$$=egin{bmatrix} \hat{\phi}_{BH} & \hat{\phi}_{BT} \ \hat{\phi}_{FH} & \hat{\phi}_{FT} \end{bmatrix} = egin{bmatrix} rac{4}{4+1} & rac{1}{4+1} \ rac{2}{2+4} & rac{4}{2+4} \end{bmatrix} = egin{bmatrix} rac{4}{5} & rac{1}{5} \ rac{2}{6} & rac{4}{6} \end{bmatrix}$$