Financial Analysis of National University Hospitals in Korea

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Abstract

Objectives: This paper provides information for decision making of the managers and the staff of national university hospitals.

Methods: In order to conduct a financial analysis of national university hospitals, this study uses reports on the final accounts of 10 university hospitals from 2008 to 2011.

Results: The results of comparing 2008 and 2011 showed that there was a general decrease in total assets, an increase in liabilities, and a decrease in total medical revenues, with a continuous deficit in many hospitals. Moreover, as national university hospitals have low debt dependence, their management conditions generally seem satisfactory. However, some individual hospitals suffer severe financial difficulties and thus depend on short-term debts, which generally aggravate the profit and loss structure. Various indicators show that the financial state and business performance of national university hospitals have been deteriorating.

Conclusion: These research findings will be used as important basic data for managers who make direct decisions in this uncertain business environment or by researchers who analyze the medical industry to enable informed decision-making and optimized execution. Furthermore, this study is expected to contribute to raising government awareness of the need to foster and support the national university hospital industry.

1. Introduction

Unlike private hospitals that are managed for profitability, national university hospitals are special organizations that provide the medical services equivalent of public goods. Moreover, as key organizations in the public medical delivery system, national university hospitals play a leading role in the hospital services of each metropolitan administration unit in terms of three aspects: medical treatment, research, and education. However, due to their bureaucracy and inefficiency of management, these hospitals are not well regarded by the patients who visit them [1]. Moreover, most hospitals cannot avoid an annual financial deficit; this keeps national university hospitals

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hospitals from being optimistic regarding their growth prospects. In particular, given the current emphasis on patient-centered management and efficiency, there has been a growing tendency to criticize the operational methods of national university hospitals. Such hospitals had settled into a bureaucratic mode; now, however, national institutions must also increase profitability through financial soundness and management efficiency [2].

For efficient management of hospitals, it is important to achieve profitability; to do so, hospitals must identify all the factors that influence profitability, and come up with a management plan. The financial ratio indicators of hospitals display the relationships among items included in the financial statements in the form of ratios. It is therefore easy to determine the financial position and business performance of the organization [3]. These indicators have long been acknowledged as essential prerequisites for external stakeholders such as investors and creditors, as well as internal stakeholders such as managers to make business decisions. Thus far, studies conducted by associating financial ratios with the business performance of hospitals have showed the following results. A study by Cleverley et al that examined all hospitals in the United States revealed that profitability, short-term cash holdings, and capital structure are indicators with high explanation power [4]. Goldstein et al [5] analyzed the differences in financial ratios between the manufacturing industry and hospitals, and selected eight vital financial ratios: return on assets, cash holdings, debt structure, working capital flow, net income to stockholders’ equity, short-term liquidity, accounts receivable recovery, and cash flow. They then highlighted working capital flow, net income to stockholders’ equity, and cash flow as indicators reflecting a hospital’s characteristics [6]. Trinh et al [7] hold that profitability, fixed asset efficiency, capital structure, years of fixed asset acquisition, working capital efficiency, liquidity, and debt service coverage ratio are the indicators that can accurately explain the financial performance of hospitals. Bolon et al [8] argued that the significant financial ratios are profitability, capital structure, working capital efficiency, fixed asset efficiency, fixed asset acquisition period, liquidity, net income to stockholders’ equity, and debt service coverage ratio. After determining the financial performance trend of health centers, Younis et al [9] announced the findings that revenue from donations, medical insurance for the disabled, the cost of visiting, and medical personnel expenses have, in general, increased, whereas the general productivity of medical specialists has decreased. Furthermore, with regard to the characteristics of individual financial variables, they found that health centers in cities, and those with many chronically ill patients and prenatal care users, tended to show superior financial performance [10].

The profitability indicator of hospitals is the most important and ultimate standard that shows their business performance. Since the late 1980s, scholars have actively sought to pinpoint the factors that influence the profitability of hospitals, and to explore hospital management plans. The variables that influence hospital profitability have varied in each study: debt dependence, hospital size, and market share in the study by Choi et al [11]; whether or not the hospital is university, year of foundation, debt dependence, and number of medical services in the study by Gapenski et al [12]; number of beds, asset portfolio, age of hospital, region, tax benefits, and business risks in the study by Choi et al [13]; and ownership structure, size, and market share in the study by Ozcan et al [14]. According to these previous studies, financial statements are the source for analysis of the changes in the business environment. Therefore, this study aims to provide hospital managers and other concerned information users with various useful data on the revenue flow and financial soundness of national university hospitals by analyzing the flow of revenue changes in national university hospitals. This study uses liquidity, stability, growth, activity, and profitability, i.e., the information most universally used in analyzing financial ratios.

