

“If you ain’t trying to cheat a little, you ain’t likely to win much.”

NASCAR driver Richard Petty

Introduction

We might be born innocent. However, we are also born with the potential to be mischievous and act selfishly. Thus, cheating is rampant in fiercely competitive environments, like sports and business, where the stakes are high. It is widespread even in social settings where people wish to impress others, especially with the influx of social media where people regularly boast about their recent accomplishments.

However, it is hard to prove that, just because someone performs extraordinarily, they have cheated. There are natural variations in individual performance and external environmental factors that obfuscate singular cases of cheating. In those cases, cheating is only uncovered by accident. For example, there are YouTube videos that show clear evidence of “mechanical doping” in bike races (hidden electrical motors in bikes) in crashes and skids. One such video shows professional bike rider Ryder Hesjedal's bike spinning wildly on the asphalt after he crashed on stage seven of the Vuelta a España, prompting the international press to ask whether the bike was motorized. Other videos show evidence of baseball players having “corked” their bats to make them lighter, thereby giving the hitter a quicker swing. In one video, professional baseball player Sammy Sosa's bat splinters on a groundout, causing umpires to discover that it had been corked. Or how about the Indian couple who photoshopped themselves on Mt. Everest as evidence that they had reached the summit? The photoshopping was so poorly executed that people who saw the pictures online quickly uncovered the cheating and the couple lost their jobs as police officers in India.¹



Perhaps the most famous cheating incident occurred in the 1986 World Cup quarterfinal game between Argentina and England with hundreds of millions of people watching. Four years earlier, the two countries had fought a war over the Falkland Islands, which Argentina lost along with 649 lives (compared to 255 lost British lives). Consequently, the people of Argentina sought redemption on the pitch, and they clung to the hope that, Diego Maradona, undoubtedly among the best soccer players of all time, would make it happen. After a goalless first half, the match erupted six minutes into the second

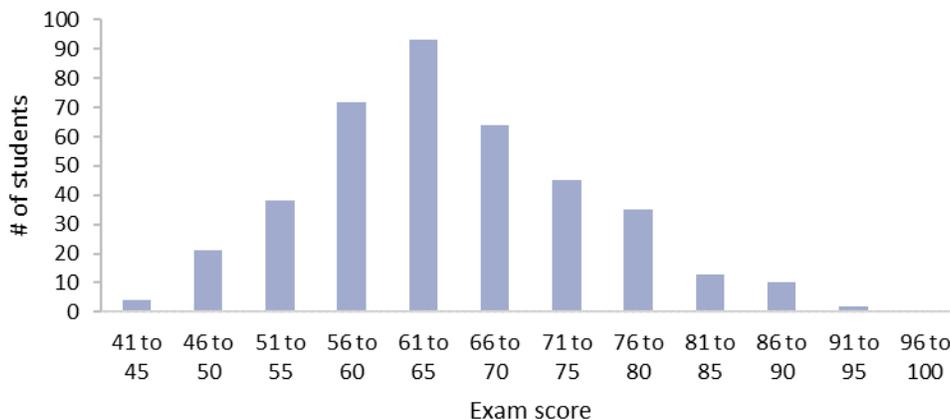
¹ Search online for “Indian couple Mt Everest” to see the original and doctored pictures.

half. Under pressure, an English defender kicked the ball in a loop toward his own goalie, Peter Shilton, perhaps as a risky pass or a failed attempt to clear the ball. Maradona leaped into the air and headed the ball over much taller Shilton just before Shilton had a chance to box the ball away. Or at least that is what it looked like on my family’s grainy 27-inch TV screen. Even commentators throughout the world called it a heading. But English defenders protested, pointing to their hands, and the slow-motion replay showed that Maradona held his left hand above his head. Did he use his hand to gain the necessary height to reach the ball before Shilton? The referee said no, and so did Maradona at first. But later Maradona conceded to divine intervention – it was the “hand of God.” Argentina won the game 2–1 and later the entire World Cup.² While the cheating infuriated the English, it mended open wounds in Argentina, and Maradona was honored as the best player of the tournament.

It is rare for cheating to be celebrated like the “hand of God.” Individuals who are caught cheating ordinarily fall into disgrace and face grim consequences. Thus, cheaters hide their cheating in a myriad of crafty ways, and unless they admit to cheating, behave recklessly, or get caught in the act, cheaters go free.

