Do Group Purchasing Organizations Achieve the Best Prices for Member Hospitals? An Empirical Analysis of Aftermarket Transactions

by

Robert E. Litan[1] and Hal J. Singer[2]

Abstract: *Group purchasing organizations (GPOs) were formed with the purpose of securing the best prices for medical devices for their member hospitals. They ostensibly do so by, among other things, conducting auctions for the right to supply a particular device to hundreds of hospitals at once. Until they were exposed to Congressional scrutiny of their practices, GPOs often structured these supply contracts as "sole source"—that is, the winning bidder would have exclusive access to the GPO's member hospitals to supply the device. In the past few years, GPOs have restructured their contracts to allow "multi-source" contracting among multiple device makers. Whether this has resulted in competitive prices for member hospitals is the subject of the current study.*

Even though competition for the GPO contract may have been marginally reduced by permitting multiple firms (rather than single firm) to supply the device in question, the GPO auction process should still generate competitive bids in theory. Because GPOs are still compensated with a share of the revenues generated under the contracts, however, they may be incentivized to maintain some monopoly pricing power for the winning bidder or bidders. After all, a fixed percentage (typically two-to-three percent, but as high as 18 percent) of revenues from a monopoly concession is more valuable than the same percentage of a competitive concession.

To measure the extent of this potential competitive distortion, we analyzed a database of approximately 8,100 aftermarket transactions, in which the winning GPO price was put up for bid after the initial GPO auction. The transactions data suggest that, when exposed to competition in the aftermarket, hospitals were able to achieve average savings of approximately 10 to 14 percent across the entire database (2001 through 2010) and a savings of 15 percent on average for 2010 data. Indeed, in over half of all auctions in the transactions database, incumbent device makers on the GPO contract were induced to lower their own prices for the same product to the same hospital, and did so by approximately 7 percent on average. Our results are inconsistent with the hypothesis that GPOs secure the best prices for their member hospitals.

One clear policy implication of this study is to modify the incentives that limit the intended pro-competitive objectives of GPOs—namely, by changing the method of compensation of GPOs to reduce conflicts of interest, which could be achieved by reinstating the application of the existing Medicare anti-kickback statute of the 1986 Social Security Act, thereby prohibiting vendors from paying GPOs. This exemption has allowed GPOs to retain an equity interest (or its functional equivalent) in their contracts with those whom they are to negotiate for lower prices. So long as GPOs are compensated via an equity interest in the concession, they have an inherent conflict that limits their ability to negotiate the best prices for their member hospitals and those hospitals (and their payors, including the federal government) will likely continue to overpay for medical devices. Based on the results from our empirical analysis, we conservatively estimate that changing the incentive structure by reapplying the anti-kickback statutes would reduce private U.S. health care expenditures by roughly $25 billion annually, and would reduce federal health care spending by roughly $11.5 billion annually.

I.   INTRODUCTION AND EXECUTIVE SUMMARY

Group purchasing organizations (GPOs) were originally established by small hospitals to pool their purchasing power for more favorable contracts with medical suppliers.[3] This is a laudable goal and is a method used in various industries, such as foodservice and industrial manufacturing, to negotiate volume discounts.[4] By buying as a group, hospitals should achieve lower prices and greater discounts than they would if they bought individually while also minimizing transaction costs involved in procuring supplies. Several decades since their inception, GPOs have consolidated and evolved into enormous for-profits that negotiate contracts worth $200 to $300 billion in 2009,[5] and the vast majority of hospitals, nursing homes, and other healthcare institutions rely upon them to make purchasing decisions.[6]

Ostensibly, GPOs seek the best products at the lowest prices through a competitive bidding or auction process in which vendors bid for the right to supply an entire network of hospitals. To cover their operating expenses, GPOs currently charge vendors "administrative" and other fees based on a percentage of the proceeds generated by the auction. The anti-kickback statute of the Social Security Act makes it illegal knowingly and willfully to offer, pay, solicit, or receive any compensation to induce referrals of items or

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3.   S. Prakash Sethi, *Group Purchasing Organizations: An Evaluation of Their Effectiveness in Providing Services to Hospitals and Their Patients,* International Center for Corporate Accountability, 2006, at 6, 17.

4.   *See*, *e.g.*, http://www.foodbuy.com/foodbuy; http://www.primeadvantage.com.

5.   GPO-financed studies indicate that GPO contract-covered purchases were expected to be worth between $257 to $287 billion by 2009. *See* Sethi, *supra*, at 18. Sethi independently estimates the market size to be $218 billion in 2005. *Id*. According to a report by Locus Systems, the estimated GPO purchasing volume for 2007 was between $246.3 billion and $274.8 billion. *See* LOCUS SYSTEMS, A 2008 UPDATE OF COST SAVINGS AND A MARKETPLACE ANALYSIS OF THE HEALTH CARE GROUP PURCHASING INDUSTRY at 11 (July 2009).

6.   *Sethi*, *supra*, at 6.

services reimbursable by federal health care programs.[7] However, convinced by GPOs that medical suppliers' paying the GPO's costs could reduce federal health care expenditures, Congress amended the Act in 1986 by exempting GPOs from the general statutory ban on such kickbacks where the government covers health care costs.[8]

In 1991, the Department of Health and Human Services (HHS) established anti-kickback-provision "safe harbors," which provide that GPOs are to have written agreements with their customers either stating that fees are to be three percent or less of the purchase price, or specifying the amount or maximum amount that each vendor will pay.[9] A survey of GPOs by *Modern Healthcare Magazine* indicates that the average GPO administrative fee in 2007 was 2.1 percent as measured by the total operating revenues of respondents divided by their total purchasing volumes.[10] While the average fee may be close to the three percent safe harbor, the Government Accounting Office (GAO) found that some GPOs collected fees up to 18 percent.[11] Regardless of the size of the kickback, as we demonstrate both theoretically and empirically below, the mere presence of a kickback distorts the bidding process and results in inflated prices for hospitals relative to a world without a kickback.

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7. 42 U.S.C. §1320a-7b(b).
8. 42 C.F.R. 1001.952(j).
9. 56 Fed. Reg. 35952, 35982. Note that GPOs were asked to "self-regulate" and report fees greater than three percent.
10. MODERN HEALTHCARE'S 5TH ANNUAL GROUP PURCHASING SURVEY, *available at* http://www.modernhealth care.com/section/lists?djoPage=product_details&djoPid=7003&djoPY=%40phEolMZlR5uk&djoTry=1242144727.
11. GAO 2003 GPO REPORT, GENERAL ACCOUNTING OFFICE, USE OF CONTRACTING PROCESSES AND STRATEGIES TO AWARD CONTRACTS FOR MEDICAL-SURGICAL PRODUCTS, GAO-03-998T, July 16, 2003, at 2.

Although this safe harbor was intended to shift the burden of administrative costs from hospitals to medical device vendors,[12] some have questioned whether the GPO compensation system creates inherent conflicts. Indeed some wonder if "safe harbors" actually raise prices for GPO members and stifle competition among medical device manufacturers relative to a world with a different GPO compensation system. Naturally, if a GPO is receiving a kickback equal to a percentage of the auction proceeds, the GPO lacks a strong incentive to seek out the lowest prices.[13] Moreover, in the presence of a kickback, medical suppliers are induced to bid less aggressively on price, as some of their resources are shifted towards competing for the largest side payment. Even worse, because bidding in a GPO auction is costly, some suppliers might skip out of an auction in which kickbacks are permitted. The resulting lack of competition might raise net costs for hospitals and government—which reimburses hospital expenses through Medicare, Medicaid, and other programs[14]—despite the purported savings in transaction costs and consolidation of purchasing power made possible by GPOs.

The complex and veiled nature of these transactions has helped GPOs evade public scrutiny until recently. Over the past decade, the government and the media have begun to take notice of GPO practices, particularly in the midst of the economic turmoil and

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12. Daniel DeLay, *Watch Out For GPOs*, FORBES, Nov. 12, 2009, *available at* http://www.forbes.com/2009/11/12/gpo-medicare-hospitals-medical-health-opinions-contributors-daniel-delay.html.

13. Another potential incentive problem is that soliciting sales quotes from device manufacturers and reviewing specifications likely requires effort on the part of the GPO, and given their compensation scheme, the GPOs internalize all of those costs. This aspect of the principal-agent problem is similar to the one faced by real estate agents, who are compensated with a percentage of the sale price. *See* Steven D. Levitt & Chad Syverson, *Market Distortions when Agents are Better Informed: The Value of Information in Real Estate Transactions*, NBER Working Paper No. W11053, Jan. 2005 (finding that that homes owned by real estate agents sold for about 3.7 percent more than other houses and stay on the market about 9.5 days longer, even after controlling for a wide range of housing characteristics).

14. *Sethi, supra*, at 53.

heightened attention to healthcare costs of the last two years. Following a 2002 *New York Times* investigation that highlighted GPOs' conflicts of interest and violations of the three-percent-fee cap,[15] Congress initiated a series of hearings to determine whether further legislation on GPOs were needed.[16]

This study is not the first to examine the potential anticompetitive effects of the GPOs' exclusionary policies on the pricing of medical supplies. Prior studies, however, focused on the savings realized by a particular hospital or a particular type of medical device. For example, a 2002 GAO study asked whether hospitals paid lower prices on their own or through a GPO when buying the same model of safety syringe.[17] The GAO found that median prices were higher by one to five percent through GPOs than outside them for all safety syringe models and for most pacemaker models.[18] Importantly, the GAO study does not purport to measure the full costs to hospitals of the exclusionary agreements because it does not consider the greater costs of excluding cheaper models.[19] For example, even if GPOs excluded a superior product that were 30 percent cheaper than the incumbent model, the GAO study "would not pick up that cost difference unless [the incumbent] charged more when its model was sold through the GPO than when its model was sold outside it."[20] According to an investigation by the *Los Angeles Times*, the prices that the largest GPO,

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15. Walt Bogdanich, *Medicine's Middlemen; Questions Raised of Conflicts at 2 Hospital Buying Groups*, NEW YORK TIMES, Mar. 4, 2002, at A1.

16. Mary Williams Walsh, *Senators Investigate Hospital Purchasing*, NEW YORK TIMES, Aug. 14, 2009, at *1.

17. *See* GAO, Group Purchasing Organizations—Pilot Study Suggests Large Buying Groups Do Not Always Offer Hospitals Lower Prices, Apr. 30, 2002.

18. *Id.* at 11 (showing that GPOs' median price is higher for all safety needle models and for 60 percent of pacemaker models) [hereinafter *2002 GAO GPO Study*].

19. Einer Elhauge, The Exclusion of Competition for Hospital Sales Through Group Purchasing Organizations, Report to U.S. Senate, June 25, 2002, at 21, *available at* http://www.law.harvard.edu/faculty/elhauge.

20. *Id.*

Novation, charges the University of California on its drug purchasing contract have been undercut by hundreds of thousands of dollars by a group of oncologists at UCLA who decided to contract with suppliers themselves.[21]

Singer (2006) found that if the GPO safe-harbor provision were removed, GPO member hospitals would keep an additional 21 to 32 percent of administrative fees (net of operating expenses) currently paid to GPOs but not passed through to member hospitals less a competitive return on GPO expenses (as an alternative form of GPO compensation), representing a savings to hospitals of roughly half a billion dollars per year.[22] He also estimated the overcharges to the federal government relating to Medicare reporting problems; relative to direct payment of rebates by manufacturers, hospitals tend not to credit indirect, lump-sum payments of rebates from GPOs to individual medical device purchases on their cost reports. That study made no attempt to quantify the anticompetitive impact on medical supply prices attributable to the GPO safe harbor. Given the roughly quarter of a trillion dollars of medical supplies that GPOs broker in a given year, anticompetitive conduct that would inflate prices by just five percent would amount to $12.5 billion in annual overcharges (equal to five percent of the $250 billion in annual medical purchases by GPOs); ten percent anticompetitive inflation would amount to $25 billion in annual overcharges.

