Game Theory
Short response paper #2
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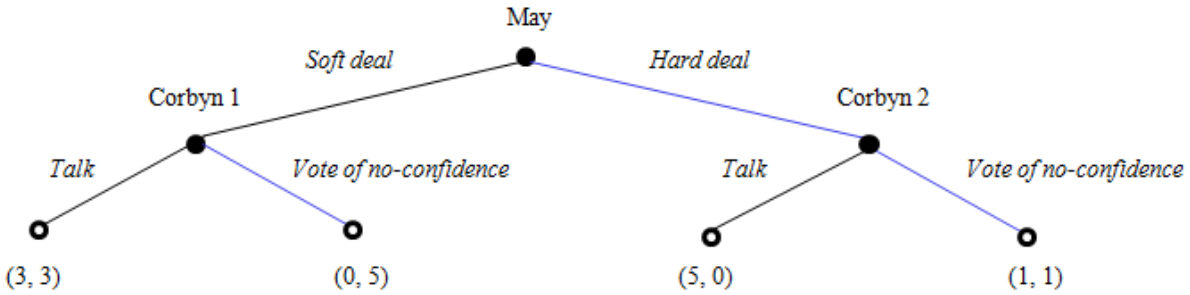
1. Extensive form of the game



2. Justification

Concerning the actions of the players, Anthony Muthoo mentions that Theresa May has two broad strategies „either to relax one or more of her redlines, and agree to a relatively soft Brexit; or to stay close to her current deal, but with sufficient changes to satisfy the DUP MPs and the eurosceptic MPs in her party." Given that May's current deal is a hard deal and given that the parliament is not included in the game, we can assume that May simply chooses between a *soft deal* and a *hard deal*. With respect to Jeremy Corbyn, Muthoo mentions that Corbyn "will not talk with the prime minister unless she takes the no-deal [here, hard deal] Brexit off the table." In addition, as Corbyn's "main objective is to be prime minister", Corbyn considers calling for a vote of no-confidence to potentially yield a general election from which he can then emerge as prime minister. Therefore, we can assume that Corbyn chooses between *talk* and *vote of no-confidence* in the game.

Concerning the payoffs, I adapted the symmetrical payoffs of a standard prisoner's dilemma. This adaptation was motivated by a number of reasons. First, in terms of May's preference ranking based on "her preferred approach at the moment", her most desired equilibrium is one in which Brexit gets through parliament "with the support of these very eurosceptic MPs and the DUP members," which requires a *hard deal*. At the same time, May wants to avoid a vote of no-confidence, which would prevent her from fulfilling her main objective "to deliver on the 2016 referendum result – that is, to deliver Brexit, in some form," and would thus prefer it if Corbyn decided to *talk*. Hence, May's ideal equilibrium outcome is (*Hard deal*, *Talk*) and we assign her payoffs of (5) for this outcome. For the same equilibrium, we assign Corbyn payoffs of (0) as entering into talks without receiving concessions in the form of a soft deal would dismantle his ambitions of becoming prime minister. Second, Corbyn's most desired equilibrium would be (*Soft deal*, *Vote of no-confidence*) as Muthoo mentions that, following a soft deal, Corbyn would be "likely to call another vote of no confidence in [May's] government." The vote is especially effective if it follows concessions from May as such concessions show the weakening position of her government. Hence, for this equilibrium

outcome, we assign Corbyn payoffs of (5) and May payoffs of (0) as she is prevented from delivering Brexit. Third, neither of the players has a mutually exclusive bargaining range as Muthoo mentions that May aims to Brexit "in some form" and Corbyn is ready to engage in talks given a soft Brexit. As these goals can overlap, I assign both players payoffs of (3) for the (*Soft deal*, *Talk*) equilibrium outcome. Lastly, in the (*Hard deal*, *Vote of no-confidence*) equilibrium outcome, both players receive a payoff of (1) as May does not make concessions by switching to a soft deal but now has to face the obstacle of another vote and Corbyn does not make any concessions by engaging in talks but now, given the hard deal, the eurosceptic Tory MPs and DUP MPs have no reason not to vote in favor of May.

Although no formal game type is specified by Muthoo, and indeed one could argue for asymmetrical payoffs or even different types of game, I think fitting the prisoner's dilemma on Brexit as it is presented here emphasizes that both sides have a common interest but are prevented from achieving this interest based on a failure of coordination that comes as the result of entrenched party politics.

3. Solving for the SPNE

The SPNE is (*Hard deal*, *Vote of no-confidence*/*Vote of no-confidence*) as indicated by the blue lines in 1.

Munthoo identifies the same equilibrium outcome by way of specifying that, initially, the dominant strategy for May is to pursue a *hard deal* to get through parliament and for Corbyn to call a *vote of no-confidence* to ensure his bid at the prime minister's job.

However, Muthoo concludes by stating that both "the prime minister and the leader of the opposition will have to compromise in some way at some point." Unless we read the "have to" as normative in the sense that both sides should pursue a Pareto-optimal outcome, the SPNE is stable and without changes to the game, no compromise will have to take place.