

chapter 1

Strategies for Cooperation

Perhaps it is time to try another approach: a commitment by each country to raise the price of emissions (whether through a carbon tax or emissions caps) to an agreed level.

—Joseph E. Stiglitz, 2010

BONNIE AND CLYDE HAVE ROBBED A BANK, but the prosecutor has little evidence against them. In prison, they are kept apart. Both know they will get only a one-year sentence for firearms possession if they remain silent, and they will be given seven-year sentences if they both confess. They know exactly what would be best for their small world—to cooperate with each other and remain silent. But they won't. Instead they will betray each other and suffer the consequences, because there is one more rule to this game.

If one confesses and betrays the other, while the other cooperates and remains silent, the silent one—the one who cooperates—will spend life in prison, while the one who betrays will go free immediately. This makes the game a “prisoners’ dilemma,” the most famous game in game theory.

I will soon explain what goes wrong, but the most surprising thing about this game is how frequently it turns up in real life—always in disguise. The most recent, well-known case occurred at the Copenhagen climate summit. Few delegates realized that the countries assembled there were playing a huge multi-player version of the prisoners’ dilemma. As usual, the prisoners did not cooperate.

Good News about Copenhagen

Global warming is a global problem, but not just because the climate is a global system. The source of the climate problem is a global failure of the fossil-fuel market. It fails to take into account the cost of emissions. But, you knew that. What you may not know, is that the only remedy is a global game. That's because there is no global government. Such a government could solve the problem with command and control—emission caps, and it could even combine caps with market forces—by allowing trade.

But without a global government there can be no global cap. So Kyoto's system of national caps and global trade is a much different game than the European Union's Emission Trading System. Few seem to have noticed this enormous difference. Europe has a single cap. The Kyoto Protocol calls for dozens of self-selected "caps," or targets. As a result, Europe's system works (though not as well as the "untax" we will discuss shortly), and the Kyoto system does not work—as was made painfully clear at Copenhagen.

Surprisingly, this is good news. If we had been trying the best approach to global cooperation at Copenhagen and that had failed disastrously, there would be little hope for success in the future. But when the wrong approach fails, there remains an excellent chance that a better approach will work. Part 2 shows such a path.

But how could this wrong approach go unnoticed for fifteen years? It didn't. Nobel economists such as Joseph E. Stiglitz and Thomas C. Schelling have been warning us that the Kyoto approach was doomed for almost a decade. But there's a reason that policy took the wrong path. The problem of cooperation has been largely ignored. This is because, of the three approaches to economics, cooperation is the focus of the newest and least understood approach—behavioral game theory—sometimes called the art of strategy. This book makes use of that approach by focusing on cooperation.

Three Approaches: Control, Efficiency, and Cooperation

The most out-of-date approach to economics is also the simplest. Often called command and control, it is the reason environmentalists like cap and trade. In fact, policy analysts at Canada's federal environmental agency, Environment Canada, have told me that cap and trade is only acceptable because it is a kind of command and control. And of course, environmentalists all love the cap but don't have much faith in the price of carbon that makes the cap effective.

The second approach, market economics, relies only on the price of carbon. The cap is simply one way to make emissions expensive and to raise the price of carbon. But the goal of economics is not pricing and it is not markets. The goal is "efficiency"—saving money, and carbon trading is just one way to save money.

So, this is why cap and trade has been popular. Environmentalists like the control that caps seem to promise, and economists like the efficiency that

comes from trade. And what more could we want than to save money and have complete control?

We should also want cooperation—the focus of the third approach to economic problems.

Control without cooperation means controls will be weak or that the control will fail. And saving money on a weak or broken policy is not very helpful. For example, Canada accepted a tight cap, did almost nothing and then announced, in the middle of the Copenhagen conference, that it no longer likes its cap, so it will not meet it. Global command and control is just an illusion. There is no global governing body with the authority to control.

Without a global authority, we are left with a hundred countries playing a global climate-policy game. Fortunately the basic game is well known and has been studied theoretically and experimentally for many years. It's called the "public-goods" game, which is just the prisoners' dilemma with many prisoners. Unfortunately prisoners in such a dilemma don't often cooperate.

So why won't Bonnie and Clyde cooperate and remain silent? A one-year sentence is far better than the seven years they are going to get when they betray each other. The most powerful concept in game theory is called a "dominant strategy." And, as luck would have it, betraying, not cooperating, is the dominant strategy. The idea is a simple one. If you are playing a game and one strategy is best no matter what your opponent does, that is a dominant strategy.

