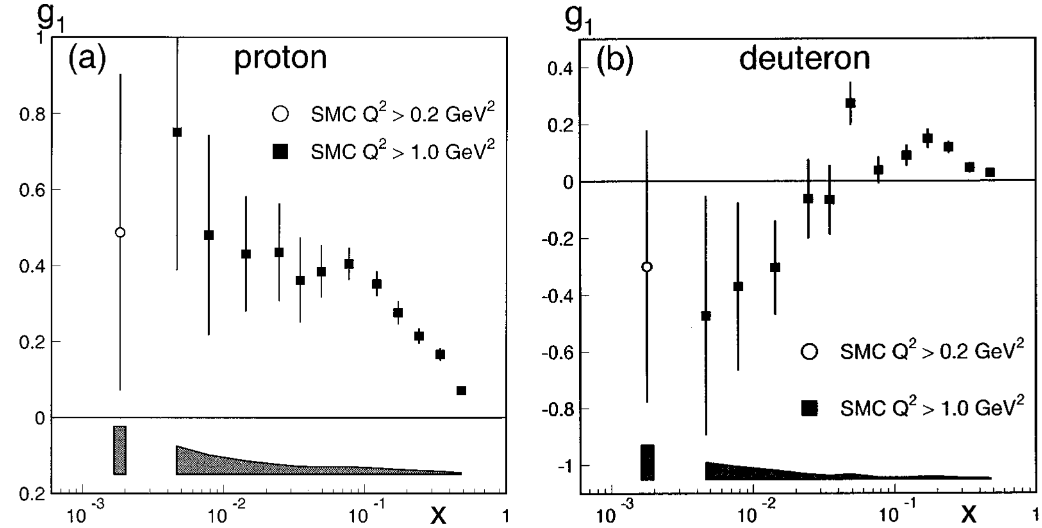

FIG. 10. The optimal set of SMC results of g_1: (a) for proton and (b) for deuteron. Statistical errors are shown as error bars while the shaded band below indicates the systematic uncertainty. The $Q^2 > 0.2$ GeV^2 result was obtained by combining the lowest three A_1 bins.

distributions from our NLO QCD analysis [14]. In the calculation of the total error we have taken into account that the value in the measured region affects the contributions from the unmeasured regions.

VII. THE NONSINGLET STRUCTURE FUNCTION g_1^{NS}

The flavor nonsinglet combination of the spin-dependent structure functions $g_1^{\mathrm{NS}} = g_1^p - g_1^n$ is an interesting quantity because a rigorous QCD prediction exists for its first moment. This sum rule was derived, in the limit of infinite momentum transfer, by Bjorken [1] using current algebra and isospin symmetry.

A. Comparison of $g_1^p - g_1^n$ and $F_1^p - F_1^n$

In our experiment $g_1^p(x,Q^2)$ and $g_1^d(x,Q^2)$ are measured in the same bins of x and Q^2. We evaluate $g_1^{\mathrm{NS}}(x,Q^2)$ from

$$g_1^{\mathrm{NS}}(x,Q^2) = 2\left[g_1^p(x,Q^2) - \frac{g_1^d(x,Q^2)}{[1-(3/2)\omega_D]}\right], \tag{13}$$

where ω_D is the probability of the deuteron to be in the D state. As in our previous publications we have used $\omega_D = 0.05 \pm 0.01$, which covers most of the published values [27].

The results are given in Table XI with statistical and systematic errors. In calculating the systematic error the contributions from the beam polarization, the dilution factor, and R were treated as correlated between proton and deuteron, whereas the other contributions to the systematic error were treated as uncorrelated [28].

The results for g_1^{NS} are shown in Fig. 11, together with g_1^{NS} from the E143 experiment calculated from their values of g_1^p and g_1^d [29]. For both data sets the points are shown at the measured Q^2. In the same figure we show the nonsinglet

TABLE VIII. The spin-dependent structure function g_1^p at the measured Q^2 and for $Q^2 > 1$ GeV^2, where the QCD evolution is applicable, g_1^p evolved to $Q_0^2 = 10$ GeV^2. The first bin, which has $Q^2 > 0.2$ GeV^2, was obtained by combining the lowest three A_1 bins from Table II. The first error is statistical and the second is systematic. In the last column the third error indicates the uncertainty in the QCD evolution.

x range	$\langle x \rangle$	$\langle Q^2 \rangle$ (GeV^2)	g_1^p	$g_1^p(Q_0^2 = 10$ GeV$^2)$
0.0008–0.003	0.002	0.5	$0.49 \pm 0.42 \pm 0.13$	
0.003–0.006	0.005	1.3	$0.75 \pm 0.36 \pm 0.07$	$1.19 \pm 0.36 \pm 0.07 \pm 0.56$
0.006–0.010	0.008	2.1	$0.48 \pm 0.26 \pm 0.05$	$0.72 \pm 0.26 \pm 0.05 \pm 0.25$
0.010–0.020	0.014	3.6	$0.43 \pm 0.15 \pm 0.03$	$0.59 \pm 0.15 \pm 0.03 \pm 0.07$
0.020–0.030	0.025	5.7	$0.43 \pm 0.13 \pm 0.03$	$0.50 \pm 0.13 \pm 0.03 \pm 0.02$
0.030–0.040	0.035	7.8	$0.36 \pm 0.11 \pm 0.02$	$0.39 \pm 0.11 \pm 0.02 \pm 0.01$
0.040–0.060	0.049	10.4	$0.38 \pm 0.07 \pm 0.02$	$0.38 \pm 0.07 \pm 0.02 \pm 0.00$
0.060–0.100	0.077	14.9	$0.41 \pm 0.04 \pm 0.02$	$0.39 \pm 0.04 \pm 0.02 \pm 0.00$
0.100–0.150	0.122	21.3	$0.35 \pm 0.03 \pm 0.02$	$0.33 \pm 0.03 \pm 0.02 \pm 0.00$
0.150–0.200	0.173	27.8	$0.28 \pm 0.03 \pm 0.01$	$0.27 \pm 0.03 \pm 0.01 \pm 0.00$
0.200–0.300	0.242	35.6	$0.21 \pm 0.02 \pm 0.01$	$0.22 \pm 0.02 \pm 0.01 \pm 0.01$
0.300–0.400	0.342	45.9	$0.17 \pm 0.02 \pm 0.01$	$0.18 \pm 0.02 \pm 0.01 \pm 0.00$
0.400–0.700	0.480	58.0	$0.07 \pm 0.01 \pm 0.00$	$0.09 \pm 0.01 \pm 0.00 \pm 0.00$