The GPOs have responded to this criticism of their *financing* with their own pricing studies, which purport to show that GPOs actually generate savings for member hospitals

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21. Michael Hiltzik, *Supply Middlemen May Leave Hospitals Ailing*, L.A. TIMES, Apr. 14, 2005, at B1.
22. Hal J. Singer, The Budgetary Impact of Eliminating the GPOs' Safe Harbor Exemption from the Anti-Kickback Statute of the Social Security Act (2006).

relative to a world *without GPOs*—that is, an irrelevant counterfactual. For example, Schneller (2009) found that GPOs save hospitals as much as $36 billion a year based on surveys of hospital administrators.[23] Setting aside the confused counterfactual, a potential bias in this particular survey design was that the survey respondents were not asked what yardstick they used to measure savings. In an interview with the *Washington Monthly*, the study's author stated that hospitals generally base their figures on the discounts they get off GPO "list prices"—that is, the penalty price for buying off the GPO contract or by not complying with certain types of rebates.[24] Clearly, this benchmark does not properly represent the price that would be obtained if the GPO's incentives were not distorted by a side payment. Indeed, an earlier survey of hospital purchasing managers by Everard (2005) found that most of the hospital managers who claim to know what they are saving through their GPOs know only what their GPOs report to them.[25] These anecdotes demonstrate that the relevant research question is whether the current GPO financing arrangement generates competitive prices for member hospitals; the relevant question is not whether GPOs should be banned.

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23. Eugene S. Schneller, The Value of Group Purchasing - 2009: Meeting the Needs for Strategic Savings, April 2009, *available at* http://www.novationco.com/pressroom/industry_info/value_of_gpo_2009.pdf.

24. Mariah Blake, *Dirty medicine: How medical supply behemoths stick it to the little guy, making America's health care system more dangerous and expensive*, WASHINGTON MONTHLY, July 2010, available at http://www.washingtonmonthly.com/features/2010/1007.blake.html.

25. Lynn James Everard, Defining and Measuring Product-Based Cost Savings in the Health Care Supply Chain, 2005, at 7, *available at* http://www.medicalsupplychain.com/pdf/Defining%20and%20Measuring%20Product%20Based%20Cost%20Savings.pdf ("80 percent of those who answered yes to question 2 said they knew how much they saved because their GPO told them how much they saved.").

Some of the media coverage of GPOs has been centered on private lawsuits alleging violations of antitrust laws.[26] For example, Masimo, maker of pulse oximetry devices (which are used to measure blood constituents and fluid responsiveness) prevailed in its antitrust litigation against Tyco Healthcare, now Covidien. In November 2009, the Ninth Circuit Court of Appeals affirmed the 2006 district court decision that Tyco had violated the antitrust laws.[27] The 2006 decision found, among other things, that Tyco's sole-source agreements and share-based loyalty provisions were unlawful restraints of trade. The Ninth Circuit also held that above-cost bundled rebates, when combined with sole-source or market-share-based pricing, can be anticompetitive when such practices exclude rivals from a significant portion of the relevant market. Masimo estimates that prices for pulse oximeters have declined by 30 percent since Masimo obtained access to the GPO channel and Covidien's sole-source and bundling contracts ended with Premier and Novation.[28]

Retractable Technologies, Inc. (RTI), maker of the first automated retractable syringe that virtually eliminates accidental needle sticks and syringe reuse, sued the two largest GPOs, Premier and Novation, alleging that the incumbent syringe supplier and the two GPOs had erected barriers for potential innovators and competitors like RTI.[29] According to the allegations, to block innovative and competitive products, the incumbent supplier paid the GPOs for exclusivity. The payments included a $1 million "special marketing" fee in exchange for an exclusive, sole-source contract that prevented hospitals

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26. Walsh, *supra*; Sethi, *supra*, at 12.
27. *Masimo Corp. v. Tyco Health Care Group, L.P.*, Nos. 07-55960, 07-56017, 2009 WL 3451725 (9th Cir. Oct. 28, 2009) [hereinafter *Masimo*].
28. Antitrust Litigation Status, *available at* http://www.masimo.com/antitrustLitigation.htm.
29. Pablo Lastra, *Putting the Bite on Hospitals*, FORT WORTH WEEKLY, Oct. 4, 2007; Bara Vaida & Marilyn Werber Serafini, *Lobbying & Law - Prick-Proof Needles? Not Today*, NATIONAL JOURNAL, 2006.

from purchasing what nurses and consumer groups believed was a superior product. RTI also asserted that Novation finally agreed to use RTI's safer needle technology, but only if it were sold under Novation's private label for a price 270 percent *higher* than RTI offered. Six years after the antitrust case was filed, the GPOs and the incumbent supplier settled with RTI for approximately $150 million.[30]

Another well-publicized case involves Cynthia Fitzgerald, a former contract manager for Novation, who filed a whistleblower lawsuit in 2003 after she was allegedly pressured to favor the device makers who offered Novation the highest fees.[31] Ms. Fitzgerald claims she was compensated based on her maximization of these side payments, and not for securing the lowest prices for the GPO's members.[32] One device vendor even asked her directly, "How much will it take to get the contract?"[33] The *New York Times* and other news outlets reported on how these questionable business practices are part of a systemic problem that amounts to Medicare fraud.[34]

The GPO industry's response to this negative publicity has not been sufficient to pacify critics, especially during an administration focused on health care reform. To preempt regulation, in 2004, a collection of GPOs launched the Healthcare Group Purchasing Industry Initiative (HGPII),[35] essentially a code of conduct and self-governance

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30. Walt Bogdanich, *Hospital Chiefs Get Paid for Advice on Selling*, NEW YORK TIMES, July 17, 2006, at *1. Premier, a large GPO based in San Diego, has been the target of similar lawsuits, including one involving an $8.8 million settlement with a catheter-producing company called Rochester Medical. *See* Del Jones, *History of Baldrige award winner angers some*, USA TODAY, Nov. 29, 2006, at *1.
31. Lastra, *supra*.
32. Walsh, *supra*.
33. *Id.*
34. *Id.*
35. Sethi, *supra*, at 9.

for the GPO industry.[36] Some have claimed that HGPII lacks real enforcement and monitoring,[37] and therefore fails to address the public's concerns. Not satisfied with a model of self-regulation, a group of three U.S. senators, Herb Kohl of Wisconsin, Charles E. Grassley of Iowa, and Bill Nelson of Florida, sent letters in 2009 to the seven largest GPOs, requesting information on their business practices and copies of contracts.[38]

This paper provides an empirical analysis of aftermarket transactions for medical supplies to assess whether GPOs are in fact securing competitive prices for hospitals. To our knowledge, it is the only study of its kind to use actual hospital transactions as source data. If the original GPO auctions are designed efficiently, then there should not be significant room for price improvement in the aftermarket. We obtained a database from MEMdata—a firm that processes capital equipment purchases for hundreds of medical facilities—of over 8,100 aftermarket auctions[39] for medical equipment from GPO contracts. The transactions database includes information on the hospital, the original GPO contract price, the type of device, the number of units to be purchased, bids from rival medical device suppliers, and the awarded price. As we document below, the database is representative of transactions entered into by hospitals in the United States generally. The database is also representative of GPOs in the United States.

The paper is organized as follows: In Part II, we explain the theory of monopoly

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36. *Id.* at 10*.*
37. *Id.*
38. Walsh, *supra.*
39. Throughout this paper, we use the term "auction" to describe a "procurement auction," whereby hospitals obtain medical materials from a pool of potential suppliers. According to economic literature, "[t]he major requirements of a procurement mechanism are cost minimization for the buyer, incentive compatibility, individual rationality, and allocative efficiency." *See, e.g.*, Y. NARAHARI ET AL., GAME THEORETIC PROBLEMS IN NETWORK ECONOMICS AND MECHANISM DESIGN SOLUTIONS 266 (Springer 2009). In the MEMdata transactions, each type of item for which bids are solicited is counted as a unique auction.

concession and how a side payment to the auctioneer or the entity in charge of granting the concession can have the perverse effect of reducing competition relative to a world without such side payments. In Part III, we summarize the database of aftermarket transactions. We describe how we merged this database with a database of U.S. hospital characteristics, and we test whether the hospitals in the transactions database are representative of the population of U.S. hospitals.

In Part IV, we analyze the price improvements afforded to hospitals in the aftermarket. In particular, we regress the price improvement in a given auction on several explanatory variables, including the hospital's size, the number of units purchased, the type of equipment, the year, and the number of rival bidders. We find that when exposed to competition in the aftermarket, hospitals enjoy an average price reduction of 10 percent from 2001 through 2010, and an average price reduction of 15 percent in 2010. When incumbent device makers are induced to bid against their GPO bid (which occurs in roughly 52 percent of the auctions), we find that they reduce their prices by seven percent on average; in 10 percent of these occasions, the incumbent dropped its own price by 15 percent or more.

In Part V, we review the policy implications of our findings. We believe that to achieve the best prices, the current incentive structure should be changed and GPOs should be subject to the rules against kick-backs from those with whom they are negotiating. This would be consistent with group purchasing practices in other industries. We also explain why the Department of Justice (DOJ) and the Federal Trade Commission (FTC) should provide guidance to courts when analyzing GPO cases involving exclusive contracts,

bundled rebates, and share-based loyalty rebates.

II. THE THEORY OF MONOPOLY CONCESSION

A concession is something granted as a right or privilege by a government or a controlling authority, such as a grant of land or a franchise. For example, a local franchise authority might grant a concession to a cable operator to provide cable television service to residents in the locality. When a GPO assigns a sole-source contract to a medical device supplier, the GPO in effect is conceding an exclusive right to supply its member hospitals a particular product. A "monopoly concession" is simply a concession that is granted on an exclusive basis.[40]

The theory of monopoly concession is most readily understood in the context of exclusive contracts granted by entities that control access to a captured customer base— that is, a set of customers who do not have ready access to substitutes. If the customer base is not captured (that is, substitutes are readily available), or if the captured customer base constitutes a small fraction of the total potential customers for rival suppliers (that is, the

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40. At the time of this report, the phrase "monopoly concession" appeared in Wikipedia on nine occasions. *See*, *e.g.*, Gambling in Macau, *available at* http://en.wikipedia.org/wiki/Gambling_in_Macau (noting that the first casino "monopoly concession" in Macau was granted to the Tai Xing Company in 1937); Abdolhossein Teymourtash, *available at* http://en.wikipedia.org/wiki/Abdolhossein_Teymourtash (noting the passage of a bill in 1927 that annulled the French "monopoly concession" for excavating antiquities in Iran); Joost Van Vollenhoven, *available at* http://en.wikipedia.org/wiki/Joost_van_Vollenhoven (explaining how "monopoly concessions" with the largest French companies in French Equatorial Africa in the early part of the 20th century had pushed out the smaller French trading firms); Viva Macau, *available at* http://en.wikipedia.org/wiki/Viva_Macau (in 1994 the Macau Government attracted a consortium of investors to start Air Macau with the promise of a 25 year "monopoly concession"); Katanga (province), available at http://en.wikipedia.org/wiki/Katanga_(province) (noting that Gecamines, the state-owned mining company, has "monopoly concessions" in the province); Thaksin Shinawatra, *available at* http://en.wikipedia.org/wiki/Thaksin_Shinawatra (In 1990, Advanced Info Service launched analog 900 MHz mobile phone services with a 20 year "monopoly concession" from the Telephone Organization of Thailand). There were over 5,000 results for the phrase "monopoly concession" on Google. The phrase "monopoly concession" could not be found on SSRN.com.

foreclosure share is small)[41], then the exclusive contract may not be problematic. Exclusive contracts may be harmful when buyers are unable to coordinate their responses,[42] or if the buyers are middlemen (like GPOs) and the upstream supplier (like a medical device company) can secure the buyers' acquiescence by sharing with them some of its expected monopoly profits.[43] As the former chief economist of the Antitrust Division of the DOJ Dennis Carlton has explained, exclusive dealing may be particularly anticompetitive when it deprives rivals of the scale necessary to achieve efficiencies.[44]

Monopoly concessions are especially problematic in the presence of a side payment. When the entity in charge of granting the concession (the "grantor")—here, the GPO—is compensated with a percentage of the proceeds generated under the concession—here, typically three percent of the sales to its member hospitals—the grantor may face conflicts of interest. In particular, the grantor often represents the interests of consumers of the concession, who seek the lowest price possible for a given quality of service. But if the grantor's compensation increases with the prices offered under the concession, then the grantor perversely prefers higher prices to lower ones. Often, the grantor will take anticompetitive steps to preserve the monopoly power of the incumbent supplier under the concession, so as to maximize the value of the concession. As in the case of GPOs, the grantor may place disproportionate weight on the concession fee relative to the price, or

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41. *See* PHILLIP AREEDA, IX ANTITRUST LAW 375, 377, 387 (Aspen 1991) (indicating that 20 percent foreclosure is presumptively anticompetitive); *See also* HERBERT HOVENKAMP, XI ANTITRUST LAW 152, 160 (indicating that 20 percent foreclosure and an HHI of 1800 is presumptively anticompetitive).