And if one strategy is best, no matter what, you would be pretty silly not to use that strategy. Pretend you are Bonnie. You only have two strategies: betray Clyde or cooperate with him and remain silent. Which is better if Clyde plays his "betray" strategy? In that case, if you play "cooperate" you get life in prison, while if you play "betray" you get only seven years. You had better betray. Which of your strategies is better if Clyde plays his "cooperate" strategy? If you play "cooperate" you get a year in prison, but if you play "betray" you get set free today. Betray is better, again. (In real life, the game may continue years later, and that may complicate today's strategy. But to understand the dilemma, assume that Bonnie and Clyde will never see each other again.)

So no matter what Clyde does, Bonnie is better off if she betrays Clyde. Worse yet, she knows that Clyde will figure this out, so he will probably betray her. She would be foolish indeed to cooperate knowing this could not help her and that she is risking life in prison. "Betray" is the dominant strategy for each.

Now there's good news and there's bad news. Hundreds of experiments have shown that when two people play a prisoners' dilemma game over and over, they tend to cooperate most of the time. That's because playing it many times changes the game to one with many more strategies. For example, there is the tit-for-tat strategy. If you betray me this time, I will betray you next time, but if you don't, I won't. The climate game goes on and on, so that's a lot like playing it over and over. Perhaps that will help with cooperation.

But now, the bad news. When there are more than three players, this doesn't happen. When the game is played repeatedly, the small amount of cooperation at the beginning—for example at Kyoto—tends to break down. Players become less cooperative over time—as we saw at Copenhagen. This is why cooperation must be the first goal of climate policy.

The No-Treaty Climate Game

Reducing greenhouse gas emissions is a public good. That's not just a value judgment. "Public good" is an economic term that means a good that cannot be sold for private profit. If you drive less, that reduces emissions and helps the climate. Almost all of the benefit goes to others, but there is no way to charge for this service.

Public goods are problematic. They are costly to produce, but no one gets paid for them. If Belgium completely stops using fossil fuel tomorrow, it will reduce world emissions by less than one percent and have almost no impact on its own climate. So what is Belgium's dominant climate strategy? If the rest of the world chooses to cooperate, Belgium will have a good climate whether it cooperates or not, so it should save the cost of abatement and do almost nothing. If the rest of the world chooses to do nothing, Belgium would be foolish to try to fix the climate on its own, so it should do almost nothing. Like Bonnie and Clyde, its dominant strategy is to *not* cooperate.

Every country faces this dilemma. Very large countries have a reason to cooperate a little because they capture more benefit from their own efforts. But even the largest country is still mainly trapped by the dilemma. At least that's the case without any treaty, so I will call this the no-treaty climate game. That was the game before Kyoto.

Strategies for Cooperation

The third economic approach, which has been gaining strength since the 1950's, is game theory. More recently this has taken a welcome turn toward behavioral studies and experiments. One of its central questions is, what features of a game improve cooperation? This is not just a scientific question, but a practical question as well.

One feature of the Kyoto Protocol was that it did not take effect until after 55 percent of emissions were covered by signers that had accepted emission targets. This changes the climate game and favors cooperation. And that's the practical reason for game theory—to help us change the rules and make the game better. Climate treaties and agreements add new rules and change the game. So the point of global climate policy is to invent treaties and agreements that change the rules and change the game so that countries play more cooperatively.

The 55-percent rule did just that, but what about the cap-and-trade rules? Do they help cooperation? Cap and trade, as already noted, was added

because of its command and control features and its ability to reduce costs. But no one ever did a serious analysis of its effect on cooperation. Unfortunately, when that analysis was undertaken in early 2010 at the Global Energy Policy Center,¹ it turned out that adding cap-and-trade rules to the no-treaty climate game harms cooperation. It causes just the sort of polarization seen in Copenhagen.

This means that larger and rich countries, which tend to be most (though not very) cooperative in the no-treaty climate game, become more cooperative when cap-and-trade rules are added. Similarly, countries that put the least effort into emission reductions under the no-treaty climate game, because they are small or poor, become even less cooperative. In theory, cap-and-trade causes small poor countries to set caps higher than their business-as-usual emissions. That's like developing countries selling carbon offsets to Europe and then pretending they would not have done certain renewable projects that they really would have done anyway. The United Nations has been busy preventing such schemes, but there has been a clear tendency for "gaming the rules"—exactly as predicted by game theory.

Now this game-theory result has only been demonstrated for a very simplified model of the world, but it is the only indication we have at present of how cap-and-trade affects cooperation. Some of reasons for this polarization lie beyond the reach of game theory. But when polarization and lack of cooperation have become such critical problems, it seems unwise to adopt cap-and-trade, which only exacerbate the polarization problem. Game theory also predicts that the net result of polarization will be increased emissions.

