bw_15_upd.R

datalab

2023-06-16

```
#############################################################
#################       Linear Polynomial        ############
################      October 10, 2018     ##################
####  Rerun: December 15, 2022 - checks out with the paper
# coefs and se validated in the replication file table1.R

rm(list=ls())
library(foreign)
library(plyr)
library(readstata13)
library(multiwayvcov)
library(sandwich)
library(lmtest)
library(stargazer)


data=read.csv("~/Dropbox/Personal Research 2017/replications/karn_nov16.csv")
names(data)
```

```
##   [1] "X.1"              "dist_name"        "vilname91"        "v1"               "dist_code"
##  [15] "phc_cntr"         "hc_cntr"          "fpc_cntr"         "tb_cntr"          "nh_cntr"
##  [29] "st_town"          "agri_land"        "near_town"        "circl_code"       "m_pop"
##  [43] "m_sc"             "f_sc"             "tot_st"           "m_st"             "f_st"
##  [57] "ngmf_char"        "ngmfprwmedd"      "ngmfprwothd"      "ngmfprwnod"       "ngmftrpr"
##  [71] "taptr"            "tapuntr"          "hp"               "covwell"          "uncovwell"
##  [85] "phs_cntr"         "prhsc"            "stname"           "stname1991"       "d_name"
##  [99] "all_hosp"         "area_na_cu"       "ayu_disp"         "ayu_hosp"         "canal_govt"
## [113] "ind_sch"          "lake"             "m_home"           "m_sch"            "nw_fac"
## [127] "power_oth"        "power_supl"       "p_sch"            "p_t_fac"          "rang_mcw"
## [141] "s_sch"            "s_s_sch"          "tot_exp"          "tot_inc"          "tr_sch"
## [155] "gov_ps_n"         "pr_ps_n"          "gov_ms_n"         "pr_ms_n"          "gov_secs_n"
## [169] "nviltmsna"        "nviltsecs"        "nviltsecsna"      "power"            "hplost"
## [183] "pnt_fac"          "power_ea"         "power_eag"        "power_edea"       "power_eo"
## [197] "medfac"           "rangmed"          "tot_hh"           "pucca_binary"     "kucha_binary"
## [211] "dist_fr_town"     "tbcl"             "tank"             "tap"              "X"
## [225] "M_POP"            "F_POP"            "TOT_L6"           "M_L6"             "F_L6"
## [239] "TOT_ILLT"         "M_ILLT"           "F_ILLT"           "TOT_W"            "M_W"
## [253] "F_AGLB"           "TOT_MFHH"         "M_MFHH"           "F_MFHH"           "TOT_OTH_W"
## [267] "M_MRG_AGLB"       "F_MRG_AGLB"       "T_MRG_HH"         "M_MRG_HH"         "F_MRG_HH"
## [281] "NEAR_DIST_border1" "NEAR_ANGLE"       "temp_av"          "wc2010mt_1"       "TerrainRug"
```

```
summary(data$Latitude)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
```

```
##   13.49   14.28   14.96   15.25   16.21   17.75     138
```

```
summary(data$Longitude)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##   74.12   75.26   75.89   75.90   76.48   77.67     138
```

```
summary(data$border1)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##   0.000   0.000   1.000   0.599   1.000   1.000    5146
```

```
summary(data$border2)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##   0.000   0.000   1.000   0.569   1.000   1.000    6425
```

```
summary(data$Slope)
```

```
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.    NA's
##    0.00   89.98   89.99   87.69   89.99   90.00     138
```

```
########################
##### Distances #####

#Distance to Mysore-Bombay Border
rd10.mb=data[which(data$NEAR_DIST_border1<7500),]

table(rd10.mb$border1)
```

```
##
##   0   1
## 423 463
```

```
#Distance to Hyderabad-Bombay Border
