A Appendix

A.1 Random Re-Matching in Groups

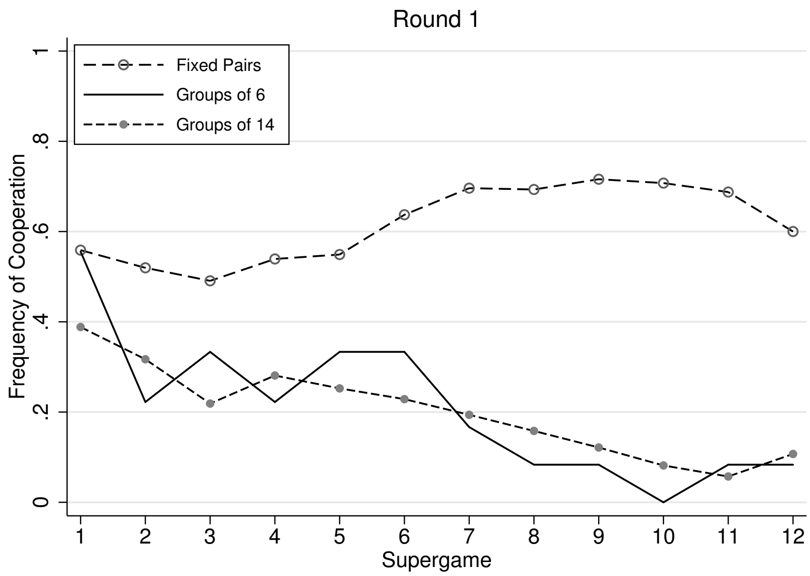


Figure 5: Duffy & Ochs (2009): Random Re-Matching in Groups

A.2 Responsiveness under Memory-one Belief-free Equilibrium

Consider a memory-one behavioral strategy σ_j of player j such that the probability $\Pr(a_j^t = C \mid h_j^{t-1})$ that it plays C in round $t \geq 2$ depends only on his signal ω_j^{t-1} in round $t-1$. Any such strategy σ_i can be expressed by the two probabilities p and q such that

$$\Pr(a_j^t = C \mid a_i^{t-1}, \omega_i^{t-1}) = \begin{cases} p & \text{if } \omega_i^{t-1} = c, \\ q & \text{if } \omega_i^{t-1} = d. \end{cases}$$

Let now $W(c)$ denote i's continuation payoff from round t on when j observes $\omega_j^{t-1} = c$ in round $t-1$, and $W(d)$ denote i's continuation payoff when j observes $\omega_j^{t-1} = d$ in round $t-1$. Since σ_j makes player i indifferent between playing C and D, we should have

$$(1-\delta)g = \delta(1-2\varepsilon)\left[W(c) - W(d)\right], \tag{8}$$

where the left-hand side is i's payoff gain in the current round from playing D rather than C, and the right-hand side is the increase in continuation payoff from playing C rather than D, which increases the probability of player j observing $\omega_j = c$ by $1-2\varepsilon$.[61] Next, if player j observes $\omega_j^{t-1} = c$ in round $t-1$ and player i plays D in round t, then i's continuation payoff from round t on is given by

$$W(c) = (1-\delta)\left\{p(1+g) + (1-p)\cdot 0\right\} + \delta\left\{(1-\varepsilon)W(d) + \varepsilon W(c)\right\}.$$

On the other hand, if player j observes $\omega_j^{t-1} = d$ in round $t-1$ and player i plays D in round t, then i's continuation payoff from round t on is given by

$$W(d) = (1-\delta)\left\{q(1+g) + (1-q)\cdot 0\right\} + \delta\left\{(1-\varepsilon)W(d) + \varepsilon W(c)\right\}.$$

These equations together imply

$$W(c) - W(d) = (1-\delta)(p-q)(1+g). \tag{9}$$

Combining (8) and (9), we obtain

$$p - q = \frac{g}{\delta(1-2\varepsilon)(1+g)}. \tag{10}$$

When player j plays σ_j satisfying (10), player i is indifferent between playing C and playing D at every history. It follows that the strategy profile (σ_i, σ_j) with both σ_i and σ_j satisfying (10) is an equilibrium. When σ_i and σ_j both begin with C in

[61] Note that the gain from playing D does not depend on j's action when $g = \ell$ as assumed.

round 1, we can verify that a player's expected payoff in this equilibrium is given by

$$1 - \frac{g\{1 - p + \varepsilon(p - q)\}}{(1 - 2\varepsilon)(p - q)} = 1 - \delta(1 + g)(1 - p) - \frac{\varepsilon}{1 - 2\varepsilon}\, g.$$

The highest equilibrium payoff is hence achieved when $p = 1$, and is given by $1 - \frac{\varepsilon}{1-2\varepsilon}\, g$.

