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Efficacy of shaming penalties: Evidence from SEC football

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Abstract

Use of public humiliation as a deterrent to crime has a long history as does the debate over its effectiveness. A recent rule change in college football presents a natural experiment to test the effectiveness of so-called shaming penalties. In 2004 the National Collegiate Athletic Association (NCAA) mandated that the head official in football should announce to the crowd the jersey number of the offending player when an infraction is called. We use data from Southeastern Conference Football (2000-2007) to evaluate the effect of disclosing the offender to the public on the number of penalties called in conference play. We find a significant decrease in penalties per game after the rule change.

We benefitted greatly from the comments of the anonymous referee. We accept responsibility for all errors.
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"Shame, Despair, Solitude! These had been her teachers…"
-Nathaniel Hawthorne, The Scarlet Letter

1. Introduction

Hawthorne's heroine was condemned to wear the scarlet A for her sin. The penalty she endured made her marital indiscretion clear to everyone who encountered her. Different forms of punishment were brought to the colonies from Europe. In colonial times it was common for public humiliation to be used as punishment. Offenders were sometimes placed in stocks or pillories in the town square to atone for their transgressions. The 8th Amendment to the U.S. Constitution forbids cruel and unusual punishment, although it is not always legally clear as to what is considered cruel and unusual.

Prisons have become a predominant method of punishment in the United States. They are perhaps considered more civilized than and not as brutal as other punishments. Because of overcrowding and high costs associated with incarceration, there has been a recent interest in pursuing alternatives to imprisonment for certain crimes. Contemporary methods of meting out justice have included special license plates or bumper stickers for DUI convictions, a shoplifter sentenced to stand in front of a shopping center wearing a sign that says "I was caught stealing," sexual offenders being registered and having their photos posted on websites, to cite a few examples of penalties that have been given in lieu of or in addition to fines and jail time. There remains the question of shame's effectiveness as a deterrent to crime.

1.1 Economics and Crime

The application of economics to criminal activity has a long history which of course begins in the modern period with Becker's (1968) analysis of criminals as rational decision makers. Over the past forty years there have been myriad applications of cost-benefit analysis of criminal behavior. For reviews of the literature, see, for example, Levitt (2002) or Polinsky and Shavell (2000).

Shaming penalties have been considered as viable alternatives to fines or prison as they possibly raise the expected cost of committing a crime thereby changing the decision calculus of potential criminals. For discussions of shame and stigma as deterrents to criminal activity see Funk (2004) or *Harvard Law Review* (2003), which mentions the difficulty of empirically investigating the effectiveness of shaming penalties. Especially relevant to our discussion is Harel and Klement (2005), who argue that frequent use of shaming penalties greatly diminishes their deterrent effects over time. Hill (2012) also finds evidence of a deterrent effect in football.

1.2 Sports and Crime

There are a variety of methods for punishing rule-breakers in athletics. A soccer official uses a yellow or red card when identifying an offending player. Basketball referees approach the scorer's table at midcourt and signal offending players' jersey number when a foul is called. The player must also raise her hand. Even more conspicuous is the penalty box in hockey in which offenders are placed in plain view, apart from their teammates. Officials in the National Football League have been equipped with wireless microphones since 1975. Officials are able to address

the crowd to call fouls, clarify rulings, and identify the team and jersey number of an offending player.

In 2004, NCAA rule changes included a provision that the referee should announce the offending player's jersey number when announcing a rule violation during games in which the referee is equipped with a microphone. Prior to the rule change, the coach of the offending team could consult the referee to identify the offending player, but fans and broadcasters could merely speculate. The rule change represents a natural experiment to test whether making such information public changes player behavior. Does announcing the offending player to the public change the expected cost of committing an infraction such that it would deter such activity?

