

# Air Pollution and Job Search Behaviour

Mariët Bogaard   Steffen Künn<sup>a</sup>   Juan Palacios<sup>b</sup>   Nico Pestel<sup>c</sup>

Maastricht University

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<sup>a</sup> Maastricht University, IZA and ROA

<sup>b</sup> MIT and IZA

<sup>c</sup> Maastricht University, IZA and ROA

# Motivation

- Ambient air pollution accounts for an estimated 4.2 million deaths per year (WHO,2016).
- Air pollution and **health**
  - (Brunekreef & Holgate, 2002; R uckerl et al., 2011; ...)
- Air pollution and **labour productivity**
  - (Chang et al., 2016 and 2019; Kahn & Li, 2019;...)
- Air pollution and **cognition/behavior**
  - (Ebenstein, Lavy & Roth, 2016; K unn, Palacios & Pestel, 2019; ...)
  - (Heyes et al., 2016; Chew et al., 2021; ...)
- **Air pollution and job search behaviour**

Theoretical framework

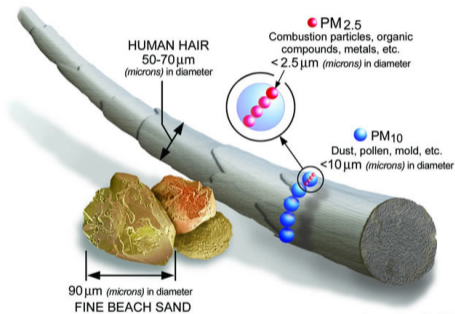


Image courtesy of the U.S. EPA

## What is the effect of particulate matter (PM) pollution on job search behaviour?

### Contribution:

First study examining the consequences of ambient air pollution for unemployed job seekers, by investigating the effects of PM on job search behaviour.

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### Main finding:

High concentrations of PM10 pollution ( $\geq 45 \mu\text{g}/\text{m}^3$ ) trigger a reduction in individuals' reservation wages.

## IZA Evaluation Dataset Survey:

- Individuals registering as unemployed between June 2007 and May 2008
- 17,396 individuals
- First interview wave
- Data on exact timing of the interview

## Pollution and weather data Dist. PM10:

- Source: Federal Environmental Agency & German Meteorological Service
- Radius of 30 kilometers of the county centroid.
- Variables measured hourly: PM10, O3
- Variables measured daily: temperature, humidity, precipitation and wind speed.

## Quasi-experimental setting due to survey design

- Exploiting spatial and temporal variation in PM10 concentrations
- Subjects are called at random → Date/time of the interview and hence **exposure to PM10 can be assumed to be as good as random**
- Exceptions Dist. phone calls
  - Not answering the phone → Return to pool of possible subjects and contacted again
  - Not available at time of contact → Make an appointment
  - We check for the sensitivity of the results by restricting the sample to individuals without an appointment

$$\ln(\text{Reservation Wage})_{ij} = \alpha + \beta PM10_j + \delta X_{ij} + \gamma M + \mu W_j + \nu R_j + \eta_j + \epsilon_j$$

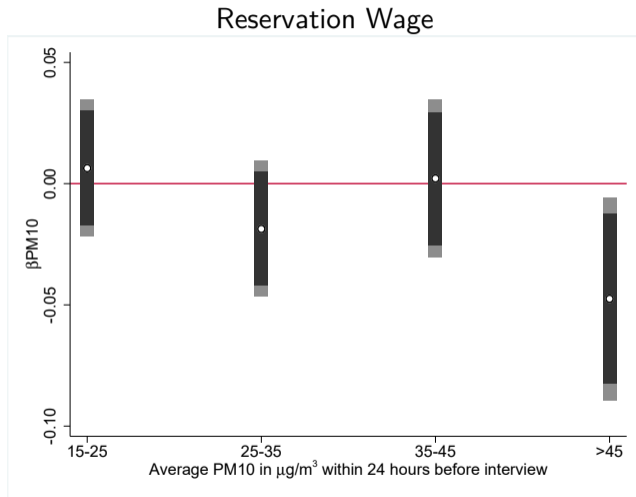
- $PM10_{jt}$ : Average PM10 concentrations over the last 24 hours before the interview. PM10 → RW
- $X_{ij}$ : Individual (labour market) characteristics (*age, gender, education, ...*)
- $M$ : Month of year FE, Hour-by-day FE
- $W_j$ : Weather and environmental controls (*O3, temperature, precipitation, humidity, wind speed*)
- $R_j$ : Regional controls (*Unemployment rate, vacancy rate, GDP, ...*)
- $\eta_j$ : County FE
- $\epsilon_j$ : Clustered at county level

