

Transportation Services, Air Quality and Trade

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Links that matter

1. Border ports of entry between trading countries have transportation flows as input to traded goods
2. Traffic delays (idling engines and cold starts) at border ports of entry waiting for good and vehicle inspection affect air quality
3. Delays and air quality may be addressed with different action with different effects

Research Questions

- Has the North American Free Trade Agreement resulted in more air pollution at the border from transported traded good flow?
- How does transportation flow (commercial and private vehicles) influence air pollution?
- What policies have impacted transportation and air pollution?

Background

- Copeland and Taylor (1993)

Institutional effect matters in conjunction with scale, composition, and technique effects that may move in opposite directions

Transportation externalities at borders have not been explicitly modelled. Empirical analyses have been based on simulations of emissions only

Analytical Model Outline

- Air Quality at border ports as a function of traded flow volume, transportation technology, border city characteristics
- Institutional change in the form of trade policy, transportation policy, or environmental policy

Empirical Approach

- Reduced form for econometric estimation
- Ports indexed by i
- Time indexed by t
- Log of Air Quality as function of log terms
- Transportation (trucks, buses, cars, containers)

$$AQ_{it} = \beta_0 + \beta_1 AQ_{base,t} + \beta_2 T_{it} + \beta_3 X_{it} + \varepsilon_t$$

Scope of Analysis-2 borders



Data

- Panel Set from 1993-2007 of Transportation flows (trucks, passenger vehicles, containers (empty, loaded), buses)- 6 U.S.-Canada land ports, 8 U.S.-Mexico land ports
- Air quality at ports, and border cities on each side of both U.S.-Canada and U.S.-Mexico borders (O₃,NO_x,SO₂,PM)

Data

- Trade flow value
- Border wait times -Customs &Border Patrol
- Policies: (1)NAFTA, (2)Dollar value decline, (3)Port policy-road infrastructure

Sulfur Dioxide-SO₂

- Detroit 1 and 2, Port Huron, Sault St. Marie: Trucks, empty containers, private vehicles, Canadian baseline all are positive and statistically significant
- El Paso 1 and 2, Otay Mesa: Trucks, buses, empty containers, U.S. baseline all positive and statistically significant

Nitrogen Oxide

- Detroit 1 and 2, Sault St. Marie, Port Huron: Trucks, Canadian baseline buses all positive and statistically significant
- Calexico East, Otay Mesa, El Paso, Laredo: Trucks, buses, private vehicles, empty containers are all positive and significant, with variation in baseline city due to prevailing wind patterns

NAFTA

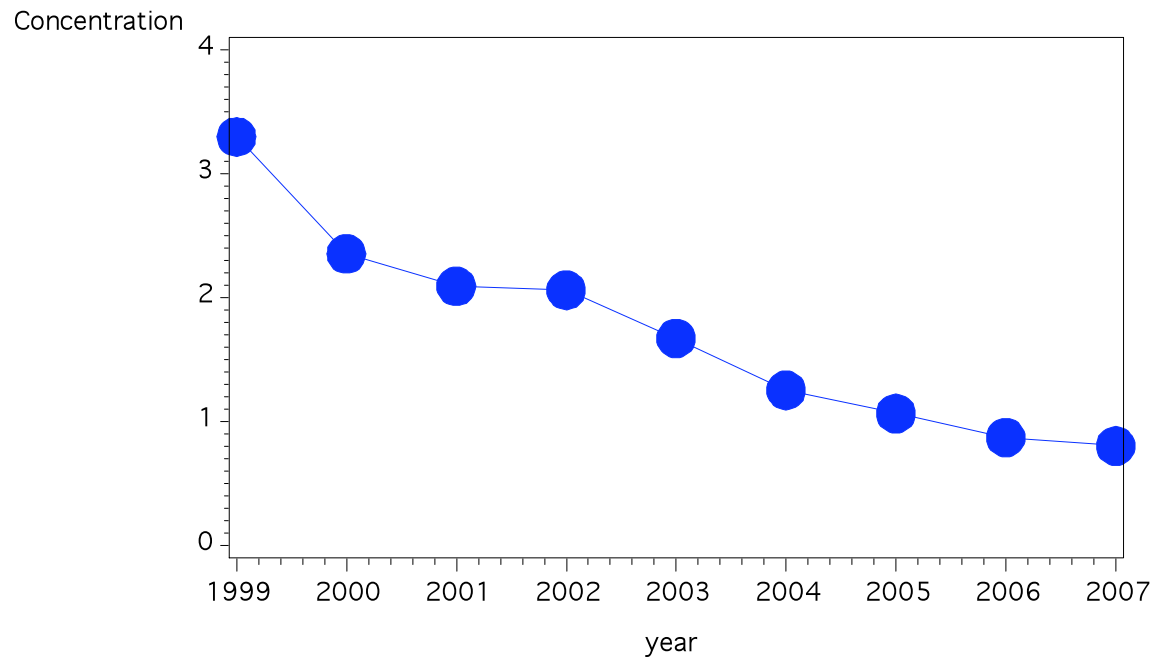
- Ozone (O3)
- Rsquared=0.97
- Policy: 0.039
- Mexico base: 0.262
- U.S base: 0.187
- Empty containers: 3.00E-07
- Loaded containers: -3.84E-07

Dollar Value Decline

- Particulate Matter impacted on both borders from different sources
- Canada: private vehicles are positive and statistically significant
- Mexico: trucks are positive and statistically significant

Road Infrastructure Change

LAREDO pm2.5



Conclusions

- Scale increase (trade transport volume) has positive impact on specific air pollutants at different ports with NAFTA and dollar value decline
- Infrastructure change can reduce particular air pollutants