Using Sports to Teach Finance and Economics

James Mahar and Rodney Paul*

ABSTRACT

Sustaining student interest in economics and finance is often a challenging task. One way to generate interest is through the use of examples that are interesting and relevant to the students. Sports provide many examples of finance and economics principles. In this paper, we provide seven sports examples that can be used to demonstrate various topics in and out of the classroom. These examples can be used either to introduce material or to assist more advanced students in gaining a deeper understanding of the subject matter. The examples have the additional benefit of providing memorable allegories to the business world.

Introduction

Excitement in a classroom is an important tool to maintain student attention and to enhance learning. To generate this excitement and attention is often difficult. This task is especially challenging in undergraduate finance and economics classrooms because many undergraduate students have little real-world experience to make textbook examples meaningful. Therefore, the professor is often compelled to use examples from areas outside of the traditional business world.

The rationale of using non-business examples has been laid out by Ardalan who finds that these examples allow the student to "relate a familiar concept to a new one, [which] allows the subject to make better inferences about the target domain" (Ardalan 1988). Within finance and economics, this concept of using material from outside of the traditional subject matter is well rooted both in the class room and in the research arena. Sauer summarizes some of this work on the efficiency of betting markets (Sauer 1998). On the pedagogy side, Becker and Watts (1996) document the use of sports examples in economic classes and Mahar and Paul (2002) provide examples for teaching finance using lessons from football.

In this paper we offer seven sports examples to demonstrate various financial and economic topics. The examples come from both individual as well as team sports. The examples are stand-alone segments that can easily be incorporated into a class lectures or can be used as supplement lecture and text reading.

Opportunity Costs

Top college underclassmen are faced with a difficult decision: stay in college or turn professional. While the rules are slightly different across collegiate sports, the basic decision can be shown in football. Due to NCAA restrictions, once a player in college football (out of high school for three years) opts in for the draft and hires an agent, he cannot return to play college football, regardless of the number of years remaining of eligibility.

Writers and broadcasters often view this decision as one of character and integrity, looking favorably upon the players who stay in school to graduate and frowning on those who follow the dollars to the NFL.[i] These decisions for the top players in the college game, however, have little to do with these character attributes, and have everything to do with the economic concept of opportunity costs. Many college football players face financial hardship, as some are from poor households and all face NCAA

* Associate Professor of Finance and Professor of Economics, respectively, St. Bonaventure University, St. Bonaventure, NY 14778.

restrictions on earnings while in college. Professional football not only offers the possibility to compete with and against the best players in the world, but also huge financial gain.

The opportunity cost, as defined by economic textbooks, is the best foregone alternative to any decision. All college students must weigh the expected costs and benefits of staying in school, whether a top round draft choice or not. In the case of turning professional as a top draft pick however, the opportunity cost of staying in school is often millions of dollars, based on draft position, supply of overall talent and demand (based on scarcity) of specific positions. The decision to attend and remain in college is made due to the expectations surrounding the situation. The benefits of being able to get a more favorable job and the fun and learning involved in the college experience must be weighed against the costs associated with going to college. These costs include the standard explicit costs such as tuition, room and board, textbooks, etc. and the opportunity costs such as money foregone in the best available job.

Contracts with present values in the millions amount to more than many college graduates will make in their working lifetimes. Thus, the costs of turning pro are lack of a college degree, lack of an opportunity to gain knowledge, possibly playing better on the field and improving one's draft stock, and all of the fun activities in which college students may participate. However, an additional factor that must be noted is that any student-athlete that does turn professional may still pursue their degree, either after their playing days are finished (for many this is fewer than five years later) or by taking classes during the off-season. The costs of staying in school are the possibilities of injury or of poor play that can diminish that first contract (and possible future contracts). A serious injury could lead to the loss of any potential future earnings as a professional, while even minor injuries could instill doubt in teams who may wish to draft the player, causing a fall in draft position and the potential loss of hundreds of thousands or even millions of dollars.

