Incentives for Sustainability in the European Union:
Analysis of institutional factors, governance issues, and tax policy

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ABSTRACT

Sustainability and the debate over climate change have become hot topics in the literature and news. Global reactions to the mounting scientific evidence have evolved rapidly in recent years, as an increased sense of urgency has emerged. On September 27, 2013, the IPCC announced that there is a 95% probability that climate change has been caused by humans. This announcement, in conjunction with extreme weather events in recent years, has created even more urgency for policymakers to address climate change issues. Since the EU has been successful in decreasing its GHG emissions, its institutional factors, governance structure, and energy tax policies are examined.

Institutional structures vary greatly between developed and developing countries, which may impact the "green-ness" of firms operating within those regions. Previous studies examine institutional factors in both developed and developing nations; however, the literature lacks sufficient research in the area of "green-specific" institutional factors. The "green-ness" of firms in developed versus developing countries is examined. The "greenness" of firms from EU-member nations are also compared to those based in both developed and developing countries. The Newsweek Green Index is tested for significance.

Governance issues, specifically agency problems, are abundant in efforts to reduce global carbon emissions. Extensive research has been conducted related to firm-level governance; however, research is lacking in the area of agency issues inherent in global collaboration. Despite the EU's multilateral governance structure, the EU was one of the few Kyoto members to reach its emissions reduction target for the period ended 2012; however, this could be offset by the inaction of developing countries. Since

the EU "green" policies have focused on energy-related emissions, Eurostat's emission data relative to developing countries (excluding deforestation) is tested.

Tax policy is one of many methods which countries can use to reduce GHG emissions. Previous studies have focused on cap and trade as well as international tax competition; however, the literature lacks sufficient research on the effectiveness of the EU's energy tax policies. This section examines the effectiveness of the 2003 EU Energy Taxation Directive in encouraging "green" activities. Eurostat's "implicit tax rate on energy" is tested for significance.

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Research Motivation

Sustainability and the debate over climate change have become hot topics in the literature and news. Global reactions to the mounting scientific evidence have evolved rapidly in recent years, as an increased sense of urgency has emerged. On September 27, 2013, the Intergovernmental Panel on Climate Change (IPCC) announced that there is a 95% probability that climate change is caused by humans. This announcement, in conjunction with extreme weather events in recent years, has created even more urgency for policymakers to address climate change issues. Since the EU has been successful in decreasing its GHG emissions, this study examines the EU's institutional factors, governance structure, and energy tax policies.

Independent research studies have produced results consistent with those reported by historical IPCC Assessment Reports, thus reinforcing the reliability of these findings. The IPCC and replicated studies have consistency in the following areas (among others): temperature-related climate change, increased precipitation intensity, and midcontinent summer drying (Meehl, Zwiers, Evans, Knutson, Mearns, & Whetton, 2000). The correlation of CO_2 and an increasing overall mean temperature has been well-documented in the literature since the 1990's (Zwiers & Kharin, 1998) (Mearns, Giorgi, & Shields, 1995) (Kjellstrom, Barring, Jacob, Jones, Lenderink, & Schar, 2007) (Duffy & Tebaldi, 2012). Precipitation intensity has also been examined in the literature. Since 1910, precipitation has increased about 10% in the U.S., with the increase primarily attributable to the "heavy and extreme daily precipitation events" (Karl & Knight, 1998).

Midsummer dryness, or drought, had also been projected using various models (Haywood, Stouffer, Wetherald, Manabe, & Ramaswamy, 1997) (Wetherald & Manabe, 1999).

Further evidence of climate change can be found in the prevalence of extreme weather events in recent years. Extreme weather includes not only record breaking temperatures, but also stronger storms, flooding, and more severe droughts. Extreme hurricanes (Katrina and Sandy in the U.S.), typhoons (Haiyan in the Philippines), and other strong storms are becoming more commonplace relative to historical occurrences. By the end of July 2012, more than two thirds of the U.S. was in drought, and it was the largest drought declaration in over fifty years (NRCD).

The National Oceanic and Atmospheric Administration (NOAA) compiled a list of 2013's most significant weather events (Kostigen, 2014):

- Dry weather conditions in the western part of U.S. created the worst drought on record for California.
- Typhoon Haiyan, which was the strongest cyclone to ever touch land, had winds speeds of over 195 miles per hour, killed about 5,700 people, and affected 11 million people.
- Australia experienced its warmest year ever.
- Russia and China had more extreme rainfall, as one area in China had half of its average annual rainfall in only one day. Also, Russia had its worst flooding in over a century.
- Both the Arctic and Antarctic saw sea ice decrease more than normal, which impacted the United Kingdom having its coldest spring in 50 years. The polar

vortex results from Arctic warming which sends cold winds south. In January 2014, northern U.S. experienced this; consequently, Chicago was colder than the South Pole (Kostigen, 2014).

The NOAA's list of extreme weather events includes locations from all over the world, highlighting that climate change is truly a global problem. The NOAA puts these weather events into a global, historical context, noting that climate change has influenced the overall trends. The NOAA stated that 2013 was the "37th consecutive year with a global temperature above the 20th Century average. The last below-average annual temperature was [in] 1976" (Kostigen, 2014).

The economic impact of extreme weather has been substantial. Economists have estimated the cost of Typhoon Haiyan to be about $14 billion, while only about $2 billion was covered by insurance (Harress, 2013). This value is lower than storms that have hit other regions because a significant portion of the damage was to very poor areas. This $14 billion estimate includes explicit costs only; therefore, the true economic impact is greater.

Hurricane Sandy had a significant economic impact on the New York and New Jersey area. The U.S. Economics and Statistics Administration estimated construction costs to repair and replace damage from the storm for New York state and New Jersey to be $41.9 billion and $29.5 billion, respectively (total $71.4 billion). Of the total explicit cost of $71.4 billion, only about $29.2 billion is expected to be covered by federal aid ($13.3 billion) and insurance ($15.9 billion). In addition to the explicit costs, the resulting decline in New Jersey's tourism was expected to have a significant impact on reducing the state's annual output by an estimated $1.2 billion. Most businesses in New

York rebounded more rapidly with minimal long-term impacts (U.S. Department of Commerce, 2013).

The European Commission notes that "Reining in climate change carries a cost, but doing nothing would be far more expensive in the long run" (European Commission). Extreme weather events have underscored the need to address climate change, and the European Union has implemented successful green policies. The EU has implemented a variety of policies that have been successful, as it exceeded its Kyoto Protocol target as of 2012. The EU policies aimed at reducing GHG emissions include:

- European Climate Change Programme (ECCP)
- EU Emissions Trading System
- Regulations aimed to increase renewable energy to 20% of energy sources by 2020
- Reduced CO2 emissions targets from new vehicles
- Carbon capture and storage (CCS) technology support

The European Union has allocated 20% of its 2014-2020 budget to climate change initiatives. Since climate change is a global problem and requires participation from all nations, the UN is in negotiations for an international climate change agreement that covers all nations. It is expected to be adopted in 2015 at the Paris climate conference, and effective as of 2020. The goal is to create a legally enforceable agreement; however, participation is voluntary (European Commission).

Overview

Climate Change and International Business

Climate change is an inherently international business issue, and it is significant to MNEs for many reasons. The implications of climate change are an international concern, and no enforceable global agreement exists. Since green markets are in their infancy, MNEs are often faced with institutional voids. These institutional failures are in varying degrees across international borders. Further, "green" products and services have created new market opportunities for MNEs (Pinkse & Kolk, 2012).

Sustainability and Climate Change

Sustainability is embedded in the concept of interdependence between the environment and human beings, and the definition of sustainability has evolved over time. In 1969, the United States' National Environmental Policy Act was created in response to concerns, and "…to declare a national policy which will encourage productive and enjoyable harmony between man and his environment" (Environmental Protection Agency (EPA), 2012).

In 1987, a World Commission on Environment and Development report, titled "Our Common Future," promoted global cooperation and provided the most widely used definition of sustainable development: "…development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Environmental Protection Agency (EPA), 2012). This comprehensive definition of sustainability includes much more than purely environmental factors.

Although the definition derived from "Our Common Future," or the Brundtland Commission, is widely cited, the "three pillars" of sustainability provide a more functional definition. The three pillars of sustainability are: Environmental, Economic, and Social. Further, each of these three "pillars" can be broken down into subcategories (Environmental Protection Agency (EPA), 2012). This "three pillar" taxonomy is commonly used today.

One such subcategory under the "environmental" pillar is climate change. The U.S. EPA defines climate change as, "any significant change in the measures of climate lasting for an extended period of time…[including] major changes in temperature, precipitation, or wind patterns, among others" (Environmental Protection Agency (EPA)). Climate change is not synonymous with global warming, as the definition of climate change encompasses a wider range of weather patterns. Global warming is only one aspect of climate change.

The influence of humans on climate change has been widely debated. Some scholars and politicians have argued that humans have no influence on the changing atmospheric temperatures (Singer, 2006) (Hoffman, 2011). On the other hand, others have maintained that humans can slow or reverse global warming through the reduction of greenhouse gas emissions (Environmental Protection Agency (EPA)) (Stavins, 1997). Caution should be used when assessing this debate, as political arguments differ from scientific evidence. Political polarization can be detrimental to our global, social interdependence (Antonio & Brulle, 2011). Nonetheless, massive accumulation of scientific evidence points to human beings as the primary source of climate change (Kahan, Jenkins-Smith, & Braman, 2011).

In contrast to political and philosophical debate, scientific evidence is the most reliable basis for assessing the influence of human beings on climate change. On September 27, 2013, the United Nations announced that there is a 95% probability that climate change has been caused by humans (United Nations, 2013). This conclusion was drawn from the work of thousands of volunteer scientists worldwide, participating in the Intergovernmental Panel on Climate Change.

Global Reactions to Climate Change

Country-Level Initiatives

Global reactions to climate change include both country-level and firm-level initiatives. Key country-level organizations include the Intergovernmental Panel on Climate Change (IPCC), United Nations Framework Convention on Climate Change (UNFCCC), Kyoto Protocol Treaty, Cancun Agreements, UN Climate Conference in Durban, and the UN Climate Conference in Doha, Qatar. Each successive initiative has refined and built upon previous policies.

In 1988, the United Nations (UN) and the World Meteorological Organization (WMO) formed the Intergovernmental Panel on Climate Change (IPCC). The purpose of the IPCC is:

> to assess on a comprehensive, objective, open and transparent basis the scientific, technical and socio-economic information relevant to understanding the scientific basis of risk of human-induced climate change, its potential impacts and options for adaptation and mitigation. IPCC reports should be neutral with respect to policy, although they may need to deal objectively with scientific, technical and socio-economic factors relevant to

> the application of particular policies (Intergovernmental Panel on Climate Change).

The IPCC receives unpaid contributions from many sources globally and consists of thousands of volunteer scientists from around the globe. The organization is structured based on objectives, or working groups. Working Group I is "The Physical Science Basis of Climate Change." Working Group II is "Climate Change Impacts, Adaptation and Vulnerability." Working Group III is "Mitigation of Climate Change." In addition to the working groups, Task Force groups can be established for the long or short term. Currently, the Task Force on National Greenhouse Gas Inventories works towards refining the methodology for greenhouse gas emission calculations (Intergovernmental Panel on Climate Change).

In 1992, several nations created an international treaty, the United Nations Framework Convention on Climate Change (UNFCCC) in an attempt to address climate change. However, by 1995 this treaty was found to be inadequate (United Nations). In response The Kyoto Protocol Treaty was developed in the city of Kyoto, Japan in 1997. The purpose of the treaty is for member countries to reduce greenhouse gas emissions. This treaty amongst industrialized countries became effective on February 16, 2005. Currently, 192 parties have joined; however, only 84 members ratified the provisions of the treaty by the 1999 deadline. The European Union ratified the Kyoto Protocol Treaty on April 29, 1998; however, the United States elected to not ratify the provisions. Ratified members have agreed to emissions reduction targets, with the first phase from 2008-2012 (Kyoto Protocol, 2013).

For the first time in 2010, a plan to assist developing countries with green initiatives was established at the Climate Conference in Cancun. Many nations approved the Cancun Agreements, which form "the basis for the largest collective effort the world has ever seen to reduce emissions, in a mutually accountable way, with national plans captured formally at the international level under the banner of the [UNFCCC]" (UNFCCC). For the first time, a wide-ranging plan was developed in order to assist developing nations adapt to climate change prevention measures. This plan includes financial, technological, and capacity-building support (UNFCCC).

