PS4, Ex. 2: Entry deterrence in a game tree

Consider the following dynamic game: firm 1 owns a shop in town A. Firm 2 decides whether to enter the market in town A. If firm 2 enters, firm 1 chooses whether to fight or accommodate the entrant. If firm 2 does not enter, firm 1 receives a profit of 2 and firm 2 gets 0. If firm 2 enters and firm 1 accommodates, they share the market and each of them receives a profit of 1. If firm 2 enters and firm 1 decides to fight, firm 2 suffers a loss of 1 (so that the payoff is -1), but fighting is costly for firm 1, lowering its payoff to 0.

(a) Draw the game tree.
(b) Solve the game by backwards induction.

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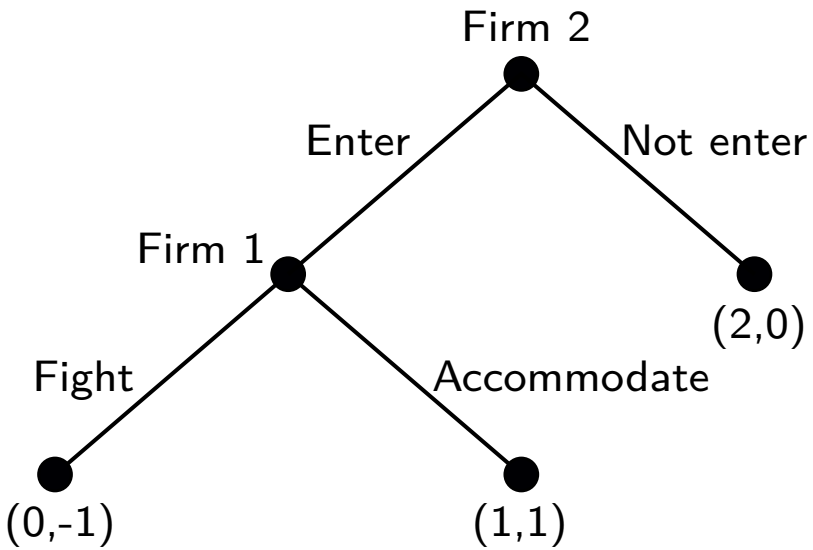

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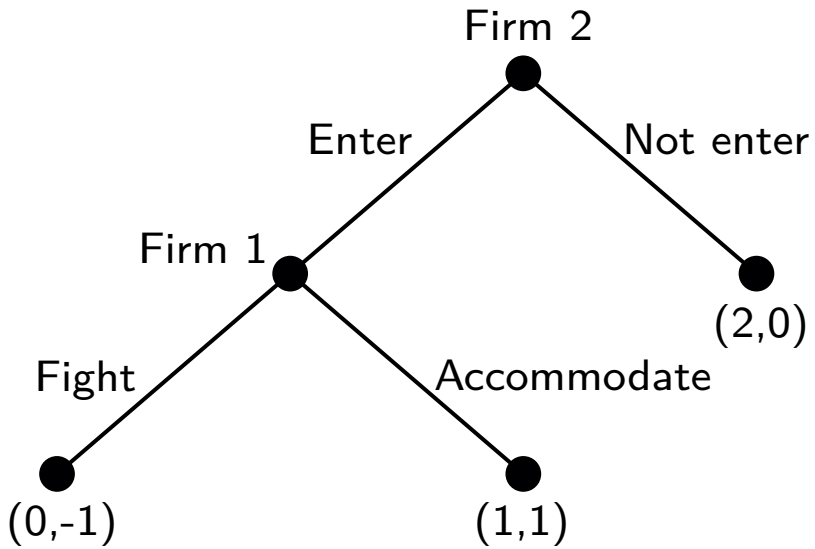
Starting from the bottom: If Firm 2 has entered the market in the 1st round, then Firm 1 can choose to either fight or accommodate in the 2nd round.



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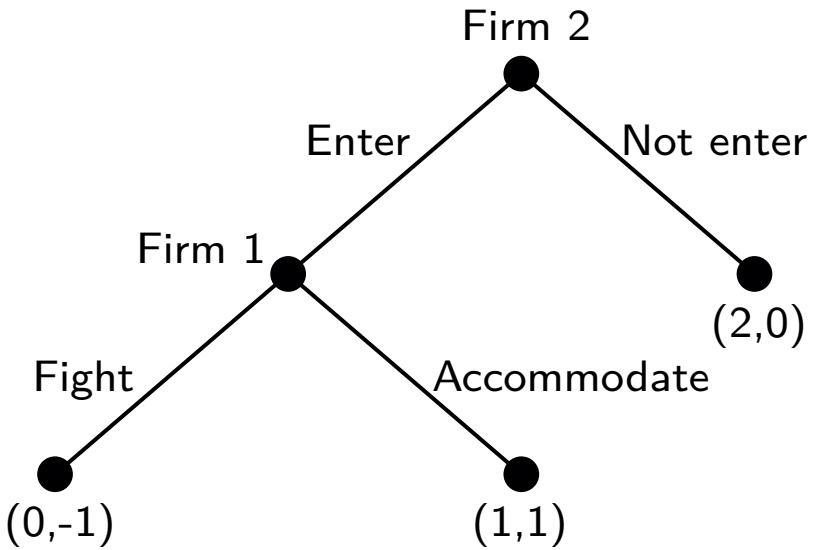
Firm 1 will always accommodate, as it is more costly to fight ($1 > 0$).



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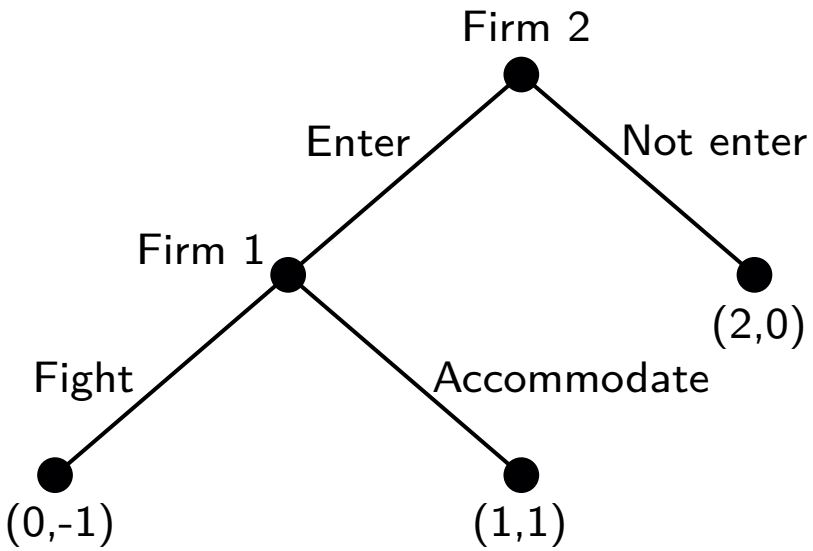
$$(s_1, s_2) = (Accommodate, Enter)$$



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Intuition: Firm 2 has *first mover advantage*, thus, to "Fight" would not be a credible threat given Firm 1 is rational. I.e. Firm 2's decision can be reduced to the upper part of the game tree.