

$$\|T_{t_n, \hat{\Sigma}}(\hat{\Sigma}) - \Sigma\| \leq \underbrace{\|T_{t_n, \hat{\Sigma}}(\hat{\Sigma}) - T_{t_n, \hat{\Sigma}}(\Sigma)\|}_{\text{II}} + \underbrace{\|T_{t_n, \hat{\Sigma}}(\Sigma) - \Sigma\|}_{\text{I}}$$

$$\text{II} \leq \max_i \sum_{j=1}^P |T_{t_n, \hat{\Sigma}}(\hat{\sigma}_{ij}) - T_{t_n, \hat{\Sigma}}(\sigma_{ij})|$$

$$\leq \underbrace{\max_i \sum_{j=1}^P |(T_{t_n, \hat{\Sigma}}(\hat{\sigma}_{ij}) - T_{t_n, \hat{\Sigma}}(\sigma_{ij})) L_{ij}^1|}_{\text{II}_1} + \max_i \sum_{j=1}^P |(T_{t_n, \hat{\Sigma}}(\hat{\sigma}_{ij}) - T_{t_n, \hat{\Sigma}}(\sigma_{ij})) L_{ij}^0|$$

$$\text{II}_1 = \max_i \sum_{j=1}^P |L_{ij}^1| \left\{ \begin{array}{l} \hat{L}_{ij}^1 [T_{t_1}(\hat{\sigma}_{ij}) - T_{t_1}(\sigma_{ij})] \leftarrow \text{II}_{1,1} \\ \hat{L}_{ij}^0 [T_{t_0}(\hat{\sigma}_{ij}) - T_{t_0}(\sigma_{ij})] \leftarrow \text{II}_{1,2} \end{array} \right.$$

$$\text{II}_{1,1} \text{ by Bickel} \leq C_1 t_1^{-q} \sqrt{\frac{\log P}{n}} + C_1 t_1^{1-q}$$

$$\text{II}_{1,2} \leq K_n \left(C_1 t_0^{-q} \sqrt{\frac{\log P}{n}} + C_1 t_0^{1-q} \right)$$

$$\text{II}_{2,1} \leq C_0 t_0^{-q} \sqrt{\frac{\log P}{n}} + C_0 t_0^{1-q}$$

$$\text{II}_{2,2} \leq K_n \left(C_0 t_1^{-q} \sqrt{\frac{\log P}{n}} + C_0 t_1^{1-q} \right)$$

$$\text{I} \leq \max_i \sum_{j=1}^P |\sigma_{ij}| (L_{ij}^1 + L_{ij}^0) +$$