



May 2006

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I. BACKGROUND AND INTRODUCTION

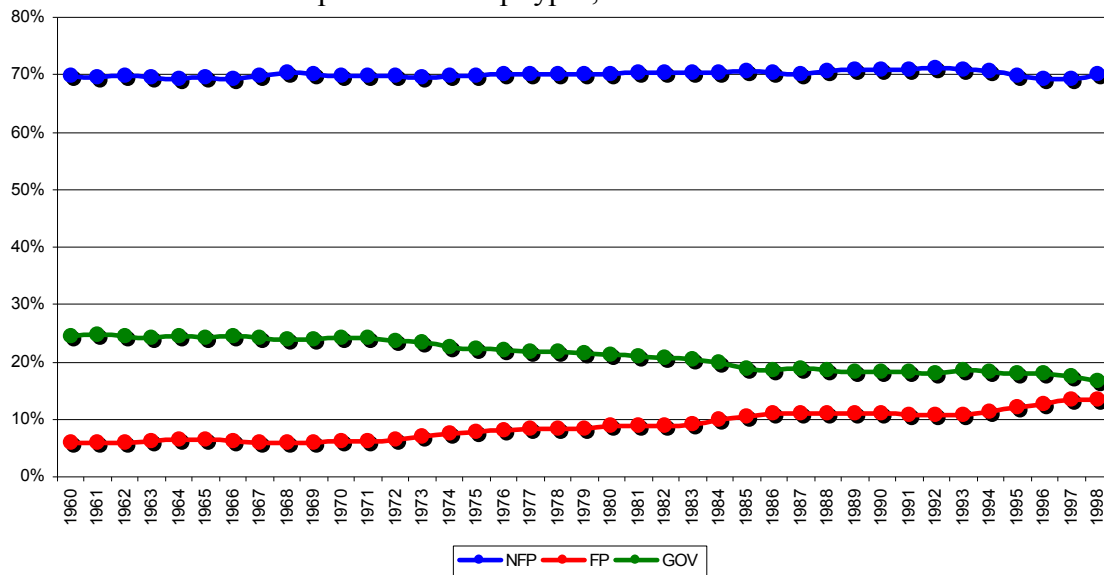
Types of hospitals in the United States

There are three types of hospitals in the United States: for-profit, nonprofit and government-run hospitals. An estimated 67 percent of community hospitals in the United States are nonprofit, while 12.5 percent are considered to be for-profit and the remaining are run by the government.¹ This ratio of ownership types has remained fairly constant over time.

Figure 1: Share of beds, share of facilities, by hospital ownership type.²

	Share of beds	Share of facilities
For-Profit	12.50%	14.50%
Nonprofit	66.90%	57.90%
Local Gov't	15.40%	23.00%
Federal Gov't	5.20%	4.60%

Figure 2: Breakdown of hospital ownership types, over time.³



While the boundary line between the two types is beginning to get blurrier, one of the main differences between nonprofits and for-profits is that the latter are expected to provide financial returns to their respective shareholders and financial support to the community via the taxes they are required to pay. The rationale behind this tax exemption lies in the deal that is “struck between the hospital and the community: a hospital would treat patients who were unable

¹ Sean Nicholson, et. al. “Measuring Community Benefits Provided by For-Profit and Nonprofit Hospitals,” *Health Affairs*.19 (2000): 168.

² David, Guy. *Presentation slides*.

³ David, Guy. *Presentation slides*.

to pay, and the government would grant a tax exemption to the hospital.”⁴ Nonprofit hospitals, considered charitable institutions, are hence exempted from most property, sales and income taxes, but are “expected to pay “community benefits” in return for their tax-exempt status.”⁵

Likewise, for-profit hospitals are owned by investors, while nonprofits are corporations without any owners. The sources of revenue differ as well. For-profits derive their revenues primarily from the sales of its services, and nonprofits, in addition to this, have access to charitable contributions. For-profits can distribute any additional profits to their owners, but nonprofits are prohibited from doing so. In contrast to the accountability that for-profits have to their shareholders, nonprofits must answer to self-perpetuating, often voluntary boards.

Figure 3: Basic differences between for-profit and nonprofit hospitals.⁶

For-profits	Nonprofits
Corporations owned by investors	Corporations without owners
<u>Purpose:</u> Management has legal obligation to promote wealth of shareholders within the boundaries of law.	<u>Purpose:</u> Has legal obligation to fulfill a stated mission; must maintain economic viability to do so.
Can distribute some proportion of profits (net revenues less expenses) to owners.	Cannot distribute surplus (net revenues -expenses) to those who control the organization.
Management ultimately accountable to owners (stockholders)	Management accountable to voluntary, often self-perpetuating boards
Sources of capital: <ul style="list-style-type: none"> • Equity capital from investors • Debt • Retained earnings • Return-on-equity payments from third-party 	Sources of capital include: <ul style="list-style-type: none"> • Charitable contributions • Debt (generally tax exempt) • Retained earnings • Government grants
Revenues derived from sale of services	Revenues derived from sale of services and from charitable contributions
Pay property, sales, and income taxes	Generally eligible for exemptions from most taxes

Increasing scrutiny of nonprofit hospitals

Recently, nonprofit hospitals have begun to come under much more scrutiny for their tax-exempt status, due to the increasingly widespread “perception that private nonprofit hospitals have replaced their community service orientation with a commercial one...”⁷ In February 2004, for example, the Illinois Department of Revenue revoked the tax-exempt status of a Catholic-affiliated nonprofit hospital in Urbana, which was a decision that sent “shock waves across the

⁴ D. Pellegrini, “Hospital Tax Exemption: A Municipal Perspective.” *Frontier of Health Services Management*, Spring 1989, Vol. 5: 44-46.

⁵ Guy David, et. al. “Ensuring and Financing Indigent Care: Are Tax Exemptions for Nonprofit Hospitals the Best Option?” 4. *To be published*.

⁶David 4.

⁷ David 5.

hospital industry⁸.” More than thirty lawsuits have already been filed in federal courts against almost 300 hospital facilities in fifteen different states because they have “failed to meet their charity care requirements.”⁹ An important issue, at hand, then, is whether the value of these added benefits provided by nonprofits warrants a tax-exemption.

The increased pressure on nonprofits to justify their tax-exempt status is, in part, the result of increasing state budget deficits and uninsured rates, both of which have caused state policy makers to ask whether they are “getting enough in return for the tax exemptions granted.”¹⁰ In addition, for-profits and nonprofits often compete in the same environment, and a tax-exempt status confers a significant financial advantage to nonprofits. There has also been a societal trend towards heightened expectations for corporate responsibility, as underscored by the Sarbanes-Oxley Act of 2002 and more stringent SEC requirements.

