The role of state investment banks for renewable energy technologies in OECD countries

Paul Waidelich, Climate Finance and Policy Group, ETH Zurich, Clausiusstr. 37, CH-8092 Zurich, paul.waidelich@gess.ethz.ch, +49 176 98794773
Bjarne Steffen, Climate Finance and Policy Group, ETH Zurich / Center for Energy and Environmental Policy Research, MIT

Overview

Achieving the Paris Agreement targets will require investments in renewable energy (RE) technologies that substantially exceed current investment levels (Klaaßen & Steffen, 2023; McCollum et al., 2018). To finance RE projects and low-carbon technologies in general, policymakers are increasingly using state investment banks (SIBs), i.e., publicly capitalized financial institutions with independent day-to-day operations and a domestic focus (Cochran et al., 2014). However, while the theoretical and empirical understanding of RE support policies, such as feed-in tariffs or portfolio standards, has greatly advanced over the past years, the prevalent use of SIBs for fostering the clean energy transition has received little attention. Conceptional studies suggest that SIBs can absorb investment risks related to new technologies, mobilize private capital, and enable smaller-scale projects (Geddes et al., 2018; OECD, 2016). However, the potential deficiencies of state-owned banks, such as lower performance and politically distorted decision making, are well-known (Berger et al., 2005; La Porta et al., 2002). As a result, the *actual* financing behavior of SIBs regarding the energy transition might deviate considerably from the literature's recommendations, but it remains starkly understudied (Polzin et al., 2019).

Existing studies either investigate the impact of public financing in general on RE investments without analyzing the role of specific institutions (Cárdenas Rodríguez et al., 2015; Deleidi et al., 2020; Polzin et al., 2015), or they assess how the involvement of public financial institutions affects bank syndicates without considering energy technologies or SIBs in particular (Broccolini et al., 2021; Degl'Innocenti et al., 2022; Gurara et al., 2020). However, quantitative evidence on whether SIBs' RE financing activities align with theoretical rationales can guide policymakers who are considering designing a new, green SIB or adding renewables to the mandates of existing institutions. Therefore, this paper investigates how the financing behavior of SIBs with respect to RE technologies differs from that of private banks, and if that is compatible with their intended role.

Methods

To answer this question, we review the academic literature on rationales for SIB financing for RE technologies and derive four hypotheses regarding the optimal behavior of SIBs, according to which SIBs should be more likely to finance i) higher-risk technologies vis-à-vis lower-risk technologies, ii) immature markets where a given technology's deployment is still low, iii) transactions with smaller ticket sizes, and iv) transactions with more non-public lenders due to SIBs' mobilization of private capital. To test these hypotheses, we identify all SIBs in a sample of $N = 4{,}999$ debt financing transactions for RE projects in OECD member countries taken from the Bloomberg New Energy Finance database. Then, we assess the predictors of SIB involvement by estimating a logit regression model populated with country, year, and technology fixed effects as well as control variables at the project, financier, and country level. To contextualize our findings further, we conduct additional descriptive analyses, for example regarding the composition of lenders for different subsets of our sample, and deploy a wide battery of robustness checks.

Results

Overall, we find that SIBs are involved in 11% of RE deals in our sample and account for nearly twice the lending activity of all other public sector entities combined, illustrating their significant role in financing the clean energy transition. Based on fixed-effect logit regressions, SIBs are more likely to appear in deals for higher-risk RE technologies such as offshore wind or biomass and waste. For solar photovoltaics plants, which exhibited a reduction in investment risks over the study period, SIBs become less likely to finance projects once the technology's deployment ramps up in the respective country, although this finding does not extend to other technologies. However, we find no clear evidence that SIBs are significantly more involved in a country's *very first* debt financing deals for a novel technology. Such first-mover roles are instead taken over by other public sector entities, with a particular role for export credit agencies and multilateral development banks in less-developed OECD member countries.

Contrary to the literature's suggestion, SIBs are *less* likely to provide debt for small-sized RE transactions. Regarding the question of mobilizing private banks, we find that SIBs often operate as sole lenders, particularly for projects sponsored by public sector entities. In a co-lending role, however, the presence of an SIB in a transaction

correlates with higher syndicate sizes—a finding that aligns with previous studies on public financial institutions (Broccolini et al., 2021; Degl'Innocenti et al., 2022) but is not consistent across all robustness checks.