42. *See, e.g.*, Ilya R. Segal & Michael D. Whinston, *Naked Exclusion: Comment*, 90 AM. ECON. REV. 296, 307 (2000).

43. *See, e.g.*, A. Douglas Melamed, *Exclusive Dealing Agreements and Other Exclusionary Conduct—Are There Unifying Principles?*, 73 ANTITRUST L.J. 375, 404 (2006).

44. Dennis W. Carlton, *A General Analysis of Exclusionary Conduct and Refusal to Deal—Why* Aspen *and* Kodak *Are Misguided*, 68 ANTITRUST L.J. 659, 663 (2001).

may broker contracts with share-based loyalty or bundled rebates that favor the incumbent. See Part V below. The closest concept to the theory of monopoly concession in the economics literature is "regulatory capture," pioneered by Nobel laureate economist George Stigler, which occurs when a government agency created to act in the public interest instead acts in favor of the commercial interests that dominate in the industry or sector it is charged with regulating.[45] Indeed, as the GPO example makes clear, the incentive problems created in a monopoly concession do not result in too little regulation; instead, they result in too little competition for the concession.

There are many examples in the U.S. economy of monopoly concessions, and these examples highlight the conflicts of interest between the grantor and its constituents. Exclusive contracts for cable television service granted by landlords of multiple-dwelling units ("MDUs") have been recognized to be anticompetitive. (Clearly, a tenant in an MDU is captured in the sense that he cannot easily move to another building.) In November 2007, the Federal Communications Commission ("FCC") unanimously voted to nullify exclusive contracts between cable companies and MDUs and to ban any such clauses going forward.[46] In May 2009, the U.S. Court of Appeals for the D.C. Circuit upheld the FCC's decision.[47] Similarly, the cable franchising process conducted by local franchising authorities ("LFAs"), which appeared to be captured by incumbent cable operators, was reformed by federal regulators and the states. LFAs impose a franchise fee on cable providers, typically equal to five percent of revenues. Accordingly, LFAs (perversely) prefer higher cable prices to lower

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45. *See* George Stigler, *The theory of economic regulation*, BELL J. ECON. MAN. SCI. 2:3-21 (1971).
46. Exclusive Service Contracts for Provision of Video Services in Multiple Dwelling Units & Other Real Estate Developments, Report & Order & Further Notice of Proposed Rulemaking, 22 FCC Rcd 20235 (2007).
47. National Cable & Telecommun. Ass'n v. FCC, 567 F.3d 659 (D.C. Cir. 2009).

ones, which might explain why they took such drastic steps to prevent entry in the 2000s of telecom companies providing video services. In March 2007, the FCC adopted rules and guidance to prevent LFAs from unreasonably refusing to grant franchises to new entrants, including time limits within which the LFA must act on an applicant's proposal.[48] A number of states also passed laws aimed at making video entry easier, either by transferring authority over video franchising from multiple LFAs to a single statewide agency or by imposing uniform statewide conditions.[49] Because their revenue-maximization objective of the grantor is not consistent with the promotion of public welfare, municipalities and landlords have been stripped of this concession.

In these cases, the grantor has offered an exclusive right to the incumbent supplier to offer the service to the grantor's constituents, or the grantor has sought to thwart entry by a rival that would provide the same service presumably at a lower price. Although the city ostensibly has a duty to protect the interests of its citizens, budgetary pressures—for example, a declining tax base or an expensive new project that requires funding—often override these concerns. If the number of units sold is not affected by the price of the service determined at auction, owning a financial interest in a local monopoly (as LFAs owned a five percent interest in the revenues of incumbent cable operators) is more valuable than owning the same interest in two firms that compete in a duopoly (as LFAs would have if they had granted two cable companies licenses instead of granting just one

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48. Report and Order and Further Notice of Proposed Rulemaking, In the Matter of Implementation of Section 621(a)(1) of the Cable Communications Policy Act of 1984 as Amended by the Cable Television Consumer Protection and Competition Act of 1992, FCC MB Docket No. 05-311, 22 FCC Rcd 5101 (2007).
49. *See*, *e.g.*, Tex. Util. Code Ann. §§ 66.001 et seq. As of November 2008, 21 states had enacted reforms to the franchising process. *See* Department of Justice, Voice, Video and Broadband: The Changing Competitive Landscape and its Impact on Consumers, Nov. 2008, at 70.

operator a license) because the monopolist charges more than the duopolists. Conversely, because incumbents value the exclusive provision more dearly than a competitive provision, some of that value will redound to the grantor under any revenue-sharing arrangement. We show formally in Appendix 1 why the grantor of a monopoly concession generally prefers monopoly prices to competitive prices, and thus why competition for a sole-source contract among medical suppliers will not generate competitive outcomes so long as the GPO is compensated with a percentage of the revenues generated under the contract.

Another misperception is that competition among GPOs can be counted on to drive the concession fee from three percent to zero. To understand why this is not the case, consider the perspective of a hospital that belongs to GPO *A*, which is charging a three percent concession rate. Would the hospital switch to the rival GPO *B*, which offers to charge suppliers a two percent concession rate? The answer is likely *no* because the hospital does not pay the fee directly; the fee is paid by the incumbent supplier. Of course, the side payment might ultimately distort competition and raise prices for the hospital (as we demonstrate in Appendix 1), but that process is not transparent to the hospital. And even if the hospital were to understand how the concession fee distorted competition (and raised its prices), the hospital still might lack the incentive to switch GPOs or to purchase some products outside of its GPO, as doing so would result in penalty prices on the items for which it continued to purchase through its GPO. Additionally, "shareholder" hospitals that are equity owners in the GPO, and thus get to share in the side payments through GPO

distributions, must balance the benefits of their GPO equity against the higher prices created by the concession fee.

Hospitals also lack the incentive to switch GPOs due to the time-consuming auditing process they must undertake to compare their current prices with that of the competing GPO's pricing. Hospitals procure tens of thousands of products and services, most of which are governed by a GPO contract. Correlating these products and aligning them for comparison between GPOs costs significant time and effort. Finally, many hospitals that are GPO members are affiliated with larger healthcare systems with cooperative agreements for patient referrals and other services. These larger health systems, many of which have an equity interest in a GPO, often require the affiliated medical facilities to be a captive member of their GPO, thus precluding the member facility from switching GPOs.

III. THE DATABASE OF AFTERMARKET TRANSACTIONS

We obtained a database of approximately 8,100 aftermarket medical device transactions between 2001 and 2010 from MEMdata,[50] a firm that conducts auctions for GPO-member hospitals that seek to improve upon the prices offered by the incumbent suppliers on the GPO contract.[51] We define competitive bids as those that are from suppliers not on the GPO contract.[52] The database contains competitive bids for a range of

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50. The mere participation in an aftermarket transaction does not affect a member hospital's eligibility to remain in the GPO; rather, purchasing some supplies off the GPO contract typically results in pricing penalties on remaining items purchased on the GPO contract. *See* Part V below.

51. In supplying the transaction data, MEMdata required strict non-disclosure rules be followed and that no pricing associated with any vendor, GPO, hospital, or equipment models be disclosed.

52. While hospitals often incur penalties from buying off the GPO contract (for example, hospitals typically pay higher prices for not meeting share-based requirements or for not complying with a bundled rebate, and are sometime forced to return prior rebates), most GPO contracts do not explicitly bar them from doing so.

capital equipment, which are defined as medical supplies that are expected to last for more than twelve months. The categories of capital equipment in the database include the following types: biomedical, dietary, imaging, information technologies, laboratory, laundry, monitoring, oncology, physical therapy, plant, storage, surgery, telecom, and vehicles. The "awarded price" (that is, the winning bid) in the transaction database ranges from $29.95 (for an oximeter thermometer) to $2.8 million (for an Intensity Modulated Radiation Therapy system). A description of each of the variables used in our data analyses is included as Appendix 2.

An observation in the database of aftermarket transactions includes the auction number and date; hospital name, size, and zip code; type and quantity of devices required by the hospital; original GPO price from the incumbent supplier by device type; the bids of rival device companies by device type; and the savings achieved by the hospital. Supplemental data on the hospitals, including the type of facility and total patient revenue, were obtained from the American Hospital Directory (AHD). Table 1 shows the summary statistics of the variables in the combined database.

TABLE 1: SUMMARY STATISTICS OF KEY VARIABLES

Variable	Obs.	Sample Mean	Sample Std. Dev.	Minimum	Maximum
Hospital staffed beds	7,294	134	149	4	799
Number of competitive bids	8,110	2.7	1.9	1	31
Hospital patient revenues	7,294	$294 million	$563 million	0	$3.38 billion
Hospital net income	7,294	$503,034	$18.3 million	-$120 million	$148 million
GPO price	8,110	$81,436	$249,080	$1	$4.81 million
Awarded price	8,110	$73,990	$227,041	$0	$5.29 million

Note: We were able to match a hospital in the transactions database to the AHD database in 7,294 auctions or approximately 90 percent of all auctions in the transactions database.

As Table 1 shows, the average hospital in the transactions database had 134 beds, $503,034 in annual net income, and $294 million in annual patient revenues. The average

incumbent price was $81,436, and the average awarded price was $73,990. On average, the aftermarket auction induced 2.7 competitive bids.

To determine whether the sample of hospitals in the aftermarket transaction data was representative of the larger population of U.S. hospitals, we compared the means of the hospitals' characteristics in the transactions database with the same characteristics in the AHD database of 6,971 U.S. hospitals in Table 2.

TABLE 2: COMPARISON OF MEAN OF HOSPITALS FROM TRANSACTIONS SAMPLE
WITH U.S. POPULATION OF HOSPITALS

	Staffed Beds	Total Patient Revenues	Net Income
Mean value from the AHD database (μ)	135	$277 million	-$126,127
Standard deviation from the AHD database (σ)	267	$553 million	$73.6 million
Mean value from the transactions database (M)	127	$254 million	$2.4 million
Sample observations (n)	280	280	280
Standard error of the mean $SE = \sigma / \sqrt{n}$	15.96	$33 million	$4.4 million
z statistic $z = (M - \mu) / SE$	-0.501	-0.697	0.574

As Table 2 shows, the means of the sample and the population of U.S. hospitals are fairly similar. The mean number of hospital beds from the sample of transaction data is 127, which is 0.501 standard error units from the population mean of 135.[53] One cannot reject the null hypothesis that the hospitals in the transactions database are comparable to a simple random sample from the population of U.S. hospitals. The same conclusion is true for total patient revenues and net income.[54] Accordingly, we conclude that our sample is not significantly different from the entire population of hospitals in terms of these

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53. Using the *z*-score in a table of the standard normal distribution, we find that the probability of observing a standard normal value below -0.501 is approximately 0.309. The two-sided p-value is approximately 0.618 (twice the one-sided p-value). Accordingly, with probability 1 – 0.618 = 0.382, a simple random sample of 280 hospitals would have a mean test score within 8 (equal to 127 - 135) units of the population mean.

54. The corresponding z-scores are -0.697 and 0.574, respectively.

characteristics. It is also worth noting that the hospitals in the transaction database are located in 41 distinct U.S. states, which suggests that most regions of the country are represented.

To determine whether the GPOs in the transactions database were representative of the population of GPOs, we compared the identity of GPOs in the transactions database with a list of GPOs by market share. According to the GAO, the top seven GPOs control 85 percent of the market share.[55] Based on an annual survey of GPOs conducted by *Modern Healthcare*, S. Prakash Sethi computed the relative share of 16 survey respondents (plus Consorta), which collectively comprise 98 percent of all purchases made through GPOs.[56] This analysis reveals that the top two GPOs (Premier and Novation) accounted for slightly over 50 percent of purchases in 2005; the top four GPOs (Premier, Novation, MedAssets, and Broadlane) accounted for slightly less than 75 percent; and the top ten (Premier, Novation, MedAssets, Broadlane, Amerinet, Health Trust, Consorta, HealthCare Purchasing Partners, GNYHA, and Innovatix) accounted for approximately 98 percent.[57] Table 3 shows the GPOs that are represented in the transactions database.

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55. Government Accountability Office, Use of Contracting Processes and Strategies to Award Contracts for Medical-Surgical Products, GAO-03-998T, July 16, 2003.
56. S. Prakash Sethi, Group Purchasing Organizations: An Evaluation of Their Effectiveness in Providing Services to Hospitals and Their Patients, International Center for Corporate Accountability, July 20, 2006, *available at* http://www.icca-corporateaccountability.org/PDFs/HGPII_Report07-20-06.pdf.
57. *Id.* at 23 (Exhibit 2).