There are a few straightforward explanations for infractions or crimes that occur in a football game. First, a player, in an effort to make a legal play, makes an error in judgment of timing or distance which results in a rule violation. A defensive back may inadvertently hit a wide receiver while the ball is in the air for a pass interference penalty, or a player may move prior to the snap of the ball resulting in an "offsides" call. Second, a player trying to gain an illegal advantage is observed by the official and called for a foul. A defensive player may commit a foul while trying gain position, or an offensive lineman could illegally hold a defenseman to execute a block with the hope that the act will go undetected.

A third explanation of fouls is that some may be committed purposefully even though the player knows they are going to be detected. This is rational as long as the cost imposed by the penalty is less than the outcome that would have occurred otherwise. A defensive back may commit a pass interference foul in order to prevent a touchdown; giving up fifteen yards is surely preferred relative to giving up a touchdown. Offensive linemen have been known to illegally hold defensemen thereby foregoing the ten yards for the penalty rather than risk injury to his quarterback. We could refer these strategic fouls. Finally, there are flagrant personal fouls for which the player should know there is a high probability of the violation being observed. These crimes include fighting and may warrant the offending player being ejected from the game.

Incidence of the violations should be reduced at the margin by public information, given that the information changes the cost to the potential offenders thereby changing their decision calculus. Some of the fouls would naturally be unaffected by the change in expected cost. The defensive back who purposefully commits a pass interference foul to prevent a touchdown may receive praise for his actions. At the margin, though, a change in behavior should be observed. Players should respond to the increased expected costs by being more careful, thus committing fewer errors that result in infractions. The increase in costs should also lessen the frequency with which they attempt to gain illegal advantage. Both of the effects would result in a lower crime rate, on average. The rule change is not expected to affect the strategic or flagrant fouls

The extent by which the cost to the offending player would change is unclear. There are a couple of underlying difficulties worth mentioning here. First, the costs and benefits of rule violations accrue to the team while the decisions about the actions are determined by the individuals on the team. Thus there is a collective action problem in a sense, but in this case the cost of the shame is borne directly by the offending player. The second issue is that the identity of the offending player was always made available to the coaches of the team being penalized. As a result, much of the costs to the individual were already being incurred. We can imagine that the increase in costs associated with announcing our crime to the general public may be small if our friends, family, boss and coworkers already knew of our criminal behavior.

The foundation for using sports fouls as analogs for crime lies with McCormick and Tollison (1984), who likened the change in the number of Atlantic Coast Conference referees to

the change in a police force. They find empirical evidence of a deterrent effect on crime rates in basketball attributable to an increase in the number of referees policing the action.

Heckelman and Yates (2003) look for a deterrent effect when a second referee is added to the ice in hockey. They find no deterrent effect and attribute the lack of deterrent effect in hockey to "crimes of passion." They argue that many infractions are accidental or retaliatory and therefore are not subject to cost-benefit analysis by the offending player. The consequence of their argument is that the penalties are for punishment only and do not serve as a deterrent to crime—not even at the margin. They also note the tradition of hockey teams having players who are "enforcers," who have the role of intimidating the opposition through extremely physical play for whom penalties are like a badge of honor. Levitt (2002) examines the hockey data as well and argues that the probability of violations being detected and punished does not increase and that is why there is no identifiable deterrent effect in the hockey data.

Following McCormick and Tollison (1984), Heckelman and Yates (2002) use player and coach characteristics to explain in-game rule violations. A more disciplined and experienced team would commit fewer of the accidental and intentional crimes while a more talented team would have less need to attempt deliberate rule infractions. In football, differences in player quality or experience are difficult to assess because of the large number of matchups that occur on any given play. We can try to approximate the relative quality of the players by observing their performance as a team or unit. We look specifically at in-game production in yards gained relative to the opposing team. Alternatively, coaching quality can be measured by the coach's lifetime winning percentage. A team with a better coach should have better strategy and therefore less need to gain illegal advantage. Better coached teams are also likely to be more disciplined.

