



Going for It on Fourth Down

By Brian Burke

It's 4th down and goal from the 2-yard line in the first quarter. What would most coaches do? Easy, they'd kick the field goal, a virtually certain 3 points.

But a 4th and goal from the 2 is successful about 3 out of 7 times, assuring the same number of expected points, on average, as the field goal. Plus, if the attempt at a touchdown is unsuccessful the opponent is left with the ball on the 2 or even 1 yard line. And if the field goal is successful, the opponent returns a kickoff which leaves them usually around the 28-yard line. It should be obvious that on balance, going for the touchdown is the better decision.

That's the case made by economist David Romer, author of a 2005 paper called "[Do Firms Maximize, Evidence from Professional Football](#)." Romer's paper is an analysis of 4th down situations in the NFL. It is quite possibly the most definitive proof that coaches are too timid on 4th down. Romer's theory is that coaches don't try to maximize their team's chances of winning games as much as they maximize their job security.

Coaches know that if they follow conventional wisdom and kick--oh well, the players just didn't make it happen. But if they take a risk and lose, even if it is on balance the better decision, they'll be Monday morning quarterbacked to death. Or at least their job security will be put in question.

In case anyone doubts how much coaches are concerned about Monday morning criticism, just take their word for it. Down by 3 points very late in the 4th quarter against the winless and fatigued Dolphin defense, former Ravens coach Brian Billick chose to kick a field goal on 4th and goal from one foot from the end zone. The Dolphins went on to score a touchdown in overtime. Billick's [explanation](#) at his Monday press conference was, "Had we done that [gone for it] after what we had done to get down there and [not scored a touchdown], *I can imagine what the critique would have been today about the play call.*" Billick, a nine-year veteran head coach and Super Bowl winner, was more concerned about criticism from Baltimore Sun columnists than the actual outcome of the game. He'd rather escape criticism than give his team the best chance to win.

Romer's paper considers data from 3 years of games. To avoid the complications of particular "end-game" scenarios with time expiring in the 2nd or 4th quarters, he considers only plays from the 1st quarter of games. So his recommendations should be considered a general baseline for the typical drive, and not a prescription for every situation.

Romer's bottom line is the graph below. The x-axis is field position, and the y-axis is the yards-to-go on 4th down. The solid line represents when it is advisable for a team to attempt the first down rather than kick. According to the analysis, it's almost

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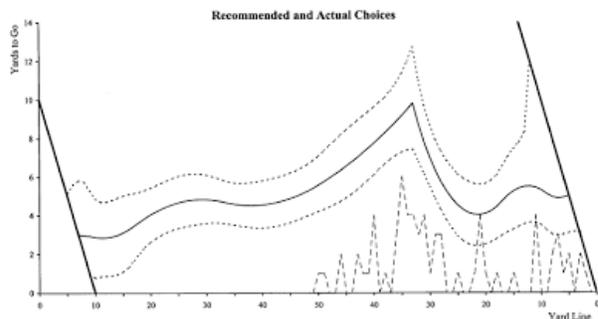
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always worth it to go for it with less than 4 yards to go. The recommendation peaks at 4th and 10 from an opponent's 33 yard-line.



The solid line shows the number of yards to go where the estimated values of kicking and going for it are equal. The dotted lines show the two-standard-error bands. The dashed line shows the greatest number of yards to go such that when teams have that many or fewer yards to go, they go for it at least as often as they kick.

Romer basically measures the expected value of the next score. Say it's 4th and 2 from the 35 yd line. He compares the value of attempting a field goal from the 35 with the point value of a 1st and 10 from the 33 (multiplied the probability of actually making the first down.) He also recognizes that a field goal isn't always worth 3 points, and a touchdown isn't always worth at least 6. The ensuing kickoff gives an expected point value to the opponent. There is a point value to having a 1st and 10 from one's own 25 yard line.

One weakness of the paper is that it dismisses the concept of risk as unimportant. Romer says that long-term point optimization should be the only goal, so coaches should always be risk neutral. But if the level of risk aversion were actually considered, we might find that coaches are more rational than he concludes.

But the paper makes a very strong case that coaches should go for it on 4th down far more often than they currently do. Job security for coaches seems to be the primary reason why they don't. At a meeting with some researchers making the case for more aggressive 4th down decision making, Bengals coach Marvin Lewis responded, "You guys might very well be right that we're calling something too conservative in that situation. But what you don't understand is that if I make a call that's viewed to be controversial by the fans and by the owner, and I fail, I lose my job."

It would be great if a coach came along and rarely kicked. It would be gamble, but if Romer and others are right, chances are the coach would be successful. And the rest of the NFL would have to adapt. It might only take one brave coach.

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24frames says:

Sunday, March 02, 2008

I love reading your blogs. Keep up the great work.

Some time ago you wrote, that we might find out which was better, the straight ahead running back like Jamal Lewis or boom or bust running backs like Barry Sanders.

Is that something you are working on?

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