rd10.hb=data[which(data$NEAR_DIST_border2<7500),]

table(rd10.hb$border2)
```

```
##
##   0   1
## 363 413
```

```
#Mysore
#outcome-health centers
health.mys=lm(health_binary~border1+TOT_POP+
        TOT_SC+TOT_ST+Slope+TerrainRug+Latitude+Longitude, data=rd10.mb) #OLS estimation
summary(health.mys)
```

```
##
## Call:
## lm(formula = health_binary ~ border1 + TOT_POP + TOT_SC + TOT_ST +
##     Slope + TerrainRug + Latitude + Longitude, data = rd10.mb)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -0.63929 -0.26024 -0.16251 -0.02562  0.94322
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
```

```
## (Intercept) -8.059e+00  3.798e+00  -2.122  0.03411 *
## border1     -2.333e-02  3.049e-02  -0.765  0.44439
## TOT_POP      5.367e-05  1.750e-05   3.067  0.00223 **
## TOT_SC       1.493e-04  5.347e-05   2.793  0.00534 **
## TOT_ST       2.582e-04  6.584e-05   3.922 9.47e-05 ***
## Slope        1.271e-03  1.293e-03   0.983  0.32573
## TerrainRug  -1.040e-02  7.725e-03  -1.347  0.17842
## Latitude    -5.948e-02  9.554e-02  -0.623  0.53372
## Longitude    1.188e-01  5.145e-02   2.309  0.02116 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4104 on 877 degrees of freedom
## Multiple R-squared:  0.08418,    Adjusted R-squared:  0.07583
## F-statistic: 10.08 on 8 and 877 DF,  p-value: 1.643e-13
```

```
health.mys.cl=cluster.vcov(health.mys, rd10.mb$dist_name)
health.mys.se=sqrt(diag(health.mys.cl)) #cluster standard errors

#outcome - paved roads
pucca.mys=lm(pucca_binary~border1+TOT_POP+
        TOT_SC+TOT_ST+Slope+TerrainRug+Latitude+Longitude, data=rd10.mb) #OLS estimation
summary(pucca.mys)
```

```
##
## Call:
## lm(formula = pucca_binary ~ border1 + TOT_POP + TOT_SC + TOT_ST +
##     Slope + TerrainRug + Latitude + Longitude, data = rd10.mb)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -1.18274 -0.00159  0.13320  0.20824  0.39022
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)  2.969e+00  3.248e+00   0.914  0.36102
## border1     -1.063e-01  2.608e-02  -4.077 4.97e-05 ***
## TOT_POP      5.419e-05  1.497e-05   3.621  0.00031 ***
## TOT_SC       1.404e-04  4.573e-05   3.070  0.00220 **
## TOT_ST       1.791e-04  5.631e-05   3.181  0.00152 **
## Slope        2.458e-03  1.106e-03   2.223  0.02644 *
## TerrainRug  -6.099e-03  6.607e-03  -0.923  0.35621
## Latitude    -7.464e-02  8.171e-02  -0.913  0.36124
## Longitude   -1.768e-02  4.401e-02  -0.402  0.68790
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.351 on 877 degrees of freedom
## Multiple R-squared:  0.09392,    Adjusted R-squared:  0.08566
## F-statistic: 11.36 on 8 and 877 DF,  p-value: 2.081e-15
```

```
pucca.mys.cl=cluster.vcov(pucca.mys, rd10.mb$dist_name)
pucca.mys.se=sqrt(diag(pucca.mys.cl)) #clustered standard errors
```

```r
#Hyderabad
#outcome-health centers
health.hyd=lm(health_binary~border2+TOT_POP+
        TOT_SC+TOT_ST+Slope+TerrainRug+Latitude+Longitude, data=rd10.hb) #ols estimation
summary(health.hyd)
```

```
##
## Call:
## lm(formula = health_binary ~ border2 + TOT_POP + TOT_SC + TOT_ST +
##     Slope + TerrainRug + Latitude + Longitude, data = rd10.hb)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -0.5858 -0.2929 -0.1984  0.4523  0.9446
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)  3.583e+00  7.578e+00   0.473 0.636472
## border2     -9.000e-02  3.298e-02  -2.729 0.006492 **
## TOT_POP      7.959e-05  1.747e-05   4.555 6.09e-06 ***
## TOT_SC       1.798e-04  5.064e-05   3.551 0.000408 ***
## TOT_ST       1.011e-04  6.567e-05   1.540 0.123958
## Slope       -7.360e-04  1.192e-03  -0.618 0.537068
## TerrainRug   2.033e-02  1.969e-02   1.033 0.302046
## Latitude     5.141e-02  4.130e-02   1.245 0.213587
## Longitude   -5.595e-02  1.054e-01  -0.531 0.595743
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.4292 on 767 degrees of freedom
