R Instrumental Variable Regression Loop

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Contents

IV Loop over RHS

Go back to fan's REconTools Package, R4Econ Repository, or Intro Stats with R Repository.

Regression with a Variety of Outcome Variables and Right Hand Side Variables. There are M outcome variables, and there are N alternative right hand side variables. Regress each M outcome variable and each N alternative right hand side variable, with some common sets of controls and perhaps shared instruments. The output file is a M by N matrix of coefficients, with proper variable names and row names. The matrix stores coefficients for this key endogenous variable.

- Dependency: *R4Econ/linreg/ivreg/ivregdfrow.R*

Construct Program The program relies on double lapply. lapply is used for convenience, not speed.

```
ff_reg_mbyn <- function(list.vars.y, list.vars.x,
                        vars.c, vars.z, df,
                        return_all = FALSE,
                        stats_ends = 'value', time = FALSE) {

    # regf.iv() function is from C:\Users\fan\R4Econ\linreg\ivreg\ivregdfrow.R
    if (time) {
        start_time <- Sys.time()
    }

    if (return_all) {
        df.reg.out.all <- bind_rows(lapply(list.vars.x,
                                function(x) (
                                    bind_rows(lapply(list.vars.y, regf.iv, vars.x=x, vars.c=vars.c, vars.
                                )))

    } else {
        df.reg.out.all <- (lapply(list.vars.x,
                                function(x) (
                                    bind_rows(lapply(list.vars.y, regf.iv, vars.x=x, vars.c=vars.c, vars.
                                        select(vars_var.y, starts_with(x)) %>%
                                        select(vars_var.y, ends_with(stats_ends))
                                )) %>% reduce(full_join)
    }

    if (time) {
```

```
        end_time <- Sys.time()
        print(paste0('Estimation for all ys and xs took (seconds):', end_time - start_time))
    }

    return(df.reg.out.all)
}
```

```
# Library
library(tidyverse)
library(AER)

# Load Sample Data
setwd('C:/Users/fan/R4Econ/_data/')
df <- read_csv('height_weight.csv')
```

Prepare Data

```
## Parsed with column specification:
## cols(
##   S.country = col_character(),
##   vil.id = col_double(),
##   indi.id = col_double(),
##   sex = col_character(),
##   svymthRound = col_double(),
##   momEdu = col_double(),
##   wealthIdx = col_double(),
##   hgt = col_double(),
##   wgt = col_double(),
##   hgt0 = col_double(),
##   wgt0 = col_double(),
##   prot = col_double(),
##   cal = col_double(),
##   p.A.prot = col_double(),
##   p.A.nProt = col_double()
## )
```

```
# Source Dependency
source('C:/Users/fan/R4Econ/linreg/ivreg/ivregdfrow.R')

# Setting
options(repr.matrix.max.rows=50, repr.matrix.max.cols=50)
```

Parameters.

```
var.y1 <- c('hgt')
var.y2 <- c('wgt')
var.y3 <- c('vil.id')
list.vars.y <- c(var.y1, var.y2, var.y3)

var.x1 <- c('prot')
var.x2 <- c('cal')
var.x3 <- c('wealthIdx')
var.x4 <- c('p.A.prot')
var.x5 <- c('p.A.nProt')
```

```
list.vars.x <- c(var.x1, var.x2, var.x3, var.x4, var.x5)

vars.z <- c('indi.id')
vars.c <- c('sex', 'wgt0', 'hgt0', 'svymthRound')
```

Program Testing

```
vars.z <- NULL
suppressMessages(ff_reg_mbyn(list.vars.y, list.vars.x,
                             vars.c, vars.z, df,
                             return_all = FALSE,
                             stats_ends = 'value'))
```

Test Program OLS Z-Stat

```
##   vars_var.y       prot_tvalue        cal_tvalue wealthIdx_tvalue  p.A.prot_tvalue p.A.nProt_tvalue
## 1        hgt  18.8756010031786  23.4421863484661  13.508899618216 3.83682180045518 32.5448257554855
## 2        wgt  16.3591125056062  17.3686031309332 14.1390521528113 1.36958319982295 12.0961557911467
## 3     vil.id -14.9385580468907 -19.6150110809452 34.0972558327347 8.45943342783186 17.7801422421419
```

```
vars.z <- c('indi.id')
suppressMessages(ff_reg_mbyn(list.vars.y, list.vars.x,
                             vars.c, vars.z, df,
                             return_all = FALSE,
                             stats_ends = 'value'))
```

Test Program IV T-stat

```
## Warning: attributes are not identical across measure variables;
## they will be dropped

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```

```
##   vars_var.y       prot_zvalue        cal_zvalue  wealthIdx_zvalue   p.A.prot_zvalue
## 1        hgt  8.87674929300964  12.0739764947235  4.62589553677969  26.6373587567312
## 2        wgt  5.60385871756365   6.1225187008946  5.17869536991717  11.9295584469998
## 3     vil.id -9.22106223347162 -13.0586007975839 -51.5866689219593 -29.9627476577329
##    p.A.nProt_zvalue
## 1  32.1162192385744
## 2  12.3509307017263
## 3 -38.3528894620707
```

```
vars.z <- NULL
suppressMessages(ff_reg_mbyn(list.vars.y, list.vars.x,
                             vars.c, vars.z, df,
                             return_all = FALSE,
                             stats_ends = 'Estimate'))
```

Test Program OLS Coefficient

```
##   vars_var.y       prot_Estimate         cal_Estimate wealthIdx_Estimate    p.A.prot_Estimate
## 1        hgt   0.049431093806755  0.00243408846205622   0.21045655488185 3.86952250259526e-05
## 2        wgt    16.5557424523585    0.699072500364623   106.678721085969  0.00521731297924587
## 3     vil.id -0.0758835879205584 -0.00395676177098486  0.451733304543324 0.000149388430455142
##    p.A.nProt_Estimate
## 1 0.00542428867316449
## 2   0.779514232050632
## 3 0.00526237555581024
```

```
vars.z <- c('indi.id')
suppressMessages(ff_reg_mbyn(list.vars.y, list.vars.x,
                             vars.c, vars.z, df,
                             return_all = FALSE,
                             stats_ends = 'Estimate'))
```

Test Program IV coefficient

```
## Warning: attributes are not identical across measure variables;
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```

```
##   vars_var.y     prot_Estimate       cal_Estimate wealthIdx_Estimate    p.A.prot_Estimate
## 1        hgt 0.859205733632614 0.0238724384575419  0.144503490136948  0.00148073028434642
## 2        wgt  98.9428234201406   2.71948246216953   69.1816142883022    0.221916473012486
## 3     vil.id -6.02451379136132 -0.168054407187466  -1.91414470908345 -0.00520794333267238
##    p.A.nProt_Estimate
## 1  0.0141317656200726
## 2    2.11856940494335
## 3 -0.0494468877742109
```

```
vars.z <- NULL
ff_reg_mbyn(list.vars.y, list.vars.x,
            vars.c, vars.z, df,
            return_all = TRUE,
            stats_ends = 'Estimate')
```

