Environmental Regulation and Employment Changes

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Contributor: Xin Liu , Zhiyong Kang

This research investigates the impact of the Top 10,000 Energy-Consuming Enterprises Program (hereafter referred to as the carbon reduction policy) implemented by the Chinese government in 2011 on the employment of manufacturing enterprises. The research indicates that the implementation of the carbon reduction policy has two ways of impacting the employment scale, namely ‘employment creation’ and ‘employment destruction’. The actual effect of the policy on the employment scale depends on the superposition of these two effects. Based on a sample data set of Chinese manufacturing enterprises, the generalized propensity score-matching method (GPSM) is used to identify the causal relationship and its mechanism between the carbon reduction policy and the employment scale.

environmental regulation carbon reduction enterprise employment GPSM

1. Introduction

The relationship between environmental regulation and employment has long been a focus of attention for scholars in environmental and labor economics fields [1][2][3][4]. Developing countries, including China, face the dilemma of balancing economic development, employment creation, and environmental protection. Since the 2008 financial crisis, determining how to achieve environmental protection and the potential impact of environmental protection on employment has become a focal point of environmental policy debates. China is the world’s largest developing country with a significant environmental pollution problem. With particulate matter and sulphur dioxide (SO_2) as indicators of environmental pollution, China has one of the worst air pollution levels in the world. The ‘State Environmental Analysis of the People’s Republic of China’ reports that few cities in China’s major urban areas meet the World Health Organization’s air quality standards. As environmental problems caused by economic development have become increasingly prominent in China, the government’s attention to environmental quality and demands for pollution control has increased. Furthermore, as the world’s most populous country, employment has always been at the core of China’s economic development. Government work reports over the years have emphasized the importance of employment, adhering to employment priority strategies, and implementing proactive employment policies, making fuller employment one of the core goals of the transition to high-quality development. In the context of globalization, people are becoming increasingly concerned about environmental issues, to the extent that there are calls to sacrifice employment and economic growth to improve the environment. Improving the environment and increasing employment are crucial for China’s livelihoods and national strategy.

Whether China can achieve simultaneous environmental improvement and employment growth will be a significant challenge for the government in the future.

Strict environmental regulations can increase production costs for companies, leading to higher product prices, reduced demand, and further decreases in input demand, including labor. This situation means that environmental regulations affect employment; however, subsequent studies have shown that strict environmental regulations can also encourage companies to increase hiring to install and maintain pollution control equipment or change their production processes to reduce waste. This situation may require more workers than in previous production processes; therefore, company labor employment may increase when environmental regulations become stricter. The neoclassical microeconomic theory cannot predict which of these two opposing mechanisms will dominate; therefore, the impact of environmental regulations on employment is uncertain and requires empirical research and analysis [5]. Most empirical studies on the effects of environmental regulations on labor demand have focused on developed economies, including the United States and European countries. Research on developing countries has been limited, especially concerning large and rapidly developing countries like China. Unlike Western countries, which tend to adopt market-oriented environmental regulations, China's market mechanisms are still in continuous improvement, with administrative environmental regulations playing a dominant role. As China is a developing country, the government plays a crucial role in economic development. Some scholars believe the Chinese government has always faced a conflict between economic growth and environmental protection [6][7]. The government's intrinsic motivation to pursue economic growth may lead it to prioritize the protection of manufacturing industry employment and increased fiscal revenue and selectively ignore environmental issues [8][9]. Therefore, the reliability of environmental regulations and the research conclusions based on these policies is debatable [10].

2. Environmental Regulation and Employment Changes

The relationship between environmental regulations and employment has long been studied; however, academic circles have no consensus on whether environmental regulations increase or decrease enterprise employment. Early studies believed that implementing environmental regulation policies would inevitably affect the employment scale of specific industries [2] and cause fluctuations in employment demand [3]. The reason is that regulated entities must purchase expensive equipment to reduce their pollution emissions to avoid the risk of closure. Strict environmental regulations may increase operating costs for manufacturing enterprises and lead them to adopt capital-intensive technologies, negatively impacting employment [4][11]. Early studies on the US Clean Air Act found that stringent environmental regulations negatively affected employment [12][13], and this negative impact was particularly evident in energy-intensive industries [14]. Conversely, subsequent research found that the relationship between environmental regulations and employment exceeded previous expectations, and the two were not simply negatively correlated. Bezdek [15] conducted empirical tests showing that strict environmental regulations did not lead to decreased employment but stimulated economic growth. Some studies have found a complementary relationship between environmental protection, economic growth, and employment [16]. That means environmental protection reduces employment and creates new job opportunities, and the net balance between employment

