Air Pollution Exposure and Fetal Health: Does A Safety Threshold Exist? (Job market paper) *

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Abstract

This paper estimates the causal impact of fetal exposure to three "criteria air pollutants" on birth weight. I establish a series of hypothetical "safety thresholds" of air pollution and construct an innovative index called "average pollution degree" (APD) that measures the pollution concentrations above each threshold. Matching individual-level natality data with county-level air pollution in the United States from 1991 to 2008, I find that fetuses are vulnerable to very low concentrations of carbon monoxide (CO), especially during the first and last trimesters of pregnancy. Fetuses are not significantly affected by ozone (O3) and sulphur dioxides (SO2) unless their concentrations rise above certain thresholds. My heterogeneity analysis suggests strong gender and racial disparities in the sensitivity to air pollution. In addition, I find maternal smoking and drinking behaviors may act synergetically with air pollution in fetal development. The fact that even a hypothetical safety threshold lying below the current EPA standards would still generate adverse health outcomes indicates that more restrictive regulation is needed to protect fetal health.

Key words: Air pollution, fetal exposure, birth weight, safety threshold

JEL codes: C23, C55, I14, Q51, Q53

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