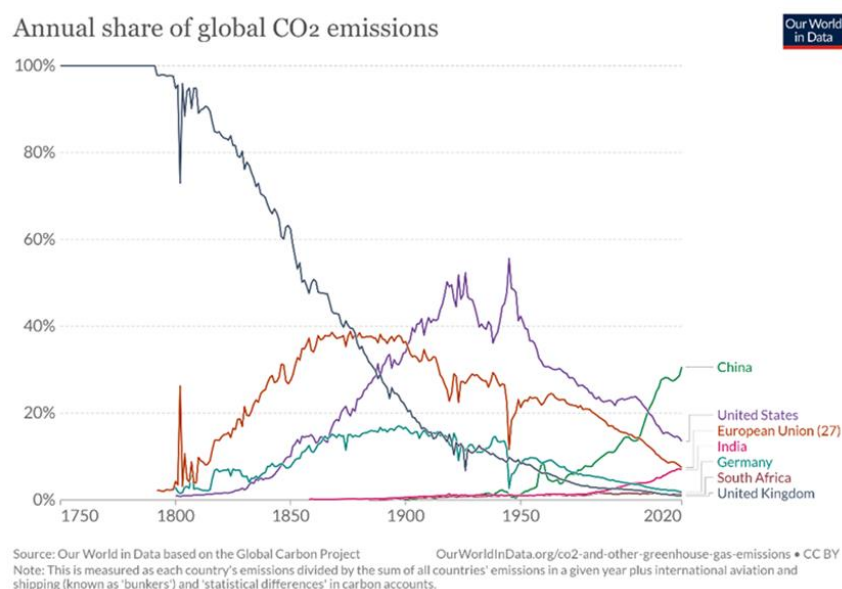


Climate change and the associated issue of reducing carbon emissions has risen on the agenda of policymakers worldwide. However, the global implementation of regulation is fragmented and largely missing. Furthermore, there is considerable disagreement regarding who should pay for the cost of adapting to and mitigating climate change. Developed countries argue that each country should bear most of the costs of their climate transition. Many developing countries such as India, argue that developed countries that have been responsible for large emissions during their industrialization should be responsible for bearing most of the costs. Indeed, at the 2009 COP meeting developed countries committed to jointly mobilize \$100 billion a year by 2020 to help developing countries fight climate change but were still about \$17 billion short as of 2020.

Achieving the Paris Agreement goal of limiting global warming to 1.5C depends importantly on achieving a substantial decarbonization in developing economies, which are currently large emitters but have historically contributed the least to global emissions (Figure 1). Ensuring that these economies have the funds to finance their transition is even more important given recent estimates that the world stands to benefit greatly from paying the polluters to stop polluting. Adrian, Bolton and Kleinnijenhuis (2022) estimate that the net social benefits of a coal phase-out amount to \$85 trillion: a huge amount which makes it in everyone's best interest to overcome the current obstacles to phasing out coal.

Figure 1 Annual CO2 emissions by country since the industrial revolution



Notwithstanding the benefits, the financial resources that need to be mobilized are well beyond what governments can provide. In addition to facing budget constraints, governments face serious political constraints in implementing climate regulation. Carbon taxes often face opposition from the citizens of economies considering imposing them, and environmental stances and policies have become increasingly politicized and thus sensitive to electoral cycles.

Allen, Barbalau and Zeni (2023) show that when political frictions limit the use of regulatory tools, financial markets may offer an alternative tool for incentivizing decarbonization and financing the climate transition. If investors face disutility (utility) from the social damage (benefit) associated with

their own actions, they may be willing to personally subsidize decarbonization if they are offered an option to do so. Financial markets, and more specifically debt securities with a rate of interest that is contingent on the carbon emission reduction achieved by the borrower, represent such an option. The authors formally show that such carbon-contingent securities provide carbon reduction incentives that are equivalent to a carbon tax, and can thus offer a decentralized alternative to regulation which is not subject to political constraints and which can fully substitute regulation if the funds deployed through such markets are sufficiently large.