In 2011, at the UN Climate Conference in Durban, several plans to assist developing countries were put into action. Notable outcomes of the Durban agreement include the development of a Green Climate Fund, Adaptation Committee, and developing country support. Participating countries pledged to donate to the Green Climate Fund, which is intended to assist developing countries in creating and implementing green initiatives. The Adaptation Committee, consisting of sixteen members, is charged with global adaptation, with particular emphasis on support for developing nations. Additional support for developing countries includes the development of a web-based platform to match support-seeking developing nations with available resources (United Nations).

On December 8, 2012, in Doha, Qatar, infrastructure was established in order to support the Durban initiatives related to developing countries' support. Infrastructure-related achievements include selection of the host of the Green Climate Fund (Republic of Korea), as well as approval of the constitution for the Climate Technology Center (United Nations). In addition, the second Kyoto commitment period, 2013-2020, was

established, and many details of the Kyoto Protocol were amended or ratified. Kyoto's previously used accounting rules were maintained, and elements to the reporting process were enhanced in order to increase transparency.

Firm-Level Initiatives

UN Global Compact

In addition to country-level sustainability initiatives, firm-level organizations have also been established. Thousands of firms have voluntarily joined these organizations in an effort to improve global sustainability. Key firm-level sustainability initiatives include the UN Global Compact and the OECD Guidelines for Multinational Enterprises.

The UN Global Compact is the largest voluntary corporate social responsibility initiative in the world. Over 10,000 corporations and other stakeholders from over 130 countries have joined. The UN Global Compact's purpose is to "assist the private sector in the management of increasingly complex risks and opportunities in the environmental, social and governance realms, seeking to embed markets and societies with universal principles and values for the benefit of all (United Nations)."

Members of the UN Global Compact must have the firm's chief executive sign a commitment and pay a small annual fee (recommended amount based on annual revenue), as well as abide by the following: (1) Integrate the Compact's principles in strategy, operations, and culture; (2) Include the Compact's Principles in decision-making; (3) Develop partnerships to promote more extensive UN objectives; (4) Document the ways in which initiatives are implemented in a "Communication of

Progress," via an annual report, sustainability report, or other public document; (5) Promote corporate social responsibility to external stakeholders, including partners, customers, and the general public (United Nations).

The Global Compact utilizes Ten Principles as guidelines for companies. These ten principles are broken down into four categories and integrate all three Pillars of Sustainability. The four categories are: Human Rights, Labour, Environment, and Anti-Corruption.

The *Human Rights* category notes that businesses should both (1) uphold internationally accepted human rights and (2) not ignore human rights mistreatments. This category of principles one and two is in line with the social pillar of sustainability, as human rights is a social responsibility.

The *Labour* category notes that businesses should (3) support the right to collective bargaining, (4) eradicate all types of involuntary labour, (5) eliminate child labour, (6) reject discrimination in employment. This category of principles three through six is also similar to the Social Pillar, as fairness in labor relations is a social responsibility.

The *Environment* category notes that businesses should (7) uphold precautionary environmental measures, (8) encourage environmental responsibility, (9) support the development and distribution of environmentally green technologies. This category of principles seven through nine is clearly similar to the Environmental Pillar, which promotes environmental sustainability.

The *Anti-Corruption* (Social and Economic Pillars) category notes that businesses should (10) pursue efforts against all types of corruption. This category of principle ten

is similar to both the Social and Economic Pillars, as corruption such as bribery and extortion produce both social and economic adverse effects to society (United Nations).

OECD Guidelines for Multinational Enterprises

In addition to the UN Global Compact, firm-level sustainability guidelines have been developed by the Organisation for Economic Co-operation and Development (OECD). The purpose of the OECD is to encourage policies that improve social and economic well-being globally. Governments work collaboratively in response to common issues (OECD).

The OECD Guidelines for Multinational Enterprises ("the Guidelines") provide recommendations for responsible business practices. A "Multinational Enterprise" is not explicitly defined by the Guidelines; rather, the Guidelines apply to a wide range of entities. The Guidelines are applicable to any organization that has a presence in more than one country, including state-owned, privately-owned, or a combination (OECD). First adopted in 1976, the Guidelines have been reviewed five times in order to ensure that they continue to align with the dynamic global economic conditions (OECD). Similar to the UN Global Compact, corporate adherence to the Guidelines is voluntary and not enforceable; however, the recommendations may overlap with legally enforceable laws at the country-level.

The Guidelines' topics include (1) human rights, (2) employment and industrial relations, (3) environment, (4) combating bribery, bribe solicitation, and extortion, (5) consumer interests, (6) science and technology, (7) competition, and (8) taxation (OECD). These topics include business ethics and cover a broader range of issues than

the UN Global Compact Principles. The *environment* chapter includes guidelines for MNEs to improve environmental impact via internal management and planning.

A unique attribute of the OECD Guidelines is the grievance process, or "Specific Instances," in which stakeholders can file a complaint against an entity that is in non-conformance with the Guidelines. Although these are not legal proceedings, the purpose is to resolve issues amicably, such as through mediation.

The grievance process occurs in three steps. Step 1 is the Initial Assessment, in which the validity of the complaint is assessed before further investigation. If it is determined to be worthy of additional examination, the process continues to Step 2. Step 2 is the Offer to Good Offices, in which parties seek advice for amicable means of reaching a resolution. Lastly, Step 3 is the Conclusion, in which a statement or report is released with the outcome. Potential outcomes are: an agreement was or was not reached, a party did not agree to participate in the procedures, or the Specific Instance did not merit additional investigation (OECD).

An example of the grievance process was an issue in Chile and Canada with salmon farming in 2009. Among other assertions, grievances included inappropriate labor practices (discouraging unionization, discrimination against women in pay structure, etc.), as well as environmental hazards (lack of safeguards against the spread of lice and Infectious Salmon Anemia, etc.). The Norwegian National Contact Point (NCP) offered to mediate the proceedings. An NCP is designated by every member country, and it is responsible for handling inquiries, assisting with resolving issues, as well as promoting the Guidelines. The outcome of the salmon grievance was positive and

resulted in updates to Cermaq's corporate code of conduct, as well as commitments to improve its business practices in question (OECD).

Criticisms of Global Reactions

Although both country-level and firm-level initiatives have been developed in order to address sustainability issues, criticisms of global reactions are abundant. Of all the country-level and firm-level initiatives in place, all consist of voluntary participation, and none are binding. The only organization with potential repercussions is the OECD Guidelines, which has established a grievance process. Nevertheless, the organization in question is not required to cooperate with the proceedings, as the grievance procedure is not a legal process.

In addition, academics and the organizations themselves recognize shortcomings of the global responses to sustainability concerns. Singer (2006) argues that the Kyoto Protocol is a "puny effort," and in a best case scenario will defer the rise in greenhouse gas emissions by only about six years (Singer, 2006). Also, the Kyoto Protocol "only encourages" member countries to reduce emissions (Kyoto Protocol, 2013). By the end of 2012, most member countries failed to achieve their emissions reduction targets (Napoli, 2012). Even if all member countries achieved their targets, the scope was insufficient. The Kyoto protocol was not ratified globally, as a narrow group of countries agreed to the terms (Pinkse & Kolk, 2012).

Although most Kyoto Protocol members did not achieve their targets, the European Union surpassed its target significantly. In 2007 when the Kyoto Protocol was agreed upon, the EU had fifteen member states, also known as the "EU-15." These

fifteen EU members agreed to reduce their aggregate emissions for a group of six greenhouse gases, including: carbon dioxide, methane, nitrous oxide, and three fluorinated gases (hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride) (European Commission).

Research Objective and Hypotheses

The EU was one of the few Kyoto Protocol members who reached their emissions reduction target for the first commitment period, ending in 2012. This research study focuses on EU institutional factors, governance, and tax policy as it relates to sustainability policy.

Overall emissions reductions can result from individuals, firms, or both. H1 examines the "greenness" of EU firms (as opposed to individuals) relative to other regions of the world.

Global greenhouse gas emissions (GHG) emissions, regardless of the source country, accumulate and contribute to climate change. Overall GHG emissions (6 primary gases) have decreased since 1990 in the EU; however, this could be offset by inaction from developing countries. H2 examines the change in the EU's emissions relative to developing countries.

In 2003, the EU Energy Taxation Directive guided member nations to develop a tax structure in which tax rates on energy are generally lower for cleaner energy sources. H3 examines the change in the EU's implicit tax rate on energy subsequent to implementation of the Directive.

H1(a.) Developed vs. Developing: The institutional voids that characterize developing countries create an environment in which businesses do not act as "green" as those firms based in developed countries.

H1(b.) EU vs. Developing: In comparison to companies in developing countries, EU firms are acting more "green."

H1(c.) EU vs. Other Developed: In comparison to companies in other developed countries, EU firms are acting more "green."

H2: Since 1990, European Union GHG energy-related emissions have decreased significantly in comparison to developing country emissions (excluding deforestation).

H3(a.): The EU Energy Taxation Directive has been effective in encouraging EU-27 citizens and businesses to use more "green" energy sources.

H3(b.): The EU Energy Taxation Directive has been effective in encouraging EU-15 citizens and businesses to use more "green" energy sources.

CHAPTER 2 – INSTITUTIONAL FACTORS AND SUSTAINABILITY

Overview

Stern describes climate change as "a market failure on the greatest scale the world has seen" (Stern, The Economics of Climate Change) (Pinkse & Kolk, 2012). Stern authored the government commissioned Stern Review in 2006, which noted a 75% chance that global temperatures would increase between two to three degrees above the long-term average; however, he has since noted that he "got it wrong on climate change – it's far, far worse" (Stewart & Elliott, 2013). Through a series of conferences, treaties, and voluntary organizations, nations have attempted to address the dangers of greenhouse gas emissions. In an effort to meet sustainability goals of these organizations, many countries have implemented sustainability strategies in order to entice individuals and corporations to reduce greenhouse gas emissions.

Firm-level strategy is influenced by the institutional factors of a region. Institutional structures vary greatly between developed and developing countries, which may impact the "green-ness" of firms operating within those regions. Institutional factors include both formal and informal constraints, both of which are also applicable to climate change policies. Since the European Union was one of the few Kyoto members to exceed its target for the period ended 2012, its institutional structures related specifically to climate change may impact the "green-ness" of EU firms relative to firms in other developed nations.

This research study examines the "green-ness" of firms based in regions with different levels of institutional structures. Both formal and informal institutional voids related to "green" initiatives may exist in both developed and developing countries. Is

there a difference between the "green-ness" of corporations in developed versus developing nations? How do each of these categories compare to the European Union?

Literature Review

Institutional Factors - Developed vs. Developing Countries

Institutional factors are a critical factor in firm-level strategic decision-making. Peng defines an institutional framework as "the set of fundamental political, social, and legal ground rules that establishes the basis for production, exchange, and distribution" (Peng, 2002). Institutional factors can be broken down into two categories: formal and informal constraints. Formal constraints are comprised of local factors such as rules and regulations, judicial precedents, and economic contracts. In contrast, informal constraints comprise local influences such as social norms and culture (Peng, 2002). Both formal and informal institutional factors of a region influence firm-level strategic decision-making.

Previous studies focus on the institutional differences between developed and developing countries (Peng, 2002) (Kwok & Reeb, 2000). Developing countries are generally characterized as having institutional voids, whereas developed countries have more sophisticated institutional structures. Both developed and developing countries provide different benefits for enterprises. Strong institutional factors reduce uncertainty and provide stability within a local operating environment (Peng, 2002). However, institutional voids allow for a lower cost of doing business (via lower regulatory costs and restrictions) and provide market opportunities. Therefore, developing economies provide a higher level of both risk and potential reward. This is consistent with Reeb and

Kwok's theory that upstream internationalization (from less-developed to developed nations) decreases firm risk, whereas downstream internationalization (from developed to less-developed nations) increases firm risk (Kwok & Reeb, 2000).

Since developing countries generally lack stringent regulation and enforcement of policies, enforceable environmental regulations are often lacking. Many argue that firms based in developing countries would consequently have relaxed environmental policies; therefore, these firms would act less "green." However, Ozen and Kusku argue that the institutional void within developing economies does not affect whether a company is environmentally friendly, as the companies' market orientations, industrial characteristics, and corporate identities outweigh the institutional voids (Ozen & Kusku, 2009).

Similar to general institutional voids, climate change-specific institutional voids include both formal and informal constraints (Pinkse & Kolk, 2012). Generally, formal institutional voids exist in developing countries; however, formal institutional voids related climate change initiatives may exist in both developed and developing countries. As evidenced by the lack of universal participation in global sustainability initiatives, developed nations have varying levels of "green" regulations. Attitudes towards "green" activity (informal institutional factor) also vary significantly from country to country.

