Don't go Climate Changing:

Finding a Solution to the Global Climate Agreement Puzzle

By Emma Howe

Since the 1970s, the climate community has worked tirelessly to establish a credible scientific basis for anthropogenic climate change. Though climate change deniers still exist, ever since the International Panel for Climate Change (the IPCC) declared that "observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations," there has been increasing global recognition of the issue.[1] Yet, this global consensus has not directly led to the implementation of a singular global climate policy, but rather to several fragmented international agreements each varying in degree of success. These agreements have all failed to adequately address the entire issue, and with the absence of significant international action, the planet is now on track to warm by at least 2.5 degrees this century.[2] Thus, I seek to investigate the conditions that explain this drastic variation in success. After examining the cases of both a successful climate deal, the Montreal Protocol, and a widely considered failed climate deal, the Kyoto Protocol, I will argue that there is one key method for obtaining a successful climate deal: a "carrots and sticks" approach, including binding emission reductions as well as an enforcement mechanism to incentivize them.

INTRODUCTION

Since the 1970s, the climate community has worked tirelessly to establish a credible scientific basis for anthropogenic climate change. In the early 1990s, the United Nations officially recognized the issue by creating the Intergovernmental Panel for Climate Change, (IPCC) intended as a platform to acquire sufficient enough scientific evidence for global climate policy. Since then, the IPCC has convened five times, concluding that the "observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations."[3]

Many human activities today, especially those driven by economic interests like deforestation and agriculture, have clearly led to quantitative increases in atmospheric concentrations of carbonaceous gases.[4] These "greenhouse gases" (GHGs) accumulate and remain in the atmosphere, acting as absorbers of UV radiation, thereby warming the Earth. This "global warming," enhanced by the anthropogenic increases in GHGs, is known to cause severe climatological effects. Changes in climate affect temperature and precipitation patterns, which in turn affect agricultural productivity, the magnitudes and locations of flooding and hurricanes, and the destruction of species habitats.[5] Though these extreme costs were thought to be future repercussions, they have now become our immediate reality. With 14 of the 15 hottest years on record occurring all within the last 20 years, it has become increasingly more difficult to argue that anthropogenic climate change is not occurring.[6] In fact, during 2013 and 2014, only 4 of 69,406 authors of peer-reviewed articles on global warming denied its anthropogenic causes, meaning the consensus for anthropogenic climate change among publishing scientists is above 99.99%—verging on unanimity, bringing international attention to the issue.[7] Therefore, it seems only natural that there would be incentive for policymakers to come to a collective climate deal.

Though there seems to be a growing international consensus that swift, substantial reductions in GHG emissions are necessary to stabilize the climate, this has proved to be a daunting task for policymakers. In fact, instead of collective agreement, there has been rather collective disagreement regarding the implementation of a singular climate policy. On the one hand, the developed world is arguing that emission cuts should be based on current GHG emissions, meaning heavily polluting countries like China and India should make rigid GHG cuts. Whereas developing countries argue that it should be the developed world making the biggest GHG cuts, claiming that since climate change results from the cumulative buildup of GHGs in the atmosphere over time, these countries are most responsible for anthropogenic climate change.[8]

Thus, the world has yet to see a completely successful climate deal--one that creates both an enduring (20+) year framework for international climate cooperation as well as phases down global GHG emissions over 60% by 2050.[9] Instead, the world has witnessed several fragmented international agreements each varying in degree of success, failing to address both of these issues. And, with the absence of significant international action, the planet is now on track to warm by at least 2.5 degrees during the current century.[10] I seek to investigate what accounts for the variation in success of climate deals and what specific factors lead to success.

In this paper, I will begin by addressing past scholars' attempts to explain what leads to a successful climate deal, arguing that though these theories may enhance a climate deal's success post

hoc, they do not serve as the direct causes of that success. Second, I will claim that the most important factor for a successful climate deal is a "carrots and sticks" approach that sets both binding GHG emission cuts as well as provides an enforcement mechanism to increase the deal's legitimacy and credibility. I will then present an empirical case study, comparing two past climate deals—one widely hailed to be a success and the other a failure—in order to analyze the importance of these competing theories in contrast with the importance of the "carrots and sticks" approach. Finally, I will conclude with implications of and my predictions on whether the recent Paris climate agreement will be successful.

