

Discussion on the relationship between the market and the environment: Before, during and after the industrial revolution

Xinyu Wang

the Department of Politics and International Studies (PAIS), University of Warwick, UK Coventry, CV4 7AL

Abstract: The Industrial Revolution saw the progress of human society and the significant development of the market economy. At the same time, merchants, factories and companies cause great damage to the natural environment in their pursuit of profit. By discussing the period before, during and after the industrial revolution, this paper holds that the relationship between the market and the environment is dynamic and complex, and multiple factors influence the relationship.

Keywords: Markets; Environment; Industrial Revolution

1. Introduction

In the late 18th century, the industrial revolution marks the emergence of a new era. During that time, the consumption of resources reached an unprecedented level, and this phenomenon continued and intensified over time as markets and technology developed. Available studies indicated that, since the mid-1970s, human consumption of the Earth's resources had exceeded the Earth's capacity. Against this backdrop, some scholars have turned their attention to the relationship between markets and the environment and have put forward three distinct perspectives: the market destroys the environment, the market can save the environment, and the relationship between the two is dynamic and is influenced by factors such as the state and technology. In the present day, a market can be understood as an institution through which a large number of buyers and sellers interact, exchange, and trade. As for the environmental problems, it fall into two categories—the extraction of non-renewable resources and the additional problems or externalities, i.e., environmental pollution. This paper will consider the impact of the market on the environment and demonstrate that the market cannot save the environment.

2. Negative effects on the environment by the market

From the agricultural period to the industrial period, fuel efficiency increased from 5% to 35%. The increase in production capacity drove the expansion of the market, involving the variety and volume of production and consumption as well as the continued growth of average incomes and population, which in turn stimulated market demand and, consequently, further expansion of the market. It is important to note that the expansion of markets is based on the massive consumption of resources. As shown in Figure 1, energy consumption has surged since the Industrial Revolution, which in part confirms the market's demand for energy. At the same time, Annual coal consumption in the UK rose from 65 million tonnes in the 1950s to 181 million tonnes in the 1900s. However, during this period, the consumption of resources was not limited. This was due to four main reasons:

Firstly, both buyers and sellers in the market realised the value of natural resources, their low cost, their easy availability, and their ability to generate high returns, and therefore continued to exploit existing resources as well as seek new ones in order to maximise their own interests.

Secondly, the countries that were the first to enter the Industrial Revolution, such as the UK, benefited greatly from the market activities associated with natural resources, such as the large tax revenues, the rapid development of export trade, and the rapid economic growth, which encouraged them to support such market activities and, consequently, the uncontrolled exploitation of natural resources.

Thirdly, the global abundance of natural resources at the time of the Industrial Revolution weakened people's awareness of the need to conserve them and the sense of crisis that they would eventually become scarce.

Fourthly, the relationship between pollution and health was not sufficiently understood at the time for people to realise that burning large amounts of fossil fuels could be damaging. We know today that Coal combustion emits a number of pollutants into the atmosphere, which has various adverse effects on the human system and natural environment.

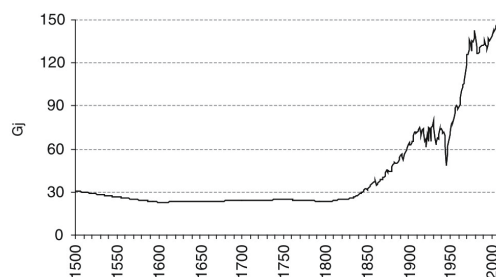


Figure 1. Energy consumption per capita in Europe between 1500 and 2005 (GJ = 1 million KJ=0.0239 Toe)

In addition, the large consumption of resources has caused damage to the external environment, such as air pollution, ocean acidification and climate change. Take air pollution as an example, in Figure 2, it can be seen that the primary source of CO₂ in the air is fossil fuel emissions. CO₂ emissions from fossil fuels rose from 196.90 million t in 1850 to 3.51 billion t in 1920, which poses a huge environmental problem and health issues. One might wonder about the role of the state. However, during this period, environmental pollution was not effectively addressed. Smith's invisible hand theory greatly influenced Europe in the 18th and 19th centuries, which emphasizes laissez-faire. This gives the market considerable freedom of development and limits the government's regulatory functions, including the supervision of environmental pollution. In this context, the rise of the market and its dominance in society during the Industrial Revolution stimulated production and consumption, which were based on the consumption of natural resources, especially non-renewable resources, and the pollution of the environment. Therefore, it can be argued that during this period, the market destroyed the environment.

