ECO3211 PS2
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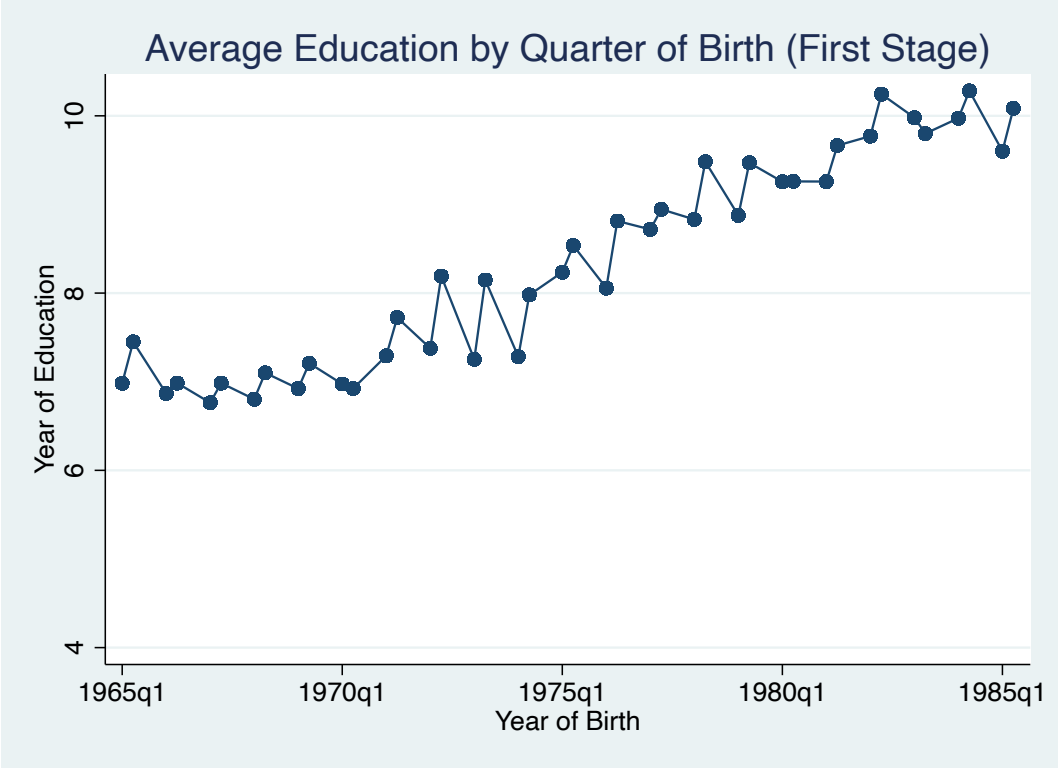
