NFL Overtime

By Anthony Tsodikov

Reviewing the Rules

1) Flip a coin, the winner decides to kick or receive

2) If receiving team scores a touchdown, they win the game.

3) Otherwise, they kick-off and the kicking team can win by outscoring the receiving team on their possession.

4) If the score is still tied, standard sudden death rules apply.

Class Analysis →P(Kicking Team Wins Overtime)= 45%

What strategies can the kicking team pursue to increase their chances of winning overtime?

The Onside Kick

Question: Does attempting an onside kick to start overtime increase a kicking team's probability of winning overtime?

Method: Probability tree analysis and game data from the past 14 seasons.

What is an Onside Kick?

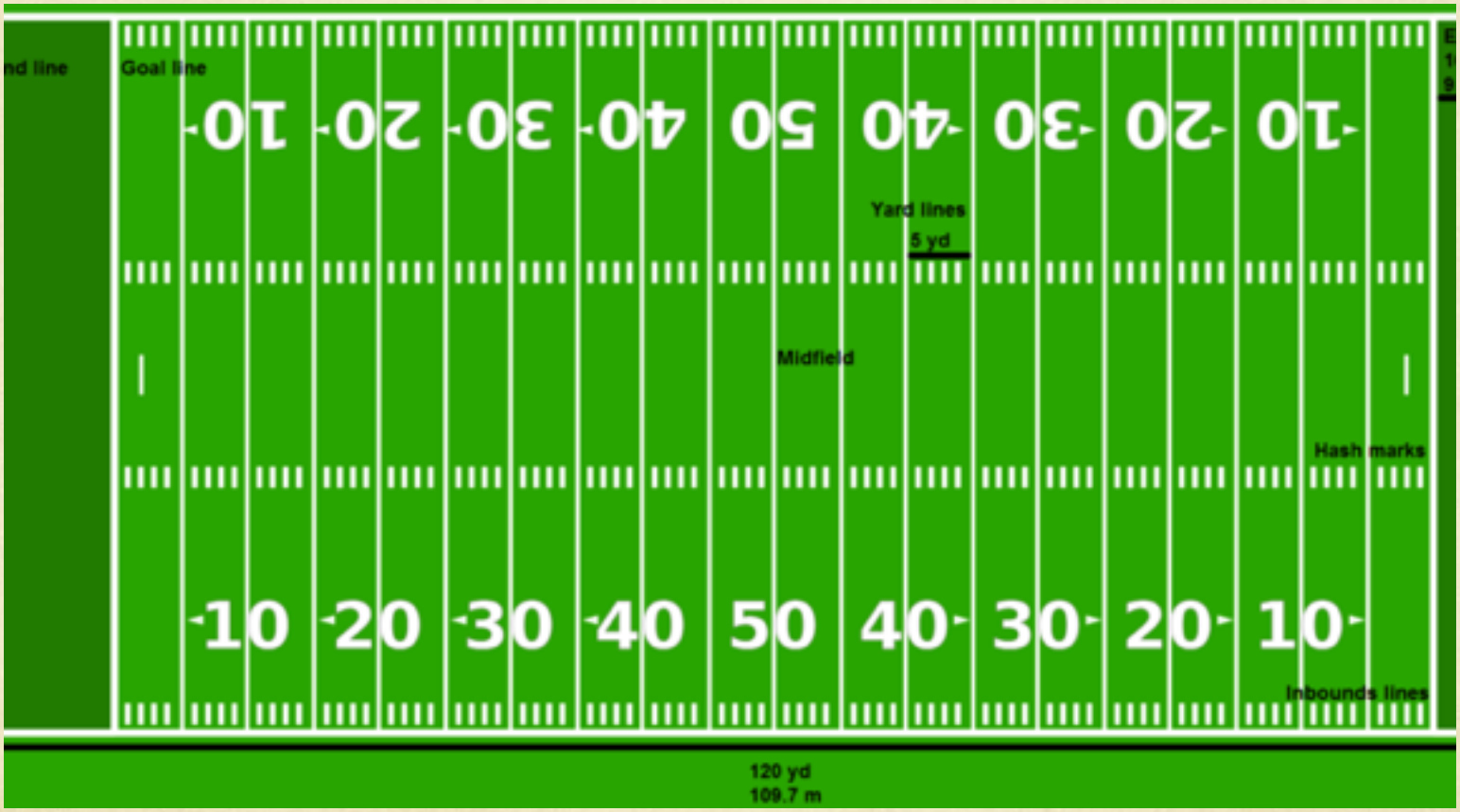
- A kickoff intentionally hit short
- Purpose: steal a possession
- Key rule: the ball must travel at least 10 yards before a member of the kicking team can touch it.
- “A desperation tactic”
- Comes with risk of giving up good field position
- Rarely successful – In the past 14 seasons, only 17.7%(145 out of 819) onside kicks were successfully recovered by the kicking team.