Securities similar to the carbon-contingent securities in the model of Allen, Barbalau, and Zeni (2023) are already widely issued in the form of Sustainability-Linked Loans and Bonds. The cumulative capital mobilized through these contracts was approximately \$1.6 trillion as of 2022 and is thus orders of magnitude larger than the \$100 billion pledge to developing countries. Furthermore, this form of carbon-contingent financing has a wider reach, being present in countries where support for regulation does not exist (Figure 2). By combining the global nature of capital markets with the carbon-pricing incentives of regulation, these securities have the potential to be an important tool for reducing carbon and for transferring capital to developing economies.

Figure 2a: Stringency of the current environmental regulation measured by the direct or implied price of carbon in \$/CO2 tones equivalent.

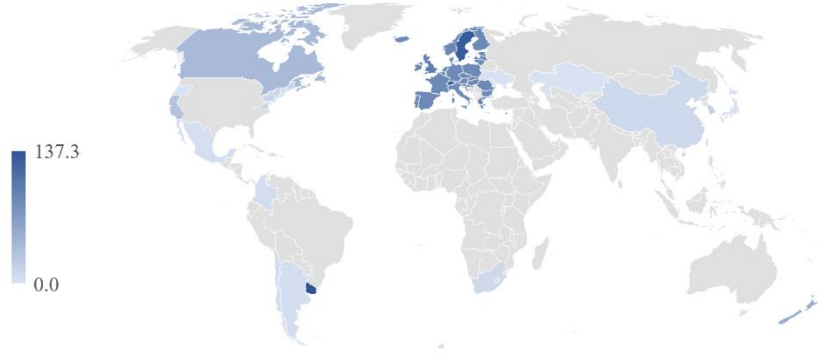
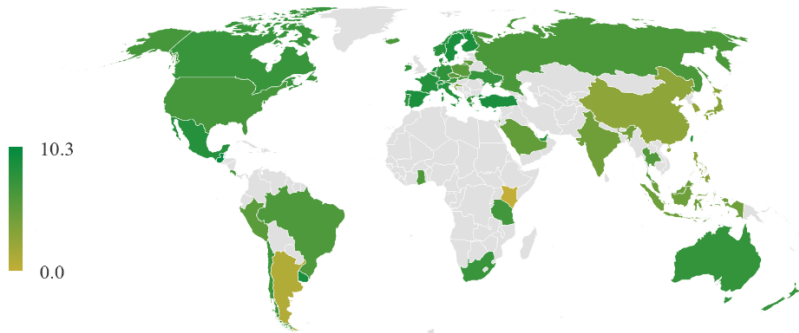


Figure 2b: Geographical distribution of sustainability-linked debt (which includes corporate, and government issued sustainability-linked loans and bonds) relative to all debt (corporate and government issued loans and bonds) issued since 2013.



Data collected from the World Bank (2a) and Bloomberg (2b). A more intense shade of green (blue) indicates a higher proportion of sustainability-linked debt relative to total debt (a higher carbon price respectively).

However, the authors caution delegating the climate transition to the private sector, as financial markets can have counterproductive implications in equilibrium. Specifically, they show that voters who anticipate the possibility of accessing funding at reduced or concessional rates, conditional on reducing emissions, will be less willing to support regulation in the first place. Welfare losses can thus occur when markets reduce support for regulation, but they are not sufficiently large to finance the transition of the entire economy.

It is important to note that the substitution result derived by Allen, Barbalau, and Zeni (2023) holds in the absence of frictions that typically affect developing economies. In such economies, decarbonization investments are often too risky for foreign investors and concerns exist regarding the availability of reliable measurement technologies as well as corruption. Addressing such frictions is a matter of first-order importance. There is an important role for MDBs and international organizations in creating blended finance solutions that would de-risk such investments, and in providing the infrastructure necessary to allow carbon-contingent financing in developing countries.