

Greening Chinese Economy¹

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1 Introduction

The year 2020 has seen the world economy enter a new phase with the occurrence of Covid-19. Countries around the world are forced to lock down to prevent a pandemic, and the economic damage is immeasurable. The need to retain jobs and industry is increasing the focus on the Green New Deal in the United States and Europe.

This article discusses China's progress on the Green New Deal and the possibilities for the future. According to Professor Angang Hu, an economist who is considered to have a strong influence on the direction of the Chinese government's economic policy, the Green New Deal has already begun in China³. The trigger for the Green New Deal was the global financial crisis of 2008. China's economic policy is strongly guided by its five-year economic plan. It is not an economic policy that utilizes the "invisible hand" of God, but an economic plan of the "visible hand" of man⁴. It is an economic plan pushed to the forefront. What does the "Green New Deal" mean in China? And what are the characteristics of China's Green New Deal, and what is the potential of China's Green New Deal for the post-Covid-19 world?

There are three reasons why we should focus on China's Green New Deal. First, its potential as an employment policy: for the world of the future, which will alternate between the Covid-19 epidemic

¹ This report was written for a webinar sponsored by the Green New Deal Policy Research Group of Japan. This paper was written with support from the Bell Foundation. This paper was based on the research supported by JSPS KAKENHI Grant Numbers 19H04332.

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³ 胡鞍鋼 (2012) 『中国のグリーンニューディール：「持続可能な発展」を超える「緑色発展」戦略とは』 日本僑報社(Japanese).

⁴ Proff. Hu does not deny the "invisible hand" of the market, but emphasizes that they are complementary to each other.

and lockdown, there is a need for economic policies that guarantee stable employment. Industrial policies that create jobs will be an important issue for both developed and developing countries. The role of governments will be greater than in pre-corona societies.

Second, as the world's largest population, vast in area, and with strong international political power, China's environmental policies will not only contribute to environmental improvement at the global level, but will also set the tone for the future of the international community.

Thirdly, it is a way to deal with global environmental issues. The transition to a low-carbon society, the effective use of renewable natural resources, the protection of nature, the prevention of pollution, and the spread of renewable energy are issues that are universally faced by modern society. Developed countries such as Europe have taken the lead in addressing these environmental issues. However, the developed countries have much to learn from the rapid greening of the Chinese economy, and developing countries have even more to learn. How has the Chinese economy gone green?

2 The Philosophy of China's Green New Deal

Let's review Prof. Hu's discussion on the philosophy of China's Green New Deal. China gradually embraced the market economy with its reform and opening-up policy in 1978. Reform and opening up led to rapid economic growth, but while the emphasis was on the economy, it neglected ecology, leading to rapid energy consumption, increased pollution, and waste of natural resources, which Prof. Hu has harshly criticized, calling it the "ecological deficit". On the other hand, the greening of China's economy has also begun to be considered. The increase in energy consumption called for improvements in energy efficiency. To deal with the increase in greenhouse gas emissions, low-carbon policies were considered. To deal with the rapid increase in pollution emissions, decoupling of pollution and economic growth was sought. To deal with the destruction of ecosystems, the regeneration of ecosystems was promoted. Energy, carbon dioxide, pollution, and ecosystems are the

key concepts of China's Green New Deal.

The two Five-Year Plans of the 2000s, namely the 9th and 10th Five-Year Plans, explicitly made the transition from "black development" to "green development". Proff. Hu criticizes the term "sustainable development", which refers to economic growth with increased energy consumption, increased greenhouse gas emissions, increased pollution, and ecological destruction. He says that the term "sustainable development" is opposed to the environment and the economy. It can be said to balance the environment and the economy. There is a vicious circle there, where the environment deteriorates as the economy grows, and we have to deal with it. In contrast, green development is a thorough decoupling of environmental indicators and economic growth. Rather, it is aimed at coupling improvements in environmental indicators with economic growth.

Proff. Hu suggests that for an accurate understanding of China's economy, green GDP should be used as a benchmark, rather than GDP as a yardstick⁵. China's green GDP, which takes into account environmental factors such as air and water pollution, protection of natural wetlands, prevention of desertification, and increased forestation, was lower than GDP until 1996, but has been higher since then, and has remained higher than 10 percent since 2002, he said. Green GDP, which is estimated by the World Bank in a different way than Proff. Hu, shows a similar trend, albeit at a lower level itself. The environmental and economic decoupling emphasized in the Green New Deal has had some success.