If onside kicks only work about 18% of the time, then how could starting overtime with an onside kick possibly increase the kicking team's chance of winning?

1. Rules

- "A kickoff is the opportunity to possess for the receiving team. If the kicking team legally recovers the kick, the receiving team considered to have had its opportunity."
- Benefit of recovering an onside kick is greater than the cost of failing to recover an onside kick
- Kicking team recovers → game becomes sudden death, only needs FG to win
- Kicking team fails to recover→ kicking team can match or beat FG, receiving team benefit is good field position

2. Field Position

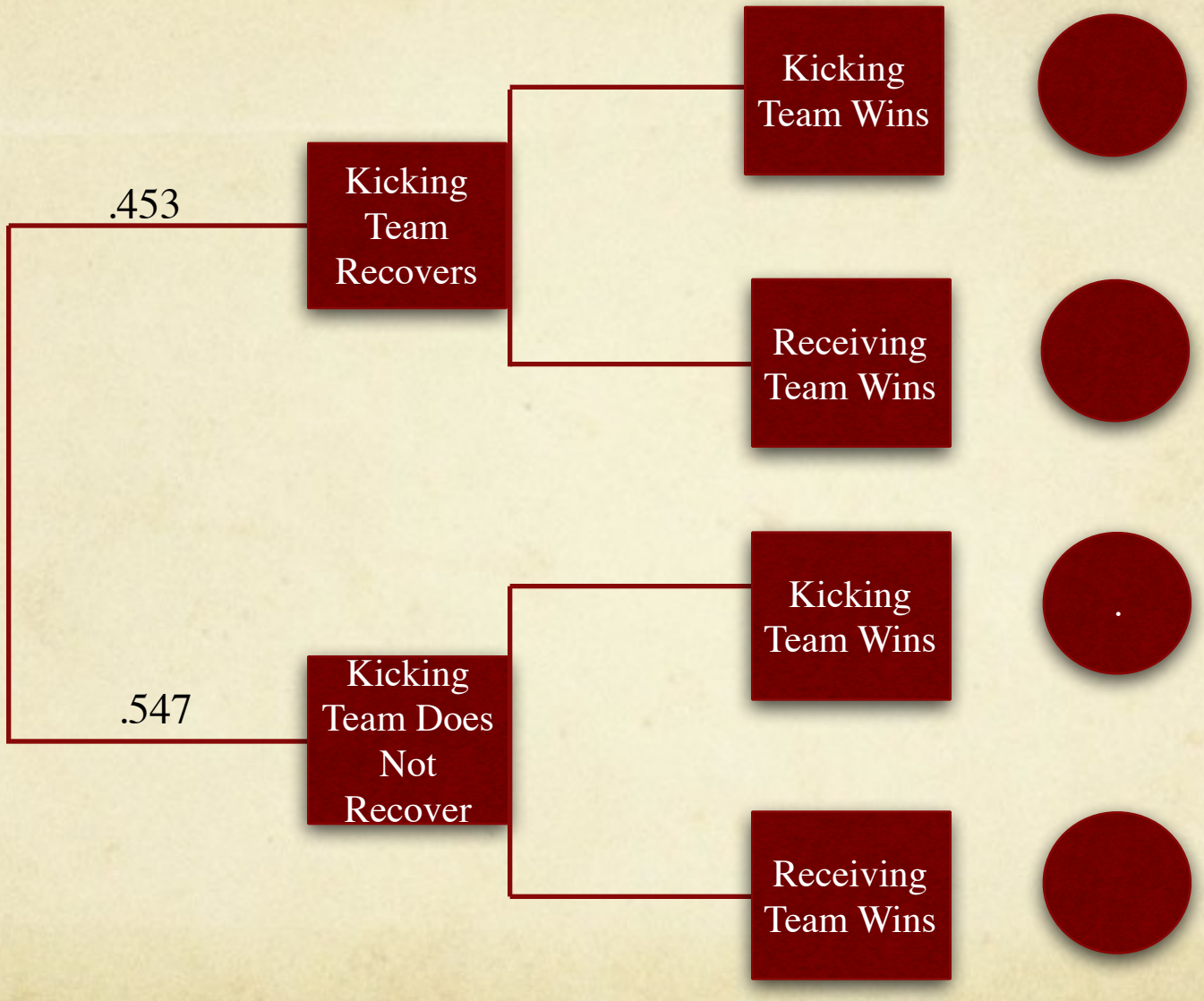


3. Surprise Factor

- No team has ever attempted an onside kick in overtime
- The fact that an onside kick in overtime is so unlikely means that is more likely to work.
- Superbowl 44: prime example of the effectiveness of a surprise onside kick.(first onside kick before 4th quarter in Super Bowl history)

http://www.nfl.com/videos/nfl-cant-miss-plays/09000d5d81646143/SB-XLIV-Can-t-Miss-Play-Saints-surprise