### 2. Materials and methods

In order to conduct a financial analysis of national university hospitals, this study uses reports on the final accounts of 10 university hospitals from 2008 to 2011. The current ratio and quick ratio have been analyzed to verify liquidity based on financial statements. Debt ratio, fixed ratio, and other indicators of capital dependence have been examined to verify soundness. Finally, the profit rate of total liabilities, net worth, operating profit to total assets, profit ratio of net worth, and profit margin on sales have been examined to determine profitability. This study analyzed the medical profit ratio to gauge profitability instead of the ratio of ordinary profit that is generally used. This was done because national university hospitals are nonprofit corporations; it is therefore difficult to accurately analyze profitability with only ordinary profit due to the accounting rule that enables such nonprofit corporations to handle medical revenues as transferred-out money to corporations or reserve for essential businesses. To examine activity, this study inspected the turnover ratio of total liabilities and net worth, turnover of net worth, and sales to working capital ratio. Finally, increases in the rate of medical revenue and total capital have been examined to determine growth.

### 3. Results

#### 3.1. Total assets

The university hospital with the highest total assets as of 2011 had 607.7 billion KRW, whereas the one with the lowest assets had 95.14 billion KRW. In terms of
asset size, there were six hospitals with assets <300 billion KRW, and four hospitals >300 billion KRW. The total assets of the 10 national university hospitals increased by 44%—from 208.85 billion KRW to 299.77 billion KRW—between 2008 and 2011. In terms of individual hospitals, B showed the highest rate of increase at 124%, whereas C showed the lowest rate at 17% (Table 1).

### 3.2. Total liabilities

Table 2 shows that total liabilities have increased constantly every year from 2008, when this figure was at 208.85 billion KRW. It increased by 16% in 2009 (243.69 billion KRW), by 34% in 2010 (280.04 billion KRW), and by 44% in 2011 (299.77 billion KRW). In terms of individual hospitals, the liabilities of nine university hospitals have increased, with the highest rate of increase in B, at 153%, and the lowest in I, which showed a 5% decrease.

### 3.3. Medical revenues

Medical revenues are obtained in return for providing medical services by conducting medical activities, and are categorized into revenues from hospitalization, revenues from outpatients, and other medical revenues. Table 3 shows that the total medical revenues of university hospitals increased from 208.32 billion KRW in 2008 to 239.75 billion KRW (by 15%) in 2009, 264.34 billion KRW (by 26%) in 2010, and 282.83 billion KRW (by 36%) in 2011. In terms of individual hospitals, H showed the highest increase rate with 95%, whereas C showed the lowest rate with 14%.

### 3.4. Net proceeds

Table 4 shows that only a few of the 10 university hospitals show a surplus in each year from 2008 to 2011, whereas the rest show a deficit. The reason why most hospitals have shown a deficit in terms of income statements is that nonprofit corporations such as national university hospitals can handle “transferred-out money to corporations” and “reserve for essential businesses” as nonmedical expenses [15]. Therefore, profit and loss can only be accurate if reserve for essential businesses and transferred-out money to corporations are not handled as nonmedical expenses but are recalculated by conversion into net profits. Table 5 shows that current net profit has increased in each year compared with Table 4. As such, there are hospitals that showed a continuous deficit even when items under “transferred-out money to corporations” and “reserve for essential businesses” were reflected in profit and loss; the overall management conditions of hospitals deteriorated as the number of hospitals showing a deficit increased from three in 2008 to six in 2011.

