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Making Effective Environmental Treaties

International agreements throughout modern history have revealed obstacles that are foundational principles regarding international relations. These obstacles, in part, stem from the structure of international relations, in which there is no overarching, central authority to enforce the constraints of an agreement in a similar manner that a federal government has the ability to enforce laws within its jurisdiction. This dynamic is consequently prevalent in any negotiation that pertains to environmental treaties with the interest of combatting issues like climate change, for example, that affect the entire planet yet are the byproduct of a century-long development process from a handful of major nations. This dynamic allows for countries, in some cases, to abandon treaties, deals, or agreements, with the understanding that in most instances no nation has the authority to enforce their participation or has the will to use force to coerce their participation. This scenario creates leverage for countries unwilling to participate in agreements, especially environmentally-related agreements, and allows for these countries to use this leverage in order to gain benefits in exchange for participation. This poses a challenge to any wishes to negotiate international environmental agreements where maximum global participation is vital to its success to solve a problem. This paper will highlight the differences between the Montreal Protocol that addresses the depletion of the ozone layer in the Earth's atmosphere, and Gothenburg Protocol, which aims to reduce the emissions of harmful chemicals that contribute to

the acidification of ecosystems. Additionally, this paper will suggest how the ambitiousness of these agreements is the underlying factor to the success of each regime.

To begin, the Montreal Protocol was adopted in 1987 with the intention of reducing the production and consumption of ozone depleting chemicals such as Chlorofluorocarbons (CFCs), Hydrochlorofluorocarbons (HCFCs), and Hydrofluorocarbons (HFCs). The importance of the ozone layer inspired the calls to hold the convention, as the ozone layer works as a protective layer against the Sun's harmful UV rays.¹ In the early 1970s, scientists began speculating that these previously mentioned harmful chemicals, in combination with solar radiation, decompose in the stratosphere and destroy ozone molecules at concerning rates.² Scientists were further justified in their findings when in 1985 a hole in the ozone layer was discovered over Antarctica, prompting the United Nations Environment Program (UNEP) to phase out these harmful pollutants and the enacting of the Montreal Protocol.³ Initially, the agreement sought to reduce the production and consumption of specific CFCs to 80% of 1986 levels by 1994, and 50% of 1986 levels by 1999, although amendments would be added to further reduce the production and consumption of CFCs in later years.⁴ One of the most heralded provisions of the Montreal Protocol is the differing schedules for developed countries versus developing countries. For

¹ Leahy, S. (2017, September 25). Without the Ozone Treaty You'd Get Sunburned in 5 Minutes. Retrieved December 13, 2018, from <https://news.nationalgeographic.com/2017/09/montreal-protocol-ozone-treaty-30-climate-change-hcfs-hfcs/>

² Britannica, T. E. (2018, September 09). Montreal Protocol. Retrieved December 13, 2018, from <https://www.britannica.com/event/Montreal-Protocol>

³ Britannica, T. E. (2018, September 09). Montreal Protocol. Retrieved December 13, 2018, from <https://www.britannica.com/event/Montreal-Protocol>

⁴ Britannica, T. E. (2018, September 09). Montreal Protocol. Retrieved December 13, 2018, from <https://www.britannica.com/event/Montreal-Protocol>

example, the 1990 London Amendment to the Montreal Protocol called for the “complete phaseout” of CFCs between 1996 and 2000 whereas this phaseout process is extended to 2010 for developing countries.⁵ The reasoning behind this extension given to developing countries is that in large portion of cases, these countries do not have the technological capacity or economic feasibility to meet the same targets as developed countries within the same time period. As it stands today, the effects of this international agreement can accurately be described as successful. Three studies carried out by the *Journal of Geophysical Research*, *Nature Communications*, and *Science* show evidence to why the Montreal Protocol has had a significant impact on the healing of the ozone layer. In the study published in 2012 by the *Journal of Geophysical Research* found that had nothing been done about ozone depleting substances, there would have been a “global collapse of the ozone layer in the mid-21st century”.⁶ In the study completed by *Nature Communications*, evidence showed that the Antarctic ozone hole is now expected to be healed by the mid-21st century, which is a 180-degree shift from the effect had no action been taken.⁷ Thirdly, the study published by *Nature* in 2016 shows that in 15 years the ozone hole over the Antarctic decreased by 1.5 million sq. miles in 15 years.⁸ Additionally, the Montreal Protocol prevented 280 million cases of skin cancer and 1.5 million skin cancer deaths

⁵ International Institute of Refrigeration. (2017). Summary Sheet | Montreal Protocol. Retrieved December 13, 2018, from http://www.iifiir.org/userfiles/file/webfiles/regulation_files/Montreal_EN.pdf