The game situation might also play a role in the rate of rule infractions. Players could respond two ways to games being "close." Teams may play more carefully because penalties can be viewed as more costly at the margin. However, playing with greater levels of intensity may be associated with a higher probability of accidental rule infractions. A one-sided victory may indicate that one team is fairly superior to the other, and both teams may view infractions as less costly at the margin. We acknowledge the potential problems that could arise from using end-of-game, aggregated data to explain in-game decision-making by individuals, but such problems often arise in economics.

There is another possible factor that should be mentioned: the referees. Each game is officiated by a crew of officials who are employed by the Southeastern Conference. The crews are usually fairly consistent throughout a single season, but there is no particular rotation that the crew assignments follow. So it is worth noting that we are implicitly assuming homogeneity among the officials. Also, the conference or NCAA usually has a few "points of emphasis" for each season. These are infractions that are either new rules, or rules that the governing body wants the officials to pay closer attention to throughout the season. These vary from season to season but offer no real insight into the overall level of fouls observed.

2. Model

Our goal is to determine any effects of the rule change instituted by the NCAA, which called for the officials in a football game to identify the offending player's jersey number in the instance of a penalty. We use data from 782 Southeastern Conference football games from the 2000 through the 2007 seasons. Although the rule change was made for all NCAA Division I

football, we chose to use only Southeastern conference games as our sample because of the importance of the games and the relative parity of the competing squads. All games are attended at high rates[1] and will have a high level of significance for each team. Each game will have implications for the final standings in the conference, bowl eligibility, recruiting and even national championships. The Southeastern Conference represents the highest standard of overall quality in college football. The statistics from each game were collected from the game box scores in the NCAA archives at NCAA.org. Other team characteristics were found in various years of the *Blue Ribbon Football Preview*.

The dependent variable in our model is the team's penalties for a single game which gives us something like a team's crime rate. The descriptive statistics for the team penalties by year are shown in Table 1. We should recognize that penalty yards for an infraction range from 5 to 15 yards, but no more than half the distance to the offending team's goal line. It should also be noted that there are opportunity costs associated with penalties in addition to the prescribed penalty yards. An offensive penalty during a play results in forfeiture of the yards gained on the play. Additionally, the team may lose a down depending on the call. In the event of a foul being called, the opposing team decides whether to accept or decline the penalty and take the results of the play. Therefore some of the offenders are arrested, but the victim does not press charges; that is, some penalties are declined.

Table 1. Mean & standard deviation of Team penalties per game 2000-2007[2]

2000	2001	2002	2003	2004	2005	2006	2007
6.816	7.479	7.285	6.469	6.551	6.428	5.928	6.316
(2.706)	(2.958)	(2.900)	(2.585)	(2.702)	(2.897)	(2.492)	(2.805)
$n = 96$	$n = 98$	$n = 98$	$n = 98$	$n = 98$	$n = 98$	$n = 98$	$n = 98$

Our model specifications included measures of coaching quality, and the difference in teams' offensive production in terms of yards gained. In other specifications we used end of season rankings or a dummy for the winner of the game in attempts to control for team quality. We also include indicators for the home team and control for the number of plays in each game. The data is aggregated at by game so there is not the possibility of identifying any in-game differentials in situational or strategic fouling.

Our unit of analysis is the team so that there are two observations for each game. Home teams enjoy a slight advantage in penalties and win around 53 percent of the games. However, winning teams are penalized more in absolute terms. Winning teams average 6.90 penalties per game while the losing squads average 6.41 penalties per game. None are significantly different as there is a high variance in penalties called. Home and away team mean and standard deviations are shown in Table 2.

[1] For example, in the most recent season all teams except Vanderbilt filled their stadiums at an average of 92 percent of capacity or more. Three teams had average attendance that was equal to or exceeded 100 percent of the stadium seating capacity.

[2] Two observations were missing complete data for 2000 season.

