# Econ 675 Assignment 3

Nathan Mather*

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## 1 Question 1: Many Instruments Asymptotics

## 2 Question 2: Weak Instruments Simulations

**Results for $n\gamma^2 = 0$**

| reg_type | variable | mean | st.dev | quant .1 | quant .5 | quant .9 |
|---|---|---|---|---|---|---|
| ols | estimate | 1.00 | 0.01 | 0.99 | 1.00 | 1.01 |
| ols | std.error | 0.01 | 0.00 | 0.01 | 0.01 | 0.01 |
| ols | rej | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 |
| 2sls | estimate | 0.66 | 20.76 | 0.68 | 1.00 | 1.32 |
| 2sls | std.error | 3248.34 | 182231.00 | 0.07 | 0.22 | 4.95 |
| 2sls | rej | 0.69 | 0.46 | 0.00 | 1.00 | 1.00 |
| 2sls | f_stat | 1.00 | 1.39 | 0.01 | 0.44 | 2.65 |

**Results for $n\gamma^2 = 0.25$**

| reg_type | variable | mean | st.dev | quant .1 | quant .5 | quant .9 |
|---|---|---|---|---|---|---|
| ols | estimate | 1.00 | 0.01 | 0.99 | 1.00 | 1.01 |
| ols | std.error | 0.01 | 0.00 | 0.01 | 0.01 | 0.01 |
| ols | rej | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 |
| 2sls | estimate | 0.28 | 31.08 | -0.97 | 0.65 | 2.64 |
| 2sls | std.error | 1630.89 | 91246.48 | 0.15 | 0.89 | 23.65 |
| 2sls | rej | 0.32 | 0.47 | 0.00 | 0.00 | 1.00 |
| 2sls | f_stat | 1.26 | 1.81 | 0.02 | 0.57 | 3.44 |

**Results for $n\gamma^2 = 9$**

*Shouts out to Ani for the help with this. Could not have done it without you!

| reg_type | variable | mean | st.dev | quant .1 | quant .5 | quant .9 |
|---|---|---|---|---|---|---|
| ols | estimate | 0.96 | 0.02 | 0.94 | 0.96 | 0.98 |
| ols | std.error | 0.02 | 0.00 | 0.01 | 0.02 | 0.02 |
| ols | rej | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 |
| 2sls | estimate | -0.31 | 6.73 | -0.77 | -0.01 | 0.29 |
| 2sls | std.error | 15.57 | 713.82 | 0.17 | 0.34 | 1.06 |
| 2sls | rej | 0.08 | 0.27 | 0.00 | 0.00 | 0.00 |
| 2sls | f_stat | 9.99 | 6.34 | 2.83 | 8.88 | 18.34 |

**Results for $n\gamma^2 = 99$**

| reg_type | variable | mean | st.dev | quant .1 | quant .5 | quant .9 |
|---|---|---|---|---|---|---|
| ols | estimate | 0.67 | 0.03 | 0.62 | 0.67 | 0.71 |
| ols | std.error | 0.03 | 0.00 | 0.03 | 0.03 | 0.04 |
| ols | rej | 1.00 | 0.00 | 1.00 | 1.00 | 1.00 |
| 2sls | estimate | -0.01 | 0.11 | -0.15 | -0.00 | 0.11 |
| 2sls | std.error | 0.10 | 0.02 | 0.08 | 0.10 | 0.14 |
| 2sls | rej | 0.05 | 0.21 | 0.00 | 0.00 | 0.00 |
| 2sls | f_stat | 100.93 | 24.69 | 71.05 | 99.09 | 133.35 |

# 3 Question 3: Weak Instrument - Empirical Study

## 3.1 Question 3.1

**Results from R**

| model | term | estimate | std.error |
|---|---|---|---|
| OLS 1 | educ | 0.06 | 0.00 |
| OLS 2 | educ | 0.06 | 0.00 |
| 2sls 1 | educ | 0.09 | 0.02 |
| 2sls 2 | educ | 0.06 | 0.03 |