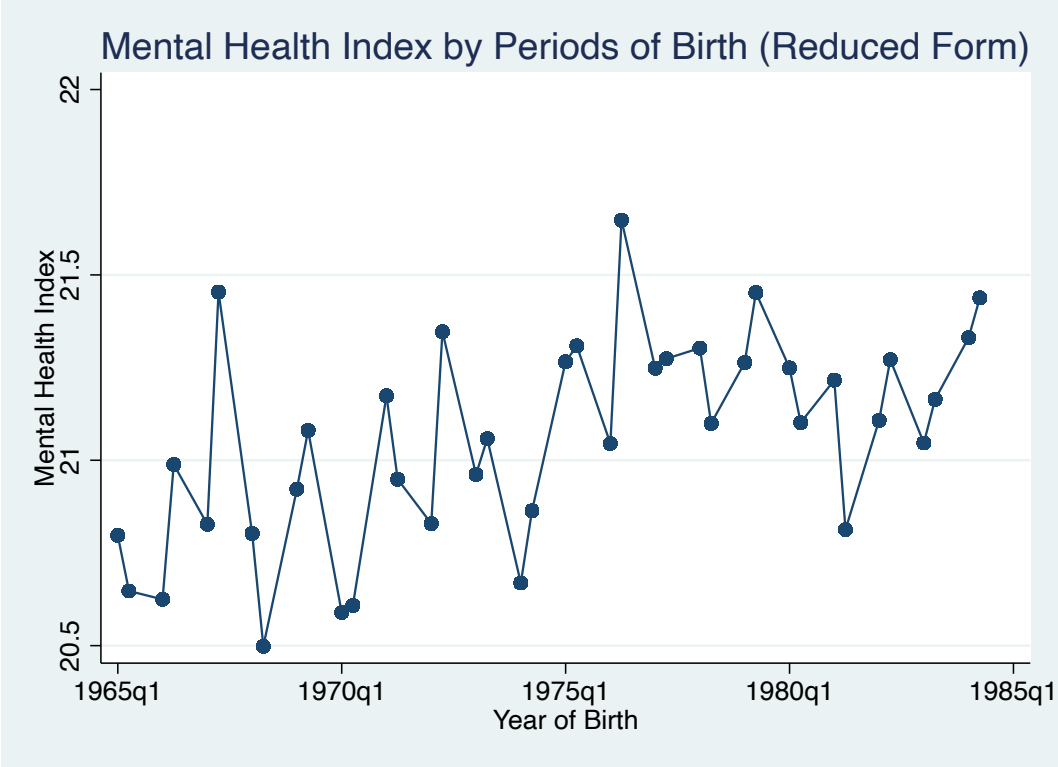
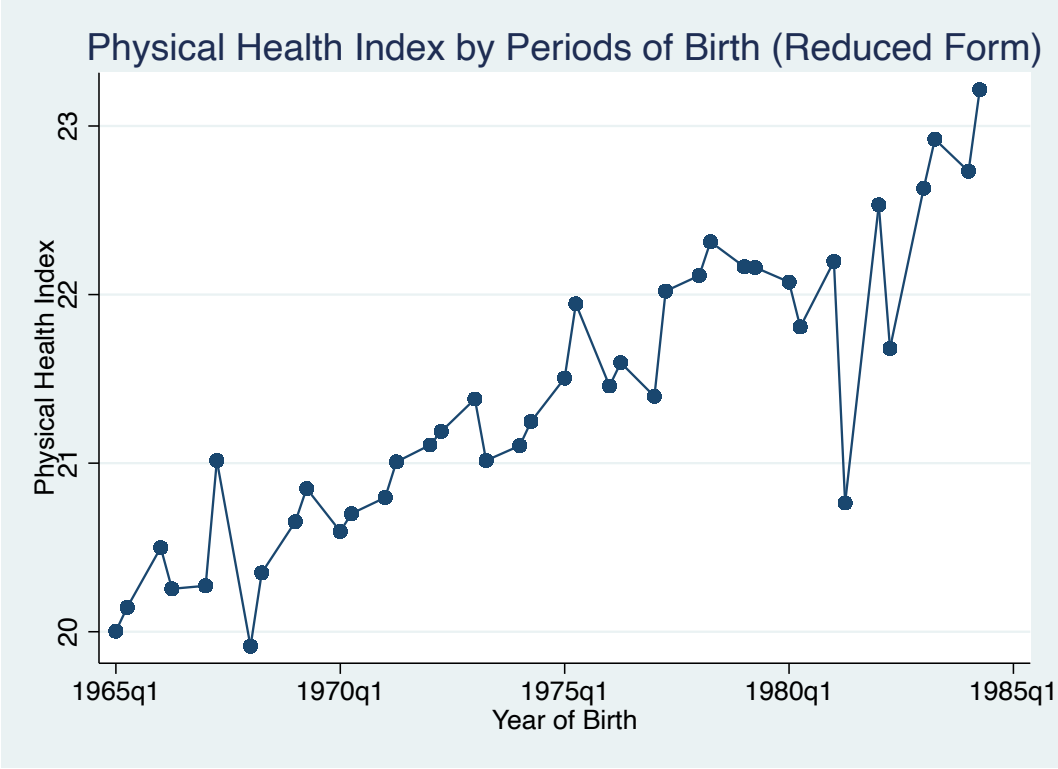
**Part II**