The Eleventh Five-Year Plan emphasizes greening energy in the post-Global Financial Crisis era:

- 1) reducing the share of fossil fuels in primary energy; 2) reducing the share of coal in fossil fuels; and
- 3) developing technologies to use clean coal. Forest coverage is also often emphasized in China.

⁵ The World Bank's green GDP is nominal GDP minus natural asset depletion, plus human capital investment; Proff. Hu, on the other hand, adds human capital investment plus non-educational health and sanitation spending and R&D spending, plus green investments such as energy conservation, ecological construction, and environmental protection, to create a net first-order, third-order. It advocates its own standards with the addition of imports.

Increasing forest cover not only increases the capacity to absorb carbon dioxide, but also has a variety of benefits, such as recharging water sources, preventing desertification, preventing soil runoff, maintaining biodiversity, improving the ecological function of society as a whole, improving quality of life, and improving amenities. The goal of the project is to create a world in which three spaces are harmonized: highly concentrated and efficient productive spaces, comfortable and livable spaces, and beautiful ecological spaces with blue mountains and clean water.

Proff. Hu summarizes the harmonization of these three spaces as the "Three Spheres Theory of Green Development". He says that the economic system should bring green growth, the social system should bring green welfare, and the natural system should bring green property. Green growth is an increase in green GDP. Green welfare refers to the improvement of health standards, social stability and quality of life. It also includes eliminating poverty, creating employment opportunities and enhancing human investment. A society that values equity and cares for the vulnerable is required. Green property is the part of the natural system that is closely related to human life and is not emphasized in the SNA, such as sunlight, air, land, mineral resources, plants, and animal microorganisms. It refers to repairing natural systems and increasing natural capital by achieving total decoupling of economic growth and non-renewable resources and pollutant emissions.

3 Chinese Green New Deal in Practice

To review the current GND status in China, Figure 1 shows China's GDP and coal consumption. As mentioned earlier, the decoupling of the economy from the perspective of energy consumption as well as from the perspective of pollution is important, especially with regard to fossil fuels, and the relationship between economic growth and coal consumption certainly disappeared between 1995 and 2002. However, since 2002, with the rapid economic growth, coal consumption has also increased. The groundwork for green development was laid during these two periods; the decoupling of the

economy and coal appears to have been completed after 2013, when the FIT was introduced.

Figure 2 shows the forest cover by area and province in China. Ecological development is the main focus of China's GND, with the forest area increasing by 125 millions hectares in the last 30 years, which is four times the area of Japan. This is four times the area of Japan. The forest coverage by province has also increased overall, but due to the vastly different climates in China, there is no significant change between the top and the bottom provinces in terms of forest coverage, and the increase in the medium level can be clearly observed.

Figure 3 shows investment in pollution control in China. The ratio of investment to GDP was relatively high between 1997 and 2006, accounting for more than 0.2% of the country's total investment. Since then, the investment amount has been increasing with economic growth, especially after the global financial crisis, and in the 12th Five-Year Plan, an increase in the investment amount in the industrial sector is observed again.

Since various indicators are emphasized in China's GND, not all of them can be reviewed here. As we can see the environmental and economic decoupling towards green development, improvement of the ecological environment, and increase in investment, it is necessary to analyze the impact it has had on employment, for GND to be a "New Deal", it must be more than just an environmental policy. This is because it must lead to economic growth and fair employment growth. Here is the latest research on GND in China.

A study by He et al. (2019) empirically analyzes the impact of renewable energy investments on employment. Using panel data from a panel of 141 renewable energy companies listed in China from 2005 to 2016, the analysis finds that a 1% increase in renewable energy investments raises 0.031% of the nation's employment volume⁶. However, the impact on overall employment is offset because it

⁶ 何凌云、杨晓蕾、钟章奇、祝婧然 (2019) 「我国可再生能源投资的就业效应研究:整体和行业视角」『中南大学学报(社会科学版)』 Vol.25 No.3、84-95(Chinese).

draws down employment at almost the same level for existing industries, such as fossil fuels. Since medium- and long-term technological development has a negative impact on employment, the report concludes that the shift to renewable energy has the effect of reducing employment. However, the impact varies greatly depending on the type of renewable energy. The report states that policies should focus on geothermal and biomass because geothermal, biomass, solar, wind, and hydroelectric power have the strongest impact on increasing employment, in that order.