Table 2. Mean & standard deviation of dependent variables[3]

Team Penalties per game	Home Team Penalties per game	Away Team Penalties per game
6.661	6.391	6.663
(2.79)	(2.66)	(2.77)
n =782	n =376	n =406

The variable of interest in our test for a deterrent effect attributable to shame is a dummy variable which equals 0 for years when individual players were not identified to the public and equals 1 for years when referees announced offending player to the public. We estimate the following model:

(1) $E(y_{i,j,t}) = exp\,(b_0 + x_1 b_1 + XB)$,

in which $y_{i,j,t}$ is the total number of penalties against team i in game j in year t. Each of the i=12 SEC teams plays j=8 regular season conference games each season for t=8 seasons. x_1 is equal to 0 for the years 2000-2003 and is equal to 1 for the years 2004-2007. X represents a vector of other explanatory variables described below. Ultimately, Negative Binomial estimation was employed to estimate the model. Our dependent variable is count data with a high level of dispersion. The variance exceeds the mean and all tests for normality rejected the hypothesis of normally distributed penalties per game.

In this model specification we included the difference in offensive yards gained by each team in a game. The number is negative if the team is out-produced in the game. Initially, it would seem that the relationship should be negative. Teams that play poorly are normally outgained by their opponent and if they play poorly, they possibly commit more violations. However, it may be that successful teams play more physically and are more often on the borderline of violations. The data will have to speak on this issue.

The coach's winning percentage should have a negative relationship with penalties. Better coached teams should be more disciplined and commit fewer fouls. The home team should commit fewer infractions, all else constant. Teams are likely more comfortable in their own stadium. The crowd is on their side, so there is less noise interference, leading to less inadvertent penalties. Also, approval or disapproval of the crowd could influence the officials' actions.

3. Results

Some penalties can be the result of a lesser athlete trying to gain illegal advantage. Examples of these types of penalties would be offensive holding when the pass rushing defender has size and strength advantages, or pass interference when the receiver has a speed advantage. Measuring athleticism is a difficult endeavor, so we proxy the teams' talent by using their relative in-game offensive production. Our results, shown in Table 3, indicate that the team that has higher productivity, in terms of yards gained, is penalized more. One possibility for this

[3] Neutral site games have both teams coded as away.

result is that teams cheat more than they are caught. It is often said by television analysts that offensive holding could be called on almost any play, but it is only called when it is especially blatant. Offensive production in yards gained is highly correlated with point production, so this could be indicating that when teams are ahead by a large margin, they get sloppy at the end of the game, or there are more inexperienced players in the game. The marginal cost of a penalty would be low when the game is out of reach. An alternate plausible explanation is that intense, aggressive teams are more successful, but their style of play results in more rule violations.

Surprisingly, the coach's winning percentage has a positive relationship with penalties. One possible explanation is the relatively high amount of turnover in the coaching profession which is coupled with recruiting players. A new coach may enter with a high winning percentage but would be coaching players who were recruited by the former coach. This dynamic may confound the results of the coach's past success in the model. This result is consistent with the relationship between penalties and output differentials and the idea that aggressive play is successful but results in a larger number of rule violations.

Home teams have a significantly lower incidence of penalties, *ceteris paribus*. One explanation for home team could be the "Jumbotrons" in the stadiums. Even if the player were not identified by the referee over the public address system, the crowd is likely able to identify the player on the replay shown in the stadium. It could be that a large portion of the costs to the

Table 3. Tests for effects of shaming in football (Negative Binomial)

	Team Penalties per game	Home Team Penalties per game	Away Team Penalties per game	Team Penalties per game Random Effects, grouped by year
Home Team	-0.0882***			-0.0871***
	(0.0291)			(0.0292)
Number of Plays	0.0008	0.0011	0.0002	0.0003
	(0.0017)	(0.0023)	(0.0026)	(0.0018)
Coach Win Percent (Lifetime)	0.2582***	0.2776**	0.2821*	0.2877***
	(0.0979)	(0.1363)	(0.094)	(0.1016)
Difference in Team Yards and Opponent Yards	0.0004***	0.0006***	0.0003*	0.0005***
	(0.0001)	(0.0001)	(0.0002)	(0.0001)
Player ID	-0.1040***	-0.1109**	-0.0961**	-0.1039***
	(0.239)	(0.0409)	(0.029)	(0.0332)
Constant	1.778	1.6792	1.8158	
Prob > X^2	0.0000	0.0000	0.0015	0.0000

*Significant at 10% **Significant at 5% ***Significant at 1%

potential offender is found in the home team variable. Or maybe there is referee bias although referees are randomly assigned, identified and escorted by state troopers from all contests.

