Replication Output for Paper: What Drives International Cooperation? Evidence from WTO Negotiations

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Load required library

```
## Loading required package: Matrix

## Warning: package 'Matrix' was built under R version 4.0.5

## Warning: package 'texreg' was built under R version 4.0.5

## Version:  1.38.6
## Date:     2022-04-06
## Author:   Philip Leifeld (University of Essex)
##
## Consider submitting praise using the praise or praise_interactive functions.
## Please cite the JSS article in your publications -- see citation("texreg").

## Warning: package 'effects' was built under R version 4.0.5

## Loading required package: carData

## Warning: package 'carData' was built under R version 4.0.5

## lattice theme set by effectsTheme()
## See ?effectsTheme for details.
```

Load data

Codebook

Two datasets will appear in the global environment:

- wto: dyadic and annual data, used for all models in Table 1 and 2 with the exception of the last model of Table 1
- wto2: dyadic data with merged years, used for the last model of Table 1

The followng variables are found in both datasets, in the wto dataset they are annual, in the wto2 dataset combined over the years. For a more detailed description, see methods section of the paper:

- iso3c1: ISO3 code of first country in dyad
- iso3c2: ISO3 code of second country in dyad
- CoopTotalCorr: cooperative events between dyads in question (by year for wto dataset, over all years for wto2 dataset)
- CoopAG: cooperative events for agricultural issue only (only in wto dataset)
- CoopNAMA: cooperative events for NAMA issue only (only in wto dataset)
- gwf: dyadic regime combination (10 categories, see paper)

- gwf2: dyadic regime combinations (only 3 categories: two democracies, mixed dyads, two autocracies)
- logtrade: bilateral trade flows between dyad in question, logged and lagged
- logdist: geographic proximity between dyad in question, logged
- diffGDP: difference between the GDP of the two countries in question, logged and lagged
- totalGDP: combined GDP of the two countries in question, logged and lagged
- comlang_off: cultural proximity measued by common official language
- groups: is dyad in question in one (or more) joind negotiation groups
- Year: year of observation

Important Note for all model results below: when replicating the results, there may be very small differences in the model results, particularly for the selection stage models (multilevel logit models). These models are computationally complex, running over thousands of iterations. Small differences in R or package versions may lead to very small differences, usually less than 0.001 in magnitude.

Models Table 1

Note: the year effects are excluded from the tables in the paper

Selection stage model

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: CoopTotalCorr > 0 ~ gwf2 * logtrade + logdist + diffGDP + totalGDP +
##     comlang_off + colony + groups + Year + (1 | iso3c2) + (1 |      iso3c1)
##    Data: wto
##
##      AIC      BIC   logLik deviance df.resid
##  40990.2  41204.3 -20471.1  40942.2    55344
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -12.358  -0.416  -0.126   0.351  33.733
##
## Random effects:
##  Groups Name        Variance Std.Dev.
##  iso3c2 (Intercept) 2.008    1.417
##  iso3c1 (Intercept) 2.130    1.459
## Number of obs: 55368, groups:  iso3c2, 109; iso3c1, 109
##
## Fixed effects:
##                    Estimate Std. Error z value Pr(>|z|)
## (Intercept)         8.89830    0.73889  12.043  < 2e-16 ***
## gwf2mixed          -0.18793    0.07015  -2.679 0.007387 **
## gwf22aut            0.39888    0.12589   3.168 0.001532 **
## logtrade            0.23096    0.01415  16.319  < 2e-16 ***
## logdist            -0.23103    0.01124 -20.555  < 2e-16 ***
## diffGDP             0.01906    0.01713   1.112 0.266022
## totalGDP           -0.46267    0.03762 -12.298  < 2e-16 ***
## comlang_off         0.76992    0.04135  18.619  < 2e-16 ***
## colony             -0.92131    0.17692  -5.208 1.91e-07 ***
```

```
## groups              1.57860    0.03825  41.266  < 2e-16 ***
## Year2003            0.27305    0.06220   4.390 1.14e-05 ***
## Year2004            1.05941    0.06090  17.395  < 2e-16 ***
## Year2005            0.22019    0.06505   3.385 0.000713 ***
## Year2006            0.85707    0.06468  13.250  < 2e-16 ***
## Year2007            2.57259    0.06633  38.782  < 2e-16 ***
## Year2008            3.30497    0.06985  47.312  < 2e-16 ***
## Year2009            2.31544    0.06750  34.304  < 2e-16 ***
## Year2010            2.33563    0.06934  33.681  < 2e-16 ***
## Year2011            2.01025    0.07097  28.326  < 2e-16 ***
## Year2012            1.91046    0.07166  26.658  < 2e-16 ***
## gwf2mixed:logtrade -0.10787    0.01133  -9.518  < 2e-16 ***
## gwf22aut:logtrade  -0.32568    0.02035 -16.003  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation matrix not shown by default, as p = 22 > 12.
## Use print(x, correlation=TRUE)  or
##     vcov(x)        if you need it
## optimizer (Nelder_Mead) convergence code: 0 (OK)
## Model failed to converge with max|grad| = 0.111127 (tol = 0.002, component 1)
```

Allocation stage model

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: CoopTotalCorr ~ gwf2 * logtrade + logdist + diffGDP + totalGDP +
##     comlang_off + colony + groups + Year + (1 | iso3c2) + (1 |      iso3c1)
##    Data: wto
##  Subset: CoopTotalCorr > 0
##
## REML criterion at convergence: 84159
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -3.6246 -0.5905 -0.0938  0.4316 10.5819
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  iso3c2   (Intercept) 0.5601   0.7484
##  iso3c1   (Intercept) 0.7670   0.8758
##  Residual             3.6104   1.9001
## Number of obs: 20244, groups:  iso3c2, 106; iso3c1, 104
##
## Fixed effects:
##                      Estimate Std. Error t value
## (Intercept)        13.324901   0.690923  19.286
## gwf2mixed          -0.035949   0.075578  -0.476
## gwf22aut            0.064508   0.129543   0.498
## logtrade            0.141956   0.014134  10.044
## logdist            -0.072755   0.008352  -8.711
## diffGDP             0.010310   0.017854   0.577
## totalGDP           -0.555133   0.037582 -14.771
## comlang_off         0.336910   0.037418   9.004
```

```
## colony             -0.006102   0.186331  -0.033
## groups              1.019670   0.052018  19.602
## Year2003            4.256517   0.079580  53.487
## Year2004            1.556642   0.075236  20.690
## Year2005            1.276521   0.082076  15.553
## Year2006            3.712217   0.078502  47.288
## Year2007            4.472919   0.073944  60.491
## Year2008            2.910778   0.073902  39.387
## Year2009            2.392303   0.076058  31.454
## Year2010            2.223877   0.077537  28.682
## Year2011            2.006623   0.080158  25.033
## Year2012            3.254397   0.080965  40.195
## gwf2mixed:logtrade -0.110390   0.012838  -8.599
## gwf22aut:logtrade  -0.262606   0.020872 -12.582
##
## Correlation matrix not shown by default, as p = 22 > 12.
## Use print(x, correlation=TRUE)  or
##     vcov(x)        if you need it
```