TABLE 3: GPOS REPRESENTED IN THE TRANSACTIONS DATABASE

GPO Name (Rank)	Represented?	GPO Name (Rank)	Represented?
Premier (1)	Yes	GNYHA (9)	Yes
Novation (2)	Yes	Innovatix (10)	Unknown
MedAssets (3)	Yes	AllHealth (11)	Unknown
Broadlane (4)	Yes	Hospital Purchasing Service (12)	Unknown
Amerinet (5)	Yes	Yankee Alliance (13)	Unknown
Health Trust (6)	Yes	Resource Optimization (14)	Yes
Consorta (7)	Yes	Child Health Corp. (15)	Yes
HealthCare Purchasing Partners (8)	Yes	National Capital Area Shared Services (16)	Unknown
		Services Healthcare (17)	Yes

As Table 3 shows, 12 of the top 17 GPOs are represented in the transactions database. Accordingly, the population of U.S. GPOs appears to be well represented in the transactions database.

IV. ECONOMETRIC ANALYSIS OF THE DATA

We now turn to explaining the variation in the savings across the auctions in the database. Before identifying explanatory variables, we first summarize the savings data by device type and year. Tables 4 and 5 below provide summaries of the savings achieved by hospitals in the transactions database. These savings are calculated by comparing the lowest GPO incumbent price to the awarded price (or, when awarded price field is blank, the lowest competing non-incumbent bid) for each auction. To be as conservative as possible, we included all observations for the purpose of making these savings calculations. In a handful of observations (1.4 percent), the percent savings were negative—that is, the hospital ended up spending more on the device than the GPO price; 21.7 percent of auctions provided were no savings, and 76.9 percent provided positive savings.[58] Positive savings amounts indicate that the awarded price was less than the GPO price. Including

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58. If a hospital seeks out an intermediary to achieve a savings, but if that intermediary is not successful in generating a lower bid, then the hospital most likely would remain with the incumbent supplier.

cases where the aftermarket auction did not produce *any* price improvement for the hospital tends to bias our average savings estimate downward.[59] Table 4 displays average percent savings by auction year and device type.[60]

TABLE 4: SUMMARY OF AVERAGE PERCENT SAVINGS BY YEAR AND DEVICE TYPE

Device Type	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Biomedical	3%	18%	4%	8%	8%	5%	9%	10%	11%	16%
Cardio Fitness Equipment									0%	
Compression									4%	
Dietary			7%			0%	17%	11%	12%	14%
Imaging		8%		21%	10%	8%	7%	7%	12%	12%
Information Technologies						25%	13%	-1%	12%	9%
Laboratory			10%	14%		4%	5%	8%	12%	12%
Laundry							12%	15%	9%	11%
Monitoring		2%	23%	0%	22%	10%	11%	11%	10%	20%
Oncology								8%	16%	
Patient Assistance Device							1%		23%	
Patient Positioning									12%	
Physical Therapy				20%	0%	12%	-7%	14%	13%	29%
Plant						18%	12%	12%	20%	20%
Storage	0%	31%				0%	11%	14%	24%	25%
Stress Test Systems							14%	12%		19%
Surgery		4%			6%	15%	8%	11%	12%	14%
Telecom				38%		19%	10%	16%	17%	16%
Vehicles					2%			2%	6%	2%
No Category	12%	13%	14%	11%	9%	9%	6%	11%	33%	

Table 4 shows that, across all years and device categories, average savings are nearly always positive, and are in many cases quite substantial.

This pattern is also reflected in Table 5, which contains average savings amounts as well as percentages by year. Table 5 includes both our conservative estimates, which

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59. It is difficult for a hospital to know *ex ante* whether it is being overcharged by the GPO. Hence, it is not a surprise that over 20 percent of auctions in the transactions database produce no savings. Assuming counterfactually that hospitals only shop around when they know that the GPO price is inflated, our savings estimates would be subject to selection bias, and extrapolation to the larger population of GPO purchases would need to be made with care.

60. This field was often not populated for the early years of the database.

include negative and zero percent savings observations, as well as averages across observations with positive savings only. We include this second set of numbers because negative savings almost always indicate data anomalies or instances where the hospital chose to spend more money on a higher quality item; similarly, zero savings might mask a potential increase in utility to the hospital that is not quantifiable through price data. For example, an incumbent may have issued a revised bid for the same price, but with the addition of free shipping or installation. Competitive bids such as this would produce zero price savings according to the transactions database, even though actual savings were achieved. Furthermore, over a fifth of the negative and zero savings auctions are for what MEMdata calls "Performer Elite" clients, who have a special right to restrict competition, often to a single vendor. Therefore, in cases where these clients exercise that right—which they frequently do—the records are not true auctions.

TABLE 5: SUMMARY OF AVERAGE SAVINGS BY YEAR

Year	Conservative Average Savings Amount	Conservative Average Percent Savings	Average Savings Amount (Positives Only)	Average Percent Savings (Positives Only)
2001	$3,779	12%	$4,602	15%
2002	$41,455	13%	$47,377	15%
2003	$12,945	14%	$15,632	16%
2004	$8,119	11%	$11,277	15%
2005	$7,282	9%	$9,950	12%
2006	$4,563	9%	$6,596	13%
2007	$5,057	7%	$8,206	13%
2008	$6,119	9%	$7,759	13%
2009	$5,564	13%	$6,603	15%
2010	$9,601	15%	$11,492	18%
Total		**10%**		**14%**

According to these results, the aftermarket transactions afforded hospitals a savings of 15

to 18 percent off the GPO price on average in 2010—a savings of roughly $9,600 to $11,500 per aftermarket auction. Across the entire period of the sample (2001 through 2010), the average savings was 10 percent by conservative estimates and 14 percent if we exclude negative and zero savings observations.[61]

We now identify through regression analysis the factors that determine the magnitude of these savings for a given auction. By merging the transactions database with the hospital profile data from AHD, we are able to estimate the average effects of hospital characteristics as well as auction-specific features on prices and savings. Tables 6 and 7 present the results of two different models that further illuminate the reasons for the price reductions highlighted above.

In Model 1, we regress percent savings in a given auction on the hospital's characteristics—including number of staffed beds, gross patient revenues, net income, the state in which the hospital is located, and type of control (governmental, proprietary, or voluntary non-profit)—as well as indicators for year, device type, whether there were multiple incumbent suppliers on the GPO contract (that is, the entrant had to improve on the lowest of two GPO prices), whether the incumbent(s) lowered its initial bid, and total

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61. The fact that savings in the transactions database were greater in 2009 and 2010 than for the entire period should not be interpreted to mean that the movement away from sole-source contracts that began in the middle part of the decade was a bad development for hospitals. Indeed, as our regression model demonstrates, the opposite appears to be true: When there is only one incumbent bid to beat on the GPO contract, the percent savings enjoyed by the hospital in the aftermarket is larger than when there are two or more incumbent prices to beat. This suggests that the more competition on the GPO contract, the less chance for price improvement in the aftermarket. Stated differently, the aftermarket appears to be most valuable to hospitals purchasing under a sole-source contract. The aftermarket still generates savings for hospitals purchasing under multi-source contracts, but those savings are on average smaller. The most likely explanation for why hospitals in the transaction database enjoyed larger-than-average savings in 2009 and 2010 is (a) the recession that began in 2008, which may have caused suppliers to compete more aggressively on price; and (b) the change in the product mix in the transactions database across years.

number of rival bids and total number of rival bids squared.[62] To filter out data anomalies

and possible errors, we excluded auctions containing outliers in terms of total rival bids

and percent savings from our regression analyses. Outliers were defined as observations

that are either less than the first quartile minus 1.5 times the interquartile range, or above

the third quartile plus 1.5 times the interquartile range.[63] The results of Model 1 are

presented in Table 6 below.

TABLE 6: MODEL 1 REGRESSION RESULTS
(DEPENDENT VARIABLE = PERCENT SAVINGS)

Explanatory Variable	Coefficient	Std. Err.	t statistic
Total Rival Bids	0.0188	0.0024	7.97
Total Rival Bids Squared	-0.0011	0.0003	-3.28
Single Incumbent	0.0423	0.0057	7.45
Incumbent Lowered Bid	0.0159	0.0021	7.54
Total Staffed Beds	0.0000	0.0000	-0.77
Total Patient Revenues	0.0000	0.0000	0.10
Net Income	0.0000	0.0000	0.20
Governmental	-0.0009	0.0054	-0.17
Proprietary	0.0070	0.0108	0.65
Voluntary Nonprofit	-0.0037	0.0051	-0.72
constant	-0.0336	0.0227	-1.48

Notes: Year, device type, and state indicator variables are excluded. Outliers for total rival bids and percent savings have been dropped. R-squared equal to 0.1002. Number of observations equal to 6,569.

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62. We observed that the incremental effect of an additional bid was not constant—that is, the first few rival bids are more powerful than the last.

63. Outliers are identified using definitions found in standard statistics textbooks. *See, e.g.*, RAND R. WILCOX, FUNDAMENTALS OF MODERN STATISTICAL METHODS: SUBSTANTIALLY IMPROVING POWER AND ACCURACY 32-34 (Springer, 2nd ed. 2010). This text describes two commonly used methods of identifying outliers. The first, a "probabilistic approach," defines an outlier as an observation that is more than two standard deviations from the mean. A second approach, "frequently employed and recommended," is based on boxplot summarization of data and defines outliers as observations that are either less than the first quartile minus 1.5 times the interquartile range or above the third quartile plus 1.5 times the interquartile range. Our regression results do not change substantively depending on the method used; however, as Wilcox discusses, the former method is more susceptible to the "masking" problem than the latter method. In other words, the presence of outliers will widen the standard deviation and influence the mean, whereas quartile calculations are more robust to outliers. Thus, the results presented here utilize the second of the two methods described above.

As Table 6 shows, rival bids exert downward pressure on the awarded price (and thus increase the percent savings) at a decreasing rate, increasing percent savings by an average of 1.7 percentage points (equal to $1.9\% + 2 \times -0.11\% \times 1$) for the first competitive bid and by an additional 1.5 percentage points (equal to $1.9\% + 2 \times -0.11\% \times 2$) for the second competitive bid and so on. Similarly, if an auction involves a single incumbent—that is, there was only one incumbent price to beat—then savings increase by 4.2 percentage points on average. Presumably, this effect occurs because lone incumbents are more insulated from competition; therefore, their original prices will be higher than those offered when the hospital has another readily available option. Because higher starting prices leave more room for savings through solicitation of rival bids, the coefficient is positive. The final coefficient that is significant at the 5 percent level is the *incumbent lowered bid* variable, which indicates whether the incumbent on the GPO contract was induced to submit a revised bid that improved upon its initial offer. Hospital characteristics do not appear to significantly influence the percent savings. A few of the dummies for device type (for example, cardio fitness devices) and state were significant as well, and these are shown in Appendix 3.

In Model 2, we use an alternative dependent variable, awarded price. We drop outliers using the same methodology as in Model 1. This second regression also includes the same list of explanatory variables as Model 1, with the one addition of *incumbent GPO price*. As one would expect, the original GPO price is a strong determinant of the price that the hospital ultimately accepts for a given device; thus, Model 2 explains much more of the

variation (R-squared of 99 percent) in the dependent variable than Model 1 (R-squared of 11.8 percent). Table 7 below summarizes the results of this regression analysis.

TABLE 7: MODEL 2 REGRESSION RESULTS
(DEPENDENT VARIABLE = AWARDED PRICE)

Explanatory Variable	Coefficient	Std. Err.	t statistic
Incumbent GPO Price	0.912	0.015	62.12
Total Rival Bids	-1960.150	623.229	-3.15
Total Rival Bids Squared	199.587	73.577	2.71
Single Incumbent	-7739.488	1974.454	-3.92
Incumbent Lowered Bid	-189.351	581.695	-0.33
Total Staffed Beds	11.597	6.989	1.66
Total Patient Revenues	0.000	0.000	-1.26
Net Income	0.000	0.000	0.60
Governmental	1267.845	1033.737	1.23
Proprietary	-2713.965	2374.878	-1.14
Voluntary Nonprofit	120.812	959.892	0.13
constant	13909.660	3408.428	4.08

Notes: Year, device type, and state indicator variables are excluded. Outliers for total rival bids and percent savings have been dropped. R-squared equal to 0.9904. Number of observations equal to 6,569.

