IMPACT OF CHANGES IN MEDICARE PAYMENTS IN THE BALANCED BUDGET ACT OF 1997 ON THE FINANCIAL CONDITION OF NON-PROFIT HOSPITALS

by

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Abstract

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In this research, I study the effect of changes in Medicare payments, introduced in the Balanced Budget Act of 1997, on the financial condition of non-profit hospitals. Non-profit hospitals are a very important part of the healthcare delivery system in US. Medicare patients constitute the single largest segment of their revenue sources. Understanding the consequence of the changes in reimbursement on the hospital finances is relevant in framing future revisions of Medicare payments.

BBA was introduced to control the growing federal budget deficit. The most important instrument for the cutback in government expense came in the form of reduction in Medicare outlays. Some of the changes introduced in Medicare payment policy had direct consequences on reimbursement received by hospitals. I look at the cumulative effect of the changes introduced in the BBA through the following steps: First, I identify the important financial and operational factors which explain the majority of the variation in

the performance of non-profit hospitals. Subsequently, I study the changes in those measures, before and after the BBA. Additionally, I look at the effect of the changes on capital use and cost of capital faced by these hospitals that can be attributed to the policy change.

I obtain financial and operational information for the hospitals mainly from the Hospital Cost Reports maintained by the Center for Medicare and Medicaid Services. To evaluate the cost of capital, I use data on new issues in municipal bond market from the Thomson Financial SDC Platinum database.

My key observation is the importance given to the use of capital by non-profit hospitals. Even though BBA adversely affected their profitability, the hospitals did not lower their use of capital. Neither did they cut back on the use of debt to finance their new investments. These were despite the fact that the declining financial conditions resulted in higher cost of borrowing for the hospitals. Acknowledging the importance of the use of debt capital is critical, for future policy changes, as the study also finds that it is the single most important determinant of the variation in the performance of non-profit hospitals.

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Dedication

To my parents

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Chapter 1 Introduction

The main objective of this research is to study the effect of the changes in Medicare payment policy introduced in the Balanced Budget Act of 1997 on financial and operational performance of non-profit hospitals. Hospitals are involved in a wide range of services received by Medicare patients. In 2000, Hospital in-patient (IP) and out-patient (OP) services accounted for 60 percent of total Medicare expenditures. Other post-acute care provided by hospital based units accounted for another 15 percent (Guterman 2000). Private non-profit hospitals accounted for about 60 percent of the facilities of the 4915 acute care community hospitals and 70 percent of the beds in the year 2000 (CMS 2003). Non-profit hospitals, thus, constitute a very important part of the healthcare delivery system in the United States.

A large part of hospital revenue come from the care provided to the beneficiaries of public programs like Medicare and Medicaid. In 1997, Medicare, Medicaid and other public programs constituted approximately 65 percent of the payer mix, with Medicare being the single largest payer accounting for about 33 percent of gross patient revenue (Lane, Longstreth, and Nixon 2001). Changes in Medicare payments thus have a substantial impact on the financial and operating conditions of hospitals.

The Balanced Budget Act (BBA[1]) was enacted in 1997 to put an end to the growing federal budget deficit (Bazzoli et al. 2004). The main instrument for the reduction in government expenditure was planned through the reduction in the growth of Medicare expenditures. The decision to control Medicare cost growth was also prompted by a concern about the condition of the Medicare's Hospital Insurance (HI) Trust Fund which was projected in 1997 to be insolvent by 2001. With the aging of the baby boom generation, the deficit was expected to increase even more (Guterman 2000; Newhouse 2001).

Apart from the imminent insolvency of the Medicare Trust Fund, the introduction of BBA was also prompted by additional concerns about Medicare overpayments in some areas and need for a more rational payment system in others. The most important change, affecting hospitals introduced in the BBA, was the reduced payment updates for hospital IP services between 1998 and 2002. It also introduced new prospective payment systems for all other post-acute care services, making virtually all Medicare payments to hospitals prospective rather than based on reported costs. According to Guterman (1998), the reduced payments over the five year period represented a 9.1% reduction in total Medicare program spending and a decrease in annual growth rate from 8.8% before to 5.6% after BBA. Initial evaluation of the policy changes by MedPac (2007) showed that the BBA was successful in balancing the federal budget and reducing Medicare's growth

[1] In this research, BBA will be used to refer only to those laws pertaining to Title IV of the Act or the Medicare, Medicaid and Children's Health Provisions, though the Act covered numerous other areas of federal expenditures.

rate. It was reported in an HCIA-Sachs study (1999) that the projected reduction in Medicare payments would postpone the insolvency of the Trust Fund till 2025.

A number of projections (Dobson et al. 2000; Guterman 1998; HCIA-Sachs 1999; MedPac 2000) on consequence of BBA however raised concerns about the possibility of a decline in the financial condition, especially profitability, for hospitals because of these changes in payments. A report by the Lewin Group (Dobson et al. 2000) projected that the BBA will reduce total Medicare payments to hospitals by $76.7 billion (10.7%) between 1998 and 2002. Concerns were also raised about other provisions of the BBA like new payment changes for teaching hospitals and additional payments received by hospitals with higher proportion of Medicaid and SSI patients.

To address these initial concerns, some changes were introduced in the Balanced Budget Refinement Act (BBRA) of 1999, which reduced the burden of the revenue cuts or postponed implementation of some of the programs. According to the Lewin Group report (Dobson et al. 2000), the BBRA was projected to restore approximately $5.4 billion of BBA reductions between 2000 and 2002. This represents 9.7% of the $55.4 billion payment reduction that would have occurred for that period. The net reductions due to BBA amounted to approximately $71.3 billion, or 10.1%, between 1998 and 2002. The report also projected that the BBA changes will result in negative Medicare margin for a large proportion of hospitals. The report also projected the Medicare margin to be

higher after BBRA but still negative. The report found that the non-profit hospitals in general and teaching hospitals and hospitals receiving higher proportion of Medicaid and SSI patients were likely to bear a higher burden of the Medicare cuts.

To further alleviate the burden of the initial payment cuts, the Benefit Improvement and Protection Act (BIPA) was passed in 2000 (became effective from 2001). It modified the Medicare payments and added coverage for few (preventive and therapeutic) services. It also introduced changes in the State Children's Health Insurance Program (SCHIP) and increased allotment to states for Medicaid DSH payments. Hospitals' share of increased reimbursements amounted to $14 billion of the total $35 billion that was intended to be spent over the period between 2000 and 2004. BBRA and BIPA together restored approximately $21 billion (17%) of the approximately $119 billion Medicare cuts in the BBA (Bazzoli et al. 2004).

Other factors affecting the financial condition of hospitals:

It should be noted that reduced payment updates (adjusting prospective payments to hospitals by less than market inflation rate) for IP payments did not happen for the first time under BBA. Guterman (1998) points out that between transition to full IP PPS in 1988 and introduction of BBA in 1998, there was only one year (1990) when the payment updates were equal to full market basket updates. The median update as a percent of

market basket update was around 60 percent during the period[2]. Also the introduction of PPS for other departments in the BBA was based on the successes in case of IP department in earlier years and was considered necessary to make the hospitals, which are predominantly non-profit, cost efficient while at the same time addressing the future sustainability of the Medicare Trust Fund.

However, these were not the only changes affecting the sector during that period. According to the CMS (2003), the period saw rising input costs for supplies, pharmaceuticals, devices and equipments as well as medical liability insurance with implications on their finances. The single most important source of cost pressure facing the hospitals was the rising wage costs which tripled between 1997 and 2001 fueled mainly by a nursing shortage. Apart from these changes, the BBA became effective in a period of some important structural changes in the hospital sector with consequence on their expense and revenue.

One important change affecting hospitals' revenue stream was the changes in the payments received from the private payers. Though the public payers are the single most important source of their revenue, the contribution of private payers is no less important. Payment to cost ratio for private payers went down from 131 percent in 1992 to

[2] IP update was 80% of market basket in 1997. BBA changes resulted in updates by 0%, 21%, 38%, 100%, 83% and 84% in 1998, 99, 00, 01, 02 and 03 respectively (CMS 2003).

approximately 118 percent by 1997[3] (MedPac 2007). This change in private payment rates in the first half of the 1990s were attributed mainly to rising importance of Health Management Organizations (HMOs) in the health care market during the period (Baker 1997; Chernew et al. 1998; Cutler and Sheiner 1998; Miller and Luft 1994).

By the mid-1990s, however, there were numerous evidences of HMO backlash. Bodenheimer (1996) identified evidences of such pressure in the form of federal and state legislations, number of lawsuits against HMOs, unfavorable media coverage etc., as well as the emergence of physician run HMOs to compete with existing HMOs and a drive towards medical savings accounts. After a stagnant short period of low private payer payment to cost ratio between 1997 and 2000, the ratio started rising and reached the high rates of early 1990s by 2004 (MedPac 2007). Shen, Wu et al.(2008) found that during the period of HMO expansion, a 10 percent point increase in HMO enrollment led to a 2.5% decrease in cost and revenue for hospitals. However, during the period of backlash[4], a 10 percent decrease in enrollment led to a 1.1 percent increase in cost and a 0.4 percent increase in revenue. Thus, the HMO backlash may have affected how hospitals managed their expenses during the period. Particularly, the lessening of pressure from the HMOs may have eased some of the impact due to the BBA.

[3] The ratio was consistently below 100 percent for Medicare payments since the introduction of IP PPS (with the exception of 1985, 1986 and 1996, 1997). The ratio for Medicaid payment was around 90% during the same period (MedPac 2007).

[4] Shen, Wu et al. (2008) considered 2000 and onwards as the period of HMO backlash.

Another related event with consequences on hospital costs and revenues was the surge in hospital mergers and consolidation throughout the 1990s (Gaynor and Haas-Wilson 1999). According to Cuellar and Gertler (2003), the industry saw an increase in both mergers and consolidations during the period. The number of such activities peaked in 1996 though the rate remained high until 1998 after which it slowed down gradually. They further point out that in 1995, 28 percent of non-profit hospitals had a local system partner while the proportion rose to 43 percent by 2000.

Some authors for example Dranove and Lindrooth (2003) argue that the rise of the local system is mainly in response to managed care pressure, based on evidences that hospitals in areas of high managed care penetration were more likely than others to be part of a local system. However, in a recent study, Town, Wholey et al. (2005) found no correlation between the rise of hospital mergers and consolidation and HMO concentration. They attributed the rise in mergers and consolidation to hospital specific factors like the need to strengthen hospital's market position and integrate services, rather than pressure from HMOs. The evidences however were mixed regarding the effect of consolidation and costs. Some (Connor et al. 1997; Spang, Bazzoli, and Arnould 2001) found evidences of lower increases in cost, while others (Dranove and Lindrooth 2003) did not. Kohn (2000) observed that a problem with consolidation was that hospitals were usually more interested in providing a wide range of services and access points rather than closing duplicated facilities at different sites. Kohn argued that while such

consolidation increased bargaining leverage, it also decreased efficiency and increased administrative costs. Similar results were also observed by Town et al. (2005). Concern was also raised about excessive acquisitions, particularly in case of non-core businesses like physician practices and managed care businesses particularly after the bankruptcy of a Pennsylvania hospital system, the Allegheny Health, Education and Research Foundation (AHERF) in 1998 with an estimated liability of $1.3 billion (Moody's 1999). Some of these unviable consolidations not only resulted in their failure, but also had other consequences. According to Carpenter, McCue, and Moon (2003), the AHERF bankruptcy with a large amount of outstanding debt resulted in high cost of capital for non-profit hospitals seeking funds from the municipal bond market.

Preliminary studies, by Bazzoli et al. (2004), comparing one year of post BBA with pre BBA data, found evidence of decline in profitability among hospitals even as their efficiency improved. A HFMA-PricewaterhouseCoopers (2003) study further observed a diverging trend in capital access among hospitals over the period 1997-2001. They found that the number of hospitals with high profitability, liquidity and low proportion of debt to assets (which they defined as broad capital access hospitals), declined from 42% to 36% during the period while the hospitals with low profitability, liquidity and high proportion of debt to assets (which they defined as limited capital access hospitals), grew from 11% to 19%. Financial conditions declined for both groups, but the decline was more rapid for limited capital access hospitals. The study also noted that, there was little

difference in average age of plant, implying that both types replaced fixed assets at the same rate. However, both the level of long term debt as percentage of net fixed asset and average annual debt service was significantly higher in case of limited capital access hospitals.

Research plan:

The BBA introduced approximately 240 changes affecting different aspects of hospital reimbursement (Silversmith, 2000). In this research, I look at the aggregate effect of these changes on the financial condition of the non-profit hospitals and their ability to attract funds externally for new capital investments. Specifically, I intend to study the effect of BBA on different aspects of hospitals financial and operational performance, their use of capital and labor as well as capital intensity. Additionally, I plan to study, whether BBA adversely affected access to capital particularly by raising the cost of capital in the tax-exempt municipal bond market.

The relevance of this study is to have a better understanding of the implication of the changes in Medicare payment policies on different aspects of the performance of non-profit hospitals. Non-profit hospitals, which receive an important share of their revenue from Medicare, form a very important part of the healthcare delivery system in the United States. On the other hand, Medicare outlays have increased dramatically since its

inception. In the coming decades, it is supposed to rise even more due to a rapid rise in the number of beneficiaries with the aging of the "baby boom" generation. To keep such a program operational it is likely that there would be similar steps to control spending growth in the future. A better understanding of these charges will contribute in designing future policies.

In the remainder of this chapter, I briefly discuss the main BBA changes affecting non-profit hospitals.

Medicare payments to hospitals:

To understand how changes introduced in BBA could have resulted in changes in revenues for hospitals, it is necessary to understand how Medicare paid hospitals for services provided for Medicare patients in various hospital departments. Detailed discussion of Medicare payments can be found in Newhouse (2001) and Guterman (2000). In the following, I briefly highlight some of the important aspects of the Medicare payments to hospitals drawing from the above literature.

Since early 1980s, hospital IP services were paid in a prospective manner based on the diagnosis and treatment category of an admission called the Diagnosis Related Group

(DRG)[5]. Each DRG is assigned a weight based on the resources required to treat an average patient in that DRG and the weights are updated annually based on previous year data. For each admission, the weight is multiplied by a dollar amount (also called the conversion factor) reflecting the average national DRG payment to obtain the amount due to the hospital for that particular case. The conversion factor is updated annually based on inflation rate of a market basket of comparable inputs used in production of the hospital services.

Additionally, hospitals receive geographic and hospital specific adjustments to account for variation found in operating cost differences due to them. The main geographic adjustment to the DRG rate is in the form of area wage index to reflect difference in labor costs. Non-labor costs are adjusted based on a cost of living index. Hospital specific payments include payment for teaching hospitals who receive additional adjustments to support their teaching and research programs (Direct Medical Education, (DME)) as well as for indirect cost of education (Indirect Medical Education, (IME)).

DME payments are a function of cost per residents adjusted for inflation and the number of full time residents. The payments also include additional charges based on specialty. IME reimbursements are essentially for technically complex procedure and are an add-on

[5] The DRG system was developed by Fetter, Thompson, and Mills (1976) as a method of defining hospital output. There are approximately 500 DRG groups, which undergo frequent review as new diagnosis, and treatment procedures are introduced or old ones revised.

to the DRG payments. The add-on is a function of resident to bed ratio and area wage and capital adjustment factor.

Hospitals treating higher proportion of indigent patients also receive additional payments to offset revenue losses due to high costs of treating those patients. These hospitals are identified as Disproportionate Share Hospitals (DSHs). Hospitals qualify to receive DSH adjustments if the percentages of Medicaid and SSI[6] patients exceed 15 percent of total acute inpatient days.

Hospitals also receive other adjustments for unusually expensive cases or lengthy admissions. These payments are referred to as outliers. Hospitals are reimbursed certain percentage of the charges, which exceed a threshold level set by Medicare and updated annually. Hospitals also receive additional payments to cover bad debts in case the beneficiaries fail to pay off coinsurance and deductibles.

Until the introduction of the BBA, the hospital out-patient services and services rendered at other post acute care sites like Skilled Nursing Facilities (SNFs), Home Health Agencies (HHAs), Long Term Care units (LTCs) and Inpatient Rehabilitation Facilities

[6] Supplemental Security Income is a means tested benefit for people who are 65 years or older, or blind, or disabled below a certain level of assets or income.

(IRFs) attached to the hospitals were paid on reasonable cost basis based on the charges reported by the hospitals to Medicare.

Balanced Budget Act:

The BBA was enacted as a part of a bigger program to balance the federal budget. The Act introduced numerous changes for a number of government programs, which also included changes in Medicare payments. The titles under BBA included Food Stamp Provisions; Housing and Related Provisions; Communications and Spectrum Allocation Provisions; Medicare, Medicaid and Children's Health Provisions; Welfare and Related Provisions; Education and Related Provisions; Civil Service Retirement and Related Provisions; Veterans and Related Provisions; Asset Sales, User Fees and Miscellaneous Provisions; Budget Enforcement and Process Provisions; District of Columbia Revitalization. In most cases, changes became effective over a period of five years starting from January 1998.

Details of the important changes and their justification can be found in Cotterill and Gage (2002), Newhouse (2001) and Guterman (2000) among others. The following discussion, based mainly on the above articles, highlights some of the important changes affecting the hospitals.

The main change[7] with direct effect on the hospital revenue in the BBA was the reduction in payment for IP services. Hospital IP spending grew at a slower rate than other department in the pre-BBA period yet it accounted for the largest share of Medicare expenditure and projected expenditure increase (Guterman 2000). It was felt that the initial PPS overlooked the fact that the hospitals were overpaid for those services because of unbundling to other departments. It was also supported by considerable large IP Medicare margin for hospitals which were at an all time high of 17 percent in 1997 (Cunningham 2001).

Instead of usual updating of the 'conversion factor' by the changes in prices of the market basket of inputs, BBA kept the payment for 1998 at the 1997 level. Updates were set at less than the market basket by 1.9 percent for 1999, by 1.8 percent for year 2000 and by 1.1 percent for years thereafter. In addition, it was felt that the initial Capital Prospective Payment System (CPPS) that started in fiscal year 1992 failed to account for cost of capital properly and possibly overpaid the hospitals. BBA reduced IP capital payments by 15.7 percent in 1998 and another 2.1% for 1999 - 02. BBA also reduced outpatient

[7] More than one half of the savings generated from BBA resulted from changes in the IP update (Guterman 1998)

payments by eliminating formula driven overpayments [8] for ambulatory surgery, radiology and diagnostic services.

Two other important changes within the PPS system was the reduction in payments for Teaching and DSH hospitals. Teaching hospital were paid higher amount per admission as they have higher cost controlling for DRG. The incremental amount was a function of resident staff to bed ratio. Newhouse and Wilensky (2001) argues that as a result of this the number of residents nearly tripled between 1985 and 1993. They also found that the additional payment to teaching hospitals which was around $1.4 billion in 1985 rose to $7 billion in 1995 BBA reduced IME adjustments by 29% (from 1.89 during 1988-97 to 1.37 by 2002 (Phillips et al. 2004)) and limited DME for residents to number of Full Time Equivalents (FTEs) at 1996.

The DSH program paid additional amounts per patient for hospitals treating higher share of Medicaid and SSI patients. Newhouse (2001) points out that initially the DSH program was justified on the basis of the hypothesis that it is usually more expensive to treat indigent patients. However, after evidences to the contrary, it was justified as safety net hospitals for uncompensated care. Newhouse (2001) also reports that the DSH payments rose substantially since its implementation from $1.1 billion in 1989 to $4.5 billion by

[8] Medicare reimbursed hospital after deducting 20% of Medicare fee to account for patient co-payments. However, co-payments were based on charges (and not Medicare rates) which led to formula driven overpayments. The reduction was achieved by reducing Medicare payments by actual co-payments.

1997 and were a cause of concern for the policymakers as there was no element in the formula that determined the excess payment to account directly for any measure of uncompensated care. Under the BBA, additional amount paid for DSH payments were reduced in increments of one percent starting from 1998. To account for the problem of uncompensated care, new reporting standards were introduced to better address the problem. BBA also introduced reduction in payments on account of bad debts. Amount of bad debt that may be allowed was reduced by 25 percent for 1998, 40 percent for 1999 and by 45 percent for subsequent years. BBA also removed IME and DSH adjustment for outlier payments, which resulted in further reduction in reimbursement for teaching hospitals.

The most important structural change in the nature of Medicare payments came with the introduction of PPS in all remaining hospital activities. Spending on post-acute care rose from 3 percent of Medicare Part A spending in the mid 1980s to 26 percent of Part A spending by the mid 1990s as hospitals adjusted to the new payment incentives and reorganized the delivery system from inpatient to more outpatient and post acute care settings (Newhouse 2001). Guterman (2000) points out that while the annual rate of growth in Medicare payments per enrollee during the period 1990-96 was 5.2 percent for IP services, it was 9.9 percent for OP, 23.2 percent for SNF and 27.9 percent for HHA. Between 1990 and 96, number of OP visits increased by 46 percent, number of hospital based SNFs rose by 82 percent and number of hospital based HHA rose by 68 percent.

Guterman (2000) further found that OP and other post-acute facilities accounted for less than 25 percentage of Medicare spending in 1996, but was projected to become half of Medicare spending increases between 1996 and 2002. SNF expenditures increased from $2.5 billion in 1990 to nearly $11 billion in 1996 (mainly for payment per day increases) while HHA expenditures increased from $3.5 billion to $17 billion in the same period (mainly for utilization increases) (Guterman 2000; Newhouse 2001).

BBA introduced (or proposed steps toward introduction of) PPS in almost all remaining departments. The three important PPS proposed in BBA included PPS for OP services, SNFs and for HHAs. The PPS was based on a set or relative weights, a conversion factor, and an adjustment for geographic differences in input prices using the IP PPS wage index and outlier payments as in IP services. The relative weights and conversion factors are to be reviewed annually. All the new PPS covered both operating and capital costs.

The procedures, services and drugs and device use in OP were classified into about 750 Ambulatory Payment Classifications (APCs). The PPS became effective from 2000. The PPS for SNF introduced case mix adjusted per diem system based on 44 Resource Utilization Groups (RUG). The RUGs were based on service type, intensity of care and therapy. The PPS became effective from fiscal year 1999.

For HHA, BBA introduced Interim Payment System (IPS) while preparing for a PPS. The IPS tightened per visit cost limit and instituted a new agency specific limit on per beneficiary costs. The HHA PPS was based on 80 Home Health Resource Groups (HHRG) based on diagnosis, functional capacity and service use. Similar relative weight and conversion factors adjusted for local wage index was set up as in other PPSs. The PPS became effective from October 2000.

The two other PPS involving LTCs and IRFs became effective only after the initial BBA period (1998-2002). The LTC payments were now based on a system similar to IP DRGs while IRF PS was based on a new Patient Assessment Instrument (PAI) used to classify patients based on clinical characteristics and expected resource use.

The rest of the research is divided into four chapters. In the next chapter, I discuss a factor analysis of relevant financial and operational ratios to identify the main financial characteristics of non-profit hospitals. In the third chapter, I use multivariate regression methods to identify effect of BBA on the main financial and operational characteristics of non-profit hospitals as well as its impact on capital intensity and use of capital. The fourth chapter looks at the extent to which the effect of BBA on hospitals' financial condition affected their ability to raise funds from external sources. The final chapter concludes with a summary of the results.

Table 1-1: Changes in BBA and BBRA

BBA	BBRA
Provisions relating to Part A	
IPD updates	
0.0% in 1998	Increase payments by
MB-1.9% in 1999	4% in 2001
MB-1.8% in 2000	4% in 2002
MB-1.1% in 2001	Sole community hospitals receive full market
MB-1.1% in 2002	basket update for 2001
Capital payments	
Reduced inpatient capital payment rates by	No change
15.7% in 1998	
2.1% in subsequent years	
DSH payments	
Additional payment	
amount reduced in by	Reduction changed to
1% in 1998	3% in 2001
2% in 1999	4% in 2002
3% in 2000	
4% in 2001	
5% in 2002	
Elimination of IME and DSH payments attributable to outlier payments	No Change
PPS exempt services	
Proposed PPS for	Enhanced payments for
Inpatient rehabilitation services	Long Term Care and Psychiatric care
Long term care hospitals	Refinement for Inpatient rehabilitation services
Skilled Nursing facilities	
Introduction of PPS for SNF services	
Interim payment system till PPS is in effect	Increase in payments during transition to PPS
Transfer Provisions	No Change
Reduced payment to ten high-volume DRGs for short stay patient transferred to post-acute care	
Others	
Reduction in payment for enrollee bad debt	No Change
25% in 1998	
40% in 1999	
45% in subsequent years	

Table 1-1 (Continued): Changes in BBA and BBRA

BBA	BBRA
Provisions relating to Part B	
OP services	
Elimination of formula driven overpayment	No Change
PPS introduced in 1999	Additional transition fund
New OPPS updated at MB-1% for 2000-2002	
Volume expenditure caps	Two year delay in implementation
Others	
Reduction in payment for durable medical equipment and other equipments	Temporary increase in payments
Both Part A and B	
Home Health service	
PPS introduced in 2000	Delayed to 2001
Interim payment system till PPS is in effect	
Graduate Medical Education	
IME adjustment factor lowered from 7.7%	Increased IME adjustment factor
to 7% in 1998	to 6.5% in 2000
to 6.5% in 1999	6.25% in 2001
to 6% in 2000	5.50% for subsequent years
to 5.5% for 2001 to 2004	
DME	
Limitation of number of resident as basis of DME payments to 1996 level	Use of national average payment methodology based on 1997 per resident amount

Source: The Balanced Budget Act of 1997 (Public Law 105-33); The Balanced Budget Refinement Act of 1999 (Public Law 106-113)

Chapter 2 Factor Analysis of Non-Profit Hospitals

Introduction:

In this chapter, I use a factor analysis of non-profit hospitals' performance measures to identify their main financial and operational characteristics. The effect of policy changes affecting revenue stream of hospitals is usually studied by evaluating the effect on its profitability as a summary measure of their financial conditions (Bazzoli et al. 2004; Feder, Hadley, and Zuckerman 1987; Hadley, Zuckerman, and Feder 1989). However, for a number of reason, profitability may not be a suitable measure of the performance of non-profit hospitals (Coulam and Gaumer 1991). Friedman and Shortell (1988) suggests that a hospital's past revenue sources and socio- economic and demographic condition of the market in which they operate results in differences in their financial organization and their targets in terms of profitability. This difference is further accentuated by the fact that these entities do not redistribute their income. On the other hand, because of their increasing dependence on external debt capital, non-profit hospital also needs to ensure satisfactory level of liquidity and capital structure along with profitability. These factors make it relevant to first identify the financial characteristics of the hospitals, which explains the majority of the variations in their performance.