Newsweek's Top Greenest Companies Ranking

Since 2008, Newsweek has collaborated with consulting firms Trucost and Sustainalytics to compile a list of the Top 500 Greenest Global Companies. The list of 500 companies was assembled using the 500 largest global firms, based on a combination

of the most recent fiscal year revenue, market capitalization, and number of employees (Newsweek, 2013). Firms included are across diverse industries and countries. Each firm is evaluated based on a "Green Score" index, which is comprised of three primary categories: Environmental Impact Score (45%), Environmental Management Score (45%), and Disclosure Score (10%) (Newsweek).

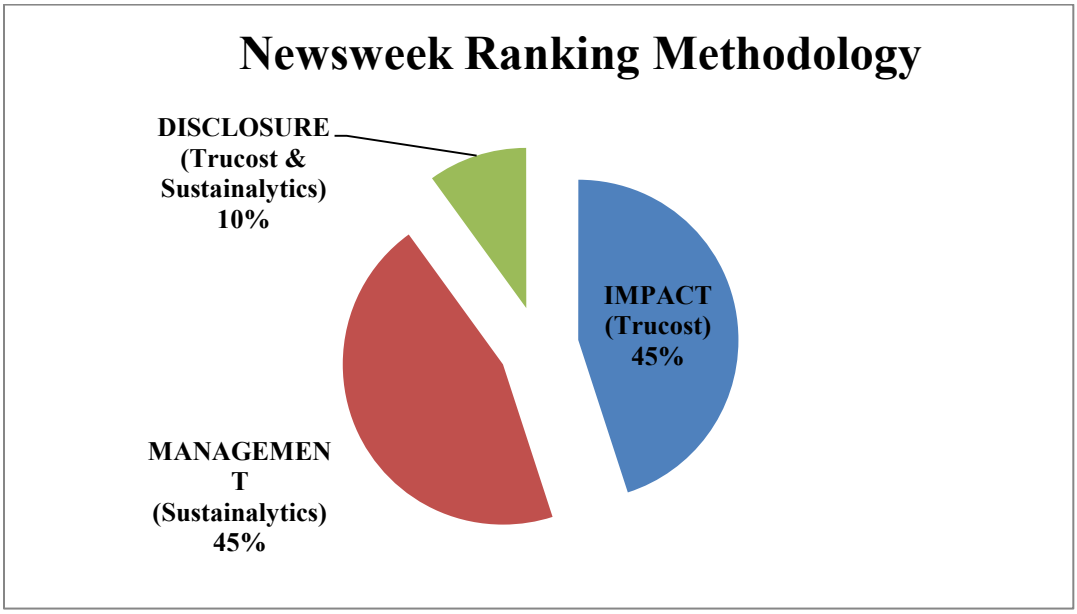

Figure 1 - Newsweek Ranking Methodology

The Environmental Impact Score (45%) is calculated by consulting firm Trucost. Trucost has been researching environmental impacts for over ten years, and researches the world's largest 4,500 companies. The firm is supported by an international academic advisory panel. Truecost data is used by fifteen academic institutions, including Yale, Harvard, and Oxford University (Newsweek, 2013).

Trucost uses over 700 metrics to determine the Environmental impact score, including: nine key greenhouse gases, water use, solid-waste disposal, and emissions that cause acid rain and smog. Using these quantitative results, Trucost computes an environmental-damage cost for each firm. This cost is expressed in dollars and represents the potential cost to society associated with the environmental damage (Newsweek, 2013).

The Environmental Management Score (45%) is calculated by consulting firm Sustainalytics. Sustainalytics has been researching in the area of sustainability for over twenty years. In 2013, the firm was named Best Responsible Investment Analysis Firm for the second consecutive year, by the Independent Research in Responsible Investment (IRRI) Survey (Sustainalytics).

Sustainalytics focuses on three areas of environmental management: (1) company operations, (2) contractors and suppliers, and (3) products and services. About a dozen core environmental indicators are examined across all industries, including environmental policies, management systems, certifications and programs, and targets to reduce emissions and increase the use of renewables. In addition, over forty sector specific indicators are applied in areas such as: biodiversity protection, hazardous-waste reduction, and supply-chain initiatives, among others (Newsweek, 2013).

The Disclosure Score (10%) is calculated by both Truecost and Sustainalytics, with each consulting firm contributing equally. Trucost's contribution represents the proportion of environmental impacts that a firm discloses with respect to those relevant to its operations. For instance, nuclear waste would be material for some utility companies, but irrelevant in other industries. Sustainalytics' contribution consists of the scope and

quality of firm-level environmental reporting. This is evaluated in terms of the level of involvement in key transparency initiatives, such as Global Reporting Initiative and Carbon Disclosure Project.

Newsweek's Greenest Companies Ranking is considered a reliable source for purposes of this study, as the methodology is comprehensive, rigorous, and from reliable sources. The Newsweek Ranking's advisory board is comprised of a variety of professionals with expertise in the field, including: John Elkington (Volans), Marjorie Kelly (Tellus), Tom Murray (Environmental Defense Fund), David Vidal (Conference Board), and Michael Toffel (Harvard Business School) (Newsweek, 2013).

See the number of companies by country and by industry in the top 100 below.

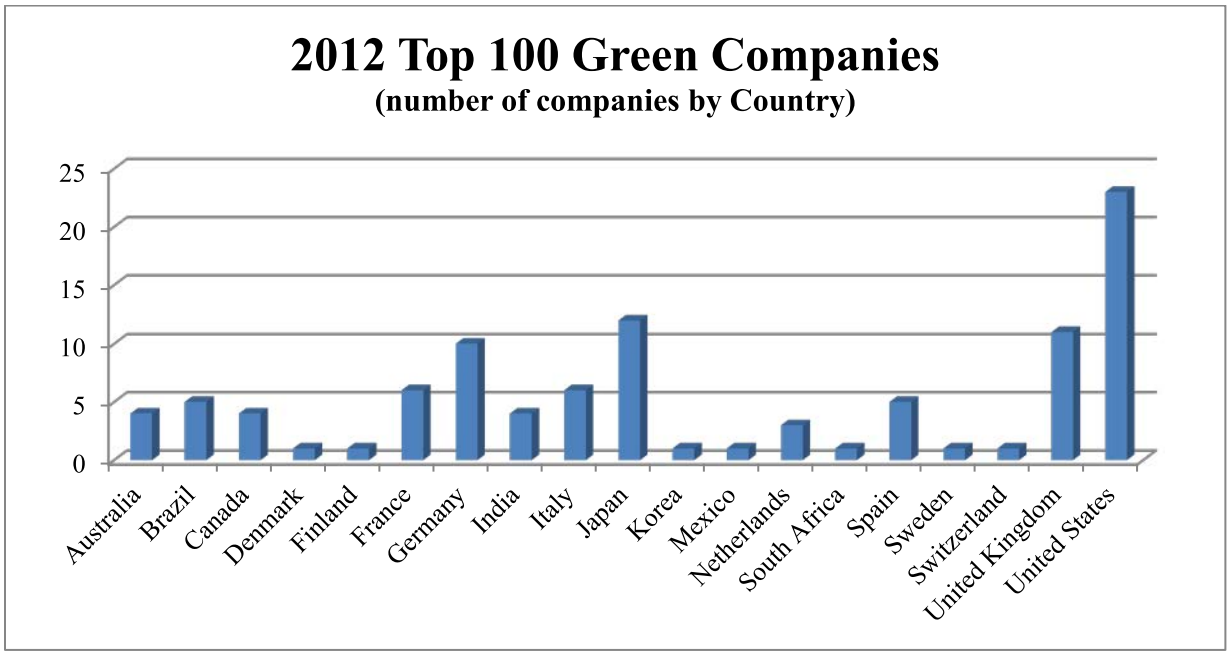

Figure 2 - Top 100 Green Companies by Country

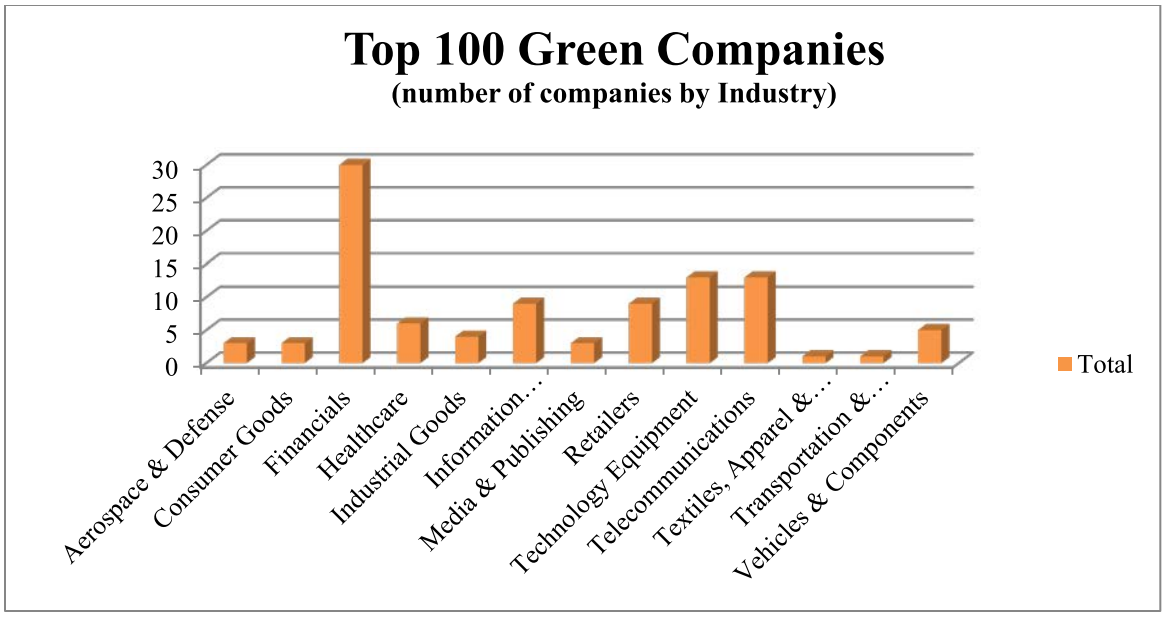

Figure 3 - Top 100 Green Companies by Industry

United States

Since the United States and Financial sector each dominated their respective category, the United States Top 100 Green Companies was broken down by industry sector. Financials was not the primary driver of the dominance of U.S. companies; rather, U.S. Top Green Companies were distributed across several industries. Likewise, when the Financial sector was examined by country, it was distributed across many countries.

As a result of this analysis, one cannot assume that the United States dominated the Top 100 Green Companies rankings merely as a result of the nature of the financial services business.

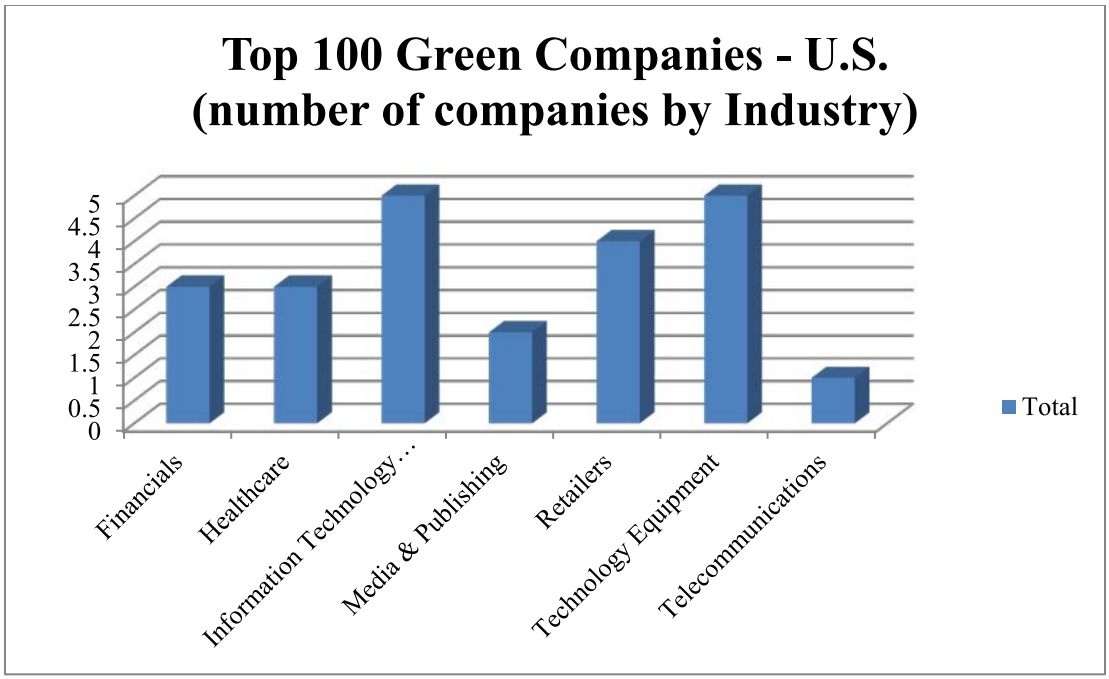

Figure 4 - Top 100 Green Companies by Industry (U.S. only)

