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Economic Evaluation of Health and Wealth

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ECONOMIC EVALUATION OF HEALTH AND WEALTH

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BACKGROUND

The relationship between wealth and health outcomes is one of the most important topics in the field of health economics. If it could be demonstrably shown that wealthier people live much healthier lives, then economic growth would certainly need to have a bigger role in health care reform. However, the literature on this topic is intensely mixed, and it has proven to be one of the most hotly debated topics the field, with some, such as Arthur van Soest, concluding that the "health-wealth gradient" is not an important factor to consider in health care reform, but others, such as Hannes Schwandt, concluding that wealth is an important factor to consider.

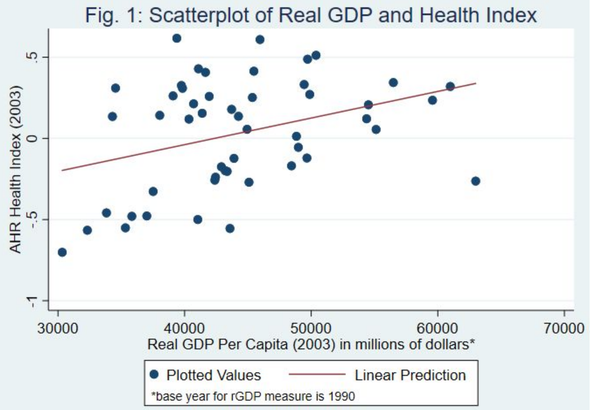
DATA

Data was assembled from the following sources:

- America's Health Rankings, a product of UHF. This rating system measures health outcomes such as cancer deaths, diabetes and infant mortality to assign each state an index value of health outcomes from -1 to +1.
- BEA estimates of real GDP per capita in the years 2003 and 2013. Both years' estimates use a base year of 1990.
- Region-based effects were controlled using regional groups as defined by the BEA.

Some of the more interesting EDA results are shown in Fig. 1. In terms of GDP, there is a large gap between the top seven states and the rest. The linear prediction shows an apparent positive relationship between wealth and health outcomes, but this is before any real model-building takes place.

Fig. 1: Scatterplot of Real GDP and Health Index



METHODS

The goal of this model is to estimate the effect of real GDP on health outcomes. With observations from the years 2003 and 2013, this dataset made a great candidate for instrumental variable analysis. Thus, the main methods used in model-building were instrumental variable analysis and two-stage least squares regression.

In the first stage, I use GDP in the year 2003 as an instrument upon GDP in the year 2013. GDP in 2003 meets the requirements of a strong instrument: it is highly correlated with GDP in 2013, but uncorrelated with a state's health index in 2013 (see Fig. 2). Using an instrument gives a much more accurate estimate, reducing the possibility of omitted variable bias in the model.

In the second stage, I use the instrumented variable to estimate the effect of GDP upon health outcomes, producing the regression output seen in Fig. 3.

RESULTS

According to this model, there is little to no causal effect of a state's GDP on health outcomes, with the results being insignificant and inconclusive in almost every measurable way. In Fig. 3, the z-statistic of 0.99 and the corresponding p-value show that the coefficient of the GDP variable is not statistically significant at the 5% or even 10% level. In addition, the 95% confidence interval shows that it is uncertain whether the effect of GDP on health outcomes is positive or negative – such an uncertain result means that this model shows no evidence of a causal link between a state's GDP and its health outcomes.

CONCLUSIONS

These findings support the conclusion, as argued by Arthur van Soest and others, that the "health-wealth gradient," while an interesting idea, doesn't adequately describe how health outcomes transpire in the United States. Factors besides individual wealth must be prioritized in the modeling of health outcomes.

Fig. 2: Correlation Matrices (Stata Output)

```
. corr gdp03 gdp13
(obs=50)

             |    gdp03    gdp13
-------------+------------------
       gdp03 |   1.0000
       gdp13 |   0.8400   1.0000


. corr gdp03 hi13
(obs=50)

             |    gdp03     hi13
-------------+------------------
       gdp03 |   1.0000
        hi13 |   0.2283   1.0000
```

IMPROVEMENTS / FURTHER RESEARCH

- Continuing to develop and improve the data set will make for more robust results.
- Longitudinal analysis could be used as an alternative to instrumental variable regression, but this would require a change in the way observations are grouped.
- An exploration into the policy implications of these findings will greatly enhance the research.

Fig. 3: Regression Results (Stata Output)

```
Instrumental variables (2SLS) regression          Number of obs   =         50
                                                  Wald chi2(8)    =      24.49
                                                  Prob > chi2     =     0.0019
                                                  R-squared       =     0.3278
                                                  Root MSE        =      .1407

------------------------------------------------------------------------------
        hi13 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
   log_gdp13 |   .1710241   .1722323     0.99   0.321     -.166545    .5085932
     mideast |  -.0380567    .081425    -0.47   0.640    -.1976467    .1215333
  greatlakes |  -.1329603   .0844434    -1.57   0.115    -.2984664    .0325457
      plains |  -.0385074   .0736054    -0.52   0.601    -.1827714    .1057565
   southeast |  -.0677994   .0776132    -0.87   0.382    -.2199186    .0843198
   southwest |  -.1240421    .09297    -1.33   0.182    -.3062599    .0581757
    rockymtn |   .1190398   .0835461     1.42   0.154    -.0447076    .2827871
     farwest |   .1512494    .072238     2.09   0.036     .0096655    .2928333
       _cons |  -1.788047   1.874053    -0.95   0.340    -5.461124    1.885029
------------------------------------------------------------------------------
Instrumented:  log_gdp13
Instruments:   mideast greatlakes plains southeast southwest rockymtn
               farwest log_gdp03
```