WITH INCREASING TEMPERATURE COMES INCREASING SOLUTIONS FOR SUCCESS

There have been many attempts to connect the climate change conundrum with the broader issues surrounding collective action. Arguably, the three biggest components of this puzzle are free riding, high costs with a lack of selective incentives, and the absence of a leader to bear the costs of initial action. Scholars highlight these issues in the climate policy dialogue by claiming that even though most governments have outlined individual climate policy plans, it is extremely difficult to replicate these actions internationally due to the anarchic nature of the international system.[11] This allows nations to take advantage of free riding on the actions of other nations who are reducing their emissions without needing to take action themselves.[12] Also, the very nature of this puzzle suggests that an agreement is more likely to occur when the benefits of the deal are short-term and the costs are minimal and long-term. Thus, in order for a deal to coalesce, there must exist some sort of concentrated short-term benefits and costs to mitigate the diffuse long-term benefits and costs typically associated with climate change. Scholars have attempted to account for the variation in success for climate deals by highlighting the circumstances that make collective action more and less likely, applying those theories within the climate deal framework.

Scholars such as Kenneth W. Abbott and Duncan Snidal along with economist Nicholas Stern, argue that since there exists no supranational authority to provide coercive sanctions in the area of climate change, collective action requires nations to feel that they are receiving sufficient enough benefits from the deal for each nation to share a common vision of responsible behavior.[13] These scholars argue that parties must also recognize that without their involvement, international collective action may very well fail. Thus, they claim that a climate agreement will be more successful when it implements "soft law" to make countries' commitments to reduce emissions more credible to one another, thereby decreasing the free rider problem. [14]Nicolas Stern, in his Stern Review, states that the principles set out in the non-binding 1992 Earth Summit at Rio de Janeiro have been developed in numerous subsequent formal and informal agreements, thus encouraging countries to take on climate obligations they would not otherwise be willing to take. He claims that this occurs because non-binding instruments require an element of good faith that countries will adhere to, perhaps influencing the development of state practices towards actual lawmaking.[15] Abbot and Snidal claim that "soft law" helps deal with climate problems related to uncertainty through arrangements that are precise but not legally binding. They assert that the agreements and principles adopted at the Earth Summit allowed states to see the impact of rules in practice and to gain benefits while retaining flexibility to avoid any unpleasant outcomes the rules may entail.[16]

However, this idealistic notion has not directly led to the creation of a credible international framework for climate cooperation. Though the idea of "soft law" may be compelling for countries in a rhetorical sense, the Earth Summit failed to actually commit governments to the actions, targets, timeframes, and financing to which they would be held accountable. The Earth Summit also does not propose any mandatory obligations for nations to reduce their GHG emissions. Instead, the Convention states that the developed nations endorse "the aim of returning ... to ... 1990 levels" by the year 2000, which has evidently failed as the globe is still on track to warm above and beyond 1990 levels as of 2016.[17]

In contrast to this top-down "soft law" approach, scholars such as Robert O. Keohane, David G. Victor, and Anthony Giddens have argued that a climate deal's success is contingent upon a series of "bottom-up" agreements, i.e. unilateral as well as bilateral actions taken by parties to reduce emissions. Anthropologist Anthony Giddens believes that since the world is dominated by power blocs, large countries and groupings of large countries, a climate deal's success will be contingent upon "what the United States does, what China does, what India and Brazil do, and what the European Union does regarding their individual climate policies."[18] He argues that there is a lot of potential in bilateral agreements, and that they could have a powerful impact over time. He believes a climate deal will be most successfully reinforced when negotiated at the city-level, pointing to groups of cities such as the C40 Cities Climate Leadership Group, which have come together to serve as a vanguard for transformation to combat climate change.[19] Keohane and Victor believe that this approach helps governments and other critical