Kicking Team Recovers
Kicking Team Does Not Recover
Kicking Team Wins
Receiving Team Wins
Kicking Team Wins
Receiving Team Wins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Kicking Team Recovers
.547
Kicking Team Does Not Recover
Kicking Team Wins
Receiving Team Wins
Kicking Team Wins
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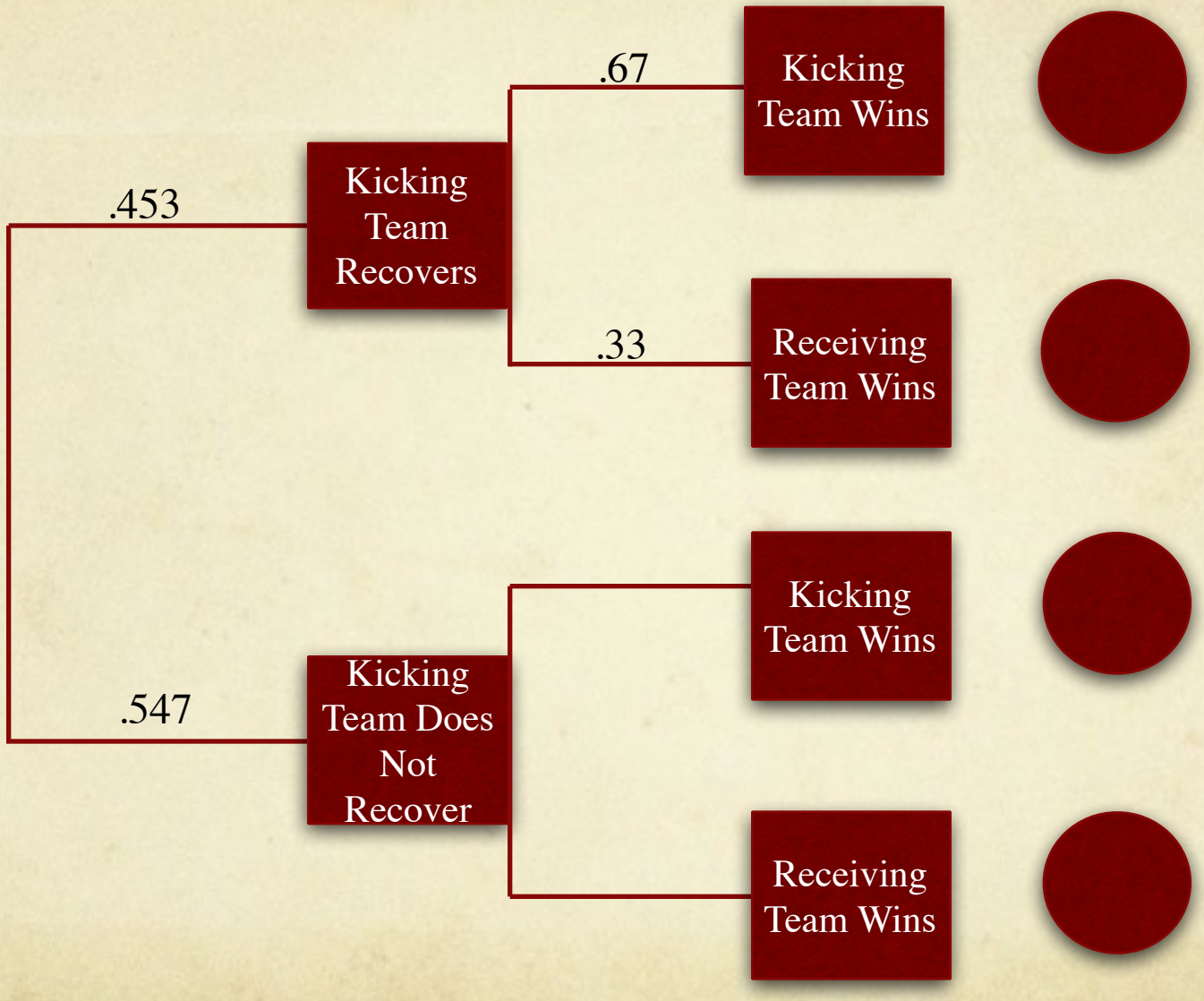
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Kicking Team Wins
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Receiving Team Wins
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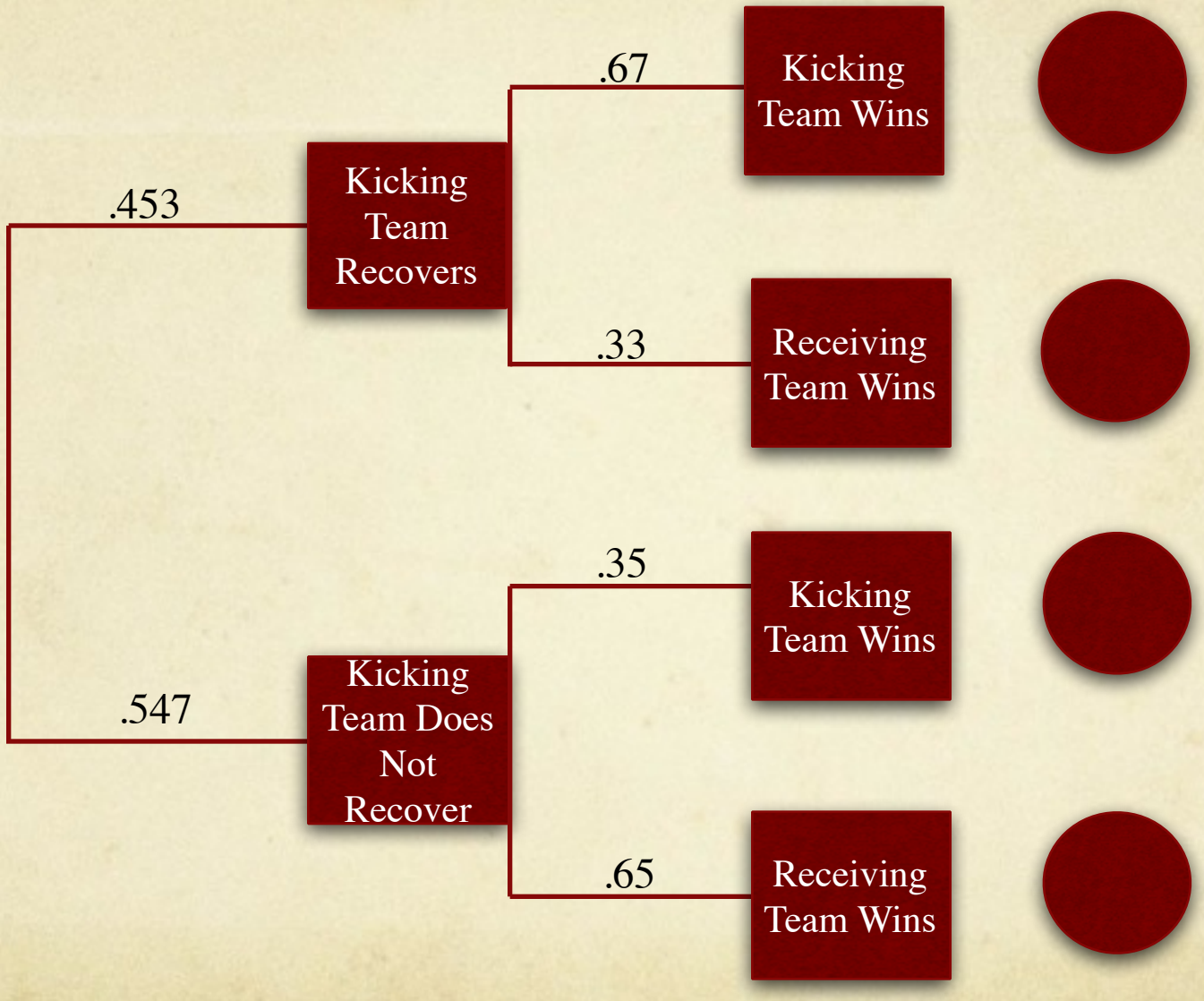
Kicking Team Does Not Recover