From the point of view of economists, this decision to stay in school seems to be a "no-brainer", but not in the same way that most sports reporters would lead one to believe. Economists would argue athletes should go pro and postpone his or her remaining years of school because the positive benefits of turning professional outweigh seemingly large costs of sustaining an injury or playing poorly after remaining in school. The opportunity cost of staying and receiving a degree, which could be made later, and the benefits of a college life do not outweigh tens of millions of dollars. Student athletes who forgo their college education in order to turn pro are not bad people, shortsighted, or do not value college education, it is just that the opportunity cost of delaying a professional career is simply too high.

Risk and Incentives

Due to the incentives created by leverage, capital budgeting at a firm with debt is not always as simple as merely picking positive Net Present Value (NPV) projects as finance professors often suggest. In the same way, stock selection by mutual fund managers may incorporate more than traditional valuation models in a world where fund performance is rewarded with increased cash inflows. While each of these has been well demonstrated in financial literature, hockey provides an excellent example of logic in a more "user-friendly" format.

In a non-Modigliani and Miller world, capital structure can influence the investments that a firm makes. Galai and Masulis show that debt in the capital structure may give shareholders the incentive to accept risky negative NPV projects and pass on safe positive NPV projects (Galai and Masulis 1976). As shown in Figure 1, this happens when the benefits of the project must go to pay off debt holders. The shareholders, who are the residual claimants, will want to take on a risky project (even if it has a negative NPV) in order to have a chance at getting paid after the debt holders have been paid.

Chevalier and Ellison uses similar logic to show that mutual fund managers who have underperformed their benchmarks, increase the risk of their selections in order to "catch-up" (Chevalier, 1997). This is partially because of the high correlation between cash inflows into the fund (i.e. "new money") and recent fund performance. In both settings, the situation is similar: unless something "big" happens, the principals get no, or a dramatically reduced, return. This creates incentives to take risks that in other settings would appear irrational.

This strategy is well-established in hockey where losing teams regularly pull their goalie off the ice for another skater (who has a greater chance of scoring) as the end of the game approaches. This is a

very high risk strategy since if the puck falls into the hands of the team that is in the lead, there is no goalie to stop a shot. The extra attacker gives the trailing team a chance to score a game-tying goal, but actually gives the leading team a much higher chance of scoring a goal without a goaltender in net. The key to understanding the decision is if a team loses, it does not matter if it loses by one, two, or even three goals as the game still results in a loss in the standings. The slight increase in the probability of scoring is worth the cost of the larger increase in the probability of allowing a goal due to the fixed-time element of a game. The decision does not make sense in other situations, but is rational as the time remaining in the game approaches zero. The team, like the firm and the fund managers above, have very little to lose by adopting this high risk approach even if they would not do so under more general conditions[1].

Expected Monetary Returns vs. Utility

If financial markets are semi-strong form efficient, then asset prices reflect all publicly available information (Brown 2006). Investors therefore cannot expect to "beat the market" and should worry more about diversification and lowering transactions costs and not concern themselves with picking undervalued assets. Of course this is counter to what many investors do. Financial economists are left with two explanations: investors are irrational (the behavioral finance literature that stresses investor overconfidence) or that markets are not semi-strong form efficient. Another, and not mutually exclusive, explanation comes from William Bernstein's Investor Entertainment Pricing Theory, the INEPT model (2002).

The INEPT model maintains that investors consider more than just risk and monetary returns. In particular, investors want to be entertained and to be able to brag about their investments. This leads to a utility maximizing investment strategy where investors may give up higher returns from "boring" stocks and settle for lower average returns (but occasionally higher returns) by buying into more speculative "exciting" stocks that allows the investor to brag and feel good about his/her stock picking prowess. This concept is consistent with the empirical findings Fama and French (1995) as well as Barreris, Shleifer, and Wurgler (2005) that find that value stocks have earned higher returns than growth of glamour stocks.