**Step2: Three graphs below**






Step 3: Validity of IV

```
. xi:reg educ IV, cluster(qa1y)

Linear regression                               Number of obs     =     12,338
                                                F(1, 19)          =      37.87
                                                Prob > F          =     0.0000
                                                R-squared         =     0.0022
                                                Root MSE          =     4.4372

                                   (Std. Err. adjusted for 20 clusters in qa1y)
------------------------------------------------------------------------------
             |               Robust
        educ |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          IV |   .4397705   .0714627     6.15   0.000     .2901974    .5893436
       _cons |   7.786615   .2334279    33.36   0.000     7.298044    8.275185
------------------------------------------------------------------------------
```

To ensure the validity of IV, we need IV is correlated with education. Regression results here shows a positively significant coefficient, therefore, the relevance restriction is validated.

Step 4: Impacts of education on both mental and physical health

First stage: $\beta_{IV}$ = 0.2906143 represent that being born after August would increase education by approximately 0.291 year. The effect is statistically significant.

```
. xi:reg educ IV i.qa1y i.provcd i.urban, cluster(provcd)
i.qa1y            _Iqa1y_1965-1984    (naturally coded; _Iqa1y_1965 omitted)
i.provcd          _Iprovcd_11-62      (naturally coded; _Iprovcd_11 omitted)
i.urban           _Iurban_0-1         (naturally coded; _Iurban_0 omitted)

Linear regression                               Number of obs     =     12,338
                                                F(20, 24)         =          .
                                                Prob > F          =          .
                                                R-squared         =     0.2978
                                                Root MSE          =     3.7291

                                  (Std. Err. adjusted for 25 clusters in provcd)
------------------------------------------------------------------------------
             |               Robust
        educ |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
          IV |   .2906143   .0702858     4.13   0.000     .1455516    .4356769
  _Iqa1y_1966|    -.180315   .1922074    -0.94   0.358    -.5770116    .2163815
  _Iqa1y_1967|   -.3490823   .2168005    -1.61   0.120    -.7965365     .098372
  _Iqa1y_1968|    -.406194   .2003618    -2.03   0.054    -.8197205    .0073324
  _Iqa1y_1969|   -.3211642   .2242153    -1.43   0.165    -.7839219    .1415934
  _Iqa1y_1970|   -.4032149   .3096755    -1.30   0.205    -1.042354     .235924
  _Iqa1y_1971|    .0660674   .2351358     0.28   0.781    -.4192291    .5513639
  _Iqa1y_1972|    .2554824   .3318354     0.77   0.449    -.4293921     .940357
  _Iqa1y_1973|    .3695037   .2547916     1.45   0.160    -.1563604    .8953678
  _Iqa1y_1974|    .2759094   .2816443     0.98   0.337    -.3053758    .8571945
  _Iqa1y_1975|    .8219178   .3492267     2.35   0.027     .1011493    1.542686
```

Second stage: In terms of physical health, we can see the outcome here is statistically insignificant as p-value is pretty large.

```
. xi:reg physicalhealth educ_hat i.qa1y i.provcd i.urban, robust
i.qa1y            _Iqa1y_1965-1984    (naturally coded; _Iqa1y_1965 omitted)
i.provcd          _Iprovcd_11-62      (naturally coded; _Iprovcd_11 omitted)
i.urban           _Iurban_0-1         (naturally coded; _Iurban_0 omitted)

Linear regression                               Number of obs     =     12,338
                                                F(45, 12292)      =       9.12
                                                Prob > F          =     0.0000
                                                R-squared         =     0.0301
                                                Root MSE          =     5.8101

------------------------------------------------------------------------------
             |               Robust
physicalhe~h |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    educ_hat |    .225128   .3770108     0.60   0.550    -.5138723    .9641283
  _Iqa1y_1966|   .3842218   .3308656     1.16   0.246    -.2643268     1.03277
  _Iqa1y_1967|   .5882552   .3519739     1.67   0.095    -.1016688    1.278179
  _Iqa1y_1968|   .0992012   .3496638     0.28   0.777    -.5861947    .7845971
  _Iqa1y_1969|   .7327583   .3452628     2.12   0.034     .0559889    1.409528
  _Iqa1y_1970|   .6315029   .3582363     1.76   0.078    -.0706964    1.333702
```

