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PERSPECTIVE

Escaping the resource curse in China

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Abstract Many societies face an income gap between rich regions with access to advanced technology and regions that are rich in natural resources but poorer in technology. This "resource curse" can lead to a Kuznets trap, in which economic inequalities between the rich and the poor increase during the process of socioeconomic development. This can also lead to depletion of natural resources, environmental degradation, social instability, and declining socioeconomic development. These problems will jeopardize China's achievements if the current path continues to be pursued without intervention by the government to solve the problems. To mitigate the socioeconomic development gap between western and eastern China, the government implemented its Western Development Program in 2000. However, recent data suggest that this program has instead worsened the resource curse. Because each region has its own unique strengths and weaknesses, China must escape the resource curse by accounting for this difference; in western China, this can be done by improving education, promoting high-tech industry, adjusting its economic strategy to balance regional development, and seeking more sustainable approaches to socioeconomic development.

Keywords Environmental degradation · Kuznets trap · Resource curse · Regional gap · Resource exploitation · Unbalanced development strategy

INTRODUCTION

When China's reform of economic institutions began in 1978, the government implemented an unbalanced regional development strategy that prioritized eastern coastal provinces. This created a large and growing gap between western and eastern China. To solve this problem, China's government implemented its Western Development Program (WDP) in 2000 in an effort to narrow the gap and balance regional development. However, recent data suggest that this approach has failed to reduce the gap between western and eastern China; on the contrary, the absolute gap has increased. From 2000 to 2012, the China Statistics Bureau (2013) reports that the gap in per capita GDP increased from 6637 RMB (1065 USD) to 26 731 RMB (4291 USD). Eastern China has developed a much stronger ability than western China to promote its own development, and has developed an equally strong ability to capture more of the state's fixed investments, and this difference reinforces the gap.

Part of the problem is a bad investment environment in western China, which is associated with the region's poor infrastructure; as a result, economic growth in this region relies too heavily on government infrastructure investments. Even though the Western Development Program provided huge investments, much of this money did not actually benefit western China. For example, the West–East Gas Pipeline Project and the West–East Electricity Transfer Project were nominally intended to stimulate development of western China, but in practice, they provided cheap electricity and resources that promoted the development of eastern China. In addition, resource exploitation in western regions has led to continuous increases in environmental damage (Ash 2006). This "resource curse," which is also referred to as the "Kuznets trap" (Kuznets 1955), is depleting western China's natural resources, accompanied by accelerating environmental degradation. Because a similar challenge faces other developing nations, lessons learned from China's experience will have global implications.

Fig. 1 The locations of eastern, central, and western China

THE GAP BETWEEN EASTERN AND WESTERN CHINA

Inequality between eastern and western China

China's western regions are remote from the more populated and developed eastern regions. All provinces in this region except Guangxi are located far from the sea (Fig. 1), which provides an important trade advantage for most provinces in eastern China. Most of the western region lies on China's frontier, and the neighboring countries are developing countries whose economic development levels are even lower than those in China's western regions; as a result, they represent weak trading partners. China's total imports and exports increased from 474.3×10^9 USD in 2000 to 3866.8×10^9 USD in 2012, but the proportion of this trade accounted for by western China decreased from 25.5 % in 2000 to 14.3 % in 2012 (China Statistics Bureau 2013). A recent report noted that the development of western China still faces "many difficulties, many problems" and that it will be an "arduous" task (Ash 2006).

In China, property belongs to the nation rather than to individuals. Most profits from resource exploitation are therefore earned by the central government and by state-owned enterprises, and local residents typically receive few benefits from resource extraction. This problem is exacerbated by weak institutions that prevent the provincial governments from stimulating the local economy and raising revenues from taxing the booming resource sectors. These activities hurt the competitiveness of provincial economies. Inflation resulting from economic growth also increases the prices of goods, thus lowering the competitiveness of local economies (Zhang et al. 2008). In addition, a large proportion of the resources produced by western China cannot be used to improve the local economy, since the resources are mostly exported to eastern China to satisfy that region's large and growing demand for energy and resources (Ji et al. 2014). As a result, the benefits of resource exploitation are divided primarily between the central government, the exploitation enterprises, and eastern China, while leaving the resulting environmental problems to be solved (without adequate

Fig. 2 Water pollution due to eutrophication and wastewater discharge occurred in 2008 in China's Taihu Lake

funding) by the governments of western China (Li and Coxhead 2011). Due to the differences in the rate of development between eastern and western China, large numbers of economic immigrants have left backward areas in the west and travelled to the cities along the eastern coast and the Yangzi River, where employment opportunities seem better. This further impoverishes western China.

