

Regressions

Juliette Verstaen

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Logit regressions

new UN GDP data, 2016 only Scaled GDPs Rerun Regressions

1. itq or turf: probability of itq = f(ISSCAPP and GDP)

wrangling

```
fisheries_recent <- read_csv("data/fisheries_recent.csv")

## Parsed with column specification:
## cols(
##   .default = col_double(),
##   Country = col_character(),
##   assess_id_short = col_character(),
##   Year.x = col_integer(),
##   CommName = col_character(),
##   Dbase = col_character(),
##   SciName = col_character(),
##   IdLevel = col_character(),
##   SpeciesCat.x = col_integer(),
##   itq = col_character(),
##   ivq = col_character(),
##   iq = col_character(),
##   turf = col_character()
## )

## See spec(...) for full column specifications.

fisheries_recent$itq[is.na(fisheries_recent$itq)] <- "FALSE"
fisheries_recent$ivq[is.na(fisheries_recent$ivq)] <- "FALSE"
fisheries_recent$iq[is.na(fisheries_recent$iq)] <- "FALSE"
fisheries_recent$turf[is.na(fisheries_recent$turf)] <- "FALSE"

turf_itq_isscaap <- read_csv("data/turf_itq_isscaap.csv")

## Parsed with column specification:
## cols(
```

```

##   SciName = col_character(),
##   Country = col_character(),
##   programstart = col_integer(),
##   itq_now = col_integer(),
##   iq = col_logical(),
##   itq = col_logical(),
##   ivq = col_logical(),
##   turf = col_logical(),
##   SpeciesCat = col_integer()
## )

turf_only <- turf_itq_isscaap %>%
  select(SciName, Country, turf, SpeciesCat)

fisheries_recent_generousturf_1 <- fisheries_recent %>%
  select(Country, assess_id_short, Year.x, CommName, Biomass, Catch, BvBmsy, FvFmsy, Dbase, SciName, Id)

fisheries_recent_generousturf <- merge(turf_only, fisheries_recent_generousturf_1, by = c("Country", "S

fisheries_recent_generousturf$turf[is.na(fisheries_recent_generousturf$turf)] <- "FALSE"
fisheries_recent_generousturf$itq[is.na(fisheries_recent_generousturf$itq)] <- "FALSE"
fisheries_recent_generousturf$ivq[is.na(fisheries_recent_generousturf$ivq)] <- "FALSE"
fisheries_recent_generousturf$iq[is.na(fisheries_recent_generousturf$iq)] <- "FALSE"

fisheries_recent_generousturf_rightsbased <- fisheries_recent_generousturf %>%
  mutate(rightsbased = case_when(
    itq == TRUE | iq == TRUE | ivq == TRUE ~ "1",
    itq == FALSE | iq == FALSE | ivq == FALSE ~ "0"
  ))

gdp_all <- read_excel("data/un_gdp_2016.xls")

gdp <- gdp_all %>%
  select(Country, gdp_center) %>%
  filter(gdp_center != "NA")

merge_gdp_rightsbased <- merge(gdp, fisheries_recent_generousturf_rightsbased, by = c("Country"))

gdp_rightsbased <- filter(merge_gdp_rightsbased, SpeciesCat != "NA" )

```

Regression 1

```

gdp_rightsbased$SpeciesCat <- factor(gdp_rightsbased$SpeciesCat)
gdp_rightsbased$rightsbased <- as.numeric(gdp_rightsbased$rightsbased)

itq_glm <- glm(formula = rightsbased ~ gdp_center + SpeciesCat, family = "binomial", data = gdp_rightsb
itq_glm

##
## Call:  glm(formula = rightsbased ~ gdp_center + SpeciesCat, family = "binomial",
##       data = gdp_rightsbased)