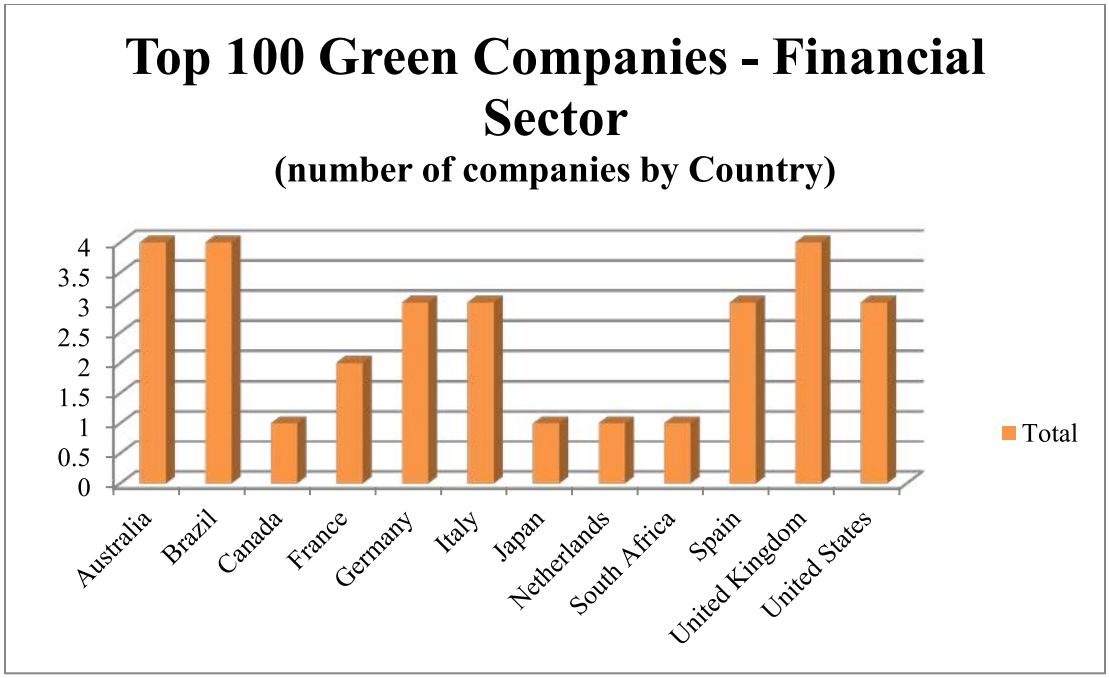

Figure 5 - Top 100 Green Companies by Country (financial sector only)

European Union (EU)

In the analysis above, it appears that the United States dominates the top 100 Green Companies; however, several European countries fall within the European Union which has unified tax strategies. As such, these European companies should be evaluated in the aggregate, as they fall under the same "green" policies. When firms within the EU are aggregated, the number of "Greenest" companies far exceeds that of the United States.

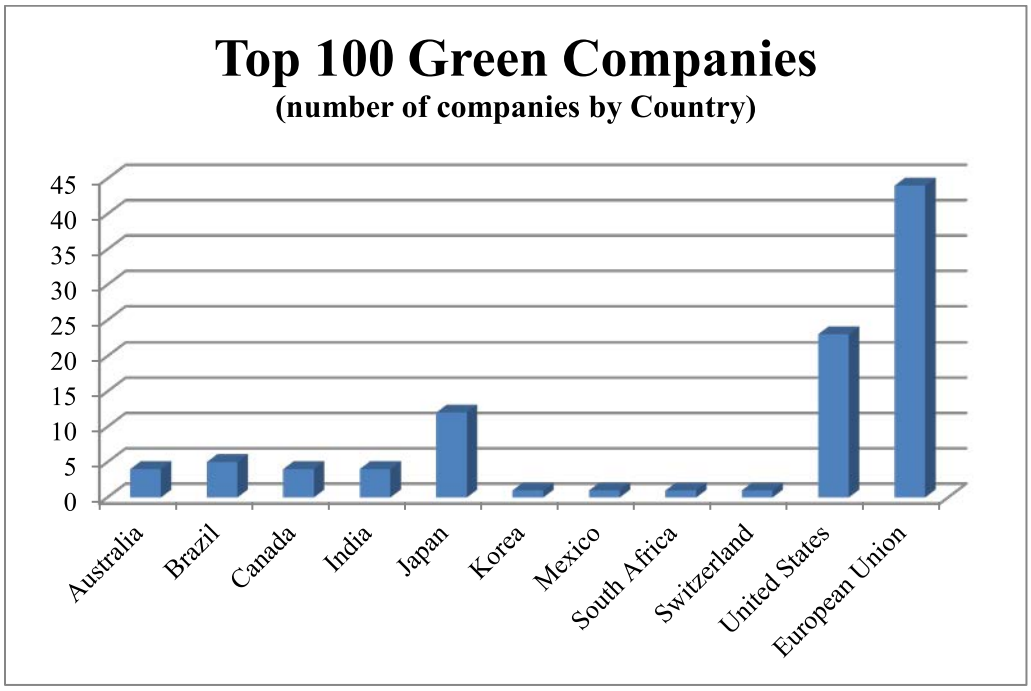

Figure 6 - Top 100 Green Companies by Country (EU aggregated)

Research Questions

Previous studies note that the EU has decreased its greenhouse gas emissions significantly; however, this could be the result of the actions of individuals, firms, or a combination of both. This research study focuses on the "green-ness" of firms.

Developed vs. Developing

- Do the institutional voids that characterize developing countries create an environment in which businesses do not act as "green" as those firms based in developed countries?

EU vs. Other Regions

- In comparison to other regions of the world, are EU firms acting more "green"? Specifically, are EU firms acting more "green" than firms based in developing countries? Are EU firms acting more "green" than firms that are likewise based in developed countries?

Data

Newsweek's Top 500 Greenest Global Companies Index for the year 2012 is used as a proxy for the "green-ness" of the 500 largest global firms. Inclusion in the Top 500 list is based on firm size, which is determined by a combination of the most recent fiscal year revenue, market capitalization, and number of employees (Newsweek, 2013). The sample of 500 firms includes companies based in both developed and developing countries. Each firm is evaluated based on a "Green Score" index and is ranked accordingly (Newsweek).

In order to categorize the sample into firms based in developed and developing countries, the World Bank's "Country and Lending Groups" classification (World Bank) was used to categorize countries represented on the Greenest Companies list. The World Bank defines a developing country as "one in which the majority lives on far less money – with far fewer basic resources – than the population in highly industrialized countries (World Bank).

Methodology

In order to determine whether there is a difference between the "green-ness" of firms based in developed vs. developing nations, the Green Indices for firms in developed countries (419 firms) were tested for significance against those based in developing countries (81 firms). Independent samples t-test was conducted.

Next, the EU-based firms were extracted from the "Developed" sample, and the remaining developed countries were renamed "Developed Excluding EU." The EU-based firms were compared to firms in developing countries and tested for significance using independent samples t-test. The developing country sample did not contain any EU-based firms; therefore, the developing country sample is identical throughout all three steps of this analysis.

Lastly, EU firms were compared to firms from the other developed countries (Developed Excluding EU) for significance using an independent samples t-test. All EU firms were extracted from the original developed country sample.

Since the sample variances differ by 67% (102.68 vs. 170.89), unequal variances were assumed in the independent samples T-test. The indices of companies in developing nations (81 firms) are compared to those of developed nations (419 firms).

Results

Developed vs. Developing:

COUNTRY CLASSIFICATION	
Developed:	
Country	**# of companies**
Australia	9
Austria	1
Belgium	2
Canada	18
Chile	1
Czech Republic	1
Denmark	2
Finland	1
France	31
Germany	27
Hong Kong	5
Ireland	1
Israel	1
Italy	11
Japan	53
Korea	8
Netherlands	8
Norway	2
Portugal	1
Russia	9
Singapore	3
Spain	8
Sweden	8
Switzerland	10
United Kingdom	36
United States	162
Total Developed	**419**
Developing:	
Country	**# of companies**
Brazil	14
China	38
India	13
Indonesia	1
Malaysia	1
Mexico	5
South Africa	4
Taiwan	4
Turkey	1
Total Developing	**81**
Total Sample	**500**

Figure 7 - Country Classification (developed vs. developing)

Green Score *Descriptive Statistics*			
	Developed	**Developing**	**Combined**
Mean	59.9468	54.1642	59.0100
Standard Error	0.4950	1.4525	0.4857
Median	59.9000	54.2000	59.2000
Mode	58.5000	63.2000	58.5000
Standard Deviation	10.1333	13.0726	10.8611
Sample Variance	102.6845	170.8941	117.9626
Kurtosis	0.5610	0.4682	0.5634
Skewness	(0.2732)	0.1528	(0.2805)
Range	62.5000	65.1000	65.3000
Minimum	20.4000	20.6000	20.4000
Maximum	82.9000	85.7000	85.7000
Sum	25,117.7000	4,387.3000	29,505.0000
Count	419	81	500
Largest(1)	82.9000	85.7000	85.7000
Smallest(1)	20.4000	20.6000	20.4000
Confidence Level(95.0%)	0.9731	2.8906	0.9543

Figure 8 - Descriptive Statistics (developed vs. developing)

t-Test: Two-Sample Assuming Unequal Variances		
	Developed	***Developing***
Mean	59.9468	54.1642
Variance	102.6845	170.8941
Observations	419	81
Hypothesized Mean Difference	0.0000	
df	99	
t Stat	3.7682	
P(T<=t) one-tail	0.0001	
t Critical one-tail	1.6604	
P(T<=t) two-tail	0.0003	
t Critical two-tail	1.9842	

Figure 9 - t-Test Output (developed vs. developing)

Based on the t-test above, the difference in "green-ness" between firms in developed and developing nations is significant.

EU vs. Other Regions:

COUNTRY CLASSIFICATION	
European Union (EU):	
Country	**# of companies**
Austria	1
Belgium	2
Czech Republic	1
Denmark	2
Finland	1
France	31
Germany	27
Ireland	1
Italy	11
Netherlands	8
Portugal	1
Spain	8
Sweden	8
United Kingdom	36
Total EU	**138**
Other Developed:	
Country	**# of companies**
Australia	9
Canada	18
Chile	1
Hong Kong	5
Israel	1
Japan	53
Korea	8
Norway	2
Russia	9
Singapore	3
Switzerland	10
United States	162
Total Other Developed	**281**
Developing:	
Country	**# of companies**
Brazil	14
China	38
India	13
Indonesia	1
Malaysia	1
Mexico	5
South Africa	4
Taiwan	4
Turkey	1
Total Developing:	**81**
Total Sample	**500**

Figure 10 - Country Classification (EU vs. other regions)

Green Score Descriptive Statistics				
	EU Only	**Developed Excluding EU**	**Developing**	**Combined**
Mean	62.6688	58.6100	54.1642	59.0100
Standard Error	0.8471	0.5948	1.4525	0.4857
Median	61.4500	59.1000	54.2000	59.2000
Mode	73.6000	61.2000	63.2000	58.5000
Standard Deviation	9.9506	9.9700	13.0726	10.8611
Sample Variance	99.0153	99.4011	170.8941	117.9626
Kurtosis	(0.4909)	0.9035	0.4682	0.5634
Skewness	0.0214	(0.4442)	0.1528	(0.2805)
Range	44.3000	62.5000	65.1000	65.3000
Minimum	38.4000	20.4000	20.6000	20.4000
Maximum	82.7000	82.9000	85.7000	85.7000
Sum	8,648.3000	16,469.4000	4,387.3000	29,505.0000
Count	138	281	81	500
Largest(1)	82.7	82.9	85.7	85.7
Smallest(1)	38.4	20.4	20.6	20.4
Confidence Level(95.0%)	1.6750	1.1708	2.8906	0.9543

Figure 11 - Descriptive Statistics (EU vs. other regions)

Since the sample variances for EU vs. developing nations differ by 73% (99.02 vs. 170.89), unequal variances were assumed in the independent samples T-test. The indices of companies based in EU member countries (138 firms) are compared to those based in developing nations (81 firms).