### 3.5. Liquidity

Liquidity indicates short-term solvency of hospitals. If the liquidity of a hospital becomes aggravated, its solvency also deteriorates and thus its date of payment for purchase liabilities (accounts payable) gets delayed. As a result, suppliers may add and claim interest as appropriate, or refuse to supply, further aggravating the liquidity of the hospital in a vicious cycle [16]. This study analyzed the current ratio quick ratio to gauge the liquidity of national university hospitals. Current ratio is a ratio that measures whether the performance capacity of short-term liabilities is sufficient; it is calculated by dividing current assets by current liabilities. Short-term soundness may seem adequate if the current ratio is high. However, it is important to note that if there are excessive current assets, the funds will turn idle, and thereby lead to erosion in profitability. The result of the analysis showed that the average current ratio of national university hospitals in 4 years was 169.4%. The ratio that is demanded in general is 200%, but hospitals may have a lower ratio with no trouble as they have stable incomes. The quick ratio is a ratio calculated by dividing quick assets with the quickest encashment speed of current liabilities. In general, quick assets are monetary assets and an immediate means of payment for

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**Table 1.** Total assets of national university hospitals (million KRW, %).

|     | 2008  | 2009  | 2010  | 2011  | Rate of change |
|-----|-------|-------|-------|-------|----------------|
| A   | 68,114| 76,825| 85,895| 99,127| 46             |
| B   | 164,856| 209,695| 336,365| 369,756| 124            |
| C   | 132,446| 145,648| 150,564| 154,831| 17             |
| D   | 464,197| 519,171| 567,817| 590,010| 27             |
| E   | 448,851| 491,933| 549,885| 607,703| 35             |
| F   | 303,790| 338,466| 369,832| 393,337| 29             |
| G   | 157,071| 197,213| 245,023| 267,666| 70             |
| H   | 159,239| 200,800| 204,230| 200,293| 26             |
| I   | 113,465| 164,145| 190,983| 219,911| 94             |
| J   | 76,515  | 93,040| 99,860| 95,141| 24             |
| Average | 208,854| 243,693| 280,045| 299,777| 44             |

KRW = Korean Won.
liabilities; thus, this ratio should ideally be at above 100%. The average quick ratio of national university hospitals from 2008 to 2011 turned out to be 164.8% (Table 6).

The result also showed that the average current ratio of national university hospitals in 4 years was 158.6—186.5%. The number of hospitals with the recommended value of 200% and above was two in 2008 (A, H), two in 2009 (A, H), one in 2010 (H), and two in 2011 (G, H). The average quick ratio of national university hospitals from 2008 to 2011 was 154.0—182.9%. Furthermore, the number of individual hospitals with a ratio of 100% and above was seven in 2008, 10 in 2009, nine in 2010, and nine in 2011.

### 3.6. Stability

The average debt ratio of national university hospitals from 2008 to 2011 was high, at 246.7% (Table 7).

### Table 2. Total liabilities of national university hospitals (million KRW, %).

| Year | A  | B  | C  | D  | E  | F  | G  | H  | I  | J  | Average |
|------|----|----|----|----|----|----|----|----|----|----|---------|
| 2008 | 19,456 | 106,447 | 69,962 | 339,347 | 403,502 | 211,334 | 78,073 | 47,796 | 84,057 | 68,881 | 142,885 |
| 2009 | 22,262 | 133,314 | 75,238 | 386,219 | 439,042 | 241,040 | 88,095 | 74,840 | 99,460 | 73,925 | 163,343 |
| 2010 | 27,608 | 255,236 | 75,412 | 399,007 | 485,084 | 261,997 | 114,885 | 76,317 | 70,717 | 76,586 | 184,284 |
| 2011 | 37,080 | 269,096 | 78,782 | 411,546 | 523,719 | 275,884 | 109,319 | 75,446 | 80,188 | 79,548 | 194,060 |
| Rate of change | 91 | 153 | 13 | 21 | 30 | 31 | 40 | 58 | -5 | 15 | 45 |

### Table 3. Medical revenues of national university hospitals (million KRW, %).

| Year | A  | B  | C  | D  | E  | F  | G  | H  | I  | J  | Average |
|------|----|----|----|----|----|----|----|----|----|----|---------|
| 2008 | 37,798 | 240,620 | 143,088 | 226,747 | 581,191 | 336,292 | 202,053 | 41,191 | 181,122 | 93,138 | 208,323 |
| 2009 | 46,747 | 267,062 | 153,744 | 324,535 | 631,653 | 380,399 | 228,099 | 53,881 | 205,767 | 105,678 | 239,756 |
| 2010 | 57,141 | 283,989 | 161,320 | 388,306 | 692,860 | 407,570 | 244,820 | 69,348 | 226,037 | 112,022 | 264,341 |
| 2011 | 62,191 | 315,496 | 162,507 | 430,299 | 750,859 | 429,876 | 243,911 | 80,222 | 237,246 | 115,771 | 282,837 |
| Rate of change | 65 | 31 | 14 | 90 | 29 | 28 | 21 | 95 | 24 | 36 |

