It's clear that

$$d_j - 1 = \sum_{t=2}^{l} \Big(\sum_{j_2,\cdots,j_t \in e_*} \beta^{(t)}_{jj_2\cdots j_t} \Big) + \beta^{(1)}_j, \tag{1}$$

$$= \sum_{t=1}^{l} \beta^{(t)}_j, \qquad \forall j \in e_*. \tag{2}$$

Equations (1) and (2) result from not considering