In studies of gambling markets, bettors have been shown to have cognitive biases similar to those mentioned for stocks above. Bettors prefer to wager on the best teams, particularly on the road, leading to a strategy of betting the favorites taking large losses and the return on a strategy betting the underdog (even more so for home underdogs) earning higher returns than expected, often overcoming the implicit commission in gambling transactions (i.e. Levitt (2004), Paul and Weinbach (2008)). Higher returns to betting the less popular side of the proposition, the underdog, have been found across sports, including the NFL, NCAA Football, NBA, NCAA Basketball, MLB, NHL, etc.

In addition, in wagering propositions where bettors can place bets on the total number of points (or goals or runs, etc.), additional behavioral biases have been found. Bettors, in general, prefer to wager on the "over" (a bet that more points will be scored than the posted number) compared to the "under" (a bet that fewer points will be scored than the posted number). Due to the excitement inherent in a high-scoring sporting event compared to a low-scoring scoring event (all else equal), betters prefer to wager on seeing more points being scored compared to fewer points being scored. Bettors who are willing to wager on a low-scoring (often considered boring) game, are the beneficiaries of positive returns to long-run betting strategies (i.e. Paul and Weinbach (2002); Paul, Weinbach, and Wilson (2004)).

Executive Compensation

Of all the topics covered in a typical corporate finance class, few are better suited for using sports examples than executive compensation. In both professional sports and the executive labor market, the participants are highly paid and widely studied, yet in each market the full impact of the pay packages can only be partially explained and often are quite controversial.

[1] Goal differential (goals scored – goals allowed) is the fourth tiebreaker for making the playoffs (after points, wins, and record against tied team(s)). This could alter the decision of coaches during the late stages of the season, but during the vast majority of the regular season, trailing teams always make the effort to pull their goaltender near the end of regulation time.

What is known is both sports and business executive pay has increased at a much faster rate than pay to other employees for much of the latter half of the 1900s and early 2000s. This increase has been the center of much debate and economic study in academic circles as well as criticism in the popular media. These criticisms went as far as to have some call for federally mandated caps on Executive Pay (Frank 2009).

A large portion of the outcry is over level of pay. For instance the AFL-CIO regularly cites data showing that CEO pay as a multiple of "average worker pay" has increased substantially over the past 30 years. In their 2008 Trends in CEO Pay, they write the following: *"However, the ratio of CEO pay to employee wages remains exceedingly high: more than 319 times in 2008, according to the 2009 survey by United for a Fair Economy. This compares with 42 times in 1980."*

The same relationship of the star performers getting more than the average performer is also true in professional athletics. Take for instance Major League Baseball. Hauber (2003) reports that the average MLB salary was $14,341 in 1965 (approximately $81,000 in 2007 dollars). In 2007, the MLB players association reported that the average salary was nearly $3 million. This increase represents an annualized increase of over 19% per year for over 40 years much ahead of the average rank and file employee's pay.

More telling, however, is the fact that all Major League players did not see their salaries increase at the same rate. As averages are driven by outliers, it is interesting to see what happens when median pay is examined. Ranking all teams on their median pay and then creating a ratio of highest paid to lowest paid results in a chart that resembles the CEO to average worker (figure 2A and figure 2B).

Why are superstars, in sports and in business getting progressively more than their more average co-workers? One important reason is that pay largely is tied to marginal product of the employee. Technology has magnified the efforts of the top players in both sports and business. In sports many more people can enjoy the talents of the top stars who become cultural icons known throughout the world. Similarly, technology has allowed firms to increase in size and has levered the impact of top managers. This has led to reduced layers of management at firms and higher CEO pay since the CEO's marginal product (benefit) has increased as well. Gabaix and Landier (2006) document this empirically and show technology and globalization can explain both increased firm size and higher executive pay.