"Marrakech Climate Change Conference - November 2016." Marrakech 2016. *Courtesy of Wikimedia Commons.*

players determine what is feasible through coordination, "establishing some momentum in negotiations," so that countries not making serious efforts can be chastised for their lack of effort.[20] They believe that countries willing to do more could learn how to connect and integrate their efforts into truly interdependent cooperation surrounding climate change.[21]

Yet this tactic creates a sort of self-fulfilling prophecy for nations: nations seeking to cut GHG emissions unilaterally or bilaterally are the ones who would be most likely to reduce emissions in the first place. Whereas other nations, primarily developing nations that rely heavily on fossil fuel production, will be further deterred from cutting emissions. Consider Russia, for example, where Vladimir Putin recently claimed that "Russia has been contributing actively to addressing global warming," taking the lead to reduce GHG emissions.[22] Even though this sounds compelling, this statement lacks any scientific backing. Russia is still the fourth largest greenhouse gas polluter, and in Russia's most recent climate change plan, its emission reductions were calculated using an outlier year, thereby skewing the results. Thus, this action may serve as a deterrent for countries entering into bilateral agreements with Russia or any other nation that is heavily reliant on fossil fuels, undermining the capability of bilateral agreements to produce a

successful climate deal.

Therefore, I will argue that though these theories may help to reinforce the success of a climate deal in the long-term, they are not direct causes of its success due to their lack of enforcement and incentivizing capabilities. Thus, I propose that a successful global climate agreement will only transpire when it utilizes a "carrots and sticks" approach. The "carrots" serve as the incentives created by developed countries that agree to incrementally pay for the costs of emission cuts by developing countries. And the "sticks" serve as trade restrictions for a list of specific goods/services that utilize or produce GHGs, which can be amended as markets adapt. This functions as an enforcement and incentivizing mechanism, compelling countries to adhere to binding emission targets. To investigate this theory's validity as well as the validity of Abbot, Snidal, and Stern's "soft law" approach; and the Keohane, Victor and Giddens "bottom-up" approach, I will examine these factors in relation to the failed Kyoto Protocol and the successful Montreal Protocol.

FINDING THE PIECES TO THE CLIMATE DEAL PUZZLE

Since 1985, there have been 16 crucial climate agreements each varying in degree of success (seen Figure 1: evaluated by their outcome). In this section, I choose to focus on two specific Climate Protocols: the Kyoto Protocol and the Montreal Protocol. I will evaluate their success based on their ability to serve as a lasting (20+ year) framework and if they were able to phase down global GHG emissions by over 60% by 2050. Based off this, I argue the Kyoto Protocol is the best example of a failed climate deal and the Montreal Protocol is the best example of a successful deal.

Ever since the Kyoto Protocol was signed in 1997, there have been substantial increases in GHG consumption with global emissions of carbon dioxide increasing by almost 50%, growing more quickly between 2000 and 2010 than in the three past decades.[23] Kyoto has also failed to become an enduring framework. In 2009, countries tried to draft a new treaty to replace Kyoto at the Copenhagen talks—just two years after the signing of the protocol (See Figure 1). Overall, since the Protocol was unable to meet its goals, create a lasting framework, or substantially reduce GHG levels; I will consider it a failed deal.[24] This lack of success makes the case ideal to study, since the circumstances leading to its failure may now be considered.

On the other hand, I will argue that the Montreal protocol was a success because it was the first Convention of any kind to achieve universal ratification, serving as an international framework for efforts to protect the globe's ozone layer since its inception in 1987. In fact, by 2009, the Parties to the Protocol had phased out the consumption of 98% of all of the chemicals controlled by the Protocol and it is believed that with implementation of the Protocol's provisions, the ozone layer will return to pre-1980 levels by the middle of this century.[25] And perhaps the biggest component to its success was that by January 2010, all 199 Parties completely phased-out consumption and production of chlorofluorocarbons (CFCs), halons, carbon tetrachloride and other fully hydrogenated ozone depleting substances.[26] Therefore, since the framework has lasted over 29 years, and has also led to a complete phase-out of crucial GHGs, I will argue that the Protocol serves as an ideal example of a successful climate deal. Thus, the Montreal Protocol may now be examined for the factors that led to its fruitful outcome.