The main categories of performance measures for a firm, discussed in financial literature are capital structure/leverage, liquidity, profitability, activity/efficiency and market value.

Choate and Tanaka (1979) argue that some of the characteristics important for an average firm may not be appropriate or similarly relevant in case of these hospitals. For example, market value has little relevance for these hospitals, as there is no market for their equity unlike for-profit entities. Besides, non-profit hospitals operate under conditions, which are unique compared to both for-profit hospitals and other non-profit institutions (Glandon et al. 1987; Wedig et al. 1988; Zeller, Stanko, and Cleverley 1996).

The uniqueness of non-profits is the result of a number of factors that are part of their operations. Non-profit hospitals differ from other non-profit institutions, as their main source of income is revenue generated for their services (Cutler and Horowitz 2000; Duggan 2002; Glandon et al. 1987). On the other hand, unlike for-profits, they cannot redistribute their earnings. They are generally assumed to concentrate on objectives like "quality and quantity" of care (Newhouse 1970). This results in their operating under financial conditions which are directed to the optimization of other objectives along with income (Hoerger 1991).

The unique characteristics of their objectives and financial organization prompted a number of attempts (Chu et al. 1991; Cleverley and Rohleder 1985; Counte et al. 1988; Watkins 2000; Zeller, Stanko, and Cleverley 1996)[9] to summarize the performance

[9] Some of these studies are not restricted to non-profit hospitals, but in those cases, they separately discuss them.

measures of these hospitals using factor analysis of their financial ratios following similar studies for firms in general[10]. One significant finding from these studies is that the importance of a particular factor may change over time as the hospitals adjust to external changes. This may also result in different assortment of factors under different financial environment. This is the main motivation for undertaking a factor analysis of financial and operational ratios of non-profit hospitals during the period of the implementation of the BBA.

Factor analysis:

In this section, I discuss briefly the basic factor model used in this study based on publications on the subject by Mulaik (1972), Gorsuch (1983), and Thompson (2004). In its simplest form, factor analysis is based on the idea that each characteristic (X_i) of a unit of observation (j) is determined by one or more latent (unobserved) factors (F_k) as follows

$$X_i = l_1F_1 + l_2F_2 + \ldots + l_mF_m + e_j \qquad 1.$$

where, $i = 1,\ldots,p$ are the characteristics of $j=1,\ldots,n$ units of observations. $F_{1,\ldots},Fm$ are m unobserved or latent factors and $l_{1,\ldots},l_m$ are m factor patterns which is essentially the relation between a particular factor and a characteristics.

[10] Barnes (1987) and Chen and Shimerda (1981) provides extensive review of such applications.

The objective is to identify the characteristics associated with a particular factor so that the factors themselves can be identified by the set of characteristics that are strongly correlated with them. This requires identifying elements of L in $X = LF + E$. Under the assumption that the factors and the errors are independent of each other and themselves,

$$\Sigma = Var(X) = LL' + \Phi \qquad 2.$$

where, Φ is a diagonal matrix of error variance. Elements of L are then obtained by eigenvalue decomposition of the matrix $\Sigma - \Phi$ as $\Sigma - \Phi = LL'$. The diagonal entries of $\Sigma - \Phi$ are called communalities which are estimates of the proportion of the variance of the characteristics which is shared with other characteristics in the matrix after removing errors in measurement and variation unrelated to other factors (specific variance). Σ can be obtained from observed characteristics, however the elements of the diagonal matrix Φ are unknown.

If it is possible to assume that, there is no error in measurement and the characteristics do not show any specific variance, for example in case of population data, the communality is set to unity before extraction. In those cases, the extraction method is called Principal Component Analysis. If it is not possible to ignore the error variation (particularly in case of sample data) and/or, specific variance of the characteristics, it is necessary to start with a communality estimate. Such extraction methods are broadly called Principal Factor Analysis. Factor extraction then involves eigenvalue decomposition of $\Sigma - \Phi$ into eigenvalues and eigenvector, which are used to estimate elements of L. The eigenvalues

equals the sum of the squared factor patterns and are used as a measure of the proportion of variance explained by the factors. Factors are retained until the subsequent factors have minimal contribution in explaining the overall variation in the data. This is the basis for the decision on the number of factors that are considered relevant. Once factors are extracted, the next step is to identify the nature of the factors. This is usually done by identifying ratios, which show high correlation with a given factor. There are two important issues here. First, the factor pattern matrix is not unique. Any orthogonal transformation of the factor pattern matrix could have resulted from the same relation between the characteristic and the factor. Second, for ease of interpreting the factors a balance need to be struck between smaller number of factors (with more characteristics related to a particular factor) and more interpretable factors (with fewer characteristics related to a particular factor). Following an initial extraction of factors, the factor pattern matrix is multiplied by a suitable orthogonal matrix by a method called factor rotation. At this stage, it is also possible to relax the assumption of independence among factors, if required.

In case of sample data, a onetime extraction may not be ideal and alternatively an iterative process is often preferred. In the first step, eigenvalue decomposition of Σ - Φ into eigenvalues and eigenvector are used to estimate elements of L and the estimate of L is used to obtain new estimates of Φ, Φ^*. Second, Φ^* is used in $\Sigma - \Phi^*$ for another

eigenvalue decomposition to improve on the estimate of the elements of *L*. The steps are repeated until elements of L converge.

In practice, Principal Factor Analysis is used widely because of its methodological simplicity, least requirements in terms of behavior of the data and computational ease. There are other methods of factor extraction (e.g. Maximum Likelihood, Unweighted Least Square, etc.[11]), but they impose strong restrictions on data matrices which are often violated in case of sample data. Fabrigar, MacCallum et al.(1999) point out that in cases where the assumptions of other methods are violated, Principal Factor Analysis is less likely to produce improper solutions.

Factor analysis of hospitals:

Earlier studies in financial analysis of hospitals argued for the need of a separate set of financial ratios for hospitals as well as separate classification pattern of those ratios (Choate and Tanaka 1979; Cleverley and Nilsen 1980). Chaote and Tanaka (1979) proposed 19 ratios classified under 5 groups liquidity, leverage, composition, activity and profitability. At the same time, Financial Analysis Service (FAS) of the Center for Healthcare Industry Performance Studies developed 29 key ratios relevant for hospitals in 1979 (Cleverley and Nilsen 1980). They categorized the ratios under the following heads:

[11] Maximum likelihood method attempts to obtain MLE of *L* and Φ subject to the restriction that $\Sigma = LL' + \Phi$. Unweighted Least Square attempts to minimize the least square for the residual function $(\Sigma - LL' - \Phi)$.

profitability, liquidity, capital structure, activity and others. Between the two sets of ratios, the FAS ratios gained popularity among most of the factor analysis study that followed (Table 2-1, Table 2-2).

There are two studies on factor analysis of these ratios for the pre- IP PPS period with quite different results in terms of the number of important factors. Cleverley and Rohleder (1985) used these ratios to analyze FAS data on hospitals for the years 1978, 79 and 80. They found ten significant factors, profitability, short term cash position, capital structure, liquidity, age of plant, debt coverage, payment mix, leverage, current asset efficiency and fixed asset efficiency. Counte et al. (1988) study allowed for possible correlation between factors. Using 25 FAS ratios for a homogenous group of 114 community hospitals in Illinois for the year 1984, they found five factors: liquidity, debt structure, profitability, cash flow management[12] and utilization of assets to be significant.

The main focus of Chu, Zollinger et al. (1991) was to use ratios from manufacturing and retail industries (developed by Gombola and Ketz, (1983)) to observe their difference from hospital ratio categories. They also attempted to assess the difference between working capital flow, cash flow and net income and depreciation as alternatives for hospital asset flow. They considered 31 ratios for 113 Indiana general acute care hospitals

[12] Cash flow management included ratios representing liquidity, activity and profitability, which did not load under respective factors.

during the period 1983-87. However, they did not consider the possibility of correlation among factors, and used orthogonal rotation. They found three factors that were consistent throughout the period: working capital flow, debt structure, receivable intensiveness, and two other factors, which varied between return on investment and return on equity, and cash position and short-term liquidity for some of the years. They found that cash flow did not differ consistently from net income adjusted for depreciation, but both differed from working capital flow. This they argue was mainly because of the importance of amortizations, changes in assets and debts and deferred third party payment among non-profits. The other important observation from this study was that unlike in the study by Cleverley and Rohleder (1985), the factors in their study were not consistent over the period. They argued that the unstable factors during their period of study, which coincided with the phase in of the IP PPS between 1983 and 1988, might be a reflection of changing financial environment faced by the hospitals. This study thus identified the possibility that different set of factors may become relevant under different financial circumstances and the influence of policy changes on the importance given to different aspect of financial performance.

There are two studies for the post- IP PPS period. The main purpose of Zeller, Stanko et al. (1996) study was to investigate the stability of the factors across hospital types over the period 1989-92. They had a bigger sample size compared to earlier studies. The study considered separate analysis of hospitals based on patient revenue, church and

government affiliation, teaching status and location (rural/urban). They used a principal component analysis of 28 FAS ratios. They allowed for possible correlation among factors and found six consistent factors profitability, fixed asset efficiency, capital structure, fixed asset age, working capital efficiency and liquidity for non-profit hospitals.

Watkins (2000) introduced non-financial ratios of performance to the list of FAS ratios due to their ability to explain credit ratings, market risk and business failure. She undertook a common factor analysis and also allowed factors to be correlated. Her sample size was smaller than the study by Zeller, Stanko et al. (1996) with around 97 – 202 hospitals each year. She considered 21 financial and 10 non-financial ratios for the period 1990-94 and identified four financial (profitability, capital structure, working capital efficiency and fixed asset efficiency) and three non-financial factors (measuring output, efficiency and productivity).

The two aspects of the studies on hospital financial ratios discussed above are the wide variation in the number of significant factors, from four (Watkins 2000) to ten (Cleverley and Rohleder 1985) and the different assortment of factors that were found to be significant. These variations may be due to variation in the nature of the data considered or the methods used in factor extraction.

The factor loadings are known to vary over samples (Chen and Shimerda 1981) and might be a reason behind the variation as none of these studies were conducted for the same time period. Also, in the cases where analysis was done over time, the results show variation in the factor patterns (E.g. Chu, Zollinger et al. (1991), Zeller, Stanko et al. (1996) and Watkins (2000)). Non-profit hospitals faced different phases of payment policies, ranging from cost based reimbursement to IP PPS and then PPS for capital payments over the period covered in these studies. Chu, Zollinger et al. (1991) found variation during changes in Medicare payment policies in early 1980s. This may explain the variation in factors identified by the other studies.

Apart from the differences in the period considered, there is another characteristic of the sample that may have resulted in the variation in identified factors. According to Fabrigar, MacCallum et al. (1999) homogeneity of the sample may result in the characteristics taking a restricted range of values and reinforce the correlation among them. Because of this, homogenous samples are usually avoided in factor analysis. This is a problem in studies like Zeller, Stanko et al. (1996) and Counte et al. (1988).

Another important reason for variation is the difference in the assortment of ratios considered. Though most of the studies based their research on the FAS ratios, due to data availability problems or for differences in focus of the research, included different

sets of ratios in the analysis. This may account for the variation in the factors that the different studies identified.

Apart from the differences in the data used, another possible reason for the variation in the number and assortment of factors may be the methods used. Most of the studies on hospital financial ratios mentioned above were not explicit about their choice as well as justification of the factor extraction methods. Only Zeller, Stanko et al. (1996) mentions use of principal component analysis as against common factor analysis. Given that most studies used sample data, the assumptions of common factor analysis are easier to justify than principal component analysis. Additionally, difference can also be due to difference in choice of factor rotation methods. Allowing for correlated factors usually result in fewer factors than when factors are assumed independent.

However, the most important methodological issue is regarding the choice of number of factors to be retained in the factor analysis. Determining the number of factors to be extracted is critical to the factor rotation and interpretation of factors. Velicer, Eaton et al. (2000) empirically demonstrated that choosing too few or too many factors result in problems interpretation of factors and replication of results. Other authors (Fava and Velicer 1992; Wood, Tataryn, and Gorsuch 1996) have also shown that factor rotation is highly sensitive to under and over extraction. All of the studies mentioned earlier mentions using Kaiser Criteria in case they do mention about the decision.

Though Kaiser Criteria is the most commonly used method[13] in earlier applications of factor analysis, various authors have argued that the method may lead to incorrect conclusion on the number of factors (Fabrigar et al. 1999; Gorsuch 1983; Nasser, Benson, and Wisenbaker 2002; Velicer 1976). They argue that the condition is essentially intended as a bound and not a mechanism for identifying number of factors. In addition, it is more relevant for population correlation matrices. Hayton, Allen et al. (2004) points out that, for finite samples, sampling errors can affect the mechanism of identifying number of factors based on the rank of a matrix, used in the Kaiser Criteria by affecting the variance covariance matrix. Using Monte Carlo simulation, Costello and Osborne (2005) found that it is the least accurate method for identifying number of factors.

Some of the earlier studies on factor analysis of hospitals also used Cattell's Scree plot[14] (Cattell 1966) to corroborate their observation on the number of factors from the Kaiser Criteria. The main problem with this method is that it works well when there is a clear distinction between major and minor factors in the data. In numerous situations and

[13] The Kaiser Criteria identifies the number of factors to be retained by extracting as many factors as the number of eigenvalues that are greater than one in the eigenvalue decomposition of the variance covariance matrix. This actually follows from the observation that the number of factors underlying a given correlation matrix is a function of its rank and an observation made by Guttman (1954) . Guttman showed that the lower bound of the rank of a correlation matrix is given by extracting only those components with eigenvalues greater than one (Thompson 2004).

[14] It is based on the plot of magnitude of eigenvalues on vertical axis with eigenvalue number on horizontal axis, with eigenvalues arranged in decreasing order of magnitude. The last substantial drop from the steeper portion of the plot enables the researcher to visually separate the major from the minor factors (Thompson 2004).

particularly in sample data this turns out to be highly subjective[15] (Cliff and Hamburger 1967).

Parallel Analysis by Horn (1965) was intended to address the limitations of the Kaiser criterion (Ford 1986; Lautenschlager 1989). The rationale for this method is that factors from real data determined by an underlying factor structure should have larger eigenvalues than those derived from a similar set of random data with the same dimensions. Number of factors is identified by comparing eigenvalues from data with the average from the set of random data samples[16]. A number of studies (Velicer, Eaton, and Fava 2000; Zwick and Velicer 1986) found it to be more reliable than other available methods for determining number of factors[17].

[15] Gorsuch (1983) and Zoski and Jurs (1996) proposed several regression based alternatives to detect the largest drop in the value of two successive eigenvalues. However studies by (Nasser, Benson, and Wisenbaker (2002) on simulated data for the regression based approach did not show consistent success in predicting number of factors.

[16] Even though the original application developed around the idea of average eigenvalues, the 95th percentile is preferred than the mean (Glorfeld 1995; Harshman and Reddon 1983), as the later is equivalent to having a Type I error rate $\alpha = 0.5$ (Hayton, Allen et al. 2004).

[17] There are yet other methods, which are usually considered better tools in identifying number of factors than the Kaiser criterion, but their applicability is usually restricted due to various reasons. Some of them are more suitable for population correlation matrix than sample correlation matrix (e.g. Velicer's minimum average partial method MAP (1976)). Other methods like Bartlett's Chi-squared test (Bartlett 1950) are affected by sample size and the accuracy is highly dependent on multivariate normality assumption (Fabrigar et al. 1999; Montanelli and Humphreys 1976).

Thus, there are two very important reasons to reconsider the factor analysis of non-profit hospitals. First is the possible change in importance of the factors during changes in financial pressure highlighted by Chu, Zollinger et al.(1991) and also observed in other studies. Second is the need for a more rigorous method to justify the choice of the number of factors to be retained in the analysis.

Data and Methods:

The main data source for this study is the Healthcare Cost Report Information System (HCRIS) data files maintained by The Centers for Medicare & Medicaid Services (CMS). All hospitals are required to maintain these cost reports with CMS. These reports are used widely by the participants in the healthcare market as well as in academic research despite some data problems due to the lack of suitable alternatives (Kane and Magnus 2001). In this study, I focus exclusively on HCRIS (2552-96) data for private non-profit acute care hospitals over the period 1996 to 2004.

CMS defines a financial year from October through September. Hospitals file their report with the CMS annually but their financial year does not necessarily coincide with that of CMS. In this study, I reclassify the year based on whether the start date of the cost report is between October and September of the subsequent year. Under certain conditions, if the hospital chooses to have a different start date than previous annual start dates, they

end up reporting their cost reports for smaller phases between two spells of start dates. To keep the ratios comparable those hospitals with data for periods less than one full year are dropped from the analysis.

A Medicare Provider Number identifies each hospital. In case of mergers or changes in the nature of service provided, the same facility may be assigned a different provider number. As a result of this, in some cases providers are not available for the entire period of this study. These hospitals are dropped from the analysis, as it is likely that they might display extraordinary financial circumstances and may skew the results.

Choice of ratios:

Craycraft (1994) points out that before 1992, there were two set of accounting principles practiced among hospitals. For-profit hospitals followed corporate reporting policies, while non-profits followed "modified accounting" policy. Since 1992, American Institute of Certified Public Accountants issued new audit guidelines entitled Audits of Providers for HealthCare services which is very similar to the GAAP standard used by corporations and is the basis of the HCRIS cost reports in most cases[18].

[18] Some providers still choose to report by the old method also called "fund accounting".

FAS ratios used in most of the earlier studies were developed in the period of "fund accounting". Currently, some of the variables are no longer reported in HCRIS cost report under the new accounting standards. Also some of the variables considered by Chu, Zollinger et al. (1991) to identify working capital flow as different from cash flow are not available as HCRIS do not require hospitals to report on statement of change in financial positions. Both of these restrict the choice of ratios that can be used in this study.

The Medicare Rural Health Flexibility Performance Monitoring Project provides an alternative. This project summarized a list of 31 ratios after an extensive review of the hospital ratios considered in the literature and in consultation with hospital financial professionals (Pink et al. 2005). The ratios were selected based on feasibility and usefulness and can be obtained from information available in the HCRIS data[19].

Initially I consider the 31 ratios identified by Pink et al. (2005). To keep this discussion comparable to earlier studies, I also consider as many ratios as possible from the FAS ratios, particularly those which were consistent in earlier studies of non-profit hospitals. In the process, I additionally consider any ratios found significant in at least two of the earlier studies and was not one among the 31 ratios identified by Pink et al. (2005).

[19] Initially 37 ratios were identified from the literature, which appears in at least five articles that they surveyed. The final set of 31 ratios was identified by consulting with hospital financial professionals.

Finally, I drop ratios if more than 10% of the data is missing in the HCRIS Cost Reports for the entire period of this study.

Among non-financial ratios, I am unable to use some of the variables considered by Watkins (2000) (e.g. CMI adjusted admission, CMI adjusted admission per bed and CMI adjusted admission per FTE) as those information are not available in the HCRIS data. I also do not consider some other variables considered by Watkins (2000), e.g. births, number of surgical operations, as they are not ratios and therefore not comparable like other ratios. Information on Case Mix Index, Average Daily Census, and number of beds are obtained from the Medicare Historical Impact files provided by CMS.

The final set of 23 ratios used in this study is listed in Table 2-3. The cost reports are audited by a private intermediary, yet there are reports of data errors due to misreporting (Cutler and Sheiner 1998). To avoid problems of extreme values because of misreporting, I exclude top and bottom one percent of all ratios.

Analysis:

Problems of data availability and steps taken above to address those issues resulted in useable data only for a sample of such hospitals and not the entire population. In addition, the nature of their operations (e.g. extent of philanthropy, governmental restrictions,

market competitions and trends in demand for services and reimbursement from third party payers) introduce specific variability in their characteristics, which makes principal component analysis inappropriate as a method to identify main dimensions of their financial and operational performance. Factors were extracted using SAS System, PROC FACTOR procedure using an Iterative Principal Factor Analysis (with random initial communalities).

Following an initial iterative factor analysis, for data from each year of the study, I compared the eigenvalues with parallel set of eigenvalues (using 100 sets of uniform random samples) to determine the number of factors. The number of factors to be retained is identified when eigenvalues from data is lower than the 95^{th} percentile of the 100 eigenvalues from the uniform random samples. Figure 2-1 shows the plots comparing the eigenvalues from the data with the 95^{th} percentile of the eigenvalues from random data set. The plots identify five factors for all years of this study. It should be noted that the cutoffs for eigenvalue in most cases are close to one (though slightly lower), the requirement for Kaiser Criteria. On the other hand, number of factors identified is smaller than what the Scree plot would have predicted. The final factor analysis for each year is done by setting the number of factors to five. PROMAX rotation, which allows for the factors being correlated, is used in factor rotation.

Results:

The results of the factor analysis are in Table 2-4 and Table 2-5. The factor analysis identifies five factors representing five aspects of operational and financial performance of non-profit hospitals consistently over the nine year period of this study. The first factor showing high correlation with ratios related to capital structure, explains more than two fifth of the variation in performance measures. The second factor showing high correlation with ratios related to profitability explains close to one fifth of the variation in performance measure. The remaining three factors, identified by ratios representing activity, liquidity and operational efficiency respectively, explains the remaining two fifth of the variation. The set of factors replicates the classification in the original FAS ratios.

Capital structure remains important throughout the period under study though the percent of total variation explained increased by a few percent points between 1998 and 2000. Profitability rose in importance mainly after 2000. Percent of total variation explained by activity went down over the period except for a slight rise in 2003. Liquidity and operational efficiency also declined in importance but by a smaller extent compared to the other factors. Importance given to factors varied in earlier studies, though most reported profitability to be the most important one (Chu et al. 1991; Watkins 2000; Zeller, Stanko, and Cleverley 1996). It was followed by either liquidity (e.g. in case of Chu et al. (1991)) or by capital structure in case of Watkins (2000) and Zeller, Stanko, and Cleverley (1996). Counte et al. (1988) on the other hand, found liquidity to be the

most important factor followed by profitability and capital structure. However, none of the earlier studies found capital structure to be the most important as in this study. This highlights an important shift in the organization of non-profit hospital's finances compared to the period of earlier studies.

Apart from the proportion explained by different factors, another important difference with the earlier studies is that this study identifies fewer factors. In some cases, the factors may not have been identified, as some of the ratios could not be considered due to data limitations. For example, Zeller, Stanko, and Cleverley (1996) found a factor representing fixed asset age, but this study could not consider the most important ratio representing asset age, average age of plant, because of inadequate data. Similarly, this study did not consider ratios which were identified under working capital efficiency and receivable intensiveness in Chu et al. (1991) for the same reason. In some other cases, ratios representing more than one factor found in other studies loaded under a single factor in this study (e.g. fixed asset efficiency and working capital efficiency were different factors in Watkins (2000) and Zeller, Stanko, and Cleverley (1996), but loaded under activity in this study). This may be because the earlier studies did not give enough importance to identifying the number of significant factor and overestimated it. This may also be because of the fact that this study could not consider as many ratios as in other studies. This is a limitation of this study and mainly the consequence of choosing the more representative HCRIS dataset.

The most important ratios under capital structure are equity financing and total liabilities to total assets. Equity financing in case of non-profit hospitals, indicates the extent to which hospitals are financing their assets using funds generated from operations and as expected, the factor pattern takes a negative sign with other ratios, which measures the extent of debt compared to other assets. All of the earlier studies except that of Chu et al. (1991) found it as a consistent ratio which loads under capital structure. None of the earlier studies considered the ratio of total liability to total asset, which shows high correlation with this factor in this study. The next important ratio with strong correlation with capital structure factor is long term debt to capitalization. The study by Counte et al. (1988) found this to be a significant ratio under capital structure. However, they defined it as permanent financing ratio.

The earlier studies considered ratios, which were closely related to total liabilities to total assets and long-term debt to capitalization. Instead of total liabilities to total assets, earlier studies considered long term liabilities to net fixed asset. This ratio defined as fixed asset financing loaded consistently in all earlier studies. This ratio also shows strong correlation with the capital structure ratio in this study.

The other ratio which is similar to long term debt to capitalization, long term debt to equity loaded consistently in all (except Chu et al. (1991)) earlier studies. Though it loaded with other ratios associated with equity in Watkins (2000) and in Cleverley and

Rohleder (1985), it does not show strong correlation with the capital structure ratio in this study.

The final ratio under the capital structure factor is cash flow to total debt, though it does not show consistent correlation with the capital structure factor for all years. Most of the earlier studies did not found it to be consistently related to capital structure. The exceptions were Counte et al. (1988) where it loaded under capital structure and Chu et al. (1991) where it loaded under cash position. Similarly Watkins (2000) found it to be correlated to profitability (though not consistently) along with capital structure. In this study, cash flow to total debt also shows strong correlation with profitability and appears in more years under profitability factor than under capital structure.

The second most important factor is one related to profitability. The ratios which show the highest correlation with the factor is total margin and return on assets. This is followed by operating margin, cash flow to total debt and return on equity. Only two of the earlier studies (Chu et al. 1991; Zeller, Stanko, and Cleverley 1996) considered total margin and found it to be significantly related to the profitability factor. Return on asset on the other hand showed strong correlation with profitability factor in all earlier studies of factor analysis of non-profit hospitals. Operating margin was found to be significant in all study except that of Watkins (2000) and Chu et al. (1991). Return on equity was also important in earlier studies (except Chu et al. (1991)) though in some cases it loaded also

under other factors (Counte et al. 1988; Watkins 2000; Zeller, Stanko, and Cleverley 1996).

Cash flow to total debt is very similar to the debt service ratio and indicates the extent to which the debt is covered by the current cash flow. Usually it is relevant in bankruptcy prediction but as previously mentioned some earlier studies (Chu et al. 1991; Counte et al. 1988; Watkins 2000) also found it to load under profitability. This highlights the relation between accessibility to debt and profitability for non-profit hospitals.