Test Program OLS Return All

```
##    X.Intercept._Estimate X.Intercept._Pr...t.. X.Intercept._Std.Error X.Intercept._tvalue
## 1       27.3528514188608 5.68247182214952e-231      0.831272666092284    32.9047886867776
## 2        99.873884728925      0.75529705553815       320.450650378664    0.31166697465244
## 3       31.4646660224049  6.78164655340399e-84       1.61328519718754     19.503474077155
## 4       27.9038445914729 8.24252673989353e-242      0.828072565159449    33.6973421962119
## 5       219.626705179399     0.493216914827181       320.522532223672   0.685214557790078
## 6       30.5103987898551  1.62608789535248e-79       1.60831193651104    18.9704485163756
## 7       35.7840188807906 2.26726906489443e-145       1.38461348429899    25.8440491058106
## 8      -2662.74787734003  7.13318862990131e-05       670.301542938561   -3.97246270039407
## 9       29.2381039651127 1.53578035267873e-124       1.22602177264147    23.8479483950102
## 10      23.9948407749744 2.11912344053336e-165       0.86658104216672    27.6890903532576
## 11     -547.959546430028    0.0941551350855875       327.343126852912    -1.6739607509042
## 12      22.3367814226238  3.04337266226599e-49        1.5098937308759    14.7936116071335
## 13      24.4904444950827 2.34941965806705e-181      0.843371070670838    29.0387533397398
## 14     -476.703973630552     0.143844033032183       326.132837036936   -1.46168652614567
## 15      22.7781908464511  9.58029450711211e-52        1.5004526558957    15.1808794212527
##       adj.r.squared_v df1_v df2_v df3_v      hgt0_Estimate         hgt0_Pr...t..     hgt0_Std.Error
## 1   0.814249026159781     6 18957     6   0.60391817340617 1.14533314566771e-183 0.0206657538633713
## 2    0.60716936506893     6 18962     6   56.3852027199184  1.52417506966835e-12   7.96735224000553
## 3  0.0373247512680971     6 18999     6 -0.296844389234445  1.40290395213743e-13 0.0401060913799595
## 4    0.81608922805658     6 18957     6  0.589847843438394 7.79174951119325e-177 0.0205836398278421
## 5   0.607863678511207     6 18962     6   52.9707041800704  3.05720143843395e-11   7.96822145797115
## 6  0.0453498711076042     6 18999     6 -0.273219210757899  8.49149153665126e-12 0.0399777363511633
## 7   0.935014931990565     6 25092     6  0.439374451256039  2.71000479249152e-36 0.0348701896610764
## 8    0.92193683733695     6 25102     6    47.176969664749   0.00520266507060071   16.8823489375743
## 9   0.059543122812776     6 30013     6  -0.35908163982046  2.41020063623865e-31 0.0307984635553859
## 10  0.814690803458616     6 18587     6  0.687269209411865 1.31914432912869e-220 0.0213841849324282
## 11  0.617300597776144     6 18591     6    72.105560623359  4.78613024244006e-19   8.07744906400683
## 12 0.0261131074199838     6 18845     6 -0.108789161111504    0.0034801146146182 0.0372288594891345
## 13  0.824542352656376     6 18587     6  0.622395388389206 1.11511327164938e-190 0.0208846437570215
## 14  0.620250730454724     6 18591     6   62.7336220289257  8.38546282719268e-15   8.07589192978212
## 15 0.0385437355117917     6 18845     6 -0.157811627494693  2.13723119924676e-05 0.0371223237183417
##          hgt0_tvalue       prot_Estimate        prot_Pr...t..      prot_Std.Error       prot_tvalue
## 1   29.2231378249683   0.049431093806755 9.54769322304645e-79 0.00261878251179557  18.8756010031786
## 2    7.0770314931977    16.5557424523585 9.61203373222183e-60    1.01201959743751  16.3591125056062
## 3  -7.40147890309685 -0.0758835879205584 3.56396093562335e-50 0.00507971302734622 -14.9385580468907
## 4   28.6561486875877               <NA>                 <NA>               <NA>              <NA>
## 5   6.64774497790599               <NA>                 <NA>               <NA>              <NA>
## 6  -6.83428417151858               <NA>                 <NA>               <NA>              <NA>
## 7   12.6002885423502               <NA>                 <NA>               <NA>              <NA>
## 8   2.79445531182864               <NA>                 <NA>               <NA>              <NA>
## 9   -11.659076407325               <NA>                 <NA>               <NA>              <NA>
## 10  32.1391351404584               <NA>                 <NA>               <NA>              <NA>
## 11  8.92677379355593               <NA>                 <NA>               <NA>              <NA>
## 12 -2.92217281443323               <NA>                 <NA>               <NA>              <NA>
```

```
## 13  29.8015803204665                <NA>                 <NA>                 <NA>              <NA>
## 14  7.76801157994423                <NA>                 <NA>                 <NA>              <NA>
## 15 -4.25112470577158                <NA>                 <NA>                 <NA>              <NA>
##           r.squared_v   sexMale_Estimate     sexMale_Pr...t..  sexMale_Std.Error    sexMale_tvalue
## 1   0.814298005954592  0.935177182449406 2.36432111724607e-51 0.0618482294097262  15.1205166481668
## 2   0.607272921412825   415.163616765357 2.48252880290814e-67   23.8518341439675  17.4059409544552
## 3  0.0375780335372857 -0.254089999175318   0.0343768259467621  0.120093045309631 -2.11577613441484
## 4   0.816137722617266  0.893484662055608 2.08765935335877e-47 0.0616078355613525  14.5027763743757
## 5    0.60796705182314   405.534891838028 2.51355675686752e-64   23.8567507583516  16.9987478993157
## 6  0.0456010419476623 -0.181389489610951    0.129768754080748   0.11972270545355 -1.51508010885476
## 7    0.93502787877066   1.80682463132073 1.26527362032354e-66  0.104475287357902  17.2942776901016
## 8   0.921952383432195   999.926876716707 2.64630894140004e-86   50.5879876531386  19.7660931597596
## 9  0.0596997716363463  -0.33436777751525 0.000311174554787706 0.0927193334338799 -3.60623577771614
## 10  0.814740639193486  0.932686930233136 7.90489020586094e-47 0.0647209948973267  14.4108867873979
## 11  0.617403496088206   397.141948675354 6.19449742677662e-59   24.4473730956481  16.2447698213453
## 12 0.0263714328556815 -0.445232370681998 7.93666802281971e-05  0.112797805327952 -3.94717228218682
## 13  0.824589538985803   0.96466980500711 1.24556615236597e-52 0.0629827627260302   15.316409812052
## 14  0.620352835549783    401.59056368102 1.18469030741261e-60   24.3549086073387  16.4891016491029
## 15 0.0387987636986586 -0.423829627017582  0.00015644693636154  0.112083516545945 -3.78137339083082
##             sigma_v svymthRound_Estimate svymthRound_Pr...t.. svymthRound_Std.Error
## 1  4.21029844914315     0.87166589100565                    0   0.00387681209575621
## 2  1623.77111076428      189.04290688382                    0        1.4955473831309
## 3  8.18491760066961  -0.0154759587993917   0.0397984032097113   0.00752730297891317
## 4  4.18939119979502    0.851989049736817                    0   0.00411253488213795
## 5  1622.33549880859     185.318286001897                    0       1.59266949679221
## 6  8.15073036560541   0.0201471237605442   0.0117151185126433   0.00799217807522278
## 7  8.18607049768594    0.432815253441723                    0  0.000728323735328998
## 8  3964.45339913597     189.877994795061                    0     0.352701518968252
## 9  7.93450742809862  0.00215144302579706 0.000447277200167272  0.000612792699568233
## 10 4.35662621773428     0.91961467696139                    0   0.00331108017589107
## 11 1645.77655955938     205.597385664745                    0       1.25083486490652
## 12  7.6435668370875  -0.0509574460702806 1.37139389802397e-18   0.00578476859618168
## 13 4.23923961592693    0.921894094780682                    0   0.00317113547025635
## 14 1639.42085007515     205.945143306004                    0       1.22639878616071
## 15 7.59462918474114  -0.0557204455206461 7.79141497751766e-23   0.00565696328562864
##    svymthRound_tvalue vars_var.y               vars_vars.c vars_vars.x         wgt0_Estimate
## 1    224.840892330022        hgt sex+wgt0+hgt0+svymthRound        prot -0.000146104685986986
## 2    126.403823119306        