### Table 4. Net profits of national university hospitals (million KRW, %).

| Year | A  | B  | C  | D  | E  | F  | G  | H  | I  | J  | Average |
|------|----|----|----|----|----|----|----|----|----|----|---------|
| 2008 | -1,963 | 40 | 1,296 | -11,447 | -38,114 | -12,064 | 6,468 | 794 | 2,798 | -2,558 | -3,539 |
| 2009 | 345 | 69 | 241 | -26,056 | -6,073 | -13,960 | 16,148 | -3,499 | 2,692 | -1,417 | -2,910 |
| 2010 | 625 | -3,911 | 1,244 | 1,350 | -12,302 | 159 | 16,076 | -2,923 | 11,249 | -2,388 | 1,526 |
| 2011 | -3,040 | -11,812 | -6,382 | -19,403 | -871 | 120 | 10,078 | -4,536 | 9,950 | -8,828 | -3,439 |
| Rate of change | -55 | -29,293 | -593 | -69 | -871 | -101 | 56 | -671 | 256 | -245 | -3 |
However, it tended to decrease: from 305.4% in 2008 to 237.1% in 2009, 222.6% in 2010, and 221.7% in 2011. In regard to other capital dependence, the desirable ratio of liabilities in total assets is < 50%, and the short-term debt ratio should ideally be lower. The average debt dependence of national university hospitals was 59.8%. However, it tended to decrease from 62.2% in 2008 to 60.1% in 2009, 58.5% in 2010, and 58.6% in 2011.

Capital adequacy ratio is the ratio of capital in total assets, and it should ideally be at 50% and above. The result of the analysis showed that the average capital adequacy ratio was 40.1%. The number of hospitals that exceeded 50% was two in 2008, three in 2009, four in 2010, and four in 2011.

### 3.7. Profitability

For hospitals, operating profit to total assets is the medical profit ratio to total assets, indicating how much medical profits (medical revenues – medical expenses) are generated from total assets. The average operating profit to total assets ratio of university hospitals was –2.3% in 2008, –0.3% in 2009, 0.1% in 2010, and –4.3% in 2011 (Table 8). In terms of individual hospitals, the number of hospitals with a negative operating profit to total assets ratio was eight in 2008, seven in 2009, five in 2010, and 10 in 2011; five hospitals showed a negative operating profit to total assets ratio for 4 years in a row. Medical return on equity is the percentage of medical profits in the owner’s capital; it is an indicator that measures the profitability of invested assets. A higher ratio indicates higher profitability. The average medical return on equity for national university hospitals was 14.3% in 2008, 3.1% in 2009, 0.1% in 2010, and 17.2% in 2011. In terms of individual hospitals, the number of hospitals with negative medical return on equity was eight in 2008, seven in 2009, six in 2010, and 10 in 2011. Furthermore, medical return on equity per hospital in 2011 showed a huge gap among hospitals with a maximum 0.7% and a minimum of 67.1%; five hospitals showed negative medical return on equity for 4 years in a row.

A hospital’s operating margin is calculated by dividing medical profits by medical revenues; medical profits are obtained by subtracting medical expenses from medical revenues.

### Table 5. Net profits of national university hospitals, including reserve for essential businesses and transferred-out money (million KRW, %).

|       | 2008       | 2009       | 2010       | 2011       | Rate of change |
|-------|------------|------------|------------|------------|----------------|
| A     | −1,963     | 345        | 625        | −3,040     | −55            |
| B     | 6,842      | 19,758     | 18,145     | −28,385    | −514           |
| C     | 1,296      | 241        | 1,244      | −6,382     | −593           |
| D     | 5,669      | −26,941    | −825       | −2,680     | −147           |
| E     | −6,023     | 54,091     | 66,720     | 53,172     | 892            |
| F     | −785       | 5,030      | 12,638     | 3,960      | 604            |
| G     | 6,464      | 16,147     | 16,076     | 10,078     | 55             |
| H     | 582        | −3,631     | −3,088     | −4,701     | −907           |
| I     | 4,721      | 16,067     | 11,249     | 9,950      | 110            |
| J     | −2,558     | −1,417     | −1,388     | −8,828     | −245           |
| Average | 18,884   | 82,723     | 125,124    | 26,028     | 37             |