A.3 Cooperation under Perfect Monitoring in Dal Bó & Fréchette (2017).

In Dal Bó & Fréchette (2017), each session in the $\delta = 0.5$ treatment has at least 19 supergames, while the three sessions in the $\delta = 0.9$ treatment have 12, 18 and 19 supergames. Given that there are at most 19 supergames in the current experiments, Figure 6 includes at most 19 supergames to make comparison easier. Dal Bó & Fréchette (2017) specify the stage-payoffs as $u_i(D, C) = 50$, $u_i(C, C) = 32$, $u_i(D, D) = 25$, and $u_i(C, D) = 12$, making the stage-game strategically equivalent to (2) for $g = \frac{25}{7} - 1 \approx 2.57$ and $\ell = \frac{13}{7} \approx 1.86$.

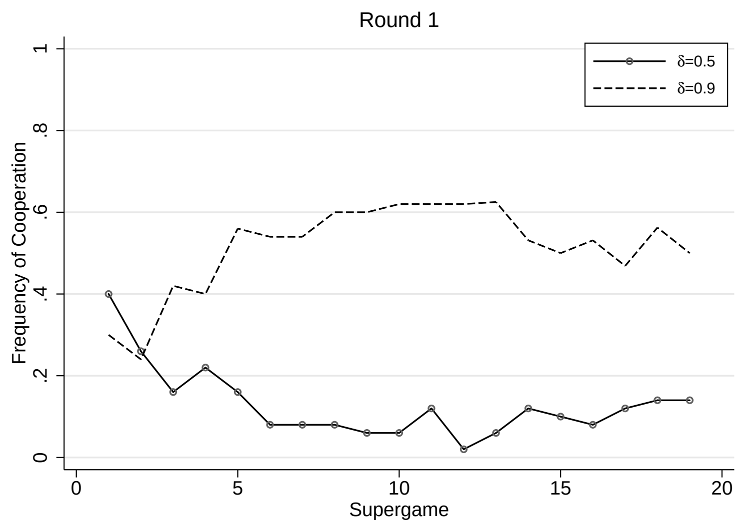


Figure 6: Cooperation Rates in Dal Bó & Fréchette (2017) by Supergame

A.4 Choices in Round Three

Table 7: Does the Opponent's Choice Two Rounds Ago Affect Choices?

Dependent Variable: Cooperation in Round Three ($1_{\{a_i^3=C\}}$)

	Perfect		Public[†]		Private	
Case:	Defect in Round 1	Coop. in Round 1	Defect in Round 1	Coop. in Round 1	Defect in Round 1	Coop. in Round 1
Action C in Round 2 ($1_{\{a_i^2=C\}}$)	0.219**	0.243**	0.155	0.203**	0.081	0.373*
	(0.050)	(0.071)	(0.146)	(0.045)	(0.106)	(0.118)
Signal c in Round 2 ($1_{\{\omega_i^2=c\}}$)	-0.105***	0.270*	-0.028	0.300*	-0.021	0.407**
	(0.010)	(0.102)	(0.041)	(0.111)	(0.049)	(0.095)
Pair (C, c) in Round 2 ($1_{\{(a_i^2,\omega_i^2)=(C,c)\}}$)	0.411**	0.189	0.367	0.143	0.195	-0.119
	(0.087)	(0.111)	(0.200)	(0.087)	(0.110)	(0.145)
Signal c in Round 1 ($1_{\{\omega_i^1=c\}}$)	0.018	0.048	0.064	0.166*	-0.003	0.108**
	(0.061)	(0.056)	(0.040)	(0.062)	(0.081)	(0.023)
Constant	0.130	0.203*	0.138**	0.190**	0.262**	0.150*
	(0.074)	(0.071)	(0.033)	(0.041)	(0.049)	(0.048)
Observations	246	406	196	343	290	402

Clustered standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

[†] Restricted to cases where the public signal coincided with the own choices.