The next financial factor in this study is one related to activity. The ratio with highest correlation with this factor is total asset turnover. Other ratios that loaded under this factor are fixed asset turnover and current asset to total asset. All earlier studies found these ratios to load consistently under this factor (except Chu et al. (1991) who did not consider this ratio). However, for seven of the nine years, and those particularly following the introduction of the BBA, another ratio usually associated with profitability, loaded under this factor. Markup, which is the ratio of revenue to expenditure, shows strong correlation along with the ratios of revenue to total asset, fixed asset and current assets in this study. Markup was considered in Cleverley and Rohleder (Cleverley and Rohleder 1985) where it loaded under payment mix while in Counte et al. (1988) it loaded under cash flow management (composed of ratios representing, liquidity, capital structure and profitability). This may indicate that this particular factor identifies not

how efficiently asset is converted into revenue but the importance of revenue given assets and expenditures for non-profits.

The final financial factor identified in this study is one related to liquidity. The ratios showing strong correlation to this factor are current ratio and quick ratio. All study except Watkins (2000) (who did not consider it) found current ratio to be strongly related to the liquidity factor (Chu et al. (1991) considered it but did not find it to load consistently over the years). Quick ratio was however not considered by both Zeller, Stanko, and Cleverley (1996) and Watkins (2000) but others who considered found it to be consistently related to liquidity. This study considered a number of other liquidity ratio such as days cash on hand, average payment period and days in patients account receivable, which did not show strong correlation with the liquidity factor. Days cash on hand was found to be consistent in all of the earlier studies (though in some cases e.g. Zeller, Stanko, and Cleverley (1996) and Watkins (2000) it loaded under different liquidity related factors), but the other two ratios – days in account receivable and average payment period – was only significant under liquidity in the study by Cleverley and Rohleder (1985), while Counte et al. (1988) found average payment period to load under cash flow management factor.

The final factor, which is consistent and significant in this study, is one related to operational performance of the hospitals. The ratio which shows the highest factor pattern

is occupancy rate which is closely followed by Medicare Case Mix adjusted average daily census. Both of these ratios load consistently in Watkins' study though under different operational factors – indicating efficiency and indicating output. Some of the other ratios considered e.g. FTE per occupied bed and Medicare Payer mix do not show strong correlation with the operational factor though FTE per occupied bed loaded consistently in Watkins (2000).

Conclusion:

The main purpose of this chapter was to identify important aspects of hospital performance. Using HCRIS data for private non-profit acute-care hospitals between 1996 and 2004, I conduct an iterative common factor analysis. The factor analysis identifies five factors, which explain the majority of the variation in the performance of non-profit hospitals during this period. The most important factor was capital structure followed by profitability, turnover, liquidity and operational efficiency/volume. The most important observation from this study is the shift on the importance given to capital structure by non-profit hospitals compared to earlier studies. In the next chapter using multivariate methods, I would explore the extent to which the ratios showing highest correlation with these factors were affected by changes introduced by BBA.

Table 2-1: Summary of earlier studies (Data and number of factors)

Studies	Data	Observations (Year)	Number of ratios	Number of factors
Watkins (2000)	All hospitals (sample)	202 (1994), 177 (1993), 125 (1992), 113 (1991), 97 (1990)	21 financial, 10 non-financial ratios	7
Zeller, Stanko and Cleverley (1996)	Non-profit hospitals	2189 (average for 1989 - 92) sample divided by ownership, revenue, mission and location	28 financial ratios	6
Chu Zollinger, Kelly and Saywell (1991)	Indiana hospitals	112 (1983), 113 (1984 - 87)	31 financial ratios	5
Counte, Glandon, Holloman and Kowalczyk (1988)	Illinois hospitals (sample)	114 (1984)	25 financial ratios	5
Cleverley and Rohleder (1985)	All hospitals (sample)	-- (1978, 79, 80)	29 financial ratios	10

Table 2-2: Summary of earlier studies for non-profit hospitals (Factors)

Studies	Factors
Watkins (2000)	Profitability, Capital Structure, Working Capital Efficiency, Fixed Asset Efficiency, Measures of Output, Measures of Efficiency, Measures of Productivity
Zeller, Stanko and Cleverley (1996)	Profitability, Fixed Asset Efficiency, Capital Structure, Fixed Asset Age, Working Capital Efficiency, Liquidity
Chu Zollinger, Kelly and Saywell (1991)	Return on Investment, Cash Position, Debt Structure, Receivable Intensiveness, Short-term Liquidity
Counte, Glandon, Holloman and Kowalczyk (1988)	Liquidity, Debt Structure, Profitability, Cash Flow Management, Utilization of Assets
Cleverley and Rohleder (1985)	Profitability, Short-term Cash Position, Capital Structure, Liquidity, Age of Plant, Debt Coverage, Payment Mix, Leverage, Current Asset Efficiency, Fixed Asset Efficiency

Table 2-3: Ratios considered in this study

	Definition	Location in HCRIS 2552-96
Profitability Ratios		
Mark-up	Gross patient revenue / Operating expenses	WG-3 C1 L1 / WG-3 C1 L4
Operating Margin	Net Patient Income / Net Patient Revenue	WG-3 C1 L5 / WG-3 C1 L3
Return On Asset	Net Income / Total Asset	WG-3 C1 L31 / WG C1+C2+C3+C4 L27
Return On Equity	Net Income / Fund Balance	WG-3 C1 L31 / WG C1+C2+C3+C4 L51
Total margin	Net Income / Total Revenue	WG-3 C1 L31 / WG-3 C1 L3 + L25
Liquidity Ratios		
Average Payment Period	(Current Liabilities / [(Operating Expenses - Depreciation) / Days]	[WG C1+C2+C3+C4 L36 / (WG-3 C1 L4 - WA-7PIII C9 L5)] / days
Current Ratio	Current Assets / Current Liabilities	WG C1+C2+C3+C4 L11 / WG C1+C2+C3+C4 L36
Days Cash On Hand	(Cash + Marketable Securities + Investments) / [(Operating Expenses-Depreciation) / Days]	[WG C1+C2+C3+C4 L1+L2+L22] / [((WG-3 C1 L4 + L30) - WA-7PIII C9 L5) / days]
Days Revenue In Account Receivable (/ Receivable Intensiveness)	(Net Patient Accounts Receivable) / (Net Patient Revenue / Days)	[WG C1+C2+C3+C4 L4 - abs(L6)] / [WG-3 C1 L3 / days]
Quick Ratio	(Cash + Marketable Securities + Account Receivables) / Current Liabilities	(WG C1+C2+C3+C4 L1 + L2 - (WG C1+C2+C3+C4 L4 - abs(L6))) / WG C1+C2+C3+C4 L36

Table 3(continued): Ratio considered in this study

	Definition	Location in HCRIS 2552-96
Capital Structure Ratios		
Cash Flow To Total Debt	(Net Income + Depreciation) / Total Liabilities	(WG-3 C1 L31 + WA-7PIII C9 L5) / WG C1+C2+C3+C4 L43
Equity Financing (Inverse Of Leverage)	Fund Balance / Total Assets	WG C1+C2+C3+C4 L51 / WG C1+C2+C3+C4 L27
Fixed Asset Financing	Long-Term Liabilities / Fixed Assets	WG C1+C2+C3+C4 L42 / WG C1+C2+C3+C4 L21
Long Term Debt To Equity	Long-Term Debt / Fund Balance	(WG C1+C2+C3+C4 L31 + L42) / (WG C1+C2+C3+C4 L51)
Long Term Debt To Capitalization	Long-Term Debt / (Fund Balance + Debt)	(WG C1+C2+C3+C4 L31 + L42) / (WG C1+C2+C3+C4 L51)
Total Liability To Total Asset	Total Liabilities / Total Assets	WG C1+C2+C3+C4 L43 / WG C1+C2+C3+C4 L27
Activity Ratios		
Current Asset Turnover	Operating Revenue / Current Asset	WG-3 C1 L1 / WG C1+C2+C3+C4 L11
Fixed Asset Turnover	Operating Revenue / Fixed Asset	WG-3 C1 L1 / WG C1+C2+C3+C4 L21
Total Asset Turnover	Operating Revenue / Total Asset	WG-3 C1 L1 / WG C1+C2+C3+C4 L27
Other Ratios		
CMI adjusted ADC	CMI x Average Daily Census	*from Historical Impact Files*
Occupancy rate	Average Daily Census / Beds	*from Historical Impact Files*
Average Length Of Stay	Total Patient Days / Total Discharges	WS-3PI C6 L12 / WS-3PI C15 L12
FTE Per Occupied Bed	FTEs / (Total Bed Days / Days)	WS-3PI C10+C11 L12 / WS-3PI C1 L12

Table 2-4: Factor analysis results (Variances)

	1996	1997	1998	1999	2000	2001	2002	2003	2004
Factor 1: Capital Structure	41.05%	41.80%	42.81%	43.52%	42.26%	41.84%	40.48%	40.08%	41.47%
Factor 2: Profitability	17.77%	17.42%	17.30%	17.65%	20.40%	21.25%	23.50%	22.84%	21.51%
Factor 3: Activity	16.96%	15.96%	15.50%	14.94%	14.48%	13.98%	13.51%	14.19%	13.82%
Factor 4: Liquidity	13.05%	13.07%	12.88%	12.47%	11.80%	11.78%	11.45%	12.07%	12.42%
Factor 5: Operational efficiency/volume	11.40%	12.01%	11.71%	11.54%	11.18%	11.27%	11.16%	10.83%	10.88%

Table 2-5: Factor analysis results (Factor Patterns)

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004
Sample size	1377	1361	1331	1322	1329	1318	1269	1262	1247
Factor 1: Capital Structure									
Long Term Debt To Capitalization	0.974	0.969	0.964	0.97	0.967	0.967	0.956	0.972	0.966
Total Liability To Total Asset	0.995	0.995	0.994	0.998	0.993	0.996	0.997	0.994	0.994
Fixed Asset Financing	0.733	0.725	0.723	0.723	0.728	0.727	0.722	0.746	0.749
Equity Financing	-0.995	-0.995	-0.994	-0.998	-0.993	-0.996	-0.997	-0.994	-0.994
Cash Flow To Total Debt	-0.604	-0.644	-0.612	-0.596	-0.575	-0.54	.	.	.
Factor 2: Profitability									
Cash Flow To Total Debt	0.608	0.625	0.653	0.621	0.614	0.673	0.761	0.765	0.628
Total margin	0.968	0.984	0.98	0.981	0.963	0.965	0.964	0.961	0.967
Return On Asset	0.926	0.921	0.931	0.937	0.963	0.956	0.96	0.949	0.911
Operating Margin	0.726	0.638	0.689	0.651	0.693	0.683	0.621	0.672	0.694
Return On Equity	.	.	.	0.558	0.584	0.56	.	0.525	.
Factor 3: Activity									
Total Asset Turnover	1.008	1.009	1.001	0.996	1	0.998	0.995	0.981	1.001
Fixed Asset Turnover	0.637	0.648	0.697	0.71	0.695	0.729	0.746	0.77	0.717
Current Asset Turnover	0.536	.	0.547	0.586	0.611	0.645	0.657	0.686	0.647
Mark-up	.	.	0.548	0.601	0.622	0.643	0.654	0.678	0.617
Factor 4: Liquidity									
Current Ratio	0.962	0.983	1	0.981	0.954	0.967	0.949	0.965	0.961
Quick Ratio	0.954	0.934	0.909	0.903	0.901	0.9	0.924	0.942	0.918
Factor 5: Operational efficiency/volume									
Occupancy rate	0.836	0.84	0.823	0.825	0.803	0.791	0.766	0.769	0.752
CMI adjusted ADC	0.692	0.72	0.737	0.743	0.712	0.732	0.742	0.736	0.739

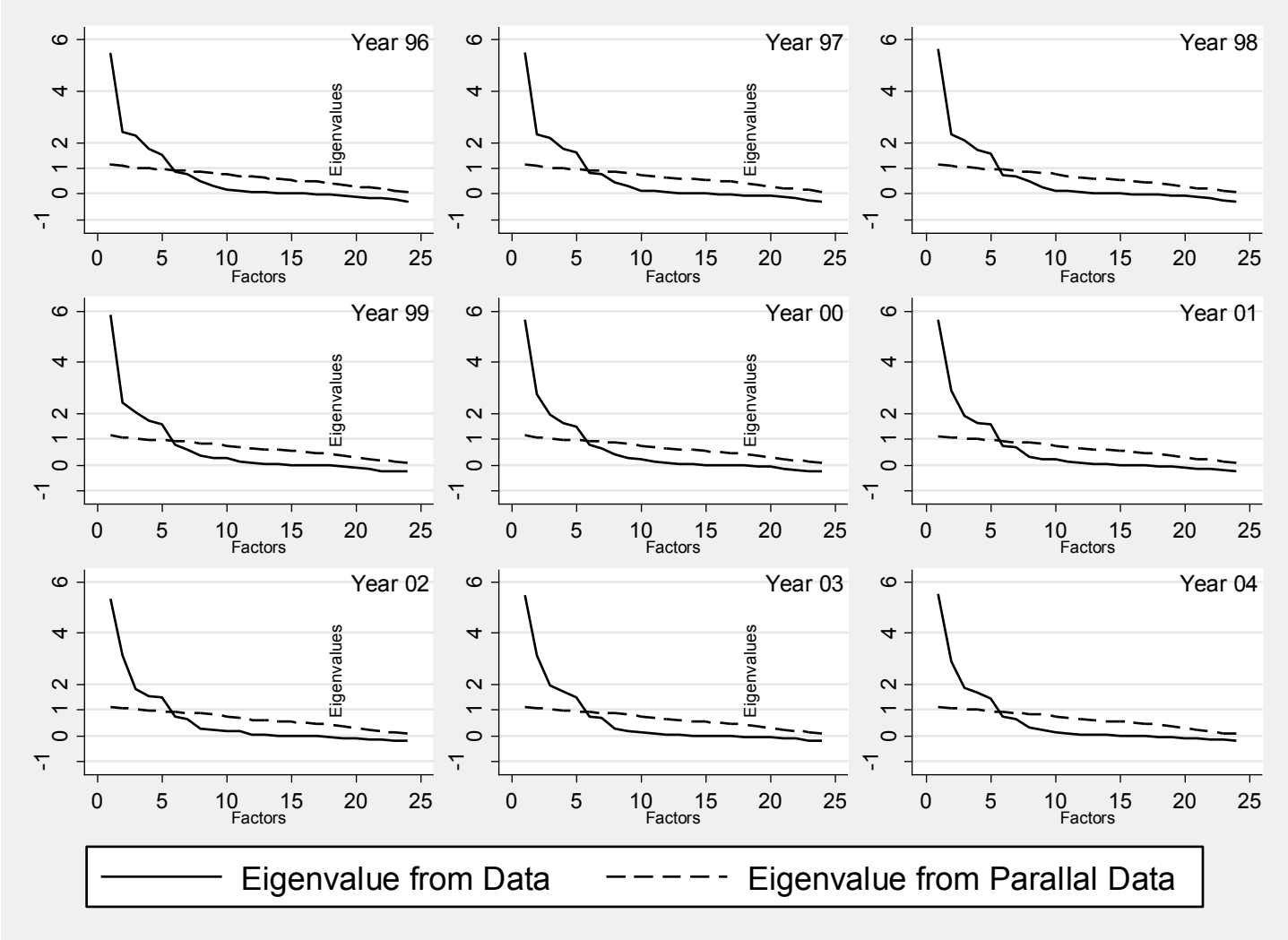

Figure 2-1: Eigenvalues from sample and 95 percentile of parallel samples over year 1996-2004.

Chapter 3 Effect of BBA on Financial Condition of Non-Profit Hospitals

Introduction:

In the previous chapter, I found five important aspects of the performance of non-profit acute care hospitals between around the time of the introduction of BBA were profitability, capital structure, liquidity, activity and operational efficiency/output. In this chapter, I study the extent to which these performance measures were affected by the changes introduced in BBA. In addition, given the relevance of financial condition to the ability of these institutions to accumulate and access capital for investments, I look into the possible effect of BBA on the use of capital in these hospitals.

Policy changes in the BBA can affect financial and performance measures in different ways. It can affect the hospitals' profitability as it is directly linked to their revenue stream. To address changes in revenue stream, hospitals may make changes in their use of resources. They may also try to improve their market share by making new investments. BBA thus provides an opportunity to observe the manner in which non-profits alter their financial organization as a result of a changes in revenue and the extent to which such revenue changes affects their use of capital.

At the outset, it is important to note that non-profit hospitals are assigned such a classification because they do not redistribute their profit. As a result of this, these institutions evolve to optimize other objectives. On the other hand, to optimize their desired objectives, they are dependent on their income. Besides, they also need to have a viable capital structure and show sufficient level of liquidity to access debt capital for new investments. Thus, importance of these financial and operational performance measures cannot be discounted.

Earlier studies:

Prospective payment system was already in effect for IP operational costs since the early 1980s. Similar payment system for capital costs in the IP department was introduced in the early 1990s. As discussed in an earlier chapter, prospective payment system essentially pays hospitals per case, based on a national average rate while adjusting for specific conditions that may result in high costs for certain type of hospitals based on their location or the nature of their services.

The focus of the studies on the effect of IP PPS on hospitals was the changes in hospital behavior as a result of those changes. Coulam and Gaumer (1991) provides an extensive review of the literature which evaluated those changes. According to their survey, the most important mechanism of cost control observed by these studies as a result of the

new per case payment system under IP PPS was the reduction in average length of stay in the IP department and higher use of outpatient department that was still being paid on a cost basis.

Studies on the effect of those policy changes on the financial condition of hospitals (Feder, Hadley, and Zuckerman 1987; Hadley, Zuckerman, and Feder 1989), looked at the changes in their expenses as controlling the growth in their expense was the main objective of the policy change. They also looked at the effect of the policy on profitability as a summary measure of their financial performance. The main observation from these studies was that the initial introduction of PPS in IP department resulted in different type of behavior among hospitals based on the extent of the financial pressure[20] created by the new payment policy. PPS resulted in slower growth of costs, but hospitals with higher level of financial pressure did most of the cost containment. Hospitals with higher fiscal pressure reduced length of stay and increased Medicare discharge more compared to the ones with lesser pressure. On the other hand, despite the higher level of reduction in their expenses, these hospitals saw a higher reduction in their profitability[21]. Similar evidences were also observed by Coelen (1991). Initial cost containment dissipated in later years resulting in lower margin on average. Coulam and Gaumer (1991) points out that, by the

[20] They considered two different measure of financial pressure. One of them was based on the difference in Medicare revenue before and after the policy change while the other was based on the difference between Medicare revenue after policy change with Medicare costs for prior year.

[21] The study by Feder, Hadley, and Zuckerman (1987) did find profitability increasing in the first year after PPS which had been later attributed to possible overpayment in the first year (Coulam and Gaumer 1991) .

fifth year of its introduction of the IP PPS, majority (57 percent) of the hospitals were earning negative profit in their inpatient department.

Hadley, Zuckerman, and Feder (1989) further investigated the factors that determined the variation of financial pressure among hospitals. As expected, they found the role of length of stay and excess capacity, identified by low occupancy rates, in explaining the differences in costs. However even controlling for average length of stay and occupancy rate, they found variation in financial pressure due to factors, which were supposed to be accounted for in the PPS. For example, they found that hospitals outside northeast region, situated in non-metropolitan areas and those which were non-teaching had lesser financial pressure at the beginning of the BBA. Later studies by Younis, Rice, and Barkoulas (2001) observing profitability in post PPS period also found profitability to vary with some of these factors e.g. geographic region, teaching status, size etc. However, they argued that the variation might be also due to factors other than the PPS. E.g., they argue that part of the geographic variation could be explained by variation in HMO penetration, differences in regulatory environment apart from differences in wage and capital costs.

Hadley, Zuckerman, and Feder (1989) also observed that even after reducing inefficiency, the hospitals facing higher financial pressure continued making losses. They argued that expenditure increase in later years of IP PPS may indicate that either hospital

have already reached an optimal level of efficiency or were reluctant to introduce further cost reduction. Friedman and Shortell (1988) pointed out that the association between hospital cost and number of their competitors, highlights that competition among these entities is primarily based on "amenities and quality rather than price" (Friedman and Shortell 1988, page 263). This may explain the apparent reluctance in reducing expenses among high cost hospitals.

Even though some of these studies found effect of IP PPS on profitability and changes in cost and expenditures, a study by Sloan, Morrisey, and Valvona (1988) found no significant change in investments due to the IP PPS changes during the initial years. The most important reason for that was even though IP operational cost was paid on a prospective basis, capital cost was still paid on cost basis. This created an incentive for higher use of capital and new technology.

Wedig et al. (1988) provides a discussion on the relation between Medicare payment practices and use of debt to finance investments by non-profit hospitals. They showed that the cost based reimbursement for capital costs without any particular reimbursement when income generated from operation is used for capital expenditures (as in case of for-profits), created a bias for debt financing among non-profit hospitals. Further, such payments also reduced the risk associated with debt financing as they both decreases the risk of bankruptcy and increases income in case there is bankruptcy.

A study by Acemoglu and Finkelstein (2006) on capital use by non-profit hospitals during that period found that partial PPS due to PPS in non capital costs and cost based payments for capital costs affected the relative cost of capital and promoted further capital investment by hospitals. As an evidence of substitution, they found that the changes in Medicare payment policies led to decrease in average length of stay as a result of substitution of high-tech capital equipments with more labor intensive hospital stay. They also found evidence in adoption of a number of new medical technologies and changes in skill composition of employees.

In 1991, Medicare introduced Capital Prospective Payment System (CPPS) under which capital expenditures were reimbursed based on national average costs adjusted for hospital specific and area specific adjustments. Given the importance of the Medicare payments, it is expected that CPPS may have resulted in a decline in capital expenditure or the use of debt. However, two studies (Barniv, Danvers, and Healy 2000; Lynch 2003) on that did not show any conclusive evidence of a decline. The main argument of Barniv, Danvers, and Healy (2000) was that separating cost and payments introduce higher level of risk in new capital expenditure as well as reduces the possible number of new investment options that hospitals can carry out. In addition, they pointed out that annual variability of the update factor leads to higher risk adjusted cost of capital. However, their empirical study of 1949 non-proprietary general acute care hospitals during 1988-96 did not show any significant effect of CPPS on capital expenditure. When their regression

specification were controlled for the changes in variables by which these hospitals could adapt to CPPS changes (e.g. depreciation expense, fund balance, total asset, age of facility, efficiency of use of assets, profit margin etc.), they found a negative residual effect of the policy change[22]. Similar results were obtained for use of long-term debt using similar methodology by Lynch (2003) for a sample of California hospitals during 1988-94. Her empirical study found a significant decline in long term debt only when the regression specification controlled for collateral value of asset, interest expense, capital expenditure, Medicare share of business etc.

The Balanced Budget Act:

Compared to earlier introduction of IP PPS, the effects of changes in BBA are different. Introduction of PPS for IP services essentially created pressure on hospitals, which had higher than average costs prior to PPS, while improving the revenues for the others. Thus, the revenue pressure was restricted to only half of all the hospitals. The decrease in payments in BBA by increasing updates at lesser than market basket affected hospitals across the board resulting in a much broader effect. Also the BBA had additional reduction for capital payments, payments for teaching and DSH hospitals and bad debts etc. Apart from this, during the initial years of IP PPS, there was a decrease in IP admissions which affected overall expenditures (Coulam and Gaumer 1991). On the other

[22] The main problem with their specification is that it does not separate the direct effect of the policy change from the effect, which resulted in change in some of the control variables due to the change in policy.

hand, Bazzoli et al. (2004), reviewing the difference in the circumstances of these two changes, reported a higher IP use after BBA. There are two other differences discussed in the study by Bazzoli et al. (2004). After IP PPS, there was a decline in staffing as well as wage costs. After BBA, there was no significant decline in staffing. Additionally, there was a significant increase in labor cost due to shortage of high skilled workers, mainly in nursing. The pressure was further increased by introduction of PPS or new lower interim payments for most of the other non-IP services, which saw most of the increased expenditure in recent years (Guterman 2000).

Because of the already existing CPPS, BBA is not expected to introduce any differential in relative cost of labor and capital as was observed by Acemoglu and Finkelstein (2006) since capital is now paid on a prospective payment basis. However, there is the direct effect of the reduction in capital PPS reimbursement, which can potentially affect all hospitals and not necessarily hospitals with higher capital costs. The general financial pressure, mainly due to reduction in IP payments and the uncertainty of the revenue stream as a result of PPS in other departments, may introduce higher level of risk and reduce the hospitals' ability to access capital or the amount of debt that they can support as suggested by Barniv, Danvers, and Healy (2000) and Lynch (2003).

Bazzoli et.al (2004) studied effects of BBA on operations of non-profit hospitals between 1996 and 1999 and compared those effects to those observed in 1980s during

implementation of PPS. They followed a methodology similar to Feder, Hadley, and Zuckerman (1987) and Hadley, Zuckerman, and Feder (1989) by classifying hospitals based on financial pressures. They found that hospitals facing high Medicare financial pressure took actions to limit the growth of costs per Medicare case compared to hospitals with lesser pressure. Despite the cost cutting by the high cost hospitals, their study found a decline in margin following BBA and changes in margin were similar for hospitals with different level of financial pressure.

Empirical strategy:

In the earlier chapter using factor analysis, I identified the main financial and operational factors, which explain the main variation in the performance of these hospitals. The main objective of this chapter is to observe whether BBA affected these factors. The effect of BBA can be observed by observing changes in the ratios that are strongly related to those factors to identify the effect of BBA. However, such comparisons of average values of the performance measures have its limitations because of the unique nature of their operations.

The most important limitation is because non-profits differ widely in their financial performance depending on the nature of the market where they are active. Friedman and Shortell (1988) argued that because of differences in reimbursement from payers,

availability of philanthropic support and other factors specific to the market in which they operate, hospitals may differ in their financial targets.

Most of the earlier studies on effect of policy changes on hospital finances (Bazzoli et al. 2004; Hadley, Zuckerman, and Feder 1989) attempted to address these systematic differences in hospitals characteristics by controlling for factors like hospital size, teaching status, urban/rural location, census region etc. In this study, I follow a strategy similar to Acemoglu and Finkelstein (2006). I compare the within hospital financial and operational ratios before and after the BBA in a regression framework, using a dummy variable controlling for hospital and year fixed effects. The hospital fixed effect will control for all time invariant factors that may affect hospital's financial conditions or their ability to address the policy changes. The year fixed effect will control for specific changes in the hospital market affecting all hospitals in a particular year. The identifying variable for the effect of BBA on financial and operational ratios is a dummy variable which equals one for all cost reports with fiscal year begin date after BBA became effective (January 1, 1998).