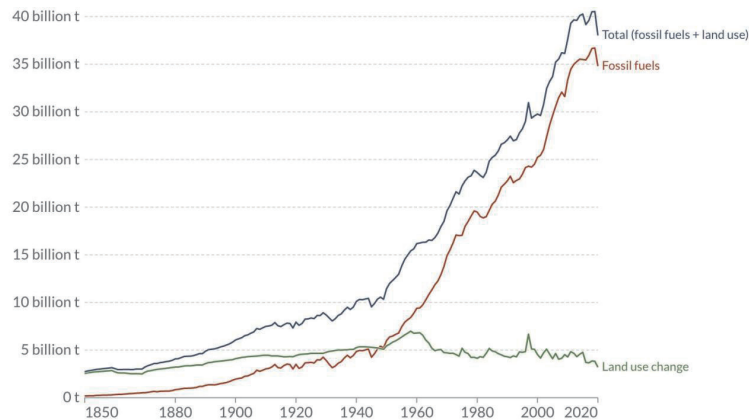


Figure 2. Global CO₂ emissions from fossil fuels and land use

Disappointingly, the market's depletion of natural resources and its pollution of the environment continued after the Industrial Revolution. First of all, with the more convenient transportation, the rapid development of network technology, and the formation of a world-class market (market globalization). Every country's markets are inextricably linked: a rise in oil prices in a country could lead to changes in the prices of commodities (food, clothing, housing and transportation on the global market). Secondly, the essence of market expansion is the increasing demand for commodity resources. This is consistent with the relationship between productivity, population, demand and market size during the industrial revolution (discussed above). This has pushed the world into even greater resource scarcity and environmental pollution than it did during the Industrial Revolution. Using oil as an example, by 1950, the energy deficit of developed countries was 4%, and by 1973 it had grown to 50%. As can be seen from Figure 1, energy consumption per capita in Europe continued to climb after 1950, which meant that people's demand for resources continued to expand. This continued to stimulate the expansion of markets, which in turn encouraged the consumption of resources as well as an increase in production capacity. Higher levels of economic activity (production and consumption) require more energy and material inputs and generate more waste by-products. By looking at carbon dioxide emissions after 1950 in Figure 2, it can be seen that environmental pollution and the depletion of non-renewable resources have become more serious. During this period, the market and the environment were still in opposition.

3. Protection and improvement of the environment by the market

Some scholars have argued that markets can, to some extent, be effective as a basic management tool to improve environmental problems. The market users as a tool do not necessarily have to be the state but can also be other subjects, such as non-governmental organisations, science and technology. They can regulate the market so that it acts positively on the environment or even saves it. The market is essentially a mechanism of supply and demand: the forces of demand and supply determine the prices of commodities and the changes therein, and it is the buyers and sellers who actually determine the price of a commodity. Eventually, under the market mechanism, the supply and demand are balanced, and then the equilibrium price is obtained. Over the past few decades, other factors have sought to intervene in this mechanism through a range of means, such as changing the price of products, the number of products supplied, and the number of products demanded, given that it has contributed to resource scarcity and environmental pollution, and to create a new, environmentally friendly mechanism of supply and demand, with the ultimate goal of protecting the environment. However, the market cannot always be a good tool. It can also be a double-edged sword, which may damage the environment in the process of operation.