Figure 1: List of Total Global Climate Agreements and Their Outcomes

Year	Location	Outcome
1985	Vienna	The Vienna Convention for the Protection of the Ozone Layer outlines states' responsibilities for protecting human health and the environment against the adverse effects of ozone depletion, established the framework for the Montreal Protocol.
1987	Montreal	The Montreal Protocol was negotiated and signed by 24 countries and the European Economic Community. The Protocol called for Parties to phase down their use of CFCs, halons, and other manmade ODCs. It has since been ratified by 197 countries (all the United Nation members, as well as Niue, the Cook Islands, the Holy See, and the European Union).
1992	Rio de Janeiro	Negotiations begin with completion of the UN Framework Convention on Climate Change (UNFCCC). Countries agree to voluntarily reduce emissions with "common but differentiated possibilities."
1995	Berlin	This marked the first annual Conference of the Parties to the framework, called the "COP." The U.S. agrees to exempt developing countries from binding emission cuts.
1997	Kyoto	COP-3 diplomats approve the Kyoto Protocol. Mandated developed countries to cut greenhouse gas emissions relative to baseline emissions by 2008-2012 period.
2000	The Hague	Outgoing Clinton administration and Europeans differ on various COP-6 terms, especially over credit for carbon sinks like forest and agriculture. There is also disagreement over the responsibility to cut emissions for developed and developing countries. The talks collapse.
2001	Bonn	A second session of the COP-6 talks wroks out finance and compliance terms. Since the Bush administration had rejected Kyoto Protocol, and the US was only an "observer" of these talks.
2004	Buenos Aires	The US blocks formal negotiations for a post-Kyoto treaty. COP-10 diplomats try, instead, informal talks.
2007	Bali	COP-13 diplomates approve the schedule for post-Kyoto negotiations to end in 2009.
2009	Copenhagen	COP-15 fails to produce a post-Kyoto binding agreement. Instead, the Copenhagen Accord declares the importance of limiting warming to 2°C, yet without any sort of binding targets or mechanisms. Developed countries pledge to provide financing to developing countries of $30 billion annually, rising to $100 billion by 2020.
2010	Cancun	Nations agreed to meet in Copenhagen to work out the details of the "Green Climate Fund."
2011	Durban	COP-17 participating countries agree to adopt a universal legal agreement on climate change "as soon as possible" and no later than 2015, taking effect by 2020.
2012	Doha	Launched a new commitment period under Kyoto, ensuring that the treaty's legal and accounting models remain in place, and underlining the principlethat developed countries should lead the action to cut greenhouse gas emissions.
2013	Warsaw	Further advanced the Durban platform, the Green Climate Fund and Long-Term Finance, the Warsaw Framework for REDD and the Warsaw International Mechanism for Loss and Damage.
2014	Lima	Agree to extend the life of Kyoto and set up framework for Paris talks. In principle, all parties commit to emission cuts, but there are no binding agreements.
2015	Paris	Reafirms the goal of limiting global temperature increase to below 2°C, while urging to keep the increase to 1.5°C. Established binding commitments by all parties to make "nationally determined contributions" NDCs that will be renewed every five years. For the first time asks developing countries to contribute to emission reductions.

WHY MONTREAL HAD IT ALL

"Perhaps the single most successful international environmental agreement to date has been the Montreal Protocol, in which states accepted the need to phase out the use of ozone-depleting substances" stated Kofi Annan, Secretary General of UN at the "Millennial Summit" in September 2000.[27] In the early 1970s, when evidence revealed that CFCs were damaging the ozone layer and increasing the amount of UV radiation reaching the Earth's surface, their production became a major potential health hazard. This triggered the global consensus that a successful international environmental agreement was necessary to mitigate these high costs. In 1997, this became reality with the adoption of the Montreal Protocol. Without the Protocol, the levels of ozone-depleting substances would be five times higher than they are today, and surface-level UV-B radiation would have doubled at mid-latitudes in the Northern Hemisphere.[28] But what made the Montreal Protocol so successful? To answer this question it is necessary to examine the Protocol's success with regards to its "soft law," "bottom-up," and "carrots and sticks" components.