The problem of using a BBA dummy variable, to identify the before and after effect of the BBA, is that it assumes that all hospitals are equally affected by the revenue changes. This however is not the case as hospitals differ in the effect of Medicare changes by the difference in their Medicare share of business. Thus, the effect if any of a BBA cut will

be more severe on hospitals with a higher share. To account for this, instead of the BBA dummy, I consider an interaction term of the BBA dummy with the Medicare share, measured by proportion of Medicare inpatient beds to total beds. It is however possible that hospital may change their Medicare share of business in the face of changes in reimbursement. To address the possible endogeneity of the Medicare share of business, I consider pre-BBA value of Medicare share.

Thus, the interaction term will be able to capture the changes in the performance measure that can be attributed to BBA in the following specification

$$y_{it} = \alpha_i + \gamma_t + \beta\,(Post\ BBA * Medicare\ Share_{1997}) + \varepsilon_i \qquad 3.$$

where, y_{it} is the performance measure, α_i s are hospital fixed effects and γ_t s are year fixed effects.

A problem with such a specification is the possibility of omitted interactions between change in policy and Medicare share. The above identification strategy is valid under the assumption that that all hospitals with same level of Medicare share reacts similarly to policy change. To test the validity of the assumption that there is no systematic difference, I further consider the following specification as a pre-specification test

$$y_{it} = \alpha_i + \gamma_t + \beta\,(Post\ BBA^{*}Medicare\ Share_{1997}) + \phi\,(d_{1997}{}^{*}Medicare\ Share_{1997}) + \varepsilon_i \quad 4.$$

where, d_{1997} is a dummy variable for the year 1997.

A final problem with the above specification is that the hospitals may be at different stages relative to their desired financial target. In that case, regression to mean may affect the identification of the effect of the BBA. To address that issue, I consider an additional set of variables using the base year (1996) value of the dependent variable interacted with year dummies for all years 1996 to 2004 (with the base year interaction term omitted for collinearity) in the following specification

$$y_{it} = \alpha_i + \gamma_t + \beta\,(Post\ BBA^{*}Medicare\ Share_{1997}) + \phi\,(d_{1997}{}^{*}Medicare\ Share_{1997}) \quad 5.$$

$$+ \theta_2\,(d_{1997}{}^{*}y_{i1997}) + \ldots + \theta_9\,(d_{2004}{}^{*}y_{i2004}) + \varepsilon_i$$

To account for potential serial correlation of observations from the same hospital, I adjust for standard errors by clustering them within each hospital (Bertrand, Duflo, and Mullainathan 2004).

Data:

The data used in the analysis is from the CMS Form 2552-96 Hospital Cost Report data files. In this research, I concentrate on the private non-profit acute-care hospitals over the

period 1996 to 2004[23]. The BBA changes became effective over the period January 1998 until end of fiscal year 2002. Thus, the study period considers data on hospital extending from two years before to two years after the initial BBA. Also, to make sure that the analysis can pick up the effect of BBA correctly, only those providers are retained for which data is available for all years. Thus, the study follows 1653 hospitals over the 9 year period. The Medicare utilization rates (Medicare days as proportion of total inpatient days), used as a measure of Medicare share of business, are obtained from the Historical Impact Files provided by CMS.

It should be noted that there were refinements to the BBA (BBRA 2000), and other changes in Medicare payments (e.g. BIPA, 2000) which were introduced over the period of the study. Also, the different changes in the BBA did not become effective at the same point of time but were introduced on different dates between 1998 and 2002. Besides, some changes affected a certain type of hospitals, while some others affected across the board. In this study, I do not attempt to separate the different channels through which hospitals financial conditions were affected. Rather, this study looks at the overall cumulative effect of all the changes, which followed since the implementation of new payment methods under BBA.

[23] CMS defines a financial year from October through September. Thus 1996 Cost Reports includes financial report filed with CMS between October 1, 1995 and September 30, 1996.

To observe the effect of BBA on hospitals, I use financial and operational ratios as dependent variables, which showed highest correlation with the main factors in the factor analysis. As measure of capital structure, I consider equity financing, which is the ratio of fund balance to total debt, and the ratio of total liabilities to total asset. I consider return on asset, which is a ratio of net income to total assets, and total margin, which is a ratio of net income to total revenue as measure of profitability. As measure of liquidity, I consider current ratio, which is the ratio of current assets to current liabilities. As a measure of activity I consider total asset turnover, which is the ratio of total revenue to total assets and as a measure of operational efficiency, I consider hospital occupancy rate.

Additionally, I also study changes in capital labor ratio and as evidence of such changes, changes in length of stay as it reflects substitution of capital intensive methods for labor intensive methods. The CMS data do not directly give information for capital expenses. Acemoglu and Finkelstein (2006) set up an alternate measure as a proxy for capital expenditures. They argued that under the assumption that cost of capital and equipment do not vary systematically across hospitals with different Medicare share, depreciation expenses could be considered as a very good proxy for capital stock. Following their study, I use depreciation expenses as a proxy for capital expenditures and define capital labor ratio as the ratio of depreciation expense over total input expenses net of interest and depreciation expenses. Further, I also consider logarithms of capital and labor

expenditures[24]. As in earlier chapters, due to possible errors in CMS data, I remove extreme values by removing top and bottom one percent of the variables considered.

Figure 3-1 to Figure 3-7 show the plots of the financial and operational ratios considered in this study over the years 1996-2004. The plots show the mean yearly values for the different ratios considered in this study. The plots also include separate set of means for different hospital types like those with SNF, HHA or teaching facilities and those classified as DSH hospitals. These particular types of hospitals were chosen because some of the important changes in BBA were directed towards them. It should be noted that these hospital types are not necessarily exclusive. A single hospital may belong to more than one type.

Among the ratios related to capital structure (Figure 3-1, Figure 3-2), equity financing started falling since 2000 and stabilized at a lower level by 2002. Since equity financing indicates funds generated from operation as a proportion of total assets and total liabilities to total assets measures the proportion of liabilities to assets, they show opposite trends. Total liabilities to total assets went up around the same time as equity financing declined. In either case, hospitals with additional facilities like SNFs and HHAs did better on average while hospitals receiving DSH payments and teaching hospitals

[24] Dependent variables, which are not ratios (capital and labor), are adjusted for PPI for General medical and surgical hospitals.

were worse than the average. The different trends of equity financing and total liabilities to total asset ratio also indicates higher use of borrowed funds compared to lower use of funds generated from operation due to revenue pressure during the period.

The most dramatic change since 1998 can be seen in decrease in profitability (Figure 3-3, Figure 3-4) compared to the pre-BBA levels. Income both as a proportion of revenue and asset declined until 2002 (end of BBA) after which it showed some improvements. However, the rates were still lower than 1998 and significantly lower than the pre-BBA period. Once again, hospitals with DSH patients and teaching hospitals were worse on average though the condition of the teaching hospitals improved faster than others since 2003.

A rather interesting result can be seen in case of activity ratio (Figure 3-5). Total asset turnover, which is the ratio of total revenue to total assets, shows a steady rise since 1998, which would imply that average use of asset, increased significantly over the period. One of the important problems for non-profit hospitals is excess capacity. The graph here shows a steady increase in use of assets among all hospital types continuing from before the introduction of BBA implying an overall decline in excess capacity. A similar trend can also be seen in occupancy rate (Figure 3-7). The occupancy rate show an increase since 2000 compared to the falling rate before 1998. The liquidity ratio (Figure 3-6)

shows some fluctuation in 1999 and 2000 but on average seems to be steady over the period.

Finally, Figure 3-8 shows the plot of capital labor ratio over the period. The capital labor ratio here is actually the ratio of depreciation expense to operating expense and not the ratio of actual capital stock to labor expenditures. The ratio on average is generally steady throughout the period though there was a sudden dip between 2001 and 2003. The dip in the capital labor ratio came about mostly from a fall in depreciation expense (Figure 3-9) as operational expense (Figure 3-10) show a steady increase over the period. The dip can be mostly explained by some changes in the Private Activity Bond (PAB) market for non-profit hospitals. Following changes in the long term market rates, there was a rise in total volume of PABs issued on behalf of hospitals between 1997 and 1998 followed immediately by a trough in 2000. Total volume of new issues by non-profit hospitals which was $6.5 billion in 1996 rose to $13.8 billion in 1998 and then fell to $6.5 billion in 2000 before rising to $9.9 billion in 2002 (Belmonte 2007). This reflected changes in long term treasury yield. 20 year treasury yield, which was around 6.7% in fourth quarter of 1996, fell to 5.4% in the fourth quarter of 1998 and was above 6% for most of 2000 before falling to 5% by fourth quarter of 2002. The changes in depreciation payment seem to reflect the expected delayed effect of new bond issue by these hospitals. Average length of stay also fell consistently during the period indicating higher use of capital intensive technology.

Similar changes in the ratios can be seen when pre and post BBA values are compared (Table 3-1). In term of averages before and after BBA, equity financing show a significant 3.8% decline in the post BBA period while ratio of total liabilities to total assets rose by approximately 4.4%. As in the plots, profitability measures show a significant 48% decline in post BBA period compared to period before BBA. Total activity ratio rose by approximately 29.5% while liquidity rose by approximately 2.9% though not apparent from the plots shown earlier. Occupancy rate, which declined initially before rising from 2000, shows no significant change in the means.

In terms of changes in capital intensity, both capital and labor show increase. However, labor expenditure grew faster than capital on average resulting in a 1.9% decline in capital labor ratio. Notwithstanding the slight decline in capital labor ratio, average length of stay declined by approximately 3.4%.

However, these changes over time may be also due to specific characteristics and conditions of the hospital or changes other than the BBA that affected the hospitals' financial conditions during the period. To account for these possible sources of variation in financial and operational conditions, in the following section I consider the regression models outlined above.

Regression results:

The regression estimates on the effect of the financial and operational measures and capital intensity etc. are shown in Table 3-2 and Table 3-3. Except for profitability, the results are not quite similar to changes outlined in the graphs of the ratios over time or pre-post changes in means. The regression result shows that neither equity financing, nor total liabilities to total assets, were significantly affected by the BBA after controlling for hospital and year fixed effects. The conclusion remains valid even after controlling for differential effect of Medicare share or mean reversion in the dependent variable.

In case of profitability, the return on asset show significant decline after controlling for mean reversion. The effect on total margin is ambiguous. Though the coefficient shows a significant negative effect of BBA, there is evidence of differential effect of Medicare share on total margin. This effect remains even when controlled for mean reversion. These two results together provide support to the earlier observation that capital structure is more important than profitability for non-profits. The hospitals were able to maintain similar level of capital structure even when profitability went down.

Compared to the plot over time (Figure 3-5) activity ratio shows completely different trend when hospital and year fixed effect are accounted for. There is a significant decline in the activity ratio even after controlling for mean reversion. There can be two possible explanations for this. The overall decline that can be seen in the plots and the differences

in mean before and after BBA may be dominated by hospitals that were rapidly reducing excess capacity thereby increasing the activity ratio. An alternative explanation for the decline in this particular ratio is possibly because of how the activity ratio is defined. Total asset turnover is the ratio of revenue to total asset. Assuming no significant change in total asset, it probably reflects the decline in revenue in the post BBA period. Thus although overall total asset turnover improved, for individual hospitals, it shows a declining trend due to extraordinary pressure on their revenue.

A similar set of result could be seen in case of occupancy rate, which is also related to operational efficiency. Occupancy rate declined as a result of the BBA changes at the individual hospital level. However, it is not possible to attribute the change to BBA, as there were systematic differences among hospitals with different levels of pre-BBA Medicare share.

The liquidity ratio which did not show any overall changes in the plot but a significant reduction in the means, was not significantly affected in the first specification, though when adjusted for mean reversion there is a positive effect. It is possible, that hospitals had to maintain or improve their liquidity to sustain the unchanged level of capital structure observed above.

The most important result for capital use however is from the fact that there was no significant change in capital labor ratio as well as logarithms of capital and labor (Table 3-3).

Table 3-4 and Table 3-5 summarize the effect of the BBA changes. Return on assets declined 19.5 percentage due BBA. After controlling for mean reversion the decline is about 16.7%. Total asset turnover ratio declined by 6.8% and after controlling for mean reversion, the decline is close to 7.1%. Finally average LOS declined by 2.8% which adjusting for mean reversion amounts to a 2.2% decline. Others did not show any change or because of differential effect of Medicare share, the effect of BBA could not be properly identified.

Finally, I look at the effect of BBA on particular types of hospitals, which were specifically affected by the BBA changes. Table 3-6 and Table 3-7 show regression results controlling for mean reversion and systematic pre-BBA differences. Table 3-8 and Table 3-9 show the marginal effects. As in the case of all hospitals, neither of the capital structure ratios was affected by BBA with the exception of total liabilities to total assets in case of DSH hospitals, which showed a 4.7% decline after controlling for mean reversion.

Among profitability ratios, return of asset went down by 19% for SNFs and 23% for DSH hospitals while total margin went down by 17.8% for teaching hospitals and 14.9% for DSH hospitals respectively. Total asset turnover went down significantly in case of both SNF and HHA hospitals by 9.1% while in case of DSH hospitals it went down by 6.7%

Among other significant effects, liquidity went up by 10% for teaching hospitals. As in the case of all hospitals, occupancy rate show decline in case of some hospitals, but it is difficult to attribute the changes to BBA for significant effect of difference in pre-BBA Medicare share on the dependent variable. Unlike the average hospital, teaching and DSH hospitals show a significant increase of 5.3% and 6.2% respectively for capital labor ratio. SNF, HHA and Teaching hospitals show significant decrease in average length of stay of 2.3%, 2.5% and 1.0% respectively.

Conclusion:

BBA affected non-profit hospitals over 1998-2002 through different changes in reimbursements. It is true that financial conditions of hospitals were affected by factors other than BBA. Also, not all hospitals were similarly affected by changes introduced by BBA because of their nature of operations as well as the extent to which they were reimbursed by Medicare program. In this study, I observe the effect of BBA controlling for hospital specific variation and other changes affecting the non-profit hospitals. The

most important result in this study is that the changes in revenue did not significantly alter their capital use. Neither did it affect their capital structure. This reflects the importance given to capital investment by these hospitals during the period under study. This is also corroborated by the importance of capital structure in explaining the variation in performance measure of these hospitals, observed in the earlier chapter.

On the other hand, profitability, which was found to be next in importance to capital structure, is found to be adversely affected by the BBA. A decline in profitability has important implications on financial condition of the hospitals as well as its operations. Particularly relevant is the implication on their ability to additional debt for new investment. Given the evidence that hospitals on average did not change their use of debt capital it may have affected their cost of borrowing. In the next chapter, I study the effect of BBA on their cost of capital.

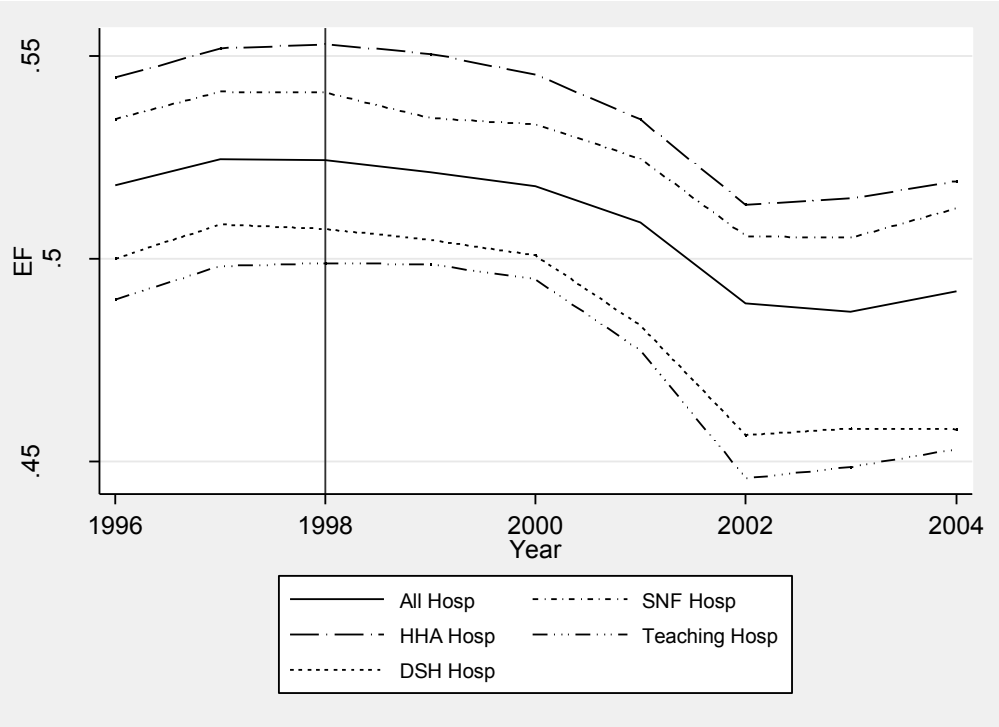

Figure 3-1: Trends in average Equity Financing of non-profit hospitals

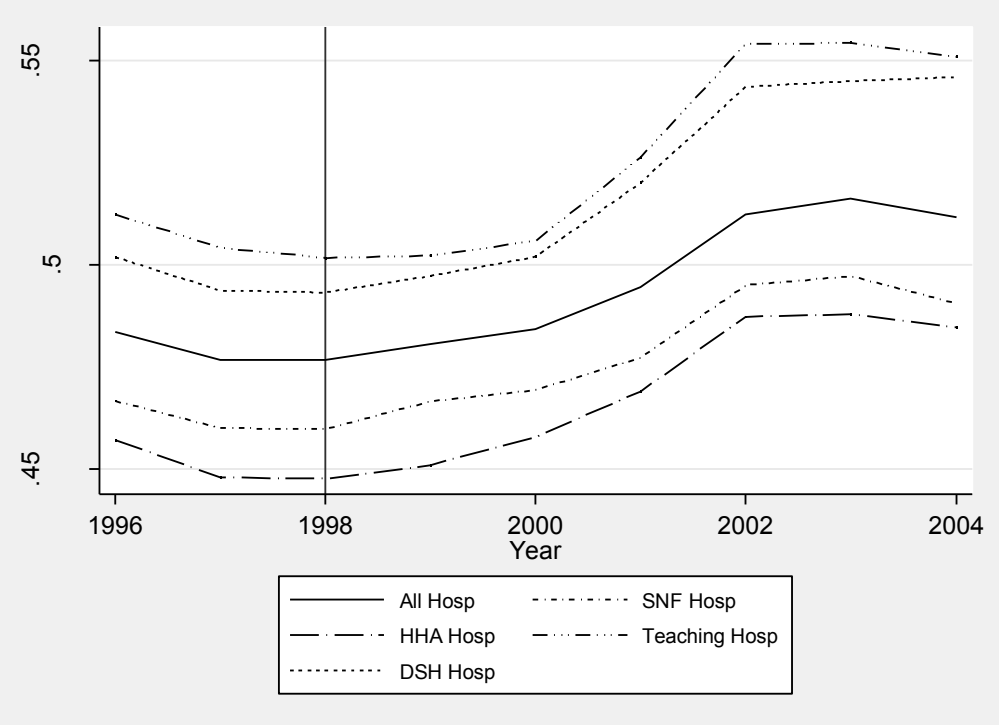

Figure 3-2: Trends in average Total Liabilities to Total Asset of non-profit hospitals