Environmental degradation caused by the development model

With the rapid expansion of industry and of urban populations, more than 40 % of China's rivers and lakes have become seriously polluted (Fig. 2; Wei and Qiu 2007; Zheng and Cao 2011). In addition, fewer than 1 % of Chinese cities meet World Health Organization (WHO) air quality standards (Asian Development Bank 2012), and about 300 million rural residents lack access to safe drinking water (Zheng and Cao 2011; Liu and Wu 2012). The imbalance of development between west and east has also created serious air pollution. Transport of coal and oil from western China to the east has supported eastern China's unsustainably rapid industrial and urban growth, leading to severe air pollution from coal-fired power plants, dust produced by urban construction, and rapid growth in the number of private vehicles. In 2013, almost 15 % of China's territory (1.43×10^6 km^2) suffered from serious pollution, especially in central and eastern China. In Beijing, the concentration of the dangerous particles in the PM2.5 size category reached 993 μg m^{-3} on 13 January in 2013 (China Daily 2013)—nearly 100 times the WHO safe level of 10 μg m^{-3} (Fig. 3).

The emphasis on resource extraction has also had severe consequences in western China. Ecosystems have been badly damaged by mining and oil extraction activities, as well as by unsustainable reclamation of land for agriculture and by overgrazing. This has accelerated desertification, which threatens both the environment's ability to sustain western residents and the safety of eastern residents; the sand and dust transported from degraded land by the prevailing circulation patterns (Zhang et al. 2002) often reaches eastern cities. For example, on 17 April 2007, a sandstorm that originated in Inner Mongolia reached Taiwan, which lies more than 2500 km downwind (China Environmental News Digest 2007). This was not an isolated incident; on 2 May 2011, a severe sandstorm that originated in western China hit Shanghai, in southern China, sharply increasing levels of particulate matter in the air (Xinhuanet 2011). The aggregate annual cost of this environmental damage has been estimated at between 4.5 and 18 % of GDP (Asian Development Bank 2012).

Fig. 3 Photograph taken at noon on 7 December 2013, when Beijing was affected by severe air pollution

More seriously, regional development plans have pushed energy-intensive, highly polluting industries from eastern China to the west and from urban to rural areas. This approach could have provided an opportunity to rebuild the industries using clean technologies, but that opportunity was not taken because this would have been expensive and the power of local residents and governments to insist on such changes is low. This transfer of polluting industries from east to west is particularly problematic because western China is the source of three major rivers (the Yangtze, Yellow, and Pearl rivers) that supply much of the water to eastern China and because the prevailing winds in China blow from west to east; thus, the pollution that has been exported to the west soon returns to harm eastern China. In addition, western China's ecological environment is fragile and will be hard to restore once it becomes polluted.

Primary problems of economic growth must be solved in western China

During implementation of the WDP, China's government has ignored the need to improve the skills of western residents, which is necessary for these citizens to be capable of finding good jobs and improving the local economy. For example, China's distribution of educational funding is uneven. China invested 256.3 billion RMB (41 billion USD) in education in 2000, which amounted to a per capita expenditure of 279 RMB (45 USD) in eastern China versus only 163 RMB (26 USD) in western China. In 2011, China invested 1521 RMB (244 USD) per capita for education in eastern China, versus 1263 RMB (203 USD) per capita in western China (China Statistics Bureau 2013). Although the ratio of the two expenditures has improved, the gap between western and eastern China has increased from 116 RMB (19 USD) per capita to 258 RMB (41 USD). In addition, the number of students per teacher in eastern China in 2012 was only half that in western China (China Statistics Bureau 2013). This directly influences both the quality of the education and student access to higher education. The lower average educational level in western China makes it more difficult for local enterprises to find qualified workers. This imbalance is both ethically unfair and detrimental to the future prospects of residents of western China.

Currently, the WDP relies primarily on "primitive" economic sectors such as those based on resource extraction, rather than on processing these resources into finished products or developing newer technologies by establishing a high-tech sector, and the WDP has not attempted to modernize the industrial structure of western provinces (Ji et al. 2014). Western China has enormous reserves of energy and mineral resources, thus it should attract more private investment to promote technological progress, the accumulation of human capital, and various positive externalities. For example, transporting raw materials to the east is inefficient in terms of both energy consumption (raw materials are heavier than processed materials) and economics (processed materials are more valuable). However, because of national monopolies by state-owned industries, western regions have failed to attract private investment from either domestic or foreign sources (Han

and Guo 2004). Unfortunately, there is substantial empirical evidence that economies that rely predominantly on natural resources have slower economic growth than more advanced economies (Boos and Holm-Müller 2012).

