

# Problem Set 10

## Econometrics

3

```
library(stats)
```

```
library(AER)
```

```
## Loading required package: car
```

```
## Loading required package: carData
```

```
## Loading required package: lmtest
```

```
## Loading required package: zoo
```

```
##
```

```
## Attaching package: 'zoo'
```

```
## The following objects are masked from 'package:base':
```

```
##
```

```
##      as.Date, as.Date.numeric
```

```
## Loading required package: sandwich
```

```
## Loading required package: survival
```

```
load("Angrist804049.Rda")
```

```
Angrist804049$YOB <- factor(Angrist804049$YOB)
```

```
Angrist804049$QOB <- factor(Angrist804049$QOB)
```

```
dummies <- model.matrix(~ QOB - 1, data = Angrist804049)
```

```

dummies <- as.data.frame(dummies)
colnames(dummies) <- c("Q1", "Q2", "Q3", "Q4")
Angrist804049 <- cbind(Angrist804049, dummies)

dummies <- model.matrix(~ YOB - 1, data = Angrist804049)
dummies <- as.data.frame(dummies)
Angrist804049 <- cbind(Angrist804049, dummies)

yob_dummies <- paste0("YOB", unique(Angrist804049$YOB))
interactions <- c()
for (yob in yob_dummies) {
  for (q in c("Q1", "Q2", "Q3")) {
    interactions <- c(interactions, paste0(yob, ":", q))
  }
}

interactions <- paste(interactions, collapse = " + ")
yob_dummies <- paste(yob_dummies, collapse = " + ")

formula <- as.formula(paste(
  "LWKLYWGE ~ EDUC + RACE + MARRIED + SMSA + NEWENG +
  MIDATL + ENOCENT + WNOCENT + SOATL + ESOCENT + WSOCENT + MT + AGE + AGEQ +",
  yob_dummies,
  "| RACE + MARRIED + SMSA +
  NEWENG + MIDATL + ENOCENT + WNOCENT + SOATL +
  ESOCENT + WSOCENT + MT + AGE + AGEQ +",
  interactions,
  " + ",
  yob_dummies
))

```

```
iv_4 <- ivreg(
  formula,
  data = Angrist804049
)

summary(iv_4, diagnostics = TRUE)
```

```
##
## Call:
## ivreg(formula = formula, data = Angrist804049)
##
## Residuals:
```

	Min	1Q	Median	3Q	Max
	-8.76357	-0.22456	0.05882	0.31859	4.77627

```
##
## Coefficients:
```

	Estimate	Std. Error	t value	Pr(> t )
(Intercept)	5.5445390	0.6755234	8.208	2.26e-16 ***
EDUC	0.0486586	0.0312796	1.556	0.119804
RACE	-0.2804085	0.0491115	-5.710	1.13e-08 ***
MARRIED	0.2510388	0.0075648	33.185	< 2e-16 ***
SMSA	-0.1914562	0.0328539	-5.828	5.63e-09 ***
NEWENG	-0.1195515	0.0191070	-6.257	3.93e-10 ***
MIDATL	-0.0623051	0.0216957	-2.872	0.004082 **
ENOCENT	0.0015817	0.0333955	0.047	0.962224
WNOCENT	-0.1171270	0.0232131	-5.046	4.52e-07 ***
SOATL	-0.1549423	0.0345365	-4.486	7.25e-06 ***
ESOCENT	-0.1864699	0.0522316	-3.570	0.000357 ***
WSOCENT	-0.1168175	0.0297200	-3.931	8.47e-05 ***

```

## MT          -0.0954433  0.0096047  -9.937  < 2e-16 ***
## AGE          0.0004984  0.0040920   0.122  0.903061
## AGEQ        -0.0099145  0.0084351  -1.175  0.239840
## YOB33         0.1009343  0.0379138   2.662  0.007763 **
## YOB37         0.0517253  0.0167683   3.085  0.002038 **
## YOB35         0.0711636  0.0270949   2.626  0.008628 **
## YOB38         0.0444558  0.0126080   3.526  0.000422 ***
## YOB39         0.0272338  0.0086590   3.145  0.001660 **
## YOB36         0.0628687  0.0216559   2.903  0.003695 **
## YOB34         0.0891028  0.0319904   2.785  0.005348 **
## YOB31         0.1223315  0.0486276   2.516  0.011881 *
## YOB30         0.1339155  0.0528012   2.536  0.011206 *
## YOB32         0.1092853  0.0431232   2.534  0.011269 *
##
## Diagnostic tests:
##
##              df1    df2 statistic p-value
## Weak instruments    27 330399    1.451  0.0611 .
## Wu-Hausman         1 330424    0.224  0.6362
## Sargan             32    NA    20.554  0.9410
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.6219 on 330425 degrees of freedom
## Multiple R-Squared: 0.1603, Adjusted R-squared: 0.1602
## Wald test: 1262 on 24 and 330425 DF, p-value: < 2.2e-16

```

Out of 32 instruments, it looks like we have 27 weak instruments. This implies that the interaction terms for the cohort dummies with QoB are likely not good instruments.