Full model

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: CoopTotalCorr ~ gwf2 * logtrade + logdist + diffGDP + totalGDP +
##     comlang_off + colony + groups + Year + (1 | iso3c2) + (1 |      iso3c1)
##    Data: wto
##
## REML criterion at convergence: 211321.4
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -2.6401 -0.5850 -0.1540  0.3636 14.7991
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  iso3c2   (Intercept) 0.4068   0.6378
##  iso3c1   (Intercept) 0.4820   0.6943
##  Residual             2.6132   1.6165
## Number of obs: 55368, groups:  iso3c2, 109; iso3c1, 109
##
## Fixed effects:
##                     Estimate Std. Error t value
## (Intercept)        13.728771   0.385227  35.638
## gwf2mixed          -0.126713   0.038447  -3.296
## gwf22aut            0.105210   0.069886   1.505
## logtrade            0.136962   0.007571  18.091
## logdist            -0.153030   0.005316 -28.788
## diffGDP             0.005091   0.008975   0.567
## totalGDP           -0.523688   0.019768 -26.491
## comlang_off         0.535574   0.022766  23.525
## colony             -0.312933   0.096651  -3.238
## groups              0.767971   0.019666  39.051
## Year2003            1.072622   0.031616  33.926
## Year2004            0.599084   0.031625  18.943
## Year2005            0.431501   0.033397  12.920
```

```
## Year2006            1.279354   0.033747  37.911
## Year2007            2.233563   0.034473  64.792
## Year2008            1.725063   0.035560  48.512
## Year2009            1.255746   0.035241  35.633
## Year2010            1.168300   0.036086  32.376
## Year2011            1.012708   0.037029  27.349
## Year2012            1.549854   0.037419  41.419
## gwf2mixed:logtrade -0.084512   0.006177 -13.682
## gwf22aut:logtrade  -0.243658   0.010258 -23.753
##
## Correlation matrix not shown by default, as p = 22 > 12.
## Use print(x, correlation=TRUE)  or
##     vcov(x)        if you need it
```

Full model (years combined)

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: CoopTotalCorr ~ gwf2 * logtrade + logdist + diffGDP + totalGDP +
##     comlang_off + colony + groups + (1 | iso3c2) + (1 | iso3c1)
##    Data: wto2
##
## REML criterion at convergence: 27835.1
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -3.7340 -0.5643 -0.0254  0.4768  9.0436
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  iso3c2   (Intercept) 12.51    3.537
##  iso3c1   (Intercept) 14.74    3.839
##  Residual             46.73    6.836
## Number of obs: 4100, groups:  iso3c2, 90; iso3c1, 90
##
## Fixed effects:
##                    Estimate Std. Error t value
## (Intercept)        15.33169    5.53397   2.770
## gwf2mixed           1.06069    0.68596   1.546
## gwf22aut            2.81008    1.26779   2.217
## logtrade            1.17165    0.10817  10.832
## logdist             0.36191    0.21601   1.675
## diffGDP             0.25095    0.20121   1.247
## totalGDP           -1.07059    0.33819  -3.166
## comlang_off         1.80724    0.33243   5.436
## colony             -1.56847    1.51374  -1.036
## groups              7.90470    0.09150  86.392
## gwf2mixed:logtrade -0.86689    0.09535  -9.092
## gwf22aut:logtrade  -1.65325    0.17858  -9.258
##
## Correlation of Fixed Effects:
##             (Intr) gwf2mx gwf22t logtrd logdst dffGDP ttlGDP cmlng_ colony
## gwf2mixed   -0.284
## gwf22aut    -0.280  0.899
## logtrade    -0.091  0.317  0.252
```

```
## logdist     -0.317  0.073  0.083  0.358
## diffGDP      0.380 -0.027 -0.047  0.153  0.127
## totalGDP    -0.756  0.119  0.129 -0.145 -0.113 -0.856
## comlang_off -0.017 -0.014 -0.011 -0.076  0.198  0.019 -0.046
## colony       0.122 -0.007 -0.012 -0.079 -0.014  0.035 -0.096 -0.068
## groups      -0.414 -0.014 -0.049 -0.191  0.320  0.070  0.140 -0.105  0.009
## gwf2mxd:lgt  0.122 -0.398 -0.186 -0.494 -0.001 -0.011 -0.052  0.005 -0.009
## gwf22t:lgtr  0.054 -0.203 -0.298 -0.403  0.019  0.017 -0.035 -0.058  0.046
##             groups gwf2m:
## gwf2mixed
## gwf22aut
## logtrade
## logdist
## diffGDP
## totalGDP
## comlang_off
## colony
## groups
## gwf2mxd:lgt  0.082
## gwf22t:lgtr  0.155  0.390
```