The challenge of defining “community benefits”

The definition of what constitutes “community benefits” is not a clear one. The IRS current stance regarding charitable organizations is underscored in its updated ruling, which was issued in 1983; the ruling states “the promotion of health...is deemed beneficial to the community as a whole” and thus delineates a number of criteria that should be met in order to be eligible for a tax exemption, such as the providing care to the uninsured.¹¹ What is important to note, however, is that the IRS “does not clearly define community benefits expected of not-for-profit hospitals” and it is this “imprecision” that has been the source of much debate regarding what the umbrella of “community benefits” actually includes.¹²

There are a number of components that could potentially fall under this category. Sean Nicholson, et. al., in their article “Measuring Community Benefits Provided By For-Profit and Nonprofit Hospitals,” contend that the following should fall under the title of “community benefits:”

- Uncompensated care
 - Hospitals, when treating poor patients, “provide a direct benefit to the patient and an indirect benefit to the altruistic members of the community.”¹³ The term “uncompensated care” refers to instances when a hospital provides services to poor patients, thus generating a bill, but only a portion of the bill is actually collected.¹⁴
- Additional “public-good” services that have not been billed
 - This refers to services which a hospital provides which are not directly paid for by the community, but still confer benefits to the members at large. Examples include educational classes for pregnant women, AIDS prevention clinics and free health screening for low-income patients.¹⁵

⁸ Lisa Maiuro, et. al. “Endangered Species? Not-for-profit Hospitals Face Tax-Exemption Challenge,” *Healthcare Financial Management*. 58 (2004): 74.

⁹ Guy David, et. al. “Ensuring and Financing Indigent Care: Are Tax Exemptions for Nonprofit Hospitals the Best Option?” *To be published*.

¹⁰ Maiuro 75.

¹¹ Maiuro 77.

¹² Maiuro 77.

¹³ Nicholson 169.

¹⁴ Nicholson 169.

- Medical research losses
 - The members of a given hospital community could potentially all benefit from the medical research funded by a hospital.
- Taxes (exclusively for for-profit hospitals)
 - This is included in the “community benefits” metric because the taxes paid by a hospital, in many instances, benefit the community at large.
- Medicare and Medicaid shortcomings in reimbursement
 - This shortfall occurs when the reimbursement that a hospital received from public insurance program does not completely cover the cost of the care that had been provided.
- Any price discounts to patients who are privately insured
- Medical education losses
 - Similar to medical research, medical education can benefit the community because it leads to more well-educated physicians who will presumably be able to treat patients in a more effective manner.

It is perhaps important to note that some of the items set forth in the aforementioned list are subject to debate by medical economists. Clement, et. al. has also suggested that “community benefits” include uncompensated care, research, price discounts and Medicare and Medicaid shortfalls.¹⁶ Kane et. al. has suggested that it include only uncompensated care, which includes charity care and bad debt¹⁷. Many studies have been published, each of which define “community benefits” differently.

Determining how much “community benefits” a hospital must provide

Another important question to ask involves the amount of community benefits a nonprofit hospital should provide in order to justify its tax-exempt status. The “community benefit” standard put into effect by the IRS does not call for a minimum charity care requirement, and tax exemption requirements differ from state to state. Again, there has been a great deal of debate surrounding this issue. One way to tackle this problem is to ask whether a community would be better off if a hospital’s tax-exempt status were revoked, which involves balancing both the benefits and costs of a tax exemption¹⁸.

The benefit of a tax exemption is the value of those extra benefits provided by a nonprofit hospital. This can be represented as: Benefit of a tax exemption = community benefits under tax exemption – community benefits under taxation.¹⁹

The costs of a tax exemption are essentially any forgone taxes. To determine the value of a nonprofit’s tax exemption, the given tax schedule is usually applied to the balance sheet of the hospital as it currently operates, which is represented by the equation: tax rate x surplus under tax exemption.²⁰ However, this equation is not completely accurate because if the exemption is revoked, it is likely that the hospital will modify both the scale and scope of

¹⁶ J. P. Clement and J.R. Wheeler. “What Do We Want and What Do We Get from Not-for-Profit Hospitals?” *Hospital and Health Services Administration*. 39 (1994): 159.

¹⁷ N.M. Kane. “Alternative Funding Policies for the Uninsured: Exploring the Value of Hospital Tax Exemption,” *The Milbank Quarterly*. 78 (2000): 2.

¹⁸ David 3.

¹⁹ David 3.

²⁰ David 4.

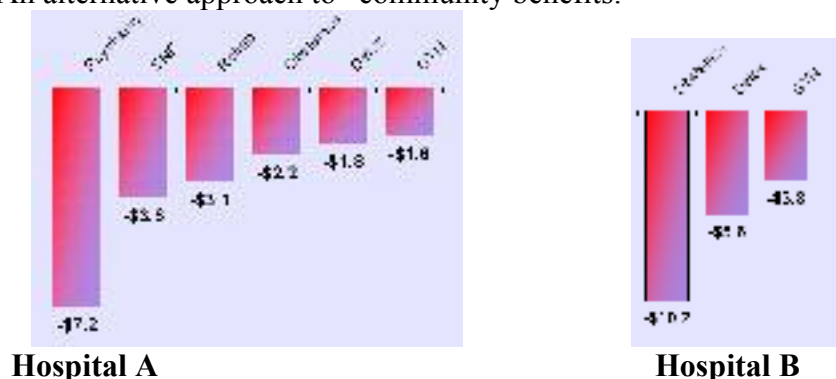
services offered. A hospital, once its exemption is taken away, may decide that it is no longer profitable to offer certain services, which in turn may decrease its income and thus, its tax payments. The scale and scope of services offered by a given hospital is thus an important consideration to take into account, as it may change under different tax environments and affect the evaluation of the benefit of granting a tax exemption.

The scale and scope of services offered by hospitals as an overlooked benefit

The term “scope” refers to the actual number of services offered by a hospital, while the term “scale” refers to the intensity of the service being offered. For instance, a hospital which offers ten pediatric beds, twenty rehabilitation beds and thirty alcohol beds has a greater scope, as compared to a hospital which offers fifty pediatric beds and fifty alcohol beds. However, the latter hospital has a greater scale, with respect to pediatric and alcohol beds. The scale and scope of services offered by a hospital may, in fact, be an overlooked benefit.

For instance, if we were to examine two hospitals, Hospital A and Hospital B:

Figure 4: An alternative approach to “community benefits.”



Technically, both hospitals have the same value of “community benefits,” equivalent to \$19.5 million. However, the question becomes: which hospital is better? Does the fact that Hospital B offers extra services confer any additional value?

Prior research about the differences in service offerings (scope) among hospital types

Using data from the American Hospital Association from the years 1988-2000, Horowitz, in her paper “Making Profits and Providing Care: Comparing Nonprofit, For-Profit and Government Hospitals,” found that the services offered by a hospital differ depending on the type of hospital²¹. She poses the question: “How do for-profit hospitals make profits?” and contends that an underlying assumption in the field is that “all general hospitals, regardless of ownership, are alike in the types of medical services they provide...[and they] merely differ in their patient mix.”²² This is perhaps not surprising, considering that most general hospitals do treat a mix of patients, and often deal with similar insurance companies and the same government payers and hire staff with similar training. This paper, however, sought to examine if there is a differential in services provided, which is contingent on ownership status. Horowitz looked into almost thirty services, ranging from AIDS treatment to sports medicine to determine

²¹ Jill Horowitz. “Making Profits and Providing Care: Comparing Nonprofit, For Profit and Government Hospitals,” *Health Affairs*. 24 (2005): 790.

²² Horowitz 791.

