

$$\Rightarrow dP(\Theta) = d\tilde{P}(\Theta \dots \Theta) = \sum_i (-1)^{d_1 + \dots + d_{i-1}} \tilde{P}(\Theta, \dots, D\Theta, \dots, \Theta) \\ = 0, \text{ since } D\Theta = 0. \quad \square$$

Finally, with D_t , Θ_t , Θ_t and η as above we see that $(\frac{\partial}{\partial t})\Theta_t = D_t\eta$, and so

$$\begin{aligned} d(k\tilde{P}(\eta, \Theta_t, \dots, \Theta_t)) &= k\tilde{P}(D_t\eta, \Theta_t, \dots, \Theta_t) \\ &= k\tilde{P}(\frac{\partial}{\partial t}\Theta_t, \Theta_t, \dots, \Theta_t) \\ &= \frac{\partial}{\partial t}P(\Theta_t). \end{aligned}$$

$$\begin{aligned} \Gamma \quad D_t &= \tilde{D} + t\eta & \Theta_t &= \tilde{\Theta} + t\eta \\ \Theta_t &= d(\tilde{\Theta} + t\eta) - (\tilde{\Theta} + t\eta) \wedge (\tilde{\Theta} + t\eta) \\ &\Rightarrow (\frac{\partial}{\partial t})\Theta_t = d\eta - \eta \wedge (\tilde{\Theta} + t\eta) - (\tilde{\Theta} + t\eta) \wedge \eta \\ &= d\eta - (\eta \wedge \tilde{\Theta} + \tilde{\Theta} \wedge \eta) - 2t\eta \wedge \eta. \end{aligned}$$

$$\} D_t(D - \tilde{D}) = D_t\eta = D_tD - D_t\tilde{D}$$

$$D_t\eta = ? \quad (D_t\eta)(z) = D_t(\eta(z)) - \eta(D_t z)$$

$$= D_t(\eta(z)) - \eta((D + t\eta)z)$$

$$= D_t(\eta(z)) - \eta(dz + \Theta \wedge z + t\eta \wedge z)$$

$$= d(\eta(z)) + \Theta \wedge \eta(z) - \eta(dz) - \Theta \wedge \eta(z) - t\eta \wedge \eta(z)$$

$$= (d\eta)(z) - \eta(dz) + \Theta \wedge \eta(z) - \eta(dz)$$

not correct.