Models Table 2

Note: the year effects are excluded from the tables in the paper

Selection stage model

```
## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: CoopTotalCorr > 0 ~ gwf * logtrade + logdist + diffGDP + totalGDP +
##     comlang_off + colony + groups + Year + (1 | iso3c2) + (1 |      iso3c1)
##    Data: wto
##
##      AIC      BIC   logLik deviance df.resid
##  40885.1  41224.1 -20404.5  40809.1    55330
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -12.302  -0.415  -0.126   0.347  32.767
##
## Random effects:
##  Groups Name        Variance Std.Dev.
##  iso3c2 (Intercept) 1.806    1.344
##  iso3c1 (Intercept) 1.961    1.400
## Number of obs: 55368, groups:  iso3c2, 109; iso3c1, 109
##
## Fixed effects:
##                     Estimate Std. Error z value Pr(>|z|)
## (Intercept)          8.48868    0.71956  11.797  < 2e-16 ***
## gwfdem-par           0.39832    0.21050   1.892 0.058454 .
## gwfdem-per           0.15743    0.08709   1.808 0.070668 .
## gwfdem-oth          -0.63857    0.10759  -5.935 2.93e-09 ***
## gwf2par              1.81073    0.43760   4.138 3.50e-05 ***
```

```
## gwfpar-per           1.64913    0.23407   7.045 1.85e-12 ***
## gwfpar-oth           0.37134    0.25391   1.463 0.143597
## gwf2per              0.98339    0.17567   5.598 2.17e-08 ***
## gwfper-oth          -0.04839    0.15499  -0.312 0.754899
## gwf2oth             -1.16053    0.26305  -4.412 1.03e-05 ***
## logtrade             0.22769    0.01409  16.160  < 2e-16 ***
## logdist             -0.22857    0.01135 -20.145  < 2e-16 ***
## diffGDP              0.01547    0.01712   0.903 0.366468
## totalGDP            -0.44879    0.03693 -12.153  < 2e-16 ***
## comlang_off          0.77697    0.04153  18.709  < 2e-16 ***
## colony              -0.89907    0.17712  -5.076 3.85e-07 ***
## groups               1.58133    0.03833  41.254  < 2e-16 ***
## Year2003             0.28324    0.06255   4.528 5.95e-06 ***
## Year2004             1.05961    0.06127  17.295  < 2e-16 ***
## Year2005             0.23604    0.06542   3.608 0.000309 ***
## Year2006             0.88742    0.06489  13.677  < 2e-16 ***
## Year2007             2.59253    0.06658  38.938  < 2e-16 ***
## Year2008             3.31301    0.06988  47.412  < 2e-16 ***
## Year2009             2.29142    0.06769  33.850  < 2e-16 ***
## Year2010             2.30403    0.06953  33.138  < 2e-16 ***
## Year2011             1.97521    0.07113  27.769  < 2e-16 ***
## Year2012             1.87363    0.07181  26.092  < 2e-16 ***
## gwfdem-par:logtrade -0.07911    0.01481  -5.341 9.25e-08 ***
## gwfdem-per:logtrade -0.12887    0.01672  -7.708 1.28e-14 ***
## gwfdem-oth:logtrade -0.12962    0.01941  -6.677 2.43e-11 ***
## gwf2par:logtrade    -0.30334    0.03648  -8.316  < 2e-16 ***
## gwfpar-per:logtrade -0.37383    0.03495 -10.696  < 2e-16 ***
## gwfpar-oth:logtrade -0.29520    0.03600  -8.199 2.42e-16 ***
## gwf2per:logtrade     0.01549    0.10885   0.142 0.886812
## gwfper-oth:logtrade -0.21868    0.06205  -3.524 0.000425 ***
## gwf2oth:logtrade    -0.32171    0.06525  -4.930 8.22e-07 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation matrix not shown by default, as p = 36 > 12.
## Use print(x, correlation=TRUE)  or
##     vcov(x)        if you need it
## optimizer (Nelder_Mead) convergence code: 4 (failure to converge in 10000 evaluations)
## Model failed to converge with max|grad| = 0.0278743 (tol = 0.002, component 1)
## failure to converge in 10000 evaluations
```

Allocation stage model

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: CoopTotalCorr ~ gwf * logtrade + logdist + diffGDP + totalGDP +
##     comlang_off + colony + groups + Year + (1 | iso3c2) + (1 |      iso3c1)
##    Data: wto
##  Subset: CoopTotalCorr > 0
##
## REML criterion at convergence: 84183.7
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
```