```

```
##
## Coefficients:
## (Intercept)    gdp_center SpeciesCat22 SpeciesCat23 SpeciesCat24
## -1.940e+01    2.217e+00  -1.327e+00  -5.097e+00    2.307e-06
## SpeciesCat31 SpeciesCat32 SpeciesCat33 SpeciesCat34 SpeciesCat35
## -3.147e+00    2.083e+01    1.577e+01    1.777e+01    1.779e+01
## SpeciesCat37 SpeciesCat42 SpeciesCat43 SpeciesCat44 SpeciesCat45
## 1.615e+01    1.522e+01    1.879e+01   -6.003e-01   -3.330e+00
## SpeciesCat47 SpeciesCat52 SpeciesCat53 SpeciesCat54 SpeciesCat55
## -1.735e+00   -1.850e+00   -3.817e+00   -1.992e+00   -1.805e+00
## SpeciesCat56 SpeciesCat57 SpeciesCat58 SpeciesCat74 SpeciesCat76
## -2.933e+00   -2.347e+00   -7.922e-01   -1.007e+00   -1.391e+00
## SpeciesCat77
## -1.952e+00
##
## Degrees of Freedom: 326 Total (i.e. Null); 301 Residual
## Null Deviance:      388.6
## Residual Deviance: 168.4    AIC: 220.4
```

```
summary(itq_glm)
```

```
##
## Call:
## glm(formula = rightsbased ~ gdp_center + SpeciesCat, family = "binomial",
##      data = gdp_rightsbased)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -2.68637  -0.22999  -0.00004   0.51469   2.90251
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept) -1.940e+01  1.773e+04  -0.001    0.999
## gdp_center   2.217e+00  4.956e-01   4.473 7.72e-06 ***
## SpeciesCat22 -1.327e+00  2.507e+04   0.000    1.000
## SpeciesCat23 -5.097e+00  1.915e+04   0.000    1.000
## SpeciesCat24  2.307e-06  2.507e+04   0.000    1.000
## SpeciesCat31 -3.147e+00  2.047e+04   0.000    1.000
## SpeciesCat32  2.083e+01  1.773e+04   0.001    0.999
## SpeciesCat33  1.577e+01  1.773e+04   0.001    0.999
## SpeciesCat34  1.777e+01  1.773e+04   0.001    0.999
## SpeciesCat35  1.779e+01  1.773e+04   0.001    0.999
## SpeciesCat37  1.615e+01  1.773e+04   0.001    0.999
## SpeciesCat42  1.522e+01  1.773e+04   0.001    0.999
## SpeciesCat43  1.879e+01  1.773e+04   0.001    0.999
## SpeciesCat44 -6.003e-01  2.161e+04   0.000    1.000
## SpeciesCat45 -3.330e+00  1.802e+04   0.000    1.000
## SpeciesCat47 -1.735e+00  2.157e+04   0.000    1.000
## SpeciesCat52 -1.850e+00  1.823e+04   0.000    1.000
## SpeciesCat53 -3.817e+00  1.897e+04   0.000    1.000
## SpeciesCat54 -1.992e+00  1.918e+04   0.000    1.000
## SpeciesCat55 -1.805e+00  1.893e+04   0.000    1.000
## SpeciesCat56 -2.933e+00  1.799e+04   0.000    1.000
## SpeciesCat57 -2.347e+00  1.858e+04   0.000    1.000
## SpeciesCat58 -7.922e-01  1.811e+04   0.000    1.000
```

```
## SpeciesCat74 -1.007e+00 2.172e+04 0.000 1.000
## SpeciesCat76 -1.391e+00 2.028e+04 0.000 1.000
## SpeciesCat77 -1.952e+00 1.948e+04 0.000 1.000
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##      Null deviance: 388.62  on 326  degrees of freedom
## Residual deviance: 168.40  on 301  degrees of freedom
## AIC: 220.4
##
## Number of Fisher Scoring iterations: 19
```

2. Run Turf versus ITQ probably: $\text{prob}(\text{ITQ})$. Turf = 1 and ITQ = 0 with the data set that was the turf/itq only one

