensive *log(pctout)*	Heckman *log(pctout)*
Non-Profit(d)	-0.015^{*}	-0.074^{*}	-0.075^{*}
	(0.008)	(0.043)	(0.043)
District(d)	0.005	-0.076	-0.077
	(0.011)	(0.064)	(0.064)
County(d)	0.006	-0.347^{***}	-0.348^{***}
	(0.018)	(0.084)	(0.085)
Staffed Beds	-0.050^{***}	-0.050^{*}	-0.052^{*}
	(0.007)	(0.030)	(0.030)
Services Offered	0.010^{***}	-0.007^{***}	-0.007^{***}
	(0.001)	(0.003)	(0.003)
Residency Program(d)	-0.036^{***}	-0.009	-0.009
	(0.010)	(0.035)	(0.035)

The Importance of Quality

- Eggleston et al (HE, 2008)- Meta-analysis of 31 papers.. "Studies representative of the US as a whole tend to find lower quality among for-profits than private nonprofits."
- Picone, Chou, Sloan (Rand, 2002)- U.S. hospitals converting from non-profit to for-profit status reduce quality on dimensions that are difficult for outsiders to observe, such as patient mortality.
- We don't measure quality, but instead contrast outsourcing choices in services where quality is presumably more important: Revenue-Generating Services (which are medical) versus Non-Revenue Generating Services.

Difference Bigger for RevGen, Only County for Non-Rev.

	Extensive *Outsourced*	Intensive *log(pctout)*
Non-Profit x Rev(d)	-0.019^{***}	-0.166^{***}
	(0.007)	(0.062)
District x Rev(d)	-0.007	-0.044
	(0.011)	(0.091)
County x Rev(d)	-0.007	-0.030
	(0.015)	(0.120)
Non-Profit(d)	-0.006	0.008
	(0.009)	(0.049)
District(d)	0.008	-0.055
	(0.012)	(0.082)
County(d)	0.009	-0.333^{***}
	(0.017)	(0.093)
Staffed Beds	-0.050^{***}	-0.047
	(0.007)	(0.030)

