



A Test of the Relationship between Air Pollution and Exports: The Case of China



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Abstract

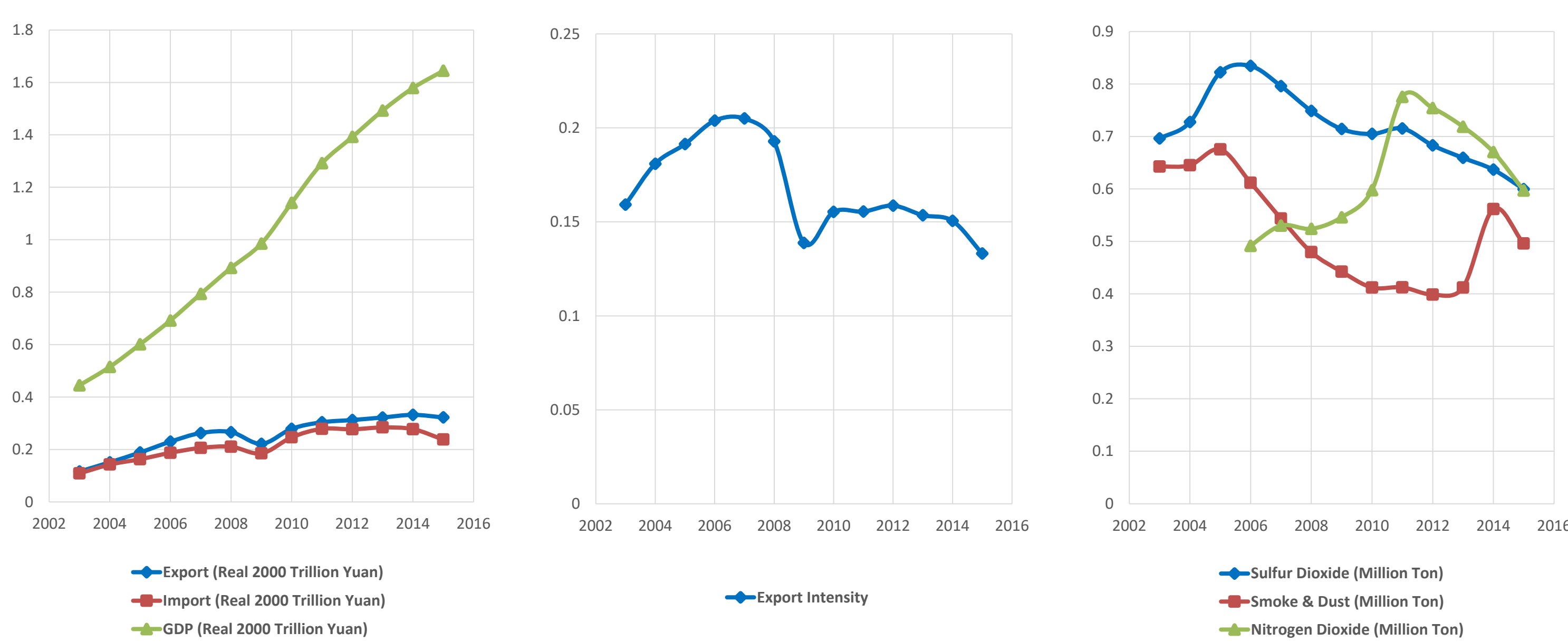
This study estimates the effects of exports on air pollution in China. To avoid endogeneity issues, an instrumental variable strategy is used, which relies on the exogenous shock to export brought about by the Great Recession and the fact that most exports from China are produced in coastal provinces. The econometric model utilizes a two-stage IV regression. In the first stage, export intensity is instrumented using the exogenous variation from the Great Recession and coastal location. Then the predicted export intensity from the first stage is used as the regressor in the second stage regression explaining air pollution.



Data

- Source: National Bureau of Statistics of the People's Republic of China
- Panel $\left\{ \begin{array}{l} 31 \text{ Provinces} \\ 13 \text{ Years: } 2003 \text{ to } 2015 \end{array} \right.$
- Components $\left\{ \begin{array}{l} \text{Air Pollution: Sulfur Dioxide, Nitrogen Dioxide, Smoke \& Dust} \\ \text{Export Intensity = Exports/GDP} \end{array} \right.$

Figure. Trend of GDP, Export, Import, Export Intensity and Air Pollution



Econometric Model

- Structural Form**
$$\text{Air Pollution}_{it} = \alpha_0 + \alpha_1 * \text{Export/GDP}_{it} + \text{Year}_t + \text{Province}_i + \varepsilon_{it} \quad (1)$$
- Reduced Form**
$$\text{Air Pollution}_{it} = \alpha_0 + \alpha_1 * \text{Great Recession}_t * \text{Coastal_Province}_i + \text{Year}_t + \text{Province}_i + \varepsilon_{it} \quad (2)$$
- First-stage Regression**
$$\text{Export/GDP}_{it} = \alpha_0 + \alpha_1 * \text{Great Recession}_t * \text{Coastal_Province}_i + \text{Year}_t + \text{Province}_i + \varepsilon_{it} \quad (3)$$

Results & Conclusions

- Pollution decreases more for coastal provinces following the Great Recession than it does for inland provinces
- Air pollution improves as export intensity declines

Chart 1. The Impact of the Great Recession on Sulfur Dioxide Emissions in Coastal Provinces

	In(Sulfur Dioxide) (Endogenous Regression)	In(Sulfur Dioxide) (IV Regression)	Export/GDP (1 st Stage of the IV)	In(Sulfur Dioxide) (Reduced Form)
Great Recession*Coastal			-0.100*** (0.032)	-0.200* (0.108)
Export/GDP	0.898 (0.563)	2.004* (1.065)		
Province FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Observations	403	403	403	403

Chart 2. The Impact of the Great Recession on Nitrogen Dioxide Emissions in Coastal Provinces

	In(Nitrogen Dioxide) (Endogenous Regression)	In(Nitrogen Dioxide) (IV Regression)	Export/GDP (1 st Stage of the IV)	In(Nitrogen Dioxide) (Reduced Form)
Great Recession*Coastal			-0.100*** (0.032)	-0.259** (0.102)
Export/GDP	1.459*** (0.534)	2.444*** (0.920)		
Province FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Observations	306	306	403	306

Chart 3. The Impact of the Great Recession on Smoke & Dust Emissions in Coastal Provinces

	In(Smoke & Dust) (Endogenous Regression)	In(Smoke & Dust) (IV Regression)	Export/GDP (1 st Stage of the IV)	In(Smoke & Dust) (Reduced Form)
Great Recession*Coastal			-0.100*** (0.032)	-0.053 (0.123)
Export/GDP	-0.173 (0.695)	0.528 (1.178)		
Province FEs	Yes	Yes	Yes	Yes
Year FEs	Yes	Yes	Yes	Yes
Observations	403	403	403	403

Air pollution measured by ton
Robust standard errors clustered by provinces are in parentheses
*** = significant at 1 percent level
** = significant at 5 percent level
* = significant at 10 percent level



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