A.5 Strategies Included in the Estimation

Table 8: Unconditional and Two-States Automata

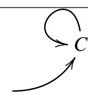
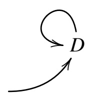
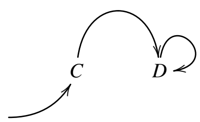
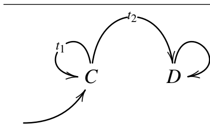
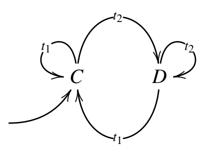
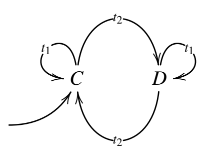
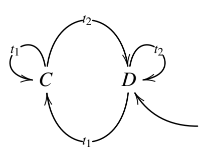
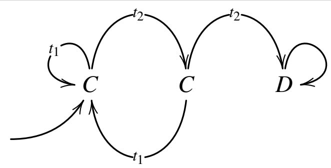
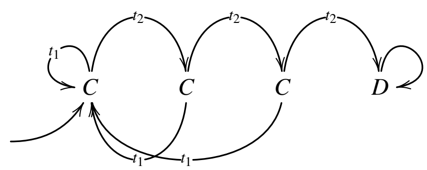
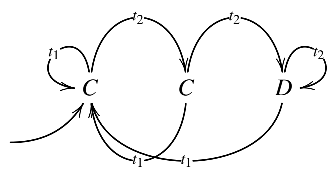
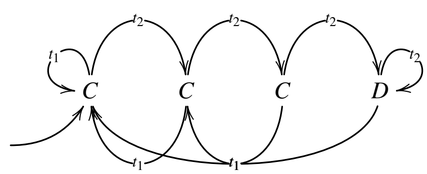
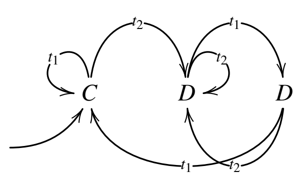
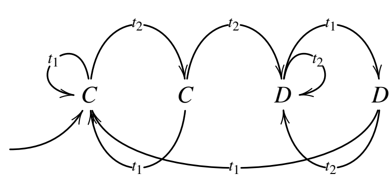
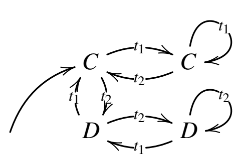
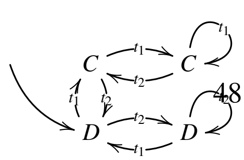
Automaton name in text	Diagram	Perfect and Public	Private
AllC			
AllD			
CDDD			
Grim		$t_1 = \{a_i = C, \omega = (c, c)\}$ $t_2 = \neg t_1$	$t_1 = \{a_i = C, \omega_i = c\}$ $t_2 = \neg t_1$
TFT		$t_1 = \{\omega_i = c\}$ $t_2 = \neg t_1$	
WSLS		$t_1 = \{\omega_i = c\}$ $t_2 = \neg t_1$	
STFT		$t_1 = \{\omega_i = c\}$ $t_2 = \neg t_1$	

Table 9: Automata with More Than Two States

Automaton name in text	Diagram	Perfect and Public	Private
Grim2		$t_1 = \{a_i = C, \omega = (c,c)\}$ $t_2 = \neg t_1$	$t_1 = \{a_i = C, \omega_i = c\}$ $t_2 = \neg t_1$
Grim3		$t_1 = \{a_i = C, \omega = (c,c)\}$ $t_2 = \neg t_1$	$t_1 = \{a_i = C, \omega_i = c\}$ $t_2 = \neg t_1$
TF2T		$t_1 = \{\omega_i = c\}$ $t_2 = \neg t_1$	
TF3T		$t_1 = \{\omega_i = c\}$ $t_2 = \neg t_1$	
2TFT		$t_1 = \{\omega_i = c\}$ $t_2 = \neg t_1$	
2TF2T		$t_1 = \{\omega_i = c\}$ $t_2 = \neg t_1$	
Sum2		$t_1 = \{\omega_i = c\}$ $t_2 = \neg t_1$	
SSum2		$t_1 = \{\omega_i = c\}$ $t_2 = \neg t_1$	

A.6 Cooperation and Coordination in the High Noise Treatments

With the payoff function g_i held fixed as in (5), and the noise $\varepsilon = 0.2$, the stage game in these high-noise treatments have $g = \ell = \frac{20}{37} \approx 0.541$ as opposed to 0.357 in the original treatments, and are explicitly given as follows:[62]

$a_1 \backslash a_2$	C	D
C	38.4, 38.4	15.6, 46.4
D	46.4, 15.6	23.6, 23.6

(11)