For example, with regard to biomass energy use, Zang et al. (2019) estimated that the potential for woody biomass energy increased from 780 million tce⁷ to 1.1 billion tce in the 20 years between 1993 and 2013⁸. Although regional differences are extremely large due to climate and other factors, some provinces have rapidly increased the amount available, indicating that there is a high potential for promoting the use of biomass energy. China's biomass power generation capacity was 18 GW in 2018, and about 200 million tce of biomass energy was used for forestry waste and agricultural waste, respectively⁹. Although the use of heat from cogeneration is also being promoted, currently only power generation is the mainstream, with 36 TWh of electricity being transmitted in 2017. Power generation from waste and other sources is also popular, with 12 TWh of electricity transmitted in 2017. If we focus only on woody biomass, the potential is more than five times greater.

In considering the Green New Deal, it is not only important to invest in renewable energy, but also in the environment as a whole. Su et al. (2020) estimated that a 1% increase in environmental investment is expected to increase employment by about 0.03%¹⁰. The effect of increased employment, especially for secondary and tertiary industries and college graduates, has been identified, with

⁷ tons of coal equivalent, equal to 2.93076×10^{10} joules.

⁸ 臧良震、张彩虹 (2019) 「中国林木生物质能源潜力测算及变化趋势」『世界林业研究』Vol.32 No.1、75-79(Chinese).

⁹ 中国产业发展促进会生物质能产业分会 (2019) 『中国生物质发电产业排名报告 2019』(Chinese).

¹⁰ 苏丽锋, 高东燕 (2019) 「环保投资对就业的带动效应及政策含义」『环境与可持续发展』No.1、76-81(Chinese).

negative short-term and long-term positive effects on GDP. Referring to Prof. Hu's argument, it can be seen that while environmental investments contribute well to green GDP and the decoupling of the environment from the economy, the path of impact on GDP, employment and wages is complex, and the effects of existing environmentally polluting industries on environmentally compatible It would be reasonable to interpret this as observing a shift toward industry (green industry).

Investment in China's Green New Deal often takes the form of formal private investment. In China, the policy goal is to improve economic and environmental indicators based on the five-year plan. Since the reform and opening up, the economic system has introduced a market economy led by the private sector, and the government needs to guide the private sector.

Here we present our two studies; Sato (2015) analyzes appliance recycling subsidies using an industry relation table¹¹. In China, in order to promote home appliance recycling, a levy is imposed on newly sold home appliances to subsidize home appliance recycling, which is funded by the levy. By guaranteeing profits in the green industry, it promotes environmental investment. This is different from a mere subsidy policy for capital investment in the green industry, which can be positioned as a subsidy policy for the flow of production activities.

A similar scheme is used for the spread of renewable energy. A feed-in tariff (FIT) for renewable energy was introduced in China in 2013, and it is a subsidy to promote renewable energy investment by adding a levy to the electricity price and using it as a source of funds. However, according to Xu et al. (mimeo), the ratio of subsidies to the purchase price of renewable energy is not large¹². Most of the cost of renewable energy generation is purchased by the utility companies and is covered by the electricity prices paid by the end consumers of electricity. However, a distinctive feature of China's renewable energy policy is the setting of this electricity tariff. China's electricity prices are set at

¹¹ Sato, Kazuaki(2016), "Input Output Analysis on Chinese Urban Mine", in Masashi Yamamoto and Eji Hosoda eds., *Economics of Waste Management in East Asia*, pp.180-200.

¹² Xu, Yirui, Kazuaki Sato and Kensuke Yoshihiro(mimeo), "Chinese Renewable Energy Policy and Financial Adjustment: from Regional Discrimination Prices of Electricity"(Japanese).

different levels in different provinces. The provinces with a strong economy have high electricity prices, while the provinces with a weak economy have low electricity prices. Therefore, the driving force behind China's renewable energy policy is discriminatory electricity prices by region, and the huge electricity prices paid in the provinces with strong economic power are the source of renewable energy purchases.

Environmental investment is not the only element of the Green New Deal. Environmental regulations are also important and the impact of those regulations on employment needs to be analyzed; Sun et al. (2020) analyzed the impact of environmental regulations on employment between 2006 and 2016 in a spatial econometric model with provincial panel data¹³. Their conclusion is that environmental regulation has a double dividend: environmental improvement and job creation. They point out that local environmental regulation has a positive impact on employment due to the direct costs of environmental measures, substitution effects, and technological innovation, and that increased environmental regulation in one area has a positive spillover effect on neighboring municipalities. They suggest that local governments should effectively strengthen environmental regulations, promote technological development, promote worker skills, strengthen coordination among municipalities, strengthen environmental monitoring and clarify administrative responsibilities.