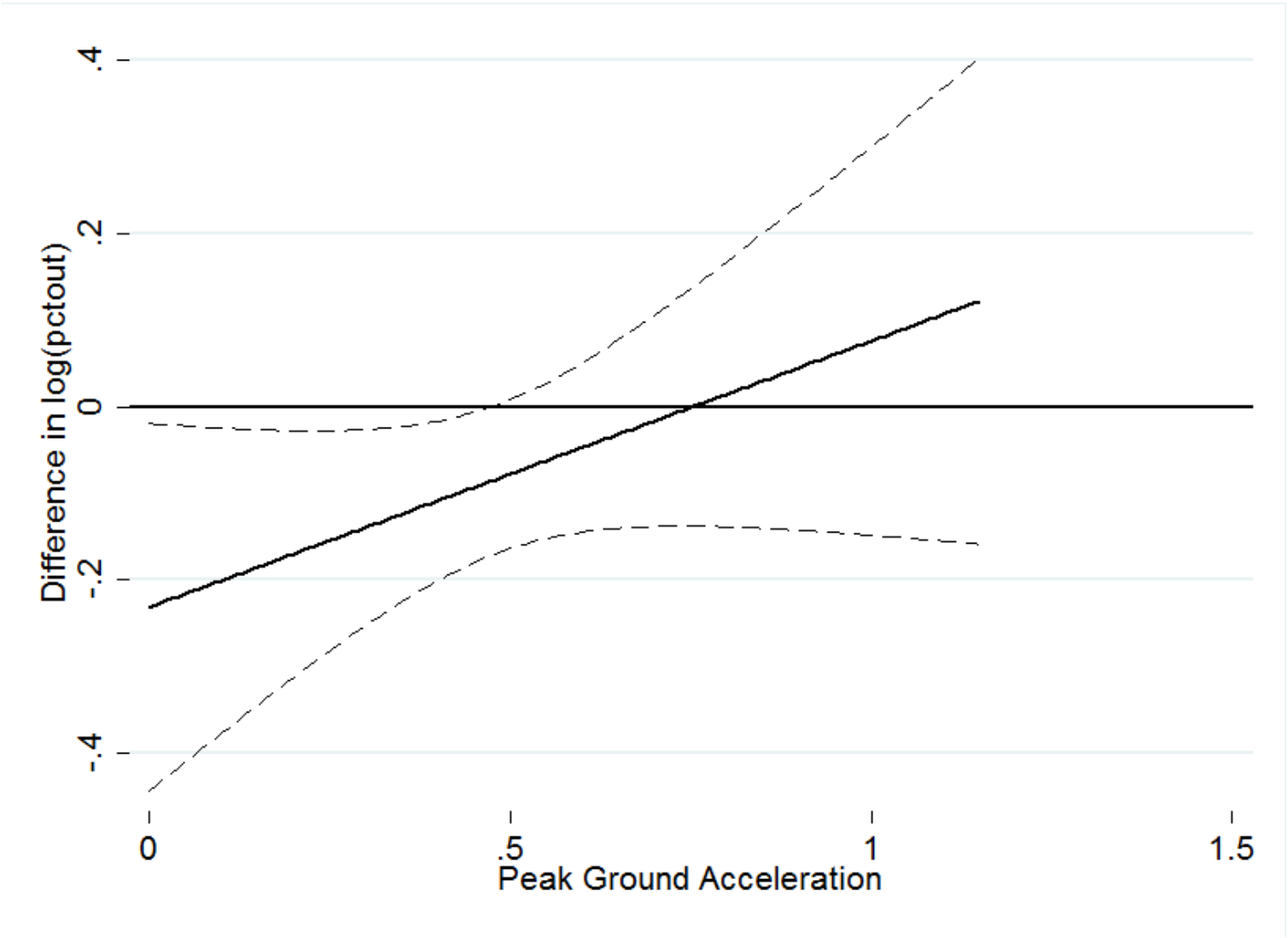
Seismic Retrofitting: A Fixed-Cost Shock

- In a 2001 seismic evaluation, 40 percent of Californias hospital buildings were shown to be at significant risk of collapse in a major earthquake.
- By state law (SB 1953), affected hospitals are required to retrofit or close by 2002/2008/2030.
- According to a 2007 report by RAND, "total construction could cost $45B to $110B in 2006 dollars."
- Hospitals in more dangerous seismic regions had to institute more extensive safeguards. G = peak ground acceleration (mean=0.48, sd=0.21). This unexpected cost would tighten budgets, leading to more outsourcing if the loose-budget/weak pressures story is right.