```
## -3.6260 -0.5900 -0.0945  0.4327 10.5803
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  iso3c2   (Intercept) 0.5571   0.7464
##  iso3c1   (Intercept) 0.7538   0.8682
##  Residual             3.6090   1.8997
## Number of obs: 20244, groups:  iso3c2, 106; iso3c1, 104
##
## Fixed effects:
##                       Estimate Std. Error t value
## (Intercept)         13.335352   0.696752  19.139
## gwfdem-par           0.352255   0.167770   2.100
## gwfdem-per          -0.156816   0.092451  -1.696
## gwfdem-oth           0.094393   0.117129   0.806
## gwf2par              0.624345   0.338221   1.846
## gwfpar-per           0.422697   0.191017   2.213
## gwfpar-oth           0.542268   0.218186   2.485
## gwf2per             -0.165278   0.168878  -0.979
## gwfper-oth          -0.016056   0.158869  -0.101
## gwf2oth              0.198907   0.284810   0.698
## logtrade             0.139724   0.014155   9.871
## logdist             -0.074873   0.008447  -8.864
## diffGDP              0.009745   0.017938   0.543
## totalGDP            -0.557209   0.037823 -14.732
## comlang_off          0.345472   0.037572   9.195
## colony              -0.003014   0.186340  -0.016
## groups               1.011935   0.052182  19.392
## Year2003             4.280660   0.079998  53.509
## Year2004             1.578220   0.075613  20.872
## Year2005             1.300419   0.082461  15.770
## Year2006             3.733011   0.078803  47.371
## Year2007             4.496002   0.074321  60.495
## Year2008             2.935172   0.074318  39.495
## Year2009             2.419266   0.076684  31.549
## Year2010             2.256198   0.078403  28.777
## Year2011             2.039000   0.081053  25.156
## Year2012             3.287104   0.081858  40.156
## gwfdem-par:logtrade -0.107089   0.016994  -6.302
## gwfdem-per:logtrade -0.105331   0.017963  -5.864
## gwfdem-oth:logtrade -0.141213   0.022221  -6.355
## gwf2par:logtrade    -0.266613   0.039702  -6.715
## gwfpar-per:logtrade -0.233619   0.036471  -6.406
## gwfpar-oth:logtrade -0.294535   0.040041  -7.356
## gwf2per:logtrade    -0.204031   0.039424  -5.175
## gwfper-oth:logtrade -0.285087   0.050196  -5.679
## gwf2oth:logtrade    -0.321190   0.077579  -4.140
##
## Correlation matrix not shown by default, as p = 36 > 12.
## Use print(x, correlation=TRUE)  or
##     vcov(x)        if you need it
```

Full model

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: CoopTotalCorr ~ gwf * logtrade + logdist + diffGDP + totalGDP +
##     comlang_off + colony + groups + Year + (1 | iso3c2) + (1 |      iso3c1)
##    Data: wto
##
## REML criterion at convergence: 211146
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -2.6555 -0.5829 -0.1524  0.3592 14.8222
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  iso3c2   (Intercept) 0.3940   0.6277
##  iso3c1   (Intercept) 0.4717   0.6868
##  Residual             2.6026   1.6133
## Number of obs: 55368, groups:  iso3c2, 109; iso3c1, 109
##
## Fixed effects:
##                       Estimate Std. Error t value
## (Intercept)         13.811217   0.390515  35.367
## gwfdem-par          -0.070486   0.112688  -0.626
## gwfdem-per          -0.138956   0.047681  -2.914
## gwfdem-oth          -0.058575   0.057535  -1.018
## gwf2par              0.244015   0.233485   1.045
## gwfpar-per           0.577088   0.125514   4.598
## gwfpar-oth          -0.093463   0.136119  -0.687
## gwf2per              0.233978   0.095259   2.456
## gwfper-oth          -0.187158   0.083061  -2.253
## gwf2oth             -0.393030   0.138614  -2.835
## logtrade             0.135292   0.007568  17.876
## logdist             -0.150631   0.005371 -28.044
## diffGDP              0.006155   0.008966   0.686
## totalGDP            -0.529738   0.019914 -26.601
## comlang_off          0.548803   0.022926  23.938
## colony              -0.312980   0.096446  -3.245
## groups               0.774495   0.019705  39.303
## Year2003             1.075026   0.031636  33.981
## Year2004             0.601269   0.031640  19.003
## Year2005             0.436452   0.033396  13.069
## Year2006             1.286266   0.033768  38.091
## Year2007             2.242043   0.034518  64.953
## Year2008             1.731342   0.035591  48.645
## Year2009             1.254288   0.035308  35.524
## Year2010             1.165904   0.036208  32.200
## Year2011             1.010430   0.037166  27.187
## Year2012             1.547637   0.037564  41.200
## gwfdem-par:logtrade -0.074241   0.008483  -8.752
## gwfdem-per:logtrade -0.058165   0.009564  -6.082
## gwfdem-oth:logtrade -0.121547   0.008760 -13.875
## gwf2par:logtrade    -0.236417   0.021576 -10.957
## gwfpar-per:logtrade -0.256417   0.019400 -13.217
```

```
## gwfpar-oth:logtrade -0.201774   0.016822 -11.995
## gwf2per:logtrade    -0.135039   0.029188  -4.627
## gwfper-oth:logtrade -0.174492   0.028079  -6.214
## gwf2oth:logtrade    -0.284557   0.024351 -11.686
##
## Correlation matrix not shown by default, as p = 36 > 12.
## Use print(x, correlation=TRUE)  or
##     vcov(x)        if you need it
```

Full model (years combined)

```
## Linear mixed model fit by REML ['lmerMod']
## Formula: CoopTotalCorr ~ gwf * logtrade + logdist + diffGDP + totalGDP +
##     comlang_off + colony + groups + (1 | iso3c2) + (1 | iso3c1)
##    Data: wto2
##
## REML criterion at convergence: 27784.3
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -3.7651 -0.5579 -0.0283  0.4789  9.0491
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  iso3c2   (Intercept) 12.64    3.555
##  iso3c1   (Intercept) 14.62    3.824
##  Residual             46.43    6.814
## Number of obs: 4100, groups:  iso3c2, 90; iso3c1, 90
##
## Fixed effects:
##                      Estimate Std. Error t value
## (Intercept)         17.19316    5.57563   3.084
## gwfdem-par           0.91319    1.10809   0.824
## gwfdem-per           0.06906    0.87537   0.079
## gwfdem-oth           2.23136    1.04228   2.141
## gwf2par              7.12940    2.57647   2.767
## gwfpar-per           2.04342    1.55548   1.314
## gwfpar-oth           5.17649    1.78839   2.894
## gwf2per             -0.10076    1.75513  -0.057
## gwfper-oth           1.59237    1.52313   1.045
## gwf2oth              2.49344    2.48814   1.002
## logtrade             1.13797    0.10848  10.490
## logdist              0.32893    0.21743   1.513
## diffGDP              0.19637    0.20138   0.975
## totalGDP            -1.07057    0.33961  -3.152
## comlang_off          1.72065    0.33394   5.153
## colony              -1.48517    1.51134  -0.983
## groups               7.92499    0.09254  85.640
## gwfdem-par:logtrade -0.51664    0.13828  -3.736
## gwfdem-per:logtrade -0.80830    0.13878  -5.825
## gwfdem-oth:logtrade -1.23566    0.13596  -9.089
## gwf2par:logtrade    -2.55550    0.51875  -4.926
## gwfpar-per:logtrade -1.02104    0.38214  -2.672
## gwfpar-oth:logtrade -2.20775    0.31244  -7.066
```

```
## gwf2per:logtrade    -0.86612    0.40372  -2.145
## gwfper-oth:logtrade -0.92068    0.43270  -2.128
## gwf2oth:logtrade    -1.88388    0.41245  -4.568
##
## Correlation matrix not shown by default, as p = 26 > 12.
## Use print(x, correlation=TRUE)  or
##     vcov(x)        if you need it
```