“whether ownership is correlated with offering services and how those choices relate to profit seeking.”²³

According to Horowitz, for-profits are more likely to be more responsive to profitability when making supply decisions. Government hospitals are more likely to supply unprofitable services that needed most by the poor and uninsured, while nonprofits were found to fall between for-profits and government hospitals in terms of supply decisions²⁴. For instance, for-profits were found to be more likely to offer open-heart surgeries, a relatively profitable service, and less likely to provide psychiatric services, a relatively unprofitable service, when compared to nonprofits and government hospitals. This difference in service mix benefits all patients, not just the poor and uninsured. Hence, when justifying the tax-exempt status of a nonprofit hospital, the “community benefits,” evaluation may not be an accurate one because it does not take into account the benefits of a greater service mix, which benefits all patients.

Figure 5:²⁵

Hospitals' Probability Of Offering Open-Heart Surgery, By Ownership Type, 1988–2000

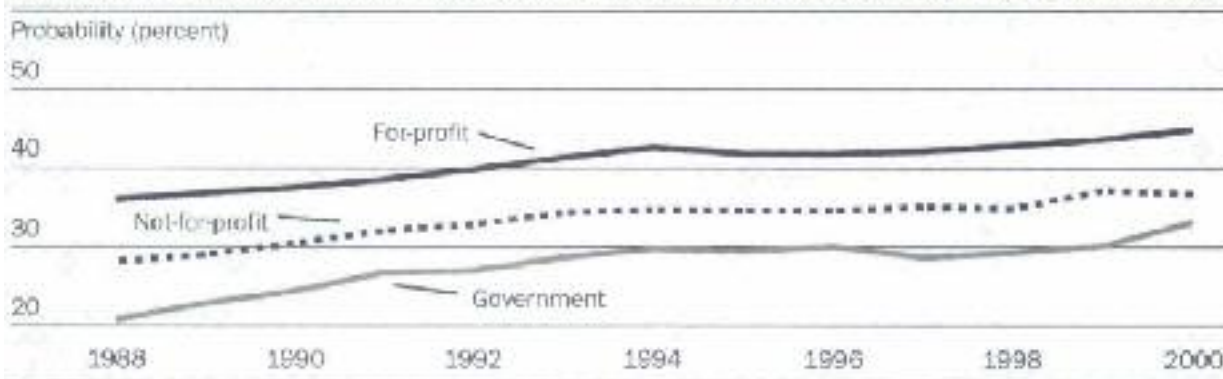
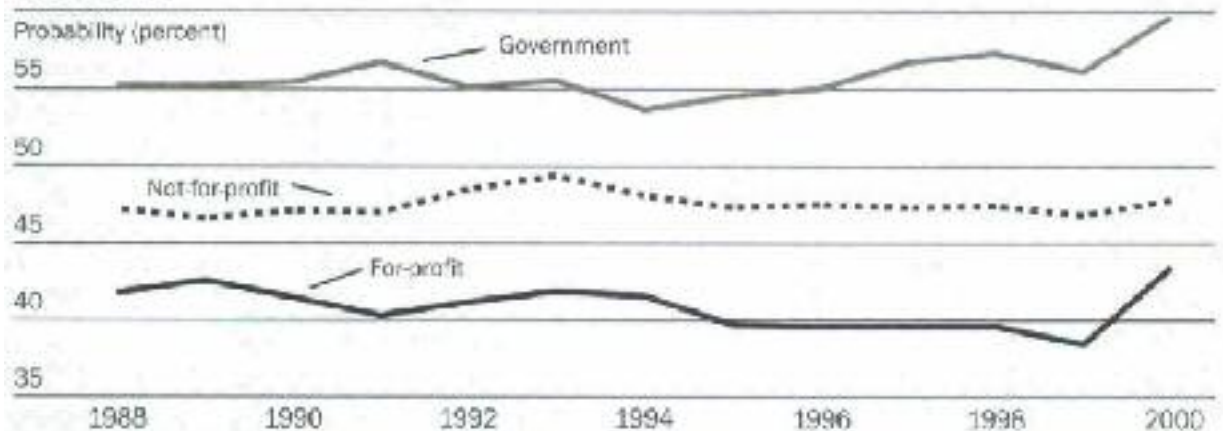


Figure 6:²⁶

Hospitals' Probability Of Offering Psychiatric Emergency Services, By Ownership Type, 1988–2000



²³ Horowitz 76.

²⁴ Horowitz 76.

²⁵ Horowitz 76.

²⁶ Horowitz 78.

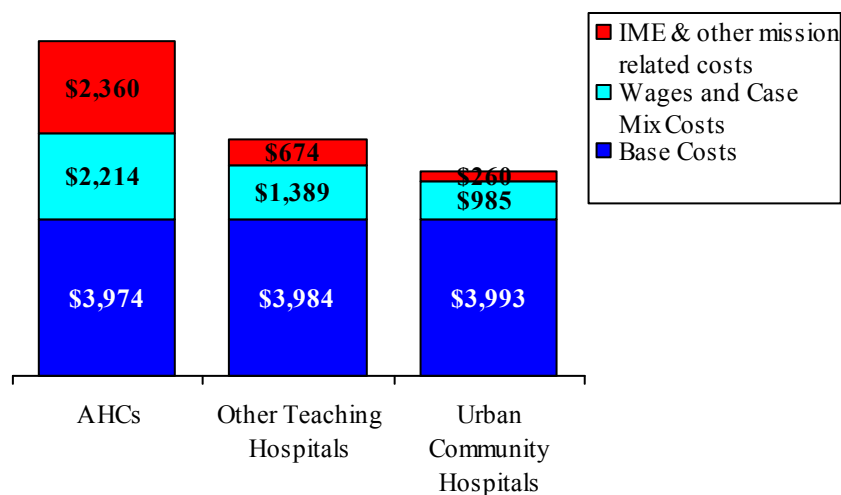
There are, however, a number of problems with this study:

- It looks at only at the propensity to offer services (scope) but not at the units' capacity (scale).
- It does not address other variables which could also be significant in predicting the scale and scope of services offered by a particular hospitals, such as teaching status, as discussed below.
- The study treats profits as exogenous. However, profitability is not an inherent attribute of medical services; it depends on institution-specific factors such as management skills, case-mix, and local input costs.

The effect of teaching status on scale and scope of services offered

Perhaps another factor to consider when analyzing the scale and scope of services provided is whether the given hospital is a teaching one. In their article, "Estimating the Mission-Related Costs of Teaching Hospitals," Koenig, et. al. contend that academic health centers in addition to teaching hospitals "face higher teaching costs than nonteaching community hospitals face" due to their biomedical research, graduate medical education (GME), and maintaining standby facilities for "medically complex patients."²⁷

Figure 7: Extra costs incurred by academic and other teaching hospitals.²⁸



Because of these extra costs, teaching hospitals receive additional reimbursements in the form of, for example, IME (Indirect Medical Education) payments from Medicare, which help pay for the "myriad patient care missions of teaching hospitals."²⁹ It is plausible that teaching status may be an important factor in explaining scope and/or scale for hospitals.

Other trends in the marketplace – the closing of public hospitals

²⁷ Lane Koenig. "Estimating the Mission-Related Costs of Teaching Hospitals," *Health Affairs*. 22 (2003):112.