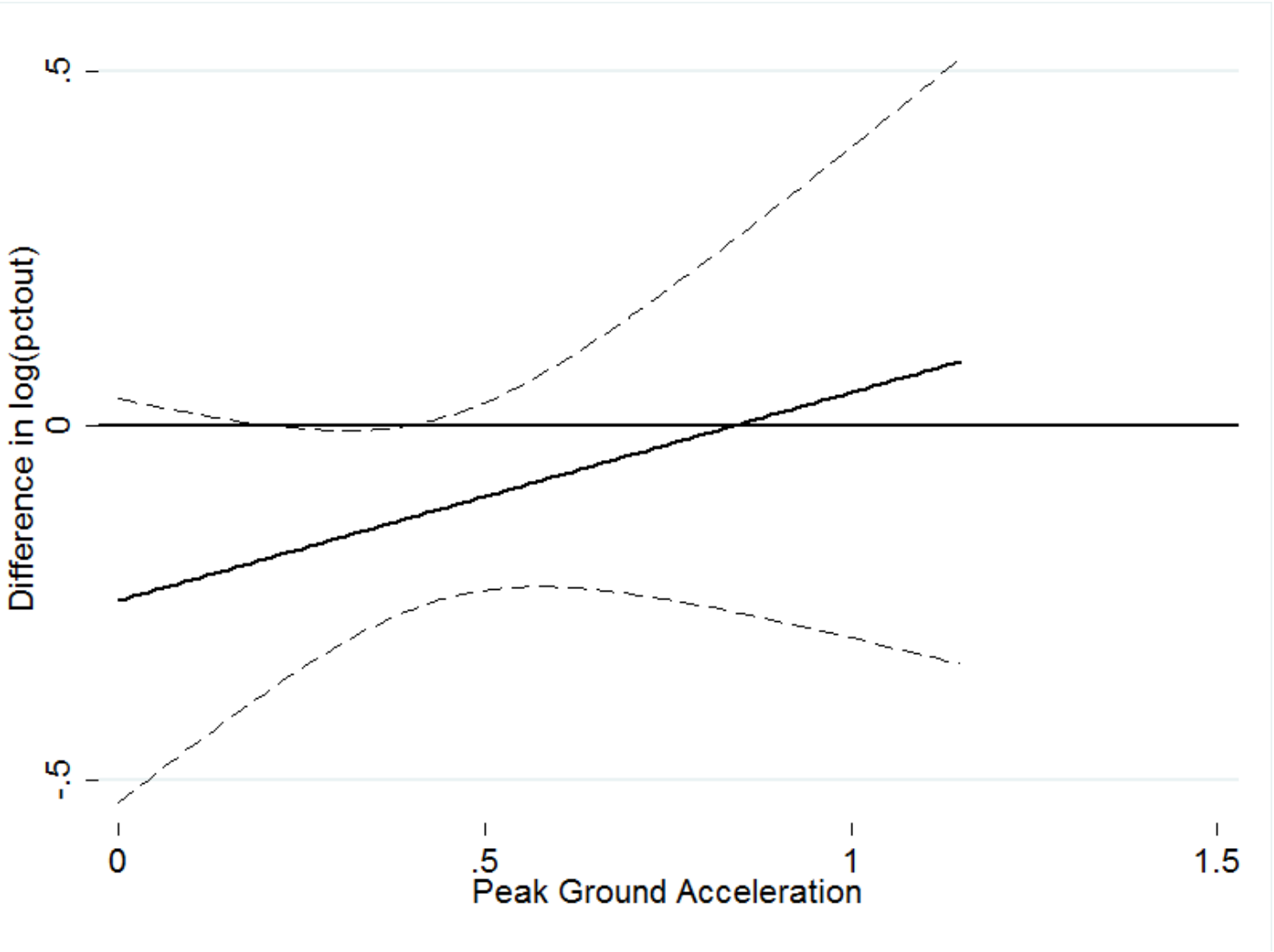
Difference Smaller after Big Fixed-Cost Shocks

	Extensive *Outsourced*	Intensive *log*(*pctout*)
Non-Profit x Acc	0.001	0.284
	(0.047)	(0.202)
District x Acc	0.019	0.260
	(0.048)	(0.288)
County x Acc	0.197***	0.336
	(0.073)	(0.434)
Peak Acceleration	−0.036	−0.084
	(0.040)	(0.210)
Non-Profit(d)	−0.015	−0.222**
	(0.025)	(0.108)
District(d)	−0.004	−0.214
	(0.029)	(0.140)
County(d)	−0.150*	−0.515**
	(0.081)	(0.261)