|       | 2008       | 2009       | 2010       | 2011       |
|-------|------------|------------|------------|------------|
| A     | 444.4      | 431.6      | 337.2      | 318.6      |
| B     | 127.7      | 125.0      | 110.4      | 108.0      |
| C     | 143.4      | 138.5      | 136.3      | 130.0      |
| D     | 61.6       | 60.8       | 104.5      | 102.7      |
| E     | 128.0      | 123.9      | 144.0      | 139.7      |
| F     | 140.1      | 143.8      | 164.3      | 162.4      |
| G     | 171.4      | 170.5      | 184.9      | 183.7      |
| H     | 455.3      | 443.4      | 245.6      | 226.4      |
| I     | 93.4       | 93.1       | 183.9      | 183.3      |
| J     | 99.6       | 98.2       | 124.4      | 123.0      |
| Average | 186.5   | 182.9      | 173.6      | 167.8      |

**Table 6.** Liquidity of national university hospitals (million KRW, %).

|       | 2008  | 2009  | 2010  | 2011  | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
|-------|-------|-------|-------|-------|---|---|---|---|---|---|---|---|---|---|---|
| A     | 444.4 | 431.6 | 337.2 | 318.6 | 195.3 | 180.1 | 156.3 | 145.4 |     |     |     |     |     |     |
| B     | 127.7 | 125.0 | 110.4 | 108.0 | 70.6  | 69.0  | 119.4 | 116.8 |     |     |     |     |     |     |
| C     | 143.4 | 138.5 | 136.3 | 130.0 | 142.7 | 136.0 | 131.4 | 126.2 |     |     |     |     |     |     |
| D     | 61.6  | 60.8  | 104.5 | 102.7 | 132.4 | 130.4 | 131.4 | 129.5 |     |     |     |     |     |     |
| E     | 128.0 | 123.9 | 144.0 | 139.7 | 160.9 | 157.2 | 140.5 | 137.3 |     |     |     |     |     |     |
| F     | 140.1 | 143.8 | 164.3 | 162.4 | 165.5 | 164.2 | 175.6 | 172.0 |     |     |     |     |     |     |
| G     | 171.4 | 170.5 | 184.9 | 183.7 | 197.1 | 196.0 | 252.8 | 251.5 |     |     |     |     |     |     |
| H     | 455.3 | 443.4 | 245.6 | 226.4 | 227.8 | 216.4 | 217.4 | 205.0 |     |     |     |     |     |     |
| I     | 93.4  | 93.1  | 183.9 | 183.3 | 182.4 | 181.7 | 162.3 | 161.9 |     |     |     |     |     |     |
| J     | 99.6  | 98.2  | 124.4 | 123.0 | 110.8 | 109.1 | 102.0 | 98.7  |     |     |     |     |     |     |
| Average | 186.5 | 182.9 | 173.6 | 167.8 | 158.6 | 154.0 | 158.9 | 154.4 |     |     |     |     |     |     |

1 = current ratio; 2 = quick ratio.
such as labor costs and material costs from medical revenues. Thus, this becomes the standard for measuring the performance of hospitals. The average operating margin of national university hospitals was –2.4% in 2008, –1.5% in 2009, –0.4% in 2010, and –4.7% in 2011. In terms of individual hospitals, the number of hospitals with a negative operating margin was eight in 2011. In terms of individual hospitals, the number of hospitals with a negative operating margin was eight in 2011. Furthermore, the average turnover of net worth was 4.7% in 2008, 3.6 in 2009, 3.3 in 2010, and 3.3 in 2011. This turned out to be higher than the turnover ratio of total liabilities and net worth. Indirectly, this implies that national university hospitals do not have a high ratio of borrowed capital. In terms of individual hospitals in 2011, seven hospitals had a ratio lower than the average, whereas three hospitals had a higher ratio. There was a huge gap among hospitals with the maximum ratio value at 4.2 and the minimum at 0.3. In particular, five hospitals had total liabilities, net worth, and turnover of net worth that were lower than the industry average.

