

$$\Rightarrow \psi^*\left(\frac{X_1}{X_0}\right) = a_{01} + a_{11} \frac{X_1}{X_0} + a_{21} \frac{X_2}{X_0}$$

$$\psi^*\left(\frac{X_2}{X_0}\right) = a_{02} + a_{12} \frac{X_1}{X_0} + a_{22} \frac{X_2}{X_0}$$

$$\Rightarrow \frac{\psi_1(X)}{\psi_0(X)} = a_{01} + a_{11} \frac{X_1}{X_0} + a_{21} \frac{X_2}{X_0}$$

$$\frac{\psi_2(X)}{\psi_0(X)} = a_{02} + a_{12} \frac{X_1}{X_0} + a_{22} \frac{X_2}{X_0} \quad \left. \vphantom{\frac{\psi_2(X)}{\psi_0(X)}} \right\} (*)$$

where $X = [X_0, X_1, X_2]$.

$$\psi^*\left(\frac{X_1}{X_0}\right)(X) = \frac{X_1}{X_0}(\psi(X)) = \frac{X_1}{X_0}(\psi_0(X), \psi_1(X)).$$

$$\psi_2(X) = \frac{\psi_1(X)}{\psi_0(X)}.$$

But since $\psi(X_0=0) = (X_0=0)$, $\psi_0(X_0=0) = 0$.

$$\Rightarrow \psi_0(X) = X_0.$$

\Rightarrow By $(*)$,

$$[\psi_0(X), \psi_1(X)] = [X_0, a_{01} X_0 + a_{11} X_1 + a_{21} X_2]$$

$$[\psi_0(X), \psi_2(X)] = [X_0, a_{02} X_0 + a_{12} X_1 + a_{22} X_2].$$

$\Rightarrow \psi$ is induced by

$$X_0 \longmapsto X_0$$

$$X_1 \longmapsto a_{01} X_0 + a_{11} X_1 + a_{21} X_2$$

$$X_2 \longmapsto a_{02} X_0 + a_{12} X_1 + a_{22} X_2.$$

\Rightarrow