ABSTRACT

Although going to college is assumed to only be a cost, it can also be viewed as an investment. For four years, people invest in a university in anticipation for a return upon graduation of a larger salary. With that in mind, high school baseball players with immense talent face the choice of two investments: the high risk, high return investment of entering into professional baseball and the low risk, moderate return investment of college. In this study, the amount of money that makes the risk of entering professional baseball equal the risk of going to college, which makes both options suitable, is determined.

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Introduction

Typically, the average American male is faced with a difficult decision upon graduation from high school. He can either choose to finish school and begin a working life or to attend a university and pursue a degree, whether that be at a junior college or four-year institution. However, for a young man who possesses top-tier baseball talent, he may also have another option. That is to pursue a career among the professional ranks in baseball. Major League Baseball (MLB) has the largest annual draft class out of any sport. Although a sport, the MLB is also a huge business entity that brings in millions of dollars through TV deals, endorsements, ticket sales, and concession each year. The business of Major League Baseball takes a chance on 1,200 potential new employees each year hoping that they can develop into everyday players at the Major League level. However, there are only 750 players currently active in the entire Major Leagues, making entering into the draft a huge financial risk for the young man.

For the 18-year-old baseball player just out of high school, the financial risk is often something not carefully assessed. This risk is definitely not something to be overlooked, though, since the risk of pursuing a baseball career instead of college can put a player in financial ruin if he does not make it to the big leagues. Since the talent of players correlates with the position in which they are drafted, one can look at the spot the player is drafted and estimate the probability that he will make it to the big leagues. This can be estimated based on how players that have been drafted in the same spot in previous years' have fared in professional baseball careers. Taking into account all the players that are drafted each year, it can be concluded that only approximately ten percent ever will make it to the Major Leagues, with the overwhelming majority of the players

making it being drafted in the top 3 out of the total 40 rounds. Therefore, there is a huge probability that the player drafted into professional baseball will never make it to the MLB and will walk away from baseball with minimal earnings. Since the probability of not making it are so high, the financial risk in entering professional baseball over college is something that must be assessed.

Minor League Salaries

The reason so much financial risk exists is because of the low minor league salaries paid to the player before he reaches the MLB. Upon being drafted, the player is awarded a signing bonus, which ranges from multi million dollars in the first round to lower than a thousand dollars in the last round. Typically, each team has five different levels of minor league competition that include: short season A, low A, high A, double A, and triple A. Each of these levels is associated with the level of capability a player has, meaning that the worst and least experienced players are typically in short season A, while the best and most experienced players are in triple A. From the time the player is drafted, he can expect to have the following different monthly paychecks as he progresses through each level of the minor leagues. Minor League players are only paid while they are in season, which is from April to September, so six months a year. Their monthly wages and yearly salaries for respective levels of the minor leagues are listed in table 1(Blank, Sportslawblogger.com).

Table 1

Minor League Salaries

Level	Monthly wage	Yearly Salary
Short Season A	$1,150	$6,900
Low A	$1,300	$7,800
High A	$1,500	$9,000
Double A	$1,700	$10,200
Triple A	$2,150	$12,900

Minimum Wage Comparison

Keeping these figures in mind, a minimum wage job in the state of Tennessee would yield approximately $15,080. It can be concluded that playing in the minor leagues has the salary equivalent of a minimum wage job, or maybe even less than that depending on what level the player participates at in the minor leagues. Obviously, the financial risk is evident since there is very little money to be made in the minor leagues, and there is no guarantee that the player drafted will ever make it out of even short season A. The player drafted out of high school who chooses to enter the minor leagues instead of attend college will ultimately face the overwhelming odds that he is going to make at or below minimum wage for several years and then retire from baseball with no degree. Therefore, skipping out on a college education to play in the minor leagues is almost like working at a local fast food joint straight out of high school salary wise. That is why the player must assess the risk of his personal situation.

Major League Salaries

The first question one may ask is why would a player take such a risk with the odds being overwhelmingly against him ever making it to the Major Leagues and financial stability? The answer to this lies in the fact that the risk is dissolved if the player gains a spot on a 25-man active roster of one of the 30 Major League teams. The minimum salary for a player on the 25-man active roster is $507,500, while the majority of big league regulars earn way more than that each year (Stephen, truebluela.com). In a study conducted over 5,898 players, once a baseball player reaches the Major Leagues he can expect to play for 6.95 years barring injury. To go along with that study, the likelihood of him making it to his second year of service after cracking the big leagues drops from 90 percent if his rookie year is at 20 years old, to 87 percent if he is 21, and then to 74 percent if he is 28 years of age (Roberts, nytimes.com). These statistics point to the conclusion that the best probability for the players to earn enough money to obtain financial stability in the Major Leagues is to get drafted at a young age and make it onto a big league active roster so they can make the minimum required salary by Major League Baseball. Since the Major League minimum salary is so large and once a player makes it he can expect to play for almost 7 full years, the player is pretty much guaranteed financial stability after those seven years for the rest of his life if he manages his money properly. More often than not, players make two, three, or four times the minimum salary so once a player reaches the big leagues, the earning possibilities are much larger and much more probable than a player playing seven seasons and only making the minimum salary. For the purposes of this study, it can be assumed, then, that if the player makes it to the big leagues, the decision to skip college was worth it.

Required Signing Bonus Equation

It has been determined what happens to the player if he does make it to the big leagues and that he will most likely not make it to the big leagues and retire with minimal baseball earnings and no college degree. Now the question must be asked of how can the young man determine whether entering the draft and assuming all of this financial risk instead of attending MTSU is worth it? He can do this by only entering the draft for a certain signing bonus. This signing bonus can be calculated by taking the Net Present Value (NPV) of the cash flows of a player who enters the minor leagues and does not make it and subtract it from the NPV of the cash flows an MTSU graduate would most likely experience and multiply that difference by the likelihood that the event will occur, which is the probability that he will not make it to the big leagues. Essentially, you have the equation:

*(NPV of MTSU grad – NPV of minor league player) * probability of not making MLB = Signing Bonus*

NPV Equation

In order to calculate the first part of the equation, we must calculate all of the parts associated with the NPV of an MTSU grad. The NPV requires two separate parts: the cash flows for the lifetime of the investment and the discount rate. For this study, a retirement age of 65 is assumed and the beginning of the cash flows starts when the player is 18 years old, since that is when he has to decide whether to attend MTSU or go to the draft. The lifetime of the cash flows is the difference between the retirement age of the student and his age when entering college, so 47 years. The discount rate would be

2.788%. This was determined because it is the rate of a U.S. Treasury Bill, which is a simply a low risk, safe investment that the player could count on acquiring.

