Economic Impacts of Health Costs Induced by Air Pollution in China

Yang Xia, Dabo Guan, et al
20/11/2015

Findings
1. Total, regional, provincial economic losses
   Jiangsu and Shandong provinces suffered most and total economic losses reached 346.26 billion Yuan in 2007, ~1.1% of GDP and annual GDP for Vietnam in same year

Background
1. Long-term environmental stress: more influence on health than capital
2. Direct effect: damages to ‘stock’, unit/ stage-damage functions; Indirect effect: damages to ‘flow’ (health effects, inter-industrial/regional linkages), input-output (I-O)
3. PM$_{2.5}$ concentration Beijing 2013: 40 times higher than WHO standard
4. Serious health effect & high population density: high vulnerability

Methodology:
emission-health-economic interdisciplinary research
1. Integrated exposure-response (IER) model
   a. mortality: $RR_{IER}(z) = 1$ and
   b. $PAF = 1 - 1/RR$
   For $zz_{cf}$
   c. $E = PAF \times B \times P$
   morbidity: $RR = e^{cR}$
2. Labor time loss estimation
   a. provincial to labor mortality&morbidity counts
   b. labor to industrial mortality&morbidity counts
   c. industrial labor time loss as indicator for value added change (input for I-O model)
3. Supply-driven I-O model
   $x' = Bx + v'$ when $G = (I-B)^{-1}$
   $x = G'v$ and $\Delta x = \Delta v' G$

Exposure

Vulnerability

Policy insights
a. Indirect economic loss outnumber direct economic loss and thus, it is important to consider inter-industry/regional relationships
b. It is crucial to consider labor constraints on production capacity, especially in the face of disruptive events with long-term impacts on human health
c. Integrating risk analysis, impact analysis and dependency analysis is significant for developing effective post-disaster economic recovery strategies and more sustainable policies
d. Give a favor to current industrial structure reforms, moving towards less-labor intensive sector focus

3. Indirect economic losses outweigh direct losses across almost all 30 provinces