Since the sample variances for EU vs. developed nations differ by only 0.39% (99.02 vs. 99.40), equal variances were assumed in the independent samples T-test. The indices of companies in EU member countries (138 firms) are compared to those based in other developed nations (281 firms).

EU vs. Developing:

t-Test: Two-Sample Assuming Unequal Variances		
	EU Only	***Developing***
Mean	62.6688	54.1642
Variance	99.0153	170.8941
Observations	138	81
Hypothesized Mean Difference	-	
df	135	
t Stat	5.0579	
P(T<=t) one-tail	0.0000	
t Critical one-tail	1.6562	
P(T<=t) two-tail	0.0000	
t Critical two-tail	1.9777	

Figure 12 - t-Test Output (EU vs. developing)

Based on the t-test above, the difference in "green-ness" between firms in developed and developing nations is significant.

EU vs. Developed Excluding EU:

t-Test: Two-Sample Assuming Equal Variances		
	EU Only	***Developed - Excl. EU***
Mean	62.6688	58.6100
Variance	99.0153	99.4011
Observations	138	281
Pooled Variance	99.2744	
Hypothesized Mean Difference	-	
df	417	
t Stat	3.9190	
P(T<=t) one-tail	0.0001	
t Critical one-tail	1.6485	
P(T<=t) two-tail	0.0001	
t Critical two-tail	1.9657	

Figure 13 - t-Test Output (EU vs. developed excluding EU)

Based on the t-test above, the difference in "green-ness" between firms in EU member countries and other developed nations is also significant.

Conclusions

As anticipated, the difference between the "Green Index" for companies based in developed and developing nations is significant. This finding is consistent with the theoretical literature which suggests that institutional voids create very different operating environments for companies from industrialized nations that internationalize (downstream internationalization). Although the literature notes that institutional voids specific to climate change can exist in both developed and developing countries,

developing countries may have more significant institutional voids specific to climate change relative to developed countries.

Also as expected, the difference between the "Green Index" for companies based in the EU and developing nations was significant. Since all companies based in EU member nations on the Top 500 list were extracted from the developed nation's sample, this finding is consistent with the developed vs. developing results.

Further, the difference between the "Green Index" for companies based in the EU and other developed nations was also significant. Since all companies based in EU member nations were extracted from the developed nation's sample, this suggests that even compared to similar developed countries, EU firms are acting more "green".

These findings suggest that theory related to institutional frameworks can be applied to climate change research. Additionally, firms based in the EU are acting significantly more "green" than their peers in other developed nations. The EU's contribution to global sustainability efforts are effective, and can be used as a model for policymakers in other developed nations.

These findings also provide ample opportunities for future research. In 2011 and 2012, the Newsweek Index methodology is consistent and yields comparative year over year results. While movements amongst rankings can be evaluated in relative terms, changes in a company's green index reflect a firm-level change (beginning in 2011). Consistent methodology is anticipated in future years and provides a strong foundation for future research.

CHAPTER 3 – GOVERNANCE AND CO2 EMISSIONS

Overview

"Continuation of high fossil emissions, given current knowledge of the consequences, would be an act of extraordinary witting intergenerational injustice" (Hansen, et al., 2013). Dr. James Hansen, former Director of the NASA Goddard Institute for Space Studies and Adjunct Professor at Columbia University, has proclaimed the dangers of climate change effects on future generations. Through a series of conferences, treaties, and voluntary organizations, nations have attempted to address the dangers of greenhouse gas emissions.

Enforcement of green initiatives is a challenge, given the inherent agency problem and lack of global governance. The climate change agency problem arises because the objectives of the organizations attempting to address climate change are often not in line with country-level primary objectives. Governance structures attempt to minimize the risks associated with the agency dilemma; however, climate change does not have a single global governance body which oversees policies.

Previous studies in international business have focused on governance of firms; however, the literature lacks sufficient research in the area of governance issues related to climate change initiatives.

Literature Review

Governance – General

The concept of corporate governance stems from the agency problem inherent in most organizations. An agency problem is the possible conflict of interest between owners and managers, as their objectives are often not fully aligned (Denis & McConnell, 2002). The primary focus of owners is increasing firm value, whereas managers often attempt to achieve their performance targets (revenue-based, volume-based, etc.). These management objectives may not translate directly into increased firm value, as other factors also contribute (expenses, efficiency, etc.).

An agency problem exists in both country-level and firm-level climate change organizations because the collective goals of a climate change initiative may be in conflict with the country's or firm's objectives. For example, the GHG emissions reduction targets set forth by the Kyoto Protocol (country-level collective climate change goal) may be expensive and complex for a nation to implement. A country's national security and financial strength objectives may be in conflict with the costs associated with addressing climate change. In this instance, the goals of the climate change organization are not fully aligned with those of the individual nations. Similarly, a firm's primary objective of profit-seeking may also be in conflict with the costs of implementing techniques of reducing GHG emissions, thus causing another agency problem.

Governance literature focuses on methods of aligning the goals of conflicting parties, most often owners and managers. Corporate governance can be defined as "the set of mechanisms – both institutional and market-based – that induce the self-interested

controllers of a company [managers] to make decisions that maximize the value of the company to its owners" (Denis & McConnell, 2002). Thus, governance attempts to align stakeholder objectives. Governance applied to addressing climate change can be described as aligning the goals of the international climate change organization with those of the individual nations and firms.

Governance - European Union

In addition to the agency problem inherent in climate change initiatives, the EU has an additional layer of governance issues inherent in its multileveled political and economic structure. Multileveled governance, or regulation, occurs when "…a range of actors [are] operating at different administrative levels [and] play a critical role in the regulatory process" (Chowdhury & Wessel, 2012). The European Union is described as a multileveled political system because many national leaders have banned together to share common economic, political, and social policies.

Governance literature generally assumes that multileveled political systems are likely to result in policy gridlock; however, this has not been the case in the European Union's sustainability policy. The European Union has implemented very ambitious goals, relative to other large Kyoto-members. Despite the multileveled governance structure and the ambitious goals, the European Union has successfully surpassed its targets (Jordan, van Asselt, Berkhout, Huitema, & Rayner, 2012).

The European Union is a unique paradox, as it is known to strive to be a leader; however, it is a relatively leaderless organization. This multilevel governance structure in the European Union has "enabled a dynamic of competitive leadership reinforcement

to take place" (Jordan, van Asselt, Berkhout, Huitema, & Rayner, 2012). No single governing body leads this economically integrated region; rather, the member-nations lead collectively (Jordan, van Asselt, Berkhout, Huitema, & Rayner, 2012).

European Union Climate Change Policy

The European Union's commitment to climate change policies has evolved. In 1970's, climate change was an insignificant portion of research policy. Rather than addressing regulation related to climate change, the research was focused on scientific issues. By 1988, policies had begun to be implemented; however, the policies were environmental and energy motivated, as opposed to climate change driven. After 1988, emission reduction policies emerged, especially within greener members including Denmark, the Netherlands, and Germany. In 1992, the EU participated in the implementation of the UNFCCC, which later evolved into the Kyoto Protocol (Jordan, van Asselt, Berkhout, Huitema, & Rayner, 2012).

The figure below shows the carbon dioxide emissions per capita compared to the population in the year 1993; thus, the area of the blocks is the total emissions for the nation. The largest contributor was the United States (both per capita and in total), which comprised 25% of total emissions globally. The U.S. was followed by Canada and Australia for emissions on a per capita basis. Lesser developed nations, such as Africa and India, were amongst the lowest per capita carbon dioxide contributors (Grubb, 1995).

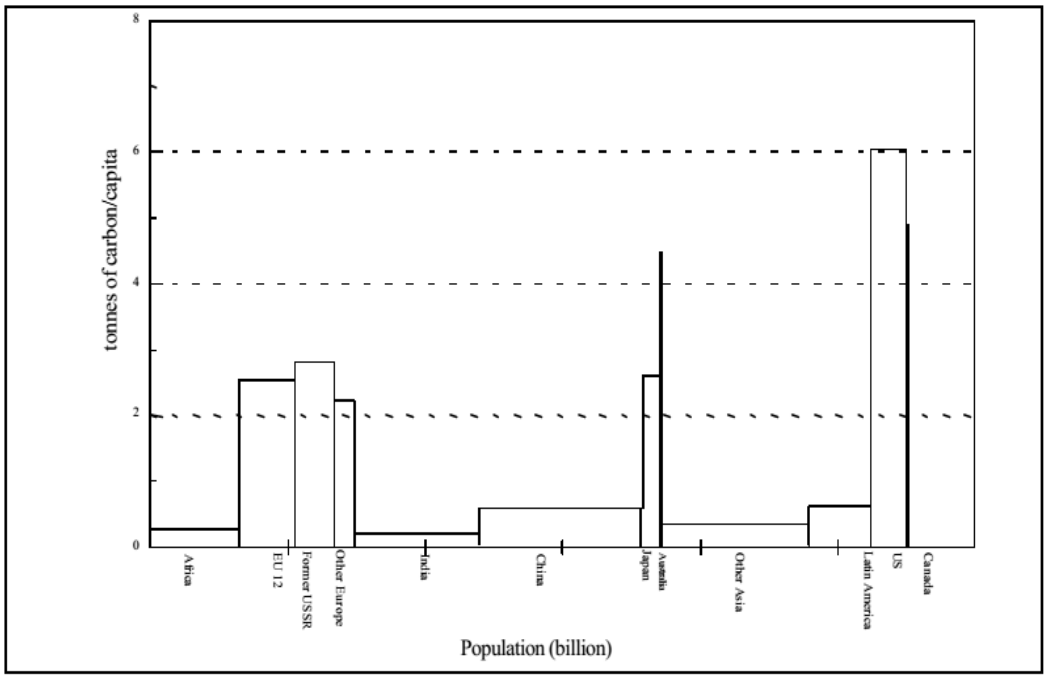

Figure 14 - Global Carbon Dioxide Emissions in 1993

Chart Source: Grubb 1995

Greenhouse gas emissions in the United States have increased from 1990-2008. In contrast, the European Union has successfully decreased its greenhouse gas emissions during the same timeframe (The Economist, 2010).

Greenhouse Gas (GHG) Emissions

Greenhouse gas emissions are negative externalities and the primary cause of climate change (The Business of Climate Change Greenhouse Gas, 2007). Human beings produce greenhouse gas emissions through consumption and activities. These emissions accumulate into greenhouse gas stocks in the atmosphere. Regardless of where the emissions originated, the stocks accumulate globally and affect all regions of the world.

This stock traps heat within the earth's atmosphere, which causes climate change. Climate change impacts humans, plants, and animals in various ways including storms, droughts, and floods (Stern, The Economics of Climate Change, 2008).

The Kyoto Protocol identifies six primary greenhouse gases: carbon dioxide, methane, nitrous oxide, and three fluorinated gases (hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride) (European Commission). CO_2 is the greenhouse gas that is most frequently produced by humans, and it is responsible for approximately 63% of climate change caused by human beings (European Commission). As a result, this research study will focus on carbon dioxide.

Greenhouse gas emissions have been found to have an adverse effect on all three "pillars" of sustainability: Environmental, Economic, and Social. Scientific evidence supporting environmental impacts of climate change continues to accumulate. The United States and European Union governments, as well as the United Nations, acknowledge the danger of continued climate change. All three agencies also concede that greenhouse gas emissions cause climate change and that global citizens must act to decrease emissions.

In addition to environmental impacts, economic impacts of CO_2 emissions are notable. Economic impacts include the explicit cost and opportunity cost from extreme weather events. The explicit cost of Hurricane Sandy in New York and New Jersey alone is estimated to be over $70 billion (CNN, 2013). This cost estimate neglects to incorporate the opportunity cost of what these resources would have been otherwise allocated to.

The primary researchers in the area of climate change economic impacts are William Nordhaus (Yale), Matin Weitzman (Harvard), and Robert Pindyck (MIT). Traditionally, Nordhaus has used Monte Carlo simulations in order to evaluate the cost-benefit of investing in climate change prevention. This has yielded a thin-tailed result, which indicates that the marginal benefit of investing to avoid future weather catastrophes is small (Pindyck, 2010-2011).

On the other hand, Weitzman argues that if the distribution is fat-tailed, the expected marginal benefit is actually infinite; therefore, one should invest 100% of his or her income into preventing climate change. Weitzman acknowledges that this is unrealistic. He argues that cost-benefit analysis understates the probability of occurrence, and the benefits of preventing, catastrophic weather events (Pindyck, 2010-2011).