wgt sex+wgt0+hgt0+svymthRound        prot     0.637023553461055
## 3   -2.05597660181154     vil.id sex+wgt0+hgt0+svymthRound        prot -0.000903390591533867
## 4    207.168832400006        hgt sex+wgt0+hgt0+svymthRound         cal -0.000116898230009949
## 5    116.357025971267        wgt sex+wgt0+hgt0+svymthRound         cal     0.649394003614758
## 6    2.52085521254888     vil.id sex+wgt0+hgt0+svymthRound         cal -0.000941137072743919
## 7    594.262183761197        hgt sex+wgt0+hgt0+svymthRound   wealthIdx   0.00122231975126219
## 8    538.353209678558        wgt sex+wgt0+hgt0+svymthRound   wealthIdx      1.32870822160235
## 9    3.51088227277012     vil.id sex+wgt0+hgt0+svymthRound   wealthIdx -0.000845938526704796
## 10   277.738571133786        hgt sex+wgt0+hgt0+svymthRound    p.A.prot -0.000489534836079617
## 11   164.368128386085        wgt sex+wgt0+hgt0+svymthRound    p.A.prot     0.580023505722658
## 12  -8.80889965139067     vil.id sex+wgt0+hgt0+svymthRound    p.A.prot  -0.00156196911156061
## 13   290.714194782148        hgt sex+wgt0+hgt0+svymthRound   p.A.nProt  3.23596154259101e-05
## 14   167.926734460268        wgt sex+wgt0+hgt0+svymthRound   p.A.nProt      0.65551206304675
## 15  -9.84988636256528     vil.id sex+wgt0+hgt0+svymthRound   p.A.nProt  -0.00115432723977403
##           wgt0_Pr...t..       wgt0_Std.Error       wgt0_tvalue         cal_Estimate
## 1     0.136011583497549 9.79994437486573e-05 -1.49087260496811                <NA>
## 2  2.96480083692757e-63   0.0378027371614794  16.8512547316329                <NA>
```

```
## 3  2.05763549729273e-06 0.000190221503167431 -4.74915073475531                <NA>
## 4     0.230228828649018 9.74307633896921e-05 -1.19980821193398  0.00243408846205622
## 5  7.43034302413852e-66    0.037739875283113  17.2071051836606    0.699072500364623
## 6  6.66901196231733e-07 0.000189270503626621 -4.97244448929308 -0.00395676177098486
## 7  1.22269348058816e-13 0.000164767846917989  7.41843614592224                <NA>
## 8  6.75367630221077e-62   0.0798131859486402  16.6477281392748                <NA>
## 9  4.32675510884621e-09 0.000144040382619518   -5.872926128913                <NA>
## 10 7.77000489086602e-07 9.90410500454311e-05 -4.94274682926991                <NA>
## 11 7.42419220783427e-54   0.0374185042114355  15.5009805428138                <NA>
## 12 1.40362012201826e-19 0.000172365145002826  -9.0619777654873                <NA>
## 13    0.740027016459552 9.75208524392668e-05 0.331822524275644                <NA>
## 14 4.09082062947785e-67   0.0377202854835204  17.3782370584956                <NA>
## 15 2.75472781728448e-11 0.000173241059789276 -6.66312732777158                <NA>
##             cal_Pr...t..        cal_Std.Error        cal_tvalue wealthIdx_Estimate
## 1                   <NA>                 <NA>              <NA>               <NA>
## 2                   <NA>                 <NA>              <NA>               <NA>
## 3                   <NA>                 <NA>              <NA>               <NA>
## 4  8.01672708877986e-120 0.000103833679413418  23.4421863484661               <NA>
## 5   4.71331900885298e-67   0.0402492068645167  17.3686031309332               <NA>
## 6   7.94646124029527e-85 0.000201721108117477 -19.6150110809452               <NA>
## 7                   <NA>                 <NA>              <NA>   0.21045655488185
## 8                   <NA>                 <NA>              <NA>   106.678721085969
## 9                   <NA>                 <NA>              <NA>  0.451733304543324
## 10                  <NA>                 <NA>              <NA>               <NA>
## 11                  <NA>                 <NA>              <NA>               <NA>
## 12                  <NA>                 <NA>              <NA>               <NA>
## 13                  <NA>                 <NA>              <NA>               <NA>
## 14                  <NA>                 <NA>              <NA>               <NA>
## 15                  <NA>                 <NA>              <NA>               <NA>
##       wealthIdx_Pr...t.. wealthIdx_Std.Error wealthIdx_tvalue    p.A.prot_Estimate
## 1                   <NA>                <NA>             <NA>                <NA>
## 2                   <NA>                <NA>             <NA>                <NA>
## 3                   <NA>                <NA>             <NA>                <NA>
## 4                   <NA>                <NA>             <NA>                <NA>
## 5                   <NA>                <NA>             <NA>                <NA>
## 6                   <NA>                <NA>             <NA>                <NA>
## 7   1.93494257274268e-41  0.0155791042075745  13.508899618216                <NA>
## 8    3.2548345535026e-45    7.54496977117083 14.1390521528113                <NA>
## 9  4.82890644822007e-250  0.0132483771350785 34.0972558327347                <NA>
## 10                  <NA>                <NA>             <NA> 3.86952250259526e-05
## 11                  <NA>                <NA>             <NA>  0.00521731297924587
## 12                  <NA>                <NA>             <NA> 0.000149388430455142
## 13                  <NA>                <NA>             <NA>                <NA>
## 14                  <NA>                <NA>             <NA>                <NA>
## 15                  <NA>                <NA>             <NA>                <NA>
##       p.A.prot_Pr...t..   p.A.prot_Std.Error  p.A.prot_tvalue  p.A.nProt_Estimate
## 1                  <NA>                 <NA>              <NA>               <NA>
## 2                  <NA>                 <NA>              <NA>               <NA>
## 3                  <NA>                 <NA>              <NA>               <NA>
## 4                  <NA>                 <NA>              <NA>               <NA>
## 5                  <NA>                 <NA>              <NA>               <NA>
## 6                  <NA>                 <NA>              <NA>               <NA>
## 7                  <NA>                 <NA>              <NA>               <NA>
## 8                  <NA>                 <NA>              <NA>               <NA>
```

```
## 9                  <NA>                  <NA>             <NA>                 <NA>
## 10 0.000125048896903791 1.00852286184785e-05 3.83682180045518                 <NA>
## 11    0.170833589209346  0.00380941660201464 1.36958319982295                 <NA>
## 12 2.88060045451681e-17 1.76593895713687e-05 8.45943342783186                 <NA>
## 13                 <NA>                  <NA>             <NA> 0.00542428867316449
## 14                 <NA>                  <NA>             <NA>   0.779514232050632
## 15                 <NA>                  <NA>             <NA> 0.00526237555581024
##       p.A.nProt_Pr...t..  p.A.nProt_Std.Error p.A.nProt_tvalue
## 1                   <NA>                  <NA>             <NA>
## 2                   <NA>                  <NA>             <NA>
## 3                   <NA>                  <NA>             <NA>
## 4                   <NA>                  <NA>             <NA>
## 5                   <NA>                  <NA>             <NA>
## 6                   <NA>                  <NA>             <NA>
## 7                   <NA>                  <NA>             <NA>
## 8                   <NA>                  <NA>             <NA>
## 9                   <NA>                  <NA>             <NA>
## 10                  <NA>                  <NA>             <NA>
## 11                  <NA>                  <NA>             <NA>
## 12                  <NA>                  <NA>             <NA>
## 13 5.25341325077391e-226 0.000166671307872964 32.5448257554855
## 14  1.47950939943836e-33     0.06444313759758 12.0961557911467
## 15   3.7685780281174e-70 0.000295969260771016 17.7801422421419
```

```
vars.z <- c('indi.id')
ff_reg_mbyn(list.vars.y, list.vars.x,
            vars.c, vars.z, df,
            return_all = TRUE,
            stats_ends = 'Estimate')
```

