"THE VALUE OF MEDICAL EDUCATION IN THE UNITED STATES"

Neil Borad
The College of New Jersey
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Dr. Donka Mirtcheva

Abstract

As undergraduate students continue to apply to medical schools at record-setting rates, it is necessary to examine the profitability of medical education in the United States. This paper calculates the net present value of medical education, measuring its returns and costs over a lifetime. Using 2013 state-specific wage data for 25 medical specialties from the Medscape Physician Compensation Report, 2004 medical school tuition data from the Association of American Medical Colleges, 2013 residents' stipend data from the American Medical Association, and foregone wages of attending medical school, this study determines the medical specialties and locations for medical practice that experience the greatest/lowest returns on an investment to medical school.

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I. Introduction:

As of 2014, the healthcare industry supports over 12 million jobs in the United States and fuels nearly 18% of the nation's economy (Kaiser Family Foundation). Despite its enormous size, the healthcare industry continues to be plagued with issues of rising costs and falling quality of care. Furthermore, an alarming statistic from the Association of American Medical Colleges projecting a shortage of over 90,000 physicians by the end of the decade has only added to the plethora of issues surrounding the sector (AAMC, 2013). With the enforcement of the Patient Protection and Affordable Care Act, over 16 million Americans have obtained health insurance as of March 2015 (U.S. Department of Health and Human Services). As these numbers are only projected to rise in the next decade, there is a clear need to expand the supply of physicians in our nation.

Fortunately, a physician shortage does not seem probable in the upcoming years as medicine continues to remain a popular choice amongst college graduates. In 2014, a record number of 49,500 undergraduate students applied to medical school, reflecting a 3.1% increase from the previous year (AAMC). Despite this positive trend, American medical students are finding their journey towards a medical profession increasingly difficult with respect to their personal finances as over 85% of medical students graduate in debt (Youngclaus and Fresne, 2012). Furthermore, the cost of attending medical school, which includes tuition, fees, and living expenses, has been rising annually since 1992 at a rate (6.3%) that outpaces the CPI measured inflation rate (2.5%) during the same time period (Youngclaus and Fresne, 2012).

II. Research Question and Contributions:

With these issues in mind, I will attempt to examine *whether medical education is still worth the cost for our aspiring medical students.* By considering medical education as a financial investment, I can calculate measures of its profitability through a metric called the net present value (NPV). Using state-specific data on the costs and returns to a medical education, I will be able to determine which medical specialties have the greatest value in each state.

I hope to expand primarily upon the work of Nicholas Roth as well as the findings of other economists by addressing their shortcomings. Roth noted that the location of physician employment was a crucial factor that was left out of his net present value analyses. Using state-specific data for particular medical specialties, I will be able to make more accurate calculations of the net present value of medical education investments. For example, I will be able to determine whether it is of higher value to practice as a cardiologist in New Jersey or in California by comparing their respective net present values. Furthermore, by using the most recent salary and tuition data available, I will be able to compare my net present values to previously derived ones to determine which specialties have experienced financial improvements over time.

III. Literature Review

There are a number of studies published that relate to the costs and benefits of medical education in the United States. Whereas some studies focus solely on the costs of medical education, others examine the internal rates of return and net present values as well.

A. Costs of Medical Education

Youngclaus and Fresne, in a 2012 report titled, "Physician Education Debt and the Cost to Attend Medical School", investigated the costs of medical school and education debt of medical school graduates. They defined education debt to include any debt incurred during medical school in addition to any undergraduate education debt as well. Using data from annual surveys sent to both medical students and medical schools by the AAMC, the authors were able to discover some key findings regarding the costs of a US medical education. Using the responses of 79 medical schools in the nation, the authors were able to conclude that the median in-state four-year cost of attending medical school for the Class of 2013 was $228,200. Additional findings from the report showed that the median education debt for the Class of 2013 was $170,000 and that education debt does not seem to play a role in determining the medical specialty chosen by the student. Lastly, the authors noted that numerous policy changes have affected loan repayments for medical students. They concluded their report by stating that although our nation has been unable to alter the trends of increasing medical education costs in the last two decades, physicians are ultimately always able to repay their debt levels.

B. Physician Compensation

There are ample studies in the medical economics literature that have looked at physician compensation in the United States. Leigh *et al.* (2010), in their paper titled, "Physician Wages Across Specialties: Informing the Physician Reimbursement Debate", focused on the wage disparities between various medical specialties in the nation. The authors addressed the income gap that is known to exist between general physicians and specialists. They chose to compare wages on an earnings-per-hour basis instead of an annual basis as annual comparisons were claimed to lack accuracy. They used data from 6,381 physicians in the 2004-2005 Community Tracking Study and ran linear regressions that incorporated additional demographic and market variables. They found that surgeons and pediatric subspecialties enjoyed 48% and 45% higher wages than their primary care counterparts, respectively. They concluded their findings with an appeal to policymakers to raise incomes for primary care physicians, especially as medical graduates continue to stray away from choosing careers in primary care.

