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Carbon Burden

Based on BFI Working Paper No. 2024-138, "Carbon Burden," by Lubos Pastor, University of Chicago; Robert F. Stambaugh, University of Pennsylvania; and Lucian A. Taylor, University of Pennsylvania

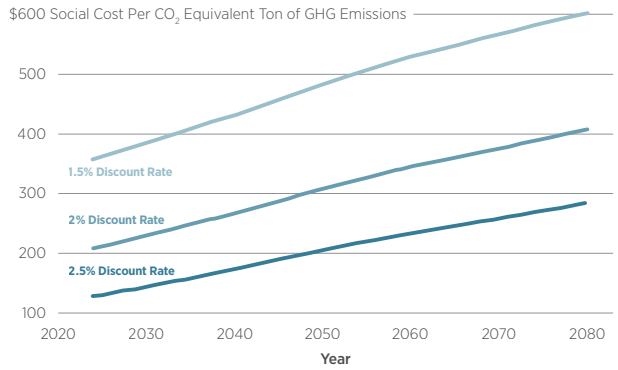
The US corporate sector's "carbon burden" (the present value of social costs of its future carbon emissions) is 131% of total corporate equity value; 77% of individual firms have carbon burdens exceeding their market capitalizations.

The value of firms to society involves more than direct returns to shareholders, employees, and consumers, but also includes **externalities**, which can be positive (such as technological spillovers from R&D investment), or negative (such as environmental damage). Understanding the magnitude of externalities is important as they can influence such policies as regulations and taxes, as well as corporate issues like sustainability efforts and risk management practices. Consumers and investors also weigh externalities when considering their relationships with firms.

Economists have long considered the role of firms and their broader effects on an economy and society. Milton Friedman famously wrote in 1970 that the social responsibility of firms is to maximize market value. In that New York Times piece, Friedman quotes from his book, *Capitalism and Freedom*, to conclude that in a free society, "there is one and only one social responsibility of business—to use its resources and engage in activities designed to increase its profits so long as it stays within the rules of the game, which is to say, engages in open and free competition without deception or fraud."

However, in a world with externalities, such a rigid position breaks down. A firm's shareholders, for example, may have concerns beyond the bottom line to include social and ethical issues. For example, does a firm's "activities designed to increase its profits" allow it to spew pollution into the environment? Do firm activities have a negative impact on a certain demographic, or within a particular geographic space? Conversely, could a firm increase certain social benefits by attenuating its profit-maximizing goals?

Figure 1 · Social Costs of Greenhouse Gas (GHG) Emissions



Note: This figure plots EPA estimates of the social cost per CO2-equivalent ton of GHGs emitted in a given future year. The EPA provides the costs through 2080 that are associated with each of three discount rates: 1.5% (top line), 2% (middle line), and 2.5% (bottom line).

This paper attempts to quantify one externality of current import: damages from corporate emissions of greenhouse gases. Key to measuring this carbon externality is recognizing its *future*

Externalities: A cost or benefit that affects a third party that is not directly involved in an economic activity. Externalities can be positive or negative, and they can be caused by production or consumption.

dimensions, namely that carbon emissions have consequences for many years, and that the future path of those enduring emissions are crucial in determining effects of climate change. The authors' contribution is to quantify the carbon externality while incorporating the impact of future emissions.

To measure the magnitude of the carbon externality, the authors develop what they term a "carbon burden," which they define as the **present value** of the social costs associated with its future greenhouse gas (GHG) emissions. Key to the carbon burden is the social cost of carbon (SCC), which is the dollar cost of societal damages resulting from the emission of one additional ton of carbon into the atmosphere. The authors carefully aggregate the US carbon burden, including future ramifications of such policies as the **2015 Paris Agreement**, under which the US aims to reduce its emissions by at least 26% by 2025 and 50% by 2030 (relative to the 2005 level). They find the following:

- The aggregate US carbon burden is $87 trillion, which equals 131% of the total value of corporate equity.
- Carbon burdens vary greatly across industries, from 695% of market value for utilities to 1% for financials, based on direct emissions. With indirect emissions, the carbon burden of utilities more than doubles, but the financials' carbon burden grows more than thousandfold.
- For 13% of firms, which represent 9% of total market capitalization, their direct carbon burdens exceed their market values. Adding in indirect emissions, carbon burdens exceed market values for 77% of firms, which make up half of total market capitalization. For these firms, the present value of their carbon costs to society exceeds the present value of their dividends to shareholders.
- Adherence to the 2015 Paris Agreement would reduce the aggregate US carbon burden by 21% or 32%, depending on the projected emission path beyond 2030. Large carbon emitters are key; all the decarbonization of the US corporate sector by 2050 is expected to come from the 30 largest emitters. However, such reductions would still fall short of US Paris goals.

While these carbon burden data point to corporations as the main culprit, the authors are clear that responsibility also extends to household and industrial demand, and politics (for example, some European countries rely more on nuclear energy, which does not emit carbon). Further, efforts to reduce firm output of carbon is complicated by the symbiotic relationships among firms and across industries. It is simplistic to hold utilities fully accountable for their direct emissions when demand from other sectors also drives those emissions. That said, accountability for carbon emitters is necessary; the trick is to get it right. Regulatory discrepancies abound among firms of different sizes, for example, and rules vary among states. At the same time, measurement issues persist. Future research into the risk profile of carbon emissions that fully captures externalities and improves upon measurement, as well as analysis of the most effective policies, is necessary for the United States to even approach its Paris commitments.

Present value: The value today of an amount of money in the future. If the appropriate interest rate is 10 percent, then the present value of $100 spent or earned one year from now is $100 divided by 1.10, which is about $91.

2015 Paris Agreement: A legally binding international treaty on climate change, adopted by 196 parties at the UN Climate Change Conference (COP21) on Dec. 12, 2015. Its goal is to hold "the increase in the global average temperature to well below 2°C above pre-industrial levels," and to pursue efforts "to limit the temperature increase to 1.5°C above pre-industrial levels."

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ABOUT OUR SCHOLAR

Lubos Pastor
Charles P. McQuaid Distinguished Service Professor of Finance and Robert King Steele Faculty Fellow, Chicago Booth

CHICAGO BOOTH
The University of Chicago Booth School of Business

Written by David Fettig • Designed by Maia Rabenold