⁶ International Institute of Refrigeration. (2017). Summary Sheet | Montreal Protocol. Retrieved December 13, 2018, from http://www.iifiir.org/userfiles/file/webfiles/regulation_files/Montreal_EN.pdf

⁷ International Institute of Refrigeration. (2017). Summary Sheet | Montreal Protocol. Retrieved December 13, 2018, from http://www.iifiir.org/userfiles/file/webfiles/regulation_files/Montreal_EN.pdf

⁸ International Institute of Refrigeration. (2017). Summary Sheet | Montreal Protocol. Retrieved December 13, 2018, from http://www.iifiir.org/userfiles/file/webfiles/regulation_files/Montreal_EN.pdf

according to the US Environmental Protection Agency.⁹ The Montreal Protocol is widely recognized as the most successful international environmental regime, and with the previously highlighted effects since its enactment, it is easy to understand the reason why it is held with such high regard. The next section will go onto illustrate three key factors of the Montreal Protocol.

The first characteristic of the Montreal Protocol that distinguishes it from other international agreements is that it addresses a Global Commons Problem. A Global Commons is essentially a physical or biological system that exists completely or partially outside of the jurisdictions of a country, therefore creating a predicament where nations all around the globe share a common resource such as the ozone layer, oceans, or the global temperature. With the depletion of the ozone layer being the subject Montreal Protocol, it can be concluded that this agreement falls under the “Global Commons Problem” category. The challenge that arises when encountering dilemmas that can be labeled a Global Commons Problem is that essentially an individual, or individual country has an incentive to take advantage of a resource such as the atmosphere without directly feeling the consequences of the activity they are participating in. The result is various individuals depleting a resource at an unsustainable rate. Understanding this is critical since this paradigm forces the cooperation of nations if they are all joined in consensus that a “commons”, such as the ozone, is in the planet’s best interest to preserve it. Another characteristic associated with the Montreal Protocol is the universal participation. Currently, 197 countries are participating in the Protocol and it has resulted in “the phaseout of 99% of nearly

⁹ United States Environmental Protection Agency. (2015, February 27). UPDATING OZONE CALCULATIONS AND EMISSIONS PROFILES FOR USE IN THE ATMOSPHERIC AND HEALTH EFFECTS FRAMEWORK MODEL. Retrieved December 13, 2018, from https://www.epa.gov/sites/production/files/2015-07/documents/updating_ozone_calculations_and_emissions_profiles_for_use_in_the_atmospheric_and_health_effects_framework_model.pdf

100 ozone-depleting chemicals”.¹⁰ Universal participation is critical to any international agreement with the intention of achieving some environmental target but it is especially critical in Global Commons Problems because the actions of those that abandon a given agreement hinder the progress of those that are working to address the issue. However, since the Montreal Protocol has universal participation, there is a level of assurance and reliability that targets regarding ozone depletion will be met at a point in the near-future. The third and final characteristic of the Montreal Protocol is presence of leadership exhibited by the United States. The scientists who theorized about the negative impact CFCs were having on the ozone layer were two Americans named Frank Sherwood Roland and Mario Molina. Additionally, President Ronald Reagan in a December 1987 press release urged the Senate to ratify the Protocol stating that the “United States played a leading role in the negotiation of the Protocol” and that “Early ratification by the United States will encourage similar action by other nations whose participation is also essential”.¹¹ In the case of the Montreal Protocol, the United States was not only a leader in negotiating and enacting the agreement but also led on the scientific front as well, without the leadership of the United States it can be debated whether the protocol turned out as successful as it did.

The second international regime this paper will discuss is known as the Gothenburg Protocol. The *Convention on Long-range Transboundary Air Pollution* (CLRTAP) was adopted

¹⁰ Leahy, S. (2017, September 25). Without the Ozone Treaty You'd Get Sunburned in 5 Minutes. Retrieved December 13, 2018, from <https://news.nationalgeographic.com/2017/09/montreal-protocol-ozone-treaty-30-climate-change-hcfs-hfcs/>

¹¹ Office of the Press Secretary. (2016, August 11). President Reagan on Montreal Protocol Ratification. Retrieved December 14, 2018, from <https://archive.epa.gov/epa/aboutepa/president-reagan-montreal-protocol-ratification.html>

in 1979 and entered into force in 1983 with the purpose of addressing environmental problems in the UNECE (United Nations Economic Commission for Europe).¹² The Executive Body of the UNECE would adopt the Gothenburg Protocol in November of 1999. The goal of the Gothenburg Protocol is to set emission ceilings for Sulphur, NO_x (nitrogen oxides), VOCs (volatile organic compounds), and ammonia, all of which have been found to have harmful effects on humans and the environment.¹³ The motivation for convening to address these harmful pollutants was spurred in the 1960s when scientists observed acid rain killing ecosystems such as forests and fisheries in the Northern Hemisphere.¹⁴ Scientists found that the harmful pollutants previously mentioned were the culprits behind these negative effects of acid rain. Consequently in 1979 at the original LRTAP Convention, 32 countries in Europe, Canada, and the United States signed on to limit the emissions of these harmful pollutants.¹⁵ At full implementation, it is expected that Europe's Sulphur emissions will be cut by 63%, NO_x by 41%, VOC emissions by 40%, and ammonia emissions by 17% in comparison to 1990 levels.¹⁶ Additional effects of the

