



Green Lending: Is Regulatory Exuberance Irrational (and a Little Dangerous)?

Bill Nelson | July 14, 2021

In the United States, bank regulators are paying increased attention to the risks posed by climate change on the theory that climate change could present risks to bank safety and soundness in the form of credit losses. A mortgage in a floodplain could go bad if more frequent floods erode the value of the underlying property. A loan to a coal company could go bad if a steep carbon tax were imposed, reducing the demand for coal.

The premise, sometimes stated and sometimes unstated, is that bank regulators fully appreciate the severity of the climate outlook while bankers and other market participants do not; thus, mandating that banks invest more heavily in green assets and disinvest in brown assets should produce attractive returns as the underlying asset values adjust to reflect reality.

For example, in a recent presentation, Nobel Prize-winning economist Robert Engle described how to form a portfolio that was long green firms and short brown firms in order to hedge climate change risk. After observing that such a portfolio should have a low return (a negative alpha) over the long term because it was a hedge against an important source of risk, he indicated that investors could also expect a *high* return in the medium term:

...if there is news that the climate change is going to be more severe than the market expects, and this might include a lot of news about climate change because the market is, perhaps, underpricing it, the climate hedge portfolios will actually rise in value because both the long and the short positions would likely appreciate. So, if climate ultimately turns out to be worse than the market expects it to be, then these portfolios would have an accumulation of appreciations, which would more than offset these negative alphas.¹

It is worth noting that this observation conflicts with financial markets theory, which generally suggests that the market does not persistently misprice assets and that risk and reward move together. Indeed, even though climate change can cause loan losses, it does not necessarily follow that loans to firms that specialize in climate-change-mitigating products or activities are relatively safe. Loans default for all kinds of reasons, and many green firms are startups with negative earnings and unstable funding, and with correlated exposures to certain volatile commodities (e.g., copper and rare earth minerals). Both green firms and brown firms are subject to risks associated with changes in each Administration's climate policies.

Leaving theory aside, this note uses actual, existing data to analyze how a portfolio of green firms and a portfolio of brown firms have performed – specifically, how they would best fit into a broader portfolio designed to have the lowest risk possible for any given level of reward. In general, the weight on green firms goes up with the risk of the portfolio.

¹ Remarks at “The Green Swan Conference – Coordinating finance on climate,” June 2-4, 2021. https://www.bis.org/events/green_swan_2021/overview.htm?2+June=5.

DATA AND RESULTS

We use standard portfolio analysis to evaluate the risk-return properties of a green portfolio and a brown portfolio when combined with portfolios representing major industry groups. Across the portfolios, green firms offer a relatively high return but also high risk. When we form portfolios designed to minimize variance for any given return, we find that portfolio risk goes up as the portfolio becomes greener.

The data for the analysis are daily cum-dividend returns on five exchange-traded funds chosen to cover green and brown firms and other major industrial sectors.

- Green: ETF QCLN, which consists of energy companies that are publicly traded.
- Brown: ETF VDE, which consists of firms in the traditional energy sector.
- Financial: ETF VFH, which consists of financial firms.
- Health: ETF XLV, which includes companies from the following industries: pharmaceuticals; health care equipment & supplies; health care providers & services; biotechnology; life sciences tools & services; and health care technology.
- Technology: ETF XLK, which consists of firms in the technology sector.

The sample period is February 2007 through mid-July 2021.

As can be seen in table 1, over the sample period, the Green portfolio produced the second-highest returns of the five portfolios, but the highest risk – that is, the standard deviation of the Green ETF’s returns is the highest of the five portfolios. The Brown portfolio produced the lowest returns and the second-highest risk.