Table: Effect of PM10 on the reservation wage

	(1)	(2)	(3)	(4)	(5)
PM10 (in $\mu\text{g}/\text{m}^3$ )	-0.0013** (0.0005)	-0.0016*** (0.0005)	-0.0017*** (0.0004)	-0.0010** (0.0005)	-0.0012** (0.0005)
Observations	7,724	7,291	7,280	7,280	7,277
Adjusted R-squared	0.2953	0.2930	0.3068	0.3193	0.3156
Individual characteristics	YES	YES	YES	YES	YES
Environmental controls	NO	YES	YES	YES	YES
Month FE	NO	NO	YES	YES	YES
Hour-by-day FE	NO	NO	YES	YES	YES
Regional characteristics	NO	NO	NO	YES	YES
County FE	NO	NO	NO	NO	YES

Dependent variable: log of reservation wage. Robust standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

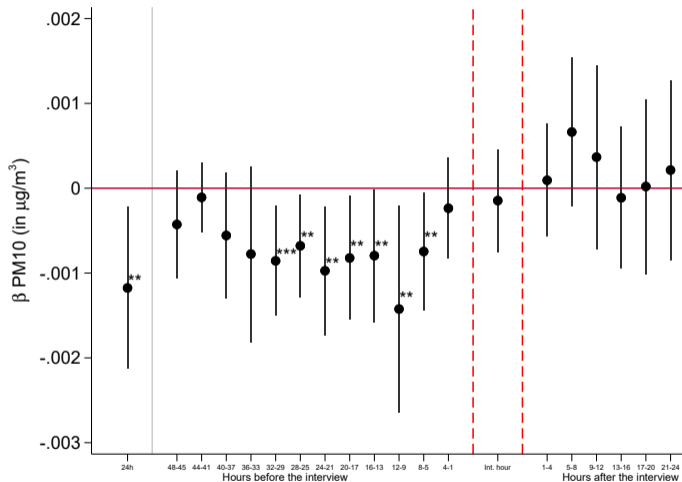




Dots represent point estimates. Reference group: Days with PM10 pollution below  $15 \mu\text{g}/\text{m}^3$ . Black (gray) bars show the 90% (95%) confidence intervals calculated based on standard errors clustered at the state level. All regressions include the full set of fixed effects and control variables.

# Lagged and lead PM10 values

Restricted Sample



The graph shows the estimated coefficient of separate regressions with a 95% confidence interval based on the clustered standard errors.

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Table: Effect of PM10 pollution on the reservation wage

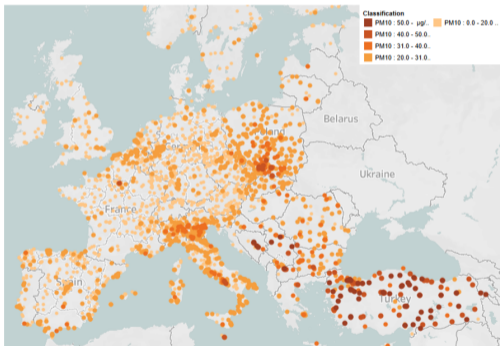
	(1) First stage	(2) Second stage
Wind speed (in m/s)	-2.4691*** (0.0972)	
PM10 (in $\mu\text{g}/\text{m}^3$ )		-0.0034** (0.0013)
Observations	7244	7244
First stage F-stat	645	
Individual characteristics	X	X
Environmental controls	X	X
Month FE	X	X
Hour-by-day FE	X	X
Regional characteristics	X	X
County FE	X	X

Dependent variable: column (1) PM10 and column (2) log of reservation wage.

