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Green credit subsidy and environmental tax as determinants of green technology adoption

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Abstract

Adoption of green technology has emerged as a key area of attention for governments and corporations globally as they work to solve environmental issues and accomplish sustainability objectives. The impact of environmental levies on encouraging the adoption of green technologies, however, seems to be more complex. We use a theoretical literature in this research. Based on the conceptual research, authors conduct that subsidy on green credits has positive effect on green technology adoption, and environmental tax has negative effect on green technology adoption. Suggestions for further research are to conduct empirical research on the concept of this research.

Introduction

Adoption of green technology has emerged as a key area of attention for governments and corporations globally as they work to solve environmental issues and accomplish sustainability objectives. Research shows that a variety of governmental tools, like environmental taxes and subsidies, are important in encouraging businesses to embrace green technologies.

Subsidies can efficiently encourage the use and innovation of green technologies, according to studies. For example, tax credits and investment subsidies have been shown to boost investments in green technology, while subsidies finance different kinds of eco-innovations and tax incentives mainly promote cleaner production technologies (Garcia-Quevedo et al., 2022). Furthermore, it has been shown that carbon taxes and green innovation subsidies work in concert to promote the adoption of Low Carbon Technology (LCT) by businesses (Yu et al., 2022).

The impact of environmental levies on encouraging the adoption of green technologies, however, seems to be more complex. When paired with other policy tools, environmental taxes can significantly influence the adoption of green technologies, despite some research suggesting that they may not be effective at promoting the adoption of eco-innovation (Garcia-Quevedo et al., 2022). According to Yu et al. (2022),

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the implementation of a unit progressive carbon tax in conjunction with green innovation subsidies has demonstrated a synergistic effect in promoting green innovation strategies among businesses.

Green credit subsidy policies contribute to the enhancement of environmental performance levels in heavily polluting enterprises (Zhang et al., 2024). Green credit policies help to improve the environmental performance of enterprises and green credit has an intermediary effect on corporate environmental performance (Zhang et al., 2024).

In order to map corporate adoption of green technology, previous research has mostly relied on surveys and questionnaires. Recent studies, however, have expressed worries about this method's drawbacks, such as biases associated with subjectivity, selection, and non-response (Lyness & Brumit Kropf, 2007). Self-developed environmental innovation indicators have been utilized in several research to address these problems, although they have come under fire for possible selection noise (Zaman et al., 2021). This study overcame this limitation by referencing recent research (Zaman et al., 2021; Zaman, Asiaei, Nadeem, Malik, & Arif, 2023) and measuring GTA using the eco-innovation score from LSEG Data & Analytics (formerly Refinitiv Eikon), which indicates a company's ability to lower environmental costs and burdens for its clients, thereby opening up new markets through eco-designed products or new environmental technologies and processes.

Shen et al. (2020) evaluates the impact of clean technology adoption and environmental taxes on textiles and apparel supply chains, finding that environmental taxes can incentivize manufacturers to invest in green technologies, and that the optimal greenness level depends on the relative market shares in a duopoly scenario, with consumer welfare potentially improved through policies that encourage green technology adoption and consumer education. Yi et al. (2022) investigates the impact of green subsidies versus emissions taxes on the development of green technologies in a supply chain, finding that subsidies generally provide greater incentives for manufacturers to invest in green technology and lead to higher profits for both manufacturers and retailers. Environmental taxation is effective at stimulating green technology adoption, with higher levels of taxation being more effective, and even low levels being effective when combined with public financing (Tchorzewska et al., 2022).

Energy transitions may become much more troublesome when new technologies become economically viable since respectable industries that don't want to fall behind occasionally prevent broader adoption. For example, Shinwari et al. (2022) analyzed the factors that affected resource allocation for renewable energy sources and evaluated the proportional importance of each factor in the setting of China between 1990 and 2020. In a similar analysis, green technology dramatically improves energy efficiency by reducing energy intensity while adversely affecting energy consumption, as demonstrated by Paramati et al. (2022).

Method

To accomplish the aims and objectives of the research, a theoretical literature assessment is carried out, and a conceptual framework for further investigation is provided. The research methodology that was used by earlier researchers (Vasiljeva et al., 2017; Torkayesh et al., 2023) was presented by us.

