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Health and Wealth: Empirical relationships

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Introduction

- Disentangling the relationships between health and wealth and uncovering causal relationship in either direction is very tricky
  - Fundamental endogeneity problem
  - Measurement issues
  - Health: inputs (nutrition, expenditure) or output (health status)
  - Proper measurement of inputs: adjustment for quality, waistage
  - Wealth: short or long run? Measurement error in income Functional form (non-linearities are key to the story, but it may not be possible to observe them.

  cf. table 1: Wide variety in the estimates of the elasticities of calorie demand with respect to household resources (0.01 to 0.82)

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Income to Health: Nutrition

Deaton and Subramamian(1996)-Non parametric approach

Data set = 5630 households in 563 villages. Recall data on 149 food items, meals taken out and given away, etc.

From those 149 food items, they calculate caloric intake using a conversion table. Also correct for meals taken out and meals given to people.

Interesting aspect of this work = non-parametric estimate.

$$y = g(x) + \epsilon$$

How can we estimate $g(x)$?

- Kernel regression
- Fan (1992) locally weighted regression

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Results:

- Positive relationship between income and nutrition, precisely estimated even non-parametrically
- The elasticity declines with outlay, but not dramatically. Sample of poor people.
- Price per calories paid increase with outlay. Richer households pay each calories more. Rich=1.50 rupees per 1000 calories, Average 1.14 rupees per 1000 calories, Poor=88 rupees
- Elasticity of calories price seems constant

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PARAMETRIC ANALYSIS

Problem with non-parametric analysis: introducing control variables is difficult $\Longrightarrow$ move to parametric analysis

Log (calorie per capita) = $\alpha \log$(Exp. per capita) $+X\beta + \epsilon$ (x is vector of control variable)

Coefficient (elasticity) = 0.37 for calorie(t=29) 0.38 for price per calorie (t=25)

Summary: There seems to be a clear relationship between income and nutrition, even if the magnitude depends on the sample, the variables used, etc...

However:

1. Elasticity is much lower than one.
2. Endogeneity of income with respect to nutrition is not solved.

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3. This may cause a specific problem in interpreting the non-parametric relationship.
4. Nobody may exist at the point where the elasticities is very high.

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INCOME AND HEALTH: NATURAL EXPERIMENTS

- ➜ Duflo (2001): pension and child health
- ➜ Postel-Vinay et al. (2004): long-run consequences on health shock in childhood

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- ➜ Setting is 19th century France
- ➜ A developing country, in many respects: infant mortality before 1 27%, mean height at 20 is 1.64 meters (3d percentile of the American distribution today).
- ➜ France wine income was hit by a plague in the years 1870-1890: the Phylloxera. The phylloxera is an aphid (fly) that kills wine, and eventually destroyed 40% of France's wine production.
- ➜ Wine employed 1/6 of France and was the third largest agricultural production.
- ➜ Phylloxera progressed slowly across France.

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- ➜ Main outcome variable: Height at age 20.
- ➜ Long tradition of using height to infer something about health: Fogel, Steckel, Dora Costa, David Weir
- ➜ Heights are measured by the military, for all young people called to the army at age 20 (before 1872, a random sample; after 1872, everybody).
- ➜ The data set is recorded as tabulations, for each "departement" (89 departements in France). Number of people less than 1.54, between 1.54 and 1.56, etc...
- ➜ From these we computed mean height in each department (by fitting a normal distribution or interpolating the bins non-parametrically).
- ➜ See the difference in mean height between wine producing regions and others over time: closely track aggregate wine production.

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Specification

Simple DD specification: Define phylloxera year as a year after phylloxera epidemics and before the production picked up again.

$$y_{jt} = \alpha + \beta P_{jt} + \upsilon_t + \nu_j + \omega_{ij}$$

Where y_{jt} is the outcome variable in departement j in year t, P_{jt} a dummy equal to 1 if there is phylloxera, υ_t is a year fixed effects (dummies), ν_j is a departement fixed effect.

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Outcome and Results

- ➜ Wine production went down by 40% in phylloxera affected regions
- ➜ Height went down by 2 milimeters in affected department
- ➜ This corresponds to about 7 milimeters for the affected families)
- ➜ Height grew by 2.5 centimeters over the 19th century
- ➜ Other effects: no effects on mortality, literacy went down
- ➜ Effect is not expressed in term of elasticity–translating height into a measure of health is difficult–we don't have a measure of the real income shock
- ➜ Back of the envelope: Mean height: 1.65. Effect: 7 mm for the affected families, for a reduction of income of about 40%. Take minimum height to be 1.54. 7 mm is 6% of the difference between minimum and mean, for a 40% reduction in income. Elasticity does not appear to be larger than one (even if reduction in income is less than 40%).