

Research Assessment Exercise 2020
Impact Case Study

University: The Hong Kong Polytechnic University |
Unit of Assessment (UoA): Economics and Finance (UoA21) |

Title of case study: Energy and Environmental Economics and Finance |

(1) Summary of the impact

Climate change is affecting the world and the general trend of overconsuming fossil fuels to power the economy is pushing us closer to an irreversible climate shift. The objective of our work in energy and environmental economics is to reduce the environmental impact that individuals or companies generate in their daily activities without sacrificing profit or utility. This case study describes how our team has achieved impact on stakeholders in public policy, industry and wider society through the following routes: (i) Educating the body of accounting and finance professionals; (ii) Influencing policy debate/discussion by directly feeding into policy briefs; (iii) Creating a dialogue with and among a general public audience; and (iv) Informing ESG (environmental, social and governance) investment practices. |

(2) Underpinning research

There are several research insights that have been obtained from diverse research conducted by the team comprising the following academics: David Broadstock, Alice Shiu and Zheng Peng. The importance of our work stems from the better understanding of how we might reduce the environmental impact that individuals or companies generate in their activities without sacrificing profit or utility. Research contributions (connected to references to research [R1]-[R6] below) explore:

- (i) [R1, R2, R3] Interactions of energy market movements with both the financial and real sectors of the economy, through the productive performance of firms and industrial sectors, as well as the overall growth trajectory of the economy;
- (ii) [R4, R5] The quantification of the consequences of climate change for agricultural yields and human productivity with a special emphasis on mainland China; and
- (iii) [R6] Aspects of energy market design, including pricing mechanisms and policy effectiveness, sometimes in the presence of material inefficiencies, such as the inefficient consumption (and hence over-consumption) of electricity within households.

Together the insights of the research reinforce the fact that economic and financial values are materially affected and driven by energy and environmental factors. Modern economic and corporate financial structures are, or can be, strengthened and made more resilient by accounting for and carefully managing the environmental capital attached to their operations. The emphasis of our work is put on empirical evaluation to reflect largely the needs of the literature and bodies of interested professionals in recent years. A number of methods have been employed by our researchers, among which advanced time-series and micro-econometric methods are adopted to obtain insights that may otherwise be masked behind trends and other data features.

An additional area of research expertise concerns the use of economic methods to measure efficiency. In this area the team members utilize innovative methodological advances that can be adapted to explore deep issues of heterogeneity and convergence. The heterogeneity aspect reflects a general trend in wider economics to adapt empirical models to the notion that one model does not fit all circumstances. The notion of convergence in efficiency is a novel research

area with substantial implications for policy design, in terms of what is realistic to achieve and in what time frame, and to inform how policy might react to the existence of path-dependency in efficiency, particularly among low-efficient agents.

(3) **References to the research** (indicative maximum of six references)

Our key researchers include David Broadstock, Alice Shiu and Zheng Peng. We provide examples of published articles and key research grants. These reflect a consistent theme in energy and environmental economics research with publications in both leading field journals and journals for a more mainstream academic audience. The unifying theme lies in the application of empirical (statistical) methods to uncover where the environmental impact can be reduced while economic activity is either maintained at the same level or enhanced.

* *This research was done in collaboration with scholars from other universities. By tradition in economics, all authors are assumed to have contributed equally to a paper.*

[R1]. **Broadstock, David C.**, Alan Collins, Lester C. Hunt, and Konstantinos Vergos. “Voluntary disclosure, greenhouse gas emissions and business performance: Assessing the first decade of reporting”, *The British Accounting Review* 50, no. 1 (2018): 48-59.

[R2]. **Broadstock, David C.**, Roman Matousek, Martin Meyer, and Nickolaos G. Tzeremes. “Does corporate social responsibility impact firms’ innovation capacity? The indirect link between environmental & social governance implementation and innovation performance”, *Journal of Business Research* (2019).

[R3]. **Broadstock, David C.**, Shunsuke Managi, Roman Matousek, and Nickolaos G. Tzeremes. “Does doing ‘good’ always translate into doing ‘well’? An eco-efficiency perspective”, *Business Strategy and the Environment* (2019).

[R4]. **Zhang, Peng**, Junjie Zhang, and Minpeng Chen. 2017. “Economic Impacts of Climate Change on Agriculture: The Importance of Additional Climatic Variables Other than Temperature and Precipitation”, *Journal of Environmental Economics and Management* 83(5): 8-31.

[R5]. **Zhang, Peng**, Olivier Deschenes, Kyle Meng, and Junjie Zhang. 2018. “Temperature Effects on Productivity and Factor Reallocation: Evidence from a Half Million Chinese Manufacturing Plants”, *Journal of Environmental Economics and Management* 88(3): 1-17.

[R6]. Woo, Chi Keung, Yuk Shing Cheng, Raymond Li, **Alice Shiu**, S. T. Ho, and Ira Horowitz. “Can Hong Kong price-manage its cross-harbor-tunnel congestion?”, *Transportation Research Part A: Policy and Practice* 82 (2015): 94-109.

Details of key research grants

David C. Broadstock: Principal Investigator, National Natural Science Foundation of China, grant number 71550110255: “Metaproduction functions and their application to measuring ‘energy consumption efficiency’ in China”, Jan. 2016-Dec. 2017. [RMB 400,000].

David C. Broadstock: Co-investigator, National Natural Science Foundation of China, grant number 71573214: “Oil price dynamics and consumption patterns in China”, Jan. 2016-Dec. 2019. [RMB 480,000].