Definitions of variables

Green technology adoption	Green Technology Adoption Score is rated on a scale from 0 to 100, with lower values indicating a lesser degree of company commitment to pursuing environmental-related innovation activities within the organization
Subsidy on green credits	1 if there is special treatment for green credit, 0 if not
Environmental tax	Percentage of gross domestic product (Source: Organisation for Economic Co-operation and Development/OECD)

Result and Discussion

In the current research, the authors consider green technology adoption as dependent variable that affected by subsidy on green credits and environmental tax. The conceptual model of the research is given at the Figure 1.

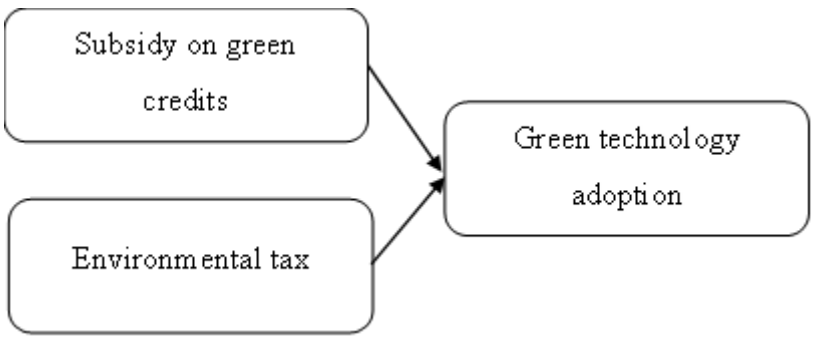

Figure 1. Conceptual model of the research

Based on the conceptual model, authors stated the following research questions:

1. RQ1: How can subsidy on green credits affect green technology adoption?
2. RQ2: Can environmental tax affect green technology adoption?

In this research, authors analyze based on existing theory that subsidy on green credits has positive effect on green technology adoption, and environmental tax has negative effect on green technology adoption. Companies that implement green technologies often lead the way in innovation, opening up new opportunities and increasing competitiveness in the market. Companies that care for the environment tend to gain a good reputation and increase trust from consumers and investors.

The burgeoning global concern for environmental sustainability has ignited a race towards greener technologies. Governments worldwide have implemented various policy instruments, including subsidies and taxes, to incentivize or discourage specific

behaviours. This research delves into the intricate relationship between these policies and their impact on green technology adoption by businesses.

At the core of this analysis lies the understanding that economic incentives, be they carrots or sticks, significantly influence corporate decision-making. Subsidies on green credit, a form of financial support, can lower the cost of capital for businesses investing in environmentally friendly technologies. This, in turn, can make such investments more attractive, thereby boosting green technology adoption.

Conversely, environmental taxes impose a cost on polluting activities. By raising the cost of environmentally harmful practices, these taxes can incentivize businesses to seek out cleaner, more sustainable alternatives. However, the impact of environmental taxes on green technology adoption is a complex issue. While they can encourage innovation, they can also hinder economic growth and competitiveness if not carefully designed and implemented.

Companies that embrace green technologies often position themselves as industry leaders. By pioneering sustainable solutions, they can unlock new markets, attract environmentally conscious consumers, and enhance their brand reputation. Moreover, green innovation can lead to cost savings through increased energy efficiency and reduced waste.

The adoption of green technologies can also strengthen a company's social license to operate. By demonstrating a commitment to environmental responsibility, businesses can build trust with stakeholders, including customers, investors, and communities. This can translate into increased brand loyalty, higher stock valuations, and reduced regulatory scrutiny. Government policies play a crucial role in shaping the landscape for green technology adoption. Subsidies can provide a much-needed boost to emerging technologies, particularly during their early stages when market risks are high. However, it is essential to ensure that subsidies are targeted effectively and avoid distorting market mechanisms.

Environmental taxes, on the other hand, can internalize the external costs of pollution, promoting a more level playing field. Nevertheless, it is imperative to design tax policies that are equitable, efficient, and conducive to innovation. A well-calibrated tax system can incentivize businesses to invest in cleaner technologies without stifling economic growth. Numerous studies have examined the impact of subsidies and taxes on green technology adoption. While the findings are mixed and often context-specific, some key insights have emerged. For instance, research has shown that subsidies can significantly accelerate the adoption of renewable energy technologies, particularly in the early stages of development. However, the long-term effectiveness of subsidies may diminish as technologies mature and become more cost-competitive.