Conclusions

Taken together, our results reveal that SIBs do indeed leverage their risk-bearing abilities to foster riskier RE technologies in immature markets but do not seem to prioritize first-mover roles or the financing of smaller assets. These findings are immediately relevant for policymakers who are considering revising an SIB's mandate or establishing a new institution, such as the potential capitalization of a US green bank through the Inflation Reduction Act's Greenhouse Gas Reduction Fund. Given our results, decision makers in such situations should place a particular emphasis on deliberately targeting smaller-scale deals, ensuring that the SIB's mandate and guidelines are effective in that regard if enabling smaller RE projects is a policy objective. Furthermore, policymakers should mandate or incentivize SIBs to withdraw from sufficiently mature technologies—for example, by setting clear guidelines for additionality. In addition, our results illustrate that empirical relationships in RE financing are strongly moderated by technology differences. This highlights the importance of a high technological resolution when assessing energy financing and can inform future empirical research to avoid spurious findings.

References

Berger, A. N., Clarke, G. R., Cull, R., Klapper, L., & Udell, G. F. (2005). Corporate governance and bank performance: A joint analysis of the static, selection, and dynamic effects of domestic, foreign, and state ownership. *Journal of Banking & Finance*, 29 (8-9), 2179–2221.

Broccolini, C., Lotti, G., Maffioli, A., Presbitero, A. F., & Stucchi, R. (2021). Mobilization effects of multilateral development banks. *The World Bank Economic Review*, 35 (2), 521–543.

Cárdenas Rodríguez, M., Hascic, I., Johnstone, N., Silva, J., & Ferey, A. (2015). Renewable energy policies and private sector investment: Evidence from financial microdata. *Environmental and Resource Economics*, 62 (1), 163–188.

Cochran, I., Hubert, R., Marchal, V., & Youngman, R. (2014). *Public financial institutions and the low-carbon transition: Five case studies on low-carbon infrastructure and project investment* (OECD Environment Policy Paper No. 72).

Degl'Innocenti, M., Frigerio, M., & Zhou, S. (2022). Development banks and the syndicate structure: Evidence from a world sample. *Journal of Empirical Finance*, 66, 99–120.

Deleidi, M., Mazzucato, M., & Semieniuk, G. (2020). Neither crowding in nor out: Public direct investment mobilising private investment into renewable electricity projects. *Energy Policy*, 140, 111195.

Geddes, A., Schmidt, T. S., & Steffen, B. (2018). The multiple roles of state investment banks in low-carbon energy finance: An analysis of Australia, the UK and Germany. *Energy Policy*, 115, 158–170.

Gurara, D., Presbitero, A., & Sarmiento, M. (2020). Borrowing costs and the role of multilateral development banks: Evidence from cross-border syndicated bank lending. *Journal of International Money and Finance*, 100, 102090.

Klaaßen, L., & Steffen, B. (2023). Meta-analysis on necessary investment shifts to reach net zero pathways in Europe. *Nature Climate Change*, 13, 58–66.

La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2002). Government ownership of banks. *Journal of Finance*, 57 (1), 265–301.

McCollum, D. L., Zhou, W., Bertram, C., . . . Riahi, K. (2018). Energy investment needs for fulfilling the Paris Agreement and achieving the Sustainable Development Goals. *Nature Energy*, 3 (7), 589–599.

OECD (2016). *Green investment banks: Scaling up private investment in low-carbon, climate-resilient infrastructure*. Green Finance and Investment, OECD Publishing. https://doi.org/10.1787/9789264245129-en

Polzin, F., Egli, F., Steffen, B., & Schmidt, T. S. (2019). How do policies mobilize private finance for renewable energy? A systematic review with an investor perspective. *Applied Energy*, 236, 1249–1268.

Polzin, F., Migendt, M., Täube, F. A., & von Flotow, P. (2015). Public policy influence on renewable energy investments. A panel data study across OECD countries. *Energy Policy*, 80, 98–111.