Agriculture selection model

```
## Warning in vcov.merMod(object, use.hessian = use.hessian): variance-covariance matrix computed from
## not positive definite or contains NA values: falling back to var-cov estimated from RX

## Warning in vcov.merMod(object, correlation = correlation, sigm = sig): variance-covariance matrix co
## not positive definite or contains NA values: falling back to var-cov estimated from RX

## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: CoopAg > 0 ~ gwf * logtrade + logdist + diffGDP + totalGDP +
##     comlang_off + colony + groups + Year + (1 | iso3c2) + (1 |      iso3c1)
##    Data: wto
##
##      AIC      BIC   logLik deviance df.resid
##  24977.2  25328.5 -12449.6  24899.2    60279
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
##  -4.632  -0.227  -0.074  -0.012 104.363
##
## Random effects:
##  Groups Name        Variance Std.Dev.
##  iso3c2 (Intercept) 1.213    1.101
##  iso3c1 (Intercept) 1.593    1.262
## Number of obs: 60318, groups:  iso3c2, 109; iso3c1, 109
##
## Fixed effects:
##                      Estimate Std. Error z value Pr(>|z|)
## (Intercept)           6.15945    0.92960   6.626 3.45e-11 ***
## gwfdem-par            0.26618    0.17610   1.512 0.130648
## gwfdem-per            0.37778    0.10179   3.711 0.000206 ***
## gwfdem-oth           -0.03494    0.13272  -0.263 0.792355
## gwf2par               0.42603    0.36735   1.160 0.246149
## gwfpar-per            0.93714    0.20280   4.621 3.82e-06 ***
## gwfpar-oth            0.23637    0.24221   0.976 0.329122
## gwf2per               0.93776    0.18977   4.942 7.75e-07 ***
## gwfper-oth            0.55013    0.17839   3.084 0.002043 **
## gwf2oth               0.01492    0.33485   0.045 0.964455
## logtrade              0.10157    0.01813   5.601 2.13e-08 ***
## logdist              -0.12655    0.01085 -11.660  < 2e-16 ***
## diffGDP               0.01421    0.02247   0.632 0.527099
## totalGDP             -0.44799    0.04999  -8.962  < 2e-16 ***
## comlang_off           0.26731    0.04916   5.437 5.41e-08 ***
## colony               -0.99637    0.30057  -3.315 0.000917 ***
## groups                2.16860    0.07386  29.362  < 2e-16 ***
```

```
## Year2002              1.07167    0.07069  15.160  < 2e-16 ***
## Year2003             -3.10351    0.20090 -15.448  < 2e-16 ***
## Year2004              1.01697    0.07287  13.955  < 2e-16 ***
## Year2005             -1.01044    0.10106  -9.999  < 2e-16 ***
## Year2006             -2.25542    0.15634 -14.427  < 2e-16 ***
## Year2007              3.47126    0.08097  42.873  < 2e-16 ***
## Year2008              0.99325    0.08254  12.034  < 2e-16 ***
## Year2009            -16.22688  156.71586  -0.104 0.917532
## Year2010              0.71972    0.08674   8.298  < 2e-16 ***
## Year2011              1.63535    0.08606  19.002  < 2e-16 ***
## Year2012              0.33931    0.09360   3.625 0.000289 ***
## gwfdem-par:logtrade  -0.10673    0.02245  -4.754 1.99e-06 ***
## gwfdem-per:logtrade  -0.06107    0.02395  -2.550 0.010761 *
## gwfdem-oth:logtrade  -0.24175    0.03118  -7.752 9.02e-15 ***
## gwf2par:logtrade     -0.12123    0.04684  -2.588 0.009644 **
## gwfpar-per:logtrade  -0.16171    0.04075  -3.969 7.23e-05 ***
## gwfpar-oth:logtrade  -0.23689    0.04644  -5.101 3.38e-07 ***
## gwf2per:logtrade     -0.19577    0.05018  -3.901 9.56e-05 ***
## gwfper-oth:logtrade  -0.34890    0.06521  -5.350 8.78e-08 ***
## gwf2oth:logtrade     -0.35560    0.09452  -3.762 0.000169 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation matrix not shown by default, as p = 37 > 12.
## Use print(x, correlation=TRUE)  or
##     vcov(x)        if you need it
## optimizer (Nelder_Mead) convergence code: 4 (failure to converge in 10000 evaluations)
## unable to evaluate scaled gradient
## Model failed to converge: degenerate  Hessian with 1 negative eigenvalues
## failure to converge in 10000 evaluations
```

Agriculture allocation model

```
## Linear mixed model fit by REML ['lmerMod']
## Formula:
## CoopAg ~ gwf * logtrade + logdist + diffGDP + totalGDP + comlang_off +
##     colony + groups + Year + (1 | iso3c2) + (1 | iso3c1)
##    Data: wto
##  Subset: CoopAg > 0
##
## REML criterion at convergence: 19881.8
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -4.4309 -0.5368 -0.0522  0.4817  6.7832
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  iso3c2   (Intercept) 0.3459   0.5881
##  iso3c1   (Intercept) 0.2956   0.5437
##  Residual             0.8869   0.9417
## Number of obs: 7071, groups:  iso3c2, 102; iso3c1, 101
##
```

```
## Fixed effects:
##                          Estimate Std. Error t value
## (Intercept)              8.423155   0.616568  13.661
## gwfdem-par              -0.011335   0.110672  -0.102
## gwfdem-per              -0.394861   0.073498  -5.372
## gwfdem-oth              -0.150906   0.094162  -1.603
## gwf2par                  0.227436   0.227420   1.000
## gwfpar-per              -0.165453   0.131934  -1.254
## gwfpar-oth               0.225527   0.159835   1.411
## gwf2per                 -0.670097   0.136538  -4.908
## gwfper-oth              -0.295698   0.133814  -2.210
## gwf2oth                 -0.010448   0.238164  -0.044
## logtrade                 0.071937   0.012710   5.660
## logdist                 -0.027921   0.007156  -3.902
## diffGDP                  0.022890   0.015432   1.483
## totalGDP                -0.246848   0.033543  -7.359
## comlang_off              0.180998   0.032897   5.502
## colony                  -0.346018   0.210033  -1.647
## groups                   1.243180   0.061527  20.206
## Year2002                -3.331397   0.066361 -50.201
## Year2003                -3.293072   0.194281 -16.950
## Year2004                -3.215862   0.069343 -46.376
## Year2005                -2.809003   0.099340 -28.277
## Year2006                -2.155485   0.151004 -14.274
## Year2007                -0.759066   0.064525 -11.764
## Year2008                -2.010683   0.072159 -27.865
## Year2010                -1.996479   0.075490 -26.447
## Year2011                -2.413582   0.071399 -33.804
## Year2012                -3.094795   0.082685 -37.429
## gwfdem-par:logtrade     -0.055428   0.016522  -3.355
## gwfdem-per:logtrade     -0.034700   0.016632  -2.086
## gwfdem-oth:logtrade     -0.110510   0.023925  -4.619
## gwf2par:logtrade        -0.154474   0.032893  -4.696
## gwfpar-per:logtrade     -0.104405   0.026487  -3.942
## gwfpar-oth:logtrade     -0.198985   0.033327  -5.971
## gwf2per:logtrade        -0.061103   0.032482  -1.881
## gwfper-oth:logtrade     -0.138332   0.046591  -2.969
## gwf2oth:logtrade        -0.249352   0.070515  -3.536
##
## Correlation matrix not shown by default, as p = 36 > 12.
## Use print(x, correlation=TRUE)  or
##     vcov(x)        if you need it
```