In-State Tuition Rates

First of all, in order to determine the total amount of lifetime cash flows for the player who choses to attend MTSU out of high school, the tuition cost must be taken into account and whether he is an in-state or out-of-state player. For an in-state student seeking to attend MTSU the cost of attendance as of 2016 is $23,612, which includes a meal plan, room and board, books, and tuition (Middle Tennessee State University Tuition, collegedata.com). Therefore, the cost of attendance multiplied by four would be the expense the player is subject to which will take away from his NPV after retirement.

However, since this study is only relevant to baseball players who have enough talent to elect to begin a professional career, it can be assumed that he will earn a baseball scholarship, lessening the financial burden of college. The four most common scholarships distributed by MTSU have the value of 25%, 50%, and 75%. These percentages are multiplied by the cost of attendance to get the scholarship dollar amount. Table 2 summarizes the dollar amounts for certain scholarship percentages.

Table 2

In-State Scholarship Amounts

Scholarship Percentage	Scholarship Dollar Amount	Tuition Cost	Total College Cost
25%	$5,903	$17,709	$70,836
50%	$11,806	$11,806	$47,223
75%	$17,709	$5,903	$23,612

Post-Graduation Earnings

Now that the player's total college expense has been determined for each respective scholarship, his earning potential with a college bachelor's degree must be calculated. A study was conducted of 82 different MTSU graduates who worked in five different cities in Tennessee following graduation. These 82 graduates worked in 7 different career fields ranging from operations managers to financial analysts. The median salaries associated with respective fields are as listed in Table 3.

Table 3

MTSU Graduate Median Salaries

Operations Manager	$53,025
HR Generalist	$45,761
Staff Accountant	$43,610
Software Developer	$54,100
HR Manager	$60,000
Financial Analyst	$55,000
Senior Accountant	$62,381

Cash Flows for In-State Student

The average of these medians comes out to $50,512, which will be assumed to be the starting salary for an MTSU graduate with a bachelor's degree (Middle Tennssee State University Alumni Average Salary, payscale.com). However, salaries grow over time so for this study we will assume that One can expect his salary to grow by 3 percent each year since U.S. salary budget grew by a median of 3 percent in 2015. (Torok, conference-board.org). To bring it all together, the 47 years of cash flows for each student can be determined as summarized in appendix A.

Out-of-State Tuition Rates

Next, the same steps must be followed in order to determine the cost of college for an out-of-state MTSU student. The cost of attendance goes up for out-of-state students since they are subject to out-of-state tuition. The cost of attendance for an out-of-state student is $41,180 a year. Table 4 summarizes the tuition costs of an out-of-state student with a 25%, 50%, and 75% scholarship:

Table 4

Out-of-State Scholarship Amounts

Scholarship Percentage	Scholarship Dollar Amount	Tuition Cost	Total College Cost
25%	$10,295	$30,885	$123,540
50%	$20,590	$20,590	$82,360
75%	$30,885	$10,295	$41,180

Cash Flows for Out-of-State Students

Even though the cost of college is different for in-state and out-of-state students, the same starting salary and growth rate can be used since the student still ends up with the same bachelor's degree; it just cost them more money to obtain it. The 47 years of cash flows for these three out-of-state scenarios are listed in Appendix B.

Minor League Career Length

Since we have found the cash flows up until age 65 of the MTSU graduate in all scenarios, the potential cash flows of the player being drafted and choosing professional

baseball over college must be determined. According to a study conducted between the years 2005 and 2009, the average minor league player made his major league debut at the age of 24.4 years. He compiled approximately 2,070 plate appearances in the minor leagues (Baseball Prospectus Overthinking It, baseballprospectus.com). Given that the average player makes his debut at the age of 24, the player that chooses to skip out on college at 18 and enter professional baseball will spend approximately 6 years in the minor leagues. However, most minor league players do not even make it that far and are released after only a couple years. For the sake of this study, 6 years will be assumed to be the amount of time spent in minor league baseball.

6-Year Minor League Earnings

With a six-year minor league career in mind, the player will be subject to the previously mentioned salaries associated with short season A, low A, high A, double A, and triple A. Typically, a player will spend more time at the higher levels before he is released. For this study, it will be assumed that the player spends one year at each level and two at the highest minor league level of triple A. The first six years of a minor leaguer's cash flows then are listed below in Figure 1.

Drafted into Pro baseball	
Year	Earnings
1	$ 6,900.00
2	$ 7,800.00
3	$ 9,000.00
4	$ 10,200.00
5	$ 12,900.00
6	$ 12,900.00

Cash Flows in Minor Leagues

Figure 1

Post Minor-League Earnings

The next 39 years of cash flows for the player who decides to enter the draft out of high school can be computed in a different manner. The cash flows from the time the player is 24 until 65 would result from what kind of money could be made without any college education, since the player entered professional baseball immediately after high school. According to the U.S. Bureau of Labor Statistics, the weekly income for someone with a high school education was only $638. That is equivalent to $33,176 a year. (Williams, work.chron.com). Just as it was applied to the player who decided to enter college, the 3% annual salary growth will be applied to these 39 years of cash flows. The next 39 years of cash flows of post baseball earnings are summarized in appendix C.