Wrangling

```
fisheries_recent <- read_csv("data/fisheries_recent.csv")

## Parsed with column specification:
## cols(
##   .default = col_double(),
##   Country = col_character(),
##   assess_id_short = col_character(),
##   Year.x = col_integer(),
##   CommName = col_character(),
##   Dbase = col_character(),
##   SciName = col_character(),
##   IdLevel = col_character(),
##   SpeciesCat.x = col_integer(),
##   itq = col_character(),
##   ivq = col_character(),
##   iq = col_character(),
##   turf = col_character()
## )

## See spec(...) for full column specifications.

fisheries_recent$itq[is.na(fisheries_recent$itq)] <- "FALSE"
fisheries_recent$ivq[is.na(fisheries_recent$ivq)] <- "FALSE"
fisheries_recent$iq[is.na(fisheries_recent$iq)] <- "FALSE"
fisheries_recent$turf[is.na(fisheries_recent$turf)] <- "FALSE"

turf_itq_isscaap <- read_csv("data/turf_itq_isscaap.csv")

## Parsed with column specification:
## cols(
##   SciName = col_character(),
##   Country = col_character(),
##   programstart = col_integer(),
##   itq_now = col_integer(),
##   iq = col_logical(),
##   itq = col_logical(),
```

```

##   ivq = col_logical(),
##   turf = col_logical(),
##   SpeciesCat = col_integer()
## )

turf_only <- turf_itq_isscaap %>%
  select(SciName, Country, turf, SpeciesCat)

fisheries_recent_generousturf_1 <- fisheries_recent %>%
  select(Country, assess_id_short, Year.x, CommName, Biomass, Catch, BvBmsy, FvFmsy, Dbase, SciName, Id)

fisheries_recent_generousturf <- merge(turf_only, fisheries_recent_generousturf_1, by = c("Country", "SciName"))

fisheries_recent_generousturf$turf[is.na(fisheries_recent_generousturf$turf)] <- "FALSE"
fisheries_recent_generousturf$itq[is.na(fisheries_recent_generousturf$itq)] <- "FALSE"
fisheries_recent_generousturf$ivq[is.na(fisheries_recent_generousturf$ivq)] <- "FALSE"
fisheries_recent_generousturf$iq[is.na(fisheries_recent_generousturf$iq)] <- "FALSE"

fisheries_recent_generousturf_rightsbased <- fisheries_recent_generousturf %>%
  mutate(rightsbased = case_when(
    turf == TRUE ~ "1",
    itq == TRUE | iq == TRUE | ivq == TRUE ~ "0"
  ))

gdp_all <- read_excel("data/un_gdp_2016.xls")

gdp <- gdp_all %>%
  select(Country, gdp_center) %>%
  filter(gdp_center != "NA")

join_gdp_rightsbased <- merge(gdp, fisheries_recent_generousturf_rightsbased, by = c("Country"))

gdp_rightsbased <- filter(join_gdp_rightsbased, SpeciesCat != "NA")

```

Regression 2

```

gdp_rightsbased$SpeciesCat <- factor(gdp_rightsbased$SpeciesCat)
gdp_rightsbased$rightsbased <- as.numeric(gdp_rightsbased$rightsbased)

itq_turf_glm <- glm(formula = rightsbased ~ gdp_center + SpeciesCat, family = "binomial", data = gdp_rightsbased)
itq_glm

##
## Call:  glm(formula = rightsbased ~ gdp_center + SpeciesCat, family = "binomial",
##         data = gdp_rightsbased)
##
## Coefficients:
## (Intercept)      gdp_center  SpeciesCat22  SpeciesCat23  SpeciesCat24
## -1.940e+01    2.217e+00   -1.327e+00   -5.097e+00    2.307e-06
## SpeciesCat31  SpeciesCat32  SpeciesCat33  SpeciesCat34  SpeciesCat35
## -3.147e+00    2.083e+01    1.577e+01    1.777e+01    1.779e+01
## SpeciesCat37  SpeciesCat42  SpeciesCat43  SpeciesCat44  SpeciesCat45