Robust standard errors in parentheses. \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

- PM10 pollution triggers a reduction in individuals' reservation wages.
- Lagged effect driven by high concentrations of PM10 pollution above  $45\mu\text{g}/\text{m}^3$ .

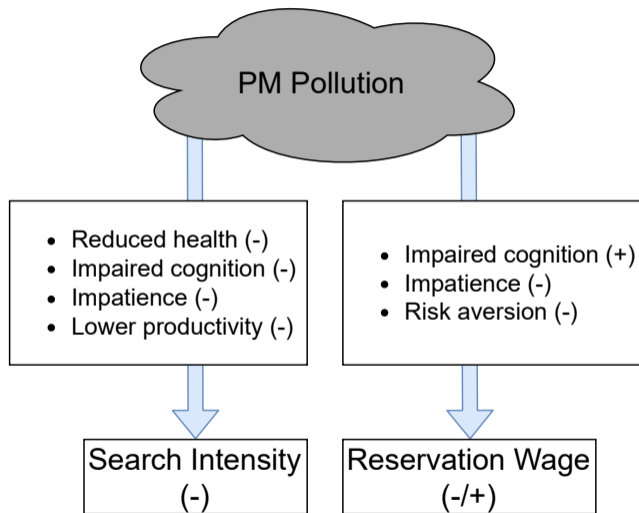
- Still some days with PM10 concentration above  $45\mu\text{g}/\text{m}^3$  per year.

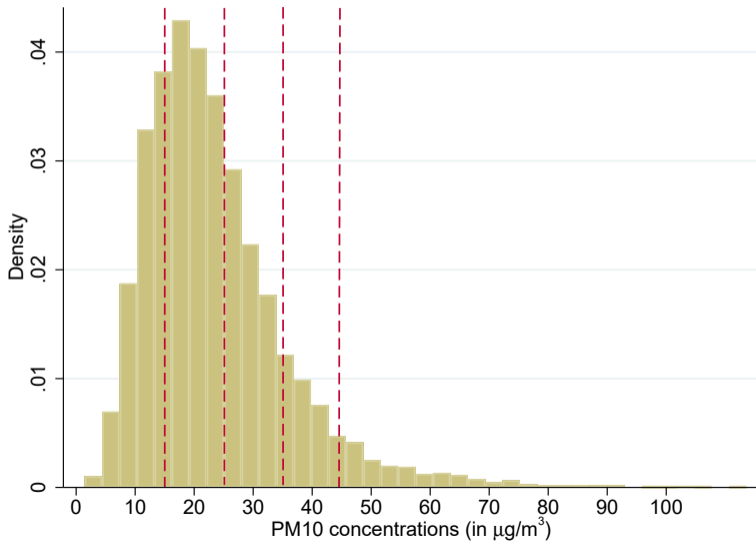


Annual mean PM10 concentrations in 2019 in Europe

- What is the effect of PM10 pollution on individuals' job search success?
  - Observational: PM10 pollution increases individuals' probability to exit unemployment and slightly reduces their realized wages.