²⁸ Koenig 115.

²⁹ American Academy of Medical Colleges.

<<http://www.aamc.org/newsroom/reporter/july02/imecuts.htm>>.

The closing of public hospitals has not been confined to the current decade. During the 1970s, the number of beds in public hospitals was stable at around 210,000 beds, but this changed in the 1980s, when the bed count dropped a whole 20 percent.³⁰ Currently, about 30 percent of such hospitals are in inner city localities, Such closings can be problematic because public hospitals are often “medical havens of last resort for the underinsured and the uninsurable.”³¹ They serve as community hospitals for the local communities and “handle proportionately more patients with conditions that have considerable financial and social as well as medical impact, including drug addiction, alcoholism, abuse, trauma, tuberculosis, and AIDS.”³² They also often provide special care units, such trauma center and burn care units and provide valuable training to students and young doctors.

II. RESEARCH PROBLEMS

This project consisted of two sub-projects:

- I. The first part of the project investigated the effect of teaching hospitals on the and scale and scope of services offered by hospitals.
 - a. **Are teaching hospitals more or less likely to offer certain services?**
 - b. **Does a hospital’s teaching status affect the intensity of a given service offered?**

- II. The second project entailed studying the effect of a specific large public hospital exiting the marketplace.
 - a. **What effect does this change have on the level of services provided by neighboring hospitals? Is this change a function of distance from the closed hospital?**

III. METHODOLOGY

Source of data

All data was obtained from the American Hospital Association, which compiles a comprehensive database of many hospital characteristics. All regression analyses were performed via special statistical programs such as Stata.

Note on Variables Used:

- **“Teaching” variable:** Used to specify which hospitals had greater than twenty residents. This was deemed the cutoff between a “teaching” hospital and a “non-teaching” hospital.
- **“Teaching_dummy” variable:** Used in the regression analysis. This variable was set to 0 if the hospital was a non-teaching, and 1 if it was a teaching hospital.
- **“Ownership_dummy2” variable:** Used in the regression analysis. This variable was set to 0 if the hospital was publicly owned (“local government”), and 1 if the hospital was either a nonprofit or for-profit hospital.

Part I:

³⁰ Editorial. *New England Journal of Medicine*. 20 (1995) 1348.
<NEJMhttp://content.nejm.org/cgi/content/full/333/20/1348>.

³¹ NEJM, 1349.

³² NEJM, 1350.

Two specific services were analyzed: burn care units and obstetrics units, because the former was deemed unprofitable by Horowitz, in contrast to the latter, which was considered profitable. The purpose was to investigate whether the scale and scope of these two services was affected by a hospital's teaching status.

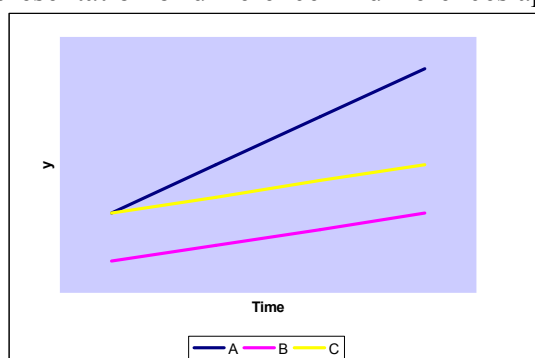
Part II:

b) Using the Differences-in-Differences approach to analyze the effect of exit hospitals on the level of services provided by neighboring hospitals

To analyze the effect of an exit hospital, a differences-in-differences approach was used. This approach helps mitigate the problem of omitted variables. Ideally, when comparing two groups, an experimental one and a control group, one hopes that all attributes of both groups are identical except for the variable being studied. However, this is not always the case and it is probable that the two groups differ along many characteristics, which makes it difficult to tease out the real effect of the variable in question. If one assumes, however, that there is an inherent difference between the two groups before treatment, then any change in the previous difference could be attributed to the treatment with the variable. Hence, one is crediting the “difference-in-difference” to treatment with the variable.

• **Differences-in-Differences Graphical Illustration**

Figure 8: Graphical representation of difference-in-differences approach.

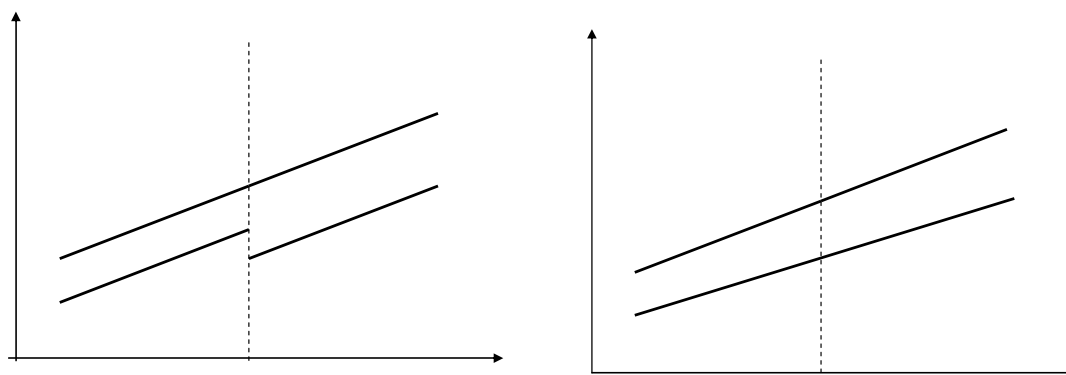


- *Without using the differences-in-differences approach.* In this diagram B represents the Control group and A represents the Treatment group. If one were to simply look at the data towards the left of the graph, which is the post-treatment time period, one would assume that the distance between A and B is the effect of the treatment. However, this outlook is not entirely accurate.

- *Using the differences-in-differences approach.* Using this method, one assumes that the “normal” difference between the Control and Treatment groups is the distance CB, which is the difference that exists, regardless of Treatment. Hence, the effect of the treatment, then, is really only the distance AC.

- *Validity of the model.* For this model to be accurate, the initial difference between the Control and Treatment groups must be constant prior to treatment; in this way, one can attribute the difference-in-difference post-treatment solely to the treatment.

Figure 9. Graphical analysis of differences-in-differences approach.



Differences-in-differences works well *Differences-in-differences does not work as well*

- **Choice of Exit Hospital: John C. Doyne Hospital – Milwaukee, Wisconsin**

John C. Doyne hospital was a public hospital located in Milwaukee, Wisconsin, which was closed in December of 2005.³³ This hospital served as the “primary source for inpatient, emergency and... outpatient care for the uninsured.”³⁴ John Doyne hospital “subsidized care for a limited group of very poor, uninsured individuals.”³⁵ and was chosen for this study for a number of reasons. It was the only major public hospital in the region, and its closing had a significant effect on the care provided by neighboring hospitals, due to the sheer size of Doyne hospital. This hospital was chosen for a number of reasons:

- a) It was a large hospital, which provided a great deal of care to the surrounding population.
- b) It was the only major public hospital in the region, and its closing, hence, would have a significant impact on surrounding hospitals.
- c) John Doyne had a number of thriving hospitals in the surrounding regions, some of which would presumably alter the level of care provided in order to compensate for its closing.