As Table 7 shows, *incumbent GPO price* is highly significant (t statistic equals 62.1). The coefficient indicates that for every dollar increase in the incumbent price, the awarded price can be expected to rise by $0.91, on average. Also significant at the five-percent level are the total rival bids variables and the indicator for whether there was only one incumbent involved in the auction. As in Model 1, we see that each additional rival bid reduces the price; the first rival bid reduces prices by $1,560.97 (equal to $-\$1,960.15 + 2 \times \$1,999.59 \times 1$). Hospital characteristics do not appear to influence significantly the awarded price. Once again, we found that a few of the category (for example, biomedical and dietary) and state variables were significant, and these are shown in Appendix 3.

V. POLICY IMPLICATIONS

While our empirical findings show that GPOs fail to secure the best prices for their members, economic theory explains that this failure emerges from the way in which GPOs are compensated. The current system—which allows GPOs to share in the sales revenue of those with whom they are to negotiate for the best prices—creates a perverse incentive that limits the GPOs' ability to procure the lowest prices for its member hospitals. If GPOs were prevented from receiving side-payments from medical suppliers, then they would likely structure their auctions in a way that elicited more competitive bidding, resulting in lower prices and greater competition. As our theoretical model shows in Appendix 1, device suppliers bid less aggressively in the presence of a kickback because they perceive the kickback as an increased cost of business. Moreover those negotiating actively for the lowest prices negotiate less aggressively in the presence of the kickback, as they view the kickback as an aggregate compensation in their negotiations. Barred from capturing a concession fee, GPOs would be forced to raise funds entirely from their hospitals in the form of membership fees. Naturally the GPOs' allegiances would reciprocate their compensation. Because the side payments encourage GPOs to exclude smaller device makers or lower-cost suppliers, eliminating this distortion could lead to greater price competition and to additional investment both by entrants (who may be currently disinclined to take risks under the current scheme) and by incumbent device makers (who may lack the incentives to innovate to maintain market share from would-be entrants). Professor Michael E. Porter of Harvard Business School echoes this conclusion in his book on health care policy and competition, explaining that "buying groups may serve the

interests of the suppliers that provide their funding, not providers, thereby undermining value-based competition…. There is no valid reason for buying groups to accept financing or any payments from suppliers…."[64] To the extent that the statistical analysis in Part IV constitutes a reasonable approximation of a world in which GPOs were not funded by suppliers, health care expenditures by GPO-member hospitals would decline by roughly $25 billion annually (equal to the product of the 10 percent average savings across the entire sample and $250 billion in annual purchases by GPOs); using the average price improvements from 2010, the savings to member hospitals would rise to $37.5 billion (equal to 15 percent of $250 billion). Assuming that the federal government saves $0.46 for each additional dollar saved by member hospitals,[65] we estimate that the federal government would save between $11.5 billion and $17.3 billion per year. In addition to this clear policy implication, policymakers and antitrust agencies (the Department of Justice and the Federal Trade Commission) should consider other strategies that GPOs use to maintain monopoly power.

In this section, we discuss three types of GPO contracting practices that raise significant concerns from a competition-policy perspective. These three practices are: (1) sole-source and dual-source contracts, (2) share-based loyalty provisions, and (3) bundled discounts. For each of these practices, we define the terms, discuss a sampling of legal cases

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64. MICHAEL E. PORTER & ELIZABETH OLMSTEAD TEISBERG, REDEFINING HEALTH CARE: CREATING VALUE-BASED COMPETITION ON RESULTS 361-362 (Harvard Business School Press, 2006).

65. According to the Center for Medicare and Medicaid Services National Health Accounts, the ratio of federal expenditures on hospital services to total expenditures on hospital services in 2008 was roughly 46 percent. *See* National Health Expenditures by type of service and source of funds, CY 1960-2008, *available at* http://www.cms.hhs.gov/NationalHealthExpendData. Other studies in the health care industry have used the same methodology to calculate federal savings resulting from a reduction in total health care expenditures. *See, e.g.,* Muse and Associates, A Cost Savings and Marketplace Analysis of the Health Care Group Purchasing Industry, prepared for the Health Industry Group Purchasing Association (HIGPA), June 2005, at 1.

where the particular practice was under scrutiny, and discuss the corpus of law that governs the practice. Although for the most part we focus on the law as it stands in the United States, for the share-based loyalty provisions we also discuss European Commission (EC) policy, as the EC has articulated the most comprehensive policy towards such conduct. We then conclude by using both economic theory and empirical evidence to assess the extent to which these three GPO contracting practices could harm consumers. Because of the large potential for consumer welfare improvements, the DOJ or the FTC should investigate GPO contracting practices.[66]

A.   Sole-source contracts

Under a sole-source GPO contract, the GPO selects a single manufacturer to be the only supplier of a given product available to member hospitals; dual-source GPO contracts constrain member hospitals to purchasing from one of two manufacturers.[67] Sole-source and dual-source contracts have been challenged as anticompetitive exclusive dealing arrangements in a number of cases. In *Masimo Corp. v. Tyco Health Care Group, L.P.*, Masimo, a company that produces pulse oximeters, sued Nellcor, which was acquired by Tyco, for entering into sole-source contracts, among other restraints, to exclude Tyco's rivals from the market for pulse oximeters.[68] The Ninth Circuit affirmed the district court's

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66. Under a rule of reason standard, defendant firms would be permitted to offer efficiency justifications for these practices. For example, they could argue that non-linear pricing effectuated by these schemes ultimately improve total surplus by eliminating part of the lost surplus that exists in high margin industries. A court would ultimately have to weigh these alleged efficiency benefits against potential anticompetitive harms.

67. ABA Section of Antitrust Law, Pharmaceutical Industry Antitrust Handbook 27 (American Bar Association 2009).

68. *Masimo Corp. v. Tyco Health Care Group, L.P.*, Nos. 07-55960, 07-56017, 2009 WL 3451725 (9th Cir. Oct. 28, 2009) [hereinafter *Masimo*].

ruling that Tyco's sole-source agreements violated antitrust law.[69] In *Retractable Technologies, Inc. v. Becton Dickinson & Company et al.*, Retractable Technologies, a company that produces and sells hypodermic safety syringes with retractable needles sued Becton Dickinson and Tyco for entering into sole-source and dual-source contracts, among other restraints, to exclude the defendants' rivals from the market for medical syringes.[70] In *Rochester Medical Corporation, Inc. v. C.R. Bard et al.,* Rochester Medical, a company that produces and sells anti-infective urinary catheters, sued C.R. Bard for entering into sole-source and dual-source contracts, among other restraints, to exclude rivals from the markets for Foley and intermittent catheters.[71] In *Natchitoches Parish Hospital Service District v. Tyco International, Ltd.*, a class of hospitals charged that Tyco's sole-source and dual-source distribution contracts with GPOs, among other restraints, allowed Tyco to maintain monopoly power over the sale of sharps containers, used for the disposal of medical devices with needles.[72]

Exclusive dealing contracts are presumptively anticompetitive when rivals are foreclosed from more than 20 percent of a market.[73] Furthermore, scholarship in law and economics has demonstrated that exclusive dealing arrangements create anticompetitive

69. *Masimo* at 8.
70. Complaint, *Retractable Technologies, Inc. v. Becton Dickinson & Company et al.*, Civil Action No. 5:01-CV-036 (E.D. Tex. filed 2003), at ¶ 34 [hereinafter *Retractable*].
71. Complaint, *Rochester Medical Corporation, Inc. v. C.R. Bard et al.*, Civil Action No. 5:04-CV-060 (E.D. Tex. filed 2004), at ¶ 31 [hereinafter *Rochester*].
72. Complaint, *Natchitoches Parish Hospital Service District v. Tyco International, Ltd.*, Case No. 1:05-CV-12024 PBS (D. Mass. filed 2005), at ¶¶ 58-62 [hereinafter *Natchitoches*].
73. *See* PHILLIP AREEDA, IX ANTITRUST LAW 375, 377, 387 (Aspen 1991) (indicating that 20 percent foreclosure is presumptively anticompetitive); *see also* HERBERT HOVENKAMP, XI ANTITRUST LAW 152, 160 (indicating that 20 percent foreclosure and an Herfindahl-Hirschman Index of market concentration of 1800 is presumptively anticompetitive).

effects when they raise rivals' costs[74] or prevent rivals from achieving economies of scale.[75] In *United States v. Dentsply*, the Third Circuit Court of Appeals recognized the anticompetitive nature of conduct that forecloses rivals from the most efficient distribution mechanism for a product,[76] an effect already well known to economic researchers.[77]

B.   Share-based loyalty provisions

Share-based loyalty provisions are contractual terms that impose certain commitment requirements on GPO members.[78] Such provisions typically condition usage of the standardized GPO contract on a requirement that members purchase a certain high percentage of a product from a specified manufacturer.[79] They often also tier discounts commensurate with commitment levels.[80] *Masimo,*[81] *Retractable,*[82] *Rochester,*[83] and *Natchitoches*[84] all involved accusations of anticompetitive use of share-based loyalty provisions in addition to the exclusive dealing claims related to sole-source and dual-source contracts. In *Masimo*, the Ninth Circuit affirmed the district court's ruling that Tyco's share-based loyalty discounts were anticompetitive.[85]

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74. Steven C. Salop & David T. Scheffman, *Raising Rivals' Costs*, 73 AMER. ECON REV. 267, 270 (1983) [hereinafter *RRC*].

75. Einer Elhauge, *Defining Better Monopolization Standards*, 56 STANFORD L. REV. 253, 256, 321 (2003) [hereinafter *Monopolization Standards*].

76. *United States v. Dentsply Int'l, Inc.*, 399 F.3d 181, 191-193 (3d Cir. 2005) [hereinafter *Dentsply*].

77. Dennis W. Carlton, Patrick Greenlee & Michael Waldman, *Assessing the Anticompetitive Effects of Multiproduct Pricing*, 53 ANTITRUST BULL. 587, 614 (2008) [hereinafter *Multiproduct Pricing*].

78. ABA Section of Antitrust Law, *supra*, at 27.

79. *Id.*

80. *Id.*

81. *Masimo*, *supra,* 2009 WL 3451725.

82. *Retractable*, *supra*, at ¶¶ 34-35.

83. *Rochester*, *supra*, ¶¶ 31-32.

84. *Natchitoches, supra,* ¶¶ 42-43.

85. *Masimo* at 8.

The regulation of share-based loyalty provisions represents a new area of antitrust enforcement. The European Union, which regulates share-based rebates under Article 82 of the European Community Treaty, has been quicker than the United States to articulate a comprehensive policy on share-based loyalty provisions.[86] In its *Guidance on the Commission's Enforcement Priorities in Applying Article 82 EC Treaty to Abusive Exclusionary Conduct by Dominant Undertakings*, the EC lays out the steps it uses to determine when share-based rebates are anticompetitive. The EC begins by assessing the "effective price" of the product at issue or "what price a competitor would have to offer in order to compensate the customer for the loss of the conditional rebate if the latter would switch part of its demand ('the relevant range') away from the dominant undertaking."[87] To calculate the effective price, the EC calculates "the normal (list) price less the rebate the customer loses by switching, calculated over the relevant range of sales and in the relevant time period."[88] The EC defines the "relevant range" as the contestable share of purchases in the market or "how much of a customer's purchase requirements can realistically be switched to a competitor."[89] The EC then compares the effective price with the dominant firm's cost of producing the product in question.[90] Costs are measured with respect to two economic methodologies for assessing costs: long-run average incremental cost ("LRAIC") and average avoidable cost ("AAC").[91] LRAIC represents "the average of all the (variable

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86. Commission of the European Communities, *Guidance on the Commission's Enforcement Priorities in Applying Article 82 EC Treaty to Abusive Exclusionary Conduct by Dominant Undertakings*, Feb. 2009, ¶ 1.

87. *Id.* ¶ 41

88. *Id.*

89. *Id.*

90. *Id.* ¶¶ 43-44.