China's GND is certainly making progress. The decoupling of the environment and the economy, restructuring of the natural environment, tighter regulations and subsidy schemes have encouraged environmental investment, and the creation of jobs has also been identified as a result of GND. However, the greening of the economy and society has also resulted in the loss of jobs in existing polluting industries. This is especially true for the energy industry, where hydropower and solar power generation is very investment-efficient and is capital- rather than labor-intensive. This confirms the

¹³ 孙文远、周寒 (2020) 「环境规制对就业结构的影响——基于空间计量模型的实证分析」『人口与经济』 No.3、106-122(Chinese).

fact that the shift from black to green industries has been strong in the past.

4 The Possibility of Chinese Green New Deal

Finally, we will summarize the future possibilities and lessons for China's GND. As we have already seen, China's economic policy is clearly aimed at green development. As a result, China's green development strategy has been successful. On the other hand, its effectiveness in creating jobs, raising average income and reducing inequality is insufficient. The black and polluting industries also created a lot of jobs. In China, which has a large area and a large economic disparity within the country, factories are moving from the coast to the interior. In the coastal areas, high-tech, clean factories are operating at the same level as in other developed countries. Workers' income levels are also higher. However, inland areas, pollution from factories that have moved out of the coastal areas is spreading, and the building of a green economy and society is a long way off.

Economic growth and environmental improvement in the country's underdeveloped areas must be achieved simultaneously. Due to the economic disparity and pollution situation in China, it can be said that the potential of GND still remains; from the point of view of the concept of GND and green development, income equality and narrowing the disparity between the regions are important issues, and it is necessary to pay attention to the future trend of Chinese economy.

The experience of China can be summarized in three points. First, it is about employment. The development of green industries means the decline of black industries, as observed in some renewable energy and pollution investments. Although the shift from polluting industries to clean industries is desirable as an environmental policy, it is not effective enough to increase employment, increase average wages and reduce income disparity; GND should further focus on fair employment and promote the accumulation of human capital to create quality jobs. In China, afforestation and forestation are in progress, and the use of biomass as an energy source has been shown to be highly

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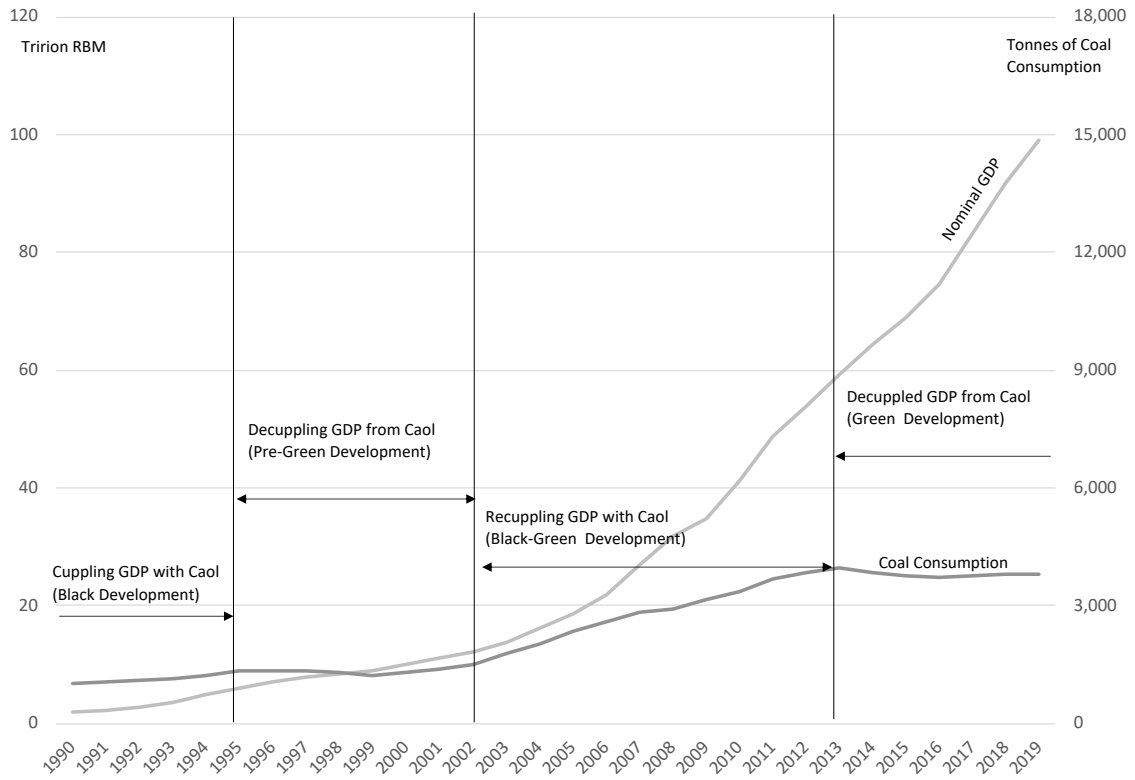
effective in creating jobs. There is a need to focus on green but labor-intensive industries that appear to be economically inefficient at first glance.