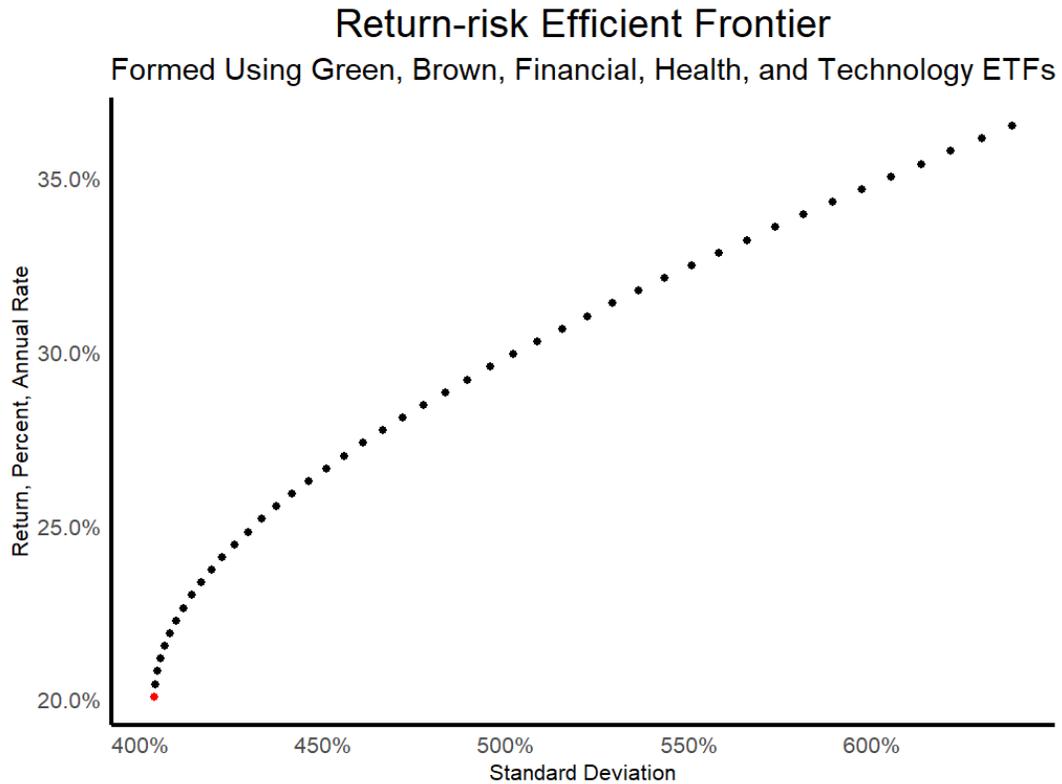
Table 1

	Percent, Annual Rate				
	Green	Brown	Financial	Health	Technology
Mean Return	21.5%	9.2%	13.1%	18.1%	24.5%
Standard Deviation	786%	727%	706%	413%	519%

MEAN-VARIANCE EFFICIENT FRONTIER

Using the means, variances and correlations of the returns across the five ETFs, we formed the mean-variance efficient frontier, shown in figure 1. The points along the frontier are the means and standard deviations of portfolios formed by combining the five fundamental portfolios. The frontier represents the lowest possible standard deviation of returns for each possible return; conversely, it is the highest achievable return for each standard deviation. The red dot represents the portfolio with the lowest achievable risk.