Test Program IV Return All

```
## Warning: attributes are not identical across measure variables;
## they will be dropped

## Warning: attributes are not identical across measure variables;
## they will be dropped

## Warning: attributes are not identical across measure variables;
## they will be dropped

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## they will be dropped

## Warning: attributes are not identical across measure variables;
```

```
## they will be dropped

## Warning: attributes are not identical across measure variables;
## they will be dropped

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## they will be dropped

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## they will be dropped

## Warning: attributes are not identical across measure variables;
## they will be dropped

## Warning: attributes are not identical across measure variables;
## they will be dropped

## Warning: attributes are not identical across measure variables;
## they will be dropped

## Warning: attributes are not identical across measure variables;
## they will be dropped
```

	X.Intercept._Estimate	X.Intercept._Pr...z..	X.Intercept._Std.Error	X.Intercept._zvalue
1	40.2173991882938	3.69748206920405e-59	2.47963650430699	16.2190704639323
2	1408.1626637032	0.00217397545504963	459.377029874119	3.06537456626657
3	-64.490636067872	0.000109756271656929	16.673099250727	-3.86794531107106
4	39.6732302990235	1.30030240177373e-103	1.83545587849039	21.6149190857443
5	1325.54736576331	0.00138952700443324	414.645900526211	3.19681772828602
6	-59.8304089440729	3.75547414421179e-07	11.7754321198995	-5.08095230263053
7	35.5561817357046	2.01357089467444e-142	1.39936229104453	25.4088465605032
8	-2791.221534909	1.95034793045284e-05	653.605248808641	-4.27050048939585
9	21.8005242861645	1.17899313785408e-34	1.77547715237629	12.2786847788984
10	24.3009261707644	1.97968607369592e-84	1.2481331128579	19.4698193008609
11	-499.067024090554	0.155922992163314	351.723712333143	-1.41891776582254
12	21.4632286881661	1.84405333738942e-09	3.57067054655531	6.01097984491234
13	25.299209739617	1.29388565624566e-157	0.945826571474308	26.748254386829
14	-352.278518334717	0.287184942021997	330.990098562619	-1.0643173915611
15	17.9359211844992	1.13855583530306e-12	2.52170174723203	7.11262590993832