- **Choice of “Treatment”**

The “treatment” for this experiment was distance. The Control group is comprised of the hospitals located far from John Doyne Hospital, while the Treatment group consists of those hospitals located nearby. The rationale behind this methodology is that, presumably, the hospitals located nearby will be affected most by the Doyne’s closing, while those far away will not be affected due to the distance. The dividing line between the two groups was chosen somewhat arbitrarily to be at or around the location of the median of the distances. In addition, four key services were examined to see if the levels provided by the hospitals were affected by their distance from John Doyne hospital. The services studied were: psychology services, rehabilitation services and burn care services.

The overall question then becomes: Assuming there are some initial differences in level of services offered between the Control (far hospitals) and Treatment (nearby hospitals), what portion of the final difference is due to the closing of John Doyne hospital?

33

34

35

Figure 10. Surrounding hospitals.

Distance from J. Doyne	Name of Hospital	Type of Hospital	Assigned Group
0.14	Children's Hospital of Wisconsin	NFP	Treatment
0.28	Frodert Hospital	NFP	Treatment
0.98	Lakeview General Hospital	NFP	Treatment
3.95	Charter Hospital	FP	Treatment
4.74	St. Joseph's Hospital	NFP	Treatment
5.44	Northwest General Hospital	NFP	Treatment
			Control
8.2	Sinai Samaritan Hospital	NFP	
8.83	St. Luke's Hospital	NFP	Control
10.52	Sacred Heart Rehabilitation Center	NFP	Control
10.52	St. Mary's Hospital	NFP	Control
12.13	St. Francis Hospital	NFP	Control
12.22	Columbia Center	NFP	Control
13.21	St. Michael Hospital	NFP	Control

III. RESULTS AND DISCUSSION

Figure 11. Breakdown of general hospitals, by year, ownership type and teaching status.

Year	Teaching Status	For-profit	Local Government	Nonprofit	Total
1990	Non-Teaching	709 (15%)	1349 (28%)	2,709 (57%)	4,767
	Teaching	1 (0%)	93 (21%)	341 (79%)	435
1991	Non-Teaching	685 (15%)	1333 (28%)	2,671 (57%)	4,689
	Teaching	1 (0%)	91 (21%)	351 (79%)	443
1992	Non-Teaching	656 (14%)	1297 (28%)	2,667 (58%)	4,620
	Teaching	1 (0%)	94 (21%)	344 (79%)	439
1993	Non-Teaching	649 (14%)	1295 (28%)	2,614 (58%)	4,588
	Teaching	3 (1%)	87 (18%)	369 (81%)	459
1994	Non-Teaching	645 (14%)	1264 (28%)	2,573 (58%)	4,482
	Teaching	4 (1%)	91 (18%)	379 (81%)	474
1995	Non-Teaching	666 (15%)	1240 (28%)	2,510 (57%)	4,416
	Teaching	3 (1%)	91 (18%)	398 (82%)	492
1996	Non-Teaching	662 (15%)	1223 (28%)	2,477 (57%)	4,362
	Teaching	5 (1%)	91 (18%)	394 (81%)	490
1997	Non-Teaching	691 (16%)	1153 (27%)	2,426 (57%)	4,270
	Teaching	6 (1%)	90 (17%)	404 (81%)	500
1998	Non-Teaching	662 (15%)	1120 (26%)	2,466 (58%)	4,248
	Teaching	14 (3%)	85 (17%)	387 (80%)	486
1999	Non-Teaching	637 (15%)	1102 (26%)	2,441 (59%)	4,180
	Teaching	6 (1%)	80 (16%)	394 (82%)	480
2000	Non-Teaching	629 (15%)	1063 (26%)	2,439 (59%)	4,131
	Teaching	10 (2%)	83 (17%)	392 (81%)	485

The above table provides a breakdown of hospitals from the years, 1990 to 2000, categorized by ownership type (local government control vs. private nonprofit vs. private for-profit) and teaching status (teaching hospital, with the number of residents greater than twenty

vs. non-teaching hospital, with the number of residents less than twenty). The percentages within each box denote what percentage of the total the given box constitutes. For instance, in the 1990, “Non-teaching,” “For-profit” box, the 15% entails that 15% of all non-teaching hospitals in 1990 were for-profit ones. According to the above table:

- The majority of teaching hospitals in the United States are nonprofit hospitals (approximately 80%).
- The majority of non-teaching hospitals are also nonprofit (approximately 60%). It is perhaps important to keep in mind that the majority of hospitals in the United States, overall, are nonprofit hospitals.

Figure 12. Scope Measure – Number of hospitals offering burn care treatment, broken down by year, ownership and teaching status.

