I have a game of timing with perfect information in continuous time. The game involves two players: a Workers Union ($U$) and an Employer ($E$). Once the old collective agreement contract expires the players have to find a new agreement about the way to split the quasi-rent ($R$). Under the old contract the employer earns $a^0_E R$ and the worker $a^0_U R$. The two players have two different discount factors $\delta_U = e^{-g_U t}$ (for the union) and $\delta_E = e^{-g_E t}$ (for the employer). When the union carries out his threat (going to strike) the payoffs are exogenous and given by $C = (C_U, C_E)$. If the employer decides to avoid the strike with a new agreement, the employer earns $a^N_E R < a^0_E R$ and the worker $a^N_U R > a^0_U R$. Then, if a player stops the game at time $t$ (the worker ($U$) with the strike and the employer with an agreement ($E$)), the payoffs are the following:

**NEW AGREEMENT ($\alpha(t)$):**

$$\int_0^t a^0 R e^{-gs} ds + \int_t^1 a^N R e^{-gs} ds$$

**CONFLICT ($\beta(t)$):**

$$\int_0^t a^0 R e^{-gs} ds + \int_t^1 C e^{-gs} ds$$

**STATUS QUO ($\gamma(\infty)$):**

$$\int_0^1 a^0 R e^{-gs} ds$$

Allowing the mixed strategies, it’s necessary to introduce a probability distribution $G_i$ (with $i = \{E, U\}$) on $[0, 1]$.

I have three problems (maybe they’re stupids):

- I can imagine that if the players decides to stop at the same time $t$ there is a situation of conflict that leads to a payoff of $C = (C_U, C_E)$???
- Are the expected utility as follow (it lacks a part for the possibility that the players choose the same time $t$):

$$P_U(G_U(t), G_E(t)) =$$

$$= \int_0^1 [a^0_U R e^{-gs} (1 - G_U(s))(1 - G_E(s)) + C_U e^{-gs} (1 - G_E(s)) dG_U(s) + a^N_U R e^{-gs} (1 - G_U(s)) dG_E(s)]$$
\[ P_E(G_U(t), G_E(t)) = \]
\[ = \int_0^1 [a_E e^{-t (1 - G_U(s)) (1 - G_E(s))} + C_E e^{-t (1 - G_U(s))} dG_E(s) + a^N_E e^{-t (1 - G_E(s))} dG_U(s)] \]

- What’s the utility of the worker if he decides to stop at time \( t \) and the employer utilizes the distribution \( G_E ?? \)