	hgt0_Estimate	hgt0_Pr...z..	hgt0_Std.Error	hgt0_zvalue	prot_Estimate
1	0.403139725681418	1.25009876641748e-13	0.0543948312973965	7.41136089709158	0.859205733632614
2	35.5765914326678	0.000445802636381424	10.1318250572006	3.51137048180512	98.9428234201406
3	1.20995060148712	0.00097112649404847	0.366789440587685	3.29876072644971	-6.02451379136132
4	0.357976348180876	2.82141265004339e-17	0.0423453726223874	8.45373003027063	<NA>
5	31.0172706497394	0.0013100303315764	9.65135595900306	3.21377335801252	<NA>
6	1.5037447089682	3.70002169470828e-08	0.273179527952317	5.50460248701607	<NA>
7	0.460434521499963	2.98739737280869e-37	0.0361031059207763	12.7533216258548	<NA>
8	59.1545587745268	0.000542570320022534	17.1025823111635	3.45880859967647	<NA>
9	0.412512139031067	3.02226357947691e-20	0.0447499166716409	9.21816552325528	<NA>
10	0.515794899569023	8.57492956381676e-59	0.0319035514861838	16.1673191711084	<NA>
11	46.2591615803265	2.8561488738123e-07	9.01263684093548	5.13270005180026	<NA>
12	0.520812513246773	1.10039023747789e-08	0.0911390672920558	5.71448149208973	<NA>
13	0.510868687340428	3.24936430168307e-102	0.0237991645877977	21.4658243761363	<NA>
14	45.5654716961559	6.3454545304127e-08	8.42434865398195	5.40878275196011	<NA>

```
## 15 0.534362107844268  3.42500501176006e-17  0.063380058773461  8.4310762436216              <NA>
##          prot_Pr...z..     prot_Std.Error       prot_zvalue Sargan_df1   sexMale_Estimate
## 1  6.88427338202428e-19 0.0967928354481331  8.87674929300964          0  0.154043421788007
## 2  2.09631602352917e-08   17.6561952052848  5.60385871756365          0   333.799680049259
## 3  2.94171378745816e-20  0.653342710289155 -9.22106223347162          0   5.41175429817609
## 4                  <NA>              <NA>              <NA>          0  0.106307556057668
## 5                  <NA>              <NA>              <NA>          0   330.452608866758
## 6                  <NA>              <NA>              <NA>          0   5.83118942788808
## 7                  <NA>              <NA>              <NA>          0   1.80283907885782
## 8                  <NA>              <NA>              <NA>          0   997.747599807148
## 9                  <NA>              <NA>              <NA>          0 -0.452827875182598
## 10                 <NA>              <NA>              <NA>          0   1.02741625216018
## 11                 <NA>              <NA>              <NA>          0   411.365911332896
## 12                 <NA>              <NA>              <NA>          0 -0.789122421167432
## 13                 <NA>              <NA>              <NA>          0   1.02009164592608
## 14                 <NA>              <NA>              <NA>          0   409.820707458838
## 15                 <NA>              <NA>              <NA>          0 -0.746032636368145
##        sexMale_Pr...z..  sexMale_Std.Error    sexMale_zvalue svymthRound_Estimate
## 1      0.38807812932888  0.178475271469781  0.86310792817082     0.20990165085783
## 2  5.06413216642981e-24   33.0216035385405  10.1085242471545      121.78985943172
## 3  5.80077629932476e-06   1.19371921154418  4.53352366774387     4.84745570027424
## 4     0.423490075745117  0.132821186086547 0.800381017440976    0.322893837128574
## 5  2.52735690930834e-27   30.5174257711927  10.8283251459136     135.494858749214
## 6  6.12283824664132e-12  0.847955715223327  6.87676174970095     4.07024693316581
## 7   1.1689328480129e-65  0.105343525210948   17.113904962338    0.433164820953121
## 8  2.02347084785411e-89   49.7632792630648  20.0498764266063      190.07735139541
## 9  0.000647195788038449  0.132754263303719 -3.41102322376347   0.0137438264666969
## 10 1.69796551008584e-27 0.0945646985181925  10.8646912458831     1.00582859923509
## 11 2.05327249429949e-54   26.4822313532216  15.5336574870174     218.549980922774
## 12  0.00428270841484855  0.276250047248363 -2.85655126226267   -0.369567838754916
## 13 1.70848440093529e-51 0.0675715533063635  15.0964658352764    0.929266902426869
## 14 2.36314216739034e-62   24.5920104216267  16.6647907361992     207.078222946319
## 15 6.57521045473888e-05   0.18692145837209 -3.99115565898846  -0.0985678389223824
##     svymthRound_Pr...z.. svymthRound_Std.Error svymthRound_zvalue vars_var.y
## 1    0.00846239710392287    0.0797183179471441   2.63304164291327        hgt
## 2   5.96047652813855e-17      14.5577085129475   8.36600480930094        wgt
## 3   2.07373887977152e-19     0.538050140685815   9.00930105527994     vil.id
## 4   9.66146445882893e-11    0.0498896912188091   6.47215545416802        hgt
## 5   4.48931446042076e-34       11.133488331472   12.1700274626596        wgt
## 6   5.64723572160763e-36     0.325043349284718   12.5221664806331     vil.id
## 7                      0   0.00120472816008751   359.553993426746        hgt
## 8                      0    0.739269879490032    257.11496798237        wgt
## 9   1.57416908709431e-66  0.000797655931686456   17.2302692435808     vil.id
## 10                     0   0.00746867714609297   134.672925279848        hgt
## 11                     0       1.9315711781906   113.146221785884        wgt
## 12 2.42696379701225e-102    0.0172056989832505  -21.4793853545086     vil.id
## 13                     0   0.00539330635998817   172.300040161061        hgt
## 14                     0      1.46167854745858   141.671520941705        wgt
## 15  1.84569897952709e-27   0.00907867488118012  -10.8570733297996     vil.id
##                 vars_vars.c vars_vars.x vars_vars.z Weakinstruments_df1 Weakinstruments_df2
## 1  sex+wgt0+hgt0+svymthRound        prot     indi.id                  1               18957
## 2  sex+wgt0+hgt0+svymthRound        prot     indi.id                  1               18962
## 3  sex+wgt0+hgt0+svymthRound        prot     indi.id                  1               18999
## 4  sex+wgt0+hgt0+svymthRound         cal     indi.id                  1               18957
```

```
## 5  sex+wgt0+hgt0+svymthRound         cal     indi.id                   1               18962
## 6  sex+wgt0+hgt0+svymthRound         cal     indi.id                   1               18999
## 7  sex+wgt0+hgt0+svymthRound   wealthIdx     indi.id                   1               25092
## 8  sex+wgt0+hgt0+svymthRound   wealthIdx     indi.id                   1               25102
## 9  sex+wgt0+hgt0+svymthRound   wealthIdx     indi.id                   1               30013
## 10 sex+wgt0+hgt0+svymthRound    p.A.prot     indi.id                   1               18587
## 11 sex+wgt0+hgt0+svymthRound    p.A.prot     indi.id                   1               18591
## 12 sex+wgt0+hgt0+svymthRound    p.A.prot     indi.id                   1               18845
## 13 sex+wgt0+hgt0+svymthRound   p.A.nProt     indi.id                   1               18587
## 14 sex+wgt0+hgt0+svymthRound   p.A.nProt     indi.id                   1               18591
## 15 sex+wgt0+hgt0+svymthRound   p.A.nProt     indi.id                   1               18845
##    Weakinstruments_p.value Weakinstruments_statistic         wgt0_Estimate         wgt0_Pr...z..
## 1     1.42153759923994e-19          82.0931934821266  -0.00163274724538111  4.88365163639597e-08
## 2     4.45734829676713e-19          79.8251182827386     0.492582112313709  2.33136555228405e-20
## 3     5.72345606957941e-20          83.8989817367586   0.00999798623641602  7.95432753711715e-07
## 4     1.77770827184424e-37          164.392129625299 -0.000658938519302931   0.00032843149807424
## 5     4.03760292920738e-37          162.747072038429     0.601258436431587   2.0921134733036e-48
## 6     5.47447735093002e-38           166.75260665498   0.00326074237566435   0.00667886646012294
## 7                        0          7029.47383089383   0.00112485055604169  2.26123807446765e-11
## 8                        0          7038.38467113128      1.27282038539707  6.67525280062144e-56
## 9                        0          12942.6315513372  -0.00512158791392237 6.51923753120087e-127
## 10                       0          1710.98122418591  0.000716628918444932  2.43477572076212e-06
## 11                       0          1715.15052113399     0.761704518610475   8.2201479288098e-69
## 12                       0          1725.71954882902  -0.00601345031606092  5.19751747217521e-44
## 13                       0          5097.88462603711  0.000922100117259348  1.68237436753105e-15
## 14                       0           5110.7741807338     0.792700893714085  4.81415543564975e-82
## 15                       0          5136.55662964887  -0.00668277875606482 2.54848840100353e-105
##          wgt0_Std.Error       wgt0_zvalue Wu.Hausman_df1 Wu.Hausman_df2    Wu.Hausman_p.value
## 1   0.00029928487659495 -5.45549532591606              1          18956 1.53929570343279e-118
## 2    0.0532753838702833  9.24596082710666              1          18961  3.13415891402799e-08
## 3   0.00202532507408065  4.93648469787221              1          18998                     0
## 4  0.000183457551985601 -3.59177647456371              1          18956 2.88592507054107e-108
## 5    0.0411255751282477  14.6200614716414              1          18961   7.6495944085204e-07
## 6   0.00120214094164169  2.71244598924594              1          18998                     0
## 7  0.000168187467853553  6.68807593334564              1          25091    0.0221987672063003
## 8      0.08080475140115  15.7518012657231              1          25101    0.0099360023036833
## 9  0.000213715312589078 -23.9645341827701              1          30012                     0
## 10 0.000152036990658929  4.71351685756907              1          18586 1.80909125272768e-238
## 11   0.0434474820359048   17.531614789115              1          18590  2.14946499922491e-35
## 12  0.00043218241369976 -13.9141485757875              1          18844                     0
## 13  0.00011580150512068  7.96276452796019              1          18586 3.15182965429765e-108
## 14   0.0413159097814445  19.1863351892132              1          18590   1.7681125741529e-17
## 15 0.000306609919182859 -21.7957030675165              1          18844                     0
##    Wu.Hausman_statistic       cal_Estimate         cal_Pr...z..       cal_Std.Error
## 1      543.467268879953               <NA>                 <NA>                <NA>
## 2      30.6481856102772               <NA>                 <NA>                <NA>
## 3      5652.51924792859               <NA>                 <NA>                <NA>
## 4      494.955883488045 0.0238724384575419 1.44956616452661e-33 0.00197718112735887
## 5      24.4605456760994   2.71948246216953 9.21076021290446e-10   0.444177077282291
## 6      5583.56513052781 -0.168054407187466 5.67614501764414e-39  0.0128692506794877
## 7      5.23078768861684               <NA>                 <NA>                <NA>
## 8       6.6473469952822               <NA>                 <NA>                <NA>
## 9      25949.7118056025               <NA>                 <NA>                <NA>
## 10     1119.87022468742               <NA>                 <NA>                <NA>
```

```
## 11     154.793296861581              <NA>                <NA>                <NA>
## 12     4826.92242730041              <NA>                <NA>                <NA>
## 13     494.903094649183              <NA>                <NA>                <NA>
## 14      72.530787010352              <NA>                <NA>                <NA>
## 15     7607.83405438193              <NA>                <NA>                <NA>
##           cal_zvalue wealthIdx_Estimate   wealthIdx_Pr...z.. wealthIdx_Std.Error  wealthIdx_zvalue
## 1               <NA>               <NA>                <NA>                <NA>              <NA>
## 2               <NA>               <NA>                <NA>                <NA>              <NA>
## 3               <NA>               <NA>                <NA>                <NA>              <NA>
## 4    12.0739764947235               <NA>                <NA>                <NA>              <NA>
## 5     6.1225187008946               <NA>                <NA>                <NA>              <NA>
## 6   -13.0586007975839               <NA>                <NA>                <NA>              <NA>
## 7               <NA>  0.144503490136948 3.72983264926432e-06  0.0312379492766376  4.62589553677969
## 8               <NA>   69.1816142883022 2.23442991281176e-07     13.358888551386  5.17869536991717
## 9               <NA>  -1.91414470908345                   0  0.0371054140359243 -51.5866689219593
## 10              <NA>               <NA>                <NA>                <NA>              <NA>
## 11              <NA>               <NA>                <NA>                <NA>              <NA>
## 12              <NA>               <NA>                <NA>                <NA>              <NA>
## 13              <NA>               <NA>                <NA>                <NA>              <NA>
## 14              <NA>               <NA>                <NA>                <NA>              <NA>
## 15              <NA>               <NA>                <NA>                <NA>              <NA>
##       p.A.prot_Estimate     p.A.prot_Pr...z..   p.A.prot_Std.Error   p.A.prot_zvalue
## 1                  <NA>                 <NA>                <NA>              <NA>
## 2                  <NA>                 <NA>                <NA>              <NA>
## 3                  <NA>                 <NA>                <NA>              <NA>
## 4                  <NA>                 <NA>                <NA>              <NA>
## 5                  <NA>                 <NA>                <NA>              <NA>
## 6                  <NA>                 <NA>                <NA>              <NA>
## 7                  <NA>                 <NA>                <NA>              <NA>
## 8                  <NA>                 <NA>                <NA>              <NA>
## 9                  <NA>                 <NA>                <NA>              <NA>
## 10  0.00148073028434642 2.50759287066563e-156 5.55884799941827e-05  26.6373587567312
## 11    0.221916473012486  8.30126393398654e-33   0.0186022369560791  11.9295584469998
## 12 -0.00520794333267238 3.00201194005694e-197 0.000173813943639721 -29.9627476577329
## 13                 <NA>                 <NA>                <NA>              <NA>
## 14                 <NA>                 <NA>                <NA>              <NA>
## 15                 <NA>                 <NA>                <NA>              <NA>
##     p.A.nProt_Estimate    p.A.nProt_Pr...z..  p.A.nProt_Std.Error  p.A.nProt_zvalue
## 1                 <NA>                 <NA>                <NA>              <NA>
## 2                 <NA>                 <NA>                <NA>              <NA>
## 3                 <NA>                 <NA>                <NA>              <NA>
## 4                 <NA>                 <NA>                <NA>              <NA>
## 5                 <NA>                 <NA>                <NA>              <NA>
## 6                 <NA>                 <NA>                <NA>              <NA>
## 7                 <NA>                 <NA>                <NA>              <NA>
## 8                 <NA>                 <NA>                <NA>              <NA>
## 9                 <NA>                 <NA>                <NA>              <NA>
## 10                <NA>                 <NA>                <NA>              <NA>
## 11                <NA>                 <NA>                <NA>              <NA>
## 12                <NA>                 <NA>                <NA>              <NA>
## 13  0.0141317656200726 2.61782083774363e-226 0.000440019589949091  32.1162192385744
## 14    2.11856940494335  4.81511329043196e-35     0.17153115470458  12.3509307017263
## 15 -0.0494468877742109                    0  0.00128926108222202 -38.3528894620707
```