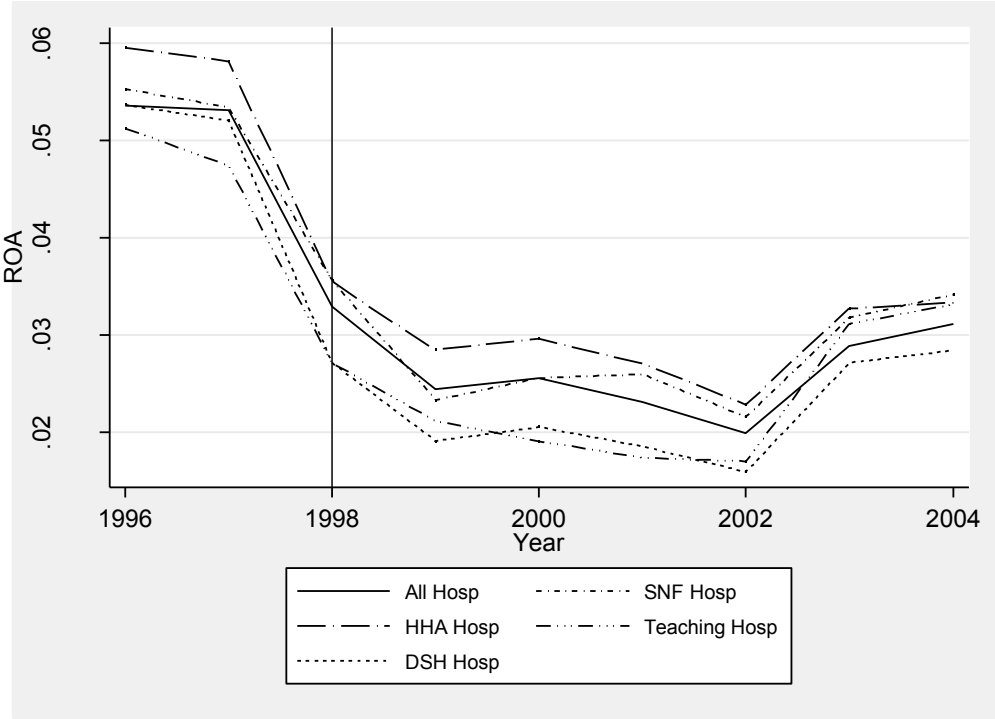

Figure 3-3: Trends in average Return on Asset of non-profit hospitals

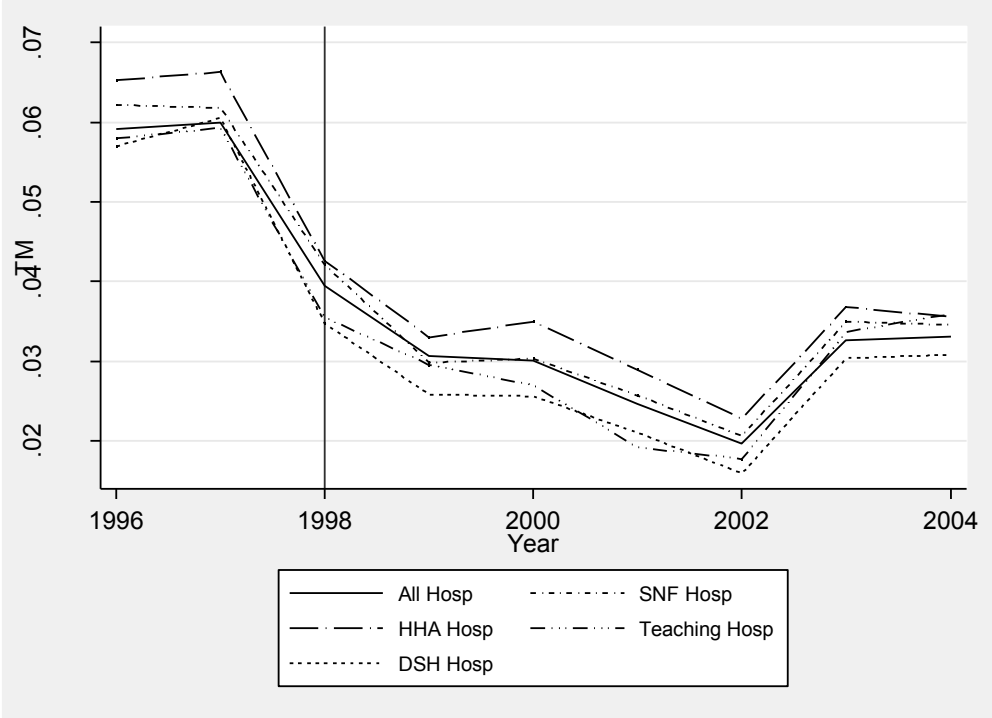

Figure 3-4: Trends in average Total Margin of non-profit hospitals

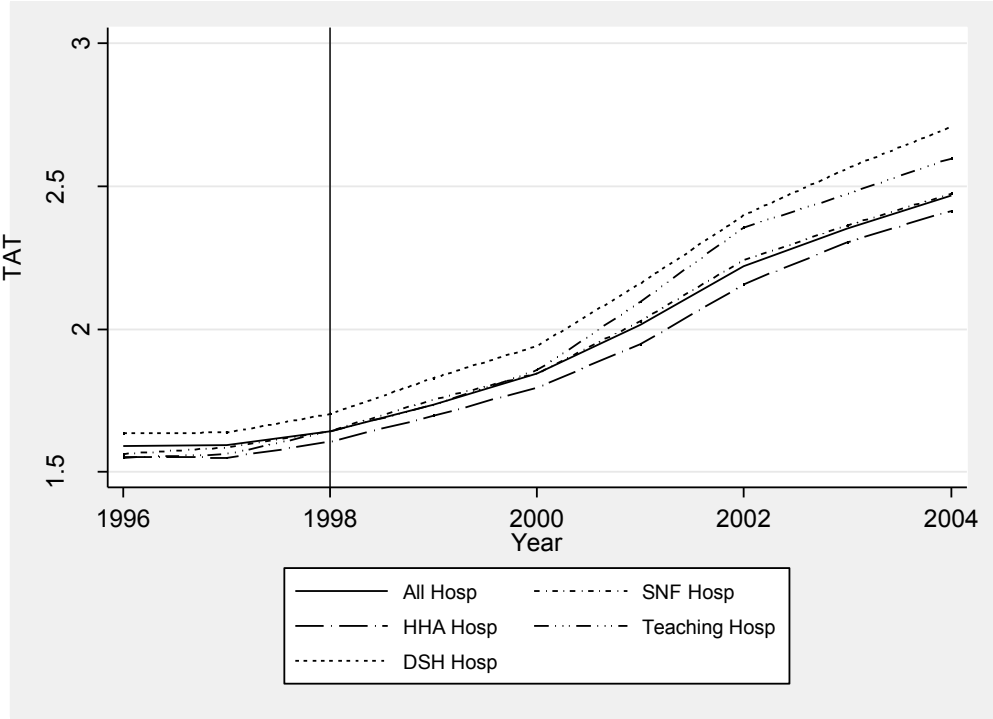

Figure 3-5: Trends in Total Asset Turnover of non-profit hospitals

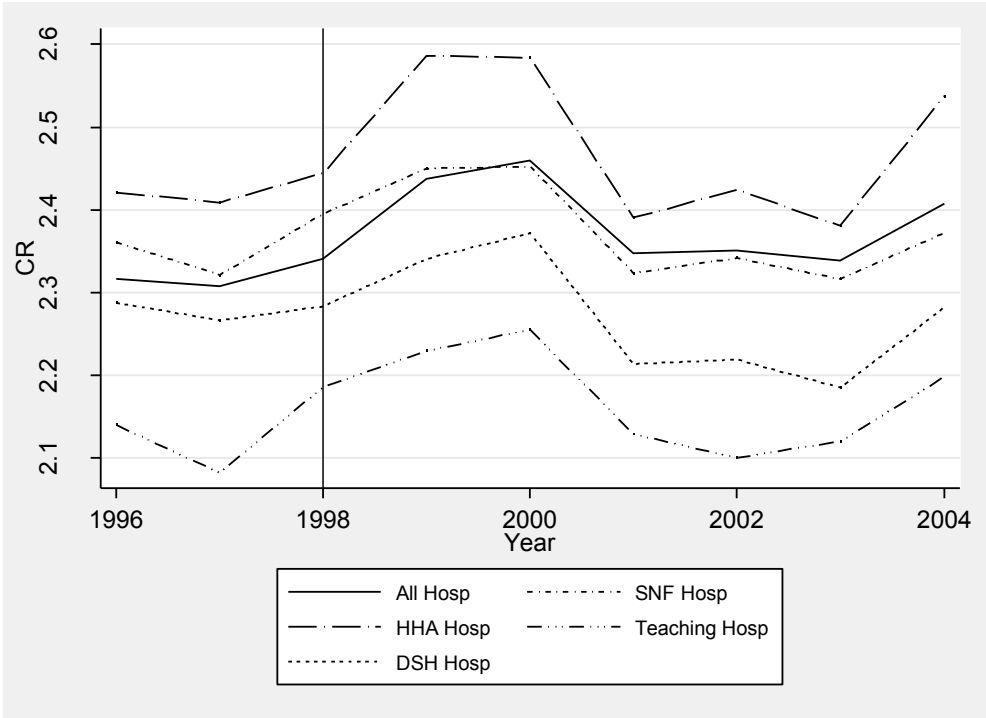

Figure 3-6: Trends in average Current Ratio of non-profit hospitals

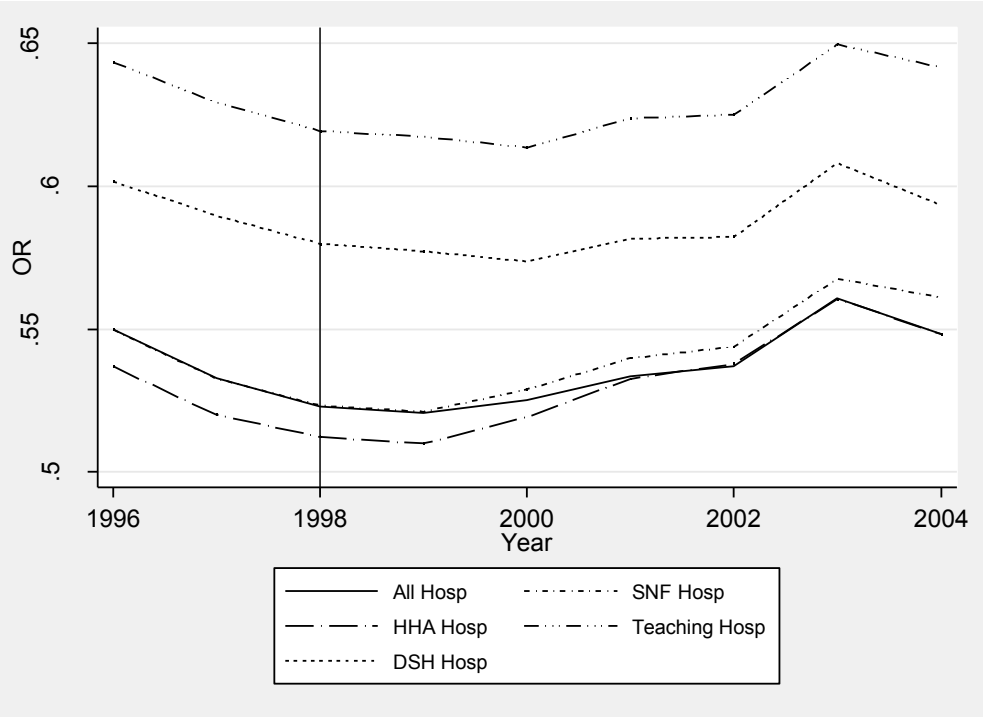

Figure 3-7: Trends in average Occupancy Rate of non-profit hospitals

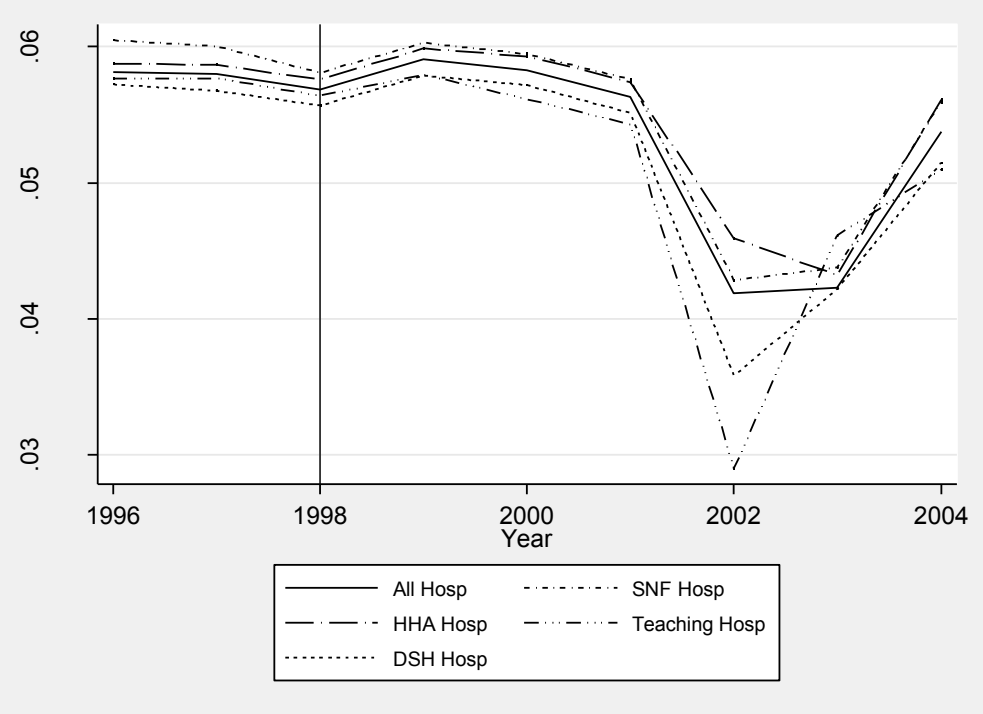

Figure 3-8: Trends in average Capital Labor Ratio of non-profit hospitals

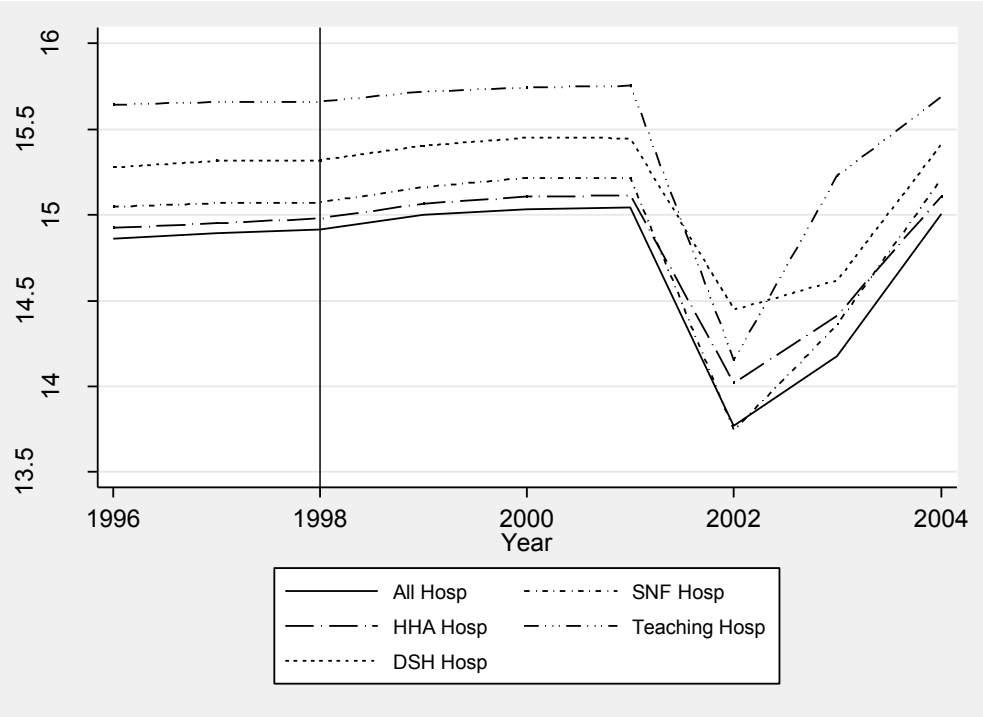

Figure 3-9: Trends in logarithm of Capital Expense of non-profit hospitals

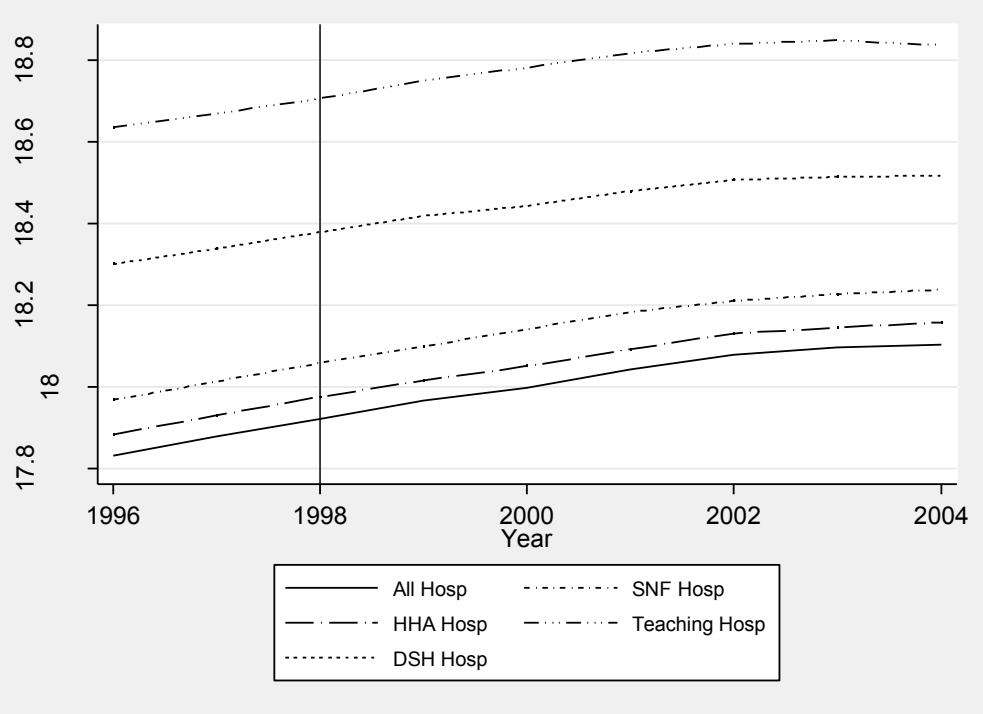

Figure 3-10: Trends in logarithm of Labor Expense of non-profit hospitals

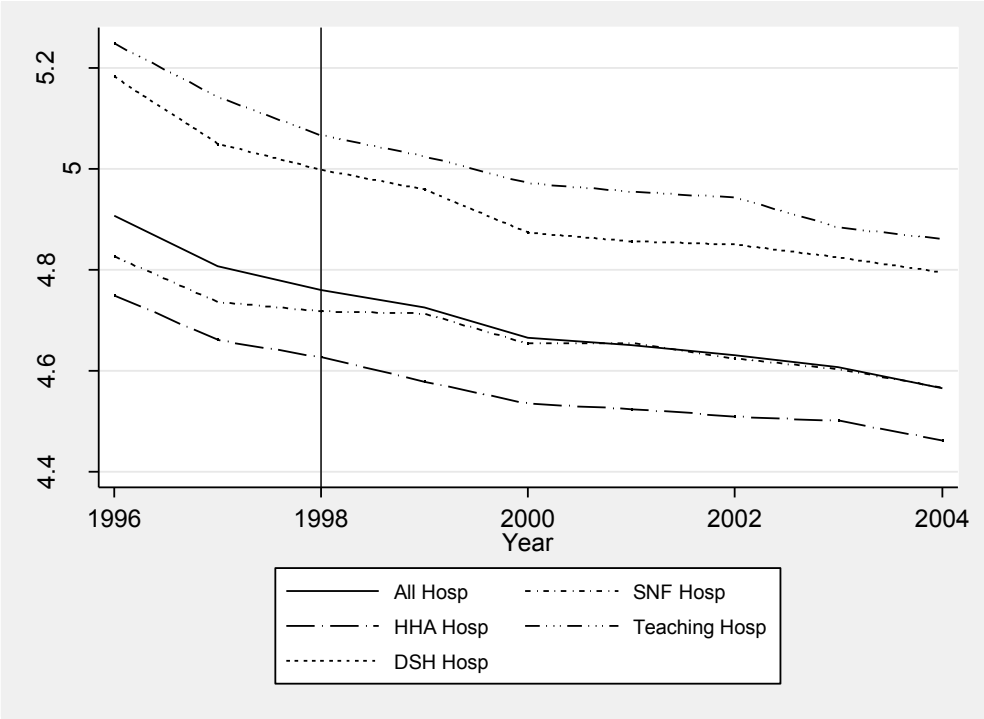

Figure 3-11: Trends in average Length of Stay of non-profit hospitals

Table 3-1: Effect of BBA on financial and operational ratios

	Pre BBA		*Post BBA*		*Pre-Post Diff*	
	Mean	*Std.Dev.*	*Mean*	*Std.Dev.*	*in Mean*	
Equity financing	0.52	0.24	0.5	0.27	0.02	***
Total liabilities to Total assets	0.48	0.24	0.5	0.27	-0.02	***
Return on assets	0.05	0.07	0.03	0.08	0.02	***
Total margin	0.06	0.07	0.03	0.07	0.03	***
Total asset turnover	1.59	0.74	2.06	1.16	-0.47	***
Current Ratio	2.32	1.54	2.38	1.69	-0.07	*
Occupancy rate	0.54	0.16	0.54	0.16	0	
Capital-Labor Ratio	0.06	0.02	0.06	0.02	0	*
log Capital	14.86	1.24	14.99	1.27	-0.13	***
log Labor	17.84	1.01	18.04	1	-0.2	***
Length of Stay	4.82	1.2	4.66	1.08	0.16	***

*** Significant at 99.9% level of confidence

** Significant at 99% level of confidence

* Significant at 95% level of confidence

Table 3-2: Regression output for the effect of BBA on financial and operational factors

Dependent variable	Independent variable	Specification I		Specification II		Specification III	
Equity financing	bbaxMS97	0.008		0.005		0.011	
		(0.48)		(0.35)		(0.77)	
	yr97xMS97			-0.023		-0.02	
				(-0.80)		(-0.71)	
	N	14352		14352		14352	
Total liabilities to Total assets	bbaxMS97	-0.01		-0.008		-0.016	
		(-0.64)		(-0.54)		(-1.19)	
	yr97xMS97			0.017		0.023	
				(0.59)		(0.83)	
	N	14357		14357		14357	
Return on assets	bbaxMS97	-0.018	**	-0.016	*	-0.015	*
		(-2.62)		(-2.30)		(-2.29)	
	yr97xMS97			0.017		0.019	
				(1.11)		(1.25)	
	N	14413		14413		14413	
Total margin	bbaxMS97	-0.015	*	-0.011		-0.012	*
		(-2.52)		(-1.94)		(-2.37)	
	yr97xMS97			0.027		0.028	
				(1.86)		(1.96)	
	N	14374		14374		14374	

Table 3-2 (continued): Regression output for the effect of BBA on financial and operational factors

Dependent variable	Independent variable	Specification I		Specification II		Specification III	
Total asset turnover	bbaxMS97	-0.195	***	-0.203	***	-0.2	***
		(-3.22)		(-3.82)		(-3.73)	
	yr97xMS97			-0.049		-0.063	
				(-0.41)		(-0.55)	
	N	14322		14322		14322	
Current Ratio	bbaxMS97	0.131		0.143		0.218	*
		(1.05)		(1.26)		(2.03)	
	yr97xMS97			0.081		0.028	
				(0.33)		(0.11)	
	N	14189		14189		14189	
Occupancy rate	bbaxMS97	-0.019	*	-0.014		-0.024	***
		(-2.35)		(-1.86)		(-3.52)	
	yr97xMS97			0.03	*	0.039	**
				(2.16)		(2.84)	
	N	14543		14543		14543	

Specification I: Fixed effect regression
Specification II: Fixed effect regression with tests for differential trends in dependent variables.
Specification III: Fixed effect regression with controls for mean reversion in dependent variable.
t-values in parenthesis; Coefficients for fixed effects and year dummy variables interacted with base year dependent variable in Specification III not reported
*** Significant at 99.9%, ** Significant at 99% level, * Significant at 95% level

Table 3-3: Regression output for the effect of BBA on Capital use and Length of Stay

Dependent variable	Independent variable	Specification I		Specification II		Specification III	
Capital-Labor Ratio	bbaxMS97	0.001		0.001		0.002	
		(0.83)		(0.96)		(1.63)	
	yr97xMS97			0.001		0	
				(0.47)		(0.11)	
	N	10334		10334		10334	
log Capital	bbaxMS97	0.007		0.013		-0.031	
		(0.16)		(0.29)		(-0.67)	
	yr97xMS97			0.037		0.005	
				(0.5)		(0.06)	
	N	10550		10550		10550	
log Labor	bbaxMS97	-0.017		-0.014		-0.023	
		(-1.06)		(-0.99)		(-1.64)	
	yr97xMS97			0.018		0.034	
				(0.75)		(1.33)	
	N	14368		14368		14368	
Average Length of Stay	bbaxMS97	-0.248	***	-0.212	***	-0.189	***
		(-4.02)		(-3.50)		(-3.56)	
	yr97xMS97			0.215		0.135	
				(1.89)		(1.18)	
	N	14699		14699		14699	

Specification I: Fixed effect regression
Specification II: Fixed effect regression with tests for differential trends in dependent variables.
Specification III: Fixed effect regression with controls for mean reversion in dependent variable.
t-values in parenthesis; Coefficients for fixed effects and year dummy variables interacted with base year dependent variable in Specification III not reported
*** Significant at 99.9%, ** Significant at 99% level, * Significant at 95% level

Table 3-4: Marginal effect of BBA on financial and operational factors

Dependent variable	β (i)		Medicare Share for 97 (ii)	Pre-BBA average (iii)	Effect on average hospital (iv) = (i) x (ii)	Percent Change due to BBA (v) = (iv) / (iii)	
Equity financing	0.008		0.554	0.524	0.004	0.80%	
Total liabilities to Total assets	-0.01		0.554	0.477	-0.006	-1.20%	
Total margin	-0.02	**	0.553	0.057	-0.008	-14.30%	*
Return on assets	-0.02	***	0.554	0.051	-0.01	-19.50%	**
Total asset turnover	-0.2	***	0.553	1.587	-0.108	-6.80%	***
Current Ratio	0.131		0.554	2.317	0.072	3.10%	
Occupancy rate	-0.02	**	0.548	0.537	-0.01	-1.90%	*
Controlling for mean reversion in dependent variable							
Equity financing	0.011		0.554	0.524	0.006	1.10%	
Total liabilities to Total assets	-0.02		0.554	0.477	-0.009	-1.90%	
Total margin	-0.01	**	0.553	0.057	-0.007	-11.90%	*
Return on assets	-0.02	**	0.554	0.051	-0.009	-16.70%	*
Total asset turnover	-0.2	***	0.553	1.587	-0.11	-7.00%	***
Current Ratio	0.218	**	0.554	2.317	0.121	5.20%	*
Occupancy rate	-0.02	***	0.548	0.537	-0.013	-2.50%	***

*** Significant at 99.9% level of confidence

** Significant at 99% level of confidence

* Significant at 95% level of confidence

Table 3-5: Marginal effect of BBA on Capital use and Length of Stay

Dependent variable	β (i)		Medicare Share for 97 (ii)	Pre-BBA average (iii)	Effect on average hospital (iv) = (i) x (ii)	Percent Change due to BBA (v) = (iv) / (iii)	
Capital-Labor Ratio	0.001		0.555	0.058	0.001	1.20%	
log Capital	0.007		0.55	14.861	0.004	0.00%	
log Labor	-0.017		0.554	17.84	-0.009	-0.10%	
Length of Stay	-0.248	***	0.549	4.825	-0.136	-2.80%	***
Controlling for mean reversion in dependent variable							
Capital-Labor Ratio	0.002		0.555	0.058	0.001	2.20%	
log Capital	-0.031		0.55	14.861	-0.017	-0.10%	
log Labor	-0.023		0.554	17.84	-0.013	-0.10%	
Length of Stay	-0.189	***	0.549	4.825	-0.104	-2.20%	***

*** Significant at 99.9% level of confidence

** Significant at 99% level of confidence

* Significant at 95% level of confidence

Table 3-6: Regression output for the effect of BBA on financial and operational factors for different hospital types controlling for mean reversion in dependent variables

Hospital Type		Equity financing	Total liabilities to Total assets	Return on assets	Total margin	Total asset turnover	Current Ratio	Occupancy rate
SNF	bbaxMS97	0.009	-0.012	-0.018*	-0.01	-0.255**	0.104	-0.037***
		(0.527)	(-0.692)	(-2.141)	(-1.407)	(-3.162)	(0.712)	(-3.950)
	yr97xMS97	-0.023	0.022	0.012	0.012	0.152	0.318	0.049*
		(-0.594)	(0.555)	(0.643)	(0.722)	(0.905)	(1.006)	(2.164)
HHA	bbaxMS97	-0.005	0.003	-0.014	-0.007	-0.254***	0.215	-0.025**
		(-0.340)	(0.19)	(-1.726)	(-1.025)	(-3.574)	(1.499)	(-2.907)
	yr97xMS97	0.017	-0.01	0.033	0.039*	0.024	0.105	0.046**
		(0.455)	(-0.285)	(1.711)	(2.427)	(0.157)	(0.365)	(2.801)
Teaching	bbaxMS97	0.031	-0.037	-0.021	-0.020*	-0.033	0.414*	-0.011
		(1.164)	(-1.436)	(-1.851)	(-2.071)	(-0.347)	(2.269)	(-1.008)
	yr97xMS97	-0.014	0.014	-0.003	0.006	-0.263	0.184	0.026
		(-0.269)	(0.282)	(-0.138)	(0.243)	(-1.317)	(0.453)	(1.269)
DSH	bbaxMS97	0.037	-0.046*	-0.024*	-0.017*	-0.213**	0.238	-0.018
		(1.611)	(-2.028)	(-2.579)	(-2.026)	(-2.665)	(1.485)	(-1.672)
	yr97xMS97	-0.045	0.041	-0.011	-0.003	-0.351	0.546	0.016
		(-1.043)	(0.941)	(-0.466)	(-0.150)	(-1.780)	(1.787)	(0.757)

t-values in parenthesis; Coefficients for fixed effects and year dummy variables interacted with base year dependent variables not reported

*** Significant at 99.9%, ** Significant at 99% level, * Significant at 95% level

Table 3-7: Regression output for the effect of BBA on Capital use and Length of Stay for different hospital types.