### 3.8. Activity

The result of the analysis showed that the average turnover ratio of total liabilities and net worth of national university hospitals was 1.0 in 2008, 0.9 in 2009, 0.9 in 2010, and 0.9 in 2011 (Table 9). In terms of individual hospitals in 2011, three hospitals had a ratio lower than the average 0.9, whereas seven hospitals had a higher ratio. There was a gap among hospitals, with the maximum ratio value at 1.2 and the minimum at 0.4. Furthermore, the average turnover of net worth was 4.7% in 2008, 3.6 in 2009, 3.3 in 2010, and 3.3 in 2011. This turned out to be higher than the turnover ratio of total liabilities and net worth. Indirectly, this implies that national university hospitals do not have a high ratio of borrowed capital. In terms of individual hospitals in 2011, seven hospitals had a ratio lower than the average 3.3, whereas three hospitals had a higher ratio. There was a huge gap among hospitals with the maximum ratio value at 4.2 and the minimum at 0.3. In particular, five hospitals had total liabilities, net worth, and turnover of net worth that were lower than the industry average.

### 4. Discussion

In the present business environment, national university hospitals face various difficulties both internally and externally. It is therefore most essential to determine their financial state and business performance. Given this problem, in order to determine their financial ratios and business performance, this study calculated the major financial ratios of national university hospitals using reports on their final accounts from 2008 to 2011, and analyzed the objective changes in the revenues of

#### Table 7. Stability of national university hospitals (million KRW, %).

|       | 2008  |       | 2009  |       | 2010  |       | 2011  |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| A     | 40.0  | 71.4  | 40.8  | 71.0  | 47.4  | 67.9  | 59.8  | 62.6  |
| B     | 182.2 | 35.4  | 174.5 | 36.4  | 314.6 | 24.1  | 267.3 | 27.2  |
| C     | 112.0 | 47.2  | 106.9 | 48.3  | 100.3 | 49.9  | 103.6 | 49.1  |
| D     | 271.8 | 26.9  | 290.5 | 25.6  | 236.4 | 29.7  | 230.6 | 30.2  |
| E     | 889.8 | 10.1  | 830.1 | 10.8  | 748.6 | 11.8  | 623.6 | 13.8  |
| F     | 228.6 | 30.4  | 247.4 | 28.8  | 243.0 | 29.2  | 234.9 | 29.9  |
| G     | 98.8  | 50.3  | 80.7  | 55.3  | 88.3  | 53.1  | 69.0  | 59.2  |
| H     | 42.9  | 70.0  | 59.4  | 62.7  | 59.7  | 62.6  | 60.4  | 62.3  |
| I     | 285.8 | 25.9  | 153.8 | 39.4  | 58.8  | 63.0  | 57.4  | 63.5  |
| J     | 902.3 | 10.0  | 386.7 | 20.5  | 329.1 | 23.3  | 510.1 | 16.4  |
| Average| 305.4 | 37.8  | 237.1 | 39.9  | 222.6 | 41.5  | 221.7 | 41.4  |

1 = debt ratio; 2 = capital adequacy ratio.

#### Table 8. Profitability of national university hospitals (%).

|       | 2008  |       | 2009  |       | 2010  |       | 2011  |       |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| A     | –5.2  | –7.3  | –9.3  | –3.5  | –5.0  | –5.8  | –3.0  | –4.5  | –4.6  | –4.0  | –6.4  | –6.4  |
| B     | 0.0   | 0.0   | 0.0   | 5.8   | 15.8  | 4.5   | 2.3   | 9.4   | 2.7   | –10.3 | –38.0 | –12.1 |
| C     | –0.9  | –1.9  | –0.8  | –1.6  | –3.3  | –1.5  | –0.6  | –1.1  | –0.5  | –6.7  | –13.7 | –6.4  |
| D     | –0.8  | –2.9  | –1.6  | –5.4  | –21.1 | –8.6  | –1.1  | –3.7  | –1.6  | –0.9  | –2.8  | –1.2  |
| E     | –4.8  | –47.6 | –3.7  | –1.4  | –13.2 | –1.1  | 0.0   | –0.3  | –0.0  | –4.3  | –30.8 | –3.4  |
| F     | –2.5  | –8.1  | –2.2  | –0.8  | –2.9  | –0.7  | 1.9   | 6.5   | 1.7   | –2.3  | –7.8  | –2.1  |
| G     | –0.8  | –1.7  | –0.6  | 4.6   | 8.3   | 4.0   | 4.6   | 8.7   | 4.6   | –0.4  | –0.7  | –0.5  |
| H     | 0.2   | 0.3   | 0.9   | –1.8  | –2.8  | –6.6  | –1.7  | –2.8  | –5.1  | –1.9  | –3.1  | –4.8  |
| I     | –0.9  | –3.5  | –0.6  | 5.7   | 14.5  | 4.5   | 2.1   | 3.4   | 1.8   | –1.3  | –2.0  | –1.2  |
| J     | –7.0  | –70.4 | –5.8  | –4.4  | –21.6 | –3.9  | –3.9  | –16.6 | –3.5  | –11.0 | –67.1 | –9.0  |
| Average| –2.3  | –14.3 | –2.4  | –0.3  | –3.1  | –1.5  | 0.1   | –0.1  | –0.4  | –4.3  | –17.2 | –4.7  |