Slot Values

Obviously, the cash flows of the college graduate, whether in-state or out-of-state, are much larger, despite the fact they start with negative cash flows resulting from the tuition of college. Therefore, upon entering the draft, it must be determined exactly what

amount of money would offset this difference in cash flows between going to college and entering professional baseball. That is why upon being drafted, players are offered an incentive to miss college in the form of a signing bonus. Higher picks are associated with higher baseball talent, and that talent is rewarded with higher signing bonuses. With that being said, the lower one is picked in the draft the less likely it is that the player will be able to offset the cost of missing college, making it less and less plausible to enter the draft out of high school. The signing bonuses are referred to as slot values based on the previous years' signing bonuses offered to the players drafted in the previous year. Figure 2 represents the trend of the slot values for the first 100 picks of the draft, based off of each tenth pick.

Overall Pick	Round	Slot Value
1	1	$ 8,616,900.00
10	1	$ 3,231,300.00
20	1	$ 2,214,000.00
30	1	$ 1,914,900.00
40	2	$ 1,545,400.00
50	2	$ 1,196,800.00
60	2	$ 1,025,900.00
70	3	$ 879,500.00
80	3	$ 754,000.00
90	3	$ 646,300.00
100	4	$ 570,300.00

Slot Values

Figure 2

This downward trend continues up until the 1200th pick in the draft, which has a slot value of zero dollars.

Probability of Making MLB

The final missing piece of information needed to compute the signing bonus required for a certain player is the probability that the difference will come in to play. This is equivalent to the probability that the player does not make it into the major leagues and achieve financial stability. However, it must be kept in mind the variation in each draft. Since the probability of making it into the major leagues is so low, if one more person than expected gets drafted in the 40th round, it throws the probability of a 40th round pick making it way off. For example, if it is assumed that one of the thirty 40th round picks makes it, and in reality two picks in a given year make it out of the 40th round, it changes the probability from 3.33% to 6.67%. Since such a small variation from the expected result causes such a large change in the probability of making it, the probabilities of different rounds are lumped together to create larger sample sizes to the variations in actual and expected results are not so large. Lumping rounds is also useful because so few players are expected to make it if they are selected in later rounds. For example, it would not be that out of the ordinary for not one player to make it out of the 40th round. That does not necessarily mean there is no chance the player will make it if he is selected in the 40th round though, so lumping together the rounds allows for more error from the expected results. Figure 3 demonstrates the lumping of these probabilities and rounds based off of a study conducted by Bleacher Report (Rosenbaum, bleacherreport.com).

Round (s)	Probability of not Making MLB
1	34%
2	51%
3 to 5	68%
6 to 10	80%
11 to 20	89%
21 to 40	93%

Probability of not making MLB

Figure 3

Required Signing Bonuses

Now that all three aspects of the information needed to determine the value of the signing bonus required to miss college have been found, the amount of signing bonus needed for each scholarship scenario is able to be calculated. Also, it is important to note that this study is based on MTSU graduates only, since their salaries are the ones used to determine the post college cash flows. As stated previously, the equation to calculate the required signing bonus is:

*(NPV of MTSU grad – NPV of minor league player) * probability of not making MLB = Signing Bonus*

Obviously, the required signing bonuses will be different for each player depending on what round the player is selected in, since the probability of not making it varies depending on the round in which the player is selected. That is why it is very advantageous that the draft occurs in the second week of June each summer. The player will be able to be drafted and know what their signing bonus is and what round they are selected in, which gives the player an idea of the probability in which they will make it to

the MLB. Then, they can calculate the break-even point, or signing bonus, at which the cash flows of going to college and entering professional baseball meet.

Figure 4 summarizes the signing bonuses required for a player who is from Tennessee and has the option to attend MSTU on a 25% scholarship or enter into professional

Round	Probability of not Making MLB	NPV if Attends MTSU	NPV if enters MLB	Difference in NPV	Signing Bonus
1	34%	$ 1,911,190.33	$ 1,223,298.03	$ 687,892.30	$ 233,883.38
2	51%	$ 1,911,190.33	$ 1,223,298.03	$ 687,892.30	$ 350,825.07
3 to 5	68%	$ 1,911,190.33	$ 1,223,298.03	$ 687,892.30	$ 467,766.76
6 to 10	80%	$ 1,911,190.33	$ 1,223,298.03	$ 687,892.30	$ 550,313.84
11 to 20	89%	$ 1,911,190.33	$ 1,223,298.03	$ 687,892.30	$ 612,224.15
21 to 40	93%	$ 1,911,190.33	$ 1,223,298.03	$ 687,892.30	$ 639,739.84

Required Bonuses for 25% In-State

Figure 4

Figure 5 summarizes the signing bonus for a player from Tennessee with a 50% scholarship offer to attend MTSU.

Round	Probability of not Making MLB	NPV if Attends MTSU	NPV if enters MLB	Difference in NPV	Signing Bonus
1	34%	$ 1,933,244.05	$ 1,223,298.03	$ 709,946.02	$ 241,381.65
2	51%	$ 1,933,244.05	$ 1,223,298.03	$ 709,946.02	$ 362,072.47
3 to 5	68%	$ 1,933,244.05	$ 1,223,298.03	$ 709,946.02	$ 482,763.29
6 to 10	80%	$ 1,933,244.05	$ 1,223,298.03	$ 709,946.02	$ 567,956.82
11 to 20	89%	$ 1,933,244.05	$ 1,223,298.03	$ 709,946.02	$ 631,851.96
21 to 40	93%	$ 1,933,244.05	$ 1,223,298.03	$ 709,946.02	$ 660,249.80

Required Bonuses for 50% In-State

Figure 5

For a player from Tennessee with a 75% scholarship, the signing bonus required to enter the minor leagues is listed in Figure 6:

Round	Probability of not Making MLB	NPV if Attends MTSU	NPV if enters MLB	Difference in NPV	Signing Bonus
1	34%	$ 1,955,297.78	$ 1,223,298.03	$ 731,999.75	$ 248,879.92
2	51%	$ 1,955,297.78	$ 1,223,298.03	$ 731,999.75	$ 373,319.87
3 to 5	68%	$ 1,955,297.78	$ 1,223,298.03	$ 731,999.75	$ 497,759.83
6 to 10	80%	$ 1,955,297.78	$ 1,223,298.03	$ 731,999.75	$ 585,599.80
11 to 20	89%	$ 1,955,297.78	$ 1,223,298.03	$ 731,999.75	$ 651,479.78
21 to 40	93%	$ 1,955,297.78	$ 1,223,298.03	$ 731,999.75	$ 680,759.77

Required Bonuses for 75% In-State

Figure 6

As one can see from the tables for in-state players, the higher scholarship they have been offered the more signing bonus is required for them to enter into the draft. That is because the first four years of the cash flows are less for higher scholarships, so it is going to take more money to offset the cash flows that could be attained from graduating from MTSU.