Hospital Type		Capital-Labor Ratio	*log* Capital	*log* Labor	Average Length of Stay
SNF	bbaxMS97	0.004	-0.011	-0.036	-0.193*
		(1.755)	(-0.125)	(-1.697)	(-2.412)
	yr97xMS97	0.007	0.105	0.051	0.15
		(1.574)	-0.835	(1.344)	(0.793)
HHA	bbaxMS97	0.003	-0.017	-0.014	-0.215***
		(1.795)	(-0.245)	(-0.690)	(-3.336)
	yr97xMS97	0.001	0.003	0.080*	0.077
		(0.341)	(0.022)	(2.165)	(0.639)
Teaching	bbaxMS97	0.006*	0.119	0.036	-0.170*
		(2.116)	(1.183)	(1.139)	(-2.276)
	yr97xMS97	0.008	0.157	-0.013	0.082
		(1.454)	(1.208)	(-0.351)	(0.474)
DSH	bbaxMS97	0.007**	0.111	0.018	-0.116
		(2.815)	(1.134)	(0.895)	(-1.574)
	yr97xMS97	0.004	0.107	0.021	0.182
		(0.809)	(0.709)	(0.605)	(1.116)

t-values in parenthesis; Coefficients for fixed effects and year dummy variables interacted with base year dependent variable in Specification III not reported *** Significant at 99.9%, ** Significant at 99% level, * Significant at 95% level

Table 3-8: Marginal effect of BBA on financial and operational factors for different hospital types (Only significant effects reported)

Dependent variable	Hospital Type	β (i)		Medicare Share for 97 (ii)	Pre-BBA average (iii)	Effect on average hospital (iv) = (i) x (ii)	Percent Change due to BBA (v) = (iv) / (iii)
Total liabilities to Total assets	DSH	-0.05	*	0.507	0.492	-0.023	-4.70%
Return on assets	SNF	-0.02	*	0.558	0.052	-0.01	-19.20%
Return on assets	DSH	-0.02	*	0.506	0.052	-0.012	-23.40%
Total margin	Teaching	-0.02	*	0.511	0.057	-0.01	-17.80%
Total margin	DSH	-0.02	*	0.506	0.058	-0.009	-14.90%
Total asset turnover	SNF	-0.26	**	0.559	1.574	-0.142	-9.10%
Total asset turnover	HHA	-0.25	***	0.557	1.551	-0.141	-9.10%
Total asset turnover	DSH	-0.21	**	0.506	1.62	-0.108	-6.70%
Current Ratio	Teaching	0.41	*	0.51	2.098	0.211	10.10%
Occupancy rate	SNF	-0.04	***	0.558	0.537	-0.021	*-3.80%*
Occupancy rate	HHA	-0.03	**	0.549	0.524	-0.014	*-2.60%*
Capital-Labor Ratio	Teaching	0.01	*	0.512	0.057	0.003	5.30%
Capital-Labor Ratio	DSH	0.01	**	0.508	0.057	0.004	6.20%
Length of Stay	SNF	-0.19	*	0.559	4.762	-0.108	-2.30%
Length of Stay	HHA	-0.22	***	0.549	4.682	-0.118	-2.50%
Length of Stay	Teaching	-0.17	*	0.501	5.16	-0.085	-1.60%

Controlling for mean reversion in dependent variable

*** Significant at 99.9%, ** Significant at 99% level, * Significant at 95% level

Table 3-9: Marginal effect of BBA on Capital-Labor Ratio and Length of Stay for different hospital types. (Only significant effects reported)

Dependent variable	Hospital Type	β (i)		Medicare Share for 97 (ii)	Pre-BBA average (iii)	Effect on average hospital (iv) = (i) x (ii)	Percent Change due to BBA (v) = (iv) / (iii)
Capital-Labor Ratio	Teaching	0.01	*	0.512	0.057	0.003	5.30%
Capital-Labor Ratio	DSH	0.01	**	0.508	0.057	0.004	6.20%
Length of Stay	SNF	-0.19	*	0.559	4.762	-0.108	-2.30%
Length of Stay	HHA	-0.22	***	0.549	4.682	-0.118	-2.50%
Length of Stay	Teaching	-0.17	*	0.501	5.16	-0.085	-1.60%

Controlling for mean reversion in dependent variable

*** Significant at 99.9%, ** Significant at 99% level, * Significant at 95% level

Chapter 4 Effect of BBA on Cost of Capital raised in the Municipal Bond Market

Introduction:

In this chapter, I study the effect of BBA on non-profit hospitals' ability to raise capital externally. Hospitals need to make continuous investments to keep up with technological innovations and changing nature and volume of their services. Such investments are also necessary to maintain and improve their market share. Improved market share is related to their ability to attract patients and physicians and thereby improve revenue and quality of their services. Besides, improved market share also helps them to obtain better rates from private payers and suppliers of inputs (Cunningham 2001).

A substantial part of investments in facilities and technology by non-profit hospitals are financed through debt in the form of tax-exempt municipal bonds (Robinson 2002). A firm's ability to raise capital externally is strongly related to its financial conditions particularly the variation in their operating revenue (Modigliani and Miller 1958). As discussed earlier, the main effect of BBA on hospitals was through revenue changes. The regression analysis also found evidence of decline in the ratio of revenue to total assets (Total Asset Turnover) due to BBA as well as a strong negative effect of BBA on the profitability of these hospitals. This may have resulted in higher cost of borrowing for

these hospitals. Difficulty in capital access, due to higher cost of capital, may affect future viability of these hospitals. Besides, increases in capital expenditure may result in additional burden on future Medicare outlays.

Background:

Traditionally, non-profits relied on charitable contributions and funds generated through operations. However, since the 1980s, tax-exempt municipal bond market became the most important means of raising funds for new investment (Kinkead 1984). The main incentive for the use of the tax-exempt bond market is the possibility of accessing funds at cheaper rates as a result of the income tax-exemption for the bond holders. However, the rapid rise in its use was also facilitated by how Medicare reimbursed non-profit hospitals for capital expenditures (Wedig, Hassan, and Morrissey 1996; Wedig, Hassan, and Sloan 1989).

Initially, Medicare reimbursed hospitals for patient related capital costs such as new depreciation expenses, insurance expenses on depreciable assets and interest expenses on borrowed funds etc. (Golub 1985; Kinkead 1984). Wedig, Hassan, and Morrissey (1996) argues that these practices lowered their overall cost of borrowing by reducing risk. However, in 1991, Capital Prospective Payment System (CPPS) was introduced over a

ten year period to contain growth of Medicare capital expenditures[25]. Under the new prospective payment system, capital costs were reimbursed based on a national average amount adjusting for location specific and facility specific adjustments as in other PPSs. Notwithstanding the change, use of municipal tax exempt bonds remain an important source of capital used for new investments by these hospitals. The total amount of long term debt raised per year in new issues by non-profit hospitals in the tax-exempt bond market went up from about $6 billion in the first half of 1990s to about $9 billion in the second half[26] (Belmonte 2007).

Variable of interest:

Private non-profit hospitals are permitted to issue tax exempt bonds, but they do not issue them directly to the buyers. Gershberg, Grossman, and Goldman (2001), Grossman et al. (1993) and Kinkead (1984) provides detailed discussion of the bond issue process and the participants involved. According to these studies, tax exemption requires that these bonds are issued by state or county or city authorities on behalf of the hospitals. Such tax-exempt bonds issued by a government agency on behalf of qualified private entities such as hospitals with 501(C) (3) (private non-profit) status are called Private Activity Bonds (PABs). The financial authority holds the title to the bond to satisfy the requirement of

[25] CPPS was initially part of the original IP PPS of 1983, but was postponed mainly due to problems in devising methods for prospective capital payments (Cotterill 1991).

[26] This includes only long term bonds, which constitute more than 98 percent of all issues (Belmonte 2007).

tax exemption until the bond is retired. The hospitals lease the bond from the financial authority. The periodic lease payments usually equal the debt service payments for the bonds. Bonds are usually marketed by underwriters who are chosen either by the issuer (financial authority) or by the hospitals in consultation with the financial authority, from among investment bankers, by competitive bid or by negotiating directly with the investment banker[27].

The cost of the issue according to the studies mentioned above is usually more than the interest and principal payments. If bonds are sold through negotiated sale, the underwriter charges fees for the transaction. In case of competitive sale, the underwriter usually takes a difference between the rate at which it buys the bonds from the issuer and the rate at which it places them in the market. In the literature on bond issue, borrowing cost is ideally measured by the "true interest cost" (TIC) which equates proceeds received by the issuer to the present value of the interest payments and principal repayments including cost of issuing the bond. Cleverley and Nutt (1984) points out that TIC generally reflects two types of risks, market risk and institutional risk. Market risk includes interest rate risk, purchasing power risk and marketability risk that is associated with a particular bond. The institutional component of the risk implies the default risk of the issuer, which is related directly to both current and projected operating conditions of the borrower.

[27] In some cases, they are privately placed through underwriters.

In this study, I assume that the effect of BBA on an issuing hospital is restricted mainly to the institutional component of the risk resulting from changes in their financial conditions. So instead of TIC, I concentrate on the default risk, which is reflected in the credit rating of the bond issued by the hospitals. The bond ratings are an important source of information about the credit worthiness of the issuer and are important determinants of the cost of debt (Cleverley and Cameron 1997; Moon and Stotsky 1993).

Bond rating:

Bond rating is primarily designed to identify the default risk of a bond. On a more general level, it reflects the overall creditworthiness of the issuing hospital. The three agencies active in the tax-exempt healthcare bond market are the Moody's, Standard and Poor's and Fitch. Rating agencies rate bonds into two main classes, investment grade and speculative grade. Investment grade bonds are those, which are eligible for purchase by "regulated financial institutions". Lower ratings are identified as "speculative" grade. The investment grade is further subdivided into Exceptional, Excellent, Good and Adequate[28] (Ederington and Yawitz 1987). Cleverley (1997) points out that usually, there are very few bonds of "speculative grades" in the tax exempt bond market as the purchase of those bonds are restricted by regulatory policies controlling the main buyers of these bonds e.g. retirement plans and commercial banks.

[28] These subdivisions are set by Moody's. S&P and Fitch subdivides the bond into Extremely or Exceptionally Strong, Very Strong, Strong and Good.

The agencies determine the ratings, considering different aspects of a hospital's performance. Generally, the decision is based on institutional features of the hospital as well as market characteristics in which it operates. Additionally, the rating agencies also evaluate the features of the particular bond (Moody's 1999; S&P 2005).

Among institutional characteristics, the rating agencies evaluate the hospital's financial conditions like its profitability, liquidity, capital structure, legal claim on cash flows etc. to evaluate its ability to make regular payments as well as its operational characteristics like admission and inpatient days, length of stay, occupancy rates, teaching and DSH services etc., to evaluate its ability to generate future income stream.

Besides, they look at the hospital's nature of services and degree of specialization as well as other locational factors that might affect demand (e.g. population, economic conditions etc.) and supply (e.g. competition and market share) of their services. The agencies also look at the managerial performance of the firm, such as contracting mechanism, relationship between the physicians and the management, as well as success with managerial challenges like mergers and acquisitions. The rating decision is also influenced by bond characteristics such as security behind the bond, and bond structures and provisions.

Earlier studies:

Since ratings are not determined by a linear causal model, and the determinants of the ratings (the characteristics of the bond and the issuer) are not independent of each other, setting up a regression model to explain ratings has its limitations (Cleverley and Nutt 1984). However, Kaplan and Urwitz (1979), reviewing a number of studies on bond ratings, found that statistical models can successfully predict ratings in at least two third of the cases for bonds issued by corporations. Similar attempts were also made by a number of studies to identify factors affecting the rating of non-profit hospitals in a regression framework (Cleverley and Nutt 1984; Craycraft 1994; Sloan, Morrisey, and Valvona 1987; Watkins 2000).

The first relevant study for non-profit hospitals is one by Cleverley and Nutt (1984) which analyzed bonds rated by Moody's and S&P. They considered a sample of 165 bonds issued between 1974 and 1977[29]. Their model assumed bond rating to be a function of hospitals' financial, non-financial, bond indenture characteristics. The variables, which were found to significantly affect rating by both Moody's and S&P, were debt coverage, profitability, size (number of beds) and expenses per patient days. Occupancy rate, changes in cash flow and the ratio of total sales to total fixed assets, significantly affected only the rating by Moody's, while debt per bed, percent of Medicaid revenue and depreciation reserves affected only the ratings by S&P.

[29] In the study, approximately 93% of the bonds reported were issued in 1976 and 1977.

Sloan, Morrisey, and Valvona (1987) looked at the relationship between financial characteristics of the hospital and hospital bond rating of all (4103) hospitals in 1982. They found that hospitals with higher total profit margin and hospitals with lower degrees of financial leverage were more likely to receive higher ratings. They additionally found system affiliation to have explanatory power on getting rated as well as getting higher ratings among private non-profit hospitals.

While the above two studies considered mainly financial variables, later studies like that of Craycraft (1994) additionally introduced county level demographic and economic variables. She developed from similar research on bonds issued by municipalities (Cluff and Farnham 1984) where these variables were found to have reasonable explanatory power. Using an ordered probit analysis for 76 bonds issued in 1987, she found returns on investment and short term liquidity as significant financial factors determining credit ratings by S&P. Among demographic and economic factors, she found percent of population over 65 years of age, net change in population and percent of Medicaid recipients provide significant information in addition to financial information. She did not find any significance for the communities' wealth, which she argued was probably due to the existence of third party payers.

Watkins (2000) undertook factor analysis to establish the main financial and operational factors affecting hospital performance and then considering variables with highest factor

loadings under each factor as independent variables in a bond rating model. She used separate specifications for models with variables representing financial ratios and models with both financial and operational ratios. She found admissions (adjusted by CMI) and beds in service (adjusted by CMI) to be positively related with bond ratings. Among financial ratios, fund balance to total asset (defined as equity financing in this study) was found to be positively related to bond ratings.

All of the above studies found strong relation between variables reflecting hospital financial conditions and the ratings. Specifically they found that financial conditions that indicate its ability to support debt (e.g. profitability, liquidity and capital structure) and operational conditions, which ensure future profitability (e.g. asset turnover and occupancy rate) as relevant in determining, bond ratings. Thus, it may be also possible to demonstrate the effect of BBA on the rating in a regression framework because of the causality of BBA on hospital financial conditions discussed in earlier chapters, and the causality between hospital financial conditions and ratings mentioned in the literature above.

Empirical strategy:

The strategy to identify the effect of BBA in this study is based on the assumption that bond ratings are affected primarily by financial conditions of the issuing hospital. Under

that assumption, if there is a sudden and permanent deviation in factors affecting financial conditions of average hospitals, it will result in a sudden and permanent deviation in their bond ratings. Specifically, if BBA is responsible for such changes, the post BBA period will show a difference in average ratings compared to pre BBA period. Such an effect of BBA can be captured using a BBA dummy variable. However, as discussed in earlier regression specifications, the effect of BBA is limited by the hospitals' share of Medicare business. Thus, instead of a BBA dummy, the effect will be identified using an interaction of BBA dummy with the hospitals' Medicare share. Further, due to possible endogeneity of Medicare share, pre BBA (year 1997) Medicare share value will be considered.

One possible problem in using this framework is that though it might be able to identify variation in rating over the pre and post BBA periods, those changes may also be because of the financial and operational characteristics of the hospitals, which issued bonds in the two periods. Not all hospitals enter the bond market at any point of time because of the nature of their investment cycles. Thus, the ratings might be biased by the financial and operational conditions of the hospitals, which were more active in the bond market during the period.

The above conditions require that I control for difference in ratings due to the financial conditions of the hospitals independent of the BBA changes. However, as we observed

earlier, BBA's effect on bond ratings of an issuing hospital is through its effect on their financial conditions. Thus, a regression model with financial ratios corresponding to the years when the bonds were issued will not be helpful in isolating the effect of the BBA. To avoid this problem, while also accepting the role historical financial characteristics of a hospital might play on the bond rating, I control for pre-BBA values of financial and operational ratios representing the factors identified by the factor analysis in the earlier chapter. The pre-BBA values will separate the variation in ratings due to their financial conditions at the pre-BBA level from the effect of the changes in those variables after BBA captured by the adjusted BBA dummy variable. I choose ratios, which showed highest correlation with the main factors identified in the factor analysis. Thus total liabilities to total assets is used as a measure of capital structure, total margin is used as measure of profitability, total asset turnover is used as a measure of activity, current ratio is used as a measure of liquidity and occupancy rate is used as a measure of operational efficiency. Additionally, I use year dummies to control for any other factors that may have affected the financial condition of the hospitals in a particular year.

The pre-BBA controls of financial and operational conditions are also assumed to reflect other hospital specific factors e.g. size, admission etc., which are found to affect ratings. Earlier studies also included variables reflecting demographic and economic conditions of the locality as variables determining the rating. The use of those variables actually evolved from the literature on municipal bonds as they reflected the revenue base for the

municipality and the relevance of the debt-funded projects for the inhabitants. Because of the importance of the third party payment system, those variables are not as informative in case of non-profit hospitals. Similarly, on the supply side, some of the earlier authors identify the nature of hospital, particularly whether it belongs to a system or the extent of competition faced from nearby hospitals as important factors determining rating. The above specification essentially assumes that the effect of these factors if any will be reflected in the financial condition of the issuing hospitals.

There are also some bond specific characteristics like credit insurance (which guarantees the future principal and interest payments), or other provisions required by government agencies, such as sinking fund requirement (which requires a creation of a separate fund to pay for the loans) which might affect the ratings. However, the ability to access those insurance (discussed later in this chapter), is usually determined by the financial condition of the issuing hospital. Therefore, they are not considered separately in the regression specification. Similarly, sinking fund requirements are mainly based on the financial condition of the hospital and are not considered. Thus to observe the effect of BBA on bond rating I use the following specification

$$rating = Constant + \gamma_t + \beta_0 (Post\ BBA * Medicare\ Share_{1997}) + \beta_1 Total\ Margin + \beta_2 Total\ Liability\ to\ Total\ Assets + \beta_3 Current\ Ratio + \beta_4 Total\ Asset\ Turnover + \beta_5 Occupancy\ Rate \quad (6.)$$

Important limitations to the above specification:

Decision to rate:

An important limitation of the above strategy to identify the effect of BBA on rating is that not all bonds get rated. The main benefit of rating a bond is that it increases marketability and consequently reduces cost of borrowing. However, Sloan, Morrisey, and Valvona (1987) points out that usually unrated bond may face only a slightly higher cost of debt as market participants, particularly the buyers, are usually aware of the risk involved. Thus the main incentive of rating is related to the size of the issue as it determines the total saving on interest expense is related to the size of the issue (Lamb and Rappaport 1980; Moon and Stotsky 1993). It is possible to hypothesize that declining profitability and general uncertainty of the new PPS may have resulted in lower volume of new investment and declining demand for debt. This would have resulted in smaller size of new bond issue and consequently fewer case of bond rating. However, in the earlier chapter, I found no evidence of such actions by hospitals. Changes in BBA did not result in changes in their capital intensity or capital structure. Thus, it is unlikely that BBA will result in fewer rating through this channel.

To verify the assumption that decision to rate was not affected by the BBA, I observe the changes in decision to rate after the BBA. The identification strategy for a decision to rate model is similar to the above specification for rating. It is being assumed that the factors that determine ratings are the same that determine the decision to get rated. Additionally, I control for the size of the bond issue as it reflects the possible interest saving due to the rating.

$$rated = Constant + \gamma_t + \beta_0 (Post\ BBA * Medicare\ Share_{1997}) + \beta_1 Total\ Margin + \beta_2 Total\ Liability\ to\ Total\ Assets + \beta_3 Current\ Ratio + \beta_4 Total\ Asset\ Turnover + \beta_5 Occupancy\ Rate + \beta_6 log(Issue\ Size) \quad (7.)$$

If the above specification identify a relation between BBA and the decision to get rated, it would imply that the ratings equation considered earlier is biased by sample selection due to the fact that standard regression results are biased and inconsistent if unobserved factors affecting ratings are correlated with unobserved factors affecting the decision to get rated (Dubin and Rivers 1989; Gronau 1974; Heckman 1979). Such bias is usually addressed in the literature using two step sample selection model as in Moon and Stotsky, (1993).

Leung and Yu (1996), reviewing earlier literature on sample selection and conducting Monte Carlo estimates, concluded that if there are few or weak exclusion restrictions, collinearity between the inverse Mill's ratio and the regressors in a Heckman type sample selection model may restrict the predictive ability of the model. This had been the moot point in the debate about the efficacy of the exclusion condition in the literature of sample selection models (Duan et al. 1984; Manning, Duan, and Rogers 1987). Since the decision to obtain a rating is so closely related to the prospective rating, it is very difficult to separate the two processes. Thus a sample selection model in this particular case is likely to suffer from the problems identified by Leung and Yu (1996) and therefore may not be useful. Thus if it is observed that decision to rate was affected by BBA, it would be necessary to clarify that changes in rating observed earlier is conditional on the bonds being rated.

Credit enhancements:

The next complication in the credit rating specification is the use of credit enhancement by some issuers. On occasions, the hospitals obtain credit enhancements before the bond gets rated. Credit enhancement is obtained in the form of credit insurance, bank letter of credit and in some cases through Federal Housing Authority mortgages. All of these reduce risk and therefore improves bond ratings, thereby lowering borrowing costs. Carlson (2004) provides a discussion about the nature of the credit enhancements used by the bond issuer. According to him, the most important type of credit enhancements that

significantly affect the rating is bond insurance, which guarantees principal and interest payments. Letter of credit (LOC) from commercial banks also provide similar guarantee though for a shorter period. Also the market for LOC and other mortgage backed securities are much smaller compared to credit insurance in case of tax exempt hospital bonds.

Carlson (2004) points out that typically the bonds with credit enhancement get a higher rating based on the ratings of the firm that provides the credit enhancement (which are usually AAA rated).

Savings from credit enhancement

= (1 – P) × (interest on AAA rated bond – interest on a bond with rating equivalent to the underlying rating of the hospital) × issue size

where, P is the premium or fees as a proportion of the issue size. It is a function of the differential between an AAA rated bond and the underlying rating of the hospital. Thus, demand for credit insurance is a function of the issue size and the differential between AAA rated bond and the underlying rating of the hospital. Naturally, P is higher for bonds from hospitals with low underlying rating. Besides, the credit enhancers may raise the minimum acceptable level of underlying rating for which they would undertake credit enhancements to minimize prospective loses in case of default.

As mentioned earlier, BBA's effect on financial conditions of hospitals affected overall risk in the non-profit hospital sector. Evidence of this can be seen in the fall in ratio of upgrades to downgrades of outstanding bonds during the period (Unland and Ponton 2003). A Moody's report (Moody's 1999) noted that the number of downgrades rose significantly in 1998. The ratio of upgrade to downgrade which was around 1.5 in the pre BBA period started going down from 1998 and was merely 0.2 for 1999 and 2000. It rose in later years, but was still below 0.5 till 2004. In the ten years leading to BBA, Moody's downgraded healthcare bonds of approximately $15 billion in outstanding debt. In the four years following BBA, Moody's downgraded a total of $47.2 billion in outstanding debt (CMS 2003). Similar trends can also be seen in upgrades and downgrades by S&P. Thus, as a consequence of BBA, more hospitals were likely to be in a situation where their underlying rating made it expensive to obtain credit enhancements. This could have resulted in fewer insured bonds and therefore relatively fewer AAA rated bonds following BBA.

One further complication:

Identification of the possible effects of BBA on bond rating in 1998 is however complicated by an event that took place in July of 1998 – the filing of bankruptcy by the Alleghany Health, Education and Research Foundation (AHERF). AHERF declared bankruptcy with an estimated liability of $1.3 billion. Of that amount $353 million was in the form of bonds insured by MBIA one of the largest credit insurers in the municipal

bond market. Some authors (Carpenter, McCue, and Moon 2003) contended that this was the main reason for the decline in bond rating as the bankruptcy affected availability of bond insurance and lowered the probability of getting higher ratings. This was not the only bond default during the period. A S&P study (S&P 2000) on bond default in the 1990s report that in the ten years between 1990 and 1999, there were on an average three defaults per year among hospital bonds (though the years between 1994 and 1998 showed less than average number of defaults). However, it is still possible that because of the size of the default, it will have some impact on the availability of credit insurance.

The main problem in separating the effect of BBA from that of the bankruptcy is the fact that the AHERF bankruptcy took place at the same time as the new payment system under BBA became effective. On one hand, BBA's effect on hospital financial conditions may have resulted in lower rating for bonds issued in the post BBA period. On the other hand, bankruptcy loses may have led to revisions in rating standard and other changes among credit enhancers resulting in lower access to credit enhancements.

To understand how AHERF could have affected bond ratings separately from the effect of BBA, it is important to understand the nature and cause of the problems leading to the bankruptcy. AHERF became Pennsylvania's largest integrated health delivery system in a short period through a series of mergers and acquisitions. The expansion was accompanied by "questionable strategies and untested assumptions" (Burns 2000).

According to Burns, the main cause of the bankruptcy was that their attempt to create a statewide delivery system did not take into account of the fact that there were different private payers in different markets within the state. Also, the numerous mergers that were undertaken to create the integrated delivery system were done too fast for them to consolidate on the gain of each merger. Besides, AHERF acquired numerous struggling hospitals, increasing its total outstanding debt. Additionally, the acquisition of "non-core" operations like physician networks did not provide the expected benefits.

As discussed elsewhere, non-profit hospitals in the 1990s tried to improve their market share by vertical and horizontal integration of services. This not only raised their patient revenue but also enabled them to obtain better rates from third party payers and suppliers of inputs because of improvements in market share. However it is also likely that excessive expansion may have its adverse effects on their financial conditions (Dranove, Durkac, and Shanley 1996; Dranove and Lindrooth 2003). Kohn (2000) argued that while such consolidation increased bargaining leverage, it also decreased efficiency and increased administrative costs. Similar results were also observed by Town et al. (2005).

Given the nature of the AHERF failure, I assume that the system hospitals are more likely to be affected by problems similar to AHERF's. Consequently, the revision on credit ratings and stricter conditions set by credit enhancers, following the bankruptcy, are more likely to affect bonds issued by these types of hospitals. Thus to uniquely identify the

effect of BBA from other financial circumstances faced by system hospitals, I only restrict the study to non-system hospitals.

Data:

The main database used in this research is the SDC Platinum database for New Issues in US Municipal Bond Market, from Thomson Financial. The database includes detailed information about the bonds issued in the tax-exempt municipal bond market. I consider only long term bonds issued by private non-profit acute care hospitals. To maintain the same time frame used in rest of the research, I consider bonds sold between October of 1995 and September of 2004 with fiscal years defined from October to September as in CMS cost reports. Among the bonds issued by non-profit acute care hospitals, I do not consider bonds issued by multi-hospital system. Financial data from the HCRIS cost reports for 1997 is used for the hospitals identified in the study. Information about Medicare share of business is obtained from the Historical Impact File provided by CMS.

Analysis:

BBA became effective from the beginning of 1998, so in this study, I consider bonds issued during fiscal year 1999 (October 1998 to September 1999) and thereafter to be affected by BBA. Figure 4-1 shows the distribution of new issues by private non-profit acute-care hospitals between the fiscal year 1996 and 2004 considered in this study.

Figure 4-2 shows the daily long term yields for 20 and 30 year US treasury bonds. The main variations in number and volume of new issues can be traced to the changes in interest rate during the period. The declining yield between 1996 and 1998 can explain a rise in both number and volume of bonds issued by hospitals. Between 1998 and 1999 there was a rise in yield but the rates were still lower than between 1995 and 1996, which explains higher number and particularly volume in the 1999 fiscal year. However, higher yield during fiscal year 2000 resulted in the decrease in both number and volume. Similar decline can also be seen in 2002. Number and volume of bonds rose in 2001 and 2003 following the decrease in yield in those years. Overall, there seems to be no particular impact of BBA on the changes, which corroborates with the unchanged level of capital intensity and capital structure observed in earlier chapters.

