



## MACRO STRATEGY

# Market Frictions and Climate Change:

## Why the Marketplace Can't Just Fix it

October 29, 2021

Countless times a day, marketplaces provide good or even great solutions to the fundamental problem of matching supply and demand. When there's a run on toilet paper, price changes and inventory shortages send urgent signals to manufacturers to make more toilet paper. And manufacturers respond, reducing their range of product offerings and running extra shifts. It can take some time, but the markets adjust—without intervention, without regulation.

But some goods, particularly those involving market frictions, have a much more indirect line between price and quantity signals and the means of production. Examples of products with market frictions include oil, which involves high and uncertain exploration costs, and street parking, which requires the conversion of an initially public good (space on the streets) into a paid-for commodity. Each of these—and many other scenarios—require policy adjustment in order to address a market failure.

Climate change is likely one of the most complex economic challenges of recent generations. There are at least four major economic frictions that converge in climate change, scrambling the signals between prices and optimal production. We do not present specific solutions here, but rather present the economic problems of climate change and some potential policy solutions.

## Economic Problem #1

### Tragedy of the Commons

One part of the frictions that plague climate change solutions is the classic economic problem of the tragedy of the commons. If one person grazes their cows on the commons there is no visible deterioration of the grass and everyone is slightly better off (free mowing! more milk!); if everyone does it then the commons becomes a muddy patch and all are worse off.

Greenhouse gas emissions, for most of history, have not been significant enough to affect the atmosphere. Like that first cow, the number of humans and their carbon output were not previously substantial enough to make a difference. But now, it's become widely accepted that emissions have a cost, and that lack of restrictions leads to overuse of the resource.<sup>1</sup>

An important fallout from the lack of market-transmitted signals is consumer and investor confusion. Although individuals appear willing to make changes to their own lives to reduce climate change effects, they do not always do so.<sup>2</sup> A key problem may be that it's not actually very clear to customers which products are the most climate friendly.

### Potential Solutions

Economists propose incorporating the costs associated with using the atmosphere into a product's costs. This alerts markets to the use—and overuse—of that resource. These are the considerations behind several different types of experimental and proposed solutions. Carbon taxes and carbon allocations (the “cap-and-trade” approach) are different ways of attempting to incorporate some or all of the carbon costs of production into prices so that market signals are made more clear.

## Economic Problem #2

### Time Inconsistency, or “Costs Now, Benefits Later”

People prefer to have things sooner rather than later. That's one reason why cash flow is discounted: we pay more when we make someone wait for their money and pay less when we pay them sooner. A clear example of where this problem comes into play is retirement savings. Only about a third of people in the U.S. have saved enough for retirement;<sup>3</sup> people generally prefer not to penalize themselves today for a tomorrow that is far off and has some chance of not taking place.

In climate change, the unfortunate problem is that the costs of reducing emissions generally take place immediately, and the benefits of non-accelerating climate change will accrue much later. Climate change presents an even worse dilemma than retirement savings, in that many people alive today aren't even expected to reap the rewards of reducing emissions since emissions prevented today may only affect climate change decades in the future.



## Potential Solutions

Efforts to get around this market failure include proclaimed long-term goals of becoming carbon neutral or a certain percentage decline in emissions by a certain date. The public statement of such goals is meant to hold policymakers to account if they fail to meet the goals. More generally, this type of goal setting is meant to pull forward some of the long-run rewards of sacrificing for climate change by providing a common purpose and a sense of personal reward. However, this remains a difficult one to pull off, particularly at a country level where there are few if any penalties for failing to meet goals. Many companies are publicly committing to such goals as well.<sup>4</sup> This can also pull forward some benefits, as it could induce greater current loyalty by consumers and investors that are committed to mitigating climate change. This may be easier to pull off since the penalty of failure might be loss of market share; it depends, however, on consumers and investors continually prioritizing climate change over other goals (including possibly other ESG goals).

Policies surrounding retirement savings are partly instructive. Required social security withholdings effectively insure the country at large against the individual inclination to save insufficiently, while legislation permitting tax-favorable 401(k) accounts provides incentives for at least some share of the population to save additionally.

### Economic Problem #3

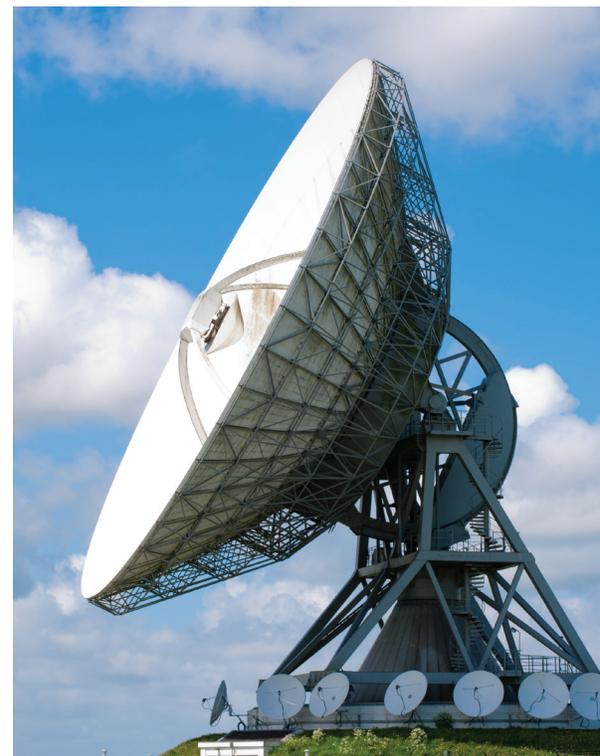
## Market Failures of Technology

There is evidence to suggest that markets underprovide technological advancement that is independent of the environmental literature.<sup>5</sup>

One problem here is that of agency. Inventors and innovators generally know more about their work—and its potential—than do investors. Because of that, investors may worry about verification and whether they are investing in a moneymaking technology.<sup>6</sup> Another problem is that the positive externalities of a technological advancement are often not captured by the innovator, as later-moving firms can piggy-back onto the technology and provide their own value-added without having to invest in the initial technology.