The following tables determine the required signing bonuses for an out-of-state student with a 25%, 50%, and 75% scholarship, respectively in Figures 7, 8, and 9.

Round	Probability of not Making MLB	NPV if Attends MTSU	NPV if enters MLB	Difference in NPV	Signing Bonus
1	34%	$ 1,861,964.53	$ 1,223,298.03	$ 638,666.50	$ 217,146.61
2	51%	$ 1,861,964.53	$ 1,223,298.03	$ 638,666.50	$ 325,719.92
3 to 5	68%	$ 1,861,964.53	$ 1,223,298.03	$ 638,666.50	$ 434,293.22
6 to 10	80%	$ 1,861,964.53	$ 1,223,298.03	$ 638,666.50	$ 510,933.20
11 to 20	89%	$ 1,861,964.53	$ 1,223,298.03	$ 638,666.50	$ 568,413.19
21 to 40	93%	$ 1,861,964.53	$ 1,223,298.03	$ 638,666.50	$ 593,959.85

Required Bonuses for 25% Out-of-State

Figure 7

Round	Probability of not Making MLB	NPV if Attends MTSU	NPV if enters MLB	Difference in NPV	Signing Bonus
1	34%	$ 1,900,426.85	$ 1,223,298.03	$ 677,128.82	$ 230,223.80
2	51%	$ 1,900,426.85	$ 1,223,298.03	$ 677,128.82	$ 345,335.70
3 to 5	68%	$ 1,900,426.85	$ 1,223,298.03	$ 677,128.82	$ 460,447.60
6 to 10	80%	$ 1,900,426.85	$ 1,223,298.03	$ 677,128.82	$ 541,703.06
11 to 20	89%	$ 1,900,426.85	$ 1,223,298.03	$ 677,128.82	$ 602,644.65
21 to 40	93%	$ 1,900,426.85	$ 1,223,298.03	$ 677,128.82	$ 629,729.80

Required Bonuses for 50% Out-of-State

Figure 8

Round	Probability of not Making MLB	NPV if Attends MTSU	NPV if enters MLB	Difference in NPV	Signing Bonus
1	34%	$ 1,938,889.18	$ 1,223,298.03	$ 715,591.15	$ 243,300.99
2	51%	$ 1,938,889.18	$ 1,223,298.03	$ 715,591.15	$ 364,951.49
3 to 5	68%	$ 1,938,889.18	$ 1,223,298.03	$ 715,591.15	$ 486,601.98
6 to 10	80%	$ 1,938,889.18	$ 1,223,298.03	$ 715,591.15	$ 572,472.92
11 to 20	89%	$ 1,938,889.18	$ 1,223,298.03	$ 715,591.15	$ 636,876.12
21 to 40	93%	$ 1,938,889.18	$ 1,223,298.03	$ 715,591.15	$ 665,499.77

Required Bonuses for 75% Out-of-State

Figure 9

Just as the signing bonuses are lower for lower scholarship offers, they are also lower for students with out-of-state tuition costs. This is for the same reason that signing bonuses are lower for lower scholarships, because the out-of-state cost of attendance is so much higher. It lowers the value of the NPV because the higher tuition cost lowers the value of the cash flows. Since the NPV is lower for the out-of-state student, it does not take as much of a signing bonus to offset the difference in the NPVs.

Recalling the table listed previously that displays slot values associated with different rounds and picks of the 2015 MLB draft, it can be observed that the values associated with the early rounds is much larger than the required signing bonuses to make

missing college worth it. The first round has values of multi-million dollars, but the bonus amount drops quickly. Still though, the required signing bonuses are much greater than what is needed to make missing college worth it. The slot value begins to drop below the amount needed around rounds 4 to 6, depending on the amount of scholarship the player has been offered. Essentially, the first three rounds of the draft have bonuses large enough to cover the cost of missing college, but around the 4th round, the player needs to start evaluating whether or not missing college is worth it.

All in all, the financial risk of entering the draft is something that must be assessed by the player who could potentially enter into professional baseball upon graduation of high school. Minor league salaries are so low that if the player never makes it to the MLB, which most do not, the player could be subject to a very poor financial situation after retiring from baseball. The financial risk is often something not assessed, though, because players want to chase their dream and the idea of making millions of dollars and being a celebrity is so enticing. This is why the player must make a choice between a very high risk, high return investment of professional baseball and a low risk, moderate return investment of college. Luckily, the signing bonuses associated with each pick in the draft can potentially offset the difference and limit the risk, but oftentimes they simply act as an advertisement to make the player sign. For example, a player with a 50% out-of-state scholarship offer to MTSU may be selected in the 12th round and offered $500,000. To the 18- year-old, the chunk of money seems like a great deal to simply have to play baseball so they simply sign the contract and go off and chase their dream. However, the $500,000 over $100,000 short of what he would need to offset the difference in the cash flows of going to MTSU and entering the Minor Leagues. That is

why careful investigation must be done to lower the risk of entering the draft out of high school. However, if the risk can be offset, there is no reason why entering the draft out of high school is a bad thing. In conclusion, by the determining the probability that the difference in NPVs will come into play, or the probability that the player will not reach the big leagues, along with the difference in NPVs of an MTSU graduate and a minor league player with no college degree, the required signing bonus to offset the risk of skipping college can be determined.