## Multiple R-squared:  0.08571,    Adjusted R-squared:  0.07617
## F-statistic: 8.988 on 8 and 767 DF,  p-value: 7.792e-12
```

```r
health.hyd.cl=cluster.vcov(health.hyd, rd10.hb$dist_name)
health.hyd.se=sqrt(diag(health.hyd.cl)) #cluster standard errors

#outcome - paved roads
pucca.hyd=lm(pucca_binary~border2+TOT_POP+
        TOT_SC+TOT_ST+Slope+TerrainRug+Latitude+Longitude, data=rd10.hb) #ols estimation
summary(pucca.hyd)
```

```
##
## Call:
## lm(formula = pucca_binary ~ border2 + TOT_POP + TOT_SC + TOT_ST +
##     Slope + TerrainRug + Latitude + Longitude, data = rd10.hb)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -1.0783  0.0239  0.1009  0.1639  0.3426
##
## Coefficients:
##               Estimate Std. Error t value Pr(>|t|)
## (Intercept)  3.458e+00  5.573e+00   0.620   0.5352
## border2     -1.855e-04  2.425e-02  -0.008   0.9939
```

```
## TOT_POP      6.183e-05  1.285e-05   4.811  1.8e-06 ***
## TOT_SC       9.314e-05  3.724e-05   2.501   0.0126 *
## TOT_ST       1.220e-04  4.830e-05   2.527   0.0117 *
## Slope        8.580e-05  8.765e-04   0.098   0.9221
## TerrainRug   2.064e-02  1.448e-02   1.426   0.1544
## Latitude     7.196e-02  3.038e-02   2.369   0.0181 *
## Longitude   -5.160e-02  7.752e-02  -0.666   0.5058
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.3157 on 767 degrees of freedom
## Multiple R-squared:  0.0749, Adjusted R-squared:  0.06525
## F-statistic: 7.763 on 8 and 767 DF,  p-value: 4.774e-10
```

```
pucca.hyd.cl=cluster.vcov(pucca.hyd, rd10.hb$dist_name)
pucca.hyd.se=sqrt(diag(pucca.hyd.cl)) #clustered standard errors
```

```
stargazer(health.mys, pucca.mys, health.hyd, pucca.hyd, se=list(health.mys.se, pucca.mys.se, health.hyd
          omit=c("TOT_POP", "TOT_SC", "TOT_ST", "Slope", "TerrainRug", "Latitude", "Longitude"),
          dep.var.labels=c("Health Centers", "Paved Roads", "Health Centers", "Paved Roads"),
          covariate.labels = c("Indirect Rule (Mysore)", "Indirect Rule (Hyderabad)", "Constant"),
          add.lines = list(c("Controls","\\checkmark","\\checkmark","\\checkmark","\\checkmark")),
          omit.stat = c("rsq", "f", "adj.rsq", "ser"))
```

```
##
## % Table created by stargazer v.5.2.2 by Marek Hlavac, Harvard University. E-mail: hlavac at fas.harva
## % Date and time: Fri, Jun 16, 2023 - 15:04:29
## \begin{table}[!htbp] \centering
##   \caption{}
##   \label{}
## \begin{tabular}{@{\extracolsep{5pt}}lcccc}
## \\[-1.8ex]\hline
## \hline \\[-1.8ex]
##  & \multicolumn{4}{c}{\textit{Dependent variable:}} \\
## \cline{2-5}
## \\[-1.8ex] & Health Centers & Paved Roads & Health Centers & Paved Roads \\
## \\[-1.8ex] & (1) & (2) & (3) & (4)\\
## \hline \\[-1.8ex]
##  Indirect Rule (Mysore) & $-$0.023 & $-$0.106$^{**}$ &  &  \\
##   & (0.018) & (0.046) &  &  \\
##   & & & & \\
##  Indirect Rule (Hyderabad) &  &  & $-$0.090$^{***}$ & $-$0.0002 \\
##   &  &  & (0.014) & (0.066) \\
##   & & & & \\
##  Constant & $-$8.059$^{*}$ & 2.969 & 3.583 & 3.458 \\
##   & (4.339) & (6.145) & (8.167) & (10.262) \\
##   & & & & \\
## \hline \\[-1.8ex]
## Controls & \checkmark & \checkmark & \checkmark & \checkmark \\
## Observations & 886 & 886 & 776 & 776 \\
## \hline
```

```
## \hline \\[-1.8ex]
## \textit{Note:}  & \multicolumn{4}{r}{$^{*}$p$<$0.1; $^{**}$p$<$0.05; $^{***}$p$<$0.01} \\
## \end{tabular}
## \end{table}
```