```

```

##      1.615e+01      1.522e+01      1.879e+01      -6.003e-01      -3.330e+00
## SpeciesCat47 SpeciesCat52 SpeciesCat53 SpeciesCat54 SpeciesCat55
##      -1.735e+00      -1.850e+00      -3.817e+00      -1.992e+00      -1.805e+00
## SpeciesCat56 SpeciesCat57 SpeciesCat58 SpeciesCat74 SpeciesCat76
##      -2.933e+00      -2.347e+00      -7.922e-01      -1.007e+00      -1.391e+00
## SpeciesCat77
##      -1.952e+00
##
## Degrees of Freedom: 326 Total (i.e. Null); 301 Residual
## Null Deviance:      388.6
## Residual Deviance: 168.4      AIC: 220.4
summary(itq_turf_glm)

##
## Call:
## glm(formula = rightsbased ~ gdp_center + SpeciesCat, family = "binomial",
##      data = gdp_rightsbased)
##
## Deviance Residuals:
##      Min        1Q      Median        3Q        Max
## -2.78655  -0.32591   0.00004   0.17282   2.59183
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept)  1.953e+01  1.773e+04  0.001    0.999
## gdp_center   -1.968e+00  4.897e-01 -4.018 5.86e-05 ***
## SpeciesCat22  1.178e+00  2.507e+04  0.000    1.000
## SpeciesCat23  4.525e+00  1.915e+04  0.000    1.000
## SpeciesCat24 -1.137e-06  2.507e+04  0.000    1.000
## SpeciesCat31  2.794e+00  2.047e+04  0.000    1.000
## SpeciesCat32 -2.095e+01  1.773e+04 -0.001    0.999
## SpeciesCat33 -1.618e+01  1.773e+04 -0.001    0.999
## SpeciesCat34 -1.926e+01  1.773e+04 -0.001    0.999
## SpeciesCat35 -1.821e+01  1.773e+04 -0.001    0.999
## SpeciesCat37 -1.651e+01  1.773e+04 -0.001    0.999
## SpeciesCat42 -1.570e+01  1.773e+04 -0.001    0.999
## SpeciesCat43 -1.911e+01  1.773e+04 -0.001    0.999
## SpeciesCat44  5.243e-01  2.163e+04  0.000    1.000
## SpeciesCat45  2.871e+00  1.803e+04  0.000    1.000
## SpeciesCat47  1.529e+00  2.160e+04  0.000    1.000
## SpeciesCat52  1.587e+00  1.824e+04  0.000    1.000
## SpeciesCat53  3.353e+00  1.900e+04  0.000    1.000
## SpeciesCat54  1.713e+00  1.923e+04  0.000    1.000
## SpeciesCat55  1.538e+00  1.897e+04  0.000    1.000
## SpeciesCat56  2.521e+00  1.800e+04  0.000    1.000
## SpeciesCat57  2.052e+00  1.860e+04  0.000    1.000
## SpeciesCat58  6.990e-01  1.811e+04  0.000    1.000
## SpeciesCat74  8.944e-01  2.172e+04  0.000    1.000
## SpeciesCat76  1.211e+00  2.031e+04  0.000    1.000
## SpeciesCat77  1.674e+00  1.954e+04  0.000    1.000
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)

```

```
##
## Null deviance: 379.13 on 312 degrees of freedom
## Residual deviance: 134.16 on 287 degrees of freedom
## (14 observations deleted due to missingness)
## AIC: 186.16
##
## Number of Fisher Scoring iterations: 19
```