DISCUSSION AND RECOMMENDATIONS

By making growth depend on the exploitation of resources from resource-rich regions, many regions become trapped in a cycle of slower economic growth and continuing poverty. The solution is to abandon the traditional development pattern and replace it with more balanced development based on increasing technology adoption and institutional innovation; in particular, the economy should shift from a focus on providing raw materials to a focus on creating processed materials and value-added goods. Hence, although natural resources will continue to play an important role in economic development, the resulting improvement of the overall technology level will diversify the economy and improve the region's economic development faster than if the region relies solely on exports of its natural resources. However, such changes are slow and take time to implement, and there is a risk of significant resource depletion and environmental damage before the change can occur. In addition, this change cannot be achieved without a supply of educated workers who are capable of meeting the needs of more advanced industries. Without more balanced government support, development in western China will always lag behind that in eastern China. As a result, the current unbalanced development plan is increasing the wealth gap between western and eastern China, accompanied by deterioration of the western environment and consequences for eastern China (Ji et al. 2014).

Each region has its own unique resource and development characteristics, with both advantages and disadvantages that must be considered in regional development planning (Cao 2012). For example, eastern China lacks the rich natural resources of western China, but is close to the ocean, thereby providing large transportation advantages such as natural deepwater ports that support international trade. In contrast, the good conditions for farmland and a favorable climate make much of central China suitable for agricultural development. Northwestern China also has abundant natural resources, but its transportation infrastructure and water resources are insufficient; in addition, the region is ecologically fragile, so the risk of environmental damage is high. This region could benefit from its natural resources advantages by adopting improved technology that conserves resources and protects the environment, and by promoting the development of economic sectors that reduce the reliance on resource exploitation, thereby improving future development (Cao 2010).

Exchanges of goods and materials among regions will also improve regional economies. For example, the transportation of products from western China to markets in eastern regions will necessarily provide economic benefits for all regions along the transportation route. A key need will be for the central government to promote this development by improving infrastructure along the transportation routes. One way to do this would be to return the profits from exploitation of natural resources to local governments so that they can promote cleaner, more sustainable development of their region; in particular, the industries that create the most environmental damage should be subsidized or forced to modernize their facilities to reduce the damage caused by their operations. It will also be critical for success to reduce the rigid control of the central government and of government monopolies in economic development by providing opportunities for foreign and domestic private-sector investments; in particular, investors must be protected from the unfair competition of government monopolies. But it will also be necessary to invest funds to raise the level of education and technology in western regions, thereby permitting development of more advanced industries that will avoid the Kuznets trap and move the economy to a more advanced stage, in which the resource curse becomes less significant.

The problems described in this paper suggest that China's current approach has done little to decrease the gap between eastern and Western China. The consequences of the current unsustainable and unequitable strategy have not only increased the risk to residents of both eastern and western China, but they will also have effects that are felt in other regions of the world (Cao et al. 2014). For China to modify the current policy in a way that will decrease its social and environmental risks, it will be necessary to focus on the unique characteristics and needs of western China. First, western residents must receive better education that will let them work in advanced manufacturing and technology sectors; simultaneously, investors must be encouraged to develop enterprises in these sectors that will provide employment opportunities for western residents. This combination will both diversify the regional economy and encourage residents to stay in the west rather than migrating to the east. Second, this strategy must be supported by appropriate institutional reforms. In addition to encouraging private sector investment, the central government must allocate a significant proportion of the revenues it obtains from western China to the region to give regional governments enough money that they can limit new environmental damage and begin to repair the damage that has already occurred. This can only be achieved if government officials are explicitly rewarded (e.g., promoted) for increasing environmental sustainability; the present approach, which is based solely on economic achievements, provides no incentive for governments to take environmental sustainability seriously.

We should learn lessons from our past, including the lessons of China's recent unbalanced development strategy. Based on these lessons, China should promote a more balanced development strategy that will result in more sustainable western economic development. This new strategy must explicitly aim to decrease the gaps in education, employment opportunities, and income between east and west based on an understanding of the problems described in this paper and based on a recognition of the unique social, environmental, and industrial contexts of western China; a "one size fits all" approach that is based solely on the conditions in eastern China will fail to achieve these goals.

Only by helping relatively undeveloped regions can China escape the resource curse and begin to eliminate the gap between its eastern and western regions. If China can achieve this goal, its recognition of the problems and development of solutions appropriate to local conditions will provide clear lessons that the rest of the developing world can emulate—provided that each nation adapts China's specific examples to account for their own unique context.

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