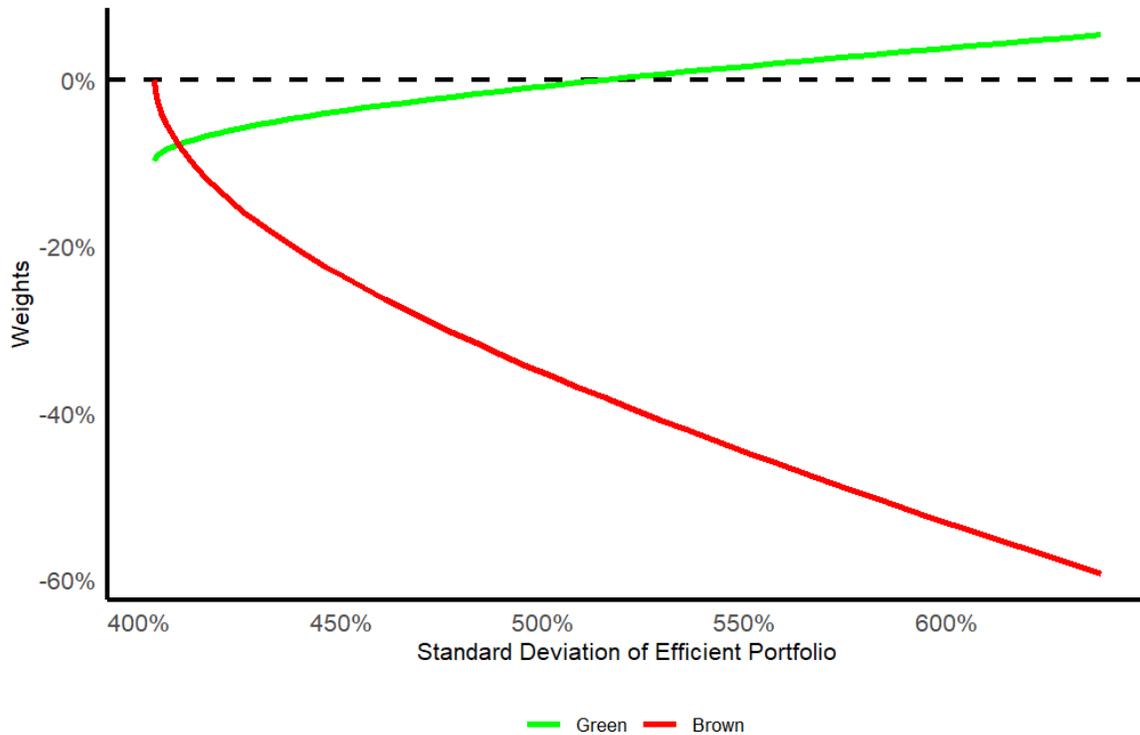
Figure 1



We are especially interested in the portfolio weights of the Green and Brown ETFs, shown in figure 2. As can be seen, the minimum variance portfolio is slightly short the Green ETF, and the weight on the green firms increases as the variance of the efficient portfolio rises, an unsurprising result given the high reward and high risk from investing in green firms over the sample period. The minimum variance portfolio does not include the Brown ETF at all, and the weight on the portfolio becomes increasingly negative as variance rises. The Brown ETF's low return makes it attractive to short the portfolio, although the strategy increases overall risk.

Figure 2

Portfolio Weights of Green and Brown ETFs in Efficient Frontier from Figure 1

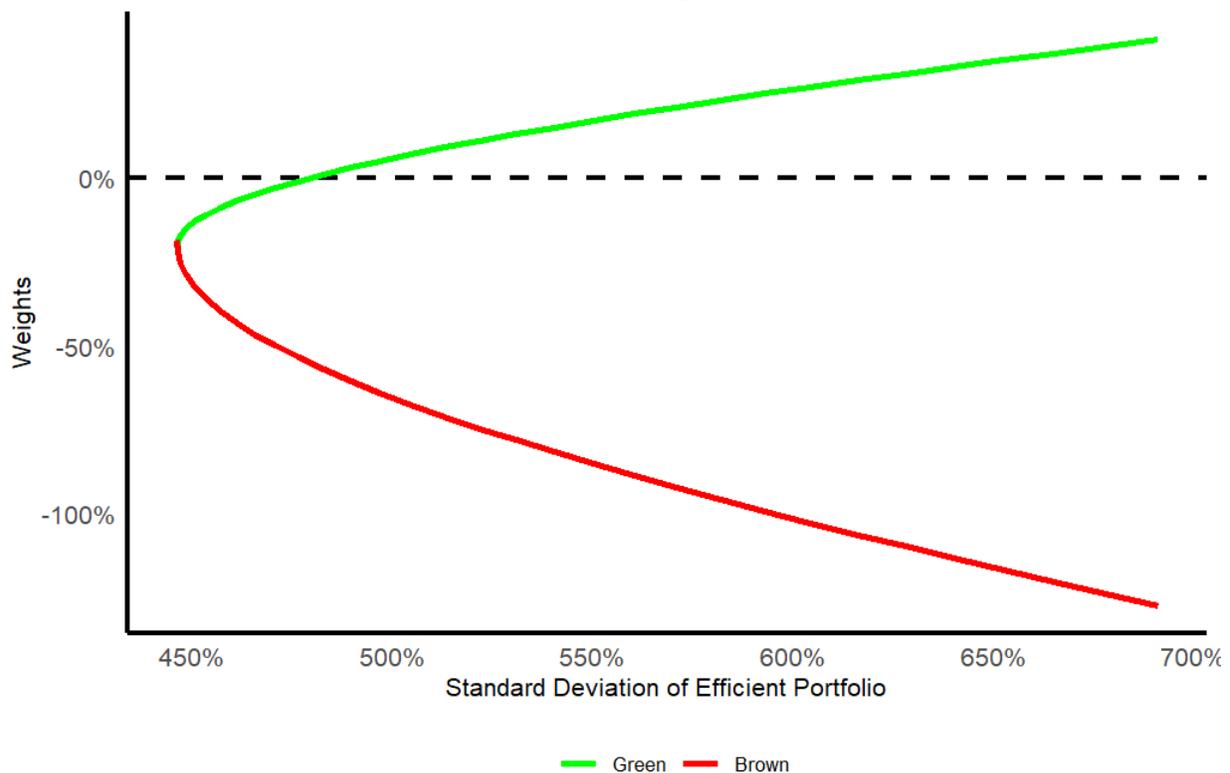


CAVEATS

These results are meant to be thought-provoking rather than dispositive, and to encourage further research. The mean-variance frontier is highly sensitive to the underlying portfolios and to the sample period. We tried a variety of combinations of ETFs, including just the Green and Brown ETFs and the S&P 500, as well as stopping the sample in 2019. While the results differed across the combinations, one result was robust: the share of Green firms relative to Brown firms rose as the variance of the efficient portfolio increased. Figure 3, for example, plots the portfolio weights when the fundamental portfolios are just the Green and Brown ETFs and an ETF designed to track the S&P 500.