91. *Id.*

and fixed) costs that a company incurs to produce a particular product."[92] AAC represents "the average of the costs that could have been avoided if the company had not produced a discrete amount of (extra) output."[93] LRAIC is usually higher than AAC because LRAIC includes all fixed and variable costs while AAC includes only fixed costs that would have been avoided if the firm ceased production of the relevant units of output.[94] If the effective price of the product is above the LRAIC of producing the product, there is no competitive concern because the effective price net of the rebate leaves sufficient margin for equally-efficient rivals to continue to compete in the market.[95] If the price is below the AAC, then the price is presumptively anticompetitive because the rebate scheme would foreclose equally-efficient rivals.[96] If the effective price is between LRAIC and the AAC, the EC considers whether there are effective "counterstrategies" competitors can use to remain viable in the market, such as whether rivals have "market power"—a segment of the market that they can leverage to meet the dominant firm's rebates.[97]

The legal rules regarding share-based loyalty provisions are less certain in the United States. Law and economics scholars Professor Einer Elhauge and Professor Damien Geradin explain that, under § 3 of the Clayton Act, "discounts conditioned on not dealing with a rival" are explicitly treated "as equivalent to agreements not to deal with a rival."[98] Elhauge and Geradin also aver that because the anticompetitive effects of share-based

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92. *Id.* ¶ 26, fn. 2.
93. *Id.*
94. *Id. See also* William J. Baumol, *Predation and the Logic of the Average Variable Cost Test*, 39 J. L. ECON. 49, 56 (1996).
95. *Id.* ¶ 43.
96. *Id.* ¶ 44.
97. *Id.*
98. EINER ELHAUGE & DAMIEN GERADIN, GLOBAL ANTITRUST LAW AND ECONOMICS 625 (Foundation Press 2007).

loyalty provisions "generally turn on the share of the market foreclosed, such agreements raise very similar issues to exclusive dealing."[99] In support of this contention that the relevant body of law for evaluating share-based rebate cases is the exclusive dealing case law, Elhauge and Geradin note that *in Microsoft v. U.S.*, the court analyzed a share-based loyalty agreement that foreclosed between 75 to 85 percent of the relevant market under the law of exclusive dealing.[100]

C.   Bundled discounts

In addition to share-based loyalty provisions, GPOs often offer discounts that are conditioned on a hospital's buying multiple products together.[101] GPOs sometimes combine bundled discounts with share-based loyalty provisions.[102] Such combinations can be particularly restrictive. For instance, the complaint in *Natchitoches* explained:

> Because Tyco's rebates were tied to meeting market-share maintenance requirements for each and every product in Tyco's bundle, health-care entities faced severe penalties on multiple products even if they used Tyco products for more than the high-percentage requirements of their needs in the other product categories but chose to buy even a small percentage of a competitor's Sharps Containers that exceeded the arbitrarily imposed limit.[103]

In addition to *Natchitoches, Masimo,*[104] *Retractable*,[105] and *Rochester*[106] all asserted that defendants had used bundled discounts to impair competition to the detriment of hospitals. In *Masimo*, the Ninth Circuit ruled that Tyco's bundling contracts discounts amounted to exclusive dealing, and therefore had the potential to be anticompetitive even if a

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99.   *Id.*
100.   *Id.*, fn. 78.
101.   ABA Section of Antitrust Law, *supra*, at 28.
102.   *Id.*
103.   *Natchitoches, supra,* ¶ 49.
104.   *Masimo*, *supra,* 2009 WL 3451725.
105.   *Retractable*, *supra*, ¶ 37.
106.   *Rochester*, *supra*, ¶ 34.

hypothetical equally efficient supplier of the tied product could profitably induce a customer to break the bundle:

> There is truth to Masimo's argument. Tyco's bundling contracts gave customers a price discount for purchasing a number of unrelated products together, one being pulse oximetry. However, receipt of the discount was conditioned upon customers purchasing 90-95% of their requirements of those products from Tyco. If a customer bought less than the required minimum, the discounts would be lost or decreased. That is conditioning the discount on the requirement of near complete exclusivity. *This effectively prevents customers from dealing in the goods of competitors, if the customers want to obtain Tyco's discount. That is the hallmark of exclusive dealing.*[107]

Although the jury determined that Tyco's bundled rebates were anticompetitive, the district court vacated that decision based on a cutoff date of July 2001, and the Ninth Circuit court affirmed, ruling that the "evidence in the trial record concerning the pervasiveness and effects of Tyco's varied bundling arrangements was insufficient to support a finding that the arrangements foreclosed competition in a substantial share of the relevant market."[108]

The issue of when the antitrust laws should regulate the use of bundled discounting by dominant firms has received an immense amount of attention. In *Brooke Group Ltd. v. Brown & Williamson Tobacco Corp.*, the Supreme Court of the United States ruled that in a single-product predatory pricing case, plaintiffs must prove that the defendant has priced the product at issue below an appropriate economic measure of cost and that defendant has "a reasonable prospect, or under § 2 of the Sherman Act, a dangerous probability, of recouping its investment in below-cost prices."[109] Although some have argued that this test should be applied to bundled discounts—that is, for a bundle to be anticompetitive, the

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107. *Masimo* at 6.
108. *Id.* at 7.
109. *Brooke Group Ltd. v. Brown & Williamson Tobacco Corp.*, 509 U.S. 209, 222, 224 (1993).

total price charged for all of the goods in the bundle is below the aggregate cost of producing all of the them ("total bundle predation standard")—two significant appellate court decisions have rejected this approach. In *Le Page's Inc. v 3M*, the Third Circuit Court of Appeals concluded that the predatory pricing test articulated in *Brooke Group* did not necessarily apply to any conduct but single-product predation.[110] In *Cascade Health Solutions v. PeaceHealth*, the Ninth Circuit Court of Appeals rejected the argument that *Brooke Group*'s recoupment requirement applied in bundling cases, citing a substantial body of economic literature demonstrating that anticompetitive bundling can immediately increase a monopolist's profits and requires no profit sacrifice.[111] The Ninth Circuit went on to articulate the following cost-based test:

> [A] plaintiff who challenges a package discount as anticompetitive must prove that, when the full amount of the discounts given by the defendant is allocated to the competitive product or products, the resulting price of the competitive product or products is below the defendant's incremental cost to produce them.[112]

Under this standard, known as the *Cascade* test, a bundled discounting arrangement is anticompetitive when a firm who has monopoly power in one market, but faces competition in an adjacent market, sets the price of the bundle such that a hypothetical equally efficient rival in the competitive market would not be able to compensate consumers for breaking the bundle. In other words, rather than a total bundle predation standard, the *Cascade* test turns on whether the bundle would foreclose a single product

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110. *LePage's Inc. v. 3M*, 324 F.3d 141, 151 (3d Cir. 2003) (en banc) [hereinafter *LePage's*].
111. *Cascade Health Solutions v. PeaceHealth*, 515 F.3d 883, 910, n.21 (9th Cir. 2008) ("We do not believe that the recoupment requirement from single product cases translates to multi-product discounting cases. Single-product predatory pricing, unlike bundling, necessarily involves a loss for the defendant...By contrast, as discussed above, exclusionary bundling does not necessarily involve any loss of profits for the bundled discounter.").
112. *Id.* at 910.

rival attempting to compete with the dominant firm in any single product market. Although the Third Circuit in *LePage's* did not articulate an alternative cost-based test to the total bundle predation standard, it did suggest that the appropriate standard would test whether an equally-efficient rival had been foreclosed in any of the product markets subject to the bundling arrangement.[113]

Despite these judicial trends, in a 2009 *Harvard Law Review* article Professor Elhauge asserted that cost-based tests such as *Cascade* are ultimately inconsistent with two Supreme Court cases that are the standing law on bundling.[114] Instead of these tests, Professor Elhauge advocates a two-pronged approached to the antitrust treatment of bundling arrangements. If the product over which the firm has market power is sold on a standalone basis at a price above its price but for the bundling arrangement (also known as the independent monopoly price, or the but-for price), then the bundling arrangement should be deemed *per se* illegal as long as plaintiffs can prove that the defendant has market power over the product sold on a standalone basis.[115] If, however, the price of the

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113. *LePage's, supra,* at 155 ("The principal anticompetitive effect of bundled rebates as offered by 3M is that when offered by a monopolist they may foreclose portions of the market to a potential competitor who does not manufacture an equally diverse group of products and who therefore cannot make a comparable offer.").

114. Einer Elhauge, *Tying, Bundled Discounts, and the Death of the Single Monopoly Profit Theory*, 123 HARVARD L. REV. 397, 465 (2009) [hereinafter *Elhauge Tying*] ("Any cost-based test also seems inconsistent with various other Supreme Court cases. In *United Shoe Machine Corp. v. United States*, the Court condemned bundled discounts that (along with other contractual clauses) had the "practical effect" of a tie, without requiring any evidence that they resulted in a bundled or effective price that was below cost. In *Loew's*, the Court held that an injunction against a firm that engaged in illegal bundling should prohibit bundled discounts that either had the effect of imposing a tying condition or exceeded any efficiency gains created by the bundling, without requiring any evidence that the bundled discounts resulted in a bundled or effective price that was below cost. Although injunctive remedies can extend beyond illegal conduct, the Court would have designed its remedy to avoid interfering with any bundled discounts it deemed procompetitive. *Loew's* thus implicitly holds that not all bundled discounts that result in bundled or effective prices above cost are procompetitive or merit safe harbor. This holding conflicts with the logic of the cost-based tests, which conclude precisely the opposite.").

115. *Id.* at 401-403.

standalone product does not exceed its but-for price, then the bundling arrangement "should be condemned only if a substantial foreclosure share or effect is proven."[116] Professor Elhauge also contends that because economic theory indicates that monopoly leveraging requires a profit sacrifice if the products in the bundle are sold in a fixed ratio or do not have separate utility, in this instance, the law should also require plaintiffs to prove substantial foreclosure share or effect.[117]

D.   Policy implications

Economic theory provides a strong basis for concluding that under certain circumstances, each of the exclusionary practices that are frequently at issue in antitrust litigation concerning GPO contracts will result in anticompetitive harm to consumers. A significant corpus of economic literature demonstrates the circumstances under which both exclusive contracts[118] and bundling[119] harm competition. The nascent literature on share-based loyalty provisions has also demonstrated that share-based loyalty provisions have the potential to create pernicious anticompetitive effects.[120] Although the economic

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116. *Id.* at 403.

117. *Id.*

118. *See e.g.*, MICHAEL D. WHINSTON, LECTURES ON ANTITRUST ECONOMICS 140-178 (MIT Press 2008); Ilya Segal & Michael Whinston, *Naked Exclusion: Comment*, 90 AMER. ECON. REV. 296, 296-309 (2000); B. Douglas Bernheim & Michael D. Whinston, *Exclusive Dealing*, 106 J. POL. ECON 64, 64-103 (1998); Eric Rasmusen, J. Mark Ramseyer, John S. Wiley, Jr., *Naked Exclusion*, 81 AMER. ECON. REV. 1137, 1137-1145 (1991); Phillipe Aghion & Patrick Bolton, *Contracts as a Barrier to Entry*, 77 AMER. ECON. REV. 388, 388-401 (1987); Thomas G. Krattenmaker & Steven C. Salop, *Anticompetitive Exclusion: Raising Rivals' Costs to Achieve Power over Price*, 96 YALE L. J. 209, 234-238, 242-248 (1986).

119. *See e.g.*, Patrick Greenlee, David Reitman & David S. Sibley, *An Antitrust Analysis of Bundled Loyalty Discounts*, 26 INT. J. IND. ORG. 1132, 1132-1152 (2008); Barry Nalebuff, *Exclusionary Bundling*, 50 ANTITRUST BULL. 321, 327-370 (2005); Barry Nalebuff, *Tied and True Exclusion*, 1 COMP. POL. INT. 41, 41-53 (2005). Barry Nalebuff, *Bundling as an Entry Barrier*, 119 Q. J. ECON. 159, 159-187 (2004); Dennis W. Carlton & Michael Waldman, *The Strategic Use of Tying to Preserve and Create Market Power in Evolving Industries*, 33 RAND J. ECON. 194, 194-220 (2002); *Elhague Tying*, *supra*, at 450-460.

120. *See e.g.*, Einer Elhague, *How Loyalty Discounts Can Perversely Discourage Discounting*, 5 J. COMP. L. ECON. 189, 189-231 (2009); Nicholas Economides, *Loyalty/Requirement Rebates and the Antitrust*

literature on exclusionary contracting offers a number of potential starting points for policy analysis, the strongest commonality is that such restraints are likely to hurt consumers when they substantially foreclose competing suppliers by depriving rivals of economies of scale or scope or by raising their costs.[121]

Given the importance of foreclosure in determining when exclusionary practices will have anticompetitive consequences for consumers, a critical step in evaluating the appropriate policy towards GPO contracting practices is to examine the GPO market shares. Table 8 depicts GPO market share statistics. These estimates are based on self-reported and unaudited data provided by the top GPOs in response to an annual *Modern Healthcare* survey. MedAssets, one of the largest GPOs, has never responded to the survey. Although these statistics cannot be used as precise estimates for individual company market shares, they do illustrate the overall industry structure.