¹² Emission Targets: Basic Information on the Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-Level Ozone. (n.d.). Retrieved December 14, 2018, from https://www2.dmu.dk/atmosphericenvironment/expost/database/docs/gothenborg_brief.pdf

¹³ Emission Targets: Basic Information on the Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-Level Ozone. (n.d.). Retrieved December 14, 2018, from https://www2.dmu.dk/atmosphericenvironment/expost/database/docs/gothenborg_brief.pdf

¹⁴ Shankman, S., Gearino, D., Jr., J. H., Berwyn, B., Lavelle, M., Kusnetz, N., . . . Subramanian, M. (2018, November 19). The Most Important Climate Treaty You've Never Heard Of. Retrieved December 14, 2018, from <https://insideclimatenews.org/news/11042018/climate-treaty-gothenburg-protocol-air-pollution-regulations-global-warming-science-black-carbon-lrtap>

¹⁵ Shankman, S., Gearino, D., Jr., J. H., Berwyn, B., Lavelle, M., Kusnetz, N., . . . Subramanian, M. (2018, November 19). The Most Important Climate Treaty You've Never Heard Of. Retrieved December 14, 2018, from <https://insideclimatenews.org/news/11042018/climate-treaty-gothenburg-protocol-air-pollution-regulations-global-warming-science-black-carbon-lrtap>

¹⁶ Emission Targets: Basic Information on the Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-Level Ozone. (n.d.). Retrieved December 14, 2018, from https://www2.dmu.dk/atmosphericenvironment/expost/database/docs/gothenborg_brief.pdf

protocol are the decrease of excessive acidification in Europe from 93 million hectares to 15 million hectares and excessive levels of eutrophication will decline from 165 million hectares to 108 million hectares.¹⁷ Also, it is pointed out that days with excessive ozone levels will be halved, and as a result it is estimated that “life-years lost as a result of chronic effects of ozone exposure will be about 2,300,000 lower in 2010 than in 1990”.¹⁸

The first characteristic of the Gothenburg Protocol that distinguishes the agreement from others such as the Montreal Protocol is that it can be classified as a Transboundary Externality. Essentially, a Transboundary Externality is when the actions of an individual nation or region have spillover effects into surrounding regions. Somewhat similar to Global Commons Problems, the emitters of a Transboundary Externality do not directly feel the effects of the actions they are taking, however the effects are having a noticeable and negative effect on other nations. For example, Michael Oppenheimer of Princeton University stated that “The UK was emitting a lot of pollution that was blowing over Scandinavia, and they weren't that interested in doing something about all this”.¹⁹ This illustrates the challenge of Transboundary Externalities in the sense that these agreements have to persuade emitters to cooperate even though emitters do not necessarily gain any utility from participating in an agreement such as the Gothenburg

¹⁷ Emission Targets: Basic Information on the Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-Level Ozone. (n.d.). Retrieved December 14, 2018, from https://www2.dmu.dk/atmosphericenvironment/expost/database/docs/gothenborg_brief.pdf

¹⁸ Emission Targets: Basic Information on the Gothenburg Protocol to Abate Acidification, Eutrophication and Ground-Level Ozone. (n.d.). Retrieved December 14, 2018, from https://www2.dmu.dk/atmosphericenvironment/expost/database/docs/gothenborg_brief.pdf

¹⁹ Shankman, S., Gearino, D., Jr., J. H., Berwyn, B., Lavelle, M., Kusnetz, N., . . . Subramanian, M. (2018, November 19). The Most Important Climate Treaty You've Never Heard Of. Retrieved December 14, 2018, from <https://insideclimatenews.org/news/11042018/climate-treaty-gothenburg-protocol-air-pollution-regulations-global-warming-science-black-carbon-lrtap>

Protocol. Another characteristic associated with the Gothenburg Protocol is the lack of universality observed in the Montreal Protocol. The Gothenburg Protocol only has the participation of 34 countries that are part of the UNECE, plus the United States and Canada. It is no surprise that this protocol only addresses a region instead of pursuing universality since Transboundary Externalities only affect surrounding the actors creating the externality. In contrast to a Global Commons Issue like ozone-depletion, the challenge for a transboundary externality is not to achieve universality, but instead to convince the emitter to participate when they do not necessarily possess an incentive to, other than to appease their neighbors. The third and final factor of the Gothenburg Protocol is that there was not the presence of U.S leadership on this issue. This issue also did not carry incentives like the Montreal Protocol does in regard to preserving the ozone layer, however the targets that were set in this agreement were already addressed through the Clean Air Act of 1970 and its amendments in 1990.²⁰ Pam Pearson, an expert who was involved with the Gothenburg Protocol states “Basically, for both the U.S. and Canada there was a decision to, in essence, say, 'our Gothenburg Protocol commitments are our national regulations already',” and that “[The U.S and Canada] didn't do anything new through Gothenburg that they hadn't done before”.²¹ Essentially, the United States and Canada did not have anything to lose by joining this regime since the targets were already being pursued by both nations.

