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APPENDIX A

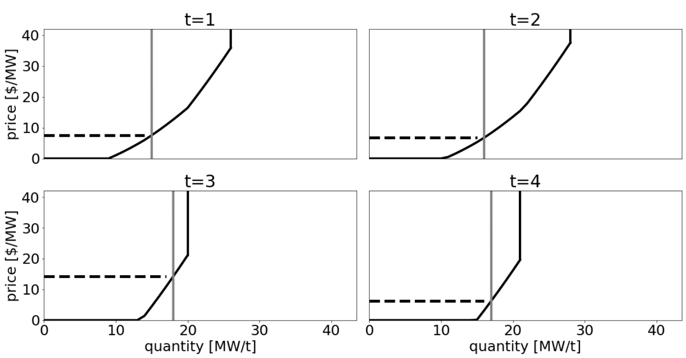

Fig. 5. Result Case 3, with 52 players

Figure 5 shows the results from figure 4 where the hydro power units are taken from the participants and split up into 50 firms with equal capacities. All of the smaller players thus inherit less market power, resulting in them bidding more competitively with reservoir transfers of $4MW, 4.5MW, 4MW$.

APPENDIX B

Assuming a hydro power producer considers shifting $r_{i,t}MW$ from period t to $t+1$, the resulting period surplus changes for unit i are:

$$\begin{aligned} \Delta W_{i,t} = & \frac{\partial S_t(b^q_{i,t} - r_{i,t}, \sum_{i_2 \neq i} b^q_{i_2,t})}{\partial d_t} q_{i,t}(b^q_{i,t} - r_{i,t}) \\ \Delta W_{i,t+1} = & \frac{\partial S_{t+1}(b^q_{i,t+1} - r_{i,t+1}, \sum_{i_2 \neq i} b^q_{i_2,t})}{\partial d_t} q_{i,t+1}(b^q_{i,t+1} + r_{i,t+1}) \end{aligned} \quad (10)$$

Further considering all of the transferred capacity will be acquired by the market results in:

$$\begin{aligned} \Delta W_{i,t} = & -\frac{\partial S_t(b^q_{i,t} - r_{i,t}, \sum_{i_2 \neq i} b^q_{i_2,t})}{\partial d_t} r_{i,t} \\ \Delta W_{i,t+1} = & +\frac{\partial S_{t+1}(b^q_{i,t+1} - r_{i,t+1}, \sum_{i_2 \neq i} b^q_{i_2,t})}{\partial d_t} r_{i,t+1} \end{aligned} \quad (11)$$

Thus, in case there is sufficient demand for the shifted capacity, only the resulting slopes of the demand functions in relation to the chosen step size will define if a period shift is conducted. Thus, players generally do not have an incentive to shift capacity if the steepness in period $t+1$ does not outweight period t.