NAMA selection model

```
## Warning in vcov.merMod(object, use.hessian = use.hessian): variance-covariance matrix computed from
## not positive definite or contains NA values: falling back to var-cov estimated from RX

## Warning in vcov.merMod(object, correlation = correlation, sigm = sig): variance-covariance matrix co
## not positive definite or contains NA values: falling back to var-cov estimated from RX

## Generalized linear mixed model fit by maximum likelihood (Laplace
##   Approximation) [glmerMod]
##  Family: binomial  ( logit )
## Formula: CoopNAMA > 0 ~ gwf * logtrade + logdist + diffGDP + totalGDP +
```

```
##     comlang_off + colony + groups + Year + (1 | iso3c2) + (1 |      iso3c1)
##    Data: wto
##
##      AIC      BIC   logLik deviance df.resid
##  20102.9  20442.0 -10013.5  20026.9    55330
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
##   -4.06   -0.16   -0.02    0.00 1834.77
##
## Random effects:
##  Groups Name        Variance Std.Dev.
##  iso3c2 (Intercept) 6.881    2.623
##  iso3c1 (Intercept) 6.796    2.607
## Number of obs: 55368, groups:  iso3c2, 109; iso3c1, 109
##
## Fixed effects:
##                       Estimate Std. Error z value Pr(>|z|)
## (Intercept)         -10.66421  490.59297  -0.022   0.9827
## gwfdem-par            0.85450    0.58060   1.472   0.1411
## gwfdem-per            0.08687    0.12967   0.670   0.5029
## gwfdem-oth           -1.17397    0.16049  -7.315 2.57e-13 ***
## gwf2par               1.47973    1.16448   1.271   0.2038
## gwfpar-per            1.22965    0.59824   2.055   0.0398 *
## gwfpar-oth           -0.28822    0.61116  -0.472   0.6372
## gwf2per               0.34518    0.24703   1.397   0.1623
## gwfper-oth           -1.14297    0.22118  -5.168 2.37e-07 ***
## gwf2oth              -2.56168    0.36595  -7.000 2.56e-12 ***
## logtrade              0.20129    0.02193   9.178  < 2e-16 ***
## logdist              -0.13804    0.01374 -10.049  < 2e-16 ***
## diffGDP               0.03178    0.02571   1.236   0.2164
## totalGDP             -0.64121    0.05850 -10.961  < 2e-16 ***
## comlang_off           0.62237    0.05723  10.874  < 2e-16 ***
## colony                0.20977    0.30718   0.683   0.4947
## groups                1.29702    0.06284  20.639  < 2e-16 ***
## Year2003             19.02542  490.59154   0.039   0.9691
## Year2004             18.17765  490.59154   0.037   0.9704
## Year2005             20.69336  490.59154   0.042   0.9664
## Year2006             21.85094  490.59154   0.045   0.9645
## Year2007             19.89226  490.59154   0.041   0.9677
## Year2008             25.40936  490.59154   0.052   0.9587
## Year2009             23.56714  490.59154   0.048   0.9617
## Year2010             23.55960  490.59154   0.048   0.9617
## Year2011             23.65758  490.59154   0.048   0.9615
## Year2012             23.80386  490.59155   0.049   0.9613
## gwfdem-par:logtrade  -0.04401    0.02295  -1.918   0.0552 .
## gwfdem-per:logtrade  -0.11093    0.02341  -4.739 2.15e-06 ***
## gwfdem-oth:logtrade   0.01329    0.02826   0.470   0.6383
## gwf2par:logtrade     -0.19324    0.07179  -2.692   0.0071 **
## gwfpar-per:logtrade  -0.33555    0.06320  -5.309 1.10e-07 ***
## gwfpar-oth:logtrade  -0.11142    0.05641  -1.975   0.0482 *
## gwf2per:logtrade     -0.38671    0.06196  -6.242 4.33e-10 ***
## gwfper-oth:logtrade  -0.11391    0.07430  -1.533   0.1253
## gwf2oth:logtrade     -0.10434    0.09636  -1.083   0.2789
```

```
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Correlation matrix not shown by default, as p = 36 > 12.
## Use print(x, correlation=TRUE)  or
##     vcov(x)        if you need it
## optimizer (Nelder_Mead) convergence code: 4 (failure to converge in 10000 evaluations)
## unable to evaluate scaled gradient
## Model failed to converge: degenerate  Hessian with 1 negative eigenvalues
## failure to converge in 10000 evaluations
```

NAMA allocation model

```
## Linear mixed model fit by REML ['lmerMod']
## Formula:
## CoopNAMA ~ gwf * logtrade + logdist + diffGDP + totalGDP + comlang_off +
##     colony + groups + Year + (1 | iso3c2) + (1 | iso3c1)
##    Data: wto
##  Subset: CoopNAMA > 0
##
## REML criterion at convergence: 13287.4
##
## Scaled residuals:
##     Min      1Q  Median      3Q     Max
## -5.2140 -0.5171 -0.1195  0.3817 15.0176
##
## Random effects:
##  Groups   Name        Variance Std.Dev.
##  iso3c2   (Intercept) 0.1217   0.3488
##  iso3c1   (Intercept) 0.1191   0.3452
##  Residual             0.1686   0.4106
## Number of obs: 11720, groups:  iso3c2, 94; iso3c1, 93
##
## Fixed effects:
##                      Estimate Std. Error t value
## (Intercept)          2.987382   0.237506  12.578
## gwfdem-par           0.069293   0.081942   0.846
## gwfdem-per           0.034514   0.027936   1.235
## gwfdem-oth          -0.335332   0.035987  -9.318
## gwf2par              0.069700   0.164273   0.424
## gwfpar-per           0.081358   0.086960   0.936
## gwfpar-oth          -0.288238   0.091955  -3.135
## gwf2per              0.059355   0.050933   1.165
## gwfper-oth          -0.324785   0.047952  -6.773
## gwf2oth             -0.707897   0.084017  -8.426
## logtrade             0.014343   0.004553   3.150
## logdist             -0.008747   0.002431  -3.599
## diffGDP              0.007102   0.005144   1.381
## totalGDP            -0.101361   0.011886  -8.528
## comlang_off          0.027543   0.010736   2.565
## colony              -0.047911   0.063433  -0.755
## groups               0.238035   0.017321  13.742
## Year2004             0.587661   0.040970  14.344
```

```
## Year2005             0.127093   0.027194   4.674
## Year2006             0.890343   0.026402  33.723
## Year2007             1.119108   0.029299  38.196
## Year2008             0.981274   0.025827  37.995
## Year2009             0.275443   0.026130  10.541
## Year2010             1.252897   0.026526  47.232
## Year2011             0.511664   0.026935  18.996
## Year2012             0.510468   0.027064  18.861
## gwfdem-par:logtrade -0.009941   0.005129  -1.938
## gwfdem-per:logtrade -0.014573   0.004909  -2.969
## gwfdem-oth:logtrade -0.007446   0.006092  -1.222
## gwf2par:logtrade    -0.025157   0.014401  -1.747
## gwfpar-per:logtrade -0.017947   0.011635  -1.542
## gwfpar-oth:logtrade -0.018694   0.012616  -1.482
## gwf2per:logtrade    -0.030725   0.010540  -2.915
## gwfper-oth:logtrade -0.017037   0.012817  -1.329
## gwf2oth:logtrade    -0.028975   0.022052  -1.314
##
## Correlation matrix not shown by default, as p = 35 > 12.
## Use print(x, correlation=TRUE)  or
##     vcov(x)        if you need it
```