Sunk Costs

Virtually every year several NFL football teams have a public controversy over who should be the starter at some key position. This controversy is most pronounced at the Quarterback. By using economics to analyze the decision, it becomes clear all too often the sports media is incorrect in their discussion of the "QB controversy." These errors can be shown using the Arizona Cardinals in 2008.

The Arizona Cardinals had a quarterback controversy at the start of the 2008 season. Matt Leinart, a former first round draft pick, had a salary for the 2008 season that was several times that of Kurt Warner, the veteran backup.

While different points could be made for each quarterback, one argument often cited in Leinart's favor was the salary differential between the two players. Due to the large contract given to Leinart, many in the local and national media expressed that Leinart would be the starter, simply because the team had so much money invested in him. They stated that the team could not afford to have a $6.75 million per season player on the bench.

The argument for Leinart by the media lacks economic reasoning. Both players had contracts that were almost completely fixed costs to the team. The contracts did not vary significantly based on how often they played or how well they performed. The signing bonuses of both players are fixed costs to the teams as they cannot be recovered. In addition, if the team plans on keeping both players on the roster for the season, their salary is not based on playing time or performance, but is a fixed amount for the year set in their contract.

Fixed costs, after they are incurred, are considered sunk costs. Sunk costs are not recoverable and they do not impact the marginal cost curve. Therefore, Leinart's contract should not affect the decision by the team of which quarterback to play. Due to the sunk cost nature of most NFL player contacts, the team only cares about the revenues generated by the team when maximizing profits. Revenues are greater when the team is successful and has popular players. Since the coaches believed that Warner gave the team a

better chance to win, expected wins (and likely revenues as well) were higher with Warner as the starter. Therefore, it is not surprising that Kurt Warner was named the starting quarterback. Ultimately, Kurt Warner led the Cardinals to the Super Bowl, but even this result will likely not deter the media in their pursuit to proclaim the higher-paid player as the starter.

Diversification Discount

The diversification discount is a standard topic in advanced corporate finance texts. It is the empirical finding that diversified firms sell at a discount to the collection of their individual parts. The discount has been the focus of numerous academic journal articles. Lang and Stulz (1994), Comment and Jarrell (1995), Berger and Ofek (1995) are a few of the papers that either show that the industry-adjusted Tobin's Q value for diversified firms is lower than that for undiversified firms, or show what happens when a firm changes its focus though restructuring, spin-offs, or acquisitions.

There have been many theories offered to explain this discount. These include increased information asymmetries and lack of transparency, as well as weak internal capital markets and poor incentives, managerial entrenchment, and a lack of focus which prevents managers from being experts in all areas.

The underlying ideas of the field can also be demonstrated using triathlons as the example. As the name suggest, triathletes combine three sports (typically swimming, biking, and running) into a single event. Not surprisingly, these diversified athletes perform worse in any single event than do their more focused peers. The summer 2008 Olympics provide evidence of this with Kenenisa Bekele, winning the Men's 10,000 meters with a time of 27:01. Jan Frodeno of Germany won the Men's Olympic triathlon running the same distance over 30 minutes in 30:46.

One explanation of the slower times (diversification discount) is that in head to head competition with a non-diversified competitor, the diversified competitor will likely lose because the diversified athlete cannot devote full attention to a single sport. Given that time in a day is fixed, the training practices of these individuals are likely to be different. This "jack of all trades, master of none" idea has also been used as a means of explaining the diversification discount in a corporate setting.

Like single event athletes, it is easy to hypothesize various reasons why stand-alone firms have better performances that diversified firms. However, the empirical fact that diversified firms or triathletes underperform is not sufficient to understand the bigger question of whether diversification is good or bad. There is a strand of financial research that draws the diversification discount into question. This is based on the view that the firms self-select as to diversify or not and implies that merely comparing diversified firms with non-diversified firms is not enough. Furthermore, even looking at stock returns on the announcements of focus changing events is not sufficient to prove a diversification discount does or does not exist since it is impossible to determine how far the firm might have fallen in the absence of diversification (Villalonga 2004).