TABLE 8: GPO MARKET SHARES (PERCENT OF PURCHASES)

GPO	2000	2005	2006	2007
Novation	30.2	33.1	33.5	31.3
Premier	27.2	32.6	30.7	31.2
AmeriNet	9.6	7.6	6.9	6.6
HCA/Health Trust	8.8	9.4	9.5	12.2
Consorta	5.7	5.0	5.5	4.7
Other*	18.5	12.3	14.0	13.9

Sources: Lawton R. Burns, *Hospital Group Purchasing Organizations (GPOs)*, Presented at the "Workshop on Health Care and Competition Law" in Washington, DC, on September 10, 2002, at 7; S. PRAKASH SETHI, GROUP PURCHASING ORGANIZATIONS: AN UNDISCLOSED SCANDAL IN THE U.S. HEALTHCARE INDUSTRY 27 (Palgrave Macmillan, 2009). *Notes*: * May include MedAssets, Tenet/BuyPower, HSCA, Broadlane, Innovatix, Resource Optimization and Innovation, Hospital Purchasing Service, Yankee Alliance, & Child Health Corporation of America.

Modernization Commission: What is the Appropriate Liability Standard?, 54 ANTITRUST BULL. 259, 259-279 (2009), Greenlee, Reitman & Sibley, *supra*, 1132-1135.

121.   *See e.g., RRC, supra*, at 270; *Monopolization Standards, supra*, at 256, 321; *Multiproduct Pricing, supra*, 614.

These data indicate that two GPOs, Novation and Premier, have enough market share that exclusive contracts between either Novation or Premier and a medical device manufacturer would be presumptively anticompetitive since both GPOs control over 20 percent of the market respectively.[122] Furthermore, GPO contracts involve an interaction between relatively concentrated GPOs and small, disconnected hospitals, which the economic literature has identified as a situation under which manufacturers and GPOs will have the greatest success in using exclusionary contracting practices for anticompetitive purposes.[123] Thus, the market share data presented here suggest that GPO contracting practices indeed warrant antitrust scrutiny.

As discussed above, one tangible piece of evidence economists and courts look at to examine when exclusionary practices have raised rivals' production costs is whether the implicated conduct has foreclosed rivals from the most efficient distribution channel for their products.[124] There is little doubt that GPOs are a highly efficient channel for the distribution of medical devices and other products to hospitals. Indeed, Professor Lawton Burns, of the Wharton Business School at the University of Pennsylvania, explained in his book on the healthcare supply chain, "GPOs thus function as an efficient funnel for contracting between large numbers of product vendors and large numbers of hospital buyers."[125] Excluded from the most efficient distribution channel, rival medical suppliers will incur higher distribution costs and thus will constrain incumbent suppliers' prices to a lesser degree.

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122. Areeda. *supra*, at 375, 377, 387; Hovenkamp, *supra*, at 152, 160.
123. Segal & Whinston, *supra*, at 296-309.
124. *Multiproduct Pricing*, *supra*, at 614; *Denstply*, *supra*, at 191-193.
125. LAWTON BURNS, THE HEALTHCARE VALUE CHAIN 60 (Josey-Bass 2002).

The economic theory and data presented above suggest a high likelihood that the exclusionary terms common in GPO contracts harm consumers. This likely harm justifies both the policies proposed above: the elimination of the supplier-funded model, including but not limited to the repeal of the safe harbor provision of the anti-kickback statute; and the DOJ or the FTC should investigate GPO pricing and contracting practices and should publish guidance for courts on how to analyze GPO cases. Such guidance should clarify the specific tests that the DOJ or FTC will use to determine when exclusionary practices are anticompetitive, much like the EC's guidelines have clarified European antitrust policy. Modern research, some of which has been cited above, has demonstrated the necessity of using antitrust policy to regulate the most egregious exclusionary contracting practices.

CONCLUSION

The financial crisis of 2008-09 revealed many broken compensation and incentive structures in the U.S. financial industry: debt issuers—rather than investors—were paying the ratings agencies; bull markets always paid—but bear markets could never punish— executives at major banks. Likewise GPOs have been poor bargaining agents because they are compensated not by their principals, the member hospitals, but instead by medical suppliers. Perversely a GPO's compensation increases with the price charged under the concession, just as a ratings agency's compensation increased—at least before the legislative reform—with the number of AAA ratings issued. Furthermore, the greater the compensation to the GPOs, the greater the exclusivity concession received by dominant firms, and a diminished market access for new market entrants. This is exactly the opposite incentive that GPOs should face. If only membership dues funded GPOs, then they would

have no reason to broker exclusive contracts or contracts with share-based loyalty and bundled rebates, but they would have greater incentive to negotiate for the lowest prices. Without these perverse incentives, the monopoly power of incumbent medical suppliers would dissipate. Importantly, any efficiencies that GPOs purportedly offer, including reduced transactions costs or consolidated buying power, would be preserved, as our proposed remedy would merely alter the financing of GPOs and would not jeopardize their existence.

If GPOs really were seeking the best prices for their members, it would be highly unlikely to identify a database of 8,100 aftermarket auctions in which GPO member hospitals consistently secured significant savings, and in which incumbent bidders on the GPO contracts were induced to lower their prices (and did so significantly) in over half of all aftermarket transactions. To the extent that aftermarket studied here is a proxy for the medical device market but for the perverse compensation scheme—and there is every reason to believe that it is given the lack of those incentives by the market maker for these transactions—GPO-member hospitals would conservatively save approximately $25 billion per year, or based on more recent data from 2010, they would save as much as $37.5 billion per year. Assuming that the federal government saves $0.46 for each additional dollar saved by GPO-member hospitals because of Medicare funding, we estimate that the federal government would save between $11.5 billion and $17.25 billion per year. These savings do not include the billions of additional savings estimated by Singer (2006), flowing from non-refunded rebates to member hospitals and from Medicare reporting problems.

APPENDIX 1: THEORETICAL MODEL OF GPO BIDDING

It is straightforward to show formally that the grantor of a monopoly concession prefers monopoly prices to competitive prices. Consider a contract in which a grantor offers a concession to supply units to a set of customers at a price P. When the quantity demanded, Q, is pre-determined and thus not a function of the auction price, then the value of the concession to the grantor (or the "concession fee") can be written as kPQ, where k is the concession rate, which can either be set by the grantor or determined as part of the bidding process. The grantor's revenue is maximized at the highest price the market will bear for any given k and Q. So long as the concession fee is a fixed share of the revenues generated under the concession, the grantor strictly prefers the monopoly price to the competitive price when the quantity demand is pre-determined.

The same preference for monopoly maintenance is generally true when the quantity demanded is a decreasing function of the auction price. In this case, the value of the concession is maximized, for any given concession rate of k, whenever

$$k\left[Q(P)+PQ'(P)\right]=0, \tag{1.1}$$

or when

$$\frac{PQ'(P)}{Q(P)} = \varepsilon = -1 \tag{1.2}$$

Because the grantor does not consider the marginal cost of supplying the item, C, it prefers a price where demand is unit-elastic (ε equal to negative one)—that is, it wants to maximize revenue.

By comparison, an incumbent bidder who is completely shielded from competition would prefer the independent monopoly price, which occurs when

$$\frac{(P-C)Q'(P)}{Q(P)} = \varepsilon - \varepsilon\frac{C}{P} = \varepsilon\left(1-\frac{C}{P}\right) = -1 \qquad (1.3)$$

Define the price that satisfies (1.3) as P^M and the associated elasticity as ε^M. Comparing (1.2) with (1.3), the term $1 - C/P^M$ can be thought of the divergence in interests between the grantor, who seeks to maximize the revenue from the concession, and the incumbent supplier, who seeks to maximize profits.

If *ex ante* competition for the concession is too intense, such that it induces bidders to bid their costs, and if all bidders have similar and constant costs of C, then the value of the concession for any given k is equal to $kCQ(C)$, where $Q(C)$ is the quantity demanded at a price equal to cost. In contrast, if *ex ante* competition for the concession is weak, such that the incumbent supplier bids at the independent monopoly price, then the value of the concession for any given k is equal to $kP^M Q(P^M)$. Thus, the grantor will prefer monopoly prices to competitive prices whenever

$$
\begin{aligned}
P^M Q(P^M) &\geq CQ(C) \\
\frac{Q(P^M)}{Q(C)} &\geq \frac{C}{P^M} = 1 + \frac{1}{\varepsilon^M}
\end{aligned}
\qquad (1.4)
$$

By (1.4), the grantor will prefer the monopoly price over the competitive price whenever demand is moderately elastic at P^M. For example, when ε^M is -1.5, the value of the concession under the monopoly price will be greater so long as the quantity demanded at the monopoly price is at least one-third the quantity demanded at the competitive price. When ε^M is -3, the value of the concession under the monopoly price will be greater so long as the quantity demanded at the monopoly price is at least two-thirds the quantity demand at the competitive price.

It is also straightforward to show that, by placing some weight, α, on the concession rate, k, the grantor can dampen competition relative to a world in which all weight is placed on the best price. To see this, consider the following simple model of competitive bidding. Under the basic model, firms compete by submitting bids, b, to an auctioneer based on their own private cost signals. Costs are drawn from a well-behaved and common distribution and are private information. Suppose the auctioneer, before the auction, specifies a percentage of the bid, k, that winning and willing bidders will pay to it. Based on the bid itself and the payment to the auctioneer, kb, the auctioneer generates a value function with which it ranks the separate bids:

$$v = \alpha b k - (1-\alpha)b \qquad (1.5)$$

From a bidder's perspective, the probability that it wins a particular auction is equal to the probability its value assignment exceeds that of its rivals. Assuming N bidders, this probability would be given by $F(v)^{N-1}$, where $F(.)$ is the distribution function for v. Under this formulation, a particular bidder, denoted i, will seek to maximize expected profits, which will be given by

$$\Pi_i = \left[b_i - c_o - k_o b_i \right] F(v)^{N-1} \qquad (1.6)$$

In (1.6), c_o is the cost realization and k_o is the percentage payment to the auctioneer for bidder i.[126] Differentiating with respect to c yields the following first order condition:

$$\left[\tfrac{db}{dc} - k \tfrac{db}{dc} \right] F(v)^{N-1} + \left[b - c_o - kb \right](N-1)F(v)^{N-2} \tfrac{dF(v)}{dc} = 0 \qquad (1.7)$$

Solving for b then results in the symmetric equilibrium bid function:

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126.   In this particular example, k is treated as a constant in that it is specified ahead of time by the auctioneer.

$$b_i = \frac{c_o}{1-k} - \frac{\frac{db}{dc}F(v)}{(N-1)f(v)\frac{dv}{dc}} \qquad (1.8)$$

Regarding equation (1.8), because $\frac{db}{dc}$ is positive and because $\frac{dv}{dc}$ is negative,[127] the function above can read simply as "bid equals cost, adjusted upward proportionally by 1/(1-k) plus a positive markup."

Moreover, the "positive markup" does not depend on k. That is, k enters into this bid function as a proportional adjustment over cost. Moreover, that adjustment over cost will increase as k increases. Put simply, because k is a cost to bidders, they will increase their own bids to adjust for higher values of k. In the extreme cases, when k is set to zero, there is no proportional increase above cost due to k. Rather, the only factor that keeps the bid above cost is the additive markup, which does not depend on k. By contrast, as k approaches 1, the bid becomes unbounded as the term 1/(1-k) approaches positive infinity. In sum, the grantor's inclusion of a concession fee results in higher bids (and thus higher prices for hospitals) relative to a world without such a fee.[128]

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127. To see that $\frac{db}{dc}$ is positive, simply note that as a firm's costs increase, its bids must also increase for profit maximization to hold. If bids are not increasing with costs, then profits will be negative for a range of costs and the firm will not submit bids. To see that $\frac{dv}{dc}$ is negative, one need only invoke the chain rule: $\frac{dv}{dc} = \frac{dv}{db}\frac{db}{dc}$. Knowing that $\frac{db}{dc}$ is positive, it is only necessary to show that $\frac{dv}{db}$ is negative. From equation 0.7, this is satisfied so long as $k < \frac{1}{\alpha} - 1$. A quick check reveals that this makes sense under any reasonable formulation. For example, for α equal 0.5, k must be less than 1. That is, the only time the marginal of v with respect to b will be positive is when the auctioneer puts excessive weight (α) on its own compensation *and* chooses an excessively high k. Even in the case where k is a choice variable, α does not enter into the bid function directly. The reason is that α is a constant from the bidder's perspective, and α only affects expected profits via the probability of selection given b and k.

128. It is worth noting here that GPOs obviate the need for member hospitals' purchasing functions, which represents a transactions cost savings. Accordingly, we do not advocate the abolition of GPOs. Rather, we advocate a change in the *compensation structure* of GPOs, whereby member hospitals would pay higher membership fees to provide GPOs a competitive return on their expenses. *See* Part V above.