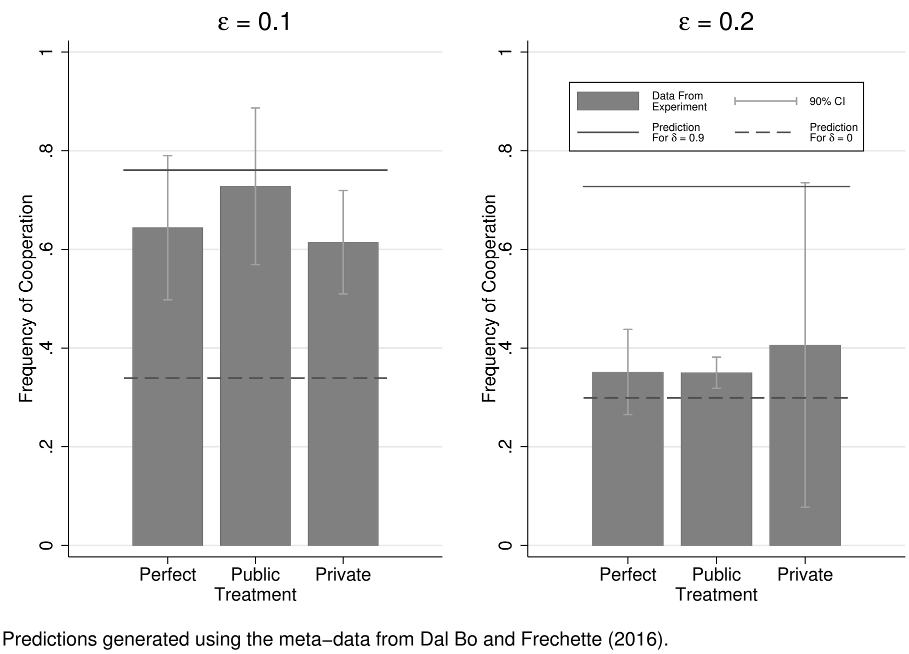


Figure 7: Round One Cooperation Rates by Treatment in the Last Four Supergames

As g and ℓ increase, the meta study of Dal Bó & Fréchette (2016) predicts a modest decrease in cooperation rates in infinitely repeated PD under perfect moni-

[62] A total of 96 subjects participated in six sessions, two each for perfect, public, and private monitoring treatments, with the number of subjects per session equal to either 12 or 24. The subjects played at least 11 supergames in every session, and the data analysis below focuses on supergames eight through 11. In two of the six sessions, a software bug ended one supergame earlier than it should have.

toring without randomly generated payoffs. In line with the expectation, the cooperation rates in the high-noise treatments are lower than in the original treatments for every monitoring structure (Figure 7): The drop in the round one cooperation rates from $\varepsilon = 0.1$ to $\varepsilon = 0.2$ is significant with $p < 0.01$ for each case. However, the size of the reduction is much larger than predicted by Dal Bó & Fréchette (2016): The cooperation rates for $\varepsilon = 0.2$ are statistically lower than the meta-analysis based prediction in all three monitoring treatments ($p < 0.01$). This is in contrast with the $\varepsilon = 0.1$ perfect and public monitoring treatments where the cooperation rates are not statistically different from the prediction.[63]

As noted in Section 8, round one cooperation rates in those treatments are not different from what is predicted for one-shot PD games. This diminished role of dynamic considerations in behavior is also visible in Figure 8 on the frequency of cooperation rate after a good versus bad signal, and in Figure 9 on the realized coordination rates. Specifically, Figure 8 shows very little separation between cooperation rates following good versus bad signals as seen in . Compared with the differences of 56 (perfect), 44 (public), and 35 (private) percentage points in the original $\varepsilon = 0.1$ treatments, the differences in the $\varepsilon = 0.2$ treatments are 23 (perfect), 11 (public), and −4 (private) percentage points with only the one for perfect being statistically significant ($p < 0.1$).

Figure 9 is the counterpart of Figure 2 and shows the realized coordination rates for $\varepsilon = 0.2$ as well as what would be expected if choices were independent within a pair. Consistent with the observations made so far, it shows that the realized coordination rates are nearly identical to what would be implied by independent action choices. In fact, comparing the total coordination rates to the sum $\Pr(a_i^t = C)^2 + \Pr(a_i^t = D)^2$, we find that statistical difference only for perfect monitoring (difference = 0.06, $p < 0.01$). The figure also shows that total coordination is lower than for $\varepsilon = 0.1$ and most of it is accounted for by coordination on defection.