Figure 3

Portfolio Weights of Green and Brown ETFs in Efficient Frontier formed using Green, Brown, and S&P 500



IMPLICATIONS

There is currently a lot of favorable investor sentiment toward green firms, but that could make them riskier, not safer, by inflating their asset values. In his book, *Irrational Exuberance*, Nobel Laureate Bob Shiller argues that major stock market bubbles have often been started by a period of technological change such as railroads, mass production, and the internet. Investors bid up the prices of stocks associated with the new technology in anticipation of rapid future growth in earnings. If Professor Shiller is correct, then the firms that banks should be avoiding now are the young firms and startups specializing in green technology.

Thus, consider the Green Asset Ratio (GAR) proposed by the European Banking Authority.

The GAR measure the volume of financial assets in the banking book (loans and advances, debt securities, equity instruments) funding sustainable economic activities contributing substantially to climate mitigation and/or adaptation (absolute figures and compared to total exposures) according to the EU taxonomy for various types of counterparties and for new and existing exposures.²

² "Draft Implementing Standards on prudential disclosures on ESG risks in accordance with Article 449a CRR," European Banking Authority, 1 March 2021, p. 37. [Consultation paper on draft ITS on Pillar 3 disclosures on ESG risks.pdf \(europa.eu\)](https://www.eba.europa.eu/media/1000222/attachment/1371127/1/Consultation%20paper%20on%20draft%20ITS%20on%20Pillar%203%20disclosures%20on%20ESG%20risks.pdf)

Shiller’s hypothesis and the data presented above would suggest that this index would be positively, not negatively, correlated with bank risk.

These simple results suggest that an examination mandate to banks to lend more to green firms may increase rather than decrease bank risk. The traditional justification for bank regulation is controlling the moral hazard caused by deposit insurance and access to a lender of last resort. In particular, the regulations are intended to ensure that banks do not take advantage of the safety net to become riskier than appropriate. That justification would not appear to support a policy to direct banks to invest in green assets.

An alternative justification for banking agency involvement in climate change policy is that climate change could result in systemic risk – significant risk to the financial system that each individual bank underappreciates. For example, if all banks are planning on shedding assets linked to carbon-producing industries if a carbon tax were enacted, each individual bank could underestimate the decline in the price of the assets that would result. Similarly, although never mentioned, there could also be systemic risk if green firms all did poorly at the same time as a result, say, of rapid advancement in carbon capture technology or withdrawal of green energy subsidies by an Administration skeptical of climate change. More importantly, there is *no* argument based on systemic risk that suggests banks should be encouraged to invest in green firms if the expectation is that green firms will *do well*.

CONCLUSION

To the extent that banking regulators are focused on financial risk, these results suggest caution about constructing scenario analyses that produce a risk profile at odds with actual performance data. At the least, as these analyses proceed, they should be back-tested against actual performance; to the extent that green portfolios continue to demonstrate high risk, scenario analyses should be reviewed to ensure that they are not biased. If these results persist in further research, bank regulators should perhaps be hesitant to use the examination process to mandate shifts in asset mix for assumed but unproven safety and soundness or financial stability reasons.

Although U.S. bank regulators have indicated that they are not using capital requirements to pursue a climate agenda, that may be less true in other jurisdictions, some of which are considering reducing capital risk weights on green assets and increasing them on brown assets. Those jurisdictions should keep in mind Paul Volcker’s explanation to Congress why risk weights were added to capital requirements in the first place: “...we wanted to avoid any sense that capital requirements would be used as a tool for encouraging the allocation of credit to particular sectors, and we also wanted to avoid excessive complexity.”³

Disclaimer: The views expressed do not necessarily reflect those of the Bank Policy Institute’s member banks, and are not intended to be, and should not be construed as, legal advice of any kind.

³ Statement by Paul A. Volcker, Chairman, Board of Governors of the Federal Reserve System, before the Subcommittee on General Oversight and Investigations of the Committee on Banking, Finance and Urban Affairs, U.S. House of Representatives, April 30, 1987. June 1987 Federal Reserve Bulletin, p. 435. https://fcic-static.law.stanford.edu/cdn_media/fcic-docs/1987-07-00%20FRB%20Bulletin%2073%20no6.pdf