creation and job loss may be positive. In other words, implementing environmental regulation policies may have a 'neutral' or 'favorable' impact on employment [17]. From an innovation perspective, Porter and Van (1995) proposed that environmental regulations can stimulate enterprises to adopt research and development innovation to improve productivity, enhance the competitive advantage of manufacturing enterprises, and affect the employment demand of manufacturing enterprises. Berman and Bui [5] constructed an empirical equation between environmental regulations and labor demand using micro-enterprise data to examine the impact of environmental regulations on employment, finding that environmental regulations had no significant negative impact on enterprise employment. Cole and Elliott [18] and Gray et al. [2] conducted empirical studies using a similar model to Berman and Bui [5]; they also found no evidence of the negative impacts of environmental regulations on enterprise employment. Empirical research on the US Environmental Protection Agency's sulphur dioxide trading program also supports that environmental regulations did not significantly reduce the employment rate of regulated fossil fuel power plants [19]. Studies on the labor demand of the European Union Emissions Trading System (EU ETS) also found no statistical evidence of environmental regulations reducing employment [20][21].

As China's environmental issues become increasingly severe, scholars have begun to study the impact of environmental regulations on employment in China. Due to the availability of microdata, existing studies have primarily focused on industry or regional data and the promotion hypothesis, the inhibition hypothesis, and the non-linear hypothesis have received some evidence support. Lu [22] conducted a study on 43 industries in China and found that introducing a 'carbon tax' in China would negatively impact employment. Sun et al. [23] argued that the 'two control zones' policy implemented in China is generally unfavorable for improving urban employment. Shi and Wang [24] examined Chinese industrial sector data. Yuan and Xie [25] and Chen, et al. [26] investigated Chinese prefecture-level city data. Sun and Yang [27] empirically studied the Chinese 'two control zones' policy, each finding that environmental regulation is conducive to expanding employment scale. Yan and Guo [28], Li and Du [29], Zhong et al. [30], and other studies argued that a non-linear relationship exists between environmental regulations and employment. Furthermore, the difference in the intensity of environmental regulations is a key factor leading to this non-linear relationship. As of the end of 2019, only two studies had examined Chinese micro-enterprise data, concluding that environmental regulations negatively impact enterprise employment. Liu et al. [3] studied the impact of changes in industrial wastewater discharge standards on employment in industries such as textiles based on China's environmental statistics and industrial enterprise databases. The results showed that stricter industrial wastewater discharge standards decreased labor demand, primarily reflected in the sample of private enterprises. Sheng et al. [31] used World Bank data from a 2003 survey on the investment environment in 18 cities in China to study the impact of environmental regulation policies on employment in 1375 manufacturing firms, finding that environmental regulations adversely affected employment in manufacturing firms through its output and substitution effects.

The differences in sample data and the variations in measuring environmental regulation policies can significantly affect research conclusions [32]. Obtaining reliable data on environmental regulations has always been a challenging task. The inherent motive of the Chinese government to pursue economic growth tends to prioritize protecting manufacturing industry employment and increasing fiscal revenue, resulting in selectively neglecting environmental issues [8][9], further complicating related research. Selecting effective environmental regulation

variables for research is essential for obtaining reliable conclusions. China's current environmental regulation measures mainly belong to end-of-pipe control policies, which are susceptible to interference from local government behavior. Research on data from macro-level policy, such as the 'two control zones' policy, usually suffers from aggregation bias. In comparison, the carbon reduction policy decomposes the national macro energy-saving goal into carbon reduction quotas borne by micro-enterprises, which belong to the front-end policy restricting energy use rights of enterprises. Therefore, research conclusions based on the carbon reduction policy have higher reliability. Currently, only two studies have examined the micro-enterprise samples in China, and the period and sample size of these studies lack representativeness. More importantly, existing studies often focus on the relationship between environmental regulation policies and overall employment, neglecting the impact on employment structure changes, thus failing to reveal the influence of environmental regulations on employment. Davis and Haltiwanger [33] used data from U.S. manufacturing enterprises to decompose employment changes into rates of employment creation and employment destruction, re-examining the issue of employment from two dimensions: Employment creation and employment destruction. This analytical framework has been widely applied in subsequent labor market research and provides possibilities for studying the impact of environmental regulations on employment from the perspectives of employment creation and destruction.

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