Considering all rounds together, we find cooperation rates under public and private monitoring not statistically different from each other, and both higher than those under perfect monitoring ($p < 0.1$ and < 0.01, respectively). The differences, however, are not substantial, being at most 5 percentage points between perfect (27%) and private (32%).

[63]The rate is lower than the prediction ($p < 0.05$) in the $\varepsilon = 0.1$ private monitoring treatment.

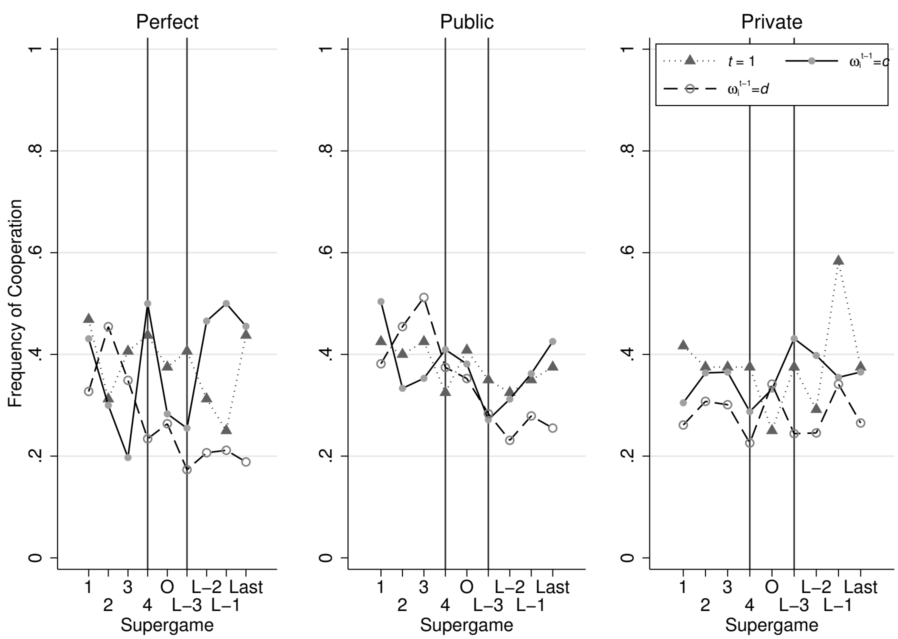


Figure 8: Cooperation Conditional On the Previous Signal with $\varepsilon = 0.2$ (Equivalent to Figure 3)

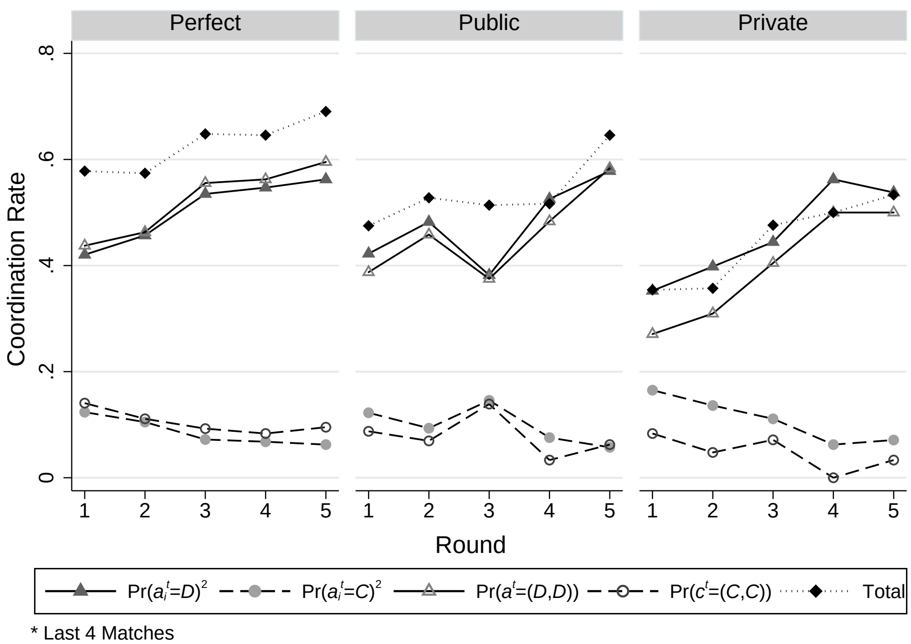


Figure 9: Coordination Rates Implied by Independent Action Choice and Realized with $\varepsilon = 0.2$ (Equivalent to Figure 2)