National and International Cooperation

Part 1, "The Carbon Untax," concerns national policy. But if this chapter has piqued your interest in global issues, you will find no difficulty in skipping directly to Part 2, Flexible Global Carbon Pricing. Although neither part takes a game-theory approach, both parts were guided by a game-theory perspective and emphasize the goal of cooperation.

The "untax" is a national policy designed to achieve national consensus by being obviously inexpensive and obviously fair. It is a carbon tax combined with an equal-per-person refund. All of the money collected is returned, with none spent on any special interest. This way, no one can say the untax will bankrupt the country or take away jobs even when much stronger climate policies are eventually needed. In fact those who choose a carbon footprint even slightly smaller than average will get back more in refunds than they pay in taxes. And those who emit more will pay a net tax only on their excess emissions. Given the high emission rates of the wealthy, with their huge homes

¹ See www.global-energy.org/international/games/cap-price-games.

and private planes, most people will, in fact, use less than average. Most will find that their refund checks more than cover their carbon taxes.

If all this sounds impossible, then you should read Part 1, where the workings of this system are revealed in full. It's not a new idea. In fact, this system is built into every economic model of climate policy, and it is the reason economists believe climate policy can be so affordable. The untax is also one of the fairest systems, and the poor, even if they have some special energy need, such as a long commute, will almost always come out ahead. This is because the untax amounts to giving them the same rights to the atmosphere as the average person already makes use of.

Part 2 presents Flexible Global Carbon Pricing, which was designed specifically to maximize international cooperation. Its flexibility means that China and India can make firm international commitments without committing to the binding caps that they have rejected for fifteen years. This eliminates the greatest barrier to cooperation. At the same time, Europe can continue with its mixture of carbon caps and carbon taxes (including its €300-per-ton-of-carbon gasoline tax). In fact, a commitment to a global carbon price target allows each country to decide whether to use cap and trade or some other pricing method, such as the carbon untax.

Besides this flexibility, using a single global price target means all countries are required to make a proportional effort to reduce their emissions. So the polarization of national efforts caused by cap and trade is simply eliminated. This is also a critical step towards cooperation.

But it is not fair to require poor countries, who have caused almost none of the climate problem, to contribute even a proportional level of effort. To remedy this, a Green Fund is proposed. This will transfer funds from countries with high-emission per capita to those with low emissions per capita. But this transfer is linked to cooperation. To receive its full share of Green Funds, a country must hit the global price target. So, again the rules of the game are designed to promote cooperation. Currently the opposite is true. The Clean Development Mechanism (CDM) of the United Nations was designed to reward countries that avoided commitments. And the countries rewarded believe that they must continue to avoid commitment in order to keep these rewards flowing. The Kyoto Protocol pays developing countries not to cooperate.

Last but not least, consider cost. Cost is the universal barrier to cooperation, and as stronger policies are needed this barrier will only become more problematic. Fortunately the policies presented here are remarkably inexpensive. The results are so striking that they are worth presenting in advance.

These results assume, for illustrative purposes only, the adoption of a €30 per tonne global carbon price (which could be achieved with cap and trade or, better yet, an untax) and a Green-Fund. The remarkable results of such an agreement are shown in the table below.

Table 1. Costs of €30-per-ton Global Carbon Pricing with a Green Fund

	Starting Emissions per Capita (tons/year)	Emission Abatement Cost (cents per person per day)	Green Fund Cost	Total Cost
India	1	0.8 ¢	-1.7 ¢	-0.9 ¢
Average Country	5	4.1 ¢	0.0 ¢	4.1 ¢
United States	20	16.4 ¢	6.6¢	23.0 ¢

Note that China is quite close to being an average country in per-capita emissions. Such a policy should cut emissions by at least 20 percent.

As Table 1 shows, this policy is surprisingly cheap. Any country that chooses to implement it with an untax will guarantee fair treatment for its poor and that the policy's low cost is clear to all. Europe's costs would be roughly half those of the United States. India, as can be seen, comes out ahead. China, having now achieved average per-capita emissions, must fund its own climate policy, but it will not need to contribute to the Green Fund. In any case, its cost will be so low that it will only delay its economic growth by about two weeks over the next decade.

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Low cost, flexibility, fairness, a single global target, and the absence of externally imposed national caps—these attributes will lead toward an international agreement. They are not the only helpful rule changes. Others are already known and yet more remain to be invented. But, what matters most at this critical time, after the polarizing events at Copenhagen, is for the world to stop thinking about targets and timetable—and think instead about strategies for cooperation.