**Thank you for your attention!**  
[m.bogaard@maastrichtuniversity.nl](mailto:m.bogaard@maastrichtuniversity.nl)

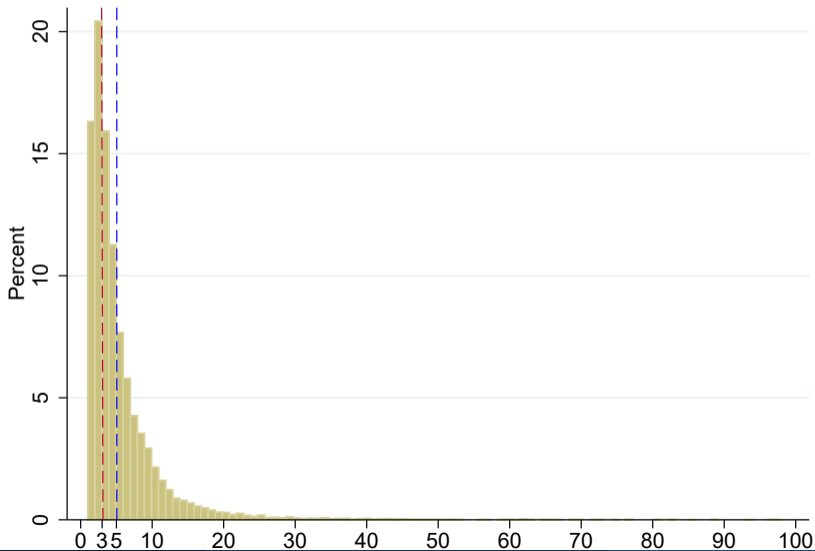






# Distribution of phone calls

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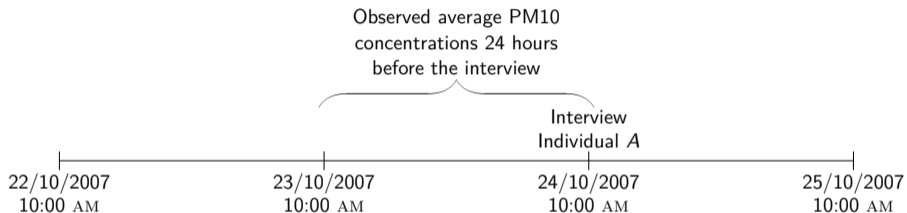
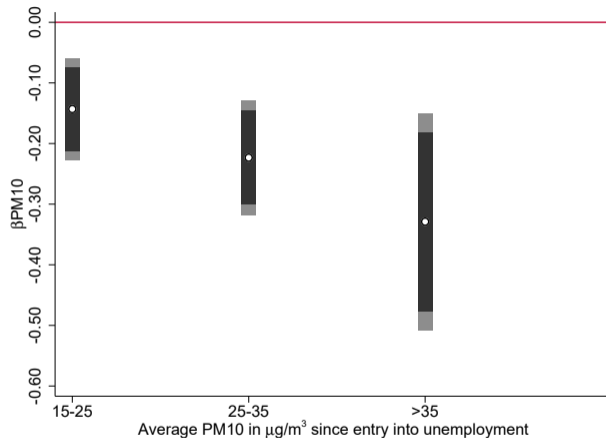
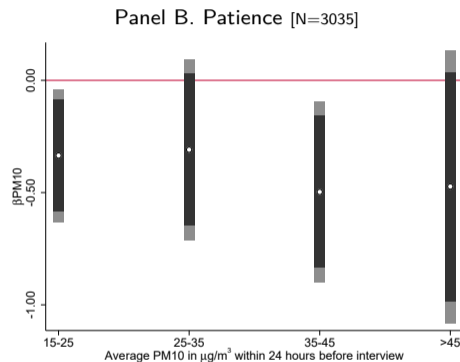
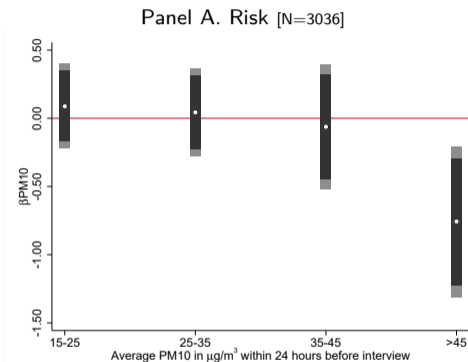


Figure: Matching PM10 to the reported reservation wage



Dots represent point estimates. Reference group: Days with PM10 pollution below  $15 \mu\text{g}/\text{m}^3$ . Black (gray) bars show the 90% (95%) confidence intervals calculated based on standard errors clustered at the state level. All regressions include the full set of fixed effects and control variables.



Dots represent point estimates. Reference group: Days with PM10 pollution below  $15 \mu\text{g}/\text{m}^3$ . Black (gray) bars show the 90% (95%) confidence intervals calculated based on standard errors clustered at the county level. All regressions include the full set of fixed effects and control variables.