Peng Zhang: Co-investigator, National Natural Science Foundation of China, grant number 71703149: “Air pollution and migration: Evidence from county-level data in China”, Jan. 2018-Dec. 2020. [RMB 190,000].]

(4) Details of the impact

[This section presents a short narrative of how the ongoing research on topics relating to energy and environmental economics has benefited wider society. This impact can be described under the following categories:

Educating the body of accounting (and finance) professionals

In 2018/2019 David Broadstock won an award as Co-Investigator under the Professional Services Advancement Support Scheme (PASS) set up by the HK Government on the topic of ‘green finance’. Since January 2019, we have actively engaged with the body of professionals and have hosted 3 high-profile seminars, each of which attracted approximately 100 senior staff/management team members from some of Hong Kong’s largest organizations, associations and listed companies and who oversee the work of thousands of employees and staff. The reach and importance of this work are underpinned by the strength of the supporting organizations for the events which include many leading global institutions and associations, such as KPMG, Deloitte, Pricewaterhouse Coopers, Ernst and Young, S&P, the Association of Chartered Certified Accountants (ACCA), the Hong Kong Institute of Certified Public Accountants (HKICPA), and the CFA Institute, among others. These are some of the largest and most powerful groups in the finance and accounting industry, creating room for global reach and impact of our activities.

Influencing policy debate/discussion

In June 2016, the King Abdullah Petroleum Studies and Research Centre (KAPSARC) helped set up a workshop in London, bringing together leading academics in the field of energy demand modelling and policy setters and users from Saudi Arabia and other countries. The workshop discussed challenging issues in energy demand modelling and how they may contribute to policy design, resulting in a policy brief issued by KAPSARC.

Maximizing impact through dialogue with and among a general public audience

In order to create visibility and understanding, and to maximize the impact of our research, we actively seek opportunities to summarize our developed insights to the public and transfer our knowledge to a wider stakeholder group.

An example of this is David Broadstock’s published articles in June 2016 and September 2017 in *South China Morning Post* (SCMP)—with a readership of approximately 400k—on the general theme of economic and environmental sustainability. These articles focus on how a five-capital approach can be used to translate positive environmental capital into improved financial capital. The articles published in September 2017 discuss green finance options for modern corporate firms and are connected directly to the abovementioned PASS grant. One of these articles was highlighted by the Climate Bonds Initiative (CBI) in their regular *Media Digest* shared with the community of climate finance professionals. CBI is an investor-focused, not-for-profit organization at the forefront of standards development for climate, including green bonds.

Peng Zhang’s publications in the *Journal of Environmental Economics and Management* were followed by additional presence in the media, including coverage in *China Daily* in July 2017 and in *HuffPost* (formerly *Huffington Post*) in June 2017, among others.

Informing ESG investment practices

Friends of the Earth (HK) Charity Limited (FoE) and PolyU's CESEF have formed a partnership program to promote the understanding and application of ESG investment practices among asset owners and investment professionals. The goal is to advocate institutional investors adopting ESG/SRI principles, such as the SFC's Principles of Responsible Ownership or principles of higher standard. The program has already organised several focus groups to gather knowledge and share experiences and a press event marking the initiation of the (multi-million HK\$) ESG investment education pledge. Friends of the Earth (HK) CEO Mr Simon Mak commented that "CESEF and the research done by Louis Cheng and David Broadstock are helping to reshape opportunities for charities in Hong Kong to pursue innovative advocacy through the ESG investment education pledge".

(5) Sources to corroborate the impact (indicative maximum of 10 references)

S1 David C. Broadstock, media contribution in *South China Morning Post*:

<http://www.scmp.com/business/global-economy/article/1956350/finding-balance-between-economic-and-environmental>

<https://www.scmp.com/business/banking-finance/article/2112354/going-green-changing-face-corporate-finance>

S2 David C. Broadstock, policy brief contribution resulting from the King Abdullah Petroleum Studies and Research Centre (KAPSARC):

<https://www.kapsarc.org/wp-content/uploads/2016/06/KS-1630-WB029A-Designing-Electricity-Markets-to-Integrate-Renewable-Energy.pdf>

S3 David C. Broadstock, policy/research advice via contributions as an international expert advisor on the THALES project. For more information please visit:

<http://excellence.minedu.gov.gr/thales/en/thalesprojects/380232>

S4 David C. Broadstock's SCMP article highlighted by the Climate Bonds Initiative in their *Media Digest*:

<https://www.climatebonds.net/2017/10/sept-media-digest-euromoney-ft-bloomberg-south-china-morning-post-telegraph-cityam-and-many>

S5 SCMP readership information:

http://advertising.scmp.com/sites/all/themes/scmpams/ratecard/South%20China%20Morning%20Post_Media%20Kit.pdf

S6 Peng Zhang's research media mentions:

http://usa.chinadaily.com.cn/epaper/2017-07/28/content_30281518.htm?from=timeline&isappinstalled=0

https://www.huffpost.com/entry/climate-change-manufacturing_n_5a280c5de4b0c21176276f00?ncid=engmodushpimg00000006

S7 ESG Investment Education Pledge launch/press release:

<https://www.foe.org.hk/en/media/Green%20Info/media%20news/decarbonise%20charity%20decarbonise%20philanthropy%20%20%20%20green%20group%20walks%20the%20tal%20k>

S8 HKICPA support for PASS grant:

http://app1.hkicpa.org.hk/correspondence/757/PASS_2019_flyer.pdf