

# Air Quality and Manufacturing Firm Productivity: Comprehensive Evidence from China

Shihe Fu

Southwestern University of Finance and Economics  
[fush@swufe.edu.cn](mailto:fush@swufe.edu.cn)

V. Brian Viard

Cheung Kong Graduate School of Business  
[brianviard@ckgsb.edu.cn](mailto:brianviard@ckgsb.edu.cn)

Peng Zhang

Hong Kong Polytechnic University  
[peng.af.zhang@polyu.edu.hk](mailto:peng.af.zhang@polyu.edu.hk)

## Abstract

We provide comprehensive estimates of air pollution's effect on short-run productivity for manufacturing firms in China from 1998 to 2007. An emerging literature estimates air pollution's effects on productivity but only for small groups of workers or sets of firms to ensure exogeneity. To provide more comprehensive estimates necessary for policy cost-benefit analyses, we estimate productivity effects for 90% of manufacturing output in China (all but small firms). We instrument for reverse causality between air quality and output using thermal inversions. Our preliminary causal estimates imply an elasticity of output with respect to pollution of -0.76 for  $PM_{2.5}$  and -0.79 for  $SO_2$ . These imply large effects. Lowering  $PM_{2.5}$  by 1% nationwide would increase per-firm output by CNY 97.4 (USD 12.8) thousand annually for the average firm in our sample and increase total output across all firms by USD 4.56 billion annually. Using air quality of a nearby city conditional on wind blowing toward a focal city as an alternative instrument yields an elasticity of -0.26 to -0.47 for a subsample of larger cities and for a different set of pollutants measured by an index. Improving air quality can generate substantial output and productivity benefits. These effects should be taken into account in evaluating environmental regulations and in studying how such regulations affect firm competitiveness.