Limitations:

There are various limitations to this study, but overall in provides a general idea of what signing bonuses are needed to offset the risk of missing college. Many assumptions are used, such as the discount rate, salary growth rate, earnings after college, retirement age, scholarship percentages, and so on. With 1,200 players being selected each year, many life situations will come into play and some people may have more money or job opportunities without a degree than others. With the excel model created along with this study, the numbers can all be changed in order to accommodate the variation among each player that was selected in the draft.

Another limitation to this study is that it simply takes into account the monetary value of going to college. It does not take into account the other lessons that a typical college student learns while at a university. Among other lessons, the ability to study and think for oneself is a very important skill learned in college that would be missed out on if the player decides to go to the draft instead of attend college. It is just very hard to quantify this, so it was neglected from the study. Also, time management, social skills,

and independence are important skills learned in college that would be missed out on if college is skipped. In reality, the decision to miss college and enter the draft involves more than just money, but since it is so hard to quantify these things, the monetary value of the risk was only taken into account in this study.

Next, this study only takes into account the scenario that the player makes this decision when he graduates high school and can choose the draft or college. However, in reality the player could decide to attend college and then get drafted again after their time in college. However, this scenario was not included because after professional baseball the player has a degree and enough earning potential to make up for the smaller cash values he is subject to while playing in the minor leagues. Also, it not included because in college there is no guarantee one will get drafted again because it will depend largely on the player's performance. Playing against bigger, stronger players, the player might not have the success they had in high school and may not be selected again. Next, since professional baseball is such a coveted profession, the MLB has all of the leverage when it comes to seniors who have no NCAA eligibility left. Many players are not ready to walk away from the game and would enter the draft for nothing since they have a degree. Therefore, senior signing bonuses are drastically lower than the fair, slot amount since the player has no leverage with the MLB because if they do not take the offer, their career is over and have no chance of ever making their dream come true. Lastly, if the player becomes injured during his college years, it would drastically affect his ability to get drafted. That another reason why high school players are offered more money in signing bonuses than college seniors. If the player can be signed out of high school, there is not the risk he gets injured and will not be able to perform as anticipated. Increased signing

bonuses serve as the incentive for him to miss college so he is not subject to injury or a step backwards in their baseball development. In conclusion, this scenario was not included because the degree the player would have would make up for the difference in the cash flows and the signing bonuses do not follow the trend for college seniors since they have no leverage.

The last limitation to this study is the neglecting of the junior college route. Upon high school graduation, a player can choose to enter into junior college instead of a four-year university such as MTSU, which was used in this study. Junior college players are eligible for the draft after any year of competition. However, this study assumes that going to college benefits the player in that it allows for higher cash flows due to higher salaries upon graduation. Junior college is different from MTSU in many cases in that one cannot earn a degree that would allow for as high of salaries at a junior college. Also, the reason for enrolling in a junior college is oftentimes so that the player can attend for one year and then enter into the MLB draft, disregarding all academic purposes of college. In this study, the academic side of going to college is reflected in the higher earning potential that results from getting a degree. Therefore, junior college is omitted because many baseball players enter to increase their baseball opportunity, not to pursue a degree.

Conclusion

There are many limitations to this study, but the study is still valuable in that it provides a baseline for assessing the risk. Even if the numbers vary a little bit as a result

of discount rates, salary growth, predicted earnings, and assumed probabilities, the excel model is flexible in that any high school player could enter into the cells his personal information and get a more accurate prediction of the required signing bonus he would need to attend enter the draft over MTSU, or whatever college he could attend. He would simply have to determine his tuition rate for the first four years of his cash flows and the model would adjust. In conclusion, this study provides a baseball for required signing bonuses that reduce risk, but the excel model can be used to build a more personal prediction.

Methodology

In order to conduct this study, I created an excel model referenced in appendix D for the minor league players and in-state students, and appendix E for out-of-state students. This model allowed me to come up with the signing bonuses needed to making entering professional baseball over obtaining an MTSU bachelor's degree worth it financially. In this excel table, I simply assumed a working life of 47 years, since the cash flows start when the player is 18 and 65 years old is a common retirement age. For the student who attends college, the first four years of his cash flows are simply how much it will cost to go to college minus any scholarships. Table 2 summarizes these tuition amounts for in-state students while Table 4 summarizes the tuition amounts for out-of-state students. His remaining 43 years is then the determined salary for an MTSU graduate, with a 3% annual growth rate. Next, for the player who chooses to enter the minor leagues instead of college has his first six years of cash flows consisting of minor league salaries as shown in Figure 1. His remaining cash flows are simply the starting salary of someone without a college degree with a 3% annual growth rate.

Next, I took the NPV of these cash flows for each scenario assuming a discount rate of that of a US Treasury Bill, since it is a very low risk investment which makes it a safe assumption. Recall that the student could be in-state on a 25%, 50%, or 75% scholarship or be out-of-state on a 25%, 50%, 75% scholarship. Then I had the NPV of the six possible college options and the NPV of the player who entered into the minor leagues, played for the average career length, and got a job with no degree. After that, I took the difference between college NPV route and the minor league NPV route which left me with the amount of cash flows the retired minor leaguer missed out on since he chose not to go to MTSU. The last step in determining the required signing bonus was to multiply that difference by the probability that the difference will come into play, which is the probability the player will not reach the Major Leagues and sign a contract that will push his baseball earnings far beyond what he could have made had he attended college. Recall these probabilities are listed in Figure 3.