The main change due to BBA can however be noted in the changes in the pattern of rating. Figure 4-3 through Figure 4-8 shows the number and percent of bonds with rating assigned to different categories by Moody's, S&P and Fitch over the period under study. Overall, more bonds were rated by S&P than either Moody's or Fitch. Number of bonds not rated by S&P increased till 1999 after which it fell till 2001 after which it again went up. In terms of percentage, however, there was not much difference till 1998. The percentage increased between 1999 and 2000 after which it fell in 2001 though it rose in 2002 before settling at the 1999 level for 2003 and 2004. In case of Moody's, number of non rated bonds went up between 1996 and 1999, since then it went down to a lower

level. Also, in terms of percentage there was not much variation over the years. Fitch rated fewer bonds, however the percent of non-rated bond went down in 1998. The percentage rose slightly over rest of the period.

On the other end of the spectrum, the number of excellent bonds rated by S&P rose steadily during 1996 -1998, after which it fell down to a lower level. Similar movement can be seen in terms of percentage. The period with the lowest percentage of excellent bonds was between 2001 and 2003. In 2004, the percentage returned to the levels of 1999 – 2000 though still lower than the level of 1996-1998. Bonds rated excellent by Moody's show similar trend, though the number and percent of excellent rated bonds remained higher than S&P during the period of fewer excellent ratings. Bonds rated excellent by Fitch rose in 1998 as did the number of bonds rated by Fitch during the period.

Not all bonds were rated by all the agencies. Among 478 bonds rated by Moody's, 140 were not rated by S&P and 221 were not rated by Fitch. Among 551 rated by S&P, 193 were not rated by Moody's and 289 were not rated by Fitch. Finally, among the 297 bonds rated by Fitch, 40 were not rated by Moody's and 55 were not rated by S&P. However, among the bonds, which were rated by more than one agency, pair-wise correlation was high, ranging from 0.93 (between Moody's and S&P) and 0.96 (between Moody's and Fitch).

Given the high correlation when rated, I create a composite rating equal to the lowest rating obtained from each agency. Studies by Billingsley et al. (1985); Liu and Moore (1987) and Thompson and Vaz (1990) have shown that in case of split rating (by Moody's and S&P), market yield are closer to the yield corresponding to the lower rating[30]. Ratings were grouped into categories as before. As there was only one bond rated in speculative category (by Moody's), it is classified in a single Adequate/Speculative category along with other adequate rated bonds.

Figure 4-9 and Figure 4-10 shows the number and percentage of the rating categories for the composite rating variable "minrating". This rating captures the important trends observed in the individual rating variables. Between 1996 and 1998, there was an increase in number of bonds rated in the top three categories. The number of bonds rated fell since 1999, as did the total number of new issues, but the percentage of exceptional bonds fell more dramatically. The percentage of non rated bond was below twenty percent for all of the years occasionally going down to close to 10 percent. Ratings show some improvement in 2004 as number and percent of exceptional bonds increased.

This trend can also be seen in Figure 4-11 and Figure 4-12 and is the focus of this study. There was a flattening of the rating distributions in post BBA period compared to the pre

[30] Two other studies argue that the yield reflects the higher rating (Hsueh and Kidwell 1988; Reiter and Ziebart 1991). However Jewell and Livingston (1999) points out that these results may be influenced by the characteristics of data used in these studies which may affect the generalizibility of their results.

BBA period. The adverse effect of BBA on financial condition would predict a similar shift in rating. Specifically, the significant negative effect on hospital profitability would imply that the percent of hospitals with good financial conditions would fall, increasing the percentage of hospitals with average financial condition. Further, the shift will push down the credit worthiness of some of the average hospitals who are likely not to benefit from rating. Since cost of credit enhancements on the bond is linked to the differential of underlying rating to an exceptional rated bond, the shift will also reduce credit enhancements (particularly credit insurance) further reducing the probability of obtaining high credit ratings.

Regression Analysis: Bond Ratings

The main purpose of this analysis is to evaluate the extent to which the changes in Figure 4-10 can be attributed to the changes in hospital financial condition due to BBA, after controlling for pre-BBA difference among firms in term of their financial condition, their Medicare services and other changes affecting the non-profit hospitals during the period. Earlier studies pursued different types of regression modeling assumptions for bond ratings. Cleverley and Nutt (1984) used a simple regression setup for the rating categories, while Sloan, Morrisey, and Valvona (1987) considered a multinomial model with rating categorized as non-rated (and missing), provisional rating and BBB to D rating categories with the highest rating category (above BBB) as base outcome. Later

studies by Craycraft (1994) and Watkins (2000) used probit and logit model respectively to model the bond ratings[31].

Given the special characteristics of the dependent variable, I first look at the effect of BBA on ratings using an ordered probit model. It has been argued by Kaplan and Urwitz (1979) that since bond ratings indicate ordinal information, an ordered discrete choice model is suitable for modeling ratings. However, these models also require a "parallel regression assumption" (Long and Freese 2006) i.e. it requires that the effect of the independent variables is constant over the categories of the dependent variable.

The parallel regression assumption is often violated in data (Williams 2006). It is also violated in the data considered in this study. While an ordered probit model allows for only changes in the constant term, a generalized ordered probit model (Fu 1998) allows for a completely unconstrained model while accounting for the ordered nature of the dependent variable. However, not all variables may be violating the parallel regression assumption, underlying an ordered probit model. Williams (2006) introduced an algorithm for a partial generalized ordered probit model, where assumptions of parallel regression are relaxed for cases where they are not justified. The algorithm uses Wald test repeatedly on each variable to identify whether parallel regression assumptions are

[31] The two studies are not explicit about whether they considered ordered model, however their reporting of one set of coefficients and their discussion about predictability of ratings, indicate they may have used ordered probit and ordered logit model respectively.

violated. Finally, after identifying the set of variables that do not violate the parallel regression assumptions, a global Wald test is used to verify whether the chosen partially constrained model do not violate the parallel regression assumptions.

Using the algorithm for the data used in this study, I find that the Medicare share adjusted BBA dummy variable, all pre-BBA financial ratios excluding capital structure, and all year dummies except for years 1997, 1998 and 1999 satisfies the parallel line assumptions while the others do not. Among other things, this implies that the Medicare share adjusted BBA dummy had similar effects on all type of ratings.

Table 4-2 and Table 4-3 show the results for the partially constrained generalized ordered probit model. Probability of being rated in exceptional category show a significant decline of 24.9 percent points due to BBA, while excellent and good category bonds increased by less than 3 percent and 9 percent points respectively.

Finally, I look at the effect of BBA on rating using a set of probit regressions. As dependent variables, I consider dichotomous variables indicating whether the bonds were rated in the top one category (exceptional) or not, rated in the top two categories (exceptional and excellent) or not and rated in the top three categories (exceptional, excellent and good) or not.

The results of the regression are show in Table 4-4 and Table 4-5. The probability of ratings being in the top one category or not was significantly affected by BBA with a marginal effect of 23 percent points. The probability of being in top two categories was also significantly affected with a marginal effect of 27 percent points. Finally, the probability of being rated anything above adequate or speculative was also significantly affected by BBA, with a marginal effect of 35 percent points. If the probability of being in the top three categories were unchanged while the probability of being in the top one category declined, it would have been possible to argue that the decline was limited only to the very highly rated bonds (which would be the only one affected by the changes in the credit insurance market), but that seems to be not the case here as probability of all ratings were adversely affected by BBA.

Carlson (2004) reported that the credit spread between AAA rated bonds and bonds with adequate ratings went up from 35 basis points in June 1998 to approximately 175 basis points in June 2000 and 125 basis points in June 2002. Bonds rated with good credit rating had a spread of approximately 85 basis points and 40 basis points in June 2000 and June 2002 respectively compared to 20 basis points in June 1998. This indicates the possible average increase in interest cost that hospitals faced, with decreasing probability of obtaining a rating in exceptional category and increasing probability of obtaining a rating in lower categories.

Regression Analysis: Decision to rate

Finally, I look at whether BBA had any significant effect on decision to rate. Among the bonds in the sample, the main difference in the decision to rate can be seen in the distribution of issue amount. Figure 4-13 shows the median and the inter-quartile range of issue amount for non-rated and rated bonds. The median issue amount of bonds that were rated ($33.67 million) is close to four times those which were not ($ 8.71 million). However, there are significant difference between rated and non-rated bonds in terms of their profitability and operational measures. In either case, the hospitals with rated bonds were with significantly higher total margin and higher occupancy rates (Table 4-1).

To evaluate the effect of decision to rate, I consider three specifications (Table 4-6, Table 4-7). The first specification is based on the model considered earlier. Using the specification, I find no significant effect of BBA on decision to rate. However, the first specification is valid if there are reasons to believe that BBA did not affect issue amount. The second specification drops the issue amount and it results in a significant effect of BBA on the decision to rate. The coefficient of the adjusted BBA dummy is also found to be higher than in the original specification. This may reflect the effect of changes in issue size after BBA[32].

[32] Given the fact that capital intensity and capital structure was unaffected by BBA, it is possible that lower average issue size after 1999 may be due to higher level of capital accumulation in prior periods (as capital prospective payment system was not fully effective till 2001) and not a consequence of changes introduced by BBA.

Though issue size variation is primarily determined by historic capital needs, the results indicate that it may have also varied with the introduction of the BBA, affecting the decision to rate. In that case, considering the issue size as a control variable may affect the identification of the effect of BBA on decision to rate. In a third specification, I introduce 20 year Treasury yield as a proxy for the effect of long term market interest rate which may also effect issue size separately than the possible effect of BBA. The coefficient for the market interest rate variable was found to be significant. However, even in this specification, BBA was found to have a significant adverse effect on decision to rate. Thus, based on the final specification, it can be seen that even though BBA did not affect capital intensity or capital structure, it resulted in fewer decision to rate. Probability of being rated went down by approximately 15.5 percent point due to BBA. Thus, the earlier result of an adverse effect of BBA on bond rating is only conditional on the bonds being rated. Since it is likely that only bonds expecting low ratings choose not to be rated, the full effect on rating is likely to be higher than what was initially estimated using the rating specification.

Conclusion:

In the earlier chapter, I found evidences of the effect of BBA on profitability and revenue of non-profit hospitals while the capital and debt remained unchanged. Such a condition may have affected the cost of borrowing for these hospitals. In this chapter, I explored the effect of BBA on the cost of borrowing faced by the hospital. Since BBA mainly affected

the financial condition of the hospitals, I use bond rating as a proxy for their cost. Using data from Thomson Financial SDC Platinum database on new issue, I find that BBA resulted in decline in average rating. Since bond rating is strongly related to cost of borrowing, this has important implication on non-profit hospitals' access to capital and consequently their ability to remain viable.

Future policy needs to look beyond profitability in evaluating the effect of revenue cuts on the financial condition of non-profit hospitals. Given the importance attributed to capital accumulation, future policy should also look at the consequence of those changes on cost of capital as it affects accessibility and therefore future viability of these hospitals.

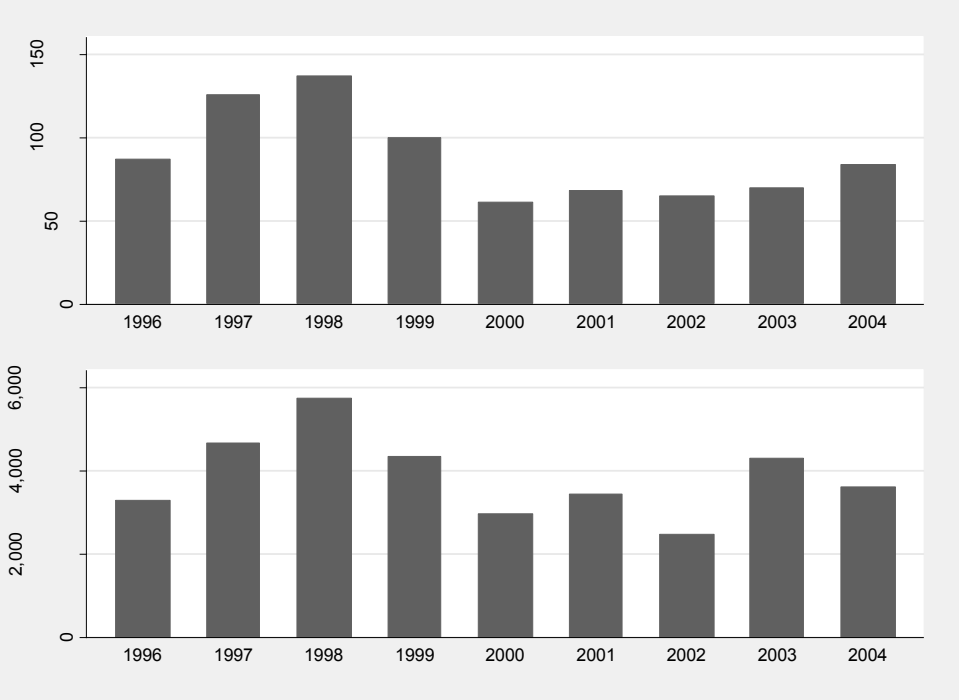

Figure 4-1: Distribution of bond issue (numbers and volume) between fiscal year 1996 and 2004

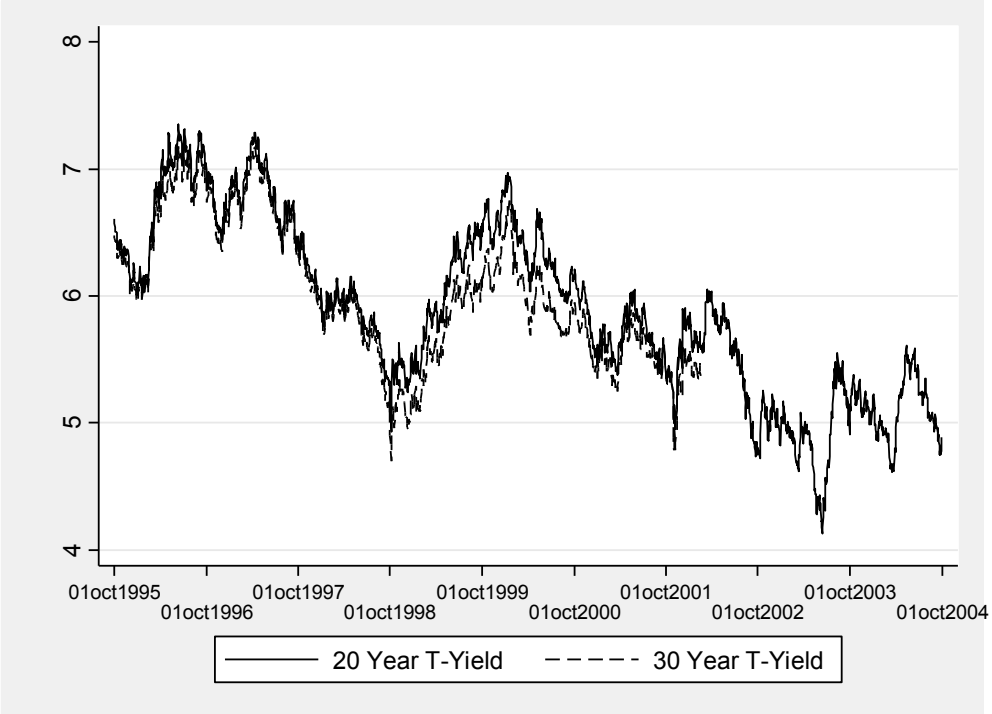

Figure 4-2: Long term government bond yield between fiscal year 1996 and 2004 (Source: US Department of Treasury)

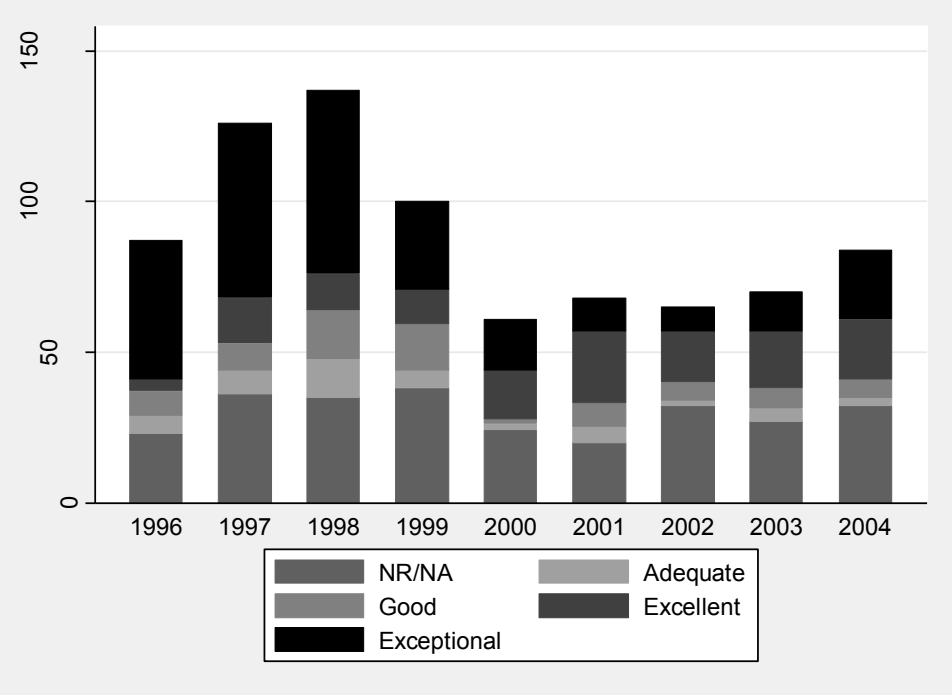

Figure 4-3: Rating distribution over years (S&P): Number of total bonds issued

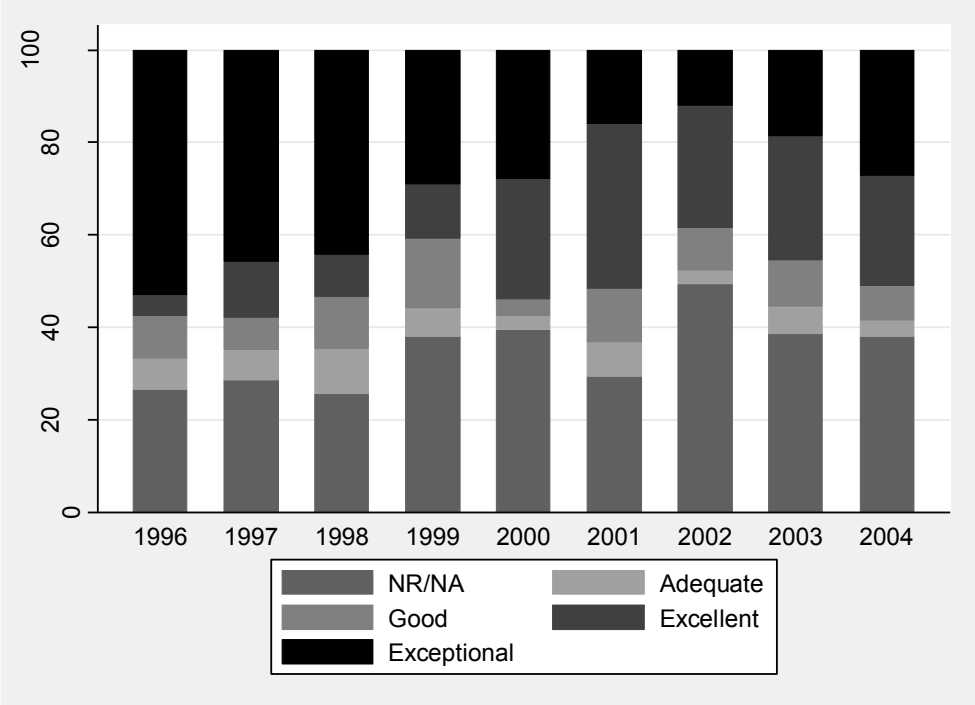

Figure 4-4: Rating distribution over years (S&P): Percent of total bonds issued

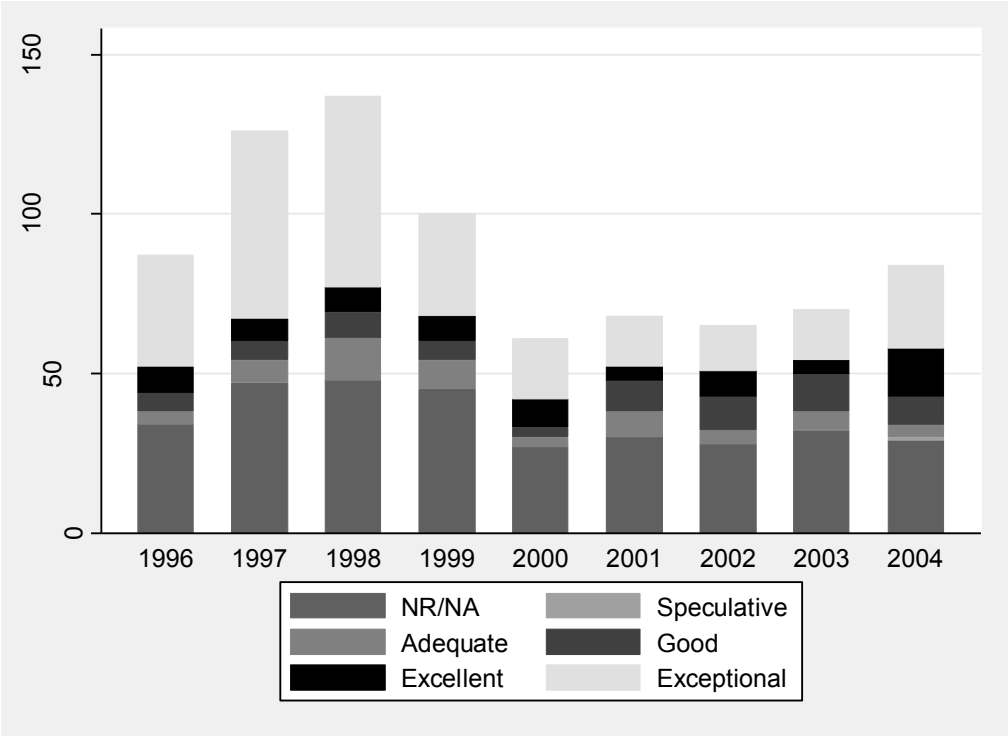

Figure 4-5: Rating distribution over years (Moodys'): Number of total bonds issued

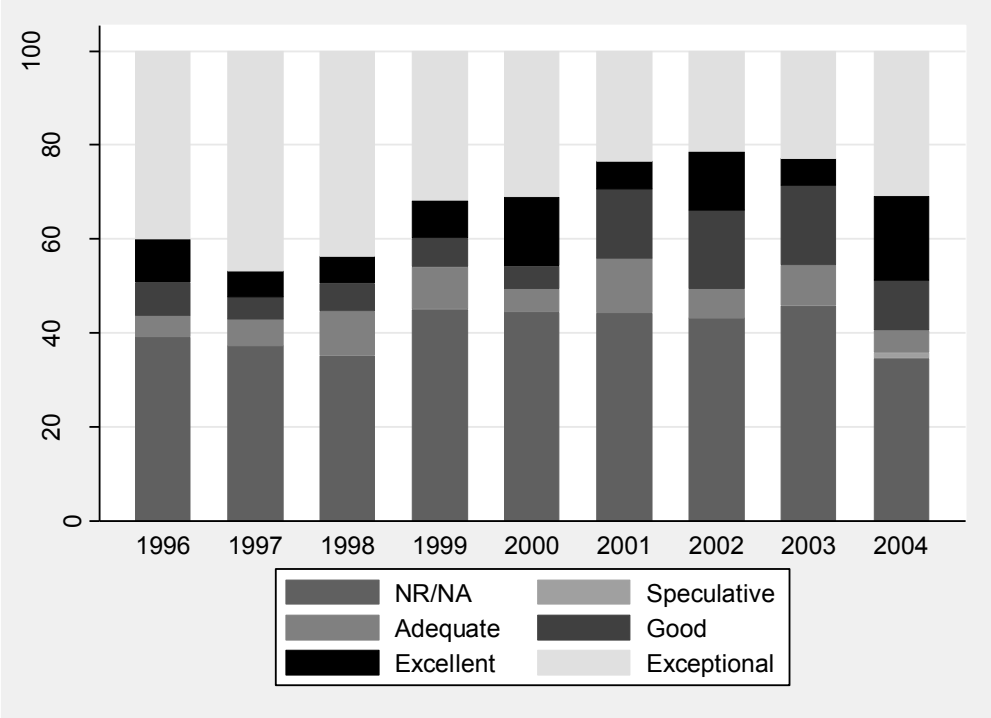

Figure 4-6: Rating distribution over years (Moodys'): Percent of total bonds issued

