**References**

Acemoglu, D., Autor, D., & Patterson, C. (2023). *Bottlenecks: Sectoral Imbalances and the US Productivity Slowdown*. NBER Working Paper.

Ambec, S., & Barla, P. (2005). Can environmental regulations be good for business? An assessment of the Porter hypothesis. *Energy Studies Review*, *14*, PAGES.

Ambec, S., Cohen, M. A., Elgie, S., & Lanoie, P. (2013). The Porter hypothesis at 20: Can environmental regulation enhance innovation and competitiveness? *Review of Environmental Economics and Policy*, *7*(1), 2–22.

Amelung, W., Bossio, D., de Vries, W., Kögel-Knabner, I., Lehmann, J., & Amundson, R. (2020). Towards a global-scale soil climate mitigation strategy. *Nature Communications*, *11*(1), 5427–END PAGE.

Amore, M. D., & Bennedsen, M. (2016). Corporate governance and green innovation. *Journal of Environmental Economics and Management*, 75, 54–72.

Borenstein, S., & Bushnell, J. B. (2022). Do two electricity pricing wrongs make a right? Cost recovery, externalities, and efficiency. *American Economic Journal: Economic Policy*, *14*(4), 80–110.

Chen, Z., Jin, J., & Li, M. (2022). Does media coverage influence firm green innovation? The moderating role of regional environment. *Technology in Society*, *70*, 102006-PAGES?.

Chen, Z., Zhang, X., & Chen, F. (2021). Do carbon emission trading schemes stimulate green innovation in enterprises? Evidence from China. *Technological Forecasting and Social Change*, *168*, 120744.

Dechezleprêtre, A., & Sato, M. (2017). The impacts of environmental regulations on competitiveness. *Review of Environmental Economics and Policy*, *11*(2), 183–206.

Du, G., Yu, M., Sun, C., & Han, Z. (2021). Green innovation effect of emission trading policy on pilot areas and neighboring areas: An analysis based on the spatial econometric model. *Energy Policy*, *156*, 112431.

European Commission. (n.d.). *EU Emissions Trading System (EU ETS)*. Retrieved January 14, 2023, from https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets\_en

Feng, S., Zhang, R., & Li, G. (2022). Environmental decentralization, digital finance and green technology innovation. *Structural Change and Economic Dynamics*, *61*, 70–83.

Hu, C., Mao, J., Tian, M., Wei, Y., Guo, L., & Wang, Z. (2021). Distance matters: Investigating how geographic proximity to ENGOs triggers green innovation of heavy-polluting firms in China. *Journal of Environmental Management*, *279*, 111542.

Jamasb, T., & Pollitt, M. G. (2011). Electricity sector liberalisation and innovation: An analysis of the UK's patenting activities. *Research Policy*, *40*(2), 309–324.

Jia, N., Huang, K. G., & Man Zhang, C. (2019). Public governance, corporate governance, and firm innovation: An examination of state-owned enterprises. *Academy of Management Journal*, *62*(1), 220–247.

Li, C. (2022). The influence of carbon emission trading policy on enterprise environmental protection investment. *China Market*, *11*, PAGES.

Li, Y. (2022). The impact of carbon emission trading on enterprise innovation performance. *Business Management*, *34*(3), 34–36.

Li, Y., Hu, S., Zhang, S., & Xue, R. (2023). The power of the imperial envoy: The impact of central government onsite environmental supervision policy on corporate green innovation. *Finance Research Letters*, *52*, 103580.

Liu, M., & Li, Y. (2022). Environmental regulation and green innovation: Evidence from China's carbon emissions trading policy. *Finance Research Letters*, *48*, 103051.

Liu, M., Shan, Y., & Li, Y. (2022). Study on the effect of carbon trading regulation on green innovation and heterogeneity analysis from China. *Energy Policy*, *171*, 113290.

Ma, R., & Qian, H. (2022). Plant-level evaluation of China’s National Emissions Trading Scheme: Benchmark matters. *Climate Change Economics*, *13*(1), 2240009.

Nancy, S. (2015). Carbon emissions in China. *Main*. https://energy.mit.edu/news/carbon-emissions-in-china/

Nemoto, J., & Goto, M. (2004). Technological externalities and economies of vertical integration in the electric utility industry. *International Journal of Industrial Organization*, *22*(1), 67–81.