C. Internal Rate of Return

Since both the costs of a medical education and the wages of physician specialties are accessible, a number of studies have attempted to estimate the internal rates of return for investments in medical training. Economists Feldman and Scheffler (1978) estimated a 22% return to training in medical school, using estimates of student expenses from 1970. Burstein and Cromwell (1985) in their study, "Relative incomes and rates of return for U.S. physicians", also chose to examine whether physicians still enjoyed high rates of return to their medical training. They used data from the American Medical Association's annual Profile of Medical Practice to obtain wage information and looked at annual reports from the Journal of the American Medical Association to obtain the costs of medical school. The authors found that physicians earned a positive return on their post-college training. They saw that the adjusted internal rate of return for general practitioners ranged from 14-17% in 1980, which was noted to be substantially high. They also found that specialty training became more profitable, as general surgeons and OB/GYNs enjoyed increasing rates of return while general practitioners suffered financial losses.

D. Net Present Value of Medical Education

Of particular interest to my proposed study are previous examinations of the net present value of medical education in the United States. Keith Leffler (1978), in his study, "Physician Licensure: Competition and Monopoly in American Medicine", estimated the net present value of a medical education for the period 1947-1973. The cost stream was found by using tuition for medical schooling as well as one's foregone wages during the period of medical training. After finding the cost streams, Leffler found the revenue streams physicians were expected to earn during the 1947-1973 period and calculated net present value at discount rates of 8, 10, and 12%. He ultimately found that that average net return to physician training was $21,161 at 8 percent, $4,900 at 10 percent, and -$5,495 at 12 percent.

Mennemeyer (1978), in “Really Great Returns to Medical Education”, reports the value of a medical education as opposed to alternative professional careers in dentistry, pharmacy, veterinary, and law. He presents two calculations for net present value in the study, using data from the 1970 Census Public Use Sample as the basic source for wages. He finds that careers in medicine enjoy a rather generous advantage over all alternative fields using standard measures. However, when Mennemeyer accounted for the length of the work period for physicians, medicine was an inferior investment relative to dentistry and only slightly better than an investment in law.

Dorsey *et al.* (2006), in their study titled, “An Evaluation of Four Proposals to Reduce the Financial Burden of Medical Education”, examined how the net present value of a medical education would change in response to some of proposed conditions. They obtained their data on medical school tuition, residency stipends, and physician wages from the 2002-3 AAMC Survey of Housestaff Stipends, Benefits, and Funding and the 2003 edition of the AMA’s Physician Socioeconomic Statistics report. They used a discount rate of 6% in their net present value calculations as well. The found that by shortening the length of medical school from four years to three years, the net present value of a medical education would increase by $160,000-$230,000. Furthermore, shortening the residency training for an internist from four years to three years also resulted in a financial benefit of nearly $170,000. They conclude that the most effective means to decrease the financial burden of a medical education in the U.S. is by reducing the duration of medical training.

Nicholas Roth (2009), an undergraduate student from UC Berkeley, studied the costs and returns to medical education in the United States. He broke up the costs of medical education into a tripartite classification: the costs of medical school, the costs of graduate medical education (residency), and the costs of foregone wages in the period of schooling for medical students. He used reports from the AAMC in 2009 to obtain medical school tuition information and looked at estimates of foregone wages of a 2009 graduate to produce his cost streams. He concluded that it cost society $112,409.90 to educate a first year medical student. He then looked at the 2009 Medical Group Management Association's Physician Compensation and Production Survey to determine the post-tax annual wages for 29 specialties. With this data at hand, Roth used both cost and revenue streams to calculate the net present value and the internal rate of return on investments in medical education. His analyses concluded that medical education remains a profitable investment, finding that non-invasive radiologists enjoy the highest net present values and the second highest median earnings. However, it is important to notice that Roth claims that a rise in average tuition and the locations of physician employment are two factors that will severely affect his results.

IV. Data:

A. Physician Compensation Report / Medscape, 2014 with salaries from 2013

This survey provides the most recent salary data from over 24,000 physicians across 25 specialties in the United States. The data are not state-specific and are instead clustered into nine geographic regions (Northeast, Mid-Atlantic, Southeast, Great Lakes, North Central, South Central, West, Northwest, and Southwest).

B. Regional Price Parities / Bureau of Economic Analysis, 2014

This report provides guidelines for adjusting regional salary data to represent state-level data. The Bureau of Economic Analysis provides a metric called the Regional Price Parity (RPP), which calculates the differences in the price levels of goods and services across states and metropolitan areas for a given year. These RPPs are expressed as a percentage of the overall national price level for each year and can be used to compare regions within the United States without the need for any cost of living adjustments. They are shown for each state in Table 1 and will be used to adjust regional salary from *MedScape's Physician Compensation Report* into state-level data.

C. FREIDA Online / American Medical Association, 2013-2014

After four years of medical school, a medical graduate then chooses a subspecialty that requires a certain number of years as a "resident". During this training period, a resident receives a stipend that is determined mostly from their selected subspecialty. FREIDA Online ® is a database from the American Medical Association that not only lists stipend information for the 25 specialties being analyzed in this paper, but also provides the length of duration for each subspecialty training program as well. Table 2 provides a list of physician subspecialties used along with their respective lengths of residency training duration.