Kicking Team Wins
Receiving Team Wins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Kicking Team Wins
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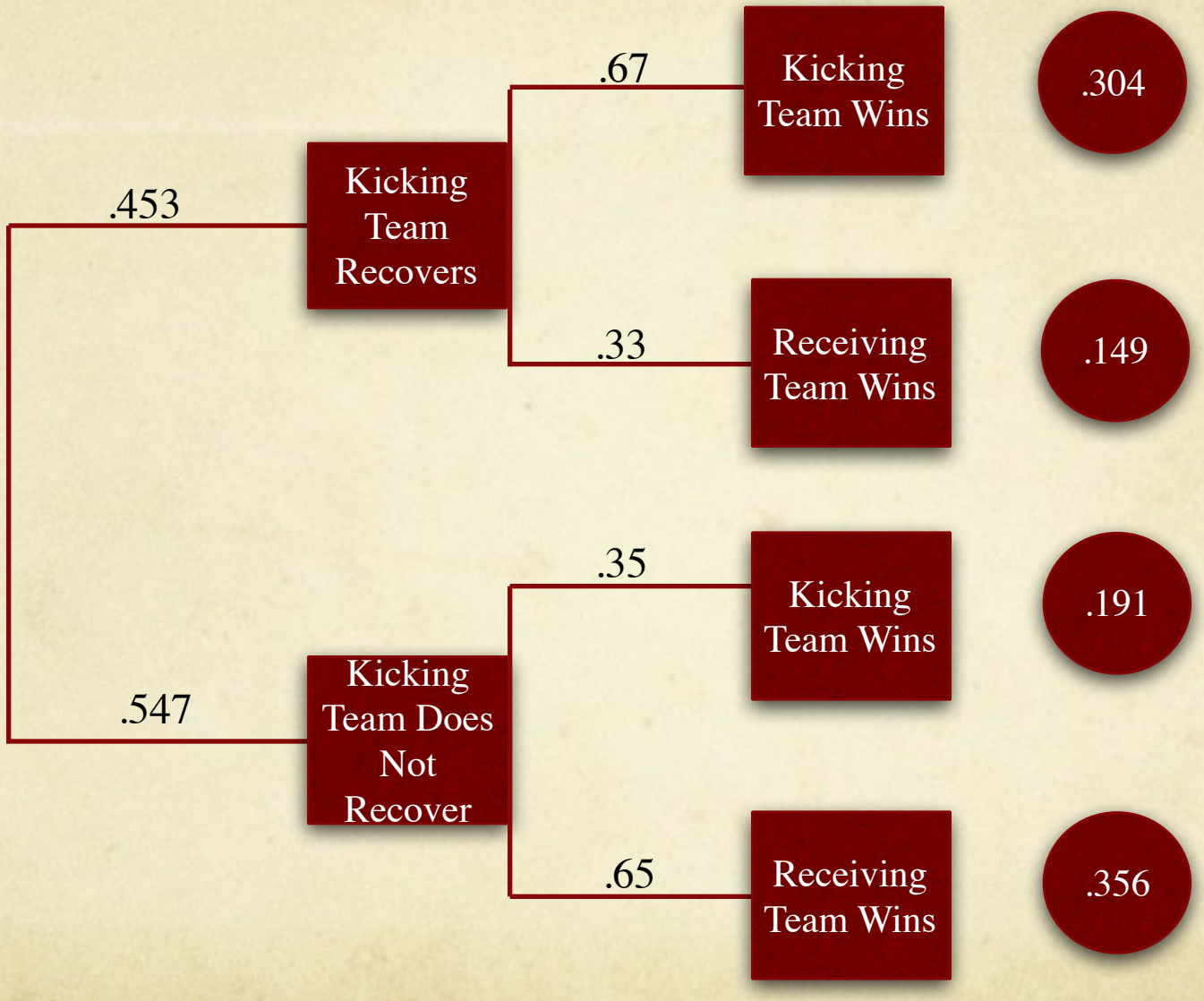
Receiving Team Wins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Kicking Team Wins