Program Line by Line Set Up Parameters

```
vars.z <- c('indi.id')
vars.z <- NULL
vars.c <- c('sex', 'wgt0', 'hgt0', 'svymthRound')
```

```
df.reg.out <- as_tibble(bind_rows(lapply(list.vars.y, regf.iv, vars.x=var.x1, vars.c=vars.c, vars.z=vars
```

Lapply

```
lapply(list.vars.y, function(y) (mean(df[[var.x1]], na.rm=TRUE) + mean(df[[y]], na.rm=TRUE)))
```

Nested Lapply Test

```
## [[1]]
## [1] 98.3272
##
## [[2]]
## [1] 13626.51
##
## [[3]]
## [1] 26.11226
```

```
lapplytwice <- lapply(list.vars.x, function(x) (lapply(list.vars.y, function(y) (mean(df[[x]], na.rm=TRU
lapplytwice
```

```
## [[1]]
## [[1]][[1]]
## [1] 98.3272
##
## [[1]][[2]]
## [1] 13626.51
##
## [[1]][[3]]
## [1] 26.11226
##
##
## [[2]]
## [[2]][[1]]
## [1] 525.4708
##
## [[2]][[2]]
## [1] 14053.65
##
## [[2]][[3]]
## [1] 453.2558
##
##
## [[3]]
## [[3]][[1]]
## [1] 90.69287
##
## [[3]][[2]]
## [1] 13618.87
```

```
##
## [[3]][[3]]
## [1] 18.47793
##
##
## [[4]]
## [[4]][[1]]
## [1] 2095.3
##
## [[4]][[2]]
## [1] 15623.48
##
## [[4]][[3]]
## [1] 2023.085
##
##
## [[5]]
## [[5]][[1]]
## [1] 271.2886
##
## [[5]][[2]]
## [1] 13799.47
##
## [[5]][[3]]
## [1] 199.0737
```

```
df.reg.out.all <- bind_rows(lapply(list.vars.x,
                      function(x) (
                          bind_rows(lapply(list.vars.y, regf.iv, vars.x=x, vars.c=vars.c, vars.z=vars.z
                      )))
```

```
df.reg.out.all
```