D. Annual Student Tuition and Fees Reports / AAMC, 2004

The AAMC has published reports on tuitions that include student fees and health insurance costs for residents and non-residents of US public/private medical schools. I will use the data and organize it by state to come up with the cost of attending medical school in 2004. This value will serve as the direct cost of obtaining a medical education and will be used in my net present value calculations. The reason for selecting tuition information from 2004 is to adjust for the chronological differences between the data and will be elaborated further in the Methods section.

E. Salary Survey / National Association of Colleges and Employers (NACE), 2004.

NACE uses data from the Bureau of Labor Statistics and other data from the Census Bureau to report the starting salary by academic major for the Class of 2004 graduates. Since most premedical students are majors in the math/sciences, I will use the reported 2004 average salary of $35,939/year to represent the foregone wages (opportunity cost) of attending medical school. The foregone wages represent an indirect cost of attending medical school and will be subtracted from the revenue stream every year in my net present value calculations.

Descriptive statistics for all the major variables used in the net present value calculations are shown in Table 3.

V. Methods:

A. Adjusting Regional Data to State Data

By dividing regional salary data for a particular medical specialty by the Regional Price Parity (RPP), I will be able to derive adjusted salary data for each state that will be sufficient for comparison analyses. For example, according to *MedScape,* an orthopedist in the Mid-Atlantic region earned $397,000 a year in 2013. To find the adjusted salary data for New Jersey, I will adjust that regional data by the RPP for New Jersey (114.1).

$$Adjusted\_Orthopedist_{NJ} = \frac{\$397{,}000}{1.141} = \$347{,}940.40$$

B. Net Present Value Calculation

The net present value (NPV), which forecasts the long-run desirability of an investment, helps elucidate which medical specialties have the best value in each state. The NPV essentially discounts all of one's expected future cash flows to their present value by a selected discount rate. The discount rate is usually assumed to be the highest rate that can be earned if the initial investment is spent elsewhere. An investment is considered desirable if it has a NPV that is large and positive.

$$\sum_{t=0}^{n} \frac{Y_t}{(1+r)^t} = NPV$$

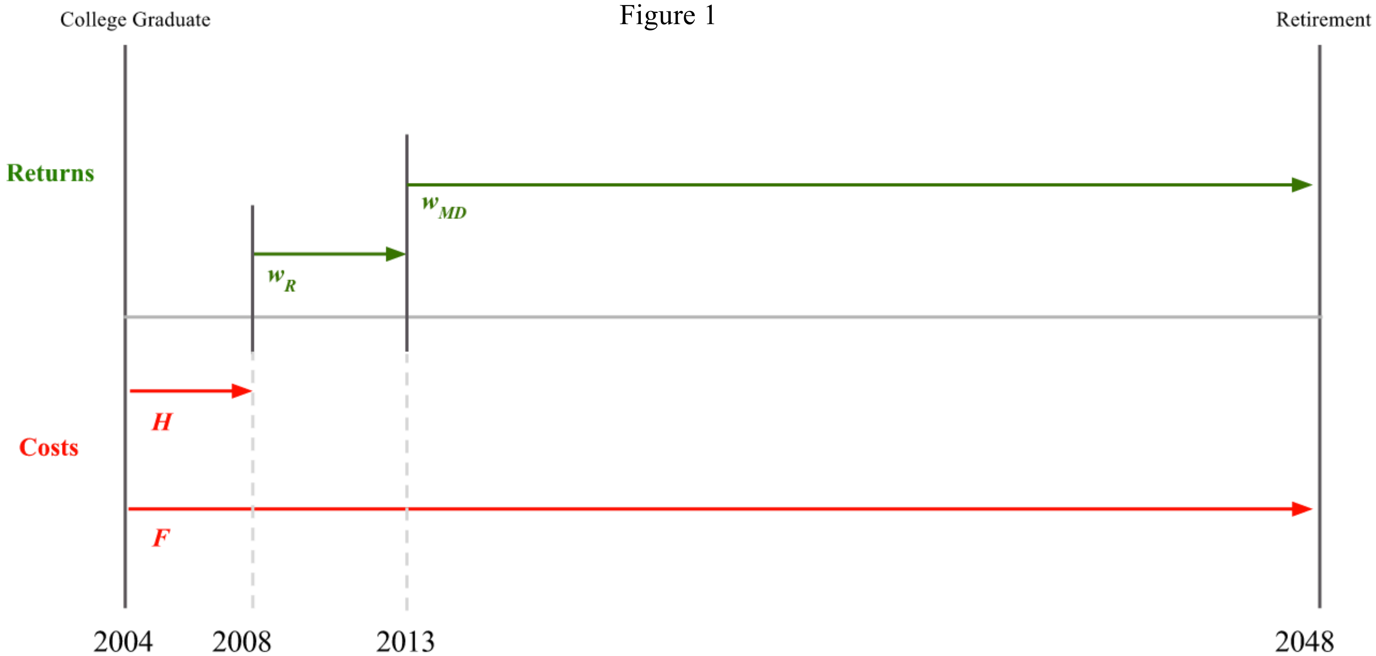
The above formula will be used to obtain the NPV where Y = future cash flow, r = the discount rate, and t = the number of time periods until retirement. The future value, Y_t, can be split into a revenue stream, R_t, and a negative cost stream, C_t, that apply in the context of pursuing a medical career. The physician compensation, w_{MD}, and residency stipend data, w_R, will serve as the revenue stream for an individual over their lifetime. The cost of attending medical school data from the AAMC will be used to represent the direct costs, H, of obtaining a medical education. This variable, along with the indirect foregone wages, F, will be added together to serve as the cost stream. Subtracting the cost stream from the revenue stream will result in Y, or the future value. In order to stay in accord with previous papers, I will assume a discount rate of 5%. This information can be summarized with the following equations:

$$Y_t = R_t - C_t$$
$$R_t = w_{MD} + w_R$$
$$C_t = H + F$$
$$r = 5\%, 0.05$$

There are a number of assumptions that need to be made prior to making net present value calculations. First, the age of matriculation into medical school is assumed to be 21 years old. With this in mind, the total duration of my NPV calculations (t = time) can be found by subtracting this age from an assumed retirement age of 65 years old; leading to t = 44. This 44-year period can be split up into a *Returns* period, where an individual enjoys positive cash flow, and a *Costs* period, where an individual incurs some negative direct and indirect costs (Figure 1). What are most imperative to my NPV analyses are the year selections chosen throughout the 44-

year duration. Since the most recent physician compensation data is available only for 2013, it is imperative to step backwards and use tuition data from when a physician practicing in 2013 would have started medical school. Assuming an average residency length of 5 years and a medical school education of 4 years, the initial year of the NPV calculations is 9 years prior to 2013 (2004). Thus, 2004 data will be used to make up the direct (*H*) and indirect (*F*) cost streams.

Figure 1



Once the timeline has been mapped out, it is easy to split up the NPV calculations into three distinct periods of cash flow. In 2004, a 21-year-old college graduate makes the decision to invest in medical education and therefore accepts an indirect cost stream of foregone wages (*F*) that will run until retirement (Figure 1). Furthermore, from 2004-2008, the graduate also starts medical school and accumulates a direct cost stream represented by the tuition of the medical school (*H*). What is important to note is that both prices from the *F* and *H* streams are converted into 2013 dollars from 2004 dollars using the CPIs from each year. Therefore, in this time period, the NPV is negative because the student does not have any incoming cash flow. The formula below depicts the NPV during the first cash flow period:

$$NPV_{2004-2008} = -\sum_{t=0}^{3} \frac{H + F}{(1+r)^t}$$

After medical school has been completed, the graduate then selects and enters a residency program where a stipend of w_R is earned for an average period of 5 years. Although the residency program durations vary from 3-6 years, the total change in the NPV by assuming an average of 5 years is very minimal. Furthermore, even though 2008 stipend data is appropriate to use in this period, a lack of resources rendered this method impossible. Instead, 2013 stipend data was taken and adjusted to 2008 dollars relative to the CPIs in both years. The NPV during this time period is the difference between the w_R stipend and the continuing foregone wages stream:

$$NPV_{2008-2013} = \sum_{t=3}^{8} \frac{w_R - F}{(1+r)^t}$$

The last period of cash flow begins when the resident becomes a practicing physician earning a wage of w_{MD}. This earning period continues until the assumed age of retirement of 65 years old. The physician during this time is also assumed to be losing the foregone wages stream, leading to a final NPV of:

$$NPV_{2013-2048} = \sum_{t=8}^{44} \frac{w_{MD} - F}{(1+r)^t}$$

The final NPV for each specialty in each state can then found by adding the NPVs from each of the three cash flow periods:

$$NPV = NPV_{2004-2008} + NPV_{2008-2013} + NPV_{2013-2048}$$

VI. Results:

The net present values of each of the 25 medical specialties across 50 states are shown in Table 4. The highest NPV across each specialty is boxed and reflects the state that has the greatest value for a physician within that specialty. For example, it is the most desirable for an aspiring Anesthesiologist to practice in South Dakota as this state has the highest net present value ($4,027,114.49) on an investment in medical education relative to other locations.

On the other hand, the highest NPV across each state is bolded in Table 4 and indicates the best specialty to undertake within a particular state. Within New Jersey, for example, a career as an Orthopedist would yield the highest returns because its NPV ($3,089,815.27) is the greatest relative to other specialties in the state.

The average NPV for each of the 25 specialties as well as for each state are shown in Table 4. The top three specialties that produce the greatest overall value are Orthopedics, Urology, and Cardiology with average NPVs of $3,982,179.42, $3,560,190.71, and $3,426,682.24, respectively. It is interesting to note that Orthopedics is the best specialty to practice in 39 out of the 50 states as well. Finally, the three best states to practice medicine by virtue of their NPVs are Mississippi, South Dakota, and Alabama ($3,080,384.71; $2,958,713.73; $2,948,438.89).

VII. Conclusions:

Pursuing a career in medicine remains a desirable investment for college graduates. Even the lowest earning physician specialty (Infectious Disease) can expect to enjoy a net present value of over $720,000 on an investment on medical education. More importantly, the net present value for each of the 25 specialties in all 50 states was positive, suggesting that a career in any field of medicine will ultimately be profitable.