A "soft law" approach, though not used in the actual Montreal Protocol, was utilized in the Vienna Convention three years prior. Vienna served as the framework ozone agreement, recognizing that immediate collective action was necessary to prevent further ozone depletion. However, no country made a substantial effort to reduce their emissions under this "soft law" framework. In fact, the convention only mentioned CFC's by name in an annex.[29] The Montreal Protocol was different in that it limited the production and consumptions of the most important CFCs. These limits, though differentiated, applied to all countries that ratified the agreement—developing and industrialized alike. Thus, "soft law," in this case, did not have much effect in causing the success of the Montreal Protocol. Yet this soft approach did help to deepen countries' obligations to cut emissions once the actual Protocol was ratified. Stern would argue that this is because non-binding instruments usually entail an element of good faith that they will be adhered to by countries, with the potential to influence the development of state practices towards actual lawmaking.[30] Soft frameworks like the Vienna Convention can serve as vehicles for focusing consensus on rules and principles and for mobilizing a more general response on the part of states. Though "soft law" did help elicit general recognition that collective action was necessary to combat ozone depletion, it was unsuccessful in actually producing those results.

In regards to the "bottom-up" approach, it is necessary to note that if all countries reduced their CFC emissions, then all countries would benefit, just at different levels. The higher latitude countries with pale-skinned populations would benefit the most, as ozone depletion is greatest there and light-skinned people are most vulnerable to skin cancer. Also, countries with higher income per capita would be willing to pay more to avoid the risk of ozone depletion.[31] Due to these factors, the country that would and has benefited the most from CFC reductions is the U.S., making it no surprise that the U.S. took significant action to cut its production and consumption unilaterally in the 70s. This gave the U.S. a stupendous return on investment, which provoked other countries to reduce their use of CFCs as well. In fact, Belgium, Canada, Norway, and Sweden all banned the use of CFCs in aerosols at the same time as the U.S. Though Giddens would argue that this "bottom-up" approach was responsible for the success of the Montreal Protocol, these actions alone were not sufficient to markedly mitigate anthropogenic ozone depletion.

Though these early bilateral and unilateral agreements were relatively easy and cheap to implement, there was no incentive for many developing nations to take action to reduce their emissions. Since only global resources of CFCs affect the ozone layer, the countries that acted unilaterally or bilaterally were just creating an incentive for CFCs to be produced everywhere else: a marvel known as trade leakage.[32] Moreover, India used the Montreal Protocol as an opportunity to expand its CFC production capacity in order to serve the growing market for CFCs in developing countries. Thus, to make a significant and lasting difference, the Montreal Protocol needed to broaden participation while at the same time restricting production and consumption incrementally. To do this, it had to create incentives and punishments; in particular, it needed to apply a combination of "carrots" and "sticks."

First, "carrots" were needed to encourage the participation of developing countries lacking a direct incentive to participate. During the initial recognition of the Montreal Protocol in 1990, the industrialized nations agreed to pay for the "incremental costs" of implementation by developing

countries under the Multilateral Fund.[33] A simple formula allocated the industrial countries' new burden: each industrialized country was to pay its share in proportion to its own emissions as well as the emissions of its allotted group of developing countries.[34] This meant that developing countries could not be made worse off by agreeing, since their costs were covered.[35] Even though they would not have benefited as much as the industrialized countries, no country benefits from ozone depletion, since it is a public good and paying to reduce global emissions is widely beneficial.[36]

Second, "sticks" were needed to create an enforcement mechanism to ensure that all countries would follow the binding emission cuts."[37] But enforcement was not easy, since enforcing an agreement to cut back on CFCs proved to be a collective action problem in itself. Since countries had incentives to free ride on enforcement, it was necessary to devise credible "sticks" to punish the target country. The Montreal "sticks" were enforced through trade restrictions. Under the agreement, trade was to be restricted between parties and nonparties for both substances controlled by the treaty (the CFCs) and in products containing these substances. Since the participant level was high for the Montreal Protocol, non-participating countries suffered from this lack of market access, which incentivized them to ratify the treaty.[38]

> "The Montreal Protocol needed to broaden participation while at the same time restricting production and consumption incrementally."