Nested Lapply All

```
##    X.Intercept._Estimate X.Intercept._Pr...t.. X.Intercept._Std.Error X.Intercept._tvalue
## 1       27.3528514188608 5.68247182214952e-231      0.831272666092284    32.9047886867776
## 2        99.873884728925      0.75529705553815       320.450650378664    0.31166697465244
## 3       31.4646660224049  6.78164655340399e-84       1.61328519718754     19.503474077155
## 4       27.9038445914729 8.24252673989353e-242      0.828072565159449    33.6973421962119
## 5       219.626705179399     0.493216914827181       320.522532223672   0.685214557790078
## 6       30.5103987898551  1.62608789535248e-79       1.60831193651104    18.9704485163756
## 7       35.7840188807906 2.26726906489443e-145       1.38461348429899    25.8440491058106
## 8      -2662.74787734003  7.13318862990131e-05       670.301542938561   -3.97246270039407
## 9       29.2381039651127 1.53578035267873e-124       1.22602177264147    23.8479483950102
## 10      23.9948407749744 2.11912344053336e-165       0.86658104216672    27.6890903532576
## 11     -547.959546430028    0.0941551350855875       327.343126852912    -1.6739607509042
## 12      22.3367814226238  3.04337266226599e-49        1.5098937308759    14.7936116071335
## 13      24.4904444950827 2.34941965806705e-181      0.843371070670838    29.0387533397398
## 14     -476.703973630552     0.143844033032183       326.132837036936   -1.46168652614567
## 15      22.7781908464511  9.58029450711211e-52        1.5004526558957    15.1808794212527
##       adj.r.squared_v df1_v df2_v df3_v      hgt0_Estimate         hgt0_Pr...t..     hgt0_Std.Error
## 1   0.814249026159781     6 18957     6   0.60391817340617 1.14533314566771e-183 0.0206657538633713
```

```
## 2    0.60716936506893     6 18962     6   56.3852027199184  1.52417506966835e-12   7.96735224000553
## 3  0.0373247512680971     6 18999     6 -0.296844389234445  1.40290395213743e-13 0.0401060913799595
## 4    0.81608922805658     6 18957     6  0.589847843438394 7.79174951119325e-177 0.0205836398278421
## 5   0.607863678511207     6 18962     6   52.9707041800704  3.05720143843395e-11   7.96822145797115
## 6  0.0453498711076042     6 18999     6 -0.273219210757899  8.49149153665126e-12 0.0399777363511633
## 7   0.935014931990565     6 25092     6  0.439374451256039  2.71000479249152e-36 0.0348701896610764
## 8    0.92193683733695     6 25102     6    47.176969664749   0.00520266507060071   16.8823489375743
## 9   0.059543122812776     6 30013     6  -0.35908163982046  2.41020063623865e-31 0.0307984635553859
## 10  0.814690803458616     6 18587     6  0.687269209411865 1.31914432912869e-220 0.0213841849324282
## 11  0.617300597776144     6 18591     6    72.105560623359  4.78613024244006e-19   8.07744906400683
## 12 0.0261131074199838     6 18845     6 -0.108789161111504    0.0034801146146182 0.0372288594891345
## 13  0.824542352656376     6 18587     6  0.622395388389206 1.11511327164938e-190 0.0208846437570215
## 14  0.620250730454724     6 18591     6   62.7336220289257  8.38546282719268e-15   8.07589192978212
## 15 0.0385437355117917     6 18845     6 -0.157811627494693  2.13723119924676e-05 0.0371223237183417
##          hgt0_tvalue       prot_Estimate        prot_Pr...t..      prot_Std.Error       prot_tvalue
## 1   29.2231378249683   0.049431093806755 9.54769322304645e-79 0.00261878251179557  18.8756010031786
## 2    7.0770314931977    16.5557424523585 9.61203373222183e-60    1.01201959743751  16.3591125056062
## 3  -7.40147890309685 -0.0758835879205584 3.56396093562335e-50 0.00507971302734622 -14.9385580468907
## 4   28.6561486875877               <NA>                 <NA>               <NA>              <NA>
## 5   6.64774497790599               <NA>                 <NA>               <NA>              <NA>
## 6  -6.83428417151858               <NA>                 <NA>               <NA>              <NA>
## 7   12.6002885423502               <NA>                 <NA>               <NA>              <NA>
## 8   2.79445531182864               <NA>                 <NA>               <NA>              <NA>
## 9   -11.659076407325               <NA>                 <NA>               <NA>              <NA>
## 10  32.1391351404584               <NA>                 <NA>               <NA>              <NA>
## 11  8.92677379355593               <NA>                 <NA>               <NA>              <NA>
## 12 -2.92217281443323               <NA>                 <NA>               <NA>              <NA>
## 13  29.8015803204665               <NA>                 <NA>               <NA>              <NA>
## 14  7.76801157994423               <NA>                 <NA>               <NA>              <NA>
## 15 -4.25112470577158               <NA>                 <NA>               <NA>              <NA>
##          r.squared_v   sexMale_Estimate     sexMale_Pr...t..  sexMale_Std.Error    sexMale_tvalue
## 1   0.814298005954592  0.935177182449406 2.36432111724607e-51 0.0618482294097262  15.1205166481668
## 2   0.607272921412825   415.163616765357 2.48252880290814e-67   23.8518341439675  17.4059409544552
## 3  0.0375780335372857 -0.254089999175318   0.0343768259467621  0.120093045309631 -2.11577613441484
## 4   0.816137722617266  0.893484662055608 2.08765935335877e-47 0.0616078355613525  14.5027763743757
## 5    0.60796705182314   405.534891838028 2.51355675686752e-64   23.8567507583516  16.9987478993157
## 6  0.0456010419476623 -0.181389489610951    0.129768754080748   0.11972270545355 -1.51508010885476
## 7   0.93502787877066   1.80682463132073 1.26527362032354e-66  0.104475287357902  17.2942776901016
## 8   0.921952383432195   999.926876716707 2.64630894140004e-86   50.5879876531386  19.7660931597596
## 9  0.0596997716363463  -0.33436777751525 0.000311174554787706 0.0927193334338799 -3.60623577771614
## 10  0.814740639193486  0.932686930233136 7.90489020586094e-47 0.0647209948973267  14.4108867873979
## 11  0.617403496088206   397.141948675354 6.19449742677662e-59   24.4473730956481  16.2447698213453
## 12 0.0263714328556815 -0.445232370681998 7.93666802281971e-05  0.112797805327952 -3.94717228218682
## 13  0.824589538985803   0.96466980500711 1.24556615236597e-52 0.0629827627260302   15.316409812052
## 14  0.620352835549783    401.59056368102 1.18469030741261e-60   24.3549086073387  16.4891016491029
## 15 0.0387987636986586 -0.423829627017582  0.00015644693636154  0.112083516545945 -3.78137339083082
##             sigma_v svymthRound_Estimate svymthRound_Pr...t.. svymthRound_Std.Error
## 1  4.21029844914315     0.87166589100565                    0   0.00387681209575621
## 2  1623.77111076428      189.04290688382                    0       1.4955473831309
## 3  8.18491760066961  -0.0154759587993917   0.0397984032097113   0.00752730297891317
## 4  4.18939119979502    0.851989049736817                    0   0.00411253488213795
## 5  1622.33549880859     185.318286001897                    0      1.59266949679221
## 6  8.15073036560541   0.0201471237605442   0.0117151185126433   0.00799217807522278
## 7  8.18607049768594    0.432815253441723                    0  0.000728323735328998
```

```
## 8  3964.45339913597     189.877994795061                    0     0.352701518968252
## 9  7.93450742809862  0.00215144302579706 0.000447277200167272  0.000612792699568233
## 10 4.35662621773428     0.91961467696139                    0   0.00331108017589107
## 11 1645.77655955938     205.597385664745                    0      1.25083486490652
## 12  7.6435668370875  -0.0509574460702806 1.37139389802397e-18   0.00578476859618168
## 13 4.23923961592693    0.921894094780682                    0   0.00317113547025635
## 14 1639.42085007515     205.945143306004                    0      1.22639878616071
## 15 7.59462918474114  -0.0557204455206461 7.79141497751766e-23   0.00565696328562864
##    svymthRound_tvalue vars_var.y               vars_vars.c vars_vars.x         wgt0_Estimate
## 1    224.840892330022        hgt sex+wgt0+hgt0+svymthRound        prot -0.000146104685986986
## 2    126.403823119306        wgt sex+wgt0+hgt0+svymthRound        prot     0.637023553461055
## 3   -2.05597660181154     vil.id sex+wgt0+hgt0+svymthRound        prot -0.000903390591533867
## 4    207.168832400006        hgt sex+wgt0+hgt0+svymthRound         cal -0.000116898230009949
## 5    116.357025971267        wgt sex+wgt0+hgt0+svymthRound         cal     0.649394003614758
## 6    2.52085521254888     vil.id sex+wgt0+hgt0+svymthRound         