In addition, comparing these results to previous NPV calculations in this field reveal important implications. Roth (2009) found a NPV of $3,432,215.26 for Orthopedists practicing in 2008 at a 5% discount rate. With similar assumptions in this paper, the NPV for Orthopedists in 2013 has increased 16% to a value of 3,982,179.42 on an investment in medical school. The increase in the NPV from 2008 to 2013 is also seen across all 25 specialties, suggesting that the overall value of medical education has increased over the last 5 years.

There are a number of limitations within this study that are important to address. First, the unavailability of residency stipend data per specialty for 2008 led to the use of 2013 stipend information instead. While this had the potential to lead to chronological inaccuracies, adjusting the stipends from 2013 dollars to 2008 dollars minimized the error. Moreover, the most accurate source of state-specific data was obtained by adjusting regional data by a regional price parity (RPP) metric. With this in mind, it follows that the best states to practice medicine will be greatly affected by their respective RPPs. States with low RPPs will have adjusted physician compensations that are much higher than other states, consequently leading to higher NPV calculations. Although unavailable as of now, using state-specific physician compensation data across 25 specialties would increase the accuracy of the NPV calculations in the future.

In addition, all of the variables used to derive NPV were taken as static cash flow streams. A medical student experiences increasing tuition costs throughout the duration of their medical school education. Therefore, not only should the tuition costs be adjusted in future studies, but the residency stipend/physician compensation streams should be increased annually by a certain rate as well. By assuming a constant physician compensation stream from the time the physician started practicing until retirement, the overall net present values were ultimately underestimated across every specialty. Despite this constraint, increasing the salary data for each specialty by the same percentage would not have changed the ranking of the top 3 specialties or top 3 states for medical practice that were presented in this paper.

Medical careers will continue to be high in demand the upcoming years in the United States. Even though college graduates are applying to medical school at record-breaking rates, the ultimate decision to invest in medical school is a difficult one. A number of non-financial factors that cannot be quantitatively measured strongly contribute to the decision as well. Nevertheless, the findings of the paper provide evidence to show that medical education is a desirable investment to undertake. Furthermore, comparing NPVs between various states also sheds light on specific locations in the nation that are more financially profitable to practice medicine than others.

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APPENDIX

Table 1. Regional Price Parities by State, 2013

Regional Price Parities	
Alabama	88.1
Alaska	107.1
Arizona	98.1
Arkansas	87.6
California	112.9
Colorado	101.6
Connecticut	109.4
Delaware	102.3
Florida	98.8
Georgia	92.0
Hawaii	117.2
Idaho	93.6
Illinois	100.6
Indiana	91.1
Iowa	89.5
Kansas	89.9
Kentucky	88.8
Louisiana	91.4
Maine	98.3
Maryland	111.3
Massachusetts	107.2
Michigan	94.4
Minnesota	97.5
Mississippi	86.4
Missouri	88.1
Montana	94.2
Nebraska	90.1
Nevada	98.2
New Hampshire	106.2
New Jersey	114.1
New Mexico	94.8
New York	115.4
North Carolina	91.6
North Dakota	90.4
Ohio	89.2
Oklahoma	89.9
Oregon	98.8
Pennsylvania	98.7
Rhode Island	98.7
South Carolina	90.7
South Dakota	88.2
Tennessee	90.7
Texas	96.5
Utah	96.8
Vermont	100.9
Virginia	103.2
Washington	103.2
West Virginia	88.6
Wisconsin	92.9
Wyoming	96.4

Source: U.S. Bureau of Economic Analysis

Table 2. List of Physician Specialties with Training period duration

Specialty	**Length of Residency + fellowship (years)**	**Average Stipend (per year)**
Anesthesiology	5	$51,069.00
Cardiology	6	$57,460.00
Critical Care	5	$59,612.00
Dermatology	5	$51,870.00
Diabetes & Endocrinology	5	$56,616.00
Emergency Medicine	5	$50,543.00
Family Medicine	3	$50,128.00
Gastroenterology	6	$56,956.00
General Surgery	5	$50,695.00
Infectious Diseases	5	$56,860.00
Internal Medicine	3	$50,580.00
Nephrology	5	$57,028.00
Neurology	5	$51,733.00
Ob/Gyn & Women's Health	4	$50,509.00
Oncology	5	$54,660.00
Ophthalmology	5	$52,118.00
Orthopedics	6	$50,215.00
Pathology & Lab Medicine	4	$57,765.00
Pediatrics	3	$50,830.00
Plastic Surgery & Aesthetic Medicine	6	$58,715.00
Psychiatry & Mental Health	4	$51,038.00
Pulmonary Medicine	5	$58,437.00
Radiology	5	$52,922.00
Rheumatology	5	$57,717.00
Urology	5	$53,266.00
Averages	-	**$53,973.68**