Thus, the "carrots and sticks" approach seems to be the most important factor leading to the Montreal Protocol's success. As of late 2006, there were only six non-participating countries: Andorra, Holy See, Iraq, San Marino, and Timor Leste, meaning this was not an agreement suffering from the free rider dilemma.[39] Most importantly, "based on assumed compliance with the amended and adjusted Protocol by all nations, the Antarctic ozone 'hole,' which was first discerned in the early 1980s, is predicted to disappear by the middle of this century."[40] The Montreal Protocol was successful because it set binding progressive phase-out obligations for developed and developing countries for all the major ozone depleting substances. It also led to the development of the Multilateral Fund, the first financial mechanism to be created under an international treaty in order to provide financial assistance to developing countries to help them achieve their phase-out obligations.

WHY KYOTO WAS A NO-GO

In 1997, the Third Conference of the Parties (COP) to the U.N. Framework Convention on Climate Change closed with the adoption of the legally binding Kyoto Protocol, under which industrialized countries as a whole were asked to reduce greenhouse gas emissions by 5.2 percent from 1990 levels between a commitment period of 2008 to 2012.[44] Industrialized nations ratifying the protocol were held accountable for at least 55% of all greenhouse gases emitted by industrialized nations in 1990. However, the deal failed to hold any one country accountable to these standards. In fact, the U.S. Senate even made it clear to the administration that they "would reject any agreement that would seriously hurt the American economy or give Third World countries a free ride."[45] Thus, it is important to examine Kyoto's failure in conversation with the

Montreal Protocol Strategies Summary

Soft Law:

The "Soft Law" used in the Vienna Convention helped reinforce the need for a binding international agreement reducing CFC use/production, yet it was only an intervening step in achieving a successful ozone treaty.

This was Primarily A Top-Down Approach:

Though nations such as the United States acted unilaterally to cut emissions, this was not enough to combat the issue of ozone depletion from being a public good. Thus, it was clear that an international agreement needed to be implemented in order to induce collective CFC emission cuts.

Carrots And Sticks:

The Multilateral Fund paved the way for the Global Environment Fund and for regime strengthening within the Vienna Convention. Every country was required to cut CFC emissions and consumption, with the added incentive for developing countries to be assisted financially and technically. They were also given more time to implement phase-out.[42]

The Parties decided to threaten trade sanctions against countries that did not join the Protocol and reward the developing countries that did join with compensation. This threat of trade sanctions and the promise of aid were effective as 196 countries ratified the Protocol.[43]

"soft law," "bottom-up," and "carrots and sticks" theories of success.

In regards to the "soft law" approach, Hiroshi Oki, President of the Conference of the Parties (COP) and Environment Agency Director General, argues that Kyoto "is a combination of common political wills to combat global warming although all these countries have different backgrounds, different economic situations and different choices and energies. We were able to overcome various differences."[46] However, this spreading of social knowledge and capital through the creation of the Clean Development Mechanism (CDM) was not enough to encourage developed countries to reduce their emissions.[47] Since the Protocol did not make it compulsory for countries with low greenhouse gas emissions to provide support to other countries, these countries did not utilize the CDM.[48] Thus, this spreading of social and economic capital under the "soft law" of Kyoto was not successful, since countries were not incentivized to participate in the CDM.

Giddens, arguing for the "bottom-up" approach, would say that since the Kyoto Protocol was structured to be a highly centralized, top-down agreement on climate change, it failed due to its lack of reliance on bilateral and unilateral agreements.[49] For the purpose of GHG emission reduction, the UNFCC divides the world into Annex I (developed) countries and Non-Annex 1 (primarily developing) countries, but only legally binds Annex I countries to reducing their GHG emissions.[50] Giddens claims that Kyoto would have been successful if it allowed all the major GHG emitters, irrespective of their GDP, to choose their own emission targets in an incremental fashion. Thus arguing that budding bilateral and regional agreements could therefore have led to a successful UNFCC/Kyoto Protocol.