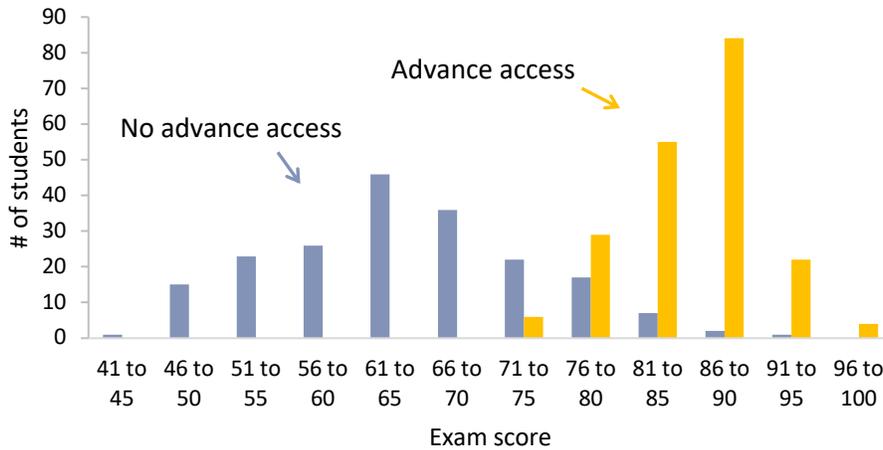
However, when cheating occurs systematically, e.g., many individuals engaging in the same type of mischief, we might use broader data to uncover patterns that prove cheating in the aggregate. We still might be unable to prove who has cheated, just that systematic cheating has occurred.

One example is that of a hypothetical professor who teaches a large class each semester and keeps the exam difficulty constant over time. If so, the distribution of the scores should be roughly bell-shaped, as in the graph below, and the average score should be similar across semesters.

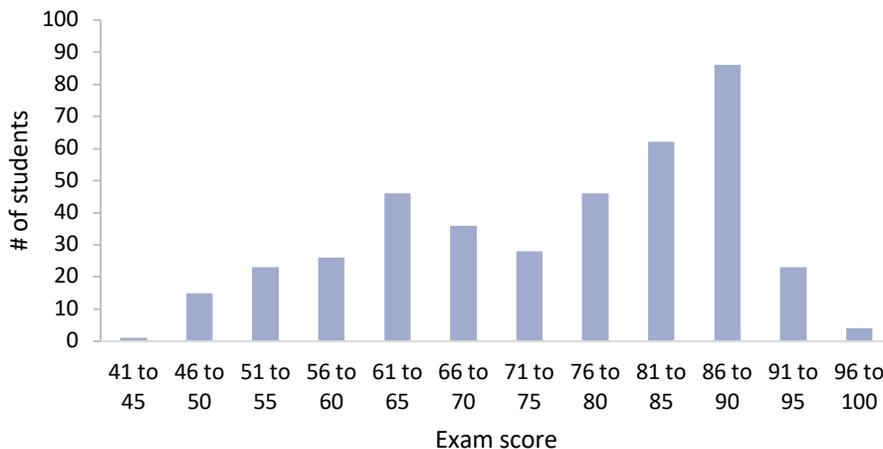


Suppose that one semester half the class gets advance access to the exam. Then the distribution for the group of students with advance access will look different from the distribution for the group of students without advance access. In particular, the average for the former group will be higher, and the standard deviation will possibly be lower. The graph below illustrates these two distributions.

² Maradona scored the second goal against England just four minutes after the first. The second goal has been called the goal of the century, with Maradona starting with the ball on Argentina’s half and dribbling past five English players and Shilton before kicking the ball into the English goal.



Of course, the professor only observes the distribution for the class as a whole, which is depicted below. Nevertheless, there are two clear clues of cheating. First, the average score is significantly above the average score for prior semesters. Second, the distribution is bimodal, meaning that it has two peaks. The second clue is inconsistent with the exam merely being particularly easy or the students being particularly strong.