APPENDIX 2: VARIABLE DESCRIPTIONS FOR COMBINED MEMDATA-AHD DATABASE

Variable	Source	Definition
competitive price	MEMdata	The final awarded price, or, if the awarded price field is blank, the lowest competitive (non-incumbent) bid (in dollars)
incumbent price	MEMdata	The incumbent vendor price; defined as the lowest incumbent price in cases where there were multiple incumbents (in dollars)
percent savings	calculation	Percent savings, calculated as (incumbent price - competitive price)/incumbent price
total staffed beds	AHD	Total number of staffed beds at hospital
total patient revenue gross	AHD	Total gross patient revenue for hospital (in dollars)
net income or loss	AHD	Net income (or loss) for hospital (in dollars)
incumbent lowered bid	MEMdata	Indicates whether the incumbent vendor submitted a revised bid that was lower than its initial bid (binary, 1=lowered bid submitted)
single incumbent	MEMdata	Indicates whether the auction involved a single incumbent as opposed to multiple incumbents (binary, 1=single incumbent)
total rival bids	MEMdata	Count of the total number of *competitive* bids (does not include incumbent bids) in the auction
total rival bids squared	calculation	Square of total rival bids
hospital control governmental	AHD	Indicator variable for type of hospital control: governmental (binary, 1=hospital control is classified as "governmental")
hospital control proprietary	AHD	Indicator variable for type of hospital control: proprietary (binary, 1=hospital control is classified as "proprietary")
hospital control voluntary non-profit	AHD	Indicator variable for type of hospital control: voluntary non-profit (binary, 1=hospital control is classified as "voluntary nonprofit")
year dummies	MEMdata	Indicator variables for year in which auction took place, 2001-2010 (binary, 1=auction took place in that year; 2001 used as base year)
device type dummies	MEMdata	Indicator variables for device type categories (binary, 1=device labeled as falling under that category; "none" used as base)
state dummies	MEMdata/ AHD	Indicator variables for each of the 41 states in the dataset (binary, 1=hospital is located in that state)

APPENDIX 3: FULL REGRESSION RESULTS

Explanatory Variable	Model 1 Coef.	Model 1 Std. err.	Model 2 Coef.	Model 2 Std. err.
year 2001	[omitted]	[omitted]	[omitted]	[omitted]
year 2002	0.0000	0.0200	-2523.75	1829.07
year 2003	0.0100	0.0200	-2626.48	2411.75
year 2004	-0.0200	0.0200	-887.26	1381.45
year 2005	-0.0200	0.0200	135.15	1231.63
year 2006	-0.0200	0.0200	-340.00	1014.65
year 2007	-0.0200	0.0200	-17.22	1089.06
year 2008	-0.0100	0.0200	628.49	1134.11
year 2009	-0.0100	0.0200	345.85	1162.90
year 2010	0.0000	0.0200	-30.60	1296.37
device type biomedical	-0.0100	0.0000	-1399.55*	661.18
device type cardio fitness equipment	-0.10***	0.0100	-2965.39	1949.93
device type compression	0.0000	0.0100	-1526.53	4141.66
device type dietary	0.0000	0.0100	-2178.39**	812.70
device type imaging	0.0000	0.0100	2202.21	2848.67
device type information technologies	-0.02*	0.0100	-1190.91	846.35
device type laboratory	-0.0100	0.0100	-438.29	937.37
device type laundry	0.0200	0.0200	-1941.00*	912.08
device type monitoring	0.0000	0.0100	-1279.20	767.13
device type oncology	0.0200	0.0200	-25469.82	16747.70
device type patient assistance device	-0.0200	0.0300	-1345.34	1108.68
device type patient positioning	0.0000	0.0200	1505.04	1844.44
device type physical therapy	0.0000	0.0100	-1641.55*	763.46
device type plant	0.0100	0.0100	-1741.83*	700.94
device type storage	0.0100	0.0100	-2987.26	2160.76
device type stress test systems	0.0400	0.0500	-2282.11	1496.10
device type surgery	-0.0100	0.0100	-961.08	677.21
device type telecom	0.0200	0.0200	-2918.73	2546.44
device type vehicles	-0.04**	0.0100	779.43	1380.37
device type none	[omitted]	[omitted]	[omitted]	[omitted]
total rival bids	0.02***	0.0000	-1960.15**	623.23
total rival bids squared	-0.00**	0.0000	199.59**	73.58
single incumbent	0.04***	0.0100	-7739.49***	1974.45
incumbent lowered bid	0.02***	0.0000	-189.35	581.69
total staffed beds	0.0000	0.0000	11.60	6.99
total patient revenue gross	0.0000	0.0000	0.00	0.00
net income or loss	0.0000	0.0000	0.00	0.00
hospital control governmental	0.0000	0.0100	1267.84	1033.74
hospital control proprietary	0.0100	0.0100	-2713.96	2374.88
hospital control voluntary non-profit	0.0000	0.0100	120.81	959.89
state1 (AK)	0.04*	0.0200	-1445.20	1808.07
state2 (AZ)	0.09***	0.0200	-5059.59	3419.29

Explanatory Variable	Model 1 Coef.	Model 1 Std. err.	Model 2 Coef.	Model 2 Std. err.
state3 (CA)	0.03**	0.0100	-2328.97	2576.78
state4 (CO)	0.06**	0.0200	-3892.33	2904.06
state5 (CT)	0.14**	0.0400	-11566.98**	4456.21
state6 (FL)	0.0200	0.0100	-1012.84	3375.05
state7 (GA)	0.03*	0.0100	-3679.01	2370.97
state8 (HI)	0.0400	0.0300	-2028.87	2755.93
state9 (IA)	0.0100	0.0100	180.08	5296.86
state10 (ID)	0.04***	0.0100	-3316.42	2492.47
state11 (IL)	0.04***	0.0100	-924.85	2730.32
state12 (IN)	0.04***	0.0100	-3163.28	2405.70
state13 (KS)	0.06**	0.0200	-1192.08	2692.97
state14 (KY)	0.05***	0.0100	-2713.14	2568.23
state15 (LA)	0.0100	0.0100	-2982.29	5288.62
state16 (MA)	0.0000	0.0200	-1906.65	2623.88
state17 (MI)	0.0800	0.0400	-4085.73	2941.96
state18 (MN)	0.04***	0.0100	-3227.50	2490.14
state19 (MO)	0.04**	0.0100	-2536.90	2795.72
state20 (MS)	0.04*	0.0200	-2486.74	2743.74
state21 (NC)	0.08***	0.0100	-3695.34	2465.26
state22 (ND)	0.0200	0.0300	-6310.81	7315.01
state23 (NE)	0.04**	0.0100	-2306.89	3603.73
state24 (NH)	0.06***	0.0100	-2959.53	2496.99
state25 (NJ)	0.07***	0.0100	-9476.77*	4141.65
state26 (NM)	0.0100	0.0200	-1444.98	2671.53
state27 (NV)	0.07**	0.0200	-4764.89	2544.82
state28 (NY)	0.04**	0.0100	-3760.07	2786.25
state29 (OH)	0.03*	0.0100	-1525.31	2819.71
state30 (OK)	0.04*	0.0200	4128.99	8659.21
state31 (OR)	0.05**	0.0200	-3610.48	2553.26
state32 (PA)	0.03*	0.0100	-2219.46	3177.01
state33 (SC)	0.03*	0.0100	-3288.47	2915.72
state34 (SD)	0.0000	.	0.00	.
state35 (TN)	0.0000	.	0.00	.
state36 (TX)	0.05***	0.0100	-3446.60	2493.26
state37 (UT)	0.03*	0.0100	4071.43	4373.81
state38 (WA)	0.04**	0.0200	-3440.10	2711.63
state39 (WI)	0.0000	.	0.00	.
state40 (WV)	0.0000	0.0100	-2541.08	2416.56
state41 (WY)	0.06***	0.0200	-2604.91	2430.52
incumbent price			0.91***	0.01
constant	-0.0300	0.0200	13909.66***	3408.43

Notes: * for $p < 0.05$, ** for $p < 0.01$, and *** for $p < 0.001$. Estimated using heteroskedasticity-robust standard errors.

APPENDIX 4: AUTHORS' BIOGRAPHIES

Robert E. Litan

Robert E. Litan is a Senior Expert at Navigant Economics, Vice President for Research and Policy at the Kauffman Foundation in Kansas City, and a Senior Fellow in Economic Studies at the Brookings Institution.

At Kauffman, Dr. Litan oversees a multi-million budget for academic research relating to entrepreneurship. At Brookings, Litan pursues a wide-ranging research agenda, which includes topics in regulation, financial institutions, telecommunications, and general economic policy. Dr. Litan has been a lecturer in banking law at the Yale Law School, consulted for numerous public and private organizations, and testified as an expert witness in a variety of legal and regulatory proceedings involving domestic (banking, antitrust) and international (primarily trade) issues. He also consulted for private sector firms and the Department of Justice on antitrust matters.

Dr. Litan also has served in several capacities in the federal government. During 1995 and 1996, he was Associate Director of the Office of Management and Budget (where he was responsible for overseeing budgetary and other policies of six cabinet agencies). From 1993 to 1995, he was Deputy Assistant Attorney General, in charge of civil antitrust litigation and regulatory issues, at the Department of Justice. From 1977 to 1979, he was the regulatory and legal staff specialist at the President's Council of Economic Advisers. In the early 1990s, Dr. Litan was a Member of the Commission on the Causes of the Savings and Loan Crisis. During his career, Dr. Litan has authored or co-authored over 20 books, edited another 14, and authored or co-authored over 200 articles in journals, magazines and newspapers on a broad range of public policy issues.

Dr. Litan received his B.S. in Economics, summa cum laude, from the Wharton School of Finance at the University of Pennsylvania; his J.D. from Yale Law School; and both his M. Phil. and Ph.D. in Economics from Yale University.

Hal J. Singer

Hal J. Singer is a Managing Director of Navigant Economics, and an Adjunct Professor at Georgetown University's McDonough School of Business. His areas of economic expertise are antitrust, finance, and regulation. He is the co-author of the book Broadband in Europe: How Brussels Can Wire the Information Society (Kluwer/Springer Press 2005). He has also published book chapters in Access Pricing: Theory, Practice and Empirical Evidence (Justus Haucap and Ralf Dewenter eds., Elsevier Press 2005); Handbook of Research in Trans-

Atlantic Antitrust (Philip Marsden, ed., Edward Elgar Publishing 2006); and Life Markets (Vishaal Bhuyan ed., John Wiley & Sons 2009). He has published scholarly articles in dozens of economics and legal journals.

Dr. Singer's scholarship has been widely cited by regulators and by courts. In the Solicitor General's September 2008 amicus brief submitted to the Supreme Court in Pacific Bell Telephone Company v. linkLine Communications, Inc, the first citation of authority was to an article on price squeezes that Dr. Singer co-authored with Dr. Robert Crandall of the Brookings Institution. Dr. Singer also served as a testifying expert on impact and damages in several antitrust litigation matters, including Natchitoches Parish Hosp. Serv. Dist. v. Tyco Int'l, Ltd. et al. (D. Mass.), Meijer, Inc. & Meijer Distribution, Inc. et al. v. Abbott Laboratories, (N.D. Ca.), and Jane Doe, et al. v. Arizona Hospital and Health Care Association, et al. (D. Az.). In each case, the class certification order favorably cited Dr. Singer's testimony. In an October 2008 order, the Federal Communications Commission cited Dr. Singer's work on behalf of the National Football League (NFL) in support of the agency's decision to refer the NFL's complaint against Comcast to an administrative law judge. In June 2008, the arbitrator in TCR Sports Broadcasting Holdings v. Time Warner extensively relied on Dr. Singer's analysis to determine the fair-market value of an out-of-region telecast of the Baltimore Orioles and Washington Nationals.

In addition to his litigation practice, Dr. Singer writes policy papers on behalf of private firms and trade associations. In 2008 and 2009, he wrote policy papers for the American Bankers' Association, CTIA—The Wireless Association, the Fiber to the Home Council, the Medical Device Manufacturers' Association, and Mobile Future.

Dr. Singer is a frequent speaker and editorial writer; his columns have appeared in several leading newspapers, including the Wall Street Journal, the Washington Post, and Canada's National Post. Dr. Singer earned M.A. and Ph.D. degrees in economics from the Johns Hopkins University and a B.S. magna cum laude in economics from Tulane University.