Second stage: In terms of mental health, we can see the outcome here is statistically insignificant as p-value is pretty large.

```
. xi:reg mentalhealth educ_hat i.qa1y i.provcd i.urban, robust
i.qa1y            _Iqa1y_1965-1984    (naturally coded; _Iqa1y_1965 omitted)
i.provcd          _Iprovcd_11-62      (naturally coded; _Iprovcd_11 omitted)
i.urban           _Iurban_0-1         (naturally coded; _Iurban_0 omitted)

Linear regression                               Number of obs     =     12,338
                                                F(45, 12292)      =       8.12
                                                Prob > F          =     0.0000
                                                R-squared         =     0.0304
                                                Root MSE          =       3.79
```

| mentalhealth | Coef. | Robust Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| educ_hat | .1610234 | .2464229 | 0.65 | 0.513 | -.3220042 | .644051 |
| _Iqa1y_1966 | .0330086 | .2081919 | 0.16 | 0.874 | -.3750802 | .4410975 |
| _Iqa1y_1967 | .3430812 | .2157489 | 1.59 | 0.112 | -.0798204 | .7659829 |
| _Iqa1y_1968 | .0414497 | .2262428 | 0.18 | 0.855 | -.4020217 | .4849211 |
| _Iqa1y_1969 | .272885 | .2121065 | 1.29 | 0.198 | -.1428769 | .688647 |
| _Iqa1y_1970 | -.0874654 | .2246265 | -0.39 | 0.697 | -.5277687 | .3528379 |
| _Iqa1y_1971 | .3260288 | .1981991 | 1.64 | 0.100 | -.0624726 | .7145302 |
| _Iqa1y_1972 | .221449 | .2149913 | 1.03 | 0.303 | -.1999677 | .6428657 |
| _Iqa1y_1973 | .2315679 | .214279 | 1.08 | 0.280 | -.1884525 | .6515883 |
| _Iqa1y_1974 | -.0274575 | .2224395 | -0.12 | 0.902 | -.4634739 | .408559 |

Step 5: Heterogeneous effect across gender, father’ s and mother’ s education

Gender: significant heterogeneous effect as the p-value for interaction term is pretty small

```
. xi:reg physicalhealth educ_hat educ_gender i.qa1y i.provcd i.urban, robust
i.qa1y            _Iqa1y_1965-1984    (naturally coded; _Iqa1y_1965 omitted)
i.provcd          _Iprovcd_11-62      (naturally coded; _Iprovcd_11 omitted)
i.urban           _Iurban_0-1         (naturally coded; _Iurban_0 omitted)

Linear regression                               Number of obs     =      7,612
                                                F(46, 7565)       =       6.51
                                                Prob > F          =     0.0000
                                                R-squared         =     0.0370
                                                Root MSE          =     5.5801
```

| physicalhe~h | Coef. | Robust Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| educ_hat | -.0363737 | .4581907 | -0.08 | 0.937 | -.9345547 | .8618074 |
| educ_gender | .0920247 | .0142335 | 6.47 | 0.000 | .0641232 | .1199262 |