First of all, the state plays an important role. Countries, especially developed countries, are able to protect resources and reduce pollution by enacting laws, imposing environmental taxes, and guiding information. For example, in the UK, laws and regulations such as the Environmental Protection Act (1990), the Road Vehicles Regulation Act (1991), the Clean Air Act (1993), and the Environment Act (1995) have been introduced to build and improve the system of governance against environmental pollution. In addition, environmental taxes are commonly levied in European countries. Typical environmental taxes are, for example, air pollution taxes - a tax on factories that

emit harmful gases. In addition to environmental taxes, the government has devised a number of subsidy mechanisms and provided grants for upgrading green equipment and introducing environmentally friendly technologies in factories. Those measures have a significant investment in emissions reductions and fuel switching. It is thus clear that state interventions for environmental protection and improvement can be effective. It is worth mentioning that the market plays a vital role in these interventions, through which the state re-establishes the order of the market and makes it work actively for the environment. Legislation and taxation raise the cost of production for suppliers, for example, factories and businesses, which leads to higher prices for products, a corresponding fall in demand, and, consequently, a fall in supply. In this case, the consumption of resources by production and consumption is limited, and the environment is thus improved. It can therefore be argued that the market helps the state to protect and improve the environment.

However, Amann et al. countered the argument that the state or the market positively impacts the environment, stating that this argument only applies to the local environment, i.e., the domestic environment. Specifically, new costs emerge as a result of state intervention, which leads to an increase in prices on the supply side and consequently frustrates consumers' willingness and behaviour to buy. In order to maintain or even enhance their profits, suppliers in developed countries move resource-consuming and polluting industries to developing countries, where environmental protection systems are not yet in place, where there is greater tolerance of resource consumption and environmental pollution, and where labour and site costs are minimal. By transferring industries and pollution together, suppliers in developed countries are able to escape state or market intervention, which allows them to invest less money, make bigger profits, and continue to deplete resources and destroy the environment.

Similar to the state, non-governmental organisations can promote environmental governance and protection by regulating the market. In the face of the global environmental crisis, single national governments have shown themselves to be limited and unable to respond effectively to the crisis. As mentioned earlier, governments in developed countries have only been able to intervene in domestic environmental issues, which has resulted in the transfer of environmental issues outward to some extent, and this has given rise to the emergence of environmental NGOs, which seek to use market activities to create new values. Tysiachnio argued that NGOs deliberately create transnational conflicts--market campaigns. Non-governmental organisations use this tactic everywhere to force commercial companies to change their practices. The activities of NGOs have an impact on the market. Thus, it can be argued that the market helps NGOs to protect and improve the environment. It is important to note that this does not only have a positive impact on the environment but drives suppliers into extinction; rather, it leads to a win-win situation. Although moving to green production means greater costs for suppliers, over time, these will be offset by the benefits of greater marketability of the product. Because NGOs can call on more people to choose green products, production and consumption will increase in tandem, and the market will gradually expand, creating a scale effect (lower costs for product providers). Inspired by this phenomenon, more companies will move toward green production, which will eventually break the old paths of production and consumption and protect both suppliers as well as the environment. However, the impact of NGOs is limited, and many obstacles can hinder their success.

In addition, some scholars argue that technology can regulate the market and thus contribute to environmental governance and protection. Specifically, in order to meet the requirements of the state and NGOs, suppliers may introduce environmentally friendly technologies into their production and distribution processes, such as emissions reduction technologies. Besides, these technologies are usually expensive, and the introduction of them implies higher production costs, higher product prices, lower demand, less production and consumption, and ultimately less resource consumption (ibid). Thus, by interacting with the market, technologies can both reduce environmental pollution and limit resource consumption. However, not all technologies have this capacity. According to Farzin, technological developments have led to the emergence of technologies that reduce the cost of resource extraction, which has a negative impact on the price of resources. As a result, resource prices fall, demand for resources increases, production as well as consumption of resources increase, and resource depletion and environmental pollution become more severe. Therefore, it can be argued that not all technologies can take advantage of the market to promote environmental governance and protection.

4. Conclusion

To conclude, this paper points out that the harmonious coexistence of the market and the environment stopped during the Industrial Revolution. Prior to the Industrial Revolution, markets were simple and closed, production and consumption were limited in scale, and the consumption of natural resources and pollution of the environment was kept within reasonable limits. However, the Industrial Revolution trigger the consumption of resources and a heavy impact on the environment. This trend continued after the Industrial Revolution and has become more severe in the last few decades.

Moreover, other factors, such as the state, non-governmental organisations, and technology, play a limited role in protecting the environment. Thus, taken together, although the market has the potential to protect and improve the environment, at this stage, it is difficult to realise this potential, and instead, it can be harmful to the environment.

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