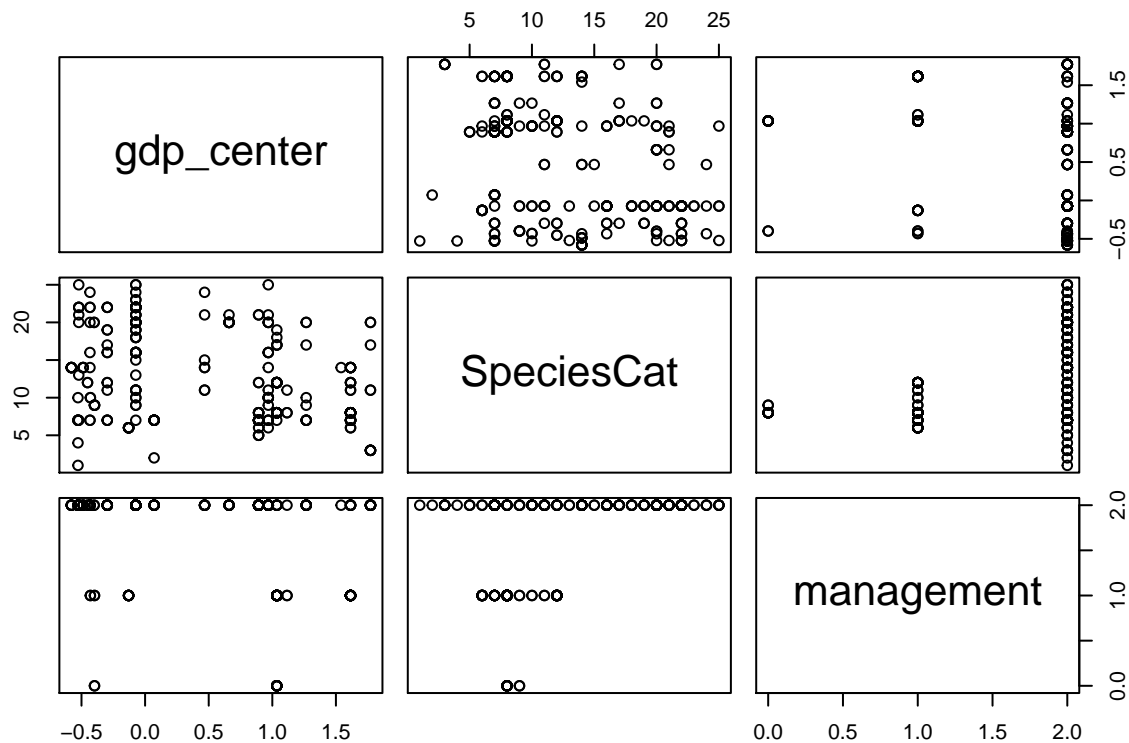
Diagnostics

##run above chunk to get gdp_rightsbased df not the old csv file that is now archived in data folder

```
diagnostics <- gdp_rightsbased %>%
  mutate(management = case_when(
    itq == TRUE | iq == TRUE | ivq == TRUE ~ "1",
    turf == TRUE ~ "2",
    itq == FALSE | iq == FALSE | ivq == FALSE | turf == FALSE ~ "0"
  )) %>%
  select(Country, gdp_center, SpeciesCat, management)

#diagnostics wont run with non-numeric?
diagnostics$SpeciesCat <- as.numeric(diagnostics$SpeciesCat)
diagnostics$management <- as.numeric(diagnostics$management)

#2= gdp; 4= turf; 5 = SpeciesCat; 23 = itq; 24= ivq; 25 = iq; 26= binary rights based
pairs(diagnostics[2:4])
```



```
#pearson's r correlations
cor(diagnostics[2:4])
```

```
##          gdp_center SpeciesCat management
## gdp_center  1.0000000 -0.4074071 -0.3992407
## SpeciesCat -0.4074071  1.0000000  0.4163631
## management -0.3992407  0.4163631  1.0000000
```

```
#run chi square?
```