The Price Air Pollution
1436 - Spatial Economics

Group II

12/31/2022

1 Introduction

Air pollution in China is a persistent issue, but how serious is it? In 2019 the major premature death causes in China were cardiovascular diseases totaling 43 percent, followed by malignant neoplasms (26 percent), respiratory diseases (10 percent), unintentional injuries (6 percent) and neurological conditions (4 percent). Other conditions that accounted for between 3 and 1 percent of premature deaths, in descending order, were digestive diseases, genitourinary diseases, respiratory infections, diabetes mellitus and infectious and parasitic diseases. Due to the outdated benefit structure in China, which will be discussed in more detail in chapter xyz, it is mainly the inhabitants of rural areas who benefit the least.

Thus air pollution has its consequences and these are reflected in the health of the population which accordingly leads to an increase in health care expenditures.

2 Literature review

2.1 Effects of air pollution on health

Analysing the effect of air pollution on health expenditures implicitly implies the aforementioned causal transition dependencies. Various studies have identified direct effects of exposure to air pollution on health.

Franklin, Brook, Pope III (2015) and Fiordelisi et al. (2017) demonstrate that the risk of cardiovascular diseases and the triggering of acute cardiac events is increased by PM air pollution. The pathways through which this occurs include the generation of proinflammatory or oxidative stress mediators in the lung that enter the systemic circulation, the direct infiltration of certain particles or components into the cardiovascular tissue, or an imbalance of the autonomous nervous system. In that context, Hoek et. al (2013) quantify the effect of PM2,5 long-term exposure by conducting a meta-analytic review of previous studies. Their pooled estimate indicates an increase in all-cause mortality and cardiovascular mortality of 6 percent and 11 percent, respectively, if increments of PM2,5 are increased by 10-myg/m3. Equivalently, an increase in NO concentration of the same magnitude leads to an increased all-cause mortality of five percent.

tbd Respiratory diseases tbd lung cancer

tbd DALY

Additionally, Zhao et al. suggest that based on recent findings air pollution may be involved in the development of autoimmune diseases such as diabetes mellitus, multiple sclerosis, or rheumatoid arthritis. The authors argue that air pollution can cause imbalances in T cells, the production of proinflammatory cytokines, oxidative stress, local pulmonary inflammation and methylation changes. These effects are involved with initiating or aggravating autoimmune diseases.

2.2 Air pollutions policies from 2011 to 2018

Air pollution in China has been a major public health problem for many years. However in recent years the government has taken various measures to address the issue. One of the main focuses of these measures has been to reduce emissions of particulate matter, sulfur dioxide and nitrogen oxides. In 2013, prompted by a period of heavy smog in eastern China, the government introduced an "Air Pollution Control Action Plan" to combat air pollution, which included specific targets for reducing particulate matter, sulfur dioxide, and nitrogen oxide emissions. More specifically, targets included, among others, reducing PM10 concentrations in cities by more than 10 percent and reducing PM2.5 concentrations in the Beijing-Tianjin-Hebei, Yangtze River Delta and Pearl River Delta regions of around 25, 20 and 15 percent, respectively.

Furthermore, the 13th Five-Year Plan (2016-2020) also set a target to reduce PM2.5 concentrations in areas heavily affected by air pollution by 18 percent by 2020. Targets have also been set for reducing sulfur dioxide and nitrogen oxide emissions by 15 percent and 15 percent, respectively, compared to 2015 levels. Huang, Pan, Guo, Li (2018) indicate in their analysis, in which they map the national air quality in 74 cities that the issued Air Pollution Prevention and Control Action Plan (APPCAP) in 2013 has shown effect. Between 2013 and 2017 PM2.5 concentrations have reduced in average by about 33 percent, and PM10 concentrations by

about 28 percent. Sulfur dioxide concentrations have reduced as well with an average reduction of about 54 percent. Nitrogen Oxides emissions, however, have not significantly decreased.

In summary, a number of measures have been taken by the Chinese government from 2011 to 2018 to reduce air pollution, including stricter emission standards for vehicles, power plants and industrial facilities, and the closure or upgrading of older, heavily polluting factories, which were partially effective.

2.3 Organization of the Chinese Healthcare System

This chapter will provide an overview of the structure of the Chinese Health Care System and highlight one of its main characteristics: It creates inequalities between the urban and rural population.

In the late 1990s, the years of the opening and globalization as **kanbur_fifty_2005empty citation** describes it, China developed from a centralized to an open market economy, there have been several reforms in the country, including in the health care system.

According to **hougaard_chinese_2011empty citation** no longer the central Chinese government but rather the different Provinces are responsible for the financing and administrating the health care system, instead of a . This, since funding is provided through taxation, in turn led to strong inequalities between the rich coastal regions and the impoverished rural regions in the east of the country. The Chinese health care system is characterized by the division of the population between two groups: The proportion of the population living in the urban and rural areas.

Before we delve deeper into the structure and allocation of the Chinese health care system, it is worth mentioning how social benefits are allocated in China. **liu_institution_2005** describes The Hukou (eng. "individual origin" or also Huji eng. "household origin") is the government's official residence registration. This was introduced in the 1950s with the aim of.

"...to maintain social order, protect the rights and interests of citizens, and serve the construction of socialism."

Because rural areas can further absorb and make use of surplus labor, the central government thought that the majority of the population should live there. Domestic migration of people was also viewed as dangerous because it could result in city overpopulation and endanger farm production. Domestic migration was likewise discouraged by the federal government. The central government closely regulated migration flows, and only recently have these limitations been loosened, in the era of Mao Zhedong. This doesn't imply that the hukou system is no longer in place; rather, it only means that, for instance, rural dwellers can move to a city but won't be eligible for any social benefits there and will have to make due with their own resources.

3 Results

Table 1:

	Dependent variable:
Disposable_Income_per_Capita_Rural	−0.007
	(0.014)
Disposable_Income_per_Capita_Urban	0.009***
	(0.003)
Forest_Coverage_Rate	2.817
	(2.866)
Rural_Population	0.103
	(0.100)
Sample_population_of_age_0_14	−12.516**
	(4.917)
Sample_population_of_age_65_and_older	−0.183
	(3.970)
Urban_Population	0.482***
	(0.075)
Waste_Gas_Emissions_Nitrogen	−0.430
	(0.349)
Waste_Gas_Emissions_Particular_Matter	0.513**
	(0.230)
Waste_Gas_Emissions_Sulphur	0.608*
	(0.330)
Waste_Gas_Emissions_Nitrogen_lag	−0.505
	(0.612)
Waste_Gas_Emissions_Particular_Matter_lag	0.127
	(0.303)
Waste_Gas_Emissions_Sulphur_lag	−0.442
	(0.391)
Disposable_Income_per_Capita_Rural_lag	0.020
	(0.021)
Disposable_Income_per_Capita_Urban_lag	−0.012*
	(0.006)

*p<0.1; **p<0.05; ***p<0.01