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Receiving Team Wins
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Kicking Team Does Not Recover
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Kicking Team Wins
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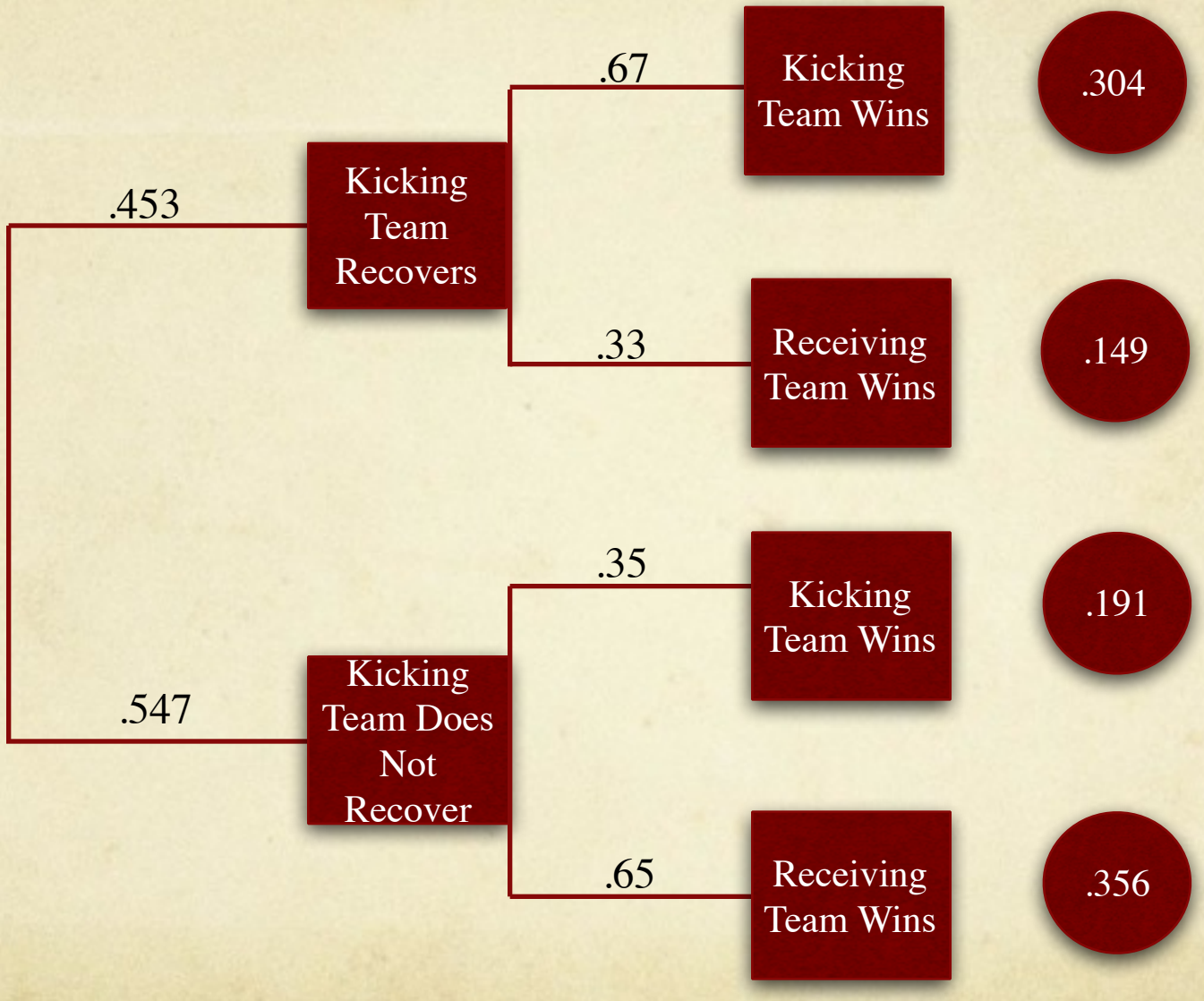
Receiving Team Wins
.356