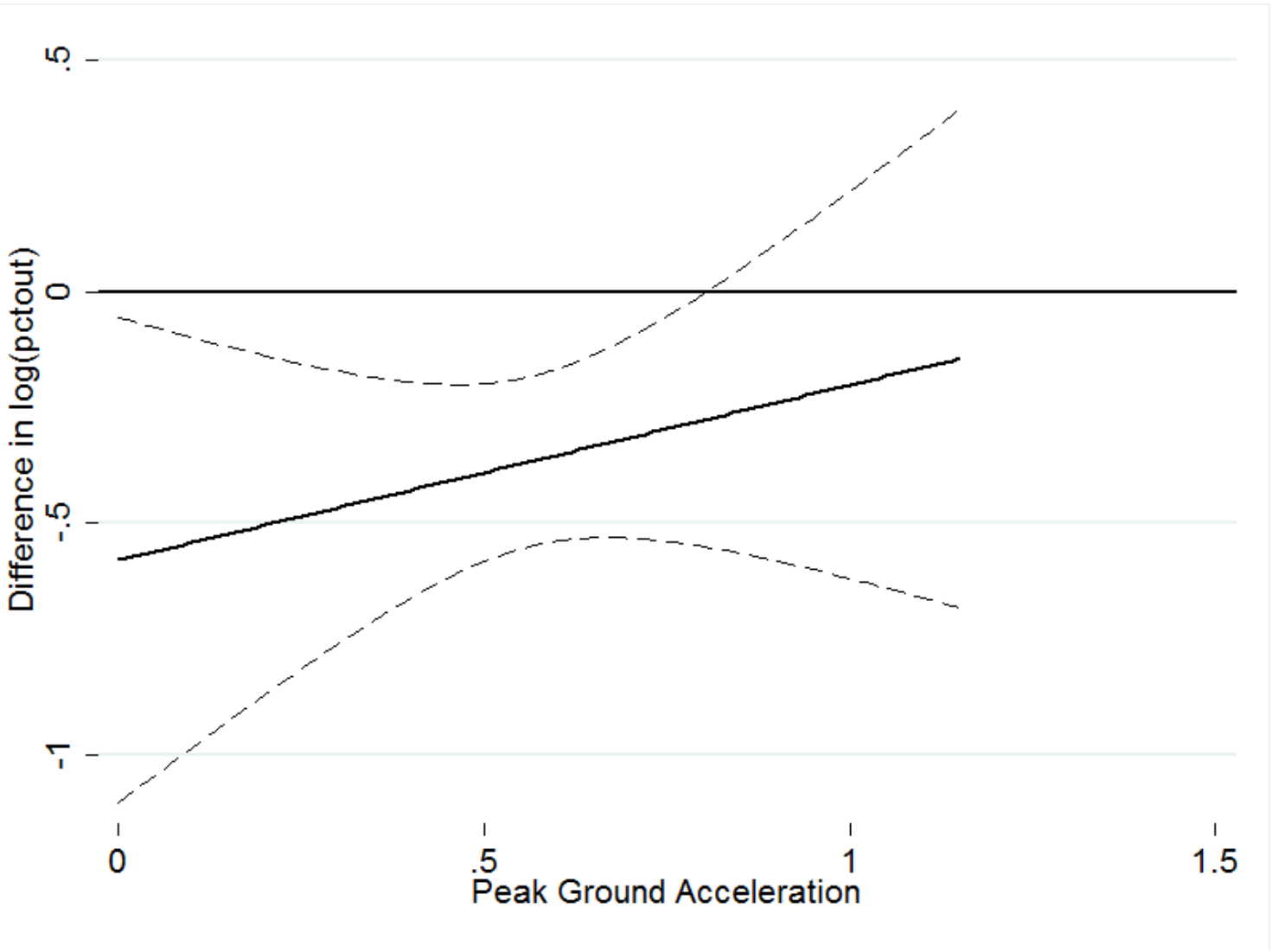
Difference Smaller after Big Fixed-Cost Shocks (Non-Profit)



Difference Smaller after Big Fixed-Cost Shocks (District)



Difference Smaller after Big Fixed-Cost Shocks (County)



In Conclusion..

1. The difference in outsourcing behavior among hospitals of different ownership types is quite robust: $FP > NP \approx Dist > Local$
2. Consistent with a model in which FP/NP make different cost/quality trade-offs induced by the restrictions on how NP's can consume net revenues.
3. This model has also predicts that the different will be most pronounced when quality is particularly important or budgets are loose.
4. Some evidence for each of these predictions.
5. Probably not the whole story, especially for the local/district hospital difference. Politics?