APPENDICES

Appendix A

Cash Flows for In-State

25% In-state		50% In-state		75% In-state	
Year	Earnings	Year	Earnings	Year	Earnings
1	$ (17,709.00)	1	$ (11,806.00)	1	$ (5,903.00)
2	$ (17,709.00)	2	$ (11,806.00)	2	$ (5,903.00)
3	$ (17,709.00)	3	$ (11,806.00)	3	$ (5,903.00)
4	$ (17,709.00)	4	$ (11,806.00)	4	$ (5,903.00)
5	$ 50,512.00	5	$ 50,512.00	5	$ 50,512.00
6	$ 52,027.36	6	$ 52,027.36	6	$ 52,027.36
7	$ 53,588.18	7	$ 53,588.18	7	$ 53,588.18
8	$ 55,195.83	8	$ 55,195.83	8	$ 55,195.83
9	$ 56,851.70	9	$ 56,851.70	9	$ 56,851.70
10	$ 58,557.25	10	$ 58,557.25	10	$ 58,557.25
11	$ 60,313.97	11	$ 60,313.97	11	$ 60,313.97
12	$ 62,123.39	12	$ 62,123.39	12	$ 62,123.39
13	$ 63,987.09	13	$ 63,987.09	13	$ 63,987.09
14	$ 65,906.70	14	$ 65,906.70	14	$ 65,906.70
15	$ 67,883.90	15	$ 67,883.90	15	$ 67,883.90
16	$ 69,920.42	16	$ 69,920.42	16	$ 69,920.42
17	$ 72,018.03	17	$ 72,018.03	17	$ 72,018.03
18	$ 74,178.57	18	$ 74,178.57	18	$ 74,178.57
19	$ 76,403.93	19	$ 76,403.93	19	$ 76,403.93
20	$ 78,696.05	20	$ 78,696.05	20	$ 78,696.05
21	$ 81,056.93	21	$ 81,056.93	21	$ 81,056.93
22	$ 83,488.64	22	$ 83,488.64	22	$ 83,488.64
23	$ 85,993.30	23	$ 85,993.30	23	$ 85,993.30
24	$ 88,573.10	24	$ 88,573.10	24	$ 88,573.10
25	$ 91,230.29	25	$ 91,230.29	25	$ 91,230.29
26	$ 93,967.20	26	$ 93,967.20	26	$ 93,967.20
27	$ 96,786.22	27	$ 96,786.22	27	$ 96,786.22
28	$ 99,689.80	28	$ 99,689.80	28	$ 99,689.80
29	$ 102,680.50	29	$ 102,680.50	29	$ 102,680.50
30	$ 105,760.91	30	$ 105,760.91	30	$ 105,760.91
31	$ 108,933.74	31	$ 108,933.74	31	$ 108,933.74
32	$ 112,201.75	32	$ 112,201.75	32	$ 112,201.75
33	$ 115,567.80	33	$ 115,567.80	33	$ 115,567.80
34	$ 119,034.84	34	$ 119,034.84	34	$ 119,034.84
35	$ 122,605.88	35	$ 122,605.88	35	$ 122,605.88
36	$ 126,284.06	36	$ 126,284.06	36	$ 126,284.06
37	$ 130,072.58	37	$ 130,072.58	37	$ 130,072.58
38	$ 133,974.76	38	$ 133,974.76	38	$ 133,974.76
39	$ 137,994.00	39	$ 137,994.00	39	$ 137,994.00
40	$ 142,133.82	40	$ 142,133.82	40	$ 142,133.82
41	$ 146,397.83	41	$ 146,397.83	41	$ 146,397.83
42	$ 150,789.77	42	$ 150,789.77	42	$ 150,789.77
43	$ 155,313.46	43	$ 155,313.46	43	$ 155,313.46
44	$ 159,972.87	44	$ 159,972.87	44	$ 159,972.87
45	$ 164,772.05	45	$ 164,772.05	45	$ 164,772.05
46	$ 169,715.21	46	$ 169,715.21	46	$ 169,715.21
47	$ 174,806.67	47	$ 174,806.67	47	$ 174,806.67

Appendix B

Cash Flows for Out-of-State

25% Out-of-State		50% Out-of-state		75% Out-of-State	
Year	**Earnings**	**Year**	**Earnings**	Year	Earnings
1	$ (30,885.00)	1	$ (20,590.00)	1	$ (10,295.00)
2	$ (30,885.00)	2	$ (20,590.00)	2	$ (10,295.00)
3	$ (30,885.00)	3	$ (20,590.00)	3	$ (10,295.00)
4	$ (30,885.00)	4	$ (20,590.00)	4	$ (10,295.00)
5	$ 50,512.00	5	$ 50,512.00	5	$ 50,512.00
6	$ 52,027.36	6	$ 52,027.36	6	$ 52,027.36
7	$ 53,588.18	7	$ 53,588.18	7	$ 53,588.18
8	$ 55,195.83	8	$ 55,195.83	8	$ 55,195.83
9	$ 56,851.70	9	$ 56,851.70	9	$ 56,851.70
10	$ 58,557.25	10	$ 58,557.25	10	$ 58,557.25
11	$ 60,313.97	11	$ 60,313.97	11	$ 60,313.97
12	$ 62,123.39	12	$ 62,123.39	12	$ 62,123.39
13	$ 63,987.09	13	$ 63,987.09	13	$ 63,987.09
14	$ 65,906.70	14	$ 65,906.70	14	$ 65,906.70
15	$ 67,883.90	15	$ 67,883.90	15	$ 67,883.90
16	$ 69,920.42	16	$ 69,920.42	16	$ 69,920.42
17	$ 72,018.03	17	$ 72,018.03	17	$ 72,018.03
18	$ 74,178.57	18	$ 74,178.57	18	$ 74,178.57
19	$ 76,403.93	19	$ 76,403.93	19	$ 76,403.93
20	$ 78,696.05	20	$ 78,696.05	20	$ 78,696.05
21	$ 81,056.93	21	$ 81,056.93	21	$ 81,056.93
22	$ 83,488.64	22	$ 83,488.64	22	$ 83,488.64
23	$ 85,993.30	23	$ 85,993.30	23	$ 85,993.30
24	$ 88,573.10	24	$ 88,573.10	24	$ 88,573.10
25	$ 91,230.29	25	$ 91,230.29	25	$ 91,230.29
26	$ 93,967.20	26	$ 93,967.20	26	$ 93,967.20
27	$ 96,786.22	27	$ 96,786.22	27	$ 96,786.22
28	$ 99,689.80	28	$ 99,689.80	28	$ 99,689.80
29	$ 102,680.50	29	$ 102,680.50	29	$ 102,680.50
30	$ 105,760.91	30	$ 105,760.91	30	$ 105,760.91
31	$ 108,933.74	31	$ 108,933.74	31	$ 108,933.74
32	$ 112,201.75	32	$ 112,201.75	32	$ 112,201.75
33	$ 115,567.80	33	$ 115,567.80	33	$ 115,567.80
34	$ 119,034.84	34	$ 119,034.84	34	$ 119,034.84
35	$ 122,605.88	35	$ 122,605.88	35	$ 122,605.88
36	$ 126,284.06	36	$ 126,284.06	36	$ 126,284.06
37	$ 130,072.58	37	$ 130,072.58	37	$ 130,072.58
38	$ 133,974.76	38	$ 133,974.76	38	$ 133,974.76
39	$ 137,994.00	39	$ 137,994.00	39	$ 137,994.00
40	$ 142,133.82	40	$ 142,133.82	40	$ 142,133.82
41	$ 146,397.83	41	$ 146,397.83	41	$ 146,397.83
42	$ 150,789.77	42	$ 150,789.77	42	$ 150,789.77
43	$ 155,313.46	43	$ 155,313.46	43	$ 155,313.46
44	$ 159,972.87	44	$ 159,972.87	44	$ 159,972.87
45	$ 164,772.05	45	$ 164,772.05	45	$ 164,772.05
46	$ 169,715.21	46	$ 169,715.21	46	$ 169,715.21
47	$ 174,806.67	47	$ 174,806.67	47	$ 174,806.67