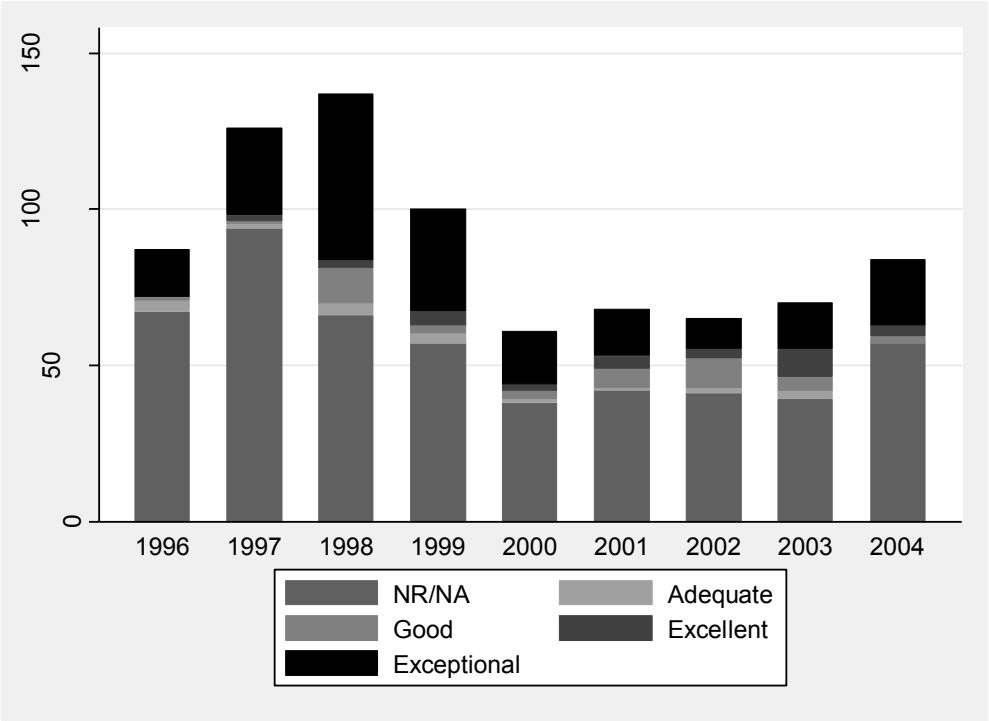

Figure 4-7: Rating distribution over years (Fitch): Number of total bonds issued

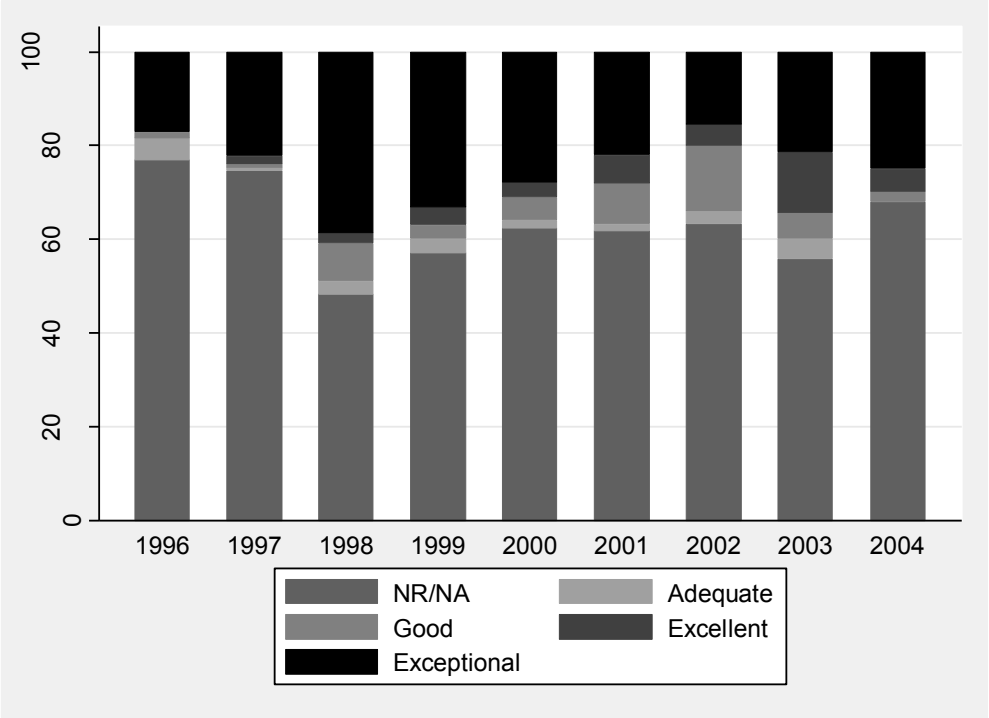

Figure 4-8: Rating distribution over years (Fitch): Percent of total bonds issued

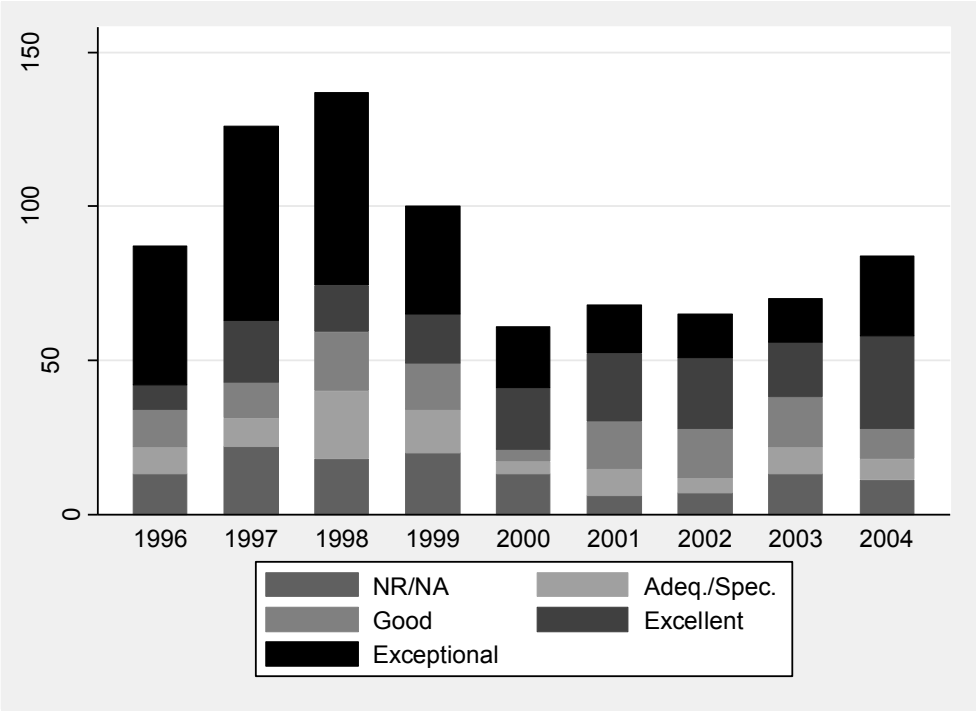

Figure 4-9: Rating distribution over years ("MinRating"): Number of total bonds issued

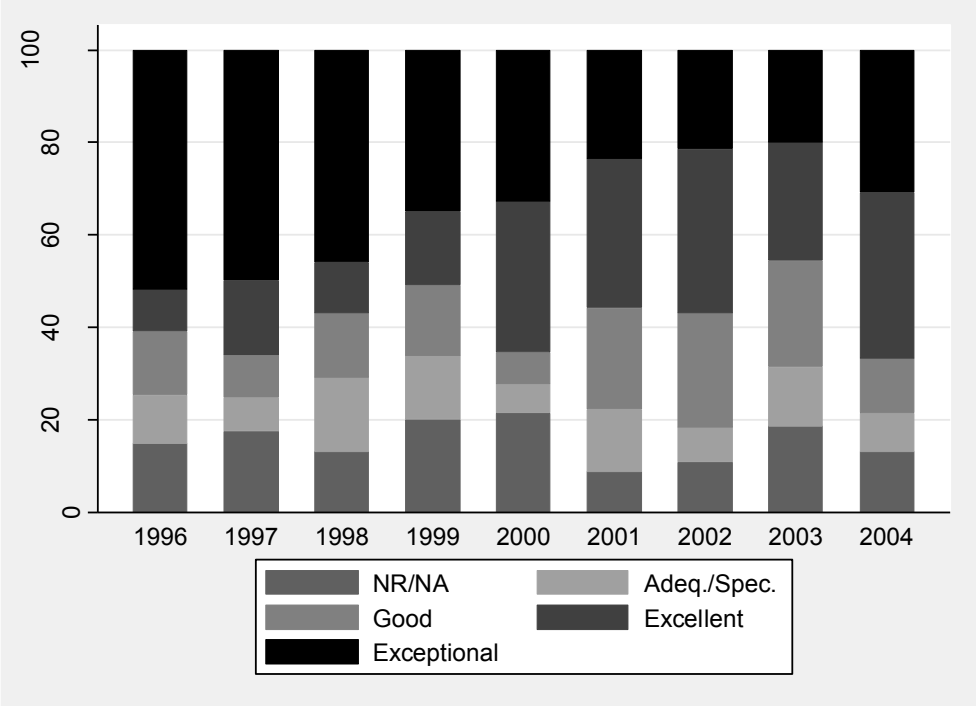

Figure 4-10: Rating distribution over years ("MinRating"): Percent of total bonds issued

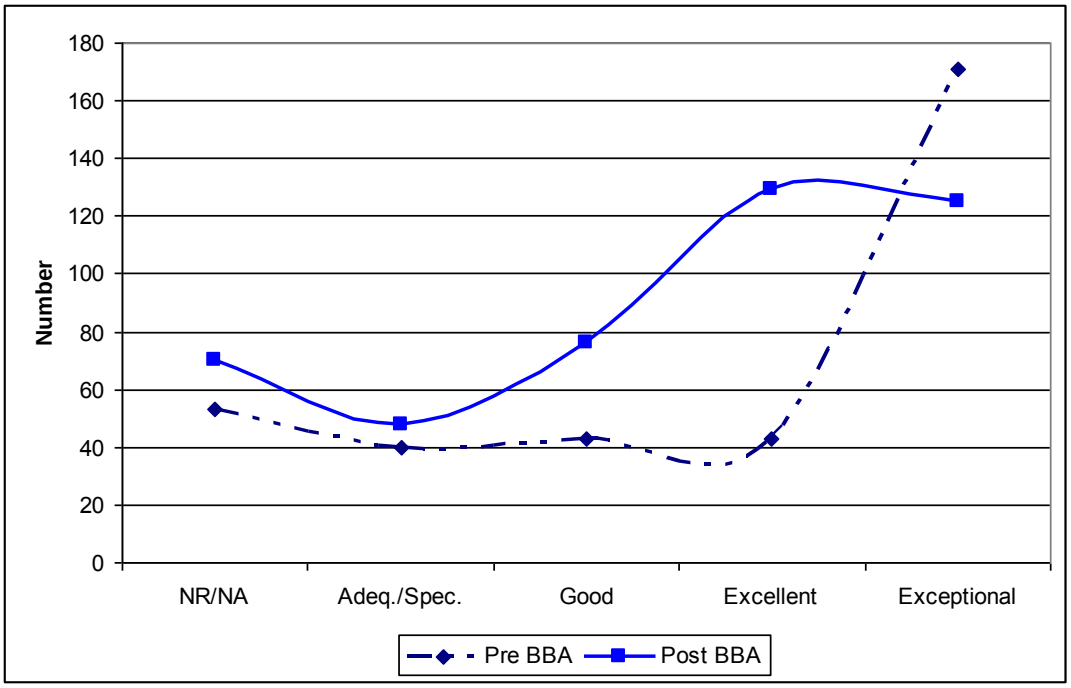

Figure 4-11: Distribution of "MinRating", before and after BBA: Number of total bonds issued

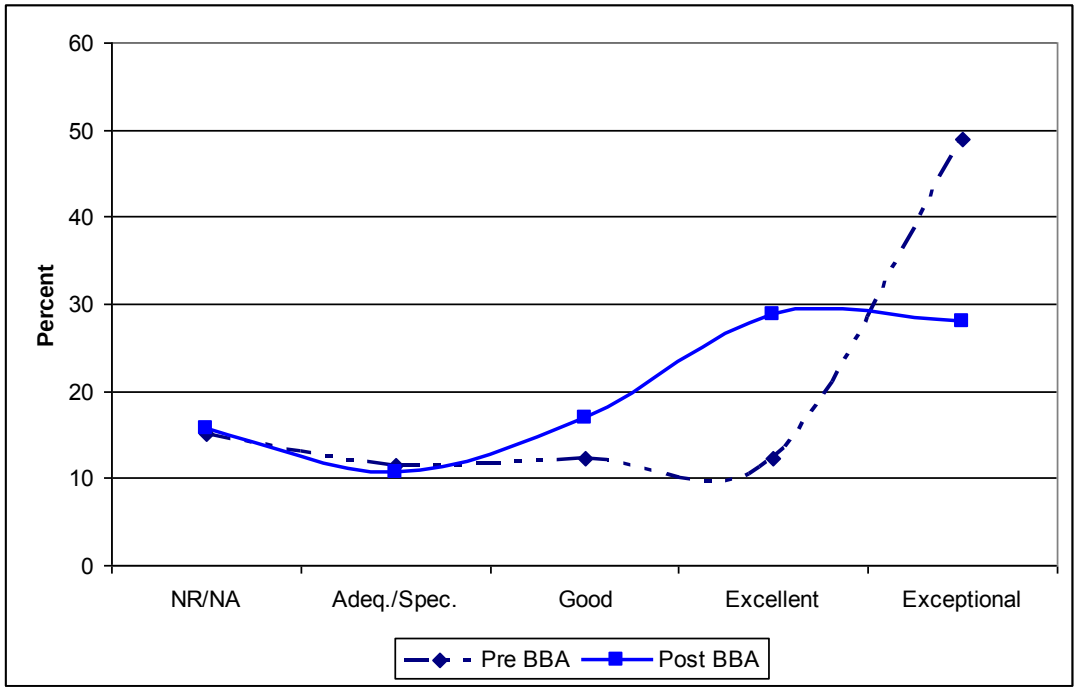

Figure 4-12: Distribution of "MinRating", before and after BBA: Percent of total bonds issued

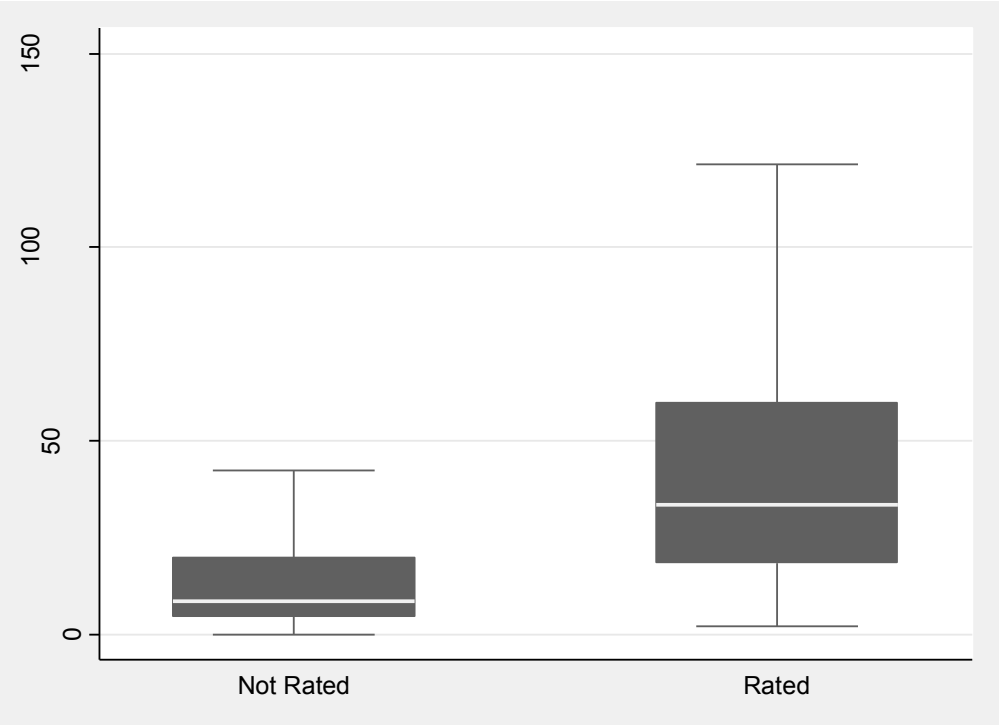

Figure 4-13: Box-plot of Issue Amount in millions for non-rated and rated bonds.

Table 4-1: Differences in financial and operational measures between rated and non-rated bonds

	Non-Rated Mean	Rated Mean	Difference in Mean
Total liabilities to Total assets	0.545	0.515	0.030
Total margin	0.024	0.045	-0.021 **
Total asset turnover	1.684	1.995	-0.310
Current Ratio	2.496	2.417	0.079
Occupancy rate	0.447	0.593	-0.146 ***
Issue Amount	15.509	48.873	-33.363 ***

*** Significant at 99.9% level of confidence

** Significant at 99% level of confidence

* Significant at 95% level of confidence

Table 4-2: Partially constrained Generalized Ordered Probit regression

	β	z-statitic
Highest category compared to those below		
BBAxMedicare Share	1.222 *	2.28
year 1997	-0.102	-0.56
year 1998	0.173	0.98
year 1999	-0.347	-0.98
year 2000	-0.2	-0.56
year 2001	0.267	0.73
year 2002	0.324	0.87
year 2003	0.32	0.88
Total Liabilities to Total Assets at 1997	-0.113	-0.32
Total Assets at 1997	-0.274	-0.92
Total Margin at 1997	-0.124	-0.35
Total Activity at 1997	0.128	1.87
Current Ratio at 1997	0.035	1.28
Occupancy Rate at 1997	-0.651 *	-2.18
Constant	0.043	0.15
Top two categories compared to those below		
BBAxMedicare Share	1.222 *	2.28
year 1997	-0.102	-0.56
year 1998	0.173	0.98
year 1999	-0.347	-0.98
year 2000	-0.919 *	-2.44
year 2001	-0.332	-0.91
year 2002	-0.293	-0.81
year 2003	-0.126	-0.35
year 2004	-0.796 *	-2.18
Total Liabilities to Total Assets at 1997	-0.145	-0.48
Total Margin at 1997	-0.124	-0.35
Total Activity at 1997	0.128	1.87
Current Ratio at 1997	0.035	1.28
Occupancy Rate at 1997	-0.651 *	-2.18
Constant	-0.443	-1.53

Table 4-2 (continued): Partially constrained Generalized Ordered Probit regression

	β		z-statitic
Top three categories compared to those below			
BBAxMedicare Share	1.222	*	2.28
year 1997	-0.102		-0.56
year 1998	0.173		0.98
year 1999	-0.347		-0.98
year 2000	-0.667		-1.65
year 2001	-0.434		-1.11
year 2002	-0.726		-1.82
year 2003	-0.303		-0.8
year 2004	-0.629		-1.62
Total Liabilities to Total Assets at 1997	1.081	**	2.97
Total Margin at 1997	-0.124		-0.35
Total Activity at 1997	0.128		1.87
Current Ratio at 1997	0.035		1.28
Occupancy Rate at 1997	-0.651	*	-2.18
Constant	-1.639	***	-5.27

*** Significant at 99.9% level of confidence
** Significant at 99% level of confidence
* Significant at 95% level of confidence

Table 4-3: Marginal Effects of BBA in the Partially constrained Generalized Ordered Probit regression

Rating categories	Marginal Effect (i)	Pre-BBA Medicare Share (ii)	Effect of BBA on average hospital (iii) = (i) x (ii)
Exceptional	-0.48	0.519	-0.249
Excellent	0.054	0.53	0.028
Good	0.178	0.552	0.098
Adequate/Speculative	0.249	0.557	0.139

Table 4-4: Probit regressions on bond rating

	Top 1 or below	Top 2 or below	Top 3 or below
BBAxMedicare Share	-1.228*	-1.333*	-2.114***
	(-2.044)	(-2.342)	(-3.361)
year 1997	-0.043	0.17	0.057
	(-0.236)	(0.917)	(0.284)
year 1998	-0.166	-0.103	-0.132
	(-0.927)	(-0.571)	(-0.684)
year 1999	0.173	0.455	0.866*
	(0.448)	(1.224)	(2.109)
year 2000	0.071	0.771*	0.909*
	(0.188)	(2.071)	(2.222)
year 2001	-0.214	0.624	1.263**
	(-0.554)	(1.664)	(2.961)
year 2002	-0.339	0.502	1.265**
	(-0.856)	(1.332)	(2.939)
year 2003	-0.301	0.329	0.962*
	(-0.778)	(0.89)	(2.326)
year 2004	0.097	0.918*	1.237**
	(0.255)	(2.459)	(2.961)
Total Liabilities to Total Assets at 1997	-0.165	-0.114	-0.704*
	(-0.561)	(-0.411)	(-2.410)
Total Margin at 1997	0.259	0.029	0.267
	(0.591)	(0.076)	(0.657)
Total Activity at 1997	-0.112	-0.198**	-0.209**
	(-1.527)	(-2.757)	(-2.739)
Current Ratio at 1997	-0.059	-0.011	-0.004
	(-1.653)	(-0.351)	(-0.104)
Occupancy Rate at 1997	1.839***	1.517***	1.901***
	(5.896)	(5.286)	(6.285)
Constant	-0.616*	-0.211	0.289
	(-2.072)	(-0.756)	(0.979)

*** Significant at 99.9% level of confidence
** Significant at 99% level of confidence
* Significant at 95% level of confidence

Table 4-5: Marginal Effects of BBA in the Probit regressions on bond rating

	Marginal Effect (i)	Pre-BBA Medicare Share (ii)	Effect of BBA on average hospital (iii) = (i) x (ii)
Top 1 or below	-0.456	0.519	-0.237
Top 2 or below	-0.519	0.523	-0.271
Top 3 or below	-0.667	0.529	-0.353

Table 4-6: Probit regressions on decision to rate

	Specification I	Specification II	Specification III
BBAxMedicare Share	-0.867	-1.507*	-1.475*
	(-1.12)	(-2.110)	(-2.060)
year 1997	-0.081	-0.086	-0.03
	(-0.300)	(-0.370)	(-0.130)
year 1998	-0.142	0.017	-0.376
	(-0.520)	(0.070)	(-1.320)
year 1999	0.129	0.495	0.057
	(0.250)	(1.050)	(0.110)
year 2000	-0.185	0.374	0.197
	(-0.350)	(0.800)	(0.410)
year 2001	0.45	1.228*	0.754
	(0.790)	(2.390)	(1.370)
year 2002	0.367	0.863	0.331
	(0.660)	(1.710)	(0.600)
year 2003	0.006	0.716	-0.161
	(0.011)	(1.470)	(-0.270)
year 2004	0.27	0.876	0.079
	(0.51)	(1.820)	(0.140)
Total Liabilities to Total Assets at 1997	-0.377	-0.355	-0.337
	(-0.980)	(-1.050)	(-0.990)
Total Margin at 1997	-0.154	0.16	0.156
	(-0.280)	(0.340)	(0.340)
Total Activity at 1997	-0.168	-0.223*	-0.231**
	(-1.660)	(-2.540)	(-2.620)
Current Ratio at 1997	-0.012	0.007	0.007
	(-0.290)	(0.160)	(0.170)
Occupancy Rate at 1997	1.126**	2.757***	2.776***
	(2.740)	(7.815)	(7.810)
log Issue Amount	0.765***		
	(8.950)		
20Yr T-Yield			-0.497*
			(-2.530)
Constant	-1.113**	0.127	3.446*
	(-2.740)	(0.370)	(2.530)

*** Significant at 99.9% level of confidence

** Significant at 99% level of confidence

* Significant at 95% level of confidence

Table 4-7: Marginal Effects of BBA in the Probit regressions on decision to rate

	Marginal Effect (i)	Pre-BBA Medicare Share (ii)	Effect of BBA on average hospital (iii) = (i) x (ii)
Specification I	-0.133	0.533	-0.071
Specification II	-0.302	0.533	-0.161
Specification III	-0.291	0.533	-0.155

Chapter 5 Conclusions

In this research, I study the effects of changes in Medicare payments on financial conditions of non-profit hospitals. Specifically I look at effects of changes introduced in the Balanced Budget Act of 1997. Non-profit hospitals are a very important part of the healthcare delivery system. The largest share of revenue for non-profits comes from Medicare payments. Thus, they are strongly affected by changes in Medicare payments. Medicare and other public payers will be under constant pressure in the near future because of the demographic changes associated with the aging of the "baby boom generation". Understanding the consequences of these changes on hospital finances will be relevant in framing similar policy changes in the future.

The BBA, which was enacted over 1998 – 2002, introduced an overhaul of the payment system for hospitals by introducing PPS in almost all hospital departments. It also reduced payment rates for already existing programs. In this research, I look at the cumulative effect of these changes, in three steps. First, I identify the important measures of non-profit hospitals financial and operational performance during the period using a factor analysis. Subsequently I study the changes in those measures, before and after BBA. Further, I examine whether the changes introduced by the BBA affected capital use. Finally, I look at the possible effect of these changes on cost faced by hospitals raising capital from municipal bond market.

The existing literature, which summarizes the main dimensions of financial and operational performance of non-profit hospitals using factor analysis, observes that factors and their importance may shift with changing financial environment facing the hospitals. Medicare payment changes in earlier years resulted in changes in factors over time. To address the effect of a similar change in Medicare policies due to the BBA, I consider a factor analysis of financial and operational ratios of private non-profit acute care hospitals during 1996 to 2004 using financial and operational information from HCRIS 2552:96 data and CMS Historical Impact files.

The analysis identifies five factors consistently for all years in the study. The most important factor is one related to capital structure, which explains at least two-fifth of the variation in all ratios. The next important factor, related to profitability, explains close to one fifth of the variation. The remaining factors related to activity/revenue, liquidity and operational efficiency/volume, explains the remaining two fifth of the variation. These results highlight the importance of use of debt capital among non-profits and its importance on their performance.

Since the main effect of BBA on hospitals was through its revenue, it is possible that BBA also affected these performance measures. In a regression framework, I studied the changes in those measures due to BBA. As proxies for the performance measures, I consider the ratios, which showed the strongest correlation to these factors. The main

finding from the study is that capital structure ratios did not show significant change, though there was a significant reduction in profitability, which went down approximately by 17 percent. An equally important observation was that such impact on profitability did not result in any significant change in their capital structure.

Separate studies on different types of hospital shows that hospitals with additional facilitates, like SNF and HHA fared better than average (except that one measure of profitability fell for SNFs). Teaching hospitals did worse than average even though their finances improved after additional payments in BBRA. DSH hospitals were the worst affected because of the dismantling of the DSH payment systems and the additional changes which effectively reduced compensation for bad debts.

The regression result also corroborates the importance of capital structure observed in the factor analysis. Hospitals on average were able to keep their capital structure at the same level even as they had falling profitability. This also resulted in their maintaining the same level of capital intensity. However, this particular scenario creates a different type of problem for the hospitals. The pressure on profitability resulted in hospital's accessing capital at a higher cost.

Since financial condition of the hospital is related to its ability to support debt, I then look at possible changes in cost of capital due to the BBA. I look at the effect of BBA on cost of capital raised in tax-exempt municipal bond market. I assume that the effect of BBA is mainly restricted to the institutional risk and hence concentrate on changes in credit rating instead of true interest cost.

Using data from Thomson Financial SDC Platinum database for new issues in municipal bond market, I find that BBA resulted in significant decline in the probability of getting higher bond ratings among bonds that were rated after BBA. The differential between 'exceptional' rated bonds and 'adequate' and 'good' credit rated bonds were about 175 and 85 basis points respectively in 2000. This indicates the additional cost burden faced by the average hospital issuing bonds after the BBA

To summarize, the main effect of BBA on non-profit hospitals was the decline in their profitability. The reduction in revenue however did not adversely affect use of capital and debt. However, there are evidences that it resulted in increased cost of borrowing by affecting the probability of higher bond rating. Increases in cost of capital may create impediments to capital access and have undesirable effect on non-profit hospitals. Acknowledging the importance of use of debt capital in these hospitals is critical for future policy changes as they are the most important determinant of their performance and viability.

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