1 = operating profit to total assets; 2 = ROE; 3 = operating margin ROE = return on equity.
these hospitals. The result of comparing 2008 and 2011 showed that there was a general decrease in total assets, an increase in liabilities, and a decrease in total medical revenues, with a continuous deficit in many hospitals. Moreover, as national university hospitals have low debt dependence, their management conditions generally seem satisfactory. However, some individual hospitals suffer severe financial difficulties and thus depend on short-term debts, which generally aggravate the profit and loss structure. For 4 years in a row, there were five hospitals with negative operating profit to total assets, which considering the profit rate of total liabilities to net worth, and the reserve for essential businesses and transferred-out money, indicate that there are issues in the profitability of national university hospitals. There was also an increase in the number of hospitals in which total liabilities to net worth and owner’s capital decreased, and there was a huge gap among hospitals in this regard. The owner’s capital of a hospital is financed by contributions, and the reduction of owner’s capital indicates that the growth of university hospitals is in decline. There was a huge gap in the turnover of total liabilities and net worth among hospitals, and the activity turned out to be low [17].

Various indicators show that the financial state and business performance of national university hospitals have been deteriorating. These research findings will be used as important basic data for managers who make direct decisions in this uncertain business environment or by researchers who analyze the medical industry to enable informed decision-making and optimized execution. Furthermore, this study is expected to contribute to raising government awareness of the need to foster and support the national university hospital industry. While business analysis using financial ratios has the advantage of requiring little effort and low costs in data collection, because it is carried out on the basis of disclosed financial statements it also has the disadvantage of being affected by the propriety of those financial statements. Moreover, it may be irrational to compare and evaluate different methods of accounting, as there are multiple alternative methods. In addition, because financial ratios were used as indicators to represent the characteristics of the hospitals, this study has limitations in that it could not reflect qualitative data. Therefore, based on the findings of this study, future research must be able to clarify the factors that influence the business performance of national university hospitals through more detailed analysis, and provide rational improvement schemes for management such as enhancement of business expertise in national university hospitals by determining the causes of the differences between them.

Conflicts of interest

The author has no conflicts of interest to declare.

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Table 9. Activity of national university hospitals.

|       | 2008 | 2009 | 2010 | 2011 |
|-------|------|------|------|------|
|       | 1    | 2    | 1    | 2    | 1    | 2    | 1    | 2    |
| A     | 0.6  | 0.8  | 0.6  | 0.9  | 0.7  | 1.0  | 0.6  | 1.0  |
| B     | 1.5  | 4.1  | 1.3  | 3.5  | 0.8  | 3.5  | 0.9  | 3.1  |
| C     | 1.1  | 2.3  | 1.1  | 2.2  | 1.1  | 2.1  | 1.0  | 2.1  |
| D     | 0.5  | 1.8  | 0.6  | 2.4  | 0.7  | 2.3  | 0.7  | 2.4  |
| E     | 1.3  | 12.8 | 1.3  | 11.9 | 1.3  | 10.7 | 1.2  | 8.9  |
| F     | 1.1  | 3.6  | 1.1  | 3.9  | 1.1  | 3.8  | 1.1  | 3.7  |
| G     | 1.3  | 2.6  | 1.2  | 2.1  | 1.0  | 1.9  | 0.9  | 1.5  |
| H     | 0.3  | 0.4  | 0.3  | 0.4  | 0.3  | 0.5  | 0.4  | 0.6  |
| I     | 1.6  | 6.2  | 1.3  | 3.2  | 1.2  | 1.9  | 1.1  | 1.7  |
| J     | 1.2  | 12.2 | 1.1  | 5.5  | 1.1  | 4.8  | 1.2  | 7.4  |
| Average | 1.0  | 4.7  | 1.0  | 3.6  | 0.9  | 3.3  | 0.9  | 3.3  |

1 = turnover of total liabilities and net worth; 2 = turnover of net worth.
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