P(Kicking Teams Wins)= .304 + .191= **49.5%**

Break-Even Success Rate

- Onside kick may work the first time, but after that it is won't be as surprising any more
- Found break-even success rate for an onside kick by solving for x in the equation below:

$.67x + .35(1-x) = .45 \rightarrow .32x = .1 \rightarrow x = 31.25\%$

This tells us that a team will increase its probability of winning the game by attempting an onside kick as long as its chance of recovering the kick is 31.25% or greater

Comparing My Analysis

In early 2011, Brain Burke did a similar analysis that tested whether starting overtime with an onside kick made strategic sense

Two keys differences in results:

1) Breakeven success rate for onside kick= 40%

2) Probability that kicking team recovers a surprise onside kick= 60% (significantly higher than 45.3%)

1. Why was Burke's breakeven success rate for an onside kick higher than mine?

- Burke performed his analysis before the NFL moved kickoffs from the 30-yard to 35-yard.
- Onside kick less effective at that time.

2. Why was Burke's success rate for a surprise kick higher than mine?

- Burke used data from the 2001 to 2010 seasons while my data included those years and the last three seasons.
- Burke defined a "surprise onside kick" as an onside kick attempted when the kicking team, based on win probability statistics, has a better than 20 percent chance of winning at the time of the kick.
- I defined a "surprise onside kick" as an onside kick not attempted in the 4th quarter.

Did my definition of “surprise onside kick” underestimate the probability that a surprising onside kick is recovered?