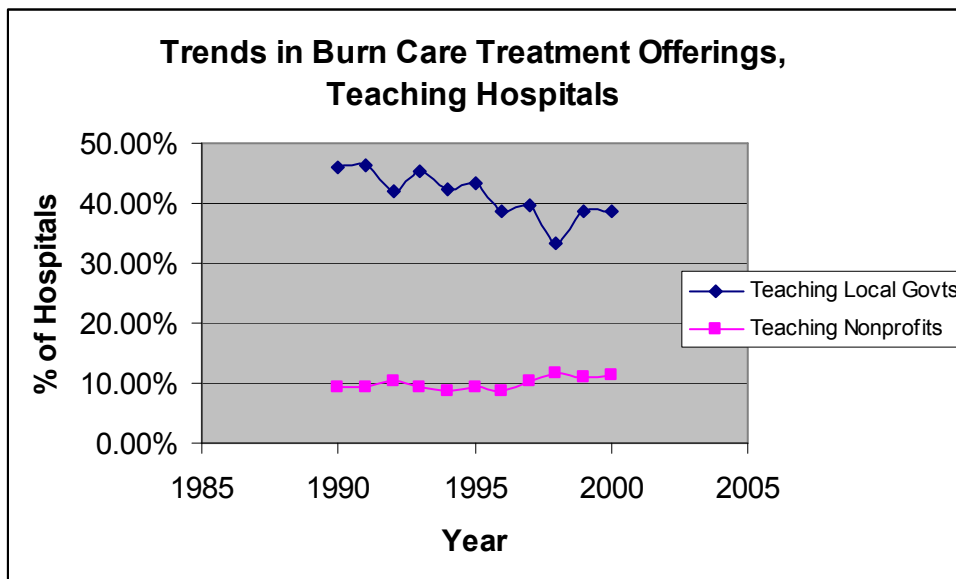
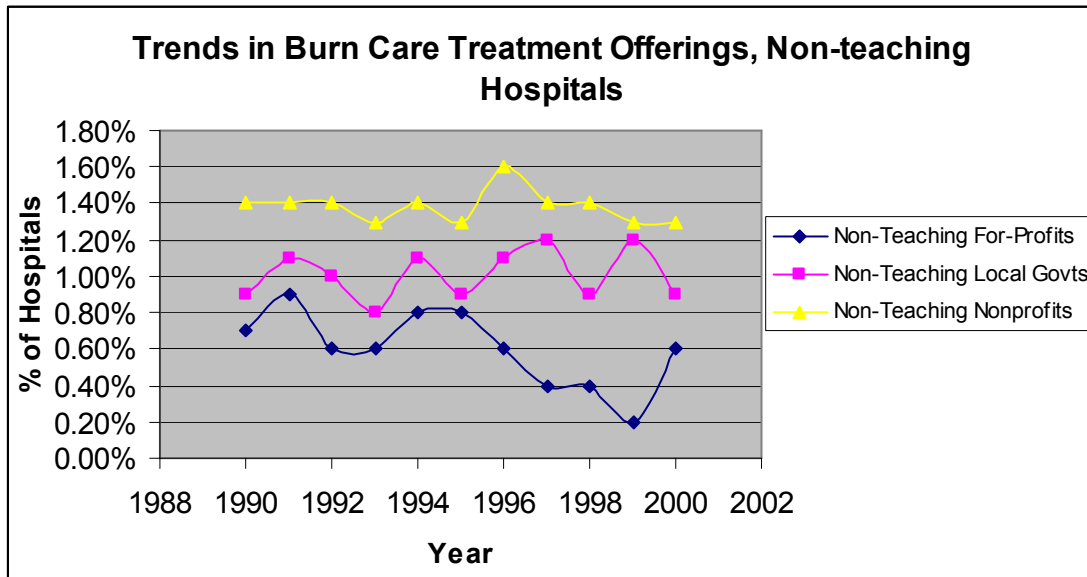
Year	Teaching Status	Local		
		For-profit	Government	Nonprofit
1990	Non-Teaching	4(594) 0.7%	11 (1260) 0.9%	36 (2595) 1.4%
	Teaching	(1)	41 (89) 46.1%	31 (336) 9.2%
1991	Non-Teaching	5 (558) 0.9%	14 (1238) 1.1%	35 (2553) 1.4%
	Teaching	(1) 0.6%	40 (86) 46.5%	31 (338) 9.2%
1992	Non-Teaching	3 (531) 0.6%	12 (1208) 1.0%	36 (2546) 1.4%
	Teaching	(1)	39 (93) 41.9%	35 (339) 10.3%
1993	Non-Teaching	3 (531) 0.6%	9 (1190) 0.8%	33 (2464) 1.3%
	Teaching	(3)	38 (84) 45.2%	33 (350) 9.4%
1994	Non-Teaching	4 (473) 0.8%	12 (1105) 1.1%	35 (2360) 1.4%
	Teaching	1 (4) 25.0%	34 (80) 42.5%	30 (345) 8.6%
1995	Non-Teaching	4 (488) 0.8%	10 (1087) 0.9%	30 (2278) 1.3%
	Teaching	(3)	37 (85) 43.5%	33 (346) 9.5%
1996	Non-Teaching	3 (472) 0.6%	12 (1071) 1.1%	35 (2182) 1.6%
	Teaching	(5)	29 (75) 38.7%	29 (331) 8.8%
1997	Non-Teaching	2 (486) 0.4%	12 (1016) 1.2%	31 (2159) 1.4%
	Teaching	1 (6) 16.7%	29 (73) 39.7%	35 (339) 10.3%
1998	Non-Teaching	2 (449) 0.4%	9 (969) 0.9%	30 (2102) 1.4%
	Teaching	1 (14) 7.1%	23 (69) 33.3%	36 (309) 11.7%
1999	Non-Teaching	1 (460) 0.2%	12 (973) 1.2%	29 (2159) 1.3%
	Teaching	(10)	26 (67) 38.8%	37 (339) 10.9%
2000	Non-Teaching	3 (482) 0.6%	8 (938) 0.9%	28 (2162) 1.3%
	Teaching	(10)	26 (67) 38.8%	38 (339) 11.2%

The hospitals included in the above group are general hospitals who, in the AHA database, had a definitive values for the burn care bed categories (either had values equal to or greater than zero. The first numbers in each box represent the number of hospitals of a particular type that offer burn care treatment, irrespective of the actual number of burn care beds. The only requirement is that the number of burn care beds does not equal zero. The second number in parentheses, refers to the total number of hospitals of that particular type, all of which had some value for the number of burn care beds. For instance, in the “for-profit,” “non-teaching” 1990 box, hereby termed “Box A,” one can see that four hospitals of this type offer at least one burn care bed as part of their services. This second number includes hospitals that have zero burn care beds (i.e., they do not offer this service), in addition to hospitals that do offer the service. Referring back to Box A again, there were 594 for-profit, non-teaching hospitals in 1990 who all had some value of burn care beds in the AHA database, whether it be zero, or greater than zero. Finally, the percentage represents the percentage of hospitals within a particular group that actually offer the burn treatment service, regardless of how many beds the hospitals have allocated to this service. 0.7% of non-teaching, for-profit hospitals in 1990 offered burn care treatment. Essentially, this graph is an overall measure of *scope*, which is the range of services offered by a hospital. This particular service was chosen because, according to Horowitz, burn treatment is considered “relatively unprofitable.”³⁶ According to the above table:

- On the whole, teaching hospitals are more likely to offer burn care treatment, as compared to non-teaching hospitals
- The difference between local government teaching and non-teaching hospitals is much greater than the corresponding difference between nonprofit teaching and non-teaching hospitals, with respect to the offering of burn care treatment.
 - On average, a local government teaching hospital is approximately forty times more likely to offer burn care treatment, when compared to local government non-teaching hospitals.
 - For non-profit hospitals, a teaching hospital is about ten times more likely to offer the service,
- There was not as much data to gauge the difference between the for-profit hospitals types.

³⁶ Horowitz 77.

Figure 13 . Graphical representation of the trends in burn care beds offerings (scope).



According to the two graphs:

- For non-teaching hospitals, the percentages of hospitals offering burn care treatment has remained fairly constant, although nonprofit hospitals have experienced more of a decline.
- For teaching hospitals, there has been a more noticeable decline in the percentage of teaching local government hospitals that have offered this service.

Figure 14. Scale Measure – Average number of burn care bed units offered by hospitals, broken down by year, teaching status and ownership type.

Year	Teaching Status	For-profit	Local	
			Government	Nonprofit
1990	Non-Teaching	18	10.18	8.6
	Teaching		11.65	10.74
1991	Non-Teaching	15.2	10.07	8.6
	Teaching		11.65	10.74
1992	Non-Teaching	14.67	9.75	9.17
	Teaching		11.10	10.6
1993	Non-Teaching	15.33	9.33	9.58
	Teaching		11.55	11.21
1994	Non-Teaching	20.5	10.33	8.17
	Teaching		10.82	9.9
1995	Non-Teaching	13	8.4	9.3
	Teaching	8	4.7%	21.2%
1996	Non-Teaching	10.67	8.5	8.49
	Teaching		11.03	10.42
1997	Non-Teaching	14.5	10.5	8.26
	Teaching		11.72	10.57
1998	Non-Teaching	17.5	8.33	8.47
	Teaching	4	11.6%	28.0%
1999	Non-Teaching	25	12.78	10.17
	Teaching	2	53.4%	20.0%
2000	Non-Teaching	15	9.92	9
	Teaching		11.77	10.12
			12.73	10.76
	Teaching		49.8%	25.6%

The above table shows the average number of burn care beds offered by each type of hospital in a given year, given that the hospital offers burn care services and there is a value in the database for this information.