The variable of interest is the effect of the referees publicly identifying the offending player when a foul is called. The dummy variable shows a statistically significant decrease in penalties after the rule change. The coefficient for the player identification dummy variable is negative and significant in all model specifications and is also of the same magnitude in all model specifications.[4]

4. Conclusion

Our results indicate that teams are penalized significantly less, *ceteris paribus*, after the change in rules called for the official to identify offending players. Each of the model specifications resulted in player identification having the same sign and magnitude.

The result begs the question of whether a reduction in penalties per game could have been achieved by other means such as increases in penalty yardage. It is not clear that this is estimable given the level of aggregation of the data. There are 5, 10, and 15 yard penalties and, as mentioned above, as well as the opportunity cost of any lost yardage because of an infraction, so that trying to calculate an alternative deterrent accurately seems unworkable with available data. It does seem logical that increases in penalty yardage would be followed by fewer penalties, *ceteris paribus*.

The explanatory power of the models and the marginal impact of player identification likely small due to much of the costs of committing the foul being internalized by the players prior to the having the information announced publicly. The coach had already been privy to the information. The head coach, coaching staff, and team members would have known who the offending player was. After being scolded by coaches on the sideline, in the locker room and probably again when the team reviews the game film, as well as when the position coaches grade player performance for the game, the increase in costs to the player from the public announcement may be quite small. They also could factor in the effect of the "Jumbotron" replay in front of 60,000 to 100,000 fans, as well as almost every game being shown on regional if not national television. Still, if the act of calling out the player results in any increase in costs, it should be met with a decrease in the quantity of penalties. That is what our results support.

[4] Other model specifications included controls for the end of season rankings, winning team and turnovers, none of which entered significantly. Player identification was significant in all specifications.

References

Becker, G.S.(1968). Crime and punishment: An economic approach. *Journal of Political Economy, 76 (2):* 169-217.

Benson, B.L. and Kim, I. and Rasmussen, D.W.(1994). Estimating Deterrence Effects: A Public Choice Perspective on the Economics of Crime Literature. *Southern Economic Journal, 61(1):* 161-168.

Funk, P.(2004). On the effective use of stigma as a crime-deterrent. *European Economic Review,48(4):* 715-728.

Harel, A. and Klement, A. (2007). The Economics of Stigma: Why More Detection of Crime May Result in Less Stigmatization. *The Journal of Legal Studies,36:* 355-377.

Heckelman, J. and Yates, A. (2003). And a Hockey Game Broke Out: Crime and Punishment in the NHL. *Economic Inquiry,41(4):* 705-712.

Hill, H.F. (2012). Evidence of Shaming Effect: A Look at NCAA Football, M.A. Thesis, Clemson University.

Levitt, S.D. (2002). Testing the economic model of crime: The national hockey league's two-referee experiment. *Contributions to Economic Analysis and Policy,1(1):* 1-19.

McCormick, R. and Tollison, R. (1984). Crime on the Court. *Journal of Political Economy, 9:* 223-235.

Polinsky, A.M. and Shavell, S. (2000). The Economic Theory of Public Enforcement of Law. *Journal of Economic Literature,38(1):* 45-76.

Posner, R.A. and Rasmusen, E.B. (2003). Shame, Stigma and Crime: Evaluating the Efficacy of Shaming Sanctions in Criminal Law. *Harvard Law Review,116:* 2186-207.