Table 3. Descriptive Statistics

Variable	**Description**	**Observations**	**Mean**	**Std. Dev**	**Source**
w_{MD}	Physician Compensation	1250	$279,683.59	$79,260.06	MedScape
w_r	Resident Stipend	25	$53,973.68	$3,323.73	FREIDA
H	Tuition (Direct Cost)	140	$46,166.58	$7,793.51	AAMC
F	Foregone W (Indirect)	1	$42,371.00	$-	NACE

Table 4.1 Net Present Values (in millions) for 25 Medical Specialties across 50 US States

Net Present Values	AK	AL	AR	AZ	CA	CO	CT	DE	FL	GA	HI	IA	ID	IL	IN	KS	KY	LA	MA	MD	ME	MI	MN	MO	MS	MT	NC	ND	NE
Anesthesiology	3.21	3.79	3.92	3.25	2.67	2.97	2.76	3.12	3.28	3.58	2.58	3.96	2.93	3.18	3.59	3.95	3.73	3.60	2.82	2.82	3.13	3.45	3.46	3.81	3.94	2.89	3.60	3.89	3.89
Cardiology	4.71	3.78	3.82	3.30	2.32	3.03	2.59	2.90	3.28	3.57	2.25	3.85	4.34	3.44	3.88	3.84	3.72	3.59	2.64	2.62	2.93	3.72	3.74	3.71	3.93	4.30	3.34	3.78	3.78
Critical Care	3.20	3.47	2.62	2.58	2.51	2.33	2.03	2.36	3.00	3.27	2.43	3.19	2.93	2.61	2.96	3.18	3.41	3.29	2.08	2.12	2.32	2.84	2.85	3.06	3.61	2.89	2.74	3.13	3.13
Dermatology	3.79	3.54	2.45	3.85	2.75	3.56	2.43	2.36	3.06	3.34	2.65	3.18	3.47	2.66	3.02	3.18	3.48	3.36	2.49	2.12	2.77	2.89	2.91	3.06	3.68	3.43	2.74	3.12	3.12
Diabetes & Endo.	1.09	1.96	1.58	1.19	1.42	0.99	1.46	1.35	1.65	1.82	1.37	1.84	0.95	1.23	1.44	1.84	1.91	1.83	1.49	1.19	1.68	1.37	1.38	1.74	2.07	0.93	1.61	1.79	1.79
Emergency Medicine	2.92	3.14	3.18	2.43	2.10	2.19	1.91	2.20	2.70	2.96	2.03	2.97	2.67	2.47	2.80	2.96	3.09	2.98	1.95	1.98	2.18	2.68	2.70	2.85	3.28	2.63	2.57	2.91	2.91
Family Medicine	1.81	1.92	1.93	1.51	1.30	1.30	1.30	1.33	1.60	1.78	1.26	2.10	1.62	1.51	1.75	2.10	1.87	1.79	1.33	1.16	1.51	1.66	1.68	2.00	2.03	1.59	1.60	2.05	2.05
Gastroenterology	3.92	3.66	3.86	3.60	2.62	3.32	2.66	2.72	3.17	3.45	2.53	3.90	3.60	3.43	3.86	3.90	3.60	3.48	2.72	2.46	3.01	3.71	3.73	3.76	3.80	3.56	3.14	3.84	3.84
General Surgery	3.28	3.19	2.99	2.82	2.34	2.56	2.28	2.59	2.75	3.00	2.26	3.45	3.00	2.71	3.08	3.45	3.14	3.03	2.33	2.33	2.59	2.95	2.96	3.32	3.33	2.96	3.00	3.39	3.39
Infectious Diseases	0.95	1.87	1.47	1.38	1.31	1.17	1.09	1.37	1.57	1.74	1.27	0.87	0.82	1.25	1.45	0.88	1.82	1.75	1.12	1.21	1.27	1.38	1.39	0.80	1.98	0.80	1.64	0.84	0.83
Internal Medicine	1.91	2.23	2.19	1.76	1.58	1.53	1.28	1.47	1.88	2.08	1.53	2.24	1.71	1.63	1.89	2.24	2.18	2.10	1.31	1.30	1.49	1.80	1.81	2.14	2.35	1.68	1.76	2.19	2.19
Nephrology	2.78	2.59	2.75	2.68	1.96	2.42	1.42	2.08	2.22	2.43	1.90	2.14	2.53	1.84	2.10	2.14	2.54	2.45	1.45	1.87	1.64	2.01	2.02	2.04	2.72	2.50	2.43	2.09	2.09