- On average, teaching hospitals offer more burn case beds, across all ownership types.
- The percentages within each box represent how many more beds the teaching hospital offers over the corresponding non-teaching hospital. For instance, in the 1991 “Teaching,” “Local Government” box, the teaching hospital for this category offers 15.7% more burn care beds than the corresponding non-teaching local government hospitals in 1991.

Figure 15. Regression analysis.

Burn Beds	Coef.	Std. Err.	z	P>z	95% Conf.	Interval]
	-		-		-	-
Ownership dummy	0.7782958	0.0618839	12.58	0	0.8995861	0.6570056
Teaching dummy	2.822378	0.0591659	47.7	0	2.706415	2.938341
			-			
Constant	-3.845811	0.0545962	70.44	0	-3.952818	-3.738804

According to this regression analysis, both ownership and teaching are valid predictors of the number of burn beds, as evidenced by the low p values.

Figure 16. Scope Measure – Number of hospitals offering obstetrics care treatment, broken down by year, ownership and teaching status.

Year	Teaching Status	Local		
		For-profit	Government	Nonprofit
1990	Non-Teaching	306 (594) 51.5%	763 (1260) 60.5%	1882 (2595) 72.5%
	Teaching	1 (1) 100%	80 (89) 89.9%	301 (336) 89.6%
1991	Non-Teaching	294 (558) 52.7%	740 (1238) 59.8%	1890 (2553) 74.03%
	Teaching	(1) (1)	79 (86) 91.9%	303 (338) 89.6%
1992	Non-Teaching	291 (531) 54.8%	726 (1208) 60.1%	1879 (2546) 73.8%
	Teaching	(1) (1)	83 (93) 89.2%	299 (339) 88.2%
1993	Non-Teaching	293 (531) 55.1%	722 (1190) 60.7%	1824 (2464) 74.0%
	Teaching	(3) (3)	75 (84) 89.3%	308 (350) 88.0%
1994	Non-Teaching	282 (473) 59.6%	663 (1105) 60.0%	1747 (2360) 74.0%
	Teaching	4 (4) 100.0%	73 (80) 91.25%	305 (345) 88.4%
1995	Non-Teaching	309 (488) 63.3%	639 (1087) 58.8%	1711 (2278) 75.1%
	Teaching	3 (3) 100.0%	79 (85) 92.9%	306 (346) 88.4%
1996	Non-Teaching	316 (472) 66.9%	637 (1071) 59.5%	1657 (2182) 75.9%
	Teaching	4 (5) 90.0%	68 (75) 90.7%	296 (331) 89.4%
1997	Non-Teaching	332 (486) 68.3%	607 (1016) 59.7%	1644 (2159) 76.1%
	Teaching	5 (6) 83.3%	65 (73) 89.0%	302 (339) 89.1%
1998	Non-Teaching	309 (449) 68.8%	569 (969) 58.7%	1602 (2102) 76.2%
	Teaching	11 (14) 78.6%	63 (69) 91.3%	277 (309) 89.6%
1999	Non-Teaching	306 (460) 66.5%	553 (973) 56.8%	1635 (2159) 75.7%
	Teaching	5 (6) 83.3%	63 (72) 87.5%	299 (331) 90.3%
2000	Non-Teaching	329 (482) 68.3%	552 (938) 58.8%	1653 (2162) 76.5%
	Teaching	9 (10) 90.0%	60 (67) 90.0%	304 (339) 89.7%

This is similar to what was done with the burn care beds. The hospitals included in the above group are general hospitals who, in the AHA database, had a definitive values for the burn care bed categories (either had values equal to or greater than zero. The first numbers in each box represent the number of hospitals of a particular type that offer burn care treatment,

irrespective of the actual number of obstetrics care beds. The only requirement is that the number of burn care beds does not equal zero. The second number in parentheses, refers to the total number of hospitals of that particular type, all of which had some value for the number of burn care beds. For instance, in the “for-profit,” “non-teaching” 1990 box, hereby termed “Box B,” one can see that 306 hospitals of this type offer at least one obstetrics care bed as part of their services. This second number includes hospitals that have zero obstetrics care beds (i.e., they do not offer this service), in addition to hospitals that do offer the service. Referring back to Box B again, there were 531 for-profit, non-teaching hospitals in 1990 who all had some value of obstetrics care beds in the AHA database, whether it be zero, or greater than zero. Finally, the percentage represents the percentage of hospitals within a particular group that actually offer the obstetrics treatment service, regardless of how many beds the hospitals have allocated to this service. 51.5% of non-teaching, for-profit hospitals in 1990 offered obstetrics care treatment. Essentially, this graph is an overall measure of *scope*.

This particular service was chosen because, according to Horowitz, burn treatment is considered “relatively profitable” and serves as a good comparison the burn care beds analysis³⁷ According to the above table:

- On the whole, teaching hospitals are more likely to offer obstetrics care treatment, as compared to non-teaching hospitals
- The difference between local government teaching and non-teaching hospitals is much greater than the corresponding difference between nonprofit teaching and non-teaching hospitals, with respect to the offering of burn care treatment.
 - On average, a local government teaching hospital is approximately forty times more likely to offer burn care treatment, when compared to local government non-teaching hospitals.
 - More than 50% of all types of hospital offer this service

Figure 17. Regression Analysis.

obbd	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
Teaching dummy	0.996969	0.042884	23.25	0	0.912918	1.08102
Ownership dummy	0.502846	0.021848	23.02	0	0.460026	0.545667
_Constant	0.413837	0.018283	22.63	0	0.378002	0.449672

According to this regression analysis, both ownership and teaching are valid predictors of the number of obstetric beds, as evidenced by the low p values.

³⁷ Horowitz 77.