cal -0.000941137072743919
## 7    594.262183761197        hgt sex+wgt0+hgt0+svymthRound   wealthIdx   0.00122231975126219
## 8    538.353209678558        wgt sex+wgt0+hgt0+svymthRound   wealthIdx      1.32870822160235
## 9    3.51088227277012     vil.id sex+wgt0+hgt0+svymthRound   wealthIdx -0.000845938526704796
## 10   277.738571133786        hgt sex+wgt0+hgt0+svymthRound    p.A.prot -0.000489534836079617
## 11   164.368128386085        wgt sex+wgt0+hgt0+svymthRound    p.A.prot     0.580023505722658
## 12  -8.80889965139067     vil.id sex+wgt0+hgt0+svymthRound    p.A.prot  -0.00156196911156061
## 13   290.714194782148        hgt sex+wgt0+hgt0+svymthRound   p.A.nProt  3.23596154259101e-05
## 14   167.926734460268        wgt sex+wgt0+hgt0+svymthRound   p.A.nProt      0.65551206304675
## 15  -9.84988636256528     vil.id sex+wgt0+hgt0+svymthRound   p.A.nProt  -0.00115432723977403
##           wgt0_Pr...t..       wgt0_Std.Error       wgt0_tvalue         cal_Estimate
## 1     0.136011583497549 9.79994437486573e-05 -1.49087260496811                 <NA>
## 2  2.96480083692757e-63   0.0378027371614794  16.8512547316329                 <NA>
## 3  2.05763549729273e-06 0.000190221503167431 -4.74915073475531                 <NA>
## 4     0.230228828649018 9.74307633896921e-05 -1.19980821193398  0.00243408846205622
## 5  7.43034302413852e-66    0.037739875283113  17.2071051836606    0.699072500364623
## 6  6.66901196231733e-07 0.000189270503626621 -4.97244448929308 -0.00395676177098486
## 7  1.22269348058816e-13 0.000164767846917989  7.41843614592224                 <NA>
## 8  6.75367630221077e-62   0.0798131859486402  16.6477281392748                 <NA>
## 9  4.32675510884621e-09 0.000144040382619518   -5.872926128913                 <NA>
## 10 7.77000489086602e-07 9.90410500454311e-05 -4.94274682926991                 <NA>
## 11 7.42419220783427e-54   0.0374185042114355  15.5009805428138                 <NA>
## 12 1.40362012201826e-19 0.000172365145002826  -9.0619777654873                 <NA>
## 13    0.740027016459552 9.75208524392668e-05 0.331822524275644                 <NA>
## 14 4.09082062947785e-67   0.0377202854835204  17.3782370584956                 <NA>
## 15 2.75472781728448e-11 0.000173241059789276 -6.66312732777158                 <NA>
##             cal_Pr...t..        cal_Std.Error        cal_tvalue wealthIdx_Estimate
## 1                   <NA>                 <NA>              <NA>               <NA>
## 2                   <NA>                 <NA>              <NA>               <NA>
## 3                   <NA>                 <NA>              <NA>               <NA>
## 4  8.01672708877986e-120 0.000103833679413418  23.4421863484661               <NA>
## 5   4.71331900885298e-67   0.0402492068645167  17.3686031309332               <NA>
## 6   7.94646124029527e-85 0.000201721108117477 -19.6150110809452               <NA>
## 7                   <NA>                 <NA>              <NA>   0.21045655488185
## 8                   <NA>                 <NA>              <NA>   106.678721085969
## 9                   <NA>                 <NA>              <NA>  0.451733304543324
## 10                  <NA>                 <NA>              <NA>               <NA>
## 11                  <NA>                 <NA>              <NA>               <NA>
## 12                  <NA>                 <NA>              <NA>               <NA>
## 13                  <NA>                 <NA>              <NA>               <NA>
```

```
## 14                  <NA>                 <NA>              <NA>                <NA>
## 15                  <NA>                 <NA>              <NA>                <NA>
##       wealthIdx_Pr...t.. wealthIdx_Std.Error wealthIdx_tvalue    p.A.prot_Estimate
## 1                   <NA>                 <NA>              <NA>                <NA>
## 2                   <NA>                 <NA>              <NA>                <NA>
## 3                   <NA>                 <NA>              <NA>                <NA>
## 4                   <NA>                 <NA>              <NA>                <NA>
## 5                   <NA>                 <NA>              <NA>                <NA>
## 6                   <NA>                 <NA>              <NA>                <NA>
## 7   1.93494257274268e-41  0.0155791042075745  13.508899618216                <NA>
## 8    3.2548345535026e-45    7.54496977117083 14.1390521528113                <NA>
## 9  4.82890644822007e-250  0.0132483771350785 34.0972558327347                <NA>
## 10                  <NA>                 <NA>              <NA> 3.86952250259526e-05
## 11                  <NA>                 <NA>              <NA>  0.00521731297924587
## 12                  <NA>                 <NA>              <NA> 0.000149388430455142
## 13                  <NA>                 <NA>              <NA>                <NA>
## 14                  <NA>                 <NA>              <NA>                <NA>
## 15                  <NA>                 <NA>              <NA>                <NA>
##       p.A.prot_Pr...t..   p.A.prot_Std.Error  p.A.prot_tvalue  p.A.nProt_Estimate
## 1                   <NA>                 <NA>              <NA>                <NA>
## 2                   <NA>                 <NA>              <NA>                <NA>
## 3                   <NA>                 <NA>              <NA>                <NA>
## 4                   <NA>                 <NA>              <NA>                <NA>
## 5                   <NA>                 <NA>              <NA>                <NA>
## 6                   <NA>                 <NA>              <NA>                <NA>
## 7                   <NA>                 <NA>              <NA>                <NA>
## 8                   <NA>                 <NA>              <NA>                <NA>
## 9                   <NA>                 <NA>              <NA>                <NA>
## 10 0.000125048896903791 1.00852286184785e-05 3.83682180045518                <NA>
## 11    0.170833589209346  0.00380941660201464 1.36958319982295                <NA>
## 12 2.88060045451681e-17 1.76593895713687e-05 8.45943342783186                <NA>
## 13                  <NA>                 <NA>              <NA> 0.00542428867316449
## 14                  <NA>                 <NA>              <NA>   0.779514232050632
## 15                  <NA>                 <NA>              <NA> 0.00526237555581024
##       p.A.nProt_Pr...t..  p.A.nProt_Std.Error p.A.nProt_tvalue
## 1                   <NA>                 <NA>              <NA>
## 2                   <NA>                 <NA>              <NA>
## 3                   <NA>                 <NA>              <NA>
## 4                   <NA>                 <NA>              <NA>
## 5                   <NA>                 <NA>              <NA>
## 6                   <NA>                 <NA>              <NA>
## 7                   <NA>                 <NA>              <NA>
## 8                   <NA>                 <NA>              <NA>
## 9                   <NA>                 <NA>              <NA>
## 10                  <NA>                 <NA>              <NA>
## 11                  <NA>                 <NA>              <NA>
## 12                  <NA>                 <NA>              <NA>
## 13 5.25341325077391e-226 0.00016667130787296 32.5448257554855
## 14  1.47950939943836e-33     0.06444313759758 12.0961557911467
## 15   3.7685780281174e-70 0.000295969260771016 17.7801422421419
```

```
df.reg.out.all <- (lapply(list.vars.x,
                      function(x) (
```

```
                        bind_rows(lapply(list.vars.y, regf.iv, vars.x=x, vars.c=vars.c, vars.z=vars.z
                            select(vars_var.y, starts_with(x)) %>%
                            select(vars_var.y, ends_with('value'))
                    ))) %>% reduce(full_join)
```

Nested Lapply Select

```
## Joining, by = "vars_var.y"Joining, by = "vars_var.y"Joining, by = "vars_var.y"Joining, by =
## "vars_var.y"
```

```
df.reg.out.all
```

```
##   vars_var.y       prot_tvalue        cal_tvalue wealthIdx_tvalue  p.A.prot_tvalue p.A.nProt_tvalue
## 1        hgt  18.8756010031786  23.4421863484661  13.508899618216 3.83682180045518 32.5448257554855
## 2        wgt  16.3591125056062  17.3686031309332 14.1390521528113 1.36958319982295 12.0961557911467
## 3     vil.id -14.9385580468907 -19.6150110809452 34.0972558327347 8.45943342783186 17.7801422421419
```