(1) $$\boxed{\delta\bar{Q} = \delta Q + \delta\hat{Q}}$$

$$\delta Q = \lambda\, d\sigma$$ adierazpen osokorra

$$\bar\lambda\, d\bar\sigma = \delta\bar Q = \lambda\, d\sigma + \hat\lambda\, d\hat\sigma$$

$$\boxed{d\bar\sigma = \frac{\lambda}{\bar\lambda}d\sigma + \frac{\hat\lambda}{\bar\lambda}d\hat\sigma} \Rightarrow \bar\sigma = \bar\sigma(\sigma,\hat\sigma) \Rightarrow d\bar\sigma = \left(\frac{\partial\bar\sigma}{\partial\sigma}\right)_{\hat\sigma} d\sigma + \left(\frac{\partial\bar\sigma}{\partial\hat\sigma}\right)_{\sigma} d\hat\sigma \Rightarrow \begin{cases} \left(\frac{\partial\bar\sigma}{\partial\sigma}\right)_{\hat\sigma} = \frac{\lambda}{\bar\lambda} = g_1(\sigma,\hat\sigma) \\ \left(\frac{\partial\bar\sigma}{\partial\hat\sigma}\right)_{\sigma} = \frac{\hat\lambda}{\bar\lambda} = g_2(\sigma,\hat\sigma) \end{cases}$$

(2) $$\bar\sigma = \bar\sigma(t,\sigma,\hat\sigma,X,\hat X)$$

$$\boxed{d\bar\sigma = \left(\frac{\partial\bar\sigma}{\partial t}\right)_{\sigma,\hat\sigma,X,\hat X} dt + \left(\frac{\partial\bar\sigma}{\partial\sigma}\right)_{t,\hat\sigma,X,\hat X} d\sigma + \left(\frac{\partial\bar\sigma}{\partial\hat\sigma}\right)_{t,\sigma,X,\hat X} d\hat\sigma + \left(\frac{\partial\bar\sigma}{\partial X}\right)_{t,\sigma,\hat\sigma,\hat X} dX + \left(\frac{\partial\bar\sigma}{\partial \hat X}\right)_{t,\sigma,\hat\sigma,X} d\hat X} \Rightarrow$$

$d\bar\sigma$ hauek alderatu

$\Downarrow$ ondorioz

$$\left(\frac{\partial\bar\sigma}{\partial t}\right)_{\sigma,\hat\sigma,X,\hat X} = \left(\frac{\partial\bar\sigma}{\partial X}\right)_{t,\sigma,\hat\sigma,\hat X} = \left(\frac{\partial\bar\sigma}{\partial \hat X}\right)_{t,\sigma,\hat\sigma,X} = 0$$

$$d\bar\sigma = \left(\frac{\partial\bar\sigma}{\partial\sigma}\right)_{t,\hat\sigma,X,\hat X} d\sigma + \left(\frac{\partial\bar\sigma}{\partial\hat\sigma}\right)_{t,\sigma,X,\hat X} d\hat\sigma \Rightarrow \boxed{\left(\frac{\partial\bar\sigma}{\partial\sigma}\right)_{t,\hat\sigma,X,\hat X} = f_1(t,\sigma,\hat\sigma,X,\hat X)}\ ;\ \boxed{\left(\frac{\partial\bar\sigma}{\partial\hat\sigma}\right)_{t,\sigma,X,\hat X} = f_2(t,\sigma,\hat\sigma,X,\hat X)}$$

hauek dira alderatuko ditugunak mendekotasunak ezagutuz

$$\left.\begin{aligned} \bar\lambda &= \bar\lambda(t,\sigma,\hat\sigma,X,\hat X) \\ \lambda &= \lambda(t,\sigma,X) \\ \hat\lambda &= \hat\lambda(t,\hat\sigma,\hat X) \end{aligned}\right\}$$

$$\frac{\lambda}{\bar\lambda} = \underbrace{\frac{\lambda(t,\sigma,X)}{\bar\lambda(t,\sigma,\hat\sigma,X,\hat X)}} = g_1(\sigma,\hat\sigma) \qquad \frac{\hat\lambda}{\bar\lambda} = \underbrace{\frac{\hat\lambda(t,\hat\sigma,\hat X)}{\bar\lambda(t,\sigma,\hat\sigma,X,\hat X)}} = g_2(\sigma,\hat\sigma)$$

$$\bar\lambda(t,\sigma,\hat\sigma,X,\hat X) \longrightarrow \bar\lambda(t,\sigma,\hat\sigma,X)\ (1) \longrightarrow \bar\lambda(t,\sigma,\hat\sigma,X) \longrightarrow \bar\lambda(t,\sigma,\hat\sigma)\ (2)$$

$$\hat\lambda(t,\hat\sigma,\hat X) \longrightarrow \hat\lambda(t,\hat\sigma)\ (3)$$

$$\lambda(t,\sigma,X) \longrightarrow \lambda(t,\sigma)\ (4)$$

$\Rightarrow$ alderaketaren ondorioz

$$\boxed{\begin{aligned} \lambda &= \lambda(t,\sigma) \\ \hat\lambda &= \hat\lambda(t,\hat\sigma) \\ \bar\lambda &= \bar\lambda(t,\sigma,\hat\sigma) \end{aligned}}$$

$\Downarrow$ jarraitu...

$$\Downarrow$$

$$\frac{\lambda}{\bar\lambda} = \frac{\lambda(t,\sigma)}{\bar\lambda(t,\sigma,\hat\sigma)} = g_1(\sigma,\hat\sigma) \qquad \frac{\hat\lambda}{\bar\lambda} = \frac{\hat\lambda(t,\hat\sigma)}{\bar\lambda(t,\sigma,\hat\sigma)} = g_2(\sigma,\hat\sigma)$$

$$\lambda(t,\sigma) = \phi(t) f_1(\sigma) \qquad \hat\lambda(t,\hat\sigma) = \phi(t) f_2(\hat\sigma)$$

$$\bar\lambda(t,\sigma,\hat\sigma) = \phi(t) f(\sigma,\hat\sigma) \qquad \bar\lambda(t,\sigma,\hat\sigma) = \phi(t) f(\sigma,\hat\sigma)$$