Endogeneity issues in general and its role in the diversification decision in particular, are frequently difficult for undergraduates to grasp. Fortunately the key points can be made more student-friendly by using triathletes as the example. As shown above, triathletes are slower than single event athletes. However, this is difficult to interpret: is it the fact that the athlete is doing multiple sports causing the discount? Or did the athlete optimally select to do multiple sports?

That a single event athlete ran faster than Jan Frodeno is not necessarily comparing like things. The triathlete may never have been able to achieve world-class times in a single sport regardless of making the decision to do multiple events. Alternatively, the athlete may have been pre-disposed to overuse injuries that could accompany single-sport training. Therefore, it may be optimal for the athlete to choose triathlons even though the performance may be reduced in any single event.

Similarly, that a diversified firm has a lower Q value or drops in value when diversifying moves are announced does not mean that the firm is necessarily making the wrong decision. The firm might have fallen further in the absence of diversification. Moreover, even the cleaner test of what happens on the announcement, is not as straight-forward as some might believe. The announcement to diversify tells the market place that the firm is not necessarily in the best position to compete in a single industry and it is this

news (like a predisposition to overuse injuries) which induces the price drop and not directly the diversification.

Measuring Manager Performance

The decision to replace a coach mid way through the season and the decision to replace money managers are similar. If a finance novice is asked to gauge the performance of a money manager, the answer is apt to be highly tied to the returns earned. Similarly, a casual sports fan may judge a coach's performance by the team's win-loss record. In each case, you are ending a longer term relationship because of unsatisfactory performance and in each case many factors must be considered when making the change.

This cursory inexperienced evaluation is incorrect as it ignores many factors which influence performance. What it needed to properly evaluate managers is a multi-faceted appraisal. In finance, this multi factor appraisal accounts for market adjustments, risks, goals of the investor, and expected future returns. Unfortunately, such a discussion includes alphas, betas, and other measures of portfolio performance often beyond the introductory finance student's initial level of understanding. Fortunately, the same concepts can be explained using sports, where students understand simple win-loss percentages may or may not be a fair gauge of a coach's performance.

The performance of a coach cannot be measured by win-loss percentage because the outcomes are often outside the control of the coach, the coach should not be judged (either positively or negatively) simply on the basis of these events. Consequentially, in order to measure performance, a series of measures must be considered that include how the team did relative to other teams, and conditioned on the various factors that are beyond the control of the coach. For instance, a coach with a team that is not very skilled may be doing an excellent job, but the record may not indicate it.

Often, however, even relative performance measures are often not enough to judge performance of the coach. For instance, consider a coach who loses his/her star player and the team goes on to have a win-loss record that is worse than expected and worse than the rest of the league. It can be argued that the injury is not the fault of the coach and (s)he should not be punished for the event. Additionally, the team's available resources, expected performance, and schedule also must be taken into account.

This analysis applies to the evaluation of money managers. If absolute returns are used, a manager doing a good job may be punished in down markets. For this reason, managerial performance should be measured both in absolute (returns or win loss percentage) and relative (industry adjusted) terms.

The riskiness of assets must be accounted for. In finance there are various models to account for these factors, for instance, the Treynor Index, Jensen's Alpha, and the Sharpe Ratio. These measurements try to control for various measurements of risk and give a clearer view of managerial ability. However, like in sports, managerial evaluation is both quantitative and qualitative.

Conclusion

In this paper, seven teaching ideas were given to demonstrate how sports examples can be used to explain topics in economics and finance. The examples are designed to generate student interest and learning by creating a mental link from what is known to what is unknown (that is from sports to finance). The examples have been used in our classes and do generate interest and discussion. The examples also have the added benefit of showing students that economics and finance theory is much more accessible than they had previously thought.