Figure 1

Note: the figures in this output are written directly from RMarkdown and have a different format. For the original format in the paper, run the replication code, which writes the figures into separate files.

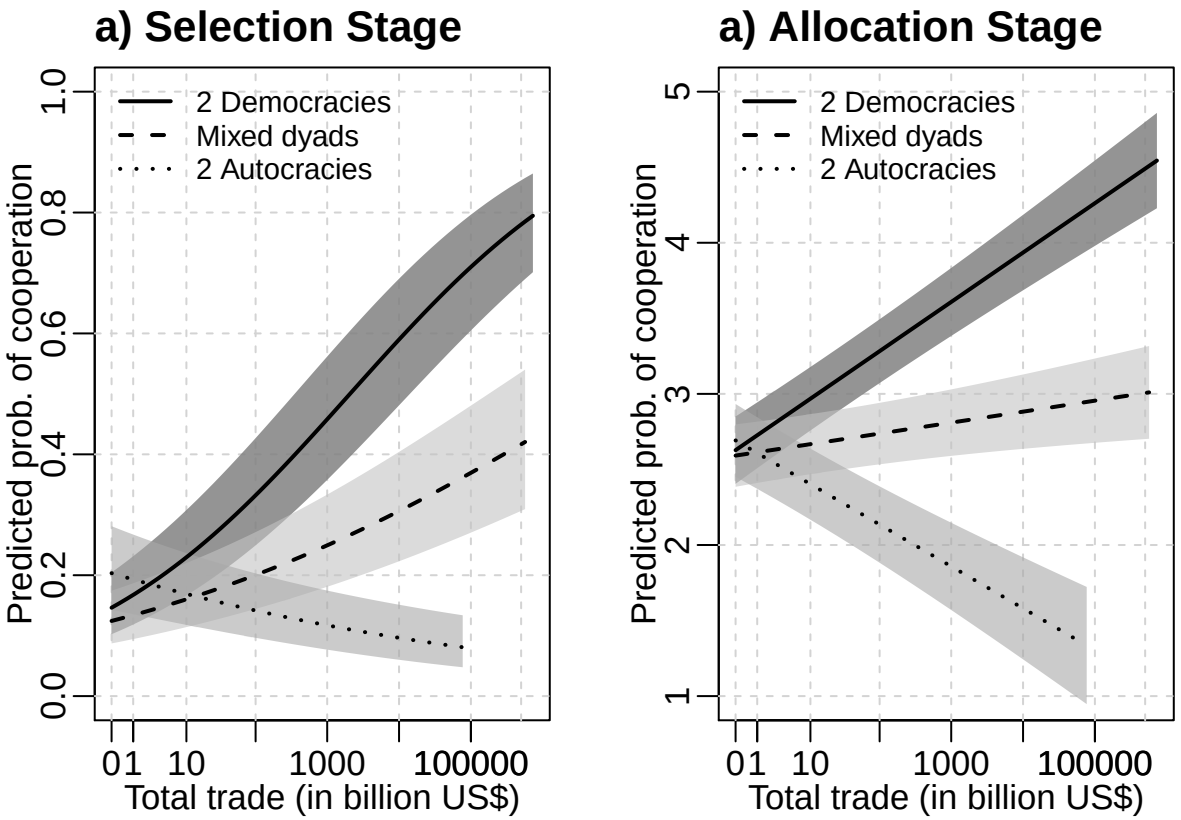

a) Selection Stage
2 Democracies
Mixed dyads
2 Autocracies
Predicted prob. of cooperation
0.0
0.2
0.4
0.6
0.8
1.0
0 1 10 1000 100000
Total trade (in billion US$)
a) Allocation Stage
2 Democracies
Mixed dyads
2 Autocracies
Predicted prob. of cooperation
1
2
3
4
5
0 1 10 1000 100000
Total trade (in billion US$)

