Additional Appendix

Finite Number of Rounds. Suppose the number of trading rounds (N) is a random variable with a geometric distribution $Prob(N = n) = p(1-p)^{n-1}$ for $n = 1, 2, \ldots$, so after each round there is a probability p, independent of history, that trading will stop. Assume that an agent does not know the realization of N. In the limit case $p = 0$ (analyzed in the main text), N approaches infinity, and an agent can enter as many contracts as he plans to enter. In contrast, when $p > 0$, an agent who plans to enter n contracts can enter only $\min(n, N)$ contracts. Thus, we need to replace n_i in the incentive constraint with $E[\min(n_i, N)] = \frac{1}{p}[1-(1-p)^{n_i}]$. Note that with probability p, an agent who plans a strategic default will end up with only one contract, exactly as suggested by the central planner. Since the agent does not default in this case, it might be optimal to design a contract that does not satisfy the incentive constraint (i.e., to require less collateral knowing that agents will sometimes default, but not always). To rule this out, I assume that p is sufficiently small.

The nature of the results remains. One can show that as p decreases (i.e., the probability of not finding a counterparty falls), the third-best agreement requires more collateral, and the gains from allowing agents to report their trades to a central planner increases. The optimal position limit decreases.

Renegotiation Proofness of the Third-Best Agreement. I first show that the third-best agreement is renegotiation proof. Suppose all agents enter the agreement ψ_{tb}, and a side planner offers to enter the agreement $\psi' \neq \psi_{tb}$ instead. After entering ψ', an agent (assume type i) can double cheat by entering ψ_{tb} with n_i additional counterparties and obtain $\overline{U}_i(\psi_{tb}, n_i) + \frac{1}{2}(x'_{-i} - k'_i)$. This is possible if $k'_i + n_i k_{tb} \leq 1$. The best side agreement maximizes $I'_1 + I'_2$ subject to feasibility and the "no-double-cheating constraint,"

$U_i(\psi') \geq \overline{U}_i(\psi_{tb}, n_i) + \frac{1}{2}(x'_{-i} - k'_i)$, for every $i \in \{1,2\}$ and $n_i \in [0, \frac{1-k'_i}{k_{tb}}]$. This reduces to

$$(R-1)I'_i \geq \frac{1}{2}(x'_i - k'_i) + \frac{1}{2}(1-k'_i)(\frac{x_{tb}-k_{tb}}{k_{tb}}), \text{ for } i = 1,2. \tag{14}$$

This problem is linear. Since ψ_{tb} satisfies Equation (13) with equality, it also satisfies Equation (14) with equality and is a unique solution. Thus, a side planner cannot improve the agents' utilities.

Next, I show that the third-best agreement is the only feasible agreement, satisfying the participation constraint and the incentive constraint, (13), that is both symmetric and renegotiation proof. To see that, assume, by contradiction, that there is a feasible agreement $\psi = (k, x, I) \neq \psi_{tb}$ that satisfies the participation constraint and the incentive constraint and that ψ is renegotiation proof. We can assume, without loss of generality, that $k + I = 1$; otherwise, we can increase I and k by Δ and $\varepsilon\Delta$, respectively, and create a feasible side agreement that is preferred to ψ. Since ψ_{tb} is a unique solution to the third-best problem, we must have $I < I_{tb}$, and $k_{tb} < k$. Since ψ satisfies Equation (13), it follows that $\frac{1}{2}(x-k)/k \leq (R-1)I$, and since ψ_{tb} satisfies Equation (13) with equality, it follows that $\frac{1}{2}(x_{tb}-k_{tb})/k_{tb} = (R-1)I_{tb}$. Hence, $(x_{tb}-k_{tb})/k_{tb} > (x-k)/k$. Hence,

$$\begin{aligned}(R-1)I_{tb} &= \frac{1}{2}(1-k_{tb})\frac{x_{tb}-k_{tb}}{k_{tb}} + \frac{1}{2}k_{tb}\frac{x_{tb}-k_{tb}}{k_{tb}} \\ &> \frac{1}{2}(1-k)\frac{x-k}{k} + \frac{1}{2}(x_{tb}-k_{tb}).\end{aligned} \tag{15}$$

Thus, if all other agents enter ψ, the side agreement ψ_{sb} satisfies the no-double-cheating constraint and provides a higher utility than ψ. This contradicts the fact that ψ is renegotiation proof. **Q.E.D.**