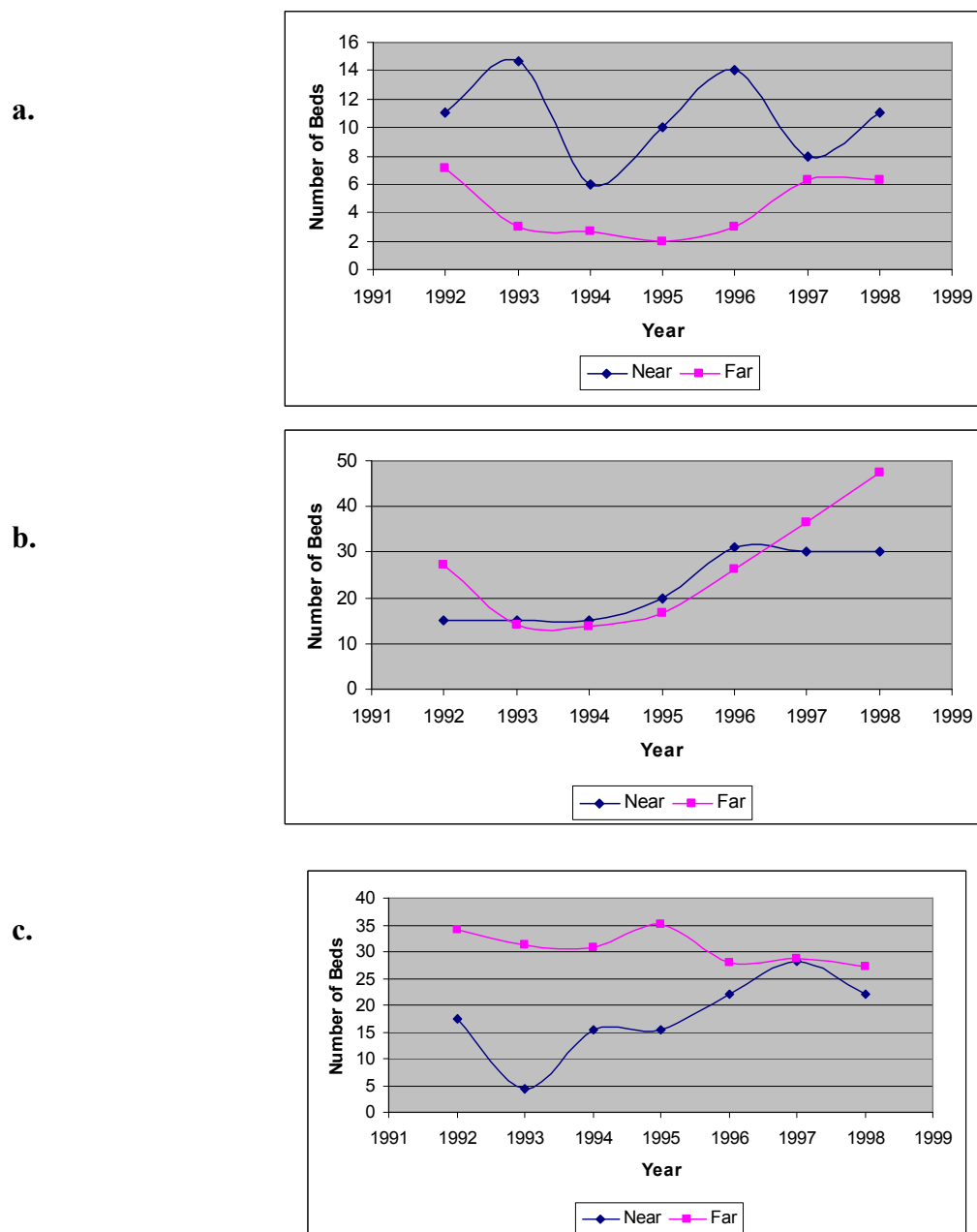
Figure 18. Scale Measure – Average number of obstetrics care bed units offered by hospitals, broken down by year, teaching status and ownership type.

Year	Teaching Status	For-profit	Local Government	Nonprofit
1990	Non-Teaching	15.80	10.26	16.47
	Teaching	17.00	49.13	36.83
			378.8%	123.6%
1991	Non-Teaching	16.05	10.31	16.21
	Teaching		47.53	36.26
			362.0%	123.7%
1992	Non-Teaching	16.98	10.17	16.66
	Teaching		45.66	36.11
			349.0%	116.7%
1993	Non-Teaching	17.08	10.39	16.55
	Teaching		45.05	35.19
			333.6%	112.6%
1994	Non-Teaching	17.01	10.56	16.92
	Teaching	25.5	44.51	34.99
			321.5%	106.8%
1995	Non-Teaching	17.88	10.51	16.10
	Teaching	18.67	41.65	34.08
			296.3%	111.7%
1996	Non-Teaching	18.56	10.29	16.49
	Teaching	30.25	39.0	34.07
			279.0%	106.6%
1997	Non-Teaching	18.11	9.74	15.86
	Teaching	18.80	35.32	35.30
			262.6%	122.6%
1998	Non-Teaching	18.22	9.79	16.03
	Teaching	29.36	37.73	35.62
			285.4%	122.2%
1999	Non-Teaching	19.73	10.39	16.00
	Teaching	23.4	36.16	37.07
			248.0%	131.7%
2000	Non-Teaching	18.95	9.74	15.88
	Teaching	19.99	37.77	36.70
			287.8%	131.1%

The above table shows the average number of obstetrics care beds offered by each type of hospital in a given year, given that the hospital offers obstetrics care services and there is a value in the database for this information.

- On average, teaching hospitals offer more burn case beds, across all ownership types. This difference is rather pronounced, ranging from about 100% for nonprofit hospitals to approximately 300% for for-profit hospitals.
- The percentages within each box represent how many more beds the teaching hospital offers over the corresponding non-teaching hospital. For instance, in the 1991 “Teaching,” “Local Government” box, the teaching hospital for this category offers 378% more burn care beds than the corresponding non-teaching local government hospitals in 1991.

Figure 19. Validity of Assumptions. (a) Alcohol beds. (b) Psychiatry beds. (c) Rehabilitation beds.



Ideally, until the treatment point (the closing of John Doyne hospital), one wants the difference between the two groups to be constant, as exemplified in Figure 2. In the above diagram, one can see the difference between the Near and Far groups is far from constant, which will perhaps taint the validity of the difference-in-differences calculations.

Figure 20. Differences-in-differences. (a) Alcohol beds. (b) Psych beds. (c) Rehabilitation beds.

(a)

	Near	Far	Differences
1992	11.00	7.17	-3.83
1998	11.00	6.33	-4.66
			-0.83

(b)

	Near	Far	Differences
1992	15.00	27.17	12.17
1998	30.00	47.50	17.50
			5.33

(c)

	Near	Far	Differences
1992	17.50	34.00	16.50
1998	22.00	27.17	5.17
			-11.33

Figure 21. Regression analysis. (a) Alcohol beds. (b) Psychiatry beds. (c) Rehabilitation beds.

(a)

ALCH BD	Coef.	Std. Err.	z	P>z
Distance Dummy	-0.2231436	1.204159	-0.19	0.853
Year Dummy	0.6931472	1.322876	0.52	0.6
Distance*Year	-1.386294	1.910495	-0.73	0.468
Constant	-0.6931472	0.866025	-0.8	0.423

(b)

PSY BED	Coef.	Std. Err.	z	P>z
Distance Dummy	3.401197	1.538397	2.21	0.027
Year Dummy	1.609438	1.48324	1.09	0.278
Distance*Year	-2.70805	2.028957	-1.33	0.182
Constant	-1.609438	1.095445	-1.47	0.142

(c)

REHAB BD	Coef.	Std. Err.	z	P>z
Distance Dummy	0.2876821	1.118034	0.26	0.797
Year Dummy	-1.098612	1.414213	-0.78	0.437
Distance*Year	1.504077	1.825742	0.82	0.41
Constant	-1.43E-16	0.816497	0	1

According to the regression analyses, the only significant predictor was distance for psychology beds. In other words, whether the hospital was nearby or far away helped predict the number of psychology beds the hospital offered.

V. CONCLUSION

Teaching status is significant predictor of both scale and scope.

The two services examined were burn care bed and obstetric beds. In both these cases, teaching hospitals were more likely to offer these services, and given that they did, they were also more likely to offer more beds within these two services.

The difference-in-differences approach is an imperfect, but informative way to view the effect of exit hospitals.

The difference-in-differences approach was not perfect in this case because the initial difference before treatment were not constant. Distance was significant only for psychiatry beds.