While these exam scores are fictitious, they show how cheating can be uncovered. The professor still could not pinpoint which students were cheating based on this data alone. However, with more data (e.g., past exam scores and grades), it might be possible to single out at least some individual students as the most likely cheaters.³

³ In the fall of 2010, professor Richard Quinn at the University of Central Florida discovered an unusual bimodal distribution and an upward shift in the average midterm exam score for his large-lecture management class relative to prior semesters. Furthermore, a student anonymously informed Quinn that the textbook publisher's test bank of questions, from which Quinn had pulled exam questions, had been circulating among some students. Consequently, Quinn went on an ethics rant that was posted on YouTube and picked up by media outlets in the US and abroad. All 600 students had to retake the exam, and Quinn gave the students an ultimatum of either coming

The exam example outlines two broad techniques for uncovering cheating:

(i) Benchmarking

How do the collected data compare to data for reasonable benchmarks? In the exam example, exam results for previous classes on similar tests serve as a benchmark, and a vastly superior average score for the current class (relative to the benchmark formed by past classes) is suspicious. A similar method could be used for sports. Suppose, for example, that we heard rumors that the medical staff at the Russian track team recently developed performance enhancing drugs that drug tests could not detect. We could provide some indirect evidence of illicit drug use by looking at the performance of the Russian track team relative to two benchmarks: its own past performance and the performance of other teams. If the Russian track team performed much better than it did in the past or relative to other teams, we would have evidence that they used illicit drugs to gain an advantage. Lastly, let us consider an example from the business world. Suppose that we suspected that collusion in the cement market inflated cement prices in New York in the 1980s.⁴ We could compare the prices in the 80s to past prices in New York, but other market factors might have contributed to price fluctuations. Thus, we should examine changes in cement prices in New York relative to changes in neighboring areas that were subject to similar market factors. For example, if cement prices increased by 60% in New York from the 70s to the 80s but only 10% in Philadelphia, the so-called *diff-in-diff* (the difference in the differences for the two cities over time) of 50% is indicative of collusion, albeit not conclusive proof. In sum, a benchmark can be very useful when analyzing data in search of misconduct, and multiple benchmarks even more so.

(ii) Distribution validation

Do the collected data match what we expect to be the shape of the underlying distribution from which the observations are drawn? In the exam example, we expect the exam results to be drawn from a bell-shaped distribution. Because the bi-modal distribution that we observe does not match our expectation, we should be suspicious. Something else that we will see several times in this book is unusual clustering of data where we would expect the distribution to be dispersed. For example, suppose 40% of the students scored exactly 84 points on a multiple-choice exam, whereas the rest of the scores spread out between 33 points and 96 points. The heavy clustering at 84 points is highly suspicious, perhaps suggesting collusion among a chunk of the students. Or suppose that eight independent firms submitted identical sealed bids of \$198,438.24 for a project.⁵ While underlying economic factors cause bids to be similar, there is no way that eight bids in the hundreds of thousands would be identical down to the penny in the absence of collusion.

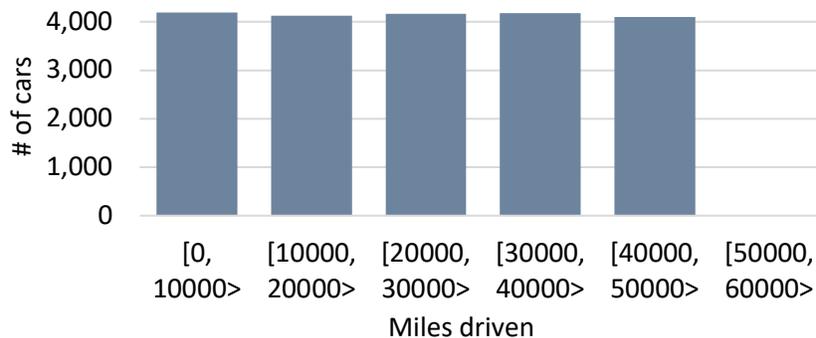
Another example stems from a study by Lisa Shu, Nina Mazar, Francesca Gino, Dan Ariely, and

clean and take an ethics seminar or risk expulsion. More than one third of the students chose the former. In online discussion boards, some applauded Quinn for fighting unethical student behavior. Others scorned him for using a test bank (while he insinuated in class that he wrote the questions himself) and/or argued that studying for an exam using test banks that can be obtained online, albeit with some effort, is neither unethical nor cheating.

