Export Subsidy Problem

Export Subsidy/Homogenous Product/Quantity competition

Consider two firms (Firm 1 and Firm 2) from two different countries (Country 1 and Country 2) that produce a homogenous good for export to a third country (Country 3). Neither firm sells anywhere else. Assume there are no tariffs or transport costs.

The (inverse) market demand curve in Country 3 is:
\[ p = 140 - q \]
where \( q = q_1 + q_2 \)

and \( q_1 \) and \( q_2 \) are the quantities produced by firms 1 and 2 respectively.

Firms have zero fixed costs and the marginal costs of production are \( MC_1 = 20, \ MC_2 = 20 \).

Assume that Country 1 Government (Gov 1) and the firms play the following two stage game. In stage 1, Gov 1 chooses a per unit export subsidy \( s_1 \). After \( s_1 \) is announced, both firms choose their quantities simultaneously (stage 2). Firms maximize profits and Gov 1 maximizes social welfare. Calculate the SPNE.