Figure 1

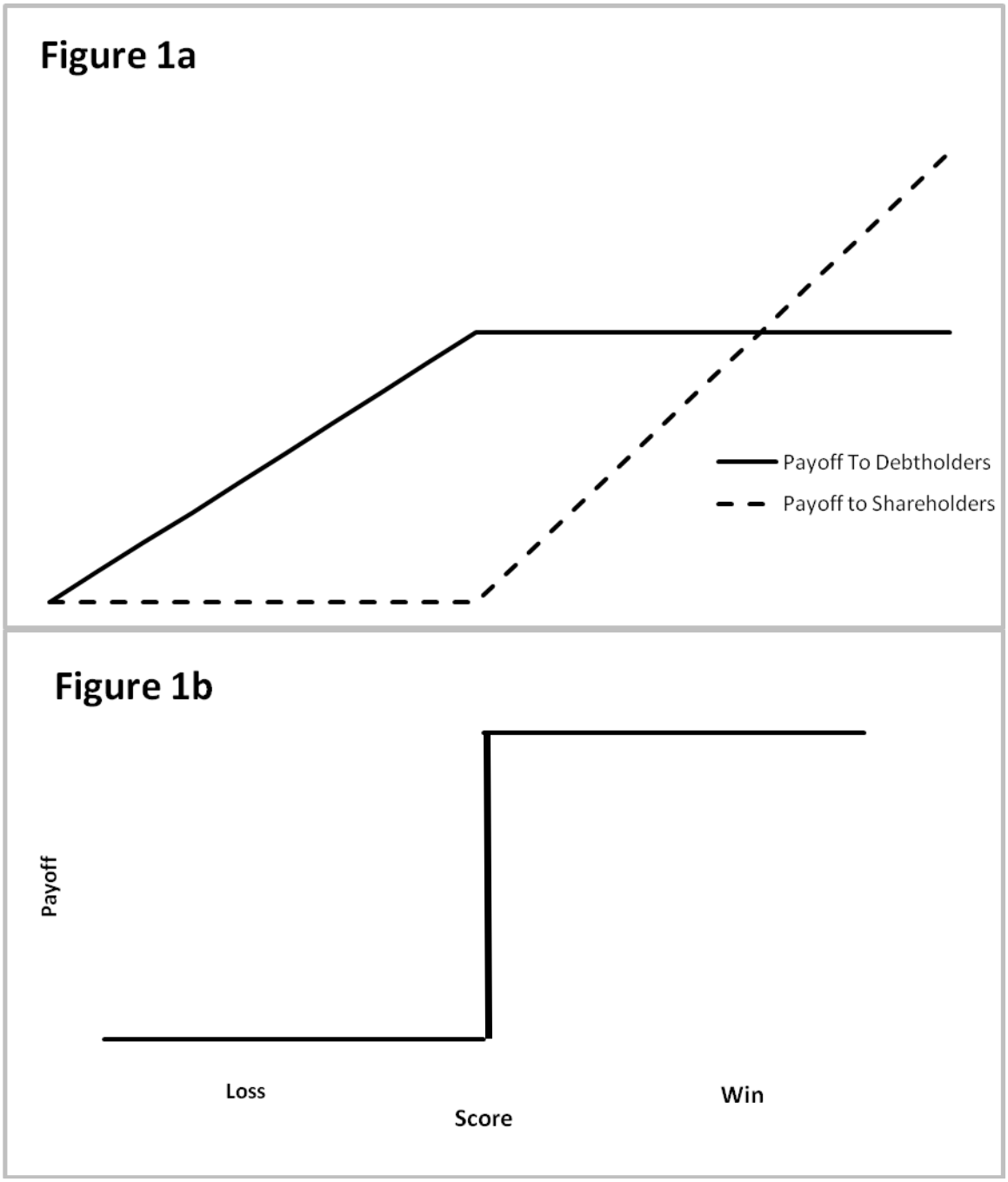


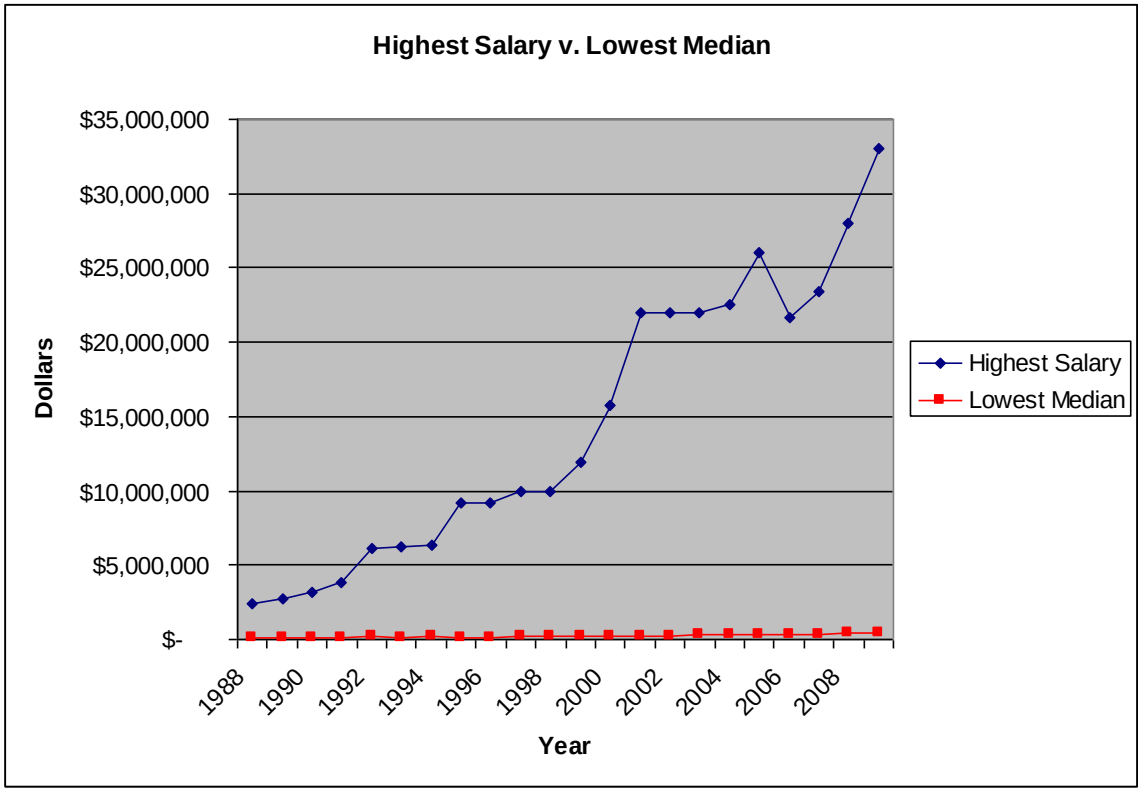
Figure 1: Conditional Risk Taking Incentives
Gala [1976] stated in positive environments where reduced climate have the incentive to take large risks if frim value is less than the amount of debt owed. This idea is also shown by Chevalier [1997] who showd that mutual fund managers that have underperformed benchmarkes increase the values of their holdings in the hopes of out perfomring prior to reporting underperformance to shareholders. This is analagous to pulling the goalie in hockey.

Figure 2A

Used by permission. Ratio of average CEO pay to average worker pay.

Figure 2 A
From AFL-CIO 2008 Trends in CEO Pay

Figure 2B Highest MLB baseball salary to the median of lowest team's pay



References

Ardalan, K. 1998. "On the Use of Entertaining Metaphors in the Introductory Finance Course," *Financial Practice and Education,* 108-114.

Bareris, Shleifer, and Wurgler. "Co-Movement." Journal of Financial Economics 75 (2005): 283-317

Becker, W. E. and M. Watts. "Chalk and Talk: A National Survey on Teaching Undergraduate Economics", *The American Economic Review*, Vol. 86, No. 2, Papers and Proceedings of the Hundredth and Eighth Annual Meeting of the American Economic Association San Francisco, CA, January 5-7, 1996 (May, 1996), 448-453.

Berger, P. G., and E. Ofek. "Diversification's Effect of Firm Value." Journal of Financial Economics 37 (1995).

Bernstein, W. The Four Pillars of Investing. Lessons for Building A Winning Portfolio. N.p.: McGraw-Hill, 2002.

Brown, K. C. and F. K. Reilly. *Investment Analysis and Portfolio Management, 8th Edition,* (Fort Worth, TX, 2006), Harcourt College Publishers.

Comment, R., and G. A. Jarrell. "Corporate Focus and Stock Returns." Journal of Financial Economics 37.1 (1995): 67-87.

Fama, E. F., and K. R. French. "Size and Book-to-Market Factors in Earnings and Returns." Journal of Finance 50 (1995): 131-155.

Frank, R. "Should Congress Cap Executive Pay", New York Times. http://www.nytimes.com/2009/01/04/business/economy/04view.html Accessed February 23, 2010

Frick, B., Prinz, F. B. and K. Winkelmann. "Pay Inequalities and Team Performance: Empirical Evidence From the North American Major Leagues," *International Journal of Manpower*, (2003), Volume 24, 472-488

Gabaix, X., and A. Landier. "Why Has CEO Pay Increased So Much?" Working Paper, 6 May 2006. MIT Department of Economics.

Galai, D. and R.W. Masulis. "The Option Pricing Model and the Risk Factor of Stock," *Journal of Financial Economics,* (March, 1976), 53-82.

Gandar, J., R. Zuber, T. O'Brien, and B.Russo. "Testing Rationality in the Point Spread Betting Market," *Journal of Finance,* (1988), 995-1007.

Harder, J. W. "Play For Pay: Effects of Inequality in a Pay-For-Performance Context." Administrative Science Quarterly 37 (1992).

Haupert, M. J.. EH.Net, The Economic History of Baseball. http://eh.net/encyclopedia/article/haupert.mlb access February 23, 2010.

Lang, L., and R. Stulz. "Tobin's q. Corporate Diversifications and Firm Performance." Journal of Political Economy 102 (1994): 1248-1280.

Levitt, S. "Why Are Gambling Markets Organized So Differently From Financial Markets," *The Economic Journal*, (2004), 114, 223-246.

Mardsen, D. "Pay Inequalities and Economic Performance," CentrePiece (Spring 2005), http://cep.lse.ac.uk/centrepiece/v10i1/marsden.pdf

Maloney, M.T., and R.E. McCormick. "The Response of Workers to Wages in Tournaments; Evidence from Foot Races." Journal of Sports Economics 1 (2000): 99-123.

Paul, R. and A. Weinbach. "Market Efficiency and a Profitable Betting Rule: Evidence from Totals on Professional Football," *Journal of Sports Economics,* (2002), 256-263.

Paul, R. and A. Weinbach and M. Wilson. "Efficient Markets, Fair Bets, and Profitability in NBA Totals 1995-96 to 2001-02." Quarterly Review of Economics and Finance 44: 4 (2004): 624-632.

Paul, R. And A. Weinbach. "Does Sportsbook.com Set Pointspreads to Maximize Profits? Tests the Levitt Model of Sportsbook Behavior." *Journal of Prediction Markets,* 1(3), (2008), 209-218.

Sauer, R. "The Economics of Wagering Markets," *Journal of Economic Literature,* (1998), 2021-2064.

Villalonga, B."Research Roundtable Discussion: The Diversification Discount" (April 24, 2003). http://ssrn.com/abstract=402220

Vasilescu, O. "Team Performance, Efficiency and Wage Distribution in Professional Baseball," (2007), http://ssrn.com/abstract=1103952