Neurology	2.31	2.38	2.17	1.58	1.73	1.37	1.44	1.60	2.03	2.23	1.67	2.23	2.10	2.03	2.32	2.23	2.33	2.24	1.48	1.43	1.66	2.21	2.23	2.13	2.50	2.06	1.90	2.18	2.18
Ob/Gyn	2.78	2.58	2.61	2.31	1.93	2.07	1.87	2.13	2.19	2.41	1.87	2.68	2.53	2.44	2.78	2.68	2.53	2.43	1.92	1.91	2.15	2.66	2.68	2.57	2.70	2.49	2.49	2.63	2.63
Oncology	3.23	3.24	3.17	3.25	2.54	2.97	1.99	2.67	2.80	3.06	2.46	3.04	2.96	2.41	2.73	3.04	3.19	3.08	2.04	2.40	2.28	2.62	2.63	2.92	3.38	2.92	3.08	2.98	2.98
Ophthalmology	3.52	3.46	3.03	2.19	1.96	1.95	2.17	2.25	2.99	3.27	1.90	3.07	3.22	3.08	3.47	3.07	3.41	3.29	2.22	2.02	2.47	3.33	3.35	2.95	3.61	3.18	2.62	3.01	3.01
Orthopedics	**5.09**	**4.62**	4.04	**3.88**	2.62	**3.58**	**3.35**	**3.49**	**4.03**	**4.38**	2.53	4.03	**4.70**	**4.10**	**4.61**	4.02	**4.56**	**4.41**	**3.43**	**3.17**	**3.79**	**4.43**	**4.45**	3.88	**4.79**	**4.65**	**4.01**	3.96	3.96
Pathology/ Lab Med.	2.88	2.48	2.76	2.29	1.93	2.05	1.83	2.19	2.11	2.32	1.87	2.44	2.62	2.34	2.66	2.44	2.43	2.34	1.87	1.96	2.10	2.55	2.56	2.33	2.60	2.59	2.55	2.39	2.38
Pediatrics	1.87	2.00	2.18	1.73	1.26	1.51	1.34	1.52	1.69	1.86	1.22	1.91	1.68	1.59	1.83	1.92	1.95	1.87	1.37	1.35	1.54	1.75	1.76	1.82	2.11	1.65	1.79	1.87	1.86
Plastic Surg/Aesthetics	1.95	3.70	3.28	2.58	2.24	2.33	2.69	2.76	3.21	3.50	2.17	3.28	1.76	3.00	3.38	3.27	3.64	3.52	2.75	2.49	3.04	3.24	3.26	3.15	3.85	1.73	3.18	3.21	3.22
Psychiatry & Mental	2.06	1.97	2.00	1.84	1.64	1.62	1.42	1.60	1.66	1.83	1.59	2.07	1.85	1.60	1.85	2.08	1.93	1.85	1.46	1.42	1.64	1.76	1.77	1.97	2.08	1.82	1.90	2.02	2.02
Pulmonary Medicine	2.24	2.83	3.03	2.19	2.12	1.95	1.87	1.87	2.42	2.66	2.05	3.11	2.03	2.48	2.81	3.10	2.77	2.67	1.92	1.67	2.14	2.69	2.71	2.98	2.96	1.99	2.19	3.05	3.05
Radiology	3.74	3.67	4.21	3.30	2.69	3.02	2.72	3.19	3.17	3.46	2.60	2.70	3.43	3.43	3.87	2.70	3.61	3.49	2.79	2.88	3.09	3.71	3.73	2.58	3.82	3.39	3.66	2.64	2.64
Rheumatology	1.58	1.95	1.55	2.50	1.74	2.25	1.58	1.61	1.64	1.81	1.68	4.02	1.41	1.78	2.04	4.01	1.90	1.83	1.61	1.43	1.81	1.95	1.97	3.87	2.06	1.39	1.90	3.95	3.95
Urology	4.62	3.71	3.71	3.55	**2.99**	3.27	2.65	3.06	3.21	3.50	**2.89**	**4.30**	4.26	3.58	4.03	**4.29**	3.65	3.52	2.71	2.76	3.01	3.87	3.89	**4.15**	3.86	4.21	3.52	**4.23**	**4.23**
Average	2.86	2.95	2.82	2.54	2.09	2.29	2.01	2.23	2.53	2.77	2.02	2.90	2.60	2.47	2.81	2.90	2.90	2.79	2.05	2.00	2.29	2.69	2.71	2.78	**3.08**	2.57	2.60	2.84	2.84