Although there were attempts at unilateral and bilateral action, these agreements were all rhetorical in nature. Argentina stood alone in having announced a voluntary target for GHG reductions, and though Kazakhstan and Bolivia "had announced a willingness to do the same," no new specifications of emissions trading and project credits actually emerged from the negotiating process for them to sign.[51] Also, with the U.S. taking action to not commit itself to greenhouse-gas reductions

unless an international agreement "mandated new specific scheduled commitments to limit or reduce greenhouse gas emissions for Developing Country Parties within the same compliance period [as the US]," the Protocol lost further credibility.[52]

Without taking a "carrots and sticks" approach, Kyoto got it wrong in two ways: at the core of the regime, states did not have incentives to commit to ambitious targets, much less legally binding ones; and the protocol did not have an enforcement mechanism in place to force countries to comply to these standards. The Kyoto Protocol seemed to only include weak "carrots" and no "sticks" by setting forth obligations that were binding but not credible. For example, nations in the European Union were supposed to reduce their average annual emissions of greenhouse gases in the 2008 to 2012 period by 8% compared to their annual emissions in 1990; the corresponding reduction for the United States was 7%; and that for Japan was 6%.[53] However, the Kyoto Protocol also authorized, though in very vague terms, a variety of mechanisms to assist countries with these binding reductions at the lowest possible cost. These mechanisms consisted of an emissions-trading scheme among the developed countries, as well as the receipt by developed nations of some sort of credit for sponsoring emission reductions in other countries. Nevertheless, this trading scheme was never clearly developed and lacked any "sticks" to enforce participation, thus industrialized nations did not find these "carrots" credible.

KYOTO IN CONVERSATION WITH MONTREAL

Today, since the most important aggregate effort to mitigate the effects of climate change is the reduction of GHG concentrations, it important to note that this issue differs from previous policies regarding ozone depletion. Since ozone depletion is more resistant to free riding, as its costs and benefits are immediate, Montreal had an easier time overcoming broader collective action issues. Efforts to reduce GHS emissions are much more vulnerable to free riding, perhaps explaining the reason why trying to limit GHG emissions has been less successful. Yet there is still much that can be learned from the success of the Montreal Protocol, especially when placing it in conversation with Kyoto and the "soft law" "bottom-up," and "carrots and sticks" theories.

The Montreal Protocol utilizes primarily a "top-down" approach enforced through the use of "carrots" and "sticks" (binding emission cuts, trade restrictions, and a multilateral fund to incentive

Kyoto Protocol Strategies Summary
Soft Law:
Its specificity as to each nation's percentage reduction of greenhouse-gas emissions
The recognition by over 191 countries that action must be taken to combat climate change
This was a Top-Down Approach:
It says nothing about obligations for developing nations, little about non-compliance, and only sketches the outlines of emissions trading, Joint Implementation, and the Clean Development Mechanism.
Neither Carrots Nor Sticks:
One may thus ascribe the immediate causes of the failure of the tightly binding set of political constraints without any proper enforcement mechanism
The Protocol left entirely open the developing countries' obligations, and it did nothing more than identify the issues of emissions trading, sinks, and responses to non-compliance.

ratification). Though the effort initially began as a "bottom-up" approach, it was not until the actual treaty was ratified and countries were bound to their emission cuts that the treaty had any success in reducing CFC emissions and fixing the hole in the ozone layer. The treaty did not rely on "soft law," even though its initial framework did. While the Vienna Convention helped set the stage for the agreement, it did not actually lead to the Protocol's success as countries had no initial incentive to participate in reducing their emissions.

In contrast, the Kyoto Protocol, in spite of the fact that it had specific binding emission cuts, failed to provide any incentive or enforcement mechanism for countries to participate. Kyoto was also primarily a "top-down" approach, where countries were encouraged to meet the set emission cuts by taking national action. This proved to be ineffective, as countries, especially those who benefitted off the production of GHGs, did not face any repercussions for inaction. Though the Protocol tried to rely on "soft law" with the hope that countries' commitments would be reinforced through mutual trust and the spread of CFC knowledge, this evidently was not enough to lead to the deal's success. This treaty proved to be ineffective, since Kyoto had no "carrots" or "sticks" to make the agreement both credible and compelling.