Second, it is a way to invest in the environment. While the New Deal tends to focus on government investment, China's GND is not necessarily preceded by public investment by the government. Rather, it is important to guarantee the private sector the benefits of green investment and remove the long-term uncertainty. Policy tools include regulation and schemes that combine levies and subsidies. Public and private financing support through the financial sector and local lending platforms, which we have not been able to mention in this paper, is also important.

Third, it is a fair burden. China's FIT differs decisively from other countries' schemes in that it makes use of regional differential pricing. Regional differential pricing and the spread of renewable energy have led to redistribution among regions. Indirectly, it also contributes to income redistribution, with higher income groups bearing more of the burden. Not only taxation, but income redistributive financing can also secure more financial resources. The rapid development of GND in China can be attributed to the strengthening of its income redistribution function.

The GND in China is instructive for a post-corona economic policy, as the Covid-19 will force a change in the conventional mass consumption society. There is a growing need to create massive and good quality jobs. In the context of the need for fair job creation, policy schemes and a vision of industrial policy that directs public and private investment to green industries will be important. There is uncertainty about how the pandemic will continue and whether it will go away. But it is clear that we are under pressure to discuss the nature of economic policy for each scenario. Let's start the discussion on the future of the Green New Deal.

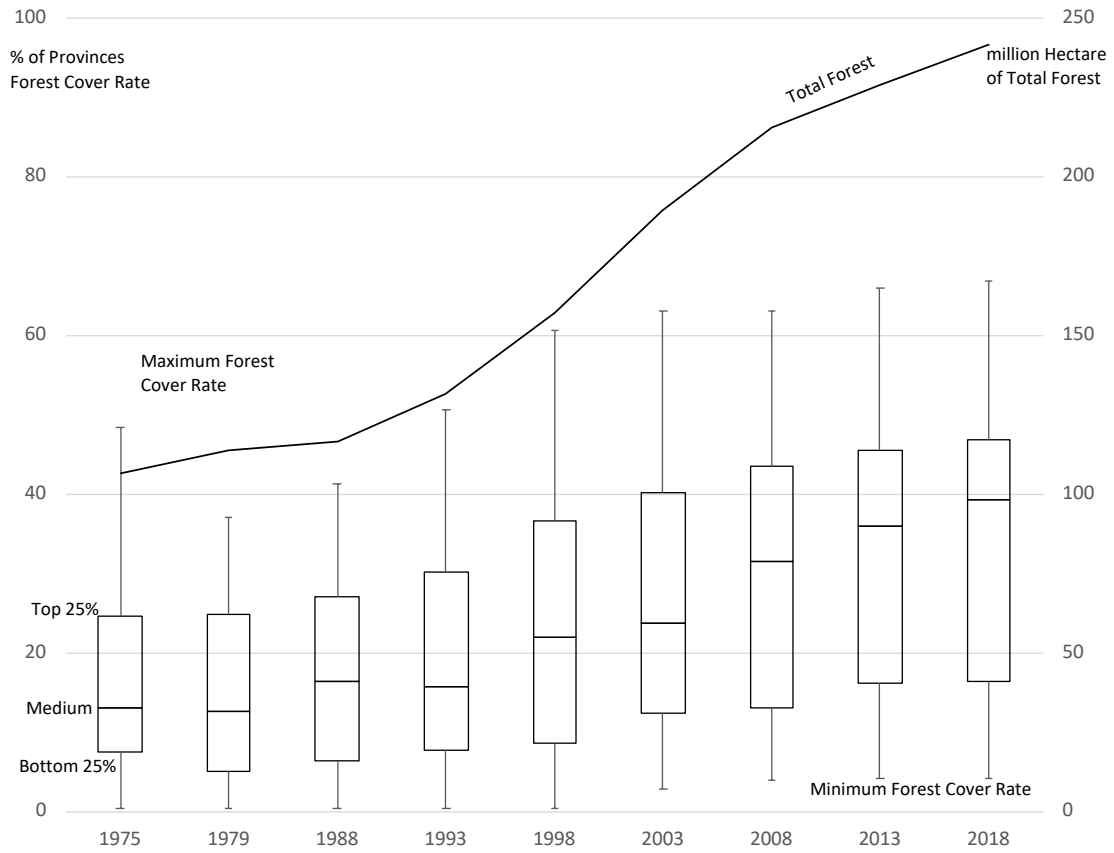
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Economic Growth and Coal Consumption Figure 1