Pindyck criticizes Weitzman's theory. If one could purchase insurance against catastrophic weather events at a cost of 10% of his or her income, Weitzman would argue that this would be beneficial (10% is far less than 100% from his model). However, Pindyck notes that competing catastrophes are also possible, such as nuclear war or a viral pandemic. If one purchases 10% insurance for each potential catastrophe, the aggregate insurance premium would be 100% of income, which is irrational. Pindyck argues that the most viable method is cost-benefit analysis on an individual basis (Pindyck, 2010-2011).

In addition to the Economic pillar, greenhouse gas emissions have also been linked to the Social pillar of sustainability. As of 2004, almost 25% of global carbon dioxide emissions were derived from transportation. Using a comparative risk assessment, Woodcock et al compared a business-as-usual scenario (for both London,

UK and Delhi, India) with alternate scenarios within the same geographic regions. These alternate scenarios included vehicles with lower carbon emissions, active travel (walking or biking), and a combination of the two. In all three scenarios, health benefits were noted (Woodcock, Edwards, Tonne, G, & Ashiru, 2009).

Climate Change in Developing Countries

Global participation in climate change initiatives is critical for policy effectiveness, and this includes both developed and developing countries. Deforestation in developing countries has occurred at an alarming rate and is estimated to be a significant contributor to CO_2 emissions. These "land use change emissions" have grown 40% from 1970 to 2004, and the largest contributors were Indonesia and Brazil, 34% and 18%, respectively, of the global total land use change emissions (Corbera, Estrada, & Brown, 2010).

Deforestation, or land use change, contributes to GHG emissions, because forests (excluding soils) contain about 75% of the living global carbon (Corbera, Estrada, & Brown, 2010). Quantifying the contribution to emissions is challenging because of variations in methods and lack of reliable data. Regardless of the exact data points, the emissions are estimated to be quite significant.

Country-level sustainability strategies have begun to address the issue of developing country contribution to global GHG emissions. For the first time in 2010, a plan to assist developing countries with green initiatives was established at the Climate Conference in Cancun. In 2011, at the UN Climate Conference in Durban, several plans to assist developing countries were put into action. Notable outcomes of the Durban

agreement include the development of a Green Climate Fund, Adaptation Committee, and developing country support. In 2012, in Doha, Qatar, infrastructure was established in order to support the Durban initiatives.

Research Question

Global GHG emissions, regardless of the source country, accumulate and contribute to climate change. Therefore, the European Union's successful sustainability initiatives could potentially be offset by inaction by other countries. GHG emissions from non-EU industrialized nations have been analyzed in the context of the Kyoto Protocol commitment periods and targets, and comparisons have been made to the EU. However, the literature lacks sufficient research comparing EU emissions to developing countries.

EU Emissions vs. Developing Countries (per inhabitant)

- Based on the findings in Chapter 2, EU firms are acting significantly "more green" than firms in both developed and developing nations. However, emissions are caused by both firms and individuals. Is there a significant change in the overall European Union GHG emissions relative to developing country emissions, as one would expect?

Data

Eurostat's "CO_2 emissions per inhabitant in the EU and in developing countries" (CO2E) is used as a proxy for the effectiveness of emissions reduction efforts in the EU

relative to developing countries. Eurostat created this index by comparing the levels of CO_2 emissions per inhabitant in each of the EU member countries with those in developing countries. The EU CO_2 statistics were compiled from the emissions data (excluding land use change and forestry) submitted by the European Commission to the UNFCCC. Per capita emission was calculated based on the Eurostat population data. The developing country statistics (both CO_2 emissions and population data) were gathered from the International Energy Agency (IEA), and it also excludes the land use change emissions (fuel combustion related CO_2 emissions). Developing countries were categorized as such by the OECD Development Assistance Committee List of Aid Recipients noted as "developing countries and territories."

A time lag exists between policy implementation and the effects of green initiatives; therefore, the oldest available and most recent available data are compared. The sample consists of the index for each of the 28 EU member countries for years 1990 and 2011. Each index compares the respective EU country's CO_2 emissions to the emissions in developing countries; therefore, the denominator for each country's ratio is consistent in each year.

Methodology

Developing countries have had little or no climate change intervention over the past couple of decades; therefore, one would expect the Eurostat ratio to decrease during the same time period. Since EU "green" policies have focused on energy-related initiatives, the developing country data excludes CO_2 emissions from deforestation for comparative purposes.

In order to determine whether there is a difference between the CO_2 emissions in the EU relative to developing countries over the past couple of decades, the difference in the Eurostat index was tested for significance. Using the oldest vs. most recent data available (1990 vs. 2010), paired samples T-test (27 EU countries) were conducted.

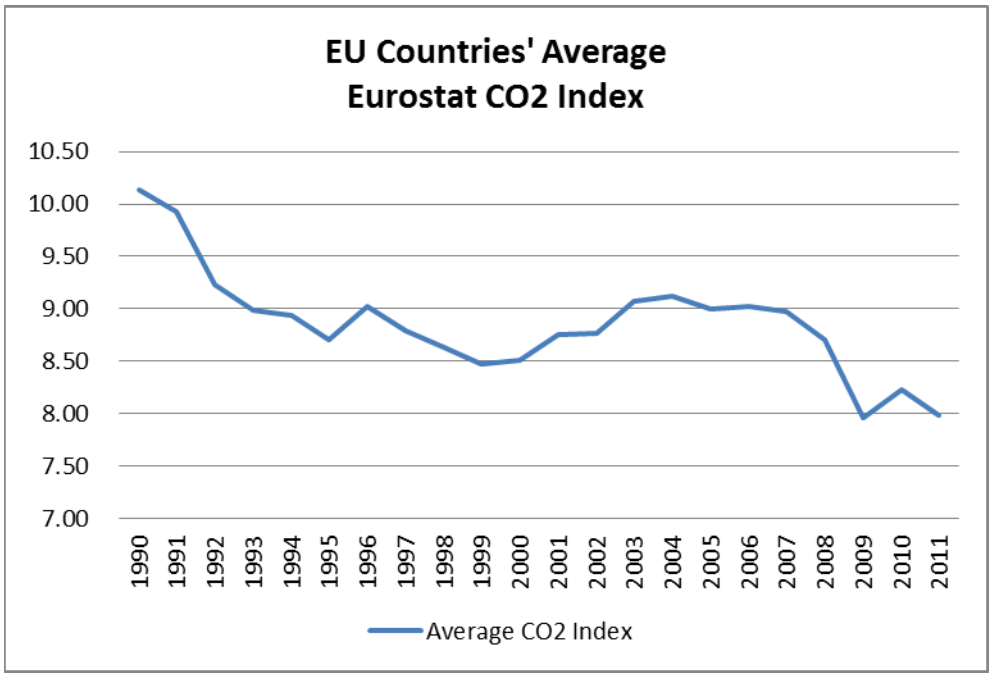

Figure 15 - EU Countries' Average Eurostat CO2 Index (1990-2011)

Results

EUROSTAT INDEX by EU-member country		
	1990	2011
Austria	8.1	8.4
Belgium	11.9	9.5
Bulgaria	9.2	7.2
Croatia	4.9	4.7
Cyprus	8.5	9
Czech Republic	15.9	10.9
Denmark	10.3	7.9
Estonia	23.3	14.1
Finland	11.4	10.5
France	7	5.5
Germany	13.1	9.8
Greece	8.2	8.4
Hungary	7.1	5
Ireland	9.2	8.2
Italy	7.7	6.8
Latvia	7.2	3.9
Lithuania	9.7	4.6
Luxembourg	31.3	21.5
Malta	5.3	6.4
Netherlands	10.7	10
Poland	9.8	8.6
Portugal	4.5	4.9
Romania	7.6	4.1
Slovakia	11.5	7
Slovenia	7.4	7.9
Spain	5.8	6.2
Sweden	6.7	5.2
United Kingdom	10.3	7.4

Figure 16 - Eurostat CO2 Index by EU-member Country

EU Member CO2 Index Descriptive Statistics		
	1990	**2011**
Mean	10.1286	7.9857
Standard Error	1.0563	0.6724
Median	8.8500	7.6500
Mode	9.2000	8.4000
Standard Deviation	5.5893	3.5577
Sample Variance	31.2399	12.6576
Kurtosis	7.7963	7.0151
Skewness	2.5796	2.1694
Range	26.8000	17.6000
Minimum	4.5000	3.9000
Maximum	31.3000	21.5000
Sum	283.6000	223.6000
Count	28	28
Largest(1)	31.3000	21.5000
Smallest(1)	4.5000	3.9000
Confidence Level(95.0%)	2.1673	1.3796

Figure 17 - Descriptive Statistics (CO2 Index)

t-Test: Paired Two Sample for Means		
	1990	***2011***
Mean	10.1286	7.9857
Variance	31.2399	12.6576
Observations	28	28
Pearson Correlation	0.9203	
Hypothesized Mean Difference	-	
df	27.0000	
t Stat	4.1979	
P(T<=t) one-tail	0.0001	
t Critical one-tail	1.7033	
P(T<=t) two-tail	0.0003	
t Critical two-tail	2.0518	

Figure 18 - t-Test Output (CO2 Index)

Based on the t-test above, the difference in the ratios between 1990 and 2011 is significant. This indicates that CO_2 emissions in the EU relative to developing countries (excluding deforestation emissions) have decreased since 1990.

Conclusions

As anticipated, the difference in the EU vs. developing nation Eurostat ratios between 1990 and 2011 is significant. This finding contradicts traditional governance literature which suggests that multilateral governance structures often result in policy gridlock. However, these findings are consistent with the more recent EU-specific theoretical literature which suggests that the paradoxical effectiveness of the EU governance structure promotes productive competition among member-nations.

This research study provides ample opportunity for future research. Recent initiatives have been established for supporting developing countries in implementing green policies. Governing bodies may want to focus these new policies on deforestation, since emissions from other sources have not increased significantly since 1990. Further, previous studies have found that deforestation is a significant portion of CO_2 emissions in developing countries. This study provides a baseline analysis prior to implementation of significant country-level and firm-level green policies in developing countries.

CHAPTER 4 – TAX POLICY AND SUSTAINABILITY

Overview

Green initiatives have both country-level (public) and firm-level (private) benefits. As noted in Chapter 3, these motivations may be in conflict with each other, causing an agency problem. Previous research has found that financial incentives are the most effective in enticing the implementation of "green" technologies, specifically in the photovoltaic industry (Allen, Nugent, Samii, Fellman, & McDougall, 2008). Aligning the financial incentives of the public (country) and private (individuals and firms) parties may assist in resolution of the agency problem.

Several options exist for policymakers to use financial incentives in order to induce socially responsible behavior. Nations may require compliance with environmental standards, subsidize green behavior, or price greenhouse gases externally. In theory, tax incentives may provide relief from the agency problem inherent in global climate change efforts. However, firms in the United States are currently under-utilizing these tax incentives. Since the EU has more effective sustainability policies, the United States and EU are both examined.

Literature Review

Sustainability Policy Options

Kyoto Protocol member-nations have agreed to lower greenhouse gas emissions, with a goal of a specific target; however, the method of reaching the target is not

specified. Policymakers have three primary categories of influencing greenhouse gas emissions:

- *require* organizations and individuals to change their behavior,
- *subsidize* organizations and individuals to change their behavior, or
- *price* greenhouse gas externally (Aldy & Stavins, 2012).

Requirements set by governments, also known as "command and control" instruments, mandate that pollution limits are not exceeded. The two methods of implementing requirements are: technology-based and performance based standards. Technology-based standards require the use of specific equipment, processes, or procedures. Performance-based standards provide limits to pollution, but do not specify equipment, processes, or procedures to achieve these limits (Stavins, 1997).

Although requirements (command and control regulations) are found to be effective to a certain extent, both technology-based and performance-based regulations have been highly criticized. Neither method is cost-effective, as information gathering is expensive. Both measurement and enforcement of all applicable entities is required in order for the requirement to be effective. Further, both methods hinder dynamic incentives to innovate and develop cleaner technologies. Performance-based standards discourage innovation once the standard requirement has been met. If a firm has already met the regulation, why incur additional cost for no additional benefit? Furthermore, technology-based standards remove all motivation to innovate, as the firm has no equipment, process, or procedure choices (Stavins, 1997).

Subsidizing entities to reduce greenhouse gas emissions does have an initial cost; however, benefits include not only environmental, but also economic and social. Tax

incentives for "acting green" encourage dynamic innovation in technologies, processes, and procedures. This method also does not increase production costs; rather, it may decrease production costs. Also, this method can be effectively implemented at the domestic level without the need for international agreement and coordination.