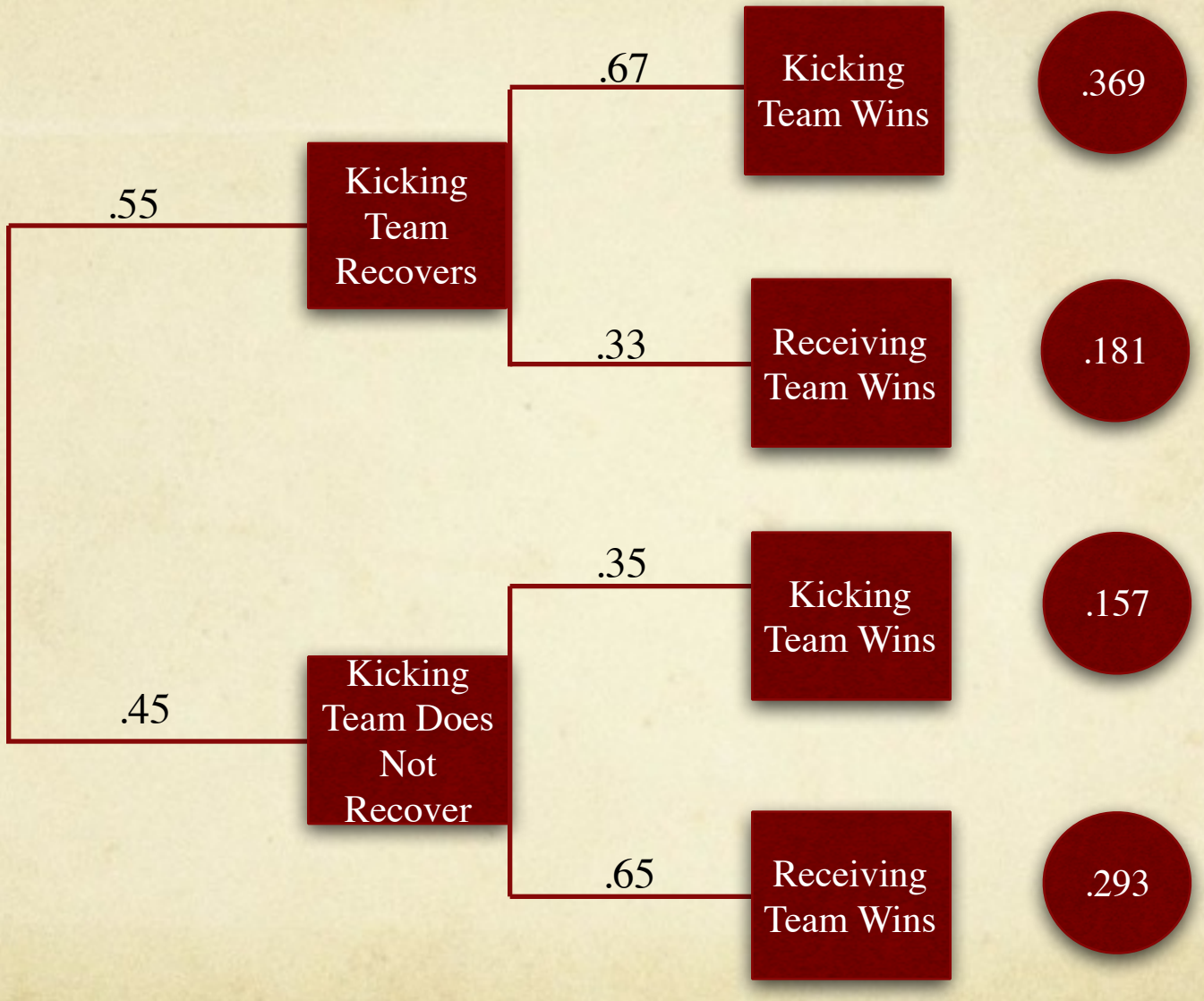
Test:

1) Look at the percentage of surprise onside kicks between the 2001 and 2010 seasons that were successfully recovered by the kicking team, using my definition of a surprise onside kick.

2) If this percentage is fairly close to 60%, I can conclude that teams have just become more prepared for the possibility of a surprise onside kick.

3) If the percentage is significantly less than 60%, I can conclude that I underestimated the success rate of a surprise onside kick.

Outcome: Percentage was 50%. I underestimated the probability that a surprise onside kick is recovered by about 10%.



P(Kicking Teams Wins)= .369 + .157= **52.6%**