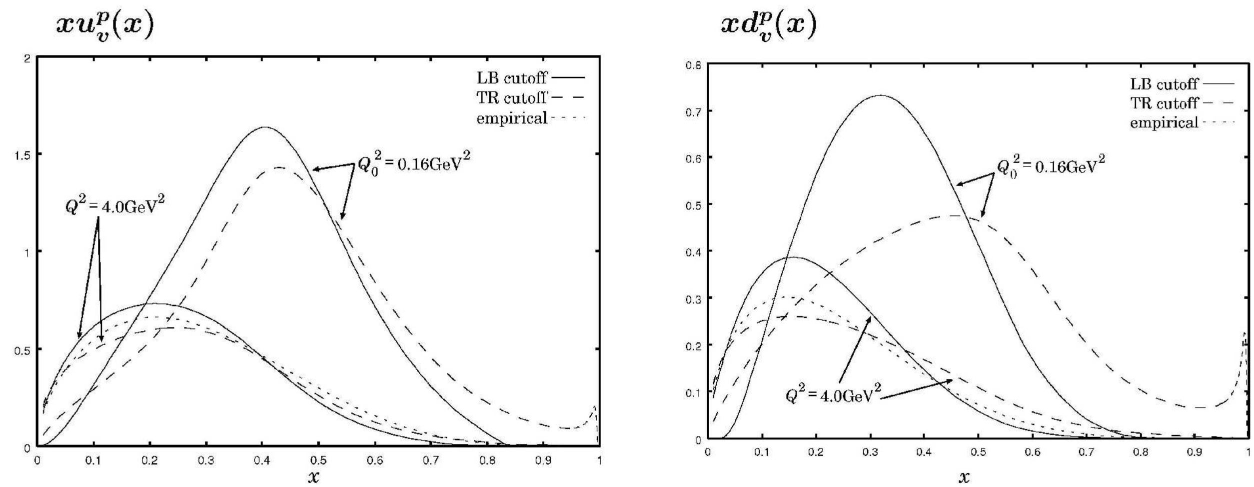

FIG. VI.34 Valence u-quark (left-panel) and d-quark (right-panel) distributions computed in a scalar-diquark picture of the nucleon based on a NJL model (Mineo *et al.*, 1999). The results exhibit a marked sensitivity to the manner in which the model is regularized. In this study the "TR" scheme is judged best. Both schemes lead to unphysical behavior on $x \gtrsim 0.8$. NLO evolution of the model results is performed from $Q_0 = 0.4\,\mathrm{GeV}$. The parametrization is that of (Martin *et al.*, 1994). [Figure adapted from (Mineo *et al.*, 1999).]

parametrizations of data.

Some general features of the distributions are nonetheless physically reasonable. For example, in this representation of the proton, the d-quark appears only as a constituent of a $[u, d]$ scalar diquark with mass $m_Q < m_{0^+} < 2m_Q$. Hence, the probability of finding a valence d-quark in the proton is obtained by convoluting two probabilities; viz., that of striking a 0^+ diquark in the nucleon with that of striking a d-quark in the scalar diquark. Naturally, therefore, the valence d-quark distribution peaks at smaller x than the valence u-quark distribution and is softer for $0.6 \lesssim x \lesssim 0.8$.

A realistic picture of the nucleon must include axial-vector diquark correlations, which generate significant attraction (Hecht *et al.*, 2002), and in (Mineo *et al.*, 2002) they are added to the model just described. The Faddeev equation is still solved in the static-truncation but the regularization procedure denoted by "LB" in Fig. VI.34 is adopted. As apparent, it forces the distribution functions to vanish at $x \simeq 0.8$, which, while still unphysical, is less difficult to overlook than the sharp rise produced by the "TR" scheme. The LB regularization procedure defines a model in which the distributions are extremely soft at Q_0.