Pricing greenhouse gas externally is a market-based approach that uses tradable permits or assesses a tax on pollution. In theory, the government would collect the same amount of revenue whether a tax is assessed or permits are auctioned off. Domestic tradable permits have been utilized by the United States Environmental Protection Agency (EPA). In the 1980's, tradable permits assisted with the phasedown of lead in gasoline (Stavins, 1997).

Carbon pricing and tradable permits have been examined thoroughly in the literature. Two notable scholars who have extensively analyzed these topics are Joseph Aldy, Assistant Professor at Harvard Kennedy School, and Robert Stavins, Professor and Director of the Environmental Economics Program at Harvard Kennedy School.

Carbon pricing is arguably effective, as it encourages firms and individuals to determine and utilize the lowest cost methods of developing and implementing new processes and technologies for carbon emission reduction. Many policy options exist in carbon pricing, including carbon taxes, cap and trade, emission reduction credits, clean energy standards, and fossil fuel subsidy reduction (Aldy & Stavins, 2012).

Cap and Trade

Of all the carbon pricing options available to policymakers, cap and trade is amongst the most highly researched and debated methods. Cap and trade was

successfully used by the U.S. to reduce power plant sulfur dioxide (SO_2) emissions by over 50% after 1990. Further, the related compliance expenses were half of comparable regulatory mandates. The success of the U.S. SO_2 cap and trade system inspired the European Union's Emission Trading Scheme (EU ETS). The EU ETS is aimed at decreasing CO_2 emissions from power plants and large manufacturing locations in Europe. It is the world's largest cap and trade system.

In market-based approaches (tradable permits, tax, etc.), similar criticisms exist. Both methods increase production costs relative to labor, which creates inefficiency costs. This may be slightly offset, as auction revenues could be used to reduce labor taxes. However, the effectiveness of such "revenue recycling" is debated by scholars (Stavins, 1997).

International tradable permit systems are accompanied by additional implementation issues. The question of who would monitor and enforce the international agreement is critical. Would a new oversight board need to be established? Also, permits could be allocated to favor low-cost countries, primarily developing nations; however, the high-cost nations, primarily industrialized countries, would not be incentivized to maintain the initial allocation (Stavins, 1997).

International Tax Competition

One potential method of aligning both public and private objectives, and minimizing the agency problem between public and private parties, is through tax competition. Several definitions of tax competition exist. Wilson and Wildasin (2004) define tax competition as "non-cooperative tax setting by interdependent governments,

under which each government's policy choices influence the allocation of a mobile tax base among regions represented by these governments" (Rendon-Garza, 2006). Alfano (2001) defines tax competition as the possibility of countries to modify their tax base against the reduction of other countries' tax base" (Rendon-Garza, 2006). A common theme is using tax policy with the intent of attracting mobile capital resources from other countries. Tax competition can be achieved through two possibilities: (1) lowering the tax rate, or (2) lowering the firm-level tax base on which the rate is applied. Either method can be employed in an attempt to attract foreign capital, which theoretically increases the country-level tax base, and consequently, country-level tax revenues.

In theory, providing tax incentives lowers taxes paid by individuals and firms, which entices inward international investment and increases overall taxes collected by the country. Therefore, a financial win-win is achieved: The tax incentive saves individuals and firms money, and simultaneously, the country collects higher tax revenues.

A substantial amount of literature has examined country tax competition and its effects on firm-level investment location decisions. Gross (2011) finds that the optimal capital tax structure for a country is independent of foreign tax level, economy size, and degree of capital mobility (Gross, 2011). Even if foreign country factors are not considered in setting tax policy, scholars note that relative taxes impact the investment location decisions of individual firms. Cash tax considerations impact firm-level strategic location decisions for liquidity reasons. Further, financial accounting (non-cash) tax implications are found to be equally as important (Graham, Hanlon, & Shelvin, 2011).

Sustainability Tax Incentives - U.S.

Countries may provide tax break incentives in an effort to encourage sustainability through tax policy, or countries may alternatively assess a tax on "non-green" activities. The United States has implemented many sustainability incentives, whereas the EU has implemented punishable tax policies. The U.S. allocated $9.6 billion dollars to sustainability tax incentives; however, its effectiveness is highly criticized (Ernst & Young LLP, 2012).

The U.S. has used tax incentives as a tool in an effort to encourage firms to act "green." For example, Section 701 of the American Jobs Creation Act of 2004 ("the Act") implemented up to $2 billion of tax-exempt private activity bonds to be issued by State or local governments for "qualified green building and sustainable design projects." Section 142 of the Act defines "qualified green building and sustainable design projects" as the following:

> any project that is designated by the Treasury Secretary, after consultation with the EPA Administrator, […] that meets the following requirements: (1) at least 75 percent of the square footage of commercial buildings that are part of the project is registered for United States Green Building Council's Leadership in Energy and Environmental Design (LEED) certification and is reasonably expected (at the time of the designation) to receive such certification; (2) the project includes a brownfield site […]; (3) the project receives specific State or local government resources of at least $5,000,000; and (4) the project includes at least (a) 1,000,000 square feet of building or (b) 20 acres (Internal Revenue Service, 2005).

Where a "brownfield site" is a location for which redevelopment may be complicated by potential hazardous substance, pollutant, or contaminant. The EPA launched its Brownfields Program in 1995, but the Small Business Liability Relief and Brownfields

Revitalization Act of 2002 ("the Brownfields Law") put EPA's policies into law (U.S. Environmental Protection Agency).

Ineffective Incentives – U.S.

In theory, sustainability tax incentives would clean up the environment, encourage inward foreign investment, and increase overall taxes collected by governments. In practice, however, this is not the case. Ernst & Young (2012) released a report examining sustainability and tax incentives. Of the 223 senior executives surveyed across several industries, only 16% of companies that either have or were developing an environmental sustainability strategy said that their tax or finance departments were actively involved (Ernst & Young LLP, 2012).

The U.S. government has allocated $9.6 billion to sustainability programs, for a wide range of industries, including small farms, large solar developers, and Fortune 500 companies (Livadas, 2012). However, the Ernst and Young report notes that only 17% of respondents say that their firm utilizes sustainability tax incentives, and 37% were unaware that they existed (Ernst & Young LLP, 2012).

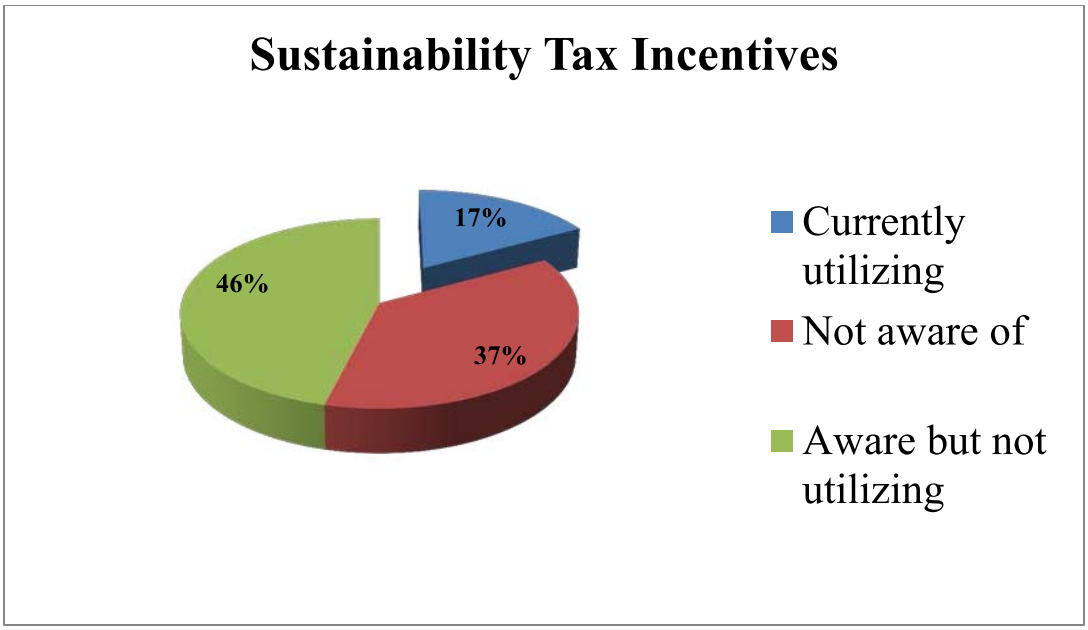

Figure 19 - Sustainability Tax Incentive Utilization

Previous research finds that the marketing of green energy has focused on the advantages for a nation or group of people; however, a more effective approach would be to promote the consumer good benefits such as individual financial advantages (Allen, Nugent, Samii, Fellman, & McDougall, 2008). In order for firms and individuals to be influenced by sustainability tax incentives, the benefits of implementation must exceed the corresponding costs.

Overall Tax Policy - EU

The European Union's overall tax strategy is not comprised of identical tax policies amongst member nations; rather, EU members can design their own tax systems, provided that they are aligned with the EU tax strategy and principles. Specifically, tax policy should focus on "elimination of tax obstacles to all forms of cross-border

economic activity [amongst EU members]" and "continuing the fight against harmful tax competition" (EU Taxation and Customs Union).

As of 2011, overall taxes collected by the EU from all sources as a percentage of GDP was higher than the U.S. and Japan, as well as other industrialized nations.

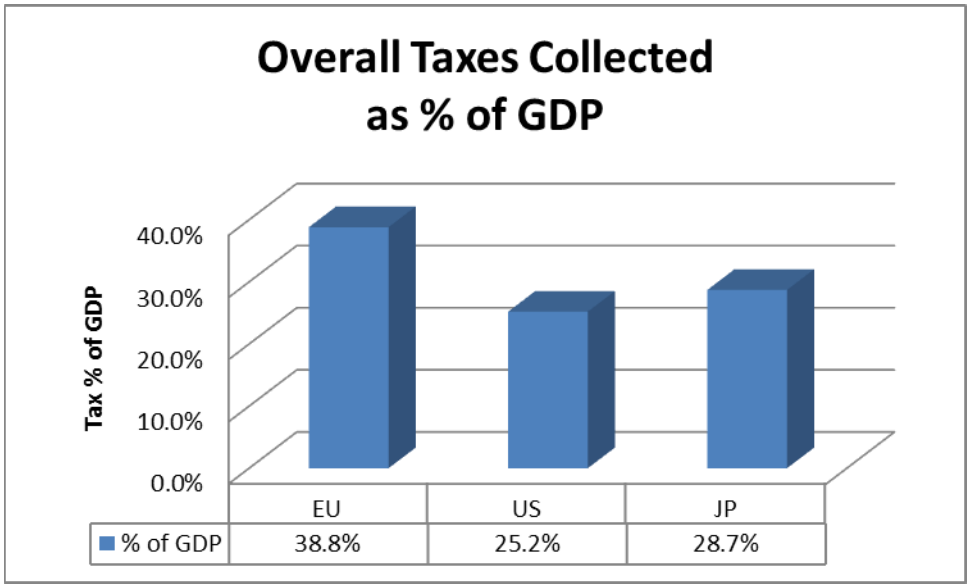

Figure 20 - Taxes Collected as % of GDP (EU, US, Japan)

Data Source: (Eurostat Statistical Books, 2013)

Overall taxes are comprised of both direct and indirect taxes. Income and capital taxes (both personal and corporate) represents "direct" taxes, whereas excise, consumption, production, and other taxes are considered "indirect" taxes. Variation in income (direct) tax levels across EU members is substantial, such as in the nearly twenty percent difference between the Lithuania (26.0%) and Denmark (47.7%) income tax to GDP ratios. However, Eurostat notes that these large variations are primarily due to the scope of social policies, such as health insurance, education, retirement pensions, etc. EU

members which have greater redistribution in its public policy have citizens more tolerant of these "visible" income taxes (Eurostat Statistical Books, 2013).

Despite the EU's divergent direct tax policies, the overall tax ratio has been converging amongst EU members since the year 2000. In 2001, the European Commission released the "Tax Policy in the European Union – Priorities for the Years Ahead," which explained the EU's tax policy strategy (EU Taxation and Customs Union). Since the movement towards a unified tax strategy within the EU, countries appear to be gradually converging, with the exception of the social policy related direct taxes.

Environmental Tax - EU

Countries have used tax policy as a method of trying to improve environmental standards. While the U.S. has attempted the use of sustainability tax incentives, the European Union has imposed environmental taxes in an effort to reach its Kyoto emissions targets. Although the European Union has implemented an emissions trading system, it covers only certain industries and companies over a certain size. The carbon tax applies to emitters who fall outside the current trading system (Mackenzie, 2009).

For developed nations with effective tax systems, a carbon tax is relatively simple to administer and implement. The new carbon tax policy can be incorporated into prevailing systems of fuel-supply monitoring and regulatory reporting. Even some developing countries have relatively effective tax systems, which would provide a solid basis for carbon tax implementation and enforcement (Aldy & Stavins, 2012).