Father’ s education: insignificant heterogeneous effect (no significant star)

```
. xi:reg physicalhealth educ_hat i.qa1y i.provcd i.urban if fed_dum1==1, cluster(provcd)
i.qa1y            _Iqa1y_1965-1984    (naturally coded; _Iqa1y_1965 omitted)
i.provcd          _Iprovcd_11-62      (naturally coded; _Iprovcd_11 omitted)
i.urban           _Iurban_0-1         (naturally coded; _Iurban_0 omitted)

Linear regression                               Number of obs     =      5,021
                                                F(20, 24)         =          .
                                                Prob > F          =          .
                                                R-squared         =     0.0311
                                                Root MSE          =      5.336

                                  (Std. Err. adjusted for 25 clusters in provcd)
------------------------------------------------------------------------------
             |               Robust
physicalhe~h |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    educ_hat |     .35017   .6149413     0.57   0.574    -.9190064    1.619346
```

```
. xi:reg physicalhealth educ_hat i.qa1y i.provcd i.urban if fed_dum1==0, cluster(provcd)
i.qa1y            _Iqa1y_1965-1984    (naturally coded; _Iqa1y_1965 omitted)
i.provcd          _Iprovcd_11-62      (naturally coded; _Iprovcd_11 omitted)
i.urban           _Iurban_0-1         (naturally coded; _Iurban_0 omitted)

Linear regression                               Number of obs     =      2,591
                                                F(20, 24)         =          .
                                                Prob > F          =          .
                                                R-squared         =     0.0378
                                                Root MSE          =      6.045

                                  (Std. Err. adjusted for 25 clusters in provcd)
------------------------------------------------------------------------------
             |               Robust
physicalhe~h |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    educ_hat |  -.8377462   .8129998    -1.03   0.313    -2.515695     .840203
```

```
. esttab `m', mtitle(`m') b(%6.3f) nogap
```

| | (1) fedu_less | (2) fedu_more |
|---|---|---|
| educ_hat | -0.838 | 0.350 |
| | (-1.03) | (0.57) |
| _Iqa1y_1966 | -0.317 | -0.055 |
| | (-0.48) | (-0.06) |
| _Iqa1y_1967 | 0.069 | 0.171 |
| | (0.13) | (0.25) |
| _Iqa1y_1968 | -0.819 | -0.435 |
| | (-1.38) | (-0.69) |
| _Iqa1y_1969 | -0.000 | 0.150 |
| | (-0.00) | (0.21) |
| _Iqa1y_1970 | -0.031 | 0.905 |
| | (-0.05) | (1.18) |

## Mother’ s education: insignificant heterogeneous effect (no significant star)

```
. xi:reg physicalhealth educ_hat i.qa1y i.provcd i.urban if med_dum1==0, cluster(provcd)
i.qa1y            _Iqa1y_1965-1984    (naturally coded; _Iqa1y_1965 omitted)
i.provcd          _Iprovcd_11-62      (naturally coded; _Iprovcd_11 omitted)
i.urban           _Iurban_0-1         (naturally coded; _Iurban_0 omitted)

Linear regression                               Number of obs     =      3,324
                                                F(20, 24)         =          .
                                                Prob > F          =          .
                                                R-squared         =     0.0394
                                                Root MSE          =     5.7974

                                  (Std. Err. adjusted for 25 clusters in provcd)
------------------------------------------------------------------------------
             |               Robust
physicalhe~h |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    educ_hat |  -.7718048   .7358453    -1.05   0.305    -2.290515    .7469052
------------------------------------------------------------------------------
```

```
. xi:reg physicalhealth educ_hat i.qa1y i.provcd i.urban if med_dum1==1, cluster(provcd)
i.qa1y            _Iqa1y_1965-1984    (naturally coded; _Iqa1y_1965 omitted)
i.provcd          _Iprovcd_11-62      (naturally coded; _Iprovcd_11 omitted)
i.urban           _Iurban_0-1         (naturally coded; _Iurban_0 omitted)

Linear regression                               Number of obs     =      3,075
                                                F(20, 24)         =          .
                                                Prob > F          =          .
                                                R-squared         =     0.0293
                                                Root MSE          =     5.1589

                                  (Std. Err. adjusted for 25 clusters in provcd)
------------------------------------------------------------------------------
             |               Robust
physicalhe~h |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    educ_hat |   .2104782   .6414122     0.33   0.746    -1.113331    1.534288
------------------------------------------------------------------------------
```

```
. local m "medu_less medu_more"

.   esttab `m', mtitle(`m') b(%6.3f) nogap
```

| | (1) medu_less | (2) medu_more |
|---|---|---|
| educ_hat | -0.772 | 0.210 |
| | (-1.05) | (0.33) |