Nie, Q. (2020). Analysis of policy effect of carbon emission trading on power generation industry. *Energy Environmental Protection*, *34*(6), PAGES. https://d.wanfangdata.com.cn/periodical/ChlQZXJpb2RpY2FsQ0hJTmV3UzIwMjMwMTEyEg9ta2hqYmgyMDIwMDYwMTIaCGR6M2RvZ2Uy

Paraschiv, D. M., Nemoianu, E. L., Langă, C. A., & Szabó, T. (2012). Eco-innovation, responsible leadership and organizational change for corporate sustainability. *Amfiteatru Economic Journal*, *14*(32), 404–419.

Popp, D. (2002). Induced innovation and energy prices. *American Economic Review*, *92*(1), 160–180.

Rosenbloom, D., Markard, J., Geels, F. W., & Fuenfschilling, L. (2020). Why carbon pricing is not sufficient to mitigate climate change—and how “Sustainability Transition Policy” can help. *Proceedings of the National Academy of Sciences*, *117*(16), 8664–8668.

Sheng, H., Li, W., & Huang, N. (2022). Carbon emission trading market price and enterprise green innovation in Guangdong Province. *Urban Insight*, *1*(14), 75–88.

Shi, H., & Wu, J. (2022). The influence of carbon market quota allocation method on enterprise green innovation in China. *Enterprise Technology and Development*, *50*, 4–END PAGE.

Song, D., Zhu, W., & Wang, B. (2021). Micro-empirical evidence based on China’s carbon trading companies: Carbon emissions trading, quota allocation methods and corporate green innovation. *China Population, Resources and Environment*, *31*, PAGES.

Spash, C. (2010). The brave new world of carbon trading. *New Political Economy*, *15*(2), PAGES.

Thopil, G. A., & Pouris, A. (2010). An overview of the electricity externality analysis in South Africa within the international context. *South African Journal of Science*, *106*(11), 1–6.

UNFCCC. (n.d.-a). Emissions trading. *Emissions Trading | UNFCCC*. Retrieved January 14, 2023, from https://unfccc.int/process/the-kyoto-protocol/mechanisms/emissions-trading

UNFCCC. (n.d.-b). What is the Kyoto Protocol? *What Is the Kyoto Protocol? | UNFCCC*. Retrieved January 14, 2023, from https://unfccc.int/kyoto\_protocol

Van Leeuwen, G., & Mohnen, P. (2017). Revisiting the Porter hypothesis: An empirical analysis of green innovation for the Netherlands. *Economics of Innovation and New Technology*, *26*(1–2), 63–77. https://doi.org/10.1080/10438599.2016.1202521

Wang, W., & Zhang, Y. J. (2022). Does China's carbon emissions trading scheme affect the market power of high-carbon enterprises? *Energy Economics*, *108*, 105906.

Xiao, Z., Tan, R., Shi, J., & Wang, F. (2022). The impact of environmental regulation on regional green innovation efficiency—A quasi-natural experiment based on the pilot of “Carbon Emission Right.” *Frontiers of Science and Technology of Engineering Management*, *41*, PAGES.

Yang, S., Jahanger, A., & Hossain, M. R. (2023). How effective has the low-carbon city pilot policy been as an environmental intervention in curbing pollution? Evidence from Chinese industrial enterprises. *Energy Economics*, *118*, 106523.

Yao, S., Yu, X., Yan, S., & Wen, S. (2021). Heterogeneous emission trading schemes and green innovation. *Energy Policy*, *155*, 112367.

Zheng, C., Deng, F., Zhuo, C., & Sun, W. (2022). Green credit policy, institution supply and enterprise green innovation. *Journal of Economic Analysis*, *1*(1), 20−34.

Zheng, M., Feng, G. F., Jiang, R. A., & Chang, C. P. (2023). Does environmental, social, and governance performance move together with corporate green innovation in China? *Business Strategy and the Environment*, *32*(4), 1670−1679.

Zhang, W., Li, G., & Guo, F. (2022). Does carbon emissions trading promote green technology innovation in China? *Applied Energy*, *315*, 119012.

**Appendix**

To test the generality of the model, we assumed that there are *n* firms in the market, where:

Accordingly, and can be expressed as:

After including the number of firms (*n*), as a variable, remains positively correlated with . This indicates that our theoretical finding can be generalized.