Appendix C

Cash Flows with no Degree

7	$	33,176.00
8	$	34,171.28
9	$	35,196.42
10	$	36,252.31
11	$	37,339.88
12	$	38,460.08
13	$	39,613.88
14	$	40,802.30
15	$	42,026.36
16	$	43,287.16
17	$	44,585.77
18	$	45,923.34
19	$	47,301.04
20	$	48,720.07
21	$	50,181.68
22	$	51,687.13
23	$	53,237.74
24	$	54,834.87
25	$	56,479.92
26	$	58,174.32
27	$	59,919.55
28	$	61,717.13
29	$	63,568.65
30	$	65,475.71
31	$	67,439.98
32	$	69,463.18
33	$	71,547.07
34	$	73,693.48
35	$	75,904.29
36	$	78,181.42
37	$	80,526.86
38	$	82,942.67
39	$	85,430.95
40	$	87,993.87
41	$	90,633.69
42	$	93,352.70
43	$	96,153.28
44	$	99,037.88
45	$	102,009.02
46	$	105,069.29
47	$	108,221.37

Appendix D

In-State Bonuses

25% In-state	
Year	Earnings
1	$ (17,709.00)
2	$ (17,709.00)
3	$ (17,709.00)
4	$ (17,709.00)
5	$ 50,512.00
6	$ 52,027.36
7	$ 53,588.18
8	$ 55,195.83
9	$ 56,851.70
10	$ 58,557.25
11	$ 60,313.97
12	$ 62,123.39
13	$ 63,987.09
14	$ 65,906.70
15	$ 67,883.90
16	$ 69,920.42
17	$ 72,018.03
18	$ 74,178.57
19	$ 76,403.93
20	$ 78,696.05
21	$ 81,056.93
22	$ 83,488.64
23	$ 85,993.30
24	$ 88,573.10
25	$ 91,230.29
26	$ 93,967.20
27	$ 96,786.22
28	$ 99,689.80
29	$ 102,680.50
30	$ 105,760.91
31	$ 108,933.74
32	$ 112,201.75
33	$ 115,567.80
34	$ 119,034.84
35	$ 122,605.88
36	$ 126,284.06
37	$ 130,072.58
38	$ 133,974.76
39	$ 137,994.00
40	$ 142,133.82
41	$ 146,397.83
42	$ 150,789.77
43	$ 155,313.46
44	$ 159,972.87
45	$ 164,772.05
46	$ 169,715.21
47	$ 174,806.67
NPV	$1,911,190.33
Total Income	$ 4,247,126.37
NPV Difference	$687,892.29
Prob. Of not Making MLB	34%
Signing Bonus Required	$ 233,883.38

50% In-state	
Year	Earnings
1	$ (11,806.00)
2	$ (11,806.00)
3	$ (11,806.00)
4	$ (11,806.00)
5	$ 50,512.00
6	$ 52,027.36
7	$ 53,588.18
8	$ 55,195.83
9	$ 56,851.70
10	$ 58,557.25
11	$ 60,313.97
12	$ 62,123.39
13	$ 63,987.09
14	$ 65,906.70
15	$ 67,883.90
16	$ 69,920.42
17	$ 72,018.03
18	$ 74,178.57
19	$ 76,403.93
20	$ 78,696.05
21	$ 81,056.93
22	$ 83,488.64
23	$ 85,993.30
24	$ 88,573.10
25	$ 91,230.29
26	$ 93,967.20
27	$ 96,786.22
28	$ 99,689.80
29	$ 102,680.50
30	$ 105,760.91
31	$ 108,933.74
32	$ 112,201.75
33	$ 115,567.80
34	$ 119,034.84
35	$ 122,605.88
36	$ 126,284.06
37	$ 130,072.58
38	$ 133,974.76
39	$ 137,994.00
40	$ 142,133.82
41	$ 146,397.83
42	$ 150,789.77
43	$ 155,313.46
44	$ 159,972.87
45	$ 164,772.05
46	$ 169,715.21
47	$ 174,806.67
NPV	$1,933,244.05
Total Income	$ 4,270,738.37
NPV Difference	$709,946.02
Prob. Of not Making MLB	34%
Signing Bonus Required	$ 241,381.65