Figure 2

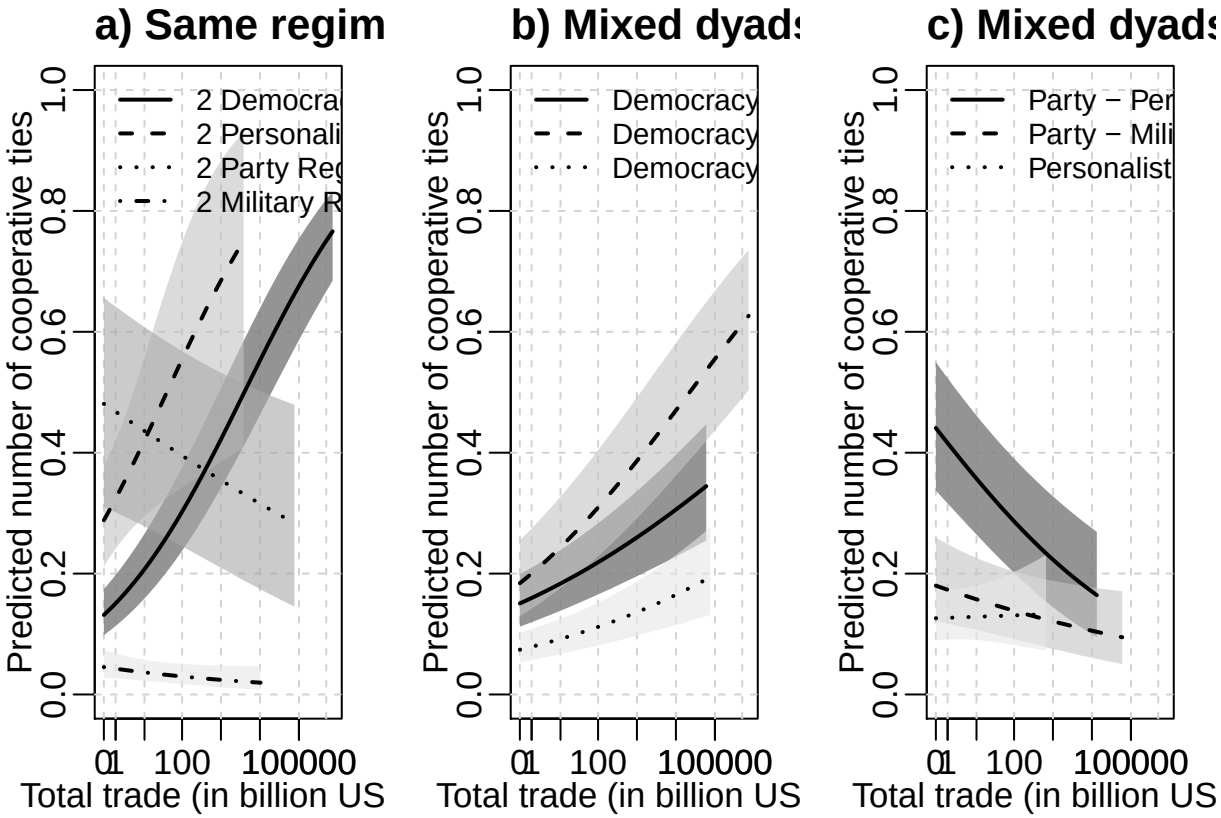
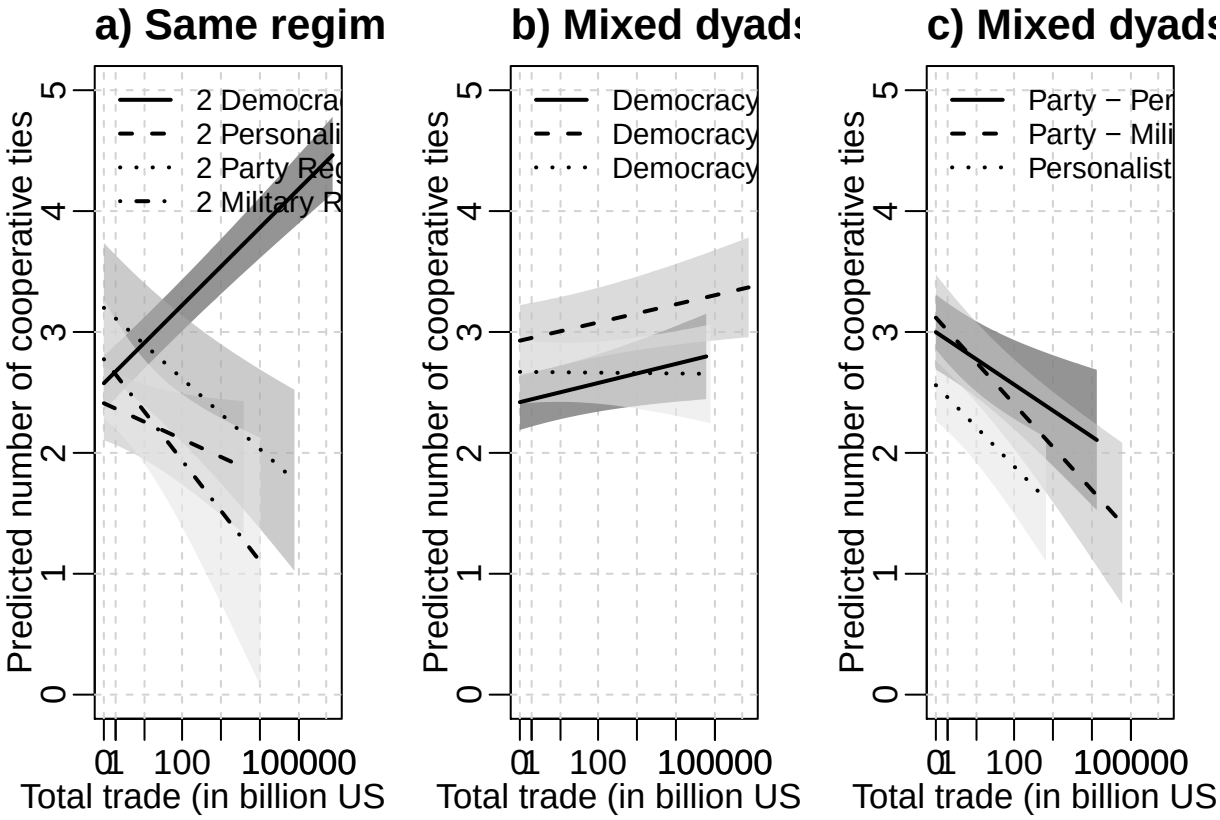

a) Same regim
2 Democra
2 Personali
2 Party Reg
2 Military R
Predicted number of cooperative ties
0.0
0.2
0.4
0.6
0.8
1.0
0 1 100 100000
Total trade (in billion US
b) Mixed dyads
Democracy
Democracy
Democracy
Predicted number of cooperative ties
0.0
0.2
0.4
0.6
0.8
1.0
0 1 100 100000
Total trade (in billion US
c) Mixed dyads
Party − Per
Party − Mili
Personalist
Predicted number of cooperative ties
0.0
0.2
0.4
0.6
0.8
1.0
0 1 100 100000
Total trade (in billion US

Figure 3


a) Same regim
b) Mixed dyads
c) Mixed dyads
Predicted number of cooperative ties
Total trade (in billion US
2 Democra
2 Personali
2 Party Reg
2 Military R
Democracy
Democracy
Democracy
Party − Per
Party − Mili
Personalist
0
1
2
3
4
5
0
1
100
100000