APPENDIX A: SURVIVAL ASYMMETRIES

In the main text we have assumed that dominants, subordinates, and lone breeders all have the same baseline survival probability. However, we could also assume that one (or two) classes experience higher mortality rates. In polistine wasps, for instance, dominant foundresses likely experience lower predation rates than both lone foundresses and subordinates, because they rarely leave the communal nest [1]. Likewise, in cooperatively breeding vertebrates, breeding females often have relatively long life-spans [2].

We can account for such cases of survival asymmetries by multiplying the baseline survival probability ($S_B$) of subordinates and/or lone breeders (or any class we like) by a coefficient $\delta$ ($0 < \delta \leq 1$), such that, for instance, the survival probability of a lone breeder is given by $S_L = \delta S_B$, and/or the survival probability of a subordinate by $S_S = \delta S_B(1-x-y)$.

We find that survival asymmetries increase the overall level of conflict, irrespective of whether dominants (not shown) or subordinates have lower baseline survival (Figure A1). If subordinates have lower survival than dominants, this decreases their queuing prospects and future fitness gains. As a consequence, subordinates invest more heavily in conflict over current reproduction and tend to be more aggressive than dominants. However, if relatedness is sufficiently high, this relationship reverses and subordinates are less aggressive than dominants (as in the case without survival asymmetries), even if they suffer from substantially higher mortality costs than dominants.
Figure A1. Stable levels of conflict effort if subordinates (and lone breeders) have lower baseline survival than dominants. In panel (a) \( S_L = 0.75S_B \) and \( S_S = 0.75S_B(1-x-y) \); in panel (b) \( S_L = 0.5S_B \) and \( S_S = 0.5S_B(1-x-y) \). Both panels depict stable conflict efforts of dominants (\( x \), solid line) and subordinates (\( y \), dotted line) as a function of relatedness (\( r \)) for two different levels of baseline survival (\( S_B \), as indicated). In all panels \( a = 0.5 \), \( b = 0.5 \), \( \lambda = 0.75 \).

REFERENCES