Environmental taxes, when combined with other policy instruments, can also stimulate green innovation. For example, a carbon tax can incentivize businesses to reduce their carbon footprint by investing in energy-efficient technologies or switching to cleaner

fuels. However, the effectiveness of environmental taxes can be influenced by factors such as the level of the tax, the use of revenue, and the overall regulatory environment. The adoption of green technologies is not merely an environmental imperative; it is also a strategic imperative for businesses seeking long-term sustainability and competitiveness. Government policies, including subsidies and taxes, can play a pivotal role in shaping the trajectory of green innovation. By carefully designing and implementing these policies, governments can create an enabling environment that encourages businesses to embrace sustainable practices and drive economic growth.

As we navigate the challenges of climate change and resource scarcity, the imperative to adopt green technologies becomes increasingly urgent. By understanding the complex interplay between policy, innovation, and market dynamics, we can accelerate the transition to a more sustainable future.

Conclusion

Based on the conceptual research, authors conduct that subsidy on green credits has positive effect on green technology adoption, and environmental tax has negative effect on green technology adoption. Suggestions for further research are to conduct empirical research on the concept of this research.

References

1. Garcia-Quevedo, J., Martinez-Ros, E., & Tchorzewska, K. B. (2022). End-of-pipe and cleaner production technologies. Do policy instruments and organizational capabilities matter? Evidence from Spanish firms. Journal of Cleaner Production, 340, 130307. https://doi.org/10.1016/j.jclepro.2021.130307
2. Lyness, K. S., & Brumit Kropf, M. (2007). Cultural values and potential nonresponse bias: A multilevel examination of cross-national differences in mail survey response rates. Organisational Research Methods, 10(2), 210–224.
3. Paramati, S. R., Shahzad, U., & Doğan, B. (2022). The role of environmental technology for energy demand and energy efficiency: Evidence from OECD countries. Renewable and sustainable energy reviews, 153, 111735.
4. Shen, B., Zhu, C., Li, Q., & Wang, X. (2020). Green technology adoption in textiles and apparel supply chains with environmental taxes. International Journal of Production Research, 59, 4157 - 4174.
5. Shinwari, R., Yangjie, W., Payab, A.H., Kubiczek, J., & Dördüncü, H., 2022. What drives investment in renewable energy resources? Evaluating the role of natural resources volatility and economic performance for China. Resour. Policy 77, 102712. https://doi.org/https://doi.org/10.1016/j.resourpol.2022.102712.
6. Tchorzewska, K.B., Garcia-Quevedo, J., & Martinez-Ros, J. (2022). The heterogeneous effects of environmental taxation on green technologies. Research Policy. 51(7), 104541.
7. Torkayesh, A.E., Tirkolaee, E.B., Bahrini, A., Pamucar, D., & Khakbaz, A. (2023). A Systematic Literature Review of MABAC Method and Applications: An Outlook for Sustainability and Circularity, Informatica 34: 415-448.
8. Vasiljeva, T., Shaikhulina, S., and Kreslins, K. (2017). Cloud Computing: Business Perspectives, Benefits and Challenges for Small and Medium Enterprises (Case of Latvia), Procedia Engineering, 178: 443-451.
9. Yi, Y., Wang, Y., Fu, C., & Li, Y. (2022). Taxes or subsidies to promote investment in green technologies for a supply chain considering consumer preferences for green products. Comput. Ind. Eng., 171, 108371.
10. Yu, X., Sun, Y., Xu, Y., & Zhang, J. (2022). The Synergy Green Innovation Effect of Green Innovation Subsidies and Carbon Taxes. Sustainability, 14(6), 3453. https://doi.org/10.3390/su14063453

11. Zaman, R., Asiaei, K., Nadeem, M., Malik, I., & Arif, M. (2023). Board demographic, structural diversity, and eco-innovation: International evidence. Corporate Governance: An International Review.
12. Zaman, R., Atawnah, N., Haseeb, M., Nadeem, M., & Irfan, S. (2021). Does corporate eco innovation affect stock price crash risk? The British Accounting Review, 53(5), 101031.
13. Zhang, X., Wang, P., & Xu, Q. (2024). Corporate environmental governance under the coordination of fiscal and financial policies: The case of green credit subsidy policy. Finance Research Letters, 64, 105409.