Similar to emissions trading systems, a key criticism of carbon tax policies is the effect on the price of goods; however, Aldy notes that when fuel suppliers pass the cost of tax onto consumers, it creates incentives for switching to cleaner fuel sources and more energy efficient technologies (Aldy & Stavins, 2012).

In 2003, the Energy Taxation Directive was implemented by the European Commission, and it incorporates environmental strategy into the energy taxation policies. While each member is granted autonomy in setting its own tax structure and rates, each nation is expected to comply with the overall tax strategy of the European Commission. Excise duty rates for environmental taxes are not consistent across all types of energy use. Rather, excise duty rates are generally comprised of three factors: energy content, CO_2 emissions, and local emissions of a certain product. Therefore, the rates for excise duties on biofuels are lower than that of "less clean" fuels (EU Taxation and Customs Union).

These environmental taxes are applicable to individuals and businesses that operate within EU member states; however, airlines flying through EU territories have not been subject to this tax. The EU has proposed a highly controversial carbon tax on the aviation industry. Any international flight traveling through EU air territory would be subject to the tax. Head of China's Civil Aviation Administration, Li Jiaxiang, notes that a better approach would be to improve operations and technologies in order to reduce emissions, rather than imposing fines. Li further noted that this policy would hinder the industry from further development (Aviation Leaders Concerned Over EU Carbon Tax, 2012).

Research Questions

Several methods exist in order to encourage individuals and companies to act more "green." Previous research has focused on emissions trading; however, the literature lacks sufficient research in the area of tax policy as a tool to induce "green-ness." As opposed to the U.S. use of sustainability tax incentives, the EU has implemented a sliding scale of tax imposed on energy, with the rate dependent on the "green-ness" of the energy source.

EU Environmental Tax Effectiveness

- Has the adoption of the EU Energy Taxation Directive been effective in encouraging individuals and companies to use more "green" energy sources?
    - Have the EU-27 countries' energy sources become more "green" after the Directive?
    - Have the EU-15 countries' energy sources become more "green" after the Directive?

Data

The proxy for the EU's tax policy effectiveness is Eurostat's "implicit tax rate on energy" (ITRE), which is the ratio of energy tax revenues (in deflated Euro) to final energy consumption for the year (in tonnes of oil equivalent). In 2003, the EU Energy Taxation Directive guided member nations to develop a tax structure in which tax rates on energy are generally lower for cleaner energy sources. As a result, this study assumes that the tax rate for any level of energy implies the "green-ness" of the energy source. A

lower implicit tax rate on energy indicates an overall more "green" source of energy consumed because lower rates are applied to greener sources of energy.

In order to extract the original EU-15 member countries from the more recent 27 members, the OECD countries classification was used (OECD).

	EU Member Countries EU-27
*	Austria
*	Belgium
	Bulgaria
	Cyprus
	Czech Republic
*	Denmark
	Estonia
*	Finland
*	France
*	Germany
*	Greece
	Hungary
*	Ireland
*	Italy
	Latvia
	Lithuania
*	Luxembourg
	Malta
*	Netherlands
	Poland
*	Portugal
	Romania
	Slovakia
	Slovenia
*	Spain
*	Sweden
*	United Kingdom
*	*EU-15 country*

Figure 21 - Classification of EU-27 and EU-15

Methodology

Subsequent to the adoption of the EU Energy Taxation Directive in 2003, one would expect the Eurostat ratio to decrease during the same time period. This would indicate a shift away from higher taxed (and less green) energy sources. In order to determine whether there is a difference between implicit tax on energy before and after the Directive, the difference in the Eurostat index was tested for significance. Since there may be a time lag between policy implementation and its effects, data from 2003 is compared to the most recent data available (2011). Paired samples T-test (for both 27 EU countries and 15 EU countries) were conducted.

Results

EU Member Implicit Tax on Energy Descriptive Statistics for EU-27		
	2003	**2011**
Mean	127.4741	143.1148
Standard Error	13.0980	12.8418
Median	125.0000	142.0000
Standard Deviation	68.0594	66.7279
Sample Variance	4,632.0774	4,452.6082
Kurtosis	0.3973	0.1265
Skewness	0.8131	0.6535
Range	263.1000	264.1000
Minimum	43.6000	48.5000
Maximum	306.7000	312.6000
Sum	3,441.8000	3,864.1000
Count	27	27
Largest(1)	306.7000	312.6000
Smallest(1)	43.6000	48.5000
Confidence Level(95.0%)	26.9234	26.3967

Figure 22 - Descriptive Statistics (EU-27)

t-Test: Paired Two Sample for Means		
EU-27		
	2003	***2011***
Mean	127.4741	143.1148
Variance	4,632.0774	4,452.6082
Observations	27	27
Pearson Correlation	0.9533	
Hypothesized Mean Difference	-	
df	26.0000	
t Stat	(3.9383)	
P(T<=t) one-tail	0.0003	
t Critical one-tail	1.7056	
P(T<=t) two-tail	0.0005	
t Critical two-tail	2.0555	

Figure 23 - t-Test Output (EU-27)

As expected, the difference in the implicit tax rate on energy was significant between 2003, the year of implementation of the EU Energy Taxation Directive and the most recent year available, 2011. However, the mean was higher in 2011 than in 2003, which was unexpected. This indicates that the implicit tax rate on energy increased significantly from 2003 to 2011.

The data could be skewed by EU member countries that have been added in recent years. Tax policy implementation takes time; additionally, a time lag occurs between policy implementation and its effects. Therefore, the EU-15 countries were extracted from the EU-27 sample and tested for significance. Since the EU-15 countries have all been EU members since 2004, a policy effects time lag would not skew the results.

EU Member Implicit Tax on Energy Descriptive Statistics for EU-15		
	2003	**2011**
Mean	169.2333	180.3133
Standard Error	15.2173	14.6428
Median	153.3000	170.8000
Standard Deviation	58.9363	56.7114
Sample Variance	3,473.4867	3,216.1827
Kurtosis	0.5588	0.9187
Skewness	0.9391	0.9508
Range	209.5000	211.0000
Minimum	97.2000	101.6000
Maximum	306.7000	312.6000
Sum	2,538.5000	2,704.7000
Count	15	15
Largest(1)	306.7000	312.6000
Smallest(1)	97.2000	101.6000
Confidence Level(95.0%)	32.6378	31.4057

Figure 24 - Descriptive Statistics (EU-15)

t-Test: Paired Two Sample for Means		
EU-15		
	2003	***2011***
Mean	169.2333	180.3133
Variance	3,473.4867	3,216.1827
Observations	15	15
Pearson Correlation	0.9300	
Hypothesized Mean Difference	-	
df	14.0000	
t Stat	(1.9736)	
P(T<=t) one-tail	0.0343	
t Critical one-tail	1.7613	
P(T<=t) two-tail	0.0685	
t Critical two-tail	2.1448	

Figure 25 - t-Test Output (EU-15)

In the EU-27, the mean implicit tax rate on energy was significantly higher in 2011 than in 2003; however, the mean difference was not significant for the EU-15. This may

indicate an overall upward shift in tax rates after joining the European Union. Also, the nations which joined most recently may have experienced a significant upward shift in energy taxes.

Conclusions

As anticipated, the difference in the 2003 vs. 2011 Eurostat implicit tax rate on energy is significant for the EU-27. However, the mean was higher in 2011 than in 2003, which was unexpected.

The data could be skewed by EU member countries that have been added in recent years. Tax policy implementation takes time; additionally, a time lag occurs between policy implementation and its effects. Therefore, the EU-15 countries were extracted from the EU-27 sample and tested for significance. Since the EU-15 countries have all been members since 2004, a policy effects time lag would not skew the results.

The mean difference of the EU-15 implicit tax rate on energy was not significant between 2003 and 2011. If tax policy induces greener energy sources, it may be offset by an overall upward shift in tax rates after joining the European Union. Also, the nations which joined most recently may have experienced a significant upward shift in energy taxes, likely as a result of the Directive.

These findings are valuable to both policymakers and multinational organizations. The EU environmental tax strategies can be examined as a model for other developed countries to create effective environmental tax policy. Also, firms which internationalize into the EU can use environmental tax strategy in order to save money on taxes, while also creating a favorable, environmentally-friendly brand image.

This study provides ample opportunities for future research. Previous studies have focused on tradable emissions permits. This research study suggests that tax policy may be an effective tool in encouraging citizens to act "more green." Environmental tax policies of other regions of the world could also be examined and compared to policies within the EU.

CHAPTER 5 – OVERALL CONCLUSIONS

Conclusions

The primary intent of this research study is to provide multinational corporations with a detailed analysis of the E.U.'s regulatory environment and governance structure, as they relate to green policies. Further, the energy tax analysis provides insights into tax strategy that would affect overall firm-level strategy.

Chapter 2 findings suggest that theory related to institutional frameworks can be applied to climate change research. Additionally, firms based in the EU are acting significantly more "green" than their peers in other developed nations. The EU's contribution to global sustainability efforts are effective and can be used as a model for policymakers in other developed nations.

Chapter 3 finds that the difference in the EU vs. developing nations (excluding deforestation) Eurostat ratios between 1990 and 2011 is significant. This finding contradicts traditional governance literature which suggests that multilateral governance structures often result in policy gridlock. However, these findings are consistent with the more recent EU-specific theoretical literature which suggests that the paradoxical effectiveness of the EU governance structure promotes productive competition among member-nations.

Chapter 4 finds that the implicit tax rate on energy for the EU-27 countries was significantly higher in 2011 than in 2003, when the EU Energy Taxation Directive was implemented. This was unexpected, but the data could be skewed by EU member countries that have been added in recent years. Therefore, the EU-15 countries were extracted from the EU-27 sample and tested for significance. The mean difference of the

EU-15 implicit tax rate on energy was not significant between 2003 and 2011. If tax policy induces greener energy sources, it may be offset by an overall upward shift in tax rates after joining the European Union.

Future Research

Chapter 2 findings provide ample opportunities for future research. In 2011 and 2012, the Newsweek Index methodology is consistent and yields comparative year over year results. While movements amongst rankings can be evaluated in relative terms, changes in a company's green index reflect a firm-level change (beginning in 2011). Consistent methodology is anticipated in future years and provides a strong foundation for future research.

Chapter 3 also provides prospects for future research. Recent initiatives have been established for supporting developing countries in implementing green policies. Governing bodies may want to focus these new policies on deforestation, since emissions from other sources have not increased significantly enough to offset the EU's emissions reductions. This study provides a baseline analysis prior to implementation of significant country-level and firm-level green policies in developing countries.

Chapter 4 also provides potential future research. Firms which internationalize into the EU can use environmental tax strategy in order to save money on taxes, while also creating a favorable, environmentally-friendly brand image. This research study suggests that tax policy may be an effective tool in encouraging citizens to act "more green." Environmental tax policies of other regions of the world could also be examined and compared to policies within the EU.

Policy Implications

The U.S. and EU have both used tax policy in an attempt to encourage citizens to act more "green." However, the methods employed differ considerably. The U.S. has provided one-time tax savings for implementing "green" technology. In contrast, the EU has assessed a usage tax, with higher rates applied to "less green" energy sources. The EU's tax structure provides a greater benefit, which provides a greater incentive for taking advantage of the tax savings. Furthermore, the EU's higher level of regulation mandates (as opposed to incentivizes) greener activities, thus making it more effective.

The divergent tax strategies of the U.S. and EU could be compared to environmental tax policies of other regions of the world. Furthermore, a comparison of tax rates for member nations both before and after joining the EU could be examined.

Global Cap and Trade

Previous studies have examined emissions cap and trade both within the EU and the U.S.; however, several obstacles exist for a global cap and trade emissions system. For example, the initial allocation of tradable permits could be allocated based on emissions targets, or sold via auction.

A key criticism of allocating based on emissions targets is that the wealthier, developed nations would purchase tradable permits from the developing countries. Therefore, the initial allocation would not be effective in emissions reductions. A similar criticism exists for an auction because the developed nations would out-bid the

developing nations. In either scenario, wealthier, developed nations would gain a disproportionate quantity of tradable permits, which would minimize the incentive for emissions reductions in developed nations.

However, these critiques provide an excellent opportunity for future research. From an economic perspective, the initial allocation of tradable permits could assist in transferring funds to developing countries. If developed nations were required to purchase tradable permits from developing countries, the economic benefit could be allocated towards environmental initiatives. In addition to tradable permits, additional research opportunities exist in the potential for environmental tradable options and futures.

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