CONCLUSION: WILL PARIS NEED AN HEIRESS?

In this paper, I have addressed past scholars' attempts to explain what leads to a successful climate deal, arguing that though these theories of "soft law" and "bottom-up" strategies may enhance a climate deal's success, they do not serve as the direct cause. Second, I claimed that the most important factor for a successful climate deal is a "carrots and sticks" approach that sets both binding GHG emission cuts as well as provides an enforcement mechanism to increase the deal's legitimacy and credibility. I then presented an empirical case study, comparing the successful Montreal Protocol to the failed Kyoto Protocol in order to analyze the importance of these competing theories in contrast with the importance of the "carrots and sticks" approach. I have concluded that though the "soft power" and "bottom-up" approaches may serve as intervening factors in a climate deal's success, it seems that a "carrots and sticks" approach is the most likely factor to lead to a deal's success. Thus, this theory may now be applied to assess the potential success of the 2015 Paris Agreement.

Though the Paris Agreement was successfully able to tackle some of the issues related to collective action by including selective benefits provisions similar to those in the Montreal Protocol, the Accords also had their limitations, as they did not set specific reductions in emissions or establish a system for the international enforcement of climate policy. The deal set a goal to ensure that the Earth's warming stays under 2 degrees Celsius, which was a successful "soft law" approach in that all countries agreed to make that initial pledge. The prospects for a successful energy transition are further boosted by a wide range of bottom-up participatory initiatives that are being undertaken by countries, regions, cities, investors and companies across the world to increase the use of clean energies in the post-Paris world.[54] Yet, to realize the aspirations of the Paris Agreement, much will depend on whether governments of both developed and developing countries will actually commit to these plans over the next five years.[55] Paris may also be successful because it included a "carrots" provision allocating money and funds from rich countries to developing nations, who had previously claimed their economic concerns were preventing them from taking

action. However, the agreement still has its limits as it is not legally binding, it does have a punishment mechanism ("sticks"), and the current emissions pledges do not meet the goal of reducing emissions to below 2 degrees Celsius.

Thus, even though an agreement was reached, it is likely that a free rider issue will continue, as countries will not be punished for falling short of their initial pledges. However, the added clause of selective benefits for developing nations may make compromise and action more likely, as they will be receiving more short-term benefits and less grave short-term economic costs.

There also may be future cause for collective action as the impacts of climate change become more immediate and dire and the benefits of renewable energies become greater. The UNEP report "Global Trends in Renewable Energy" stated a new record for overall global investment in renewable power capacity last year of $285.9 billion. Juxtaposed, the coal and gas-fired electricity generation drew less than half that amount. 2015 also marked the year in which investment in renewables in the developing world, including Brazil, China and India, outpaced that in the developed economies of Europe, Japan and the United States. According to IRENA's 2015 "Rethinking Energy" report, many of these markets are experiencing a rapid growth in energy demand, and renewable energy is seen as an increasingly important part of the future energy mix. Therefore, in the next five years, countries may be more willing to buy into these incentives, set binding emission cuts, and use trade sanctions to punish climate change cheaters. There may be hope for a successful climate deal after all.

The Arc de Triomphe in Paris is illuminated to celebrate the historic climate change agreement.
Photo by Jean-Baptiste Gurliat/ Mairie de Paris, courtesy of Wikimedia Commons.

Endnotes

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pliers may be less competitive and may lose global market to competitors in countries lacking comparable CFC policies. In addition, this potential shift in production could result in some of the powerful countries' CFC reductions being diluted by increased production in more CFC intensive countries (commonly known as "trade leakage"). Parker, Larry, and John Blodgett. ""Carbon Leakage" and Trade: Issues and Approaches." (n.d.): 1.

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Figure 1: List of Total Global Climate Agreements and Their Outcomes
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