As with other government-supported initiatives, initial forays into a new technology can be unprofitable at the scale desired. Oil exploration, as an example, has received favorable tax treatment in the U.S. as part of government initiatives toward energy independence. Without such treatment, oil exploration may have been underprovided given energy independence goals, or performed more slowly. Similarly, climate-friendly technological innovation may be underprovided without analogous intervention.

In addition, there is again a time element, where basic research can require years of slow progress before commercial applications become apparent. Often, more patient entities—the government or universities—are involved at these levels before commercialization becomes possible. Examples include vaccinations using mRNA therapeutics, with basic research funded largely by universities<sup>7</sup>, and the U.S. Department of Defense, which created and still maintains the technology behind GPS.<sup>8</sup>



Most importantly, there is a general acknowledgement that technological advances are required if we are to both maintain current living standards and reduce our impact on climate change.<sup>9</sup> More bluntly, the more extensively we can leverage technological innovation, the less we have to sacrifice our personal comfort in the quest to mitigate climate change.

## Potential Solutions

This is actually a relatively easy one. The U.S. has a long and illustrious track record of providing conditions that are conducive to technological development. This includes everything from direct funding of basic or sensitive research all the way to widespread adoption. Although the markets are a critical component of U.S. technological success, that success also requires a favorable government support structure. As in prior situations (GPS, vaccinations), early investment and a favorable adoption phase combined with the existing pro-innovation landscape in the U.S. could lead to more rapid technological development for addressing climate change.

### Economic Problem #4

## Coordination Problem

A final major economic problem set forth by carbon emissions is that the problem crosses borders. There are numerous state and quasi-state actors with overlapping but distinct interests competing on policy. The main problem may be what game theorists refer to as a coordination game.<sup>10</sup> If Country A reduces its consumption of oil while the production of oil remains constant, then Country B can simply take advantage of lower oil prices to use more of it and presumably both reap economic benefits and undermine any climate change progress made by Country A. Only if both Countries A and B agree to avoid fossil fuels do they both benefit.



## Potential Solutions

There are a few global coordination problems that have been addressed in the past, mostly in international trade and finance, that we could look to for guidance. Although low tariff barriers are somewhat taken for granted these days, the post-war trade liberalization movement was a transformative shift aimed at “[eliminating] economic warfare, to make practical international cooperation effective,” in contrast to the post-World War I “beggar-thy-neighbor” policies that were a contributing factor to World War II.<sup>11</sup> It required extensive coordination by a core group of countries to agree to mutual tariff reductions without seeing defections by members for their own advantage.

## Conclusion

The existence of climate change, and the need to do something about it, appears to have been largely accepted and has become the default assumption in the investment community.<sup>12</sup> The discussions have moved on to the details of how best to address it.

One important aspect is the multiple economic frictions related to climate change. Economic frictions occur continuously in other arenas and are often addressed with legislation and other policy accommodations. Some climate change-related economic frictions present relatively straightforward solutions (technological underinvestment in particular), while others provide deep and difficult puzzles, perhaps none more so than global coordination. Other areas, such as the endogenization of carbon costs, are the subject of intense debate.

Ultimately, what the most useful government policies will be remains more of an open discussion. Individual companies are innovating and staking claims to various levels of commitment with respect to climate change. Individual consumers are motivated to make the best decisions to counteract climate change. The best policies will help align economic actions with people's intent. Investors will need to remain vigilant in understanding how changes to government policy to address climate change may affect their investments.

## Endnotes

- <sup>1</sup> See, e.g., Kerry A. Emmanuel, "Climate Science and Climate Risk: A Primer," *Massachusetts Institute of Technology*, 2018.
- <sup>2</sup> *Pew Research Poll*, June 23, 2020, and Yatish Joshi and Zillur Rahman, "Factors affecting green purchase behaviour and future research directions," *International Strategic Management Review*, 2015.
- <sup>3</sup> Federal Reserve Board of Governors, *Report on the Economic Well-Being of U.S. Households in 2020*, May 2021.
- <sup>4</sup> Disha Shetty, "A Fifth of World's Largest Companies Committed to Net Zero Target," *Forbes*, March 24, 2021.
- <sup>5</sup> See, e.g., Bronwyn H. Hall, "The Financing of Research and Development," *NBER Working Paper No. 8773*, February 2002.
- <sup>6</sup> Adam B. Jaffe, Richard G. Newell, and Robert N. Stavins, "A Tale of Two Market Failures: Technology and Environmental Policy," *Resources for the Future*, 2004.
- <sup>7</sup> Damian Garde and Jonathan Saltzman, "The story of mRNA: How a once-dismissed idea became a leading technology in the Covid vaccine race," *Stat*, November 10, 2020.
- <sup>8</sup> U.S. Department of Defense, [defense.gov](https://www.defense.gov).
- <sup>9</sup> Adam B. Jaffe, Richard G. Newell, and Robert N. Stavins, "A Tale of Two Market Failures: Technology and Environmental Policy," *Resources for the Future*, 2004.
- <sup>10</sup> Stephen J. DeCanio and Anders Fremstad, "Game theory and climate diplomacy," *Econological Economics* 85: 177-187, 2013.
- <sup>11</sup> USITC, *Import Restraints 6th Update*, Publication 4094, 2009.
- <sup>12</sup> *Pew Research Poll*, June 23, 2020.

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