Box = highest NPV for the specialty

Bold = highest NPV for the state

Table 4.2. Net Present Values (in millions) for 25 Medical Specialties across 50 US States (continued)

Net Present Values (cont.)	NJ	NM	NV	NY	OH	OK	OR	PA	RI	SC	SD	TN	TX	UT	VA	VT	WA	WI	WV	WY	AVG
Anesthesiology	2.75	3.33	3.21	2.58	3.68	3.79	2.73	3.24	3.11	3.58	4.03	3.63	3.54	3.26	3.10	3.04	2.63	3.52	3.74	2.81	3.32
Cardiology	2.56	3.38	3.26	2.41	3.96	3.69	4.07	3.00	2.91	3.32	3.92	3.62	3.45	3.32	2.87	2.84	3.92	3.79	3.46	4.18	3.43
Critical Care	2.07	2.64	2.54	1.89	3.03	2.53	2.73	2.44	2.30	2.71	3.25	3.32	2.37	2.58	2.34	2.25	2.63	2.90	2.84	2.80	2.73
Dermatology	2.07	3.95	3.81	2.27	3.09	2.36	3.24	2.45	2.75	2.72	3.24	3.39	2.21	3.87	2.34	2.68	3.12	2.95	2.85	3.33	2.99
Diabetes & Endo.	1.17	1.20	1.15	1.34	1.47	1.51	0.86	1.40	1.67	1.58	1.88	1.85	1.42	1.17	1.34	1.63	0.84	1.40	1.68	0.89	1.46
Emergency Medicine	1.93	2.48	2.39	1.77	2.87	3.07	2.48	2.28	2.17	2.55	3.02	3.00	2.87	2.43	2.18	2.11	2.39	2.74	2.67	2.55	2.56
Family Medicine	1.14	1.53	1.47	1.19	1.79	1.85	1.48	1.38	1.50	1.57	2.14	1.81	1.73	1.50	1.31	1.46	1.43	1.71	1.67	1.53	1.62
Gastroenterology	2.40	3.69	3.56	2.49	3.95	3.74	3.37	2.82	3.00	3.12	3.97	3.51	3.50	3.62	2.70	2.93	3.24	3.78	3.26	3.46	3.35
General Surgery	2.27	2.89	2.78	2.12	3.15	2.88	2.80	2.68	2.58	2.98	3.52	3.05	2.69	2.83	2.56	2.51	2.69	3.01	3.11	2.88	2.86
Infectious Diseases	1.19	1.40	1.35	1.00	1.49	1.41	0.74	1.42	1.26	1.61	0.90	1.77	1.32	1.37	1.36	1.23	0.72	1.42	1.71	0.76	1.28
Internal Medicine	1.27	1.79	1.72	1.17	1.94	2.11	1.57	1.53	1.48	1.73	2.29	2.12	1.97	1.75	1.46	1.44	1.52	1.84	1.84	1.62	1.78
Nephrology	1.83	2.73	2.63	1.31	2.15	2.66	2.36	2.16	1.63	2.41	2.18	2.47	2.48	2.68	2.07	1.58	2.27	2.06	2.53	2.42	2.20
Neurology	1.39	1.60	1.54	1.33	2.37	2.09	1.94	1.67	1.65	1.87	2.28	2.26	1.95	1.57	1.59	1.61	1.87	2.26	1.98	2.00	1.93
Ob/Gyn	1.86	2.36	2.27	1.74	2.85	2.51	2.35	2.21	2.14	2.47	2.74	2.45	2.35	2.31	2.11	2.08	2.26	2.72	2.59	2.41	2.37
Oncology	2.35	3.33	3.21	1.85	2.80	3.06	2.76	2.77	2.26	3.07	3.10	3.10	2.86	3.26	2.64	2.21	2.65	2.67	3.21	2.83	2.80
Ophthalmology	1.97	2.23	2.15	2.02	3.55	2.92	3.01	2.34	2.46	2.60	3.13	3.32	2.73	2.19	2.23	2.40	2.89	3.40	2.73	3.09	2.77
Orthopedics	**3.09**	**3.97**	**3.83**	**3.14**	**4.71**	3.91	**4.41**	**3.62**	**3.77**	**4.00**	4.10	**4.44**	3.65	**3.89**	**3.46**	**3.68**	**4.23**	**4.51**	**4.16**	**4.52**	3.98
Pathology/ Lab Med.	1.91	2.33	2.25	1.70	2.72	2.66	2.44	2.27	2.09	2.53	2.49	2.36	2.48	2.29	2.17	2.03	2.35	2.60	2.66	2.51	2.33
Pediatrics	1.32	1.75	1.69	1.23	1.88	2.09	1.55	1.57	1.53	1.76	1.95	1.89	1.96	1.72	1.50	1.49	1.50	1.79	1.87	1.59	1.70
Plastic Surg/Aesthetics	2.43	2.63	2.54	2.51	3.46	3.17	1.62	2.86	3.03	3.16	3.34	3.55	2.97	2.58	2.73	2.95	1.57	3.31	3.30	1.67	2.87
Psychiatry & Mental	1.38	1.87	1.80	1.30	1.89	1.92	1.71	1.66	1.63	1.87	2.12	1.86	1.80	1.84	1.58	1.59	1.65	1.80	1.98	1.76	1.78
Pulmonary Medicine	1.63	2.23	2.15	1.74	2.87	2.92	1.88	1.94	2.13	2.17	3.17	2.70	2.73	2.19	1.85	2.08	1.81	2.75	2.28	1.93	2.37
Radiology	2.81	3.38	3.26	2.54	3.96	**4.07**	3.20	3.30	3.07	3.65	2.75	3.52	**3.80**	3.31	3.16	3.00	3.08	3.79	3.81	3.29	3.27
Rheumatology	1.40	2.55	2.45	1.46	2.09	1.49	1.29	1.66	1.80	1.87	4.09	1.84	1.40	2.50	1.59	1.75	1.25	2.00	1.98	1.33	2.04
Urology	2.69	3.64	3.51	2.48	4.12	3.59	3.99	3.17	3.00	3.51	**4.38**	3.55	3.35	3.57	3.03	2.92	3.83	3.95	3.66	4.09	3.56
Average	1.96	2.60	2.50	1.86	2.87	2.72	2.42	2.31	2.28	2.58	2.96	2.82	2.54	2.54	2.21	2.22	2.33	2.75	2.70	2.49	

Box = highest NPV for the specialty

Bold = highest NPV for the state