75% In-state	
Year	Earnings
1	$ (5,903.00)
2	$ (5,903.00)
3	$ (5,903.00)
4	$ (5,903.00)
5	$ 50,512.00
6	$ 52,027.36
7	$ 53,588.18
8	$ 55,195.83
9	$ 56,851.70
10	$ 58,557.25
11	$ 60,313.97
12	$ 62,123.39
13	$ 63,987.09
14	$ 65,906.70
15	$ 67,883.90
16	$ 69,920.42
17	$ 72,018.03
18	$ 74,178.57
19	$ 76,403.93
20	$ 78,696.05
21	$ 81,056.93
22	$ 83,488.64
23	$ 85,993.30
24	$ 88,573.10
25	$ 91,230.29
26	$ 93,967.20
27	$ 96,786.22
28	$ 99,689.80
29	$ 102,680.50
30	$ 105,760.91
31	$ 108,933.74
32	$ 112,201.75
33	$ 115,567.80
34	$ 119,034.84
35	$ 122,605.88
36	$ 126,284.06
37	$ 130,072.58
38	$ 133,974.76
39	$ 137,994.00
40	$ 142,133.82
41	$ 146,397.83
42	$ 150,789.77
43	$ 155,313.46
44	$ 159,972.87
45	$ 164,772.05
46	$ 169,715.21
47	$ 174,806.67
NPV	$1,955,297.78
Total Income	$ 4,294,350.37
NPV Difference	$731,999.74
Prob. Of not Making MLB	34%
Signing Bonus Required	$ 248,879.91

Appendix E

Out-of-State Bonuses

25% Out-of-State		50% Out-of-state		75% Out-of-State	
Year	**Earnings**	**Year**	**Earnings**	Year	Earnings
1	$ (30,885.00)	1	$ (20,590.00)	1	$ (10,295.00)
2	$ (30,885.00)	2	$ (20,590.00)	2	$ (10,295.00)
3	$ (30,885.00)	3	$ (20,590.00)	3	$ (10,295.00)
4	$ (30,885.00)	4	$ (20,590.00)	4	$ (10,295.00)
5	$ 50,512.00	5	$ 50,512.00	5	$ 50,512.00
6	$ 52,027.36	6	$ 52,027.36	6	$ 52,027.36
7	$ 53,588.18	7	$ 53,588.18	7	$ 53,588.18
8	$ 55,195.83	8	$ 55,195.83	8	$ 55,195.83
9	$ 56,851.70	9	$ 56,851.70	9	$ 56,851.70
10	$ 58,557.25	10	$ 58,557.25	10	$ 58,557.25
11	$ 60,313.97	11	$ 60,313.97	11	$ 60,313.97
12	$ 62,123.39	12	$ 62,123.39	12	$ 62,123.39
13	$ 63,987.09	13	$ 63,987.09	13	$ 63,987.09
14	$ 65,906.70	14	$ 65,906.70	14	$ 65,906.70
15	$ 67,883.90	15	$ 67,883.90	15	$ 67,883.90
16	$ 69,920.42	16	$ 69,920.42	16	$ 69,920.42
17	$ 72,018.03	17	$ 72,018.03	17	$ 72,018.03
18	$ 74,178.57	18	$ 74,178.57	18	$ 74,178.57
19	$ 76,403.93	19	$ 76,403.93	19	$ 76,403.93
20	$ 78,696.05	20	$ 78,696.05	20	$ 78,696.05
21	$ 81,056.93	21	$ 81,056.93	21	$ 81,056.93
22	$ 83,488.64	22	$ 83,488.64	22	$ 83,488.64
23	$ 85,993.30	23	$ 85,993.30	23	$ 85,993.30
24	$ 88,573.10	24	$ 88,573.10	24	$ 88,573.10
25	$ 91,230.29	25	$ 91,230.29	25	$ 91,230.29
26	$ 93,967.20	26	$ 93,967.20	26	$ 93,967.20
27	$ 96,786.22	27	$ 96,786.22	27	$ 96,786.22
28	$ 99,689.80	28	$ 99,689.80	28	$ 99,689.80
29	$ 102,680.50	29	$ 102,680.50	29	$ 102,680.50
30	$ 105,760.91	30	$ 105,760.91	30	$ 105,760.91
31	$ 108,933.74	31	$ 108,933.74	31	$ 108,933.74
32	$ 112,201.75	32	$ 112,201.75	32	$ 112,201.75
33	$ 115,567.80	33	$ 115,567.80	33	$ 115,567.80
34	$ 119,034.84	34	$ 119,034.84	34	$ 119,034.84
35	$ 122,605.88	35	$ 122,605.88	35	$ 122,605.88
36	$ 126,284.06	36	$ 126,284.06	36	$ 126,284.06
37	$ 130,072.58	37	$ 130,072.58	37	$ 130,072.58
38	$ 133,974.76	38	$ 133,974.76	38	$ 133,974.76
39	$ 137,994.00	39	$ 137,994.00	39	$ 137,994.00
40	$ 142,133.82	40	$ 142,133.82	40	$ 142,133.82
41	$ 146,397.83	41	$ 146,397.83	41	$ 146,397.83
42	$ 150,789.77	42	$ 150,789.77	42	$ 150,789.77
43	$ 155,313.46	43	$ 155,313.46	43	$ 155,313.46
44	$ 159,972.87	44	$ 159,972.87	44	$ 159,972.87
45	$ 164,772.05	45	$ 164,772.05	45	$ 164,772.05
46	$ 169,715.21	46	$ 169,715.21	46	$ 169,715.21
47	$ 174,806.67	47	$ 174,806.67	47	$ 174,806.67
NPV	$1,861,964.53	NPV	$1,900,426.85	NPV	$1,938,889.18
Total Income	$ 4,194,422.37	Total Income	$ 4,235,602.37	Total Income	$ 4,276,782.37
NPV Difference	$638,666.50	NPV Difference	$677,128.82	NPV Difference	$715,591.15
Prob. Of not Making MLB	34%	Prob. Of not Making MLB	34%	Prob. Of not Making MLB	34%
Signing Bonus Required	$ 217,146.61	Signing Bonus Required	$ 230,223.80	Signing Bonus Required	$ 243,300.99

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