data: Enerdata Yearbook and Chin Statistical Yearbook

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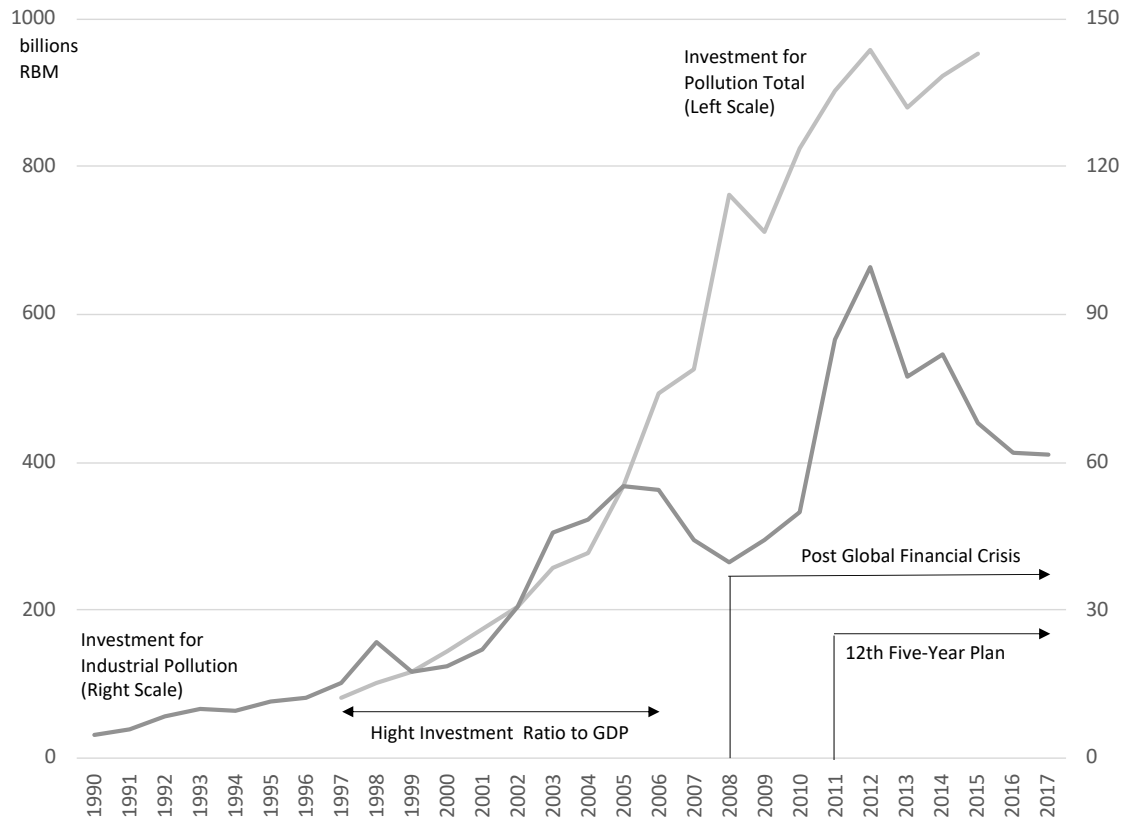


Forest Area and Forest Cover Ratio by Provinces

Figure 2

data: China Forestry(<http://www.forestry.gov.cn/gjzlzyqc.html>)

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Investment for Pollution: Total and Industrial Figure 3