²⁰ The United States Environmental Protection Agency. (2017, January 03). The Clean Air Act - Highlights of the 1990 Amendments. Retrieved December 14, 2018, from <https://www.epa.gov/clean-air-act-overview/clean-air-act-highlights-1990-amendments>

²¹ Shankman, S., Gearino, D., Jr., J. H., Berwyn, B., Lavelle, M., Kusnetz, N., . . . Subramanian, M. (2018, November 19). The Most Important Climate Treaty You've Never Heard Of. Retrieved December 14, 2018, from <https://insideclimatenews.org/news/11042018/climate-treaty-gothenburg-protocol-air-pollution-regulations-global-warming-science-black-carbon-lrtap>

Finally, this section will be a discussion on a possible variable that can determine the success of environmental regimes. Broadly speaking, if the international environmental agreement being pursued contains targets that can be seen as insubstantial, shallow, or overall less ambitious, then it can be expected to have a higher chance of implementation and participation. In shorter terms, the less ambitious the goals of an agreement, the more likely actors will be willing to cooperate since there will be less financial and political costs for doing so. This is a common variable between the Montreal Protocol and the Gothenburg Protocol in that they both essentially necessitate the phaseout of harmful pollutants and CFCs. Relative to other environmental issues such as climate change and deforestation, the phaseout of CFCs and four harmful pollutants is a much smaller task that does not require the overhaul of infrastructure that climate change requires, for example. Phasing out from CFCs does not attract the same industrial backlash that the divestment from fossil fuels and conversion to green energy will attract in any pursuit of a climate change agreement. Overall, the Montreal Protocol and Gothenburg Protocol make great strides in areas that are not as financially and politically demanding as some of the other environmental issues that still have yet to be effectively addressed.

Possible test variables that could be used to examine this hypothesis data points that can be classified as political costs and economic costs. Political costs to engaging in environmental agreements can manifest themselves in the form of industrial backlash, whether it be from the working class fearful of losing a way of life, or the white-collar branch of a given industry such as fossil fuel. Ways to measure the presence of industry, using fossil fuel as an example, could be 'number of dollars spent in lobbying'. This would put into perspective the influence an industry has over politicians and possibly shed some light on the overall power of the particular industry

in a given country. Furthermore, the percentage of carbon emissions (again, using the fossil fuel industry as an example) attributed to corporations within a nation could provide insight into 1) the country's reliance on fossil fuels and 2) the size of the labor force in a given country. The concept here being that the larger the dependence on fossil fuels and the more workers working in the coal industry, for instance, the more power an industry has in a given country and therefore the less likely the country is to engage and agree to ambitious environmental agreements. Moreover, to measure the ambitiousness of a proposed agreement there could be analysis dedicated to determining the cost of additional infrastructure needed to reach targets, as well as determining effects on GDP, GNP, or other economic factors as economic growth being stalled seems to be a concern for countries unwilling to set ambitious goals for agreements regarding climate change, for example. To summarize, determining the political and economic influence of relevant industry and determining the economic magnitude of a given agreement is critical to testing the proposed hypothesis mentioned earlier.

In conclusion, international agreements fail for a number of reasons due to the structure of international relations. It is difficult to find a compromise that makes all or most parties satisfied with the results of a negotiation. Ultimately, what will determine the success or failure of an international agreement is the recognition of scientific evidence and a consensus among political leaders that bold action must be taken in order to achieve important goals and maintain the planet as much as possible. The most significant way to improve global governance, in my view, is to be unafraid of combatting industry titans that impede progress in pursuit of profits. There must be a universal defiance to bow to fossil fuel industry if many of the environmental goals are to be met. In regard to climate change, which is undoubtedly the greatest challenge the entire planet as seen in human history, there will not be a solution available that will save the

ozone layer, remove greenhouse gases, and keep average global warming to under 2.5 degrees that does include a total rebuke of the fossil fuel industry. This concept must be understood by not only political leaders but also by the citizens of each and every nation. The stakes are too high to worry about appeasing industrial giants, the time to act was yesterday, if the globe intends on maintaining modern civil society as we know it.