⁴ In New York in the 1980s, the mafia rigged and controlled the market prices for cement, causing construction prices to be inflated by as much as 20% according to the testimony of a contractor at hearings held by the President's Organized Crime Commission.

⁵ This is one of many examples from the Great Electrical Equipment Conspiracy, in which the largest US electrical equipment makers, including General Electric and Westinghouse, were accused of price fixing in the 1950s.

Max Bazerman, who examined the honesty of car insurance customers when reporting odometer readings to their insurance companies. While the study did not show the distribution of the miles driven based on the reported odometer readings, other researchers acquired the data and found the stunning distribution displayed below: the miles driven were uniformly distributed between 0 and 50,000 miles, and no car had driven above 50,000 miles. How could that be? The miles driven across a large population should be bell-shaped, with few cars having very low or very high miles and the bulk being in the middle. A conclusion might be that customers systematically misreported the odometer readings, with one objective being to stay below 50,000 miles. The twist in this case, however, is that the original researchers were probably the culprits; they likely used a number generator to randomly generate numbers between 0 and 50,000.⁶ The irony of manipulating data in a study on honesty is thick.



I will call out the applications of these techniques in several places so the readers learn to recognize them. Moreover, the appendix elaborates on the techniques, and it also includes some instructive background and illuminating examples. Some readers might want to read the appendix first, and I think they will benefit from doing so. However, it is more technical than the rest of the book and not necessary for the understanding of other chapters. Thus, you may disregard it or just use it as a reference – I will not be offended either way.

The book covers many cases of extensive cheating. The cases come from the worlds of sports and business, where cheating scandals flourish. (My definition of business is a bit loose, in that I also cover cheating in lotteries, which are pseudo-businesses, and in the education sector, which prepares individuals for the business world.) A common theme across most cases is that viewing the data in certain ways allow us to establish systematic cheating, but not necessarily who the culprits are. But we will also see cases where the data allow us to identify pronounced outliers who likely cheated, and where additional information might seal the deal. The exam example helps illustrate yet again. The overall data pattern reveals that that cheating has likely occurred, but not who cheated. However, it would be reasonable to assume that the cheaters scored in the top half on the exam. Further, we could gather information on the scores on other course work to see which students performed particularly well on the exam in question, and voilà—we have our suspects.

I also include many anecdotal examples that shed more details on how cheating is carried out and the consequences, if any, in the unlikely event that the cheating is uncovered. These examples are intended to provide a backdrop for our understanding of how and why cheating occurs. Furthermore, isolated

⁶ This conclusion is based on other suspicious properties of the data as well.

incidents of cheating are often the first lead to our suspicion that broader cheating occurs. Lastly, I believe the examples are critical for captivating and enthralling the readers; without them, the book would reduce to a series of dry statistics and graphs, much like academic papers, which few people bother to read.

Why am I writing this book? I have a fascination with this growing area of *forensic economics* – how could you not with such a cool name? After extensive reading, I even believe that I am an expert. Of course, anyone can call themselves an expert. My unique edge is that I also had the fortune to uncover widespread cheating in the corporate world, which led to a massive Securities and Exchange Commission (SEC) investigation, countless lawsuits, congressional hearings, and a Pulitzer Prize for Public Service for the *Wall Street Journal*. My contribution was also recognized outside the academic world in that *Time Magazine* included me on its list of the 100 most influential people in the world. Pretty crazy for a finance professor, eh? You can read more about this in the backdating chapter.

Now I want to share my fascination. I want to educate people – whether they are aspiring researchers, journalists, or just smitten by curiosity – about the basics of forensic economics. I want to entertain with engaging stories and clever studies. I want to humor with the help of the superb illustrations by the Spanish illustrator Eloy Sanchez-Vizcaino Mengual. And, most ambitiously, I want to inspire others to join me and other researchers and journalists in uncovering fraud and corruption. We all want to make this world a better place, right?

Bibliography:

Shu Lisa L., Nina Mazar, Francesca Gino, Dan Ariely, and Max H. Bazerman, 2012, Signing at the beginning makes ethics salient and decreases dishonest self-